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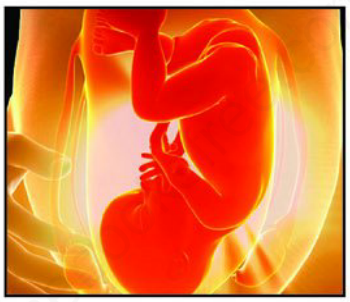


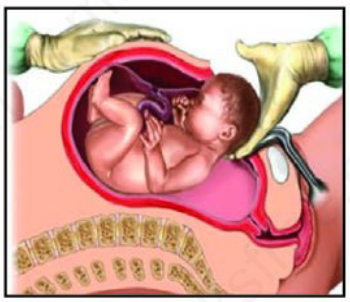

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Self Assessment & Review

Obstetrics

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Ninth Edition

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Dedicated to

SAI BABA

Just sitting here, reflecting on where I am and where I started, I could not have done it without you Sai baba... I praise you and love you for all that you have given me... and thank you for another beautiful day... to be able to sing and praise you and glorify you... you are “My Amazing God”

Preface

Dear Students,

I wish to extend my thanks to all of you for your overwhelming response to all the 8 editions of my book and for making it the bestseller book on the subject. Thanks once again for the innumerable emails you have sent in appreciation of the book, a few of which I have got printed at the end of the book. I apologize to all those who have sent me mails of appreciation but due to paucity of space, I was unable to get them printed.

NEET continued in year 2015, but yes, this time the anxiety of the students for NEET was less. Students looked more settled. The approach of NEET became a little clear. Image-based questions are still to being asked. Most of the questions are direct but require you to be well-versed with the theory. Reading important theory becomes absolutely essential, whether you do it from a textbook or from subjectwise help books, that's your choice.

It now gives me immense pleasure to share with you the new edition of the book. Many changes have been done in the book. Each chapter has been thoroughly revised and updated. All new guidelines have also been incorporated.

Salient Features of the 9th Edition

- All chapters have been thoroughly revised and updated.
- The book has been divided into 5 sections:
  - **Section 1:** General Obstetrics
  - **Section 2:** Medical, Surgical and Gynaecological Illness Complicating Pregnancy
  - **Section 3:** Abnormal Labor
  - **Section 4:** Fetus
  - **Section 5:** Diagnosis in Obstetrics
  - **Section 6:** Recent Papers
- Theory is present before the following chapters:
  - Pelvis and fetal skull
  - Placenta and amniotic fluid
  - Normal labor
  - Abortion and MTP
  - Trophoblastic diseases including choriocarcinoma
  - Antepartum haemorrhage
  - Postpartum haemorrhage, uterine inversion and shock
  - Anemia in pregnancy
  - Heart disease in pregnancy
  - Diabetes in thyroid pregnancy
  - Hypertensive disorders in pregnancy
  - Pregnancy in Rh-negative women
  - Infections in pregnancy
  - Gynaecological disorders in pregnancy
  - Fetus growth disorders
  - Fetal malformations
- Keeping in mind the apprehension of students towards NEET, I have added many new pattern questions with their explanations. The chapterwise distribution of new questions has been given on the back cover.
- For the first time ever annexures, have been added for last-minute revision.

  Total annexures added are 15 in number:
  - Color of amniotic fluid and conditions seen
  - Causes of oligohydramnios
  - Causes of polyhydramnios
  - Types of pelvis and important points on them
  - Definitive signs of early pregnancy
  - USG in pregnancy
  - Recommended daily allowance in pregnancy

- Vaccines in pregnancy
- Important time-table of events
- Named structures and their locations
- Recommended weight gain as per BMI in singleton and twin pregnancy
- Fetal heart rate traces—NICE guidelines
- Management algorithm for PPH–HEMOSTASIS
- Conditions affecting levels of AFP
- Conditions affecting levels of βhCG

- CTG is one of the topics which is generally not very well understood by undergraduate students. With the recent trend of image-based questions coming in the exam, it becomes important to understand it well. For your convenience in color plates, I have added important CTG strips along with a user manual.
- Many image-based questions have been added at the end.
- Many new USGs and Doppler images have been given in color plates for last-minute revision.
- All important diagrams on which figure-based questions could be formed are given in color plates.
- All instruments used in obstetrics with their uses have been given in color plates.
- Important specimens of obstetrics are included in color plates.
- Recent questions of AIIMS (November and May 2015) and PGI (May 2015 and November 2014) have been added with their explanations in the respective chapters.
- Along with this edition, I am again providing a live lecture on basics of reproduction and APH to strengthen your fundamental concepts.

I hope all of you appreciate the changes and accept the book in this new format, like you have done for the previous editions.

Remember there is no substitute to theory books, but hopefully you will find all relevant theory in this user-friendly book of Obstetrics. I must admit hereby that despite keeping an eagle's eye for any inaccuracy regarding factual information or typographical errors, some mistakes must have crept in inadvertently. You are requested to communicate these errors and send your valuable suggestions for the improvement of this book. Your suggestions, appreciation and criticism are most welcome.

New Delhi
May 2016

Dr Sakshi Arora Hans
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Everything what we are is the outcome of a series of factors and circumstances, in addition to ourselves.

It would not be fair, therefore, to ignore the people who have played an important part in making me known as "Dr Sakshi Arora" and to whom I am deeply grateful.

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My Family

- **Dr Pankaj Hans,** my better-half, who has always been a mountain of support and who is, to a large measure, responsible for what I am today. He has always encouraged me to deliver my best. No words are enough to thank him for all that he does.
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- **My in-laws (Hans family):** For happily accepting my maiden surname 'Arora' and taking pride in all my achievements.
- **My Brothers: Mr Bhupesh Arora** and **Mr Sachit Arora,** who encouraged me to write books and have always thought (wrong although) that their sister is a perfectionist.
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- Dr Sonika Lamba Rawal

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- **Shri Jitendar P Vij** (Group Chairman) for being my role model and a father-like figure. I will always remain indebted to him for all that he has done for me.
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My sincere thanks to all FMGE/UG/PG students, present and past, for their tremendous support, words of appreciation, rather I should say, e-mails of encouragement and informing me about the corrections, which have helped me in the betterment of the book.

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SECTION 5: DIAGNOSIS IN OBSTETRICS

SECTION 6: RECENT PAPERS

SECTION 1

General Obstetrics

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3. Placenta and Amniotic Fluid
4. Maternal Adaptations to Pregnancy
5. Diagnosis of Pregnancy and Antenatal Care
6. Normal Labor
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9. Abortion and MTP
10. Ectopic Pregnancy
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14. Multifetal Pregnancy

1

Pelvis and Fetal Skull

PELVIS

ANATOMY

- The pelvis is composed of four bones-sacrum, coccyx, and two innominate bones.
- Each innominate bone is formed by the fusion of three bones-ilium, ischium and pubis.
- **Pelvic joint:** There are four joints in the pelvis namely the symphysis pubis, sacroiliac joint (left and right) and the sacrococcygeal joint (Table 1.1).

Table 1.1: Joints in the pelvis

Joints	Types
Symphysis pubis	Fibrocartilaginous joint
Sacroiliac joint	Synovial joint
Sacrococcygeal joint	Synovial hinge joint

- The pelvis is divided anatomically into false pelvis and true pelvis by pelvis brim (Fig. 1.1).
- **The boundries of pelvic brim or inlet** (from posterior to anterior) are-sacral promontory, sacral alae, sacroiliac joint, iliopectineal lines, iliopectineal eminence, upper border of superior pubic rami, pubic tubercle, pubic crest and upper border of pubic symphysis (Fig. 1.2).

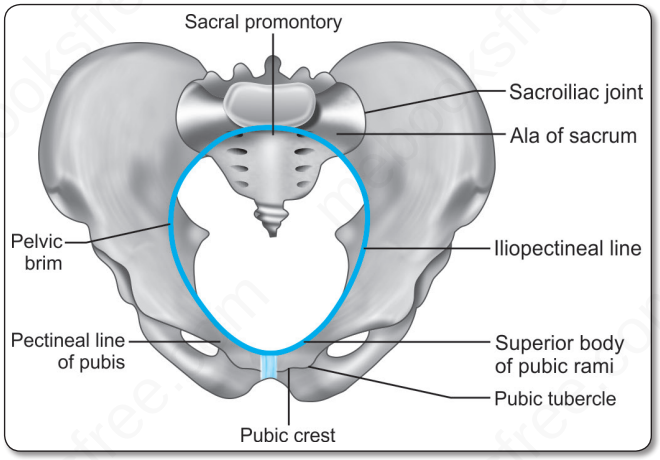


Fig. 1.1: Boundaries of the pelvic brim

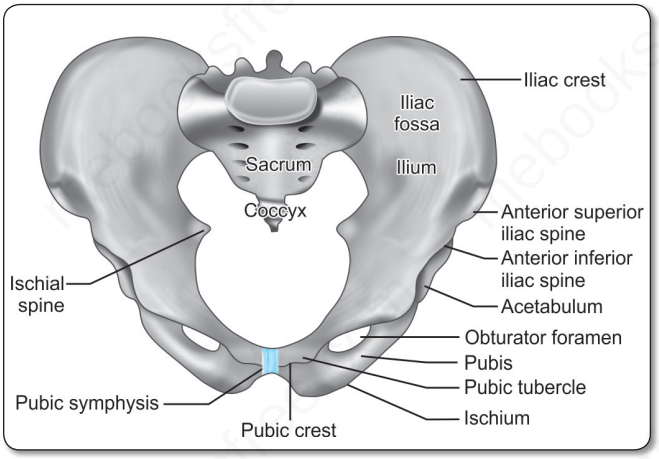


Fig. 1.2: Anterior view of maternal pelvis

- **False pelvis:** False pelvis lies above the pelvic brim and has no obstetrics significance
- **True pelvis:** True pelvis lies below the pelvic brim and plays an important role in childbirth and delivery. The true pelvis forms a bony canal through which the fetus passes at the time of labor. It is formed by the symphysis pubis anteriorly and sacrum and coccyx posteriorly.

The true pelvis can be divided into three parts—pelvic inlet, cavity and outlet.

PELVIC INLET

- Pelvic inlet is round in shape in the most common variety of pelvis (gynecoid pevis)
- It is narrowest in anteroposterior dimension and widest in transverse dimension
- The plane of the pelvic inlet (also known as superior straight) is not horizontal, but is tilted forwards. It makes an angle of 55 degree with the horizontal. This angle is known as the **angle of inclination**. Radiographically, this angle can be measured by measuring the angle between the front of the vertebra L5 and plane of inlet and subtracting this from 180°.

KEY CONCEPT

Increase in the angle of inclination (also known as the high inclination) has obstetric significance because this may result in delayed engagement of the fetal head and delay in descent of fetal head. Increase in the angle of inclination also favors occipitoposterior position. On the other hand, reduction in the angle of inclination (also known as low inclination) may not have any obstetric significance.

The axis of the pelvic inlet is a line drawn perpendicular to the plane of inlet in the midline. It is in downwards and backwards direction. Upon extension, this line passes through the umbilicus anteriorly and through the coccyx posteriorly.

KEY CONCEPT

For the proper descent and engagement of fetal head, it is important that the uterine axis coincides with the axis of inlet.

Diameters of the Pelvic Inlet

Anteroposterior Diameter

- **True conjugate or anatomical conjugate** (11 cm): This is measured from the midpoint of sacral promontory to the upper border of pubic symphysis.
- **Obstetric conjugate** (10 to 10.5 cm): It is the most important anteroposterior diameter of the pelvic inlet[Q] as it is the one through which the fetus must pass:
  - It is the smallest anteroposterior diameter[Q].
  - It is measured from symphysis pubis to the middle of the sacral promontory[Q].
  - Obstetric conjugate normally measures 10 cm or more[Q].
  - The pelvic inlet is considered to be contracted, if obstetric conjugate is less than 10 cm.[Q]
  - It can not be measured clinically but can be estimated by subtracting 1.5 cm from the diagonal conjugate.
- **Diagonal conjugate** (12.5 cm): It is measured from the tip of sacral promontory to the lower border of pubic symphysis.
- Out of three AP diameters of pelvic inlet, only diagonal conjugate can be assessed clinically during the late pregnancy or at the time of the labor.

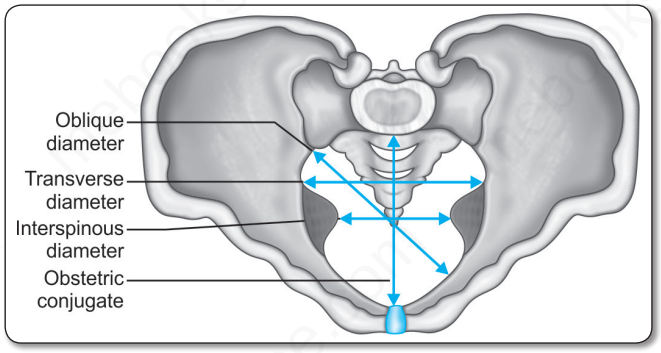


Fig. 1.3: Superior view of pelvic inlet

Transverse Diameter of Pelvic Inlet (13 to 13.5 cm)

It is the distance between the farthest two points on the iliopectineal line (Fig. 1.3). It is the largest diameter of the pelvic inlet and lies 4 cm anterior to the promontory and 7 cm behind the symphysis

Oblique Diameters of Pelvic Inlet

There are two oblique diameters, right and left (12 cm). The right oblique diameter passes from right sacroiliac joint to the left iliopubic eminence, whereas the left diameter passes from left sacroiliac joint to the right iliopubic eminence.

PELVIC CAVITY

The pelvic cavity is almost round in shape and is bounded above by the pelvic brim and below by the plane of least pelvic dimension, anteriorly by the symphysis pubis and posteriorly by sacrum. The plane of least pelvic dimension extends from the lower border of pubic symphysis to the tip of ischial spines laterally and to the tip of fifth sacral vertebra posteriorly.

KEY CONCEPT

Internal rotation of the fetal head occurs when the biparietal diameter of the fetal skull occupies this wide pelvic plane while the occiput is on the pelvic floor, i.e. at the plane of least pelvic dimension.

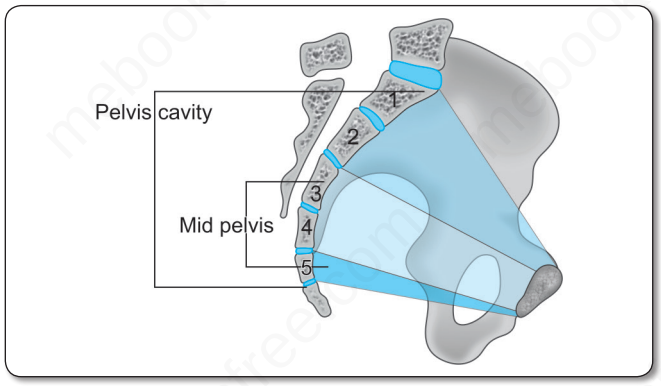


Fig. 1.4: Pelvic cavity and mid pelvis at the junction of S_4 and S_5 or tip of sacrum

Remember

The diameters of pelvic cavity both AP and transverse are 12 cm each.

MIDPELVIS AND PELVIC OUTLET

- The midpelvis is measured at the level of the ischial spine also called the midplane or plane of least pelvic dimension.
- **Plane of least pelvis dimensions** is of particular importance in labour as:
  - Internal rotation occurs at this level.[Q]
  - It marks the beginning of the forward curve of the pelvic axis.[Q]
  - Most cases of deep transverse arrest occur here.[Q]
  - Ischial spines represent zero station of the head.[Q]
  - External os lies at this level.[Q]

Besides these: It corresponds to origin of levator animuscle[Q] and is a landmark used for pudendal block[Q].

- Diameter of midpelvis: Also known as transverse diameter or bispinous or interspinous (10 cm) diameter. It is the distance between the ischial spines.

KEY CONCEPT

The interspinous diameter is usually the smallest pelvic diameter and in cases of obstructed labor is particularly important.

- **Anatomical pelvic outlet:** It is a lozenge-shaped cavity bounded by anterior border of symphysis pubis, pubic arch, ischial tuberosities, sacrotuberous ligaments, sacrospinous ligaments and tip of coccyx.
- **Plane of anatomical outlet:** It passes along with the boundaries of the anatomical outlet and consists of two triangular planes with a common base, which is the bituberous diameter (Fig. 1.5).
- **Anterior sagittal plane:** Its apex is at the lower border of the symphysis pubis.
- **Anterior sagittal diameter (6–7 cm):** It extends from the lower border of the pubic symphysis to the center of bituberous diameter.
- **Posterior sagittal plane:** Its apex lies at the tip of the coccyx.
- **Posterior sagittal diameter (7.5–10 cm):** It extends from the tip of the sacrum to the center of bituberous diameter

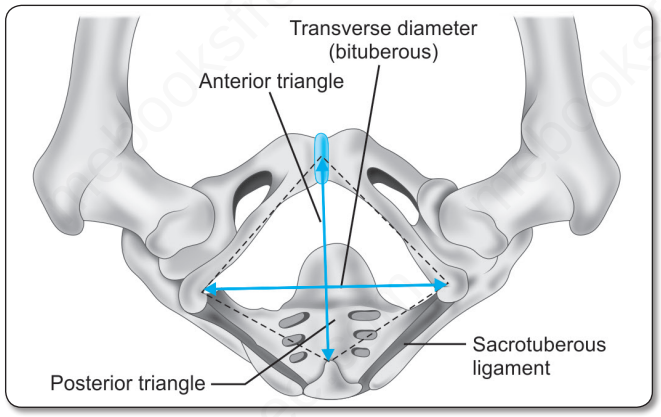


Fig. 1.5: Measurement of transverse diameter of the outlet

- Clinically three diameters of pelvic outlet are important:
  - **Anteroposterior:** It extends from the lower border of the symphysis pubis to the tip of the coccyx. It measures 13 cm or 5 ¼″ with the coccyx pushed back by the head when passing through the introitus in the second stage of labor; with the coccyx in normal position, the measurement will be 2.5 cm less
  - **Transverse — Syn: Intertuberous** diameter (11 cm or 4 ¼″): It is measured between inner borders of ischial tuberosities.
- **Subpubic angle:** It is formed by the approximation of the two descending pubic rami. In normal female pelvis, it measures 85°.

Waste Space of Morris

Normally, the width of the pubic arch is such that a round disk of 9.4 cm (diameter of a well-flexed head) can pass through the pubic arch at a distance of 1 cm from the midpoint of the inferior border of the symphysis pubis. This distance is known as the **waste space of Morris** (Fig. 1.6).

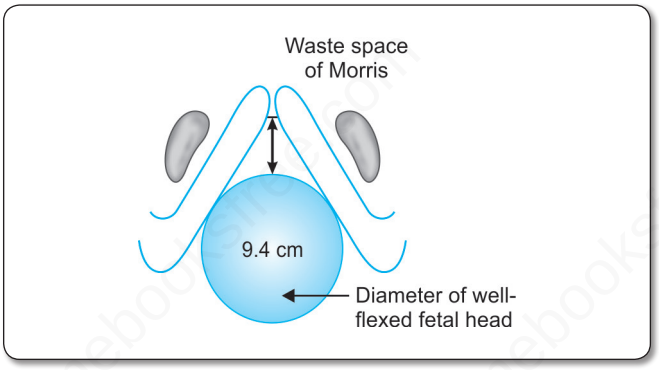


Fig. 1.6: Waste space of Morris

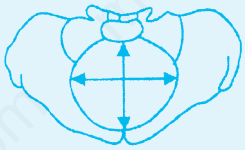
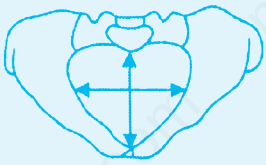
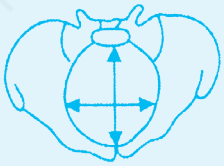
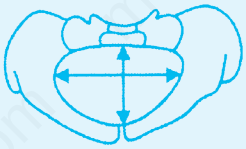
PELVIS SHAPE

On the basis of shape of the inlet, the female pelvis is divided into four types:

Caldwell and Mohoy classification

Gynaecoid	50%
Anthropoid	25%
Android	20%
Platypelloid	5%

Table 1.1: Characteristic of each type of pelvis

Characteristic	Gynaecoid pelvis	Androidpelvis	Anthropoid pelvis	Platypelloid pelvis
Intro	Female type M/C variety	Male type pelvis	Ape like pelvis	Flat pelvis least common variety
shape of Inlet				
Relationship of transverse diam to AP diam of inlet	Transverse oval Transverse diameter of inlet is slightly bigger than AP diameter	Heart shape Transverse diam is > AP diam	AP oval only pelvis with - AP diameter > transverse diameter	Flat Bowl like Pelvis with - Transverse diameter>>> (much more than AP diameter).
Subpubic angle	90°	< 90°		
Obstetric eutcome	Normal female pelvis No difficulty in engagement. M/C position of head LOT/LOA	Engagement is delayed Deep transverse arrest/persistent occipito posterior position common	Diam of engagement is AP diam Direct occipito posterior position is M/C. Nonrotation is common	Head engages in transverse diameter with marked asynctitism Engaging diameter is supersub parietal diam (18.5 cm) instead of usual biparietal diam (9.5).
Type of delivery	Normal delivery	Difficult instrumental delivery	Face to pubes delivery	If head is able to negotiate the inlet by means of asynclitism. ↓ Normal labour other wise cesarean section

KEY CONCEPT

***Remember* the following points on pelvi (most of the questions are asked on them).**

- Normal female pelvis – Gynaecoid pelvis[Q].
- Male type pelvis – Android pelvis[Q].
- Most common type of pelvis – Gynaecoid pelvis[Q].
- Least common type pelvis – Platypelloid pelvis[Q].
- The only pelvis with AP diameter more than transverse diameter – Anthropoid pelvis[Q].
- Face to pubes delivery is most common in Anthropoid pelvis[Q].
- Direct occipitoposterior position is most common in Anthropoid pelvis[Q].
- Persistent occipitoposterior position is most common in Android pelvis[Q].
- Deep transverse arrest/ Nonrotation/Dystocia is most common in Android pelvis[Q].
- Broad flat pelvis – Platypelloid pelvis[Q].
- Transverse diameter is much more than AP diameter – Platypelloid pelvis[Q].
- Engagement by exaggerated posterior asynclitism occurs in platypelloid pelvis[Q].
- Super subparietal instead of biparietal diameter engages in platypelloid pelvis[Q].

FETAL SKULL

Obstetrically, the head of fetus is the most important part in labor since an essential feature of labor is an adaptation between the fetal head and the maternal bony pelvis . Only a comparatively small part of the head of the fetus at term is represented by the face; the rest is composed of the firm skull, which is made up of two frontal, two parietal and two temporal bones, along with the upper portion of the occipital bone and the wings of the sphenoid. The bones are not united rigidly but are separated by membranous spaces, the sutures.

SUTURES

- The sagittal or longitudinal suture lies between two parietal bones.
- The coronal sutures run between parietal and frontal bones on either side.
- The frontal suture lies between two frontal bones.
- The lambdoid sutures separate the occipital bone and the two parietal bones.
- **Importance:** These sutures are of a great obstetric importance as they allow gliding movements of one bone over the other (moulding), causing a small variation in the shape of the foetal head necessary to negotiate the maternal pelvis. In addition, the digital palpation of the sagittal suture during labour while performing an internal examination gives important information regarding the internal rotation of the head and the manner of engagement of the head (synclitism or asynclitism).

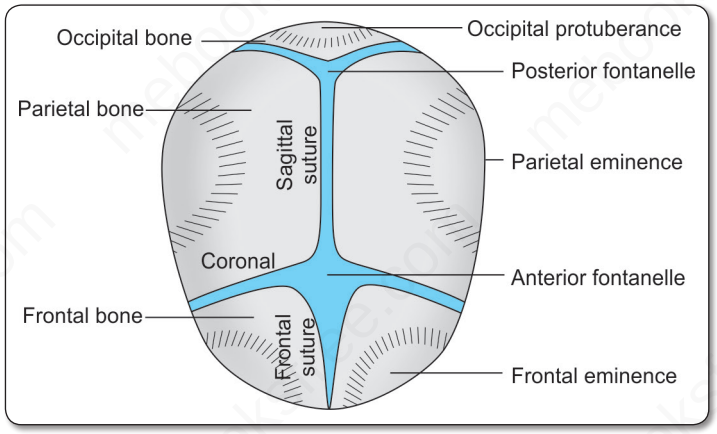


Fig. 1.7: Bones, sutures an fontanelles on foetal skull as viewed from above with head partially deflexed.

Moulding: It is the alteration of the shape of the fore-coming head while passing through the resistant birth passage during labor.

- *Grading*: There are 3 gradings:
  - *Grade 1*: Bones touch but not overlap
  - *Grade 2*: Overlap but easily separated
  - *Grade 3*: Fixed overlapping.

***Note*:** In well-flexed head the engaging suboccipitobregmatic diameter is compressed with elongation of head in mentovertical diameter which is at right angle to suboccipitobregmatic.

FONTANELLE

Wide gap in the suture line is called as fontanelle. Of the many fontanelles (6 in number), two are of obstetric significance: (1) Anterior fontanelle or bregma and (2) Posterior fontanelle or lambda.

- **Anterior fontanelle:** It is formed by joining of the four sutures in the midplane. The sutures are anteriorly frontal, posteriorly sagittal and on either side, coronal. It is diamond shaped. Its anteroposterior and transverse diameters measure approximately 3 cm each. The floor is formed by a membrane and it becomes ossified 18 months after birth. It becomes pathological, if it fails to ossify even after 24 months.
- **Posterior fontanelle:** It is formed by junction of three suture lines — sagittal suture anteriorly and lambdoid suture on either side. It is triangular in shape and measures about 1.2 × 1.2 cm (1/2″ × 1/2″). Its floor is membranous but becomes bony at term. Thus, truly its nomenclature as fontanel is misnomer. It denotes the position of the head in relation to maternal pelvis.
- **Sagittal fontanelle:** It is inconsistent in its presence. When present, it is situated on the sagittal suture at the junction of anterior two-third and posterior one-third. It has got no clinical importance.

PRESENTING PARTS OF FETAL SKULL (FIG. 1.6)

These include the following:

- **Vertex:** This is a quadrangular area bounded anteriorly by bregma (anterior fontanel) and coronal sutures; posteriorly by lambda (posterior fontanel) and lambdoid sutures; and laterally by arbitrary lines passing through the parietal eminences. When vertex is the presenting part, fetal head lies in complete flexion.
- **Face:** This is an area bounded by the root of the nose along with the supraorbital ridges and the junction of the chin or floor of mouth with the neck. Fetal head is fully extended during this presentation.
- **Brow:** This is an area of forehead extending from the root of nose and supraorbital ridges to the bregma and coronal sutures. The fetal head lies midway between full flexion and full extension in this presentation.

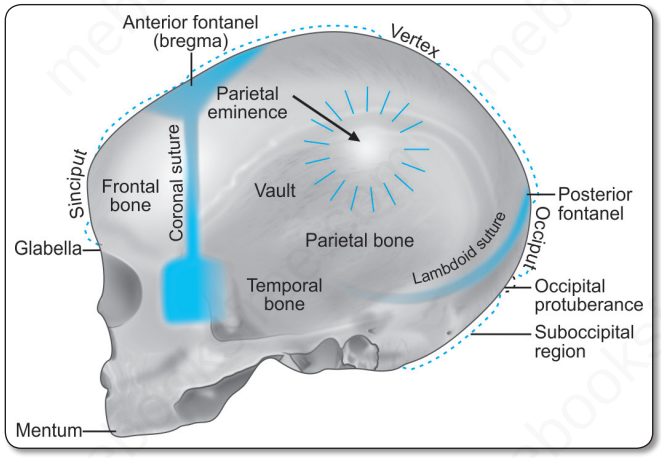


Fig. 1.8: Important landmarks of fetal skull

- Some other parts of fetal skull, which are of significance, include the following:
  - **Sinciput:** Area in front of the anterior fontanel corresponding to the forehead.
  - **Occiput:** Area limited to occipital bone.
  - **Mentum:** Chin of the fetus.
  - **Parietal eminences:** Prominent eminences on each of the parietal bones.
  - **Subocciput:** This is the junction of fetal neck and occiput, sometimes also known as the nape of the neck.
  - **Submentum:** This is the junction between the neck and chin.

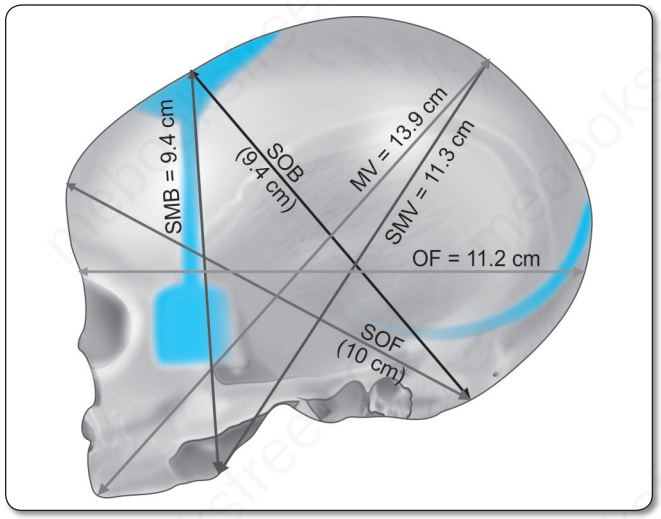


Fig. 1.9: Diameters of fetal skull

IMPORTANT DIAMETERS OF FETAL SKULL

Anteroposterior Diameters

The important AP diameters of the fetal skull are: suboccipitobregmatic (9.5 cm); suboccipitofrontal (10 cm); occipitofrontal (11.5 cm); mentovertical (14 cm); submentovertical (11.5 cm) and submentobregmatic (9.5 cm). These diameters are described in Table 1.2 and Figure 1.9.

Transverse Diameters

The transverse diameters are:

- **Biparietal diameter (9.5 cm):** It extends between the two parietal eminences. This diameter nearly always engages.
- **Supersubparietal diameter (8.5 cm):** It extends from a point placed below one parietal eminence to a point placed above the other parietal eminence of the opposite side.
- **Bitemporal diameter (8 cm):** Distance between the anteroinferior ends of the coronal sutures.
- **Bimastoid diameter (7.5 cm):** Distance between the tips of the mastoid process. This diameter is nearly incompressible.

- Remember the mnemonic "**M**iss **T**ina **S**o **P**retty" for transverse diameter when they are arranged in ascending order of their size

Miss = Bi**m**astoid diameter = 7.5 cm.
Tina = Bi**t**emporal diameter = 8 cm.
So = **S**uper subparietal diameter = 8.5 cm.
Pretty = Bi**p**arietal diameter = 9.5 cm.

Remember

- AP diameters of the skull are always bigger than transverse diameters.
- The longest AP diameter of fetal skull is mentovertical diameter (14 cm).
- The second longest AP diameter is submentovertical = occipitofrontal = 11.5 cm.

Table 1.2: Anteroposterior diameters of fetal skull

Diameters	Attitude of the head	Presentation
Suboccipitobregmatic: 9.5 cm (3 3/4") extends from the nape of the neck to the centre of the bregma	Complete flexion	Vertex
Suboccipitofrontal: 10 cm (4") extends from the nape of the neck to the anterior end of the anterior fontanelle or centre of the sinciput	Incomplete flexion	Vertex
Occipitofrontal: 11.5 cm (41/2") extends from the occipital eminence to the root of the nose (Glabella)	Marked deflexion	Vertex
Mentovertical: 14 cm (51/2") extends from the mid point of the chin to the highest point on the sagittal suture	Partial extension	Brow
Submentovertical: 11.5 cm (41/2") extends from junction of floor of the mouth and neck to the highest point on the sagittal suture	Incomplete extension	Face
Submentobregmatic: 9.5 cm (33/4") extends from junction of floor of the mouth and neck to the centre of the bregma.	Complete extension	Face

KEY CONCEPT

Engaging diameters are both transverse diameter and AP diameter. In most of the cases–Transverse diameter which engages is biparetal diameter. AP diameter which engages dependson the degree of flexion or extension of fetal skull. In case of vertex and face presentations, the engaging AP diameters of fetal skull are respectively suboccipitobregmatic (9.5 cm) and submentobregmatic (9.5 cm) which can pass through pelvis. However, the passage of the fetal head in brow presentation would not be able to take place in a normal pelvis as the engaging AP diameter of fetal skull is mentovertical (14 cm) in this case, therefore, arrest of labor occurs when the fetal head is in brow presentation and always caesarean section is done in brow presentation.

Table 1.3: Engaging diameters

Presentation	Engaging diameter (AP)	Measurement (cm)
Vertex	Suboccipito bregmatic	9.5 cm
Brow	Mento vertical	14 cm
Face	Submento bregmatic	9.5 cm
	Submento vertical	11.5 cm

QUESTIONS

1. The smallest diameter of the true pelvis is: **[AI 05]**
a. Interspinous diameter
b. Diagonal conjugate
c. True conjugate
d. Intertuberous diameter

2. Most important diameter of pelvis during labour is: **[PGI June 02]**
a. Interspinous diameter of outlet
b. Oblique diameter of inlet
c. AP diameter of outlet
d. Intertubercular diameter

3. Female pelvis as compared to the male pelvis has all except: **[PGI Dec 01]**
a. Narrow sciatic notch
b. Shallow and wide symphysis pubis
c. Subpubic angle is acute
d. Light and graceful structure
e. Pre auricular sulcus is larger

4. The shortest diameter of fetal head is:
a. Biparietal diameter **[AIIMS May 06]**
b. Suboccipito frontal diameter
c. Occipito frontal diameter
d. Bitemoral diameter

5. Which type of pelvis is associated with increased incidence of 'face to pubis' delivery? **[AI 97]**
a. Gynaecoid pelvis
b. Anthropoid pelvis
c. Android pelvis
d. Platypelloid pelvis

6. A P diameter is maximum in which type of pelvis? **[PGI June 97]**
a. Platypelloid b. Android
c. Anthropoid d. Gynaecoid

7. Triradiate pelvis is seen in: **[PGI Dec 97]**
a. Rickets b. Chondrodystrophy
c. Osteoporosis d. Hyperparathyroidism

8. One of the following features can be used to define contracted pelvis: **[AI 97]**
a. Transverse diameter of inlet is 10 cm
b. AP diameter of inlet is 12 cm
c. Platypelloid pelvis
d. Gynaecoid pelvis

9. Shortest diameter is: **[New Pattern Question]**
a. Diagonal conjugate
b. Obstetric conjugate
c. True conjugate
d. All are equal

10. Longest diameter of fetal skull is: **[New Pattern Question]**
a. Biparietal
b. Bitemporal
c. Occipito temporal
d. Submentovertical

11. Critical obstetric conjugate for trial of labour is: **[New Pattern Question]**
a. 8.5 cm b. 9.0 cm
c. 9.5 cm d. 10.0 cm

12. Conjugate of the diagonal is 'a' cm obstetric conjugate will be: **[New Pattern Question]**
a. a + 1 cm b. a + 2 cm
c. a – 1 cm d. a – 2 cm

13. Dystocia dystrophia syndrome is seen in: **[New Pattern Question]**
a. Android pelvis
b. Platypelloid pelvis
c. Anthropoid
d. Gynaecoid pelvis

14. The following are the features of "dystocia dystrophica syndrome" *except*: **[New Pattern Question]**
a. The patient is stockily built with short thighs
b. They have normal fertility
c. Android pelvis is common
d. Often have difficult labour

15. Information obtained by lateral plate X-ray pelvimetry are all *except*: **[New Pattern Question]**
a. Sacral curve
b. True conjugate
c. Bispinous diameter
d. Inclination of the pelvis

16. CPD is best assessed by: **[New Pattern Question]**
a. CT scan
b. Ultrasound
c. Radio pelvimetry
d. Pelvic assessment

17. If both the ala of the saccumb bone are absent, pelvis is called as: **[New Pattern Question]**
a. Naegele pelvis
b. Robert pelvis
c. Triradiate pelvis
d. Rachitic pelvis

EXPLANATIONS & REFERENCES

1. Ans. is a i.e. Interspinous diameter *Ref. Williams Obs. 22/e, p 34, 35, 23/e, p 32*

Friends, we have mugged up pelvis in detail for our undergraduate exams but for PGME exams you need not mug up each and everything about pelvis All you need to know are some of the important diameters, which I am listing down below.

Diameters of Pelvis

Diameter	Inlet	Mid pelvis	Outlet
Anteroposterior	Obstetric conjugate -10-10.5 cm	11.5 cm	11.5-13.5 cm
	True conjugate -11 cm Diagonal conjugate -12 cm		
Oblique	12 cm		
Transverse	13-13.5 cm	Interspinous diameter 10 cm	Intertuberus diameter 11 cm

Posterior sagittal diameter of outlet: It is an important diameter in case of obstructed labour caused by narrowing of the mid pelvis or pelvic out let as the prognosis for vaginal delivery depends on the length of posterior sagittal diameter. Posterior sagittal diameter extends from tip of coccyx to a right angle intersection with a line between the ischial tuberosities. It usually exceed 7.5 cms.

Remember

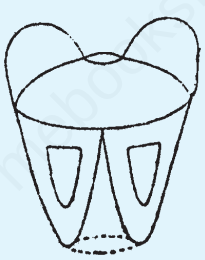
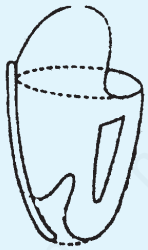
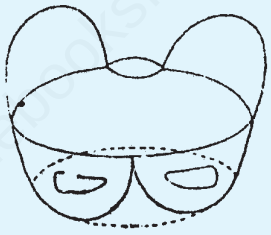
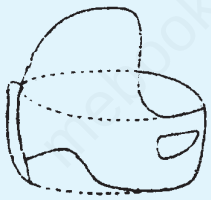
- Longest diameter of pelvis – Transverse diameter of inlet and antero posterior diameter of anatomic outlet.Q
- Shortest major diameter of pelvis – Interspinous diameter
- Longest AP diameter of inlet – Diagonal conjugateQ
- Shortest AP diameter of inlet – Obstetric conjugateQ
- Only AP diameter measured clinically – Diagonal conjugateQ
- Crtical obstetric conjugate – 10 cm (i.e if obstetric conjugate is less than 10 cms vaginal delivery is not possible)

2. Ans. is a i.e. Interspinous diameter of the outlet *Ref. Williams Obs. 22/e, p 35; 23/e, p 32; Dutta Obs. 7/e, p 90*

Interspinous diameter is the distance between the two ischial spines and is the smallest diameter of the pelvis = 10 cm. It corresponds to the transverse diameter of mid pelvis (i.e. plane of least pelvis dimensions).

3. Ans. is a and c i.e. Narrow sciatic notch and Subpubic angle is acute *Ref. Reddy 27/e, p 56*

Important differentiating feature between male and female pelvis are:

Trait	Male Pelvis	Female Pelvis
	 	 
1. ***General built***	Massive, rough with marked bony prominences	Slender, smooth, bones are light with bony markings less prominent
2. ***General shape***	Deep funnel	Flat bowl

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Trait	Male Pelvis	Female Pelvis
3. ***Pelvic brim or inlet***	Heart-shaped.	Circular or elliptical; more spacious; diameters longer
4. ***Pelvic cavity***	Conical and funnel-shaped	Broad and round
5. ***Pelvic outlet***	Smaller	Larger

- Features Narrow/small in male pelvis and broad/big in female pelvis: Mnemonic-**Great International bodies, so punctual.**

- Great: Greater sciatic notch
- International- Ischial tuberosity – Inverted and less widely separated in male pelvis while it is everted and more widely separated in female.
- Bodies - Body of pubis
- So - Subpubic angle :
  - In male pelvis - it is V shaped and ranges b/w 70-750.
  - In female pelvis it is U shaped and ranges between 90-100.Q
- Punctual
  - Preauricular sulcus (not frequently seen in male pelvis and if present at all it is narrow and shallow).

Features large/well marked in male pelvis and small/less marked in female pelvis:
Mnemonic –**PM of SAARC III**

- PM Promontory (well-marked in male pelvis)
- Of Obturator foramen (large and oval shaped in male pelvis and small and triangular in female pelvis)
- SAARC Sacroiliac joint surface (large in male pelvis)
- III Ileopectineal line (well-marked in male pelvis).

Others:

Sacrum	Coccyx
Long and narrow in male pelvis	Less movable in male pelvis
Short and wide in female pelvis	More movable in female pelvis

4. Ans. is d i.e. Bitemporal diameter *Ref. Dutta Obs. 7/e, p 85*

Remember friends : Always transverse diameters of the fetal skull are smaller than Anteroposterior diameters.

Amongst the given options: Biparietal and bitemporal diameters are transverse diameters, whereas suboccipitofrontal and occipitofrontal are anteroposterior diameters.
Now, the choice is between bitemporal and biparietal diameters.
For memorizing this: learn a mnemonic, where transverse diameter are arranged in ascending order of their size.

Miss	=	Bi**m**astoid diameter	=	7.5 cm
Tina	=	Bi**t**emporal diameter	=	8 cm
S	=	Super subparietal diameter	=	8.5 cm
Pretty	=	Bi**p**arietal diameter	=	9.5 cm

So, our answer is bitemporal diameter (8 cm)

Remember: *In AP diameters:*
- The longest AP diameter of fetal skull is mentovertical diameter =14 cm
- The second longest AP diameter is submentovertical = Occipitofrontal = 11.5 cm.

Note: Mentovertical diameter is seen in Brow presentation and therefore in Brow presentation vaginal delivery is not possible and cesarean section has to be done.

5. Ans. is b i.e. Anthropoid pelvis *Ref. Dutta Obs. 7/e, p 346, Table 23.1, 8/e, p 403, Table 24.2*

As discussed in the text in Table 1.1 face-to-pubis delivery is common in anthropoid pelvis.

6. Ans. is c i.e. Anthropoid *Ref. Dutta Obs. 7/e, p 346, Table 23.2, 8/e, p 403, Table 24.2, 24.12*

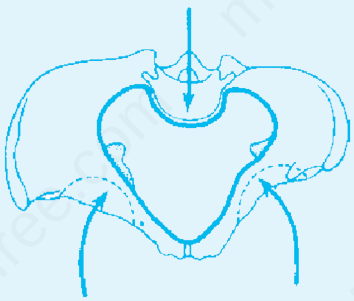
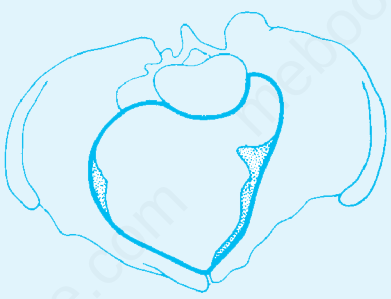
***Remember* the following points on pelvis (most of the questions are asked on them).**

- Normal female pelvis – *Gynaecoid pelvis*[Q].
- Male type pelvis – *Android pelvis*[Q].
- Most common type of pelvis – *Gynaecoid pelvis*[Q].
- Least common type pelvis – *Platypelloid pelvis*[Q].
- The only pelvis with AP diameter more than transverse diameter – *Anthropoid pelvis*[Q].
- Face to pubes delivery is most common in *Anthropoid pelvis*[Q].
- Direct occipitoposterior position is most common in *Anthropoid pelvis*[Q].
- Persistent occipitoposterior position is most common in *Android pelvis*[Q].
- Deep transverse arrest/ Nonrotation/dystocia is most common in *Android pelvis*[Q].
- Broad flat pelvis – *Platypelloid pelvis*[Q].
- Transverse diameter is much more than AP diameter – *Platypelloid pelvis*[Q].
- Engagement by exaggerated posterior asynclitism occurs in *Platypelloid pelvis*[Q].
- Super subparietal instead of biparietal diameter engages in *Platypelloid pelvis*[Q].

7. Ans. is a i.e. Rickets *Ref. Dutta Obs. 7/e, p 347, 8/e, p 404*

Contracted pelvis is alteration in size and/or shape of pelvis of sufficient degree so as to alter the normal mechanism of labour in an average size baby. It can be a result of malnutrition, diseases or injuries affecting the bone of pelvis or it can be due to any developmental defect.

Types of contracted pelvis

Type	Etiology	Feature	Diagram
Rachitic flat pelvis	Rickets	• Reniform shape of inlet with marked shortening of antero posterior diameter without affecting the transverse diameter • Sacrum is flat and tilted • Widening of transverse diameter of the outlet and pubic arch	
Triradiate pelvis	Osteomalacia[Q] Severe rickets[Q] in adults (i.e. lack of calcium and vitamin D)	• Triradiate shape of inlet[Q] • Approximation of the two ischial[Q] tuberosities and marked narrowing of pubic arch • Short sacrum with coccyx pushed forward.	

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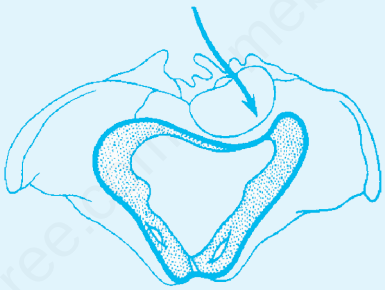
Asymmetrically contracted pelvis			
Naegele's Pelvis	Congenital osteitis of sacroiliac joint	• One ala is absent[Q], only one is seen • Remember: **NALA** i.e. one ala present in naegele pelvis • Mode of delivery–by cesarean section	
Robert's pelvis	V. Rare	• Both ala absent[Q]. • Sacrum is fused with Innominate bone. • Mode of delivery – by cesarean section.	
Scoliotic pelvis	Scoliosis of lumbar region	• Acetabulum is pushed inwards on the weight bearing sides. • One of the oblique diameter is decreased.	
Funnel shaped/kyphotic pelvis	Tuberculosis or Rickets	• Extreme funneling of the pelvis. • Mode of delivery – by cesarean section.	

8. Ans. is a i.e. Transverse diameter of inlet is 10 cm

Ref. Dutta Obs. 7/e, p 345, 8/e, p 409; Williams 22/e, p 503, 504; 23/e p 471

Minimal/Critical diameters of the Pelvis: *If any of the following diameter is less than critical diameter, Pelvis is said to be contracted*

Inlet	Mid pelvis	Outlet
Obstetric conjugate = 10 cm Diagonal conjugate = 11.5 cm	Interspinous diameter = 10 cm	Intertuberous diameter = 8 cm
Transverse diameter = 12 cm	Mid pelvis is said to be contracted when sum of interspinous diameter (Avg. = 10.5 cm) and posterior sagittal diameter (5 cm) falls from 15.5 cm to 13.5 cm	It can be clinically suspected when the intertuberous diameter does not admit four knuckles.

- Another way of defining contracted pelvis is where the essential diameters of one or more planes are shortened by 0.5 cm. In the question it is clearly evident that transverse diameter (10 cm) is too short and is therefore contracted. Gynaecoid, Anthropoid, Android and Platypelloid pelvis are variations of normal female pelvis. These varieties are not necessarily contracted, although there may be a deviation of normal mechanism of labour.

Extra edge:

In women with contracted pelvis, face and shoulder presentations are encountered three times more frequently, and cord prolapse is four to six times more often.

9. Ans. is b i.e. Obstetric conjugate *Ref. Dutta Obs. 7/e, p 88*

Antero posterior diameters of the pelvic inlet.

Diameters	Feature	Measurement
Obstetric conjugate	• It is the distance between the midpoint of the sacral promontory to prominent bony projection in the midline on the inner surface of the symphysis pubis. • It is the smallest AP diameter of pelvic inlet. • It is the diameter through which the fetus must pass. • It can not be measured clinically, but can be derived by substracting 1.5 cm from diagonal conjugate.	10 - 10.5 cm

Contd…

Contd…

Diameters	Feature	Measurement
True conjugate (Anatomical conjugate)	• It is the distance between the midpoint of the sacral promontory to the inner margin of the upper border of symphysis pubis. • It has no obstetrical significance.	11 cm
Diagonal conjugate	• It is the distance between the midpoint of the sacral promontory to the lower border of symphysis pubis. • Its importance as that it can be measured clinically.	12 cm

10. Ans. is d i.e. Submentovertical *Ref. Dutta Obs 7/e p 85*

Remember :

Smallest diameter	Longest diameter
Ist = Bimastoid diameter	Ist = Mento vertical
IInd = Bitemporal diameter	IInd = Submento vertical/occipitofrontal

11. Ans. is d i.e. 10 cm *Ref. Williams Obs. 22/e, p 503; 23/e, p 471*

12. Ans. is d i.e. a – 2 cm *Ref. Williams Obs. 22/e, p 503; 23/e, p 471*

- Obstetric conjugate normally measures 10 cm or more^{Q}.
- *The pelvic inlet is considered to be contracted, if obstetric conjugate is less than 10 cm.*^{Q}
- It can not be measured clinically but can be estimated by subtracting 1.5 cm from the diagonal conjugate. Now since in Q 12, 1.5 cm is not given, we are taking as 'a – 2 cm'.

13. Ans. is a i.e. Android pelvis *Ref. Dutta Obs 7/e, p 349, 8/e, p 406*

14. Ans. is b i.e. They have normal fertility

Dystocia dystrophia syndrome: It is charactersied by the following features:

- The patient is stockily built with bull neck, broad shoulder and short thigh.
- She is obese with a male distribution of hairs.
- *Pelvis is of the android type.*
- Occipitoposterior position is common.
- They are usually subfertile, having dysmenorrhoea, oligomenorrhoea or irregular period
- There is increased incidence of preeclampsia and a tendency for postmaturity during pregnancy.
- During labour, inertia is common and there is a tendency for deep transverse arrest or outlet dystocia leading to either increased incidence of difficult instrumental delivery or cesarean section.
- There are increase chances of lactation failure during purperium.

15. Ans. is c i.e. Bispinous diameter *Ref. Dutta Obs. 7/e, p 351; 8/e, p 409*

Bispinous diameter can be measured by anteroposterior view and not on lateral view of X-ray pelvimetry.

X-ray pelvimetry is of limited value in the diagnosis of pelvic contraction or cephalopelvic disproportion. Apart from pelvic capacity there are several other factors involved in successful vaginal delivery. These are the fetal size, presentation, position and the force of uterine contractions. X-ray pelvimetry cannot assess the other factors. It cannot reliably predict the likelihood of vaginal delivery neither in breech presentation nor in cases with previous cesarean section.

- **X-ray pelvimetry is useful** in cases with fractured pelvis and for the important diameters which are inaccessible to clinical examination.
- ***Techniques:*** For complete evaluation of the pelvis, three views are taken — anteroposterior, lateral and outlet. But commonly, X-ray pelvimetry is restricted to only the erect lateral view (the femoral head and acetabular margins must be superimposed) which gives most of the useful information. Anteroposterior view can give the accurate measurement of the transverse diameter of the inlet and bispinous diameter.
- **Hazards of X-ray pelvimetry** includes radiation exposure to the mother and the fetus. With conventional X-ray pelvimetry radiation exposure to the gonads is about 885 millirad. So it is restricted to selected cases only.

16 Ans. is d i.e. Pelvic assessment *Ref. Dutta Obs. 7/e, p 352, 353*

Cephalopelvic disproportion (CPD) is the disparity in the relation between the head of fetus and pelvis. Both the fetus and pelvis are normal, but disproportionate
Note: Best predictor of CPD is trial of labor.
Trial of labor is done only for mild CPD at the level of pelvic inlet.
If CPD is expected at the level of cavity or outlet – trial of labor is not attempted.
Clinically: By per abdomen examination/bimanual examination *(Muller-Munrokerr method).*
The bimanual method is superior to the abdominal method as pelvic assessment can be done simultaneously
Limitations of clinical assessment:
- It can assess the disproportion of the brim and not of the midpelvis or outlet.
- The fetal head can be used as a pelvimeter to elicit only the contraction in the anteroposterior plane of the inlet. (If contraction affects the transverse diameter of the inlet, it is of less use).

IOC for detecting CPD is – MRI.
Best method of detecting CPD–Trial of labor > MRI > manual pelvic assessment.

Pelvic assessment is done at 37 weeks in primigravida and at the onset of labor in multigravida.

17. Ans. is b i.e. Robert pelvis *Ref. Dutta Obs. 8/e, p 405*

- If one ala is absent–pelvis is called as Naegrle's pelvis.
- If both ala of saccumb are absent-pelvis is called as Robert's pelvis.
- Both are varieties of contracted pelvis and in both cesarean delivery is done.

2

Basics of Reproduction

All theory related to this chapter has been discussed in the DVD attached.

QUESTIONS

1. Fertilised ovum reaches uterine cavity by: **[AIIMS Nov 13]**
a. 4 to 5 days after implantation
b. 6 to 7 days after implantation
c. 7 to 9 days after implantation
d. 2 to 3 days after implantation

2. After how many days of ovulation embryo implantation occurs ? **[AIIMS May 06]**
a. 3 – 5 days b. 7 – 9 days
c. 10 – 12 days d. 13 – 15 days

3. The thickness of endometrium at the time of implantation is: **[PGI June 99]**
a. 3 – 4 mm b. 20 – 30 mm
c. 15 – 20 mm d. 30 – 40 mm

4. In which of the following transition meiosis occurs? **[AIIMS Nov 07]**
a. Primary to secondary spermatocyte
b. Second spermatocyte to globular spermatid
c. Germ cells to spermatogonium
d. Spermatogonium to primary spermatocyte

5. Primary oocyte: **[PGI June 02]**
a. Is formed after single meiotic division
b. Maximum in number in 5 months of the fetus
c. Is in prophase arrest
d. Also called as blastocyst

6. True statement regarding oogenesis is/are: **[PGI May 2010]**
a. Primary occyte arrests in prophase of 1st meiotic division
b. Primary occyte arrests in prophase of 2nd meiotic division
c. Secondary oocyte arrest in metaphase of 1st meiotic division
d. Secondary oocyte arrest in metaphase of 2nd meiotic division
e. 1st polar body is extruded during 1st meiotic division of primary oocytes

7. In a young female of reproductive age with regular menstrual cycles of 28 days, ovulation occurs around 14th day of periods. When is the first polar body extruded? **[AIIMS May 05]**
a. 24 hours prior to ovulation
b. Accompanied by ovulation
c. 48 hours after the ovulation
d. At the time of fertilization

8. Fetal kidneys start producing urine by:
a. 3 months b. 4 months
c. 5 months d. 6 months

9. Fetal stage starts at: **[JIPMER 04]**
a. 9 weeks b. 3 weeks
c. 6 weeks d. 12 weeks

10. Figure-F1 shows T:S of uterus with implanted zygote identify structure A: **[New Pattern Question]**

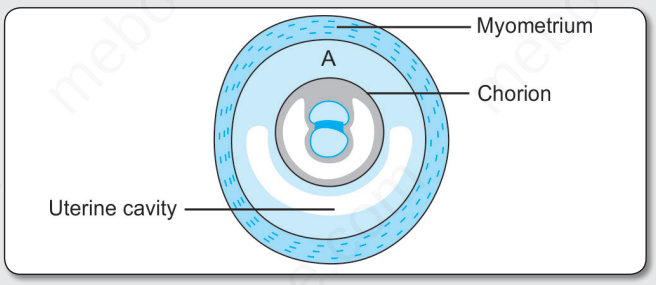


Fig. F1

a. Decidua basalis b. Decidua capsularis
c. Decidua parietalis d. None of the above

11. Lifespan of the fetal RBC approximates: **[New Pattern Question]**

a. 60 days
b. 80 days
c. 100 days
d. 120 days

12. The following are related to fetal erythropoiesis *except*: **[New Pattern Question]**

a. In the embryonic phase, the erythropoiesis is first demonstrated in the primitive mesoderm
b. By 10th week, the liver becomes the major site
c. Near term, the bone marrow becomes the major site
d. At terms 75–80% of haemoglobin is fetal type (HbF)

13. Maximum oogonia can be seen in ovaries at: **[New Pattern Question]**

a. 5th month of IUL
b. 7th month of IUL
c. At birth
d. At puberty

14. Fetal sex can be detected by USG at: **[New Pattern Question]**

a. 14 weeks
b. 16 weeks
c. 18 weeks
d. 20 weeks

15. Oxygenated blood from the placenta reaches the fetal heart in utero via: **[New Pattern Question]**

a. Umbilical arteries
b. Umbilical vein
c. Ductus venosus
d. Ductus arteriosus

16. Ligamentum teres is formed after: **[COMED 06]**

a. Obliteration of the umbilical vein
b. Obliteration of the ductus venous
c. Obliteration of the ductus arteriosus
d. Obliteration of the hypogastric artery

17. Zona hatching occurs: **[New Pattern Question]**

a. 4 days after fertilisation
b. 5 days after fertilisation
c. 6 days after fertilisation
d. 8 days after fertilisation

18. 1st meiotic devision of oogenesis gets arrested at: **[New Pattern Question]**

a. Pachytene stage of prophase
b. Diplotene stage of prophase
c. Leptotene stage of prophase
d. Metaphase stage of prophase

19. Time taken for spermatogenesis is: **[New Pattern Question]**

a. 50-60 days
b. 60-70 days
c. 70-80 days
d. 80-90 days

20. Time taken for capacitation of sperms is: **[New Pattern Question]**

a. 2-4 hours
b. 4-6 hours
c. 6-8 hours
d. 8-10 hours

21. During spermiogenesis middle piece of spermatid forms _____ of the sperm: **[New Pattern Question]**

a. Acrosomal cap
b. Middle piece
c. Axial filament
d. Head of sperm

22. Germ cells appear in yolk sac at: **[New Pattern Question]**

a. 3 weeks
b. 6 weeks
c. 9 weeks
d. 5 weeks

23. Formation of a follicle is completed by: **[New Pattern Question]**

a. 6 weeks
b. 9 weeks
c. 14 weeks
d. 24 weeks

EXPLANATIONS & REFERENCES

1. **Ans. is a, i.e. 4 to 5 days after implantation**
2. **Ans. is b, i.e. 7–9 days** *Ref. Guyton 10/e, p 936, 937; Leon Speroff 7/e, p 120*
   - As fertilisation of the ovum occurs and a zygote is formed, it undergoes cleavage to form 3, 4, 6 cell stage.
   - This cleavage continues till it is 16 cell staged and is called as ***Morula.***
   - Some fluid passes from the uterine cavity into the morula. So that the inner cell mass attaches to trophoblast on one side only. The morula now becomes a ***'blastocyst'.***
   - *As the blastocyst develops further the inner cell mass differentiates into ectoderm and endoderm initially followed by mesoderm later.*

   "From the time a fertilized ovum enters the uterine cavity from the fallopian tube (which occurs 3-4 days after ovulation) until the time ovum implants (7-9 days after ovulation) the uterine secretions called uterine milk provides nutrition for the early dividing ovum." *—Guyton 10/e, p 936, 937*

   "At the time of implantation, on days 21-22 of menstrual cycle the predominant morphologic feature is edema of the endometrial stroma." *—Leon Speroff 7/e, p 120*

   Extra Edge:

   Questions asked on Morula:
   - **Zygote enters the uterine cavity in the form of** Morula
   - **Zygote enters the uterine cavity** - On 17-18th day of menstrual cycle, i.e 3-4 days after the fertilisation.

   ***Note*: If choice is between 3 and 4 days - go for 3 days** *—Williams 24/e, p 89*

   Questions asked on Blastocyst
   - **Implantation of the zygote occurs in the form of-** Blastocyst
   - **Implantation occurs on-6-8 days after fertilisation, i.e** 20-22nd day of menstrual cycle.
   - Implantation is completed 10-11 days after fertilizalion
3. **Ans. is None** *Ref. Dutta Obs 6/e, p 23, 937; Leon Speroff 7/e, p 120*

   "The endometrium is in the secretory phase corresponding to 20-21 days of cycle" at the time of implantation. *...Dutta Obs. 6/e, p 23*

   "After ovulation, the endometrium now demonstrates a combined reaction to estrogen and progesterone activity. Most impressive is that total endometrial height is fixed at roughly its preovulatory extent (5-6 mm) despite continued availability of estrogen." *—Leon Speroff 7/e, p 119*

   Reading the above text it is clear that endometrium is thickness is 5-6 mm thick at the time of implantation, which is not given in the option. Implantation results are—better with thickness between 8-10 mm.

   Thickness of Endometrium
   - After menstruation = 0.5 mm
   - Midcycle (ovulation) = 2-3 mm
   - Luteal phase = 5-6 mm.

4. Ans. is a i.e. Primary to secondary spermatocyte

Ref. Dutta Obs 7/e, p 19; Human Embryology, IB Singh 7/e, p 9, 13; Langman Embryology 10/e, p 25

The process involved in the development of spermatids from the primordial male germ cells and their differentiation into spermatozoa (or sperms) is called as spermatogenesis.

- Spermatogenesis begins at puberty in seminiferous tubules of male testes.
- The entire process of spermatogenesis is shown in figure 2.1.
- Cell divisions are of two kinds:
  - Mitosis
  - Meiosis
- In mitosis, the chromosome number remains the same.
- Meiosis is a special type of cell division that reduces the diploid number of chromosomes (i.e., 46) to the haploid number of 23. It takes place only in germ cells; to give rise to gametes (sperms and egg cells) It involves two meiotic cell divisions, meiosis I and meiosis II.
  - The first metotic division is a reduction division because the chromosome number is reduced from diploid (46) to haploid (23).
  - The 2nd meiotic division is similar to mitosis as daughter cells formed contain the same haploid number of chromosomes as the mother cell.

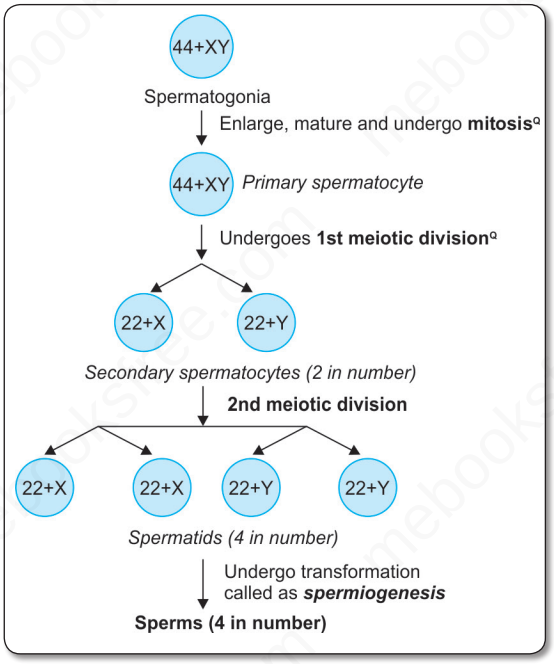


Fig. 2.1: Spermatogenesis

Thus, though option 'a' and 'b' both are correct but reduction division occurs when primary spermatocyte is transformed to secondary spermatocyte, so it is the answer of choice.

Extra Edge:

- *The developmental process from spermatogonium to sperm takes about 72-74 days and the entire process, including the transit time in the ductal system takes approximately three months.*
- **Clinical significance :** The above fact is clinically significant, as in case of male factor infertility a *repeat semen analysis* to see the sperm count, motility etc. after giving treatment should be done three months after the first analysis (as new sperms will be formed after 3 months).
  - Sperms attain maturity and motility in epididymis.
  - A mature sperm is approx. 55 micrometers (50-60 µm).

5. Ans. is b and c i.e. Maximum in number at 5th month of the fetus; and Is in the prophase arrest

6. Ans. is a, d and e i.e Primary occyte arrests in prophase of 1st meiotic division, Secondary oocyte arrest in Metaphase of 2nd meiotic division, 1st polar body is extruded during 1st meiotic division of primary oocytes

Ref. Human Embryology by IB Singh 8/e, p 14-16; Duttaobs 7/e, p 17

The process involved in the development of mature ovum is called Oogenesis.

The primitive germ cells take their origin from yolk sac at about the end of 3rd week and migrate to the developing gonadal ridge, at about the end of 4th week.

Important facts:

- Oogenesis begins in the ovary at *6-8 weeks of gestation.*
- Maximum number of oocytes/oogonia are in the ovary at 5th month of development (20 weeks of gestation number being 6-7 million).
- At birth no more mitotic division occur, all oogonia are replaced by primary oocyte.
- At birth total content of both ovaries is 2 million primary oocytes.
- At puberty number is further decreased and is ~ 300000-500000, of which only 500 are destined to mature during an individual's life time.

Contd…

Contd…

Important facts:

- All the primary oocytes in the ovary of a newborn are ***arrested in the diplotene stage of prophase*** (of meiosis).Q
- All the primary oocytes then remain arrested and the arrested phase is called as "Dictyate stage" till puberty.
- The primary oocyte gets surrounded by follicular cells in the ovary and this structure is now called as Primordial follicle.
- At puberty as a result of mid cycle preovulatory surge, meiosis is resumed and completed just prior to ovulation.Q
- *Therefore first polar body is released just prior to ovulation or along with ovulation..*
- The ***second division*** starts immediately after it and is ***arrested in metaphase.***Q
- At the time of fertilization second division is completed which results in the release of oocyte and second polar body.
- *Therefore second polar body is released only at the time of fertilisation.*Q
- Size of mature ovum = 120-130 µm (It is the largest cell in the body).
- Size of mature follicle = 18-20 mm

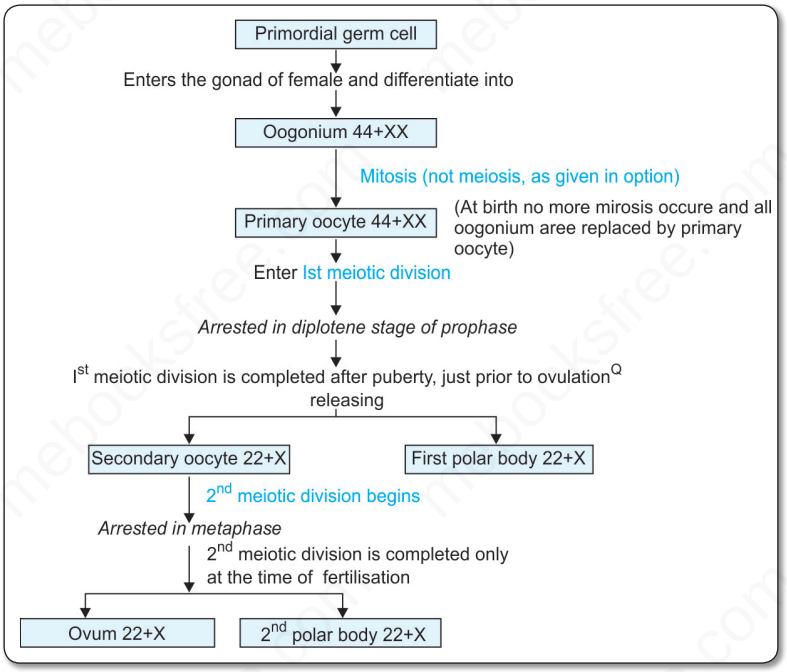


Fig. 2.2: Oogenesis

7. Ans. is b i.e. Accompanied by ovulation *Ref. Guyton 10/e, p 944; Ganong 21/e, p 438*

- Most of the standard text books say the first polar body is expelled just before or shortly before ovulation.
- Which does not mean that it is released 24 hours before ovulation.
- ***"While still in the ovary the ovum is in the primary oocyte stage. Shortly before it is released from ovarian follicle (i.e. shortly before ovulation), its nucleus divides by meiosis and a first polar body is expelled from the nucleus of the oocyte. The primary oocyte then becomes the secondary oocyte. In this process each of the 23 unpaired of chromosomes loses one of its partners which become the first polar body that is expelled. This leaves 23 unpaired chromosomes in the secondary oocyte. It is at this time that the ovum, still in the secondary oocyte stage is ovulated into the abdominal cavity."*** *—Guyton 10/e, p 944*

So, first polar body is released at the time of ovulation i.e. ***Option "b"***

Note:

- The secondary oocyte immediately begins the second meiotic division, but this division stops at metaphase and is completed only when sperm penetrates the oocyte.
- At this time second polar body is cast off. So ***second polar body is cast off at the time of fertilization.***
- Friends this is an often repeated question and those who find it difficult to remember this basic fact : I have a mnemonic :

Mnemonic

- **PP1 and M_2F**
- **PP1** i.e. **1st** meiotic division is arrested in **Prophase** and 1st polar body is released at puberty
- **M2F** : i.e. **2nd** meiotic division is arrested in **metaphase** and **2nd polar body** is released at the time of **fertilisation**

8. Ans. is a i.e. 3 months *Ref. Willams Obs 23/e, p 95*

Important Events	Following Fertilization
'0' hour	Fertilization
4th day	16 cell stage
	Morula enters uterine cavity
5th day	Blastocyst
7th day	Interstitial implantation occurs
21st – 22nd day	Placenta fully established/Fetal circulation established and heart formed
8 weeks	Internal gonads formed
10–12 weeks	Swallowing starts —*Williams Obs. 22/e, p 106*
11 weeks	Fetal breathing movements
12 weeks	External genitalia formed
12 weeks	Urine formation occurs —*Williams Obs. 22/e, p 142; 23/e, p 95*
14 weeks	Gender can be identified on USG

9. Ans. is a i.e. 9 weeks *Ref. Dutta Obs 7/e, p 41*

Fetal Growth Periods

Growth Period	Seen From	Important Points
Ovulation period	Fertilisation-2 weeks	
Embryonic period	3 weeks-8 weeks after fertilisation	Most teratogenic period
Fetal Period	>9 weeks and till delivery	

10. Ans. is a i.e. Decidua basalis *Ref. Dutta Obs 8/e, p 28*

- Implantation occurs 7 – 9 days after ovulation[Q].
- In human, the blastocyst burrows in the uterine cavity till whole of it lies within the thickness of endometrium. This is called as **interstitial implantation[Q].**
- After implantation of the embryo the uterine endometrium is called the "decidua".

Well developed endometrium has three layers- Superficial compact layer,Intermediate compact layer and thin basal layer.

Line of separation of placenta runs through the intermediate compact layer.

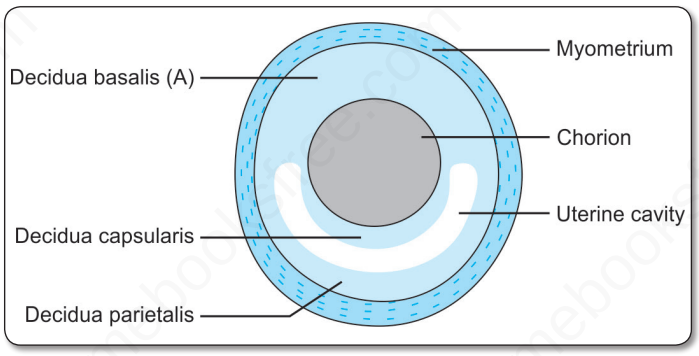


Fig. 2.3: Subdivisions of decidua

- After implantation of zygote into the compacta, decidua is renamed as:
  - **Decidua basalis** – The part of decidua where the placenta is to be formed (A in the figure).
  - **Decidua capsularis** – The part of the decidua that separates the embryo from the uterine lumen.
  - **Decidua parietalis (vera)** – The part of the decidua lining rest of the uterine cavity.
  - At the end of pregnancy, the decidua is shed off along with placenta and membranes.

11. Ans. is b i.e. 80 days *Ref. Dutta Obs 7/e, p 42*

The life span of the fetal RBC is about two-thirds of the adult RBC, i.e. about 80 days. The activities of all glycolytic enzymes in fetal erythrocytes except phosphofructokinase and 6-phosphogluconate dehydrogenase are higher than those of adults or term or premature infants.

12. Ans. is a i.e. In the embryonic phase, the erythropoiesis is first demonstrated in the primitive mesoderm *Ref. Dutta Obs 7/e, p 42*

Hematopoiesis is demonstrated in the embryonic phase first in the yolk sac by 2-3 weeks.

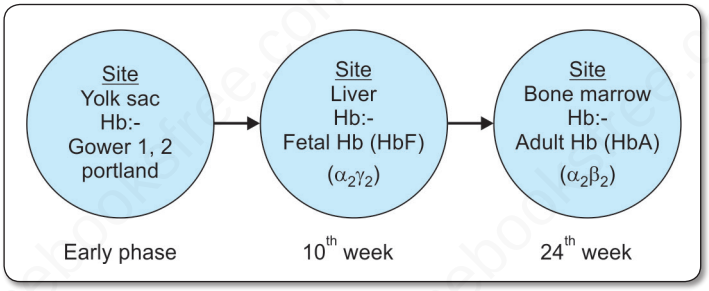


Fig. 2.4

- During the first half, the hemoglobin is of fetal type (α-2, γ-2) but from 24 weeks onwards, adult type of hemoglobin (α-2, β-2) **appears and at term about 75–80% of the total hemoglobin is of fetal type** HbF. Between 6–12 months after birth, the fetal hemoglobin is completely replaced by adult hemoglobin.
- **Difference between HbA and HbF is that fetal hemoglobin has got a greater affinity to oxygen due to lower binding of 2, 3-diphosphoglycerate compared to adult hemoglobin**. It is also resistant to acid and alkali
- At term fetus has Hb = 18 gm%.

13. Ans is a i.e. 5th month of IUL *Ref Dutta Obs 8/e, p 19*

Maximum number of oogonia are seen at 20th week (5th month), numbering 7 million.

14. Ans. is a i.e 14 weeks *Ref. William's 23/e, p 79*

"Gender can be determined by experienced observers by inspection of the external genitalia by 14 weeks".

—Williams Obs 23/e p79

15. Ans. is c i.e Ductus venosus *Ref. Dutta Obs. 7/e, p 43, 44*

16. Ans. is b i.e Obliteration of the ductus venous

Details of fetal circulation:

The circulation in the fetus is essentially the same as in the adult except for the following :

- *The source of oxygenated blood is not the lung but the placenta.*[Q]
- Oxygenated blood from the **placenta** comes to the fetus through the umbilical vein[Q], which joins the left *branch of the portal vein*. A small portion of this blood passes through the substance of the liver to the *inferior vena cava*[Q], but the greater part passes directly to the inferior vena cava through the *ductus venosus*[Q]. A sphincter mechanism in the ductus venosus controls blood flow.
- *The inferior vena cava* carries the oxygen rich blood from the **liver to the right atrium**[Q]**.**
- The oxygen rich blood reaching the **right atrium** through the inferior vena cava is directed by the valve of the inferior vena cava towards the foramen ovale. Here it is divided into two portions by the lower edge of the septum secundum (crista dividens):
  - Most of it passes through the *foramen ovale* into the **left atrium.**
  - The rest of it gets mixed up with the blood returning to the right atrium through the *superior vena cava,* and passes into the **right ventricle.**
- From the right ventricle, the blood (mostly deoxygenated) enters the *pulmonary trunk.* Only a small portion of this blood reaches the **lungs** and passes through it to the **left atrium.** The greater part is short – circuited by the *ductus arteriosus into the aorta.*
- We have seen that the **left atrium receives:**
  - Oxygenated blood from the ***right atrium,*** and
  - A small amount of deoxygenated blood from the ***lungs.***

The blood in this chamber is, therefore, fairly rich in oxygen. This blood passes into the left ventricle and then into the aorta. Some of this oxygen rich blood passes into the carotid and subclavian arteries to supply the brain, the head and neck and the upper extremities. The rest of it gets mixed up with poorly oxygenated blood from the ductus arteriosus. The parts of the body that are supplied by branches of the aorta arising distal to its junction with the ductus arteriosus, therefore, receive blood with only a moderate oxygen content.

- Much of the blood of the aorta is carried by the *umbilical arteries* to the **placenta** where it is again oxygenated[Q] and returned to the **heart.**

So, from above explanation it is clear that oxygenated blood from placenta to the liver is carried by umbilical veins whereas from the liver to the heart it is carried by inferior vena cava.

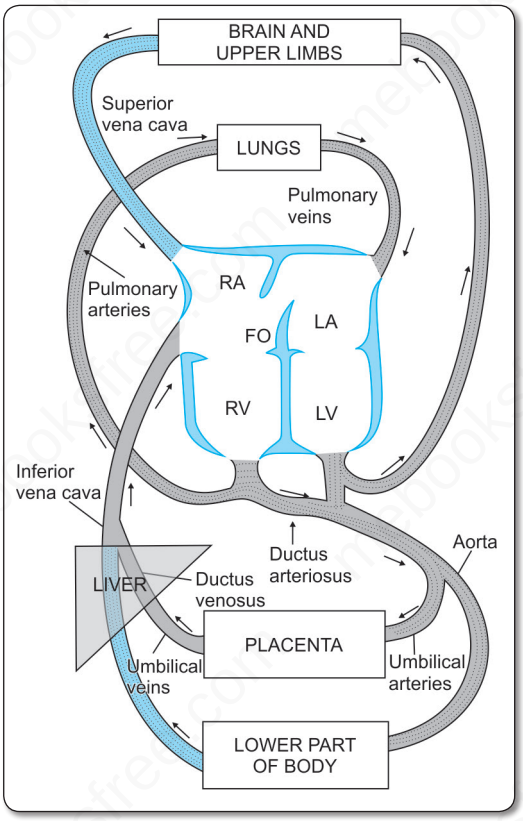


Fig. 2.5: Fetal circulation
(FO: Foramen ovale)

Extra Edge:

Changes in the circulation at Birth

Soon after birth, several changes take place in the fetal blood vessels which lead to establishment of the adult type of circulation. The changes are as follows:

- The muscle in the wall of the *umbilical arteries contracts* immediately after birth, and occludes their lumen. This prevents loss of fetal blood into the placenta.
- The *lumen of the umbilical veins* and the ductus venosus is also occluded, but this takes place a few minutes after birth, so that all fetal blood that is in the placenta has time to drain back to the fetus.
- The ductus arteriosus is occluded, so that all blood from the right ventricle now goes to the lungs, where it is oxygenated.
- The pulmonary vessels increase in size and, consequently, a much larger volume of blood reaches the left atrium from the lungs. As a result, the pressure inside the left atrium is greatly increased. Simultaneously, the pressure in the right atrium is diminished because blood from the placenta no longer reaches it. The net result of these pressure changes is that pressure in the left atrium now exceeds that in the right atrium causing the valve of the foramen ovale to close.
- The vessels that are occluded soon after birth are replaced by fibrous tissue and form the following ligaments:

Vessel	Remnant
a. Umbilical **A**rteries	**M**edial **U**mbilical **L**igaments[Q]
b. Left umbilical vein	Ligamentum teres of the liver[Q]
c. Ductus venosus	Ligamentum venosum[Q]
d. Ductus arteriosus	Ligamentum arteriosum[Q]

Mnemonic

- **Friends this table is easy to memorise, if you remember the mnemonic**
- **AMUL-A**rtery forms **M**edial **U**mblical **L**igament

17. Ans. is b i.e 5 days after fertilization

Zona hatching occurs just before implantation, i.e. 5 days after fertilization i.e. D19.

18. Ans is b i.e. Diplotene stage of prophase *Ref. Novaks Gynae 15/e, p 152*

Meiosis 1 is arrested in prophase.

Prophase is further divided into five stages- leptotene, zygotene, patchytene, diplotene and diakinesis.

The first meiotic division gets arrested in the embryonic life in the late diplotene stage of prophase.

The division is completed only after puberty just prior to ovulation.

19. Ans is c i.e. 70-80 days *Ref. Novaks Gynae, 15/e*

Spermatogenesis on average takes 70-80 days (75 days).

20. Ans is d i.e. 7 hours

Capacitation – The term capacitation refers to the changes which occurs in the sperm before it fertilizes the ova. It is the functional maturation of the spermatozoa.
- Average time required = 6-8 hours.
- Capacitation occurs in female reproductive tract.
- It begins in the cervix
- Majority part occurs in fallopian tube.

21. Ans is b i.e. Middle piece

During spermiogenesis – spermatid transforms into the sperm.

Part of spermatid	Part of sperm which it forms
• Nuclear material	Head of sperm
• Golgi body	Acrosomal cap
• Mito chondrion	Middle piece of sperm
• Microtubules	Axial filament/Tail of sperm

Note: Sperms lack endoplasmic reticulum.

22. Ans is a i.e. 3 weeks

23. Ans is d i.e. 24 weeks

3 weeks: Time table of events

At 6 weeks POG	Migrate to ovary
9 weeks	Form oogonia
12 weeks	Form primary oocyte
14 weeks	Follicle formation begins
24 weeks	Follicle competed

3

Placenta and Amniotic Fluid

PLACENTA

The human placenta is **discoid**, because of its shape; **hemochorial**, because of direct contact of the chorion with the maternal blood and **deciduate**, because some maternal tissue is shed at parturition.

Development

The placenta is developed from two sources. The principal component is fetal which develops from the chorion frondosum (Trophoblast) and the maternal component consists of decidua basalis.

Friends, it is very easy to mug up that trophoblast forms the placenta and fetal membranes viz chorion and amnion.

But if you really want to understand and know what is trophoblast and how it forms the placenta and fetal membranes, you will have to revise embryology with me:

- As fertilisation of the ovum occurs and a zygote is formed, it undergoes cleavage to form 3, 4, 6 cell stage.
- This cleavage continues till it is 16 cell staged and is called as ***Morula.***
- Cells of morula differentiates into an inner cell mass which is completely surrounded by an outer layer of cells.
- The cells of the outer layer give rise to a structure called as the ***trophoblast.*** The trophoblast differentiates 7-9 days after fertilisation into cytotrophoblast and synctiotrophoblast. **The trophoblast gives rise to the Amnion, Chorion and the fetal side of the placenta.**
- Some fluid passes from the uterine cavity into the morula. So that the inner cell mass attaches to trophoblast on one side only. The morula now becomes a ***'blastocyst'.***
- *As the blastocyst develops further the inner cell mass differentiates into ectoderm and endoderm initially followed by mesoderm later.*
- *The trophoblast gives origin to amnion, chorion and the placenta.*

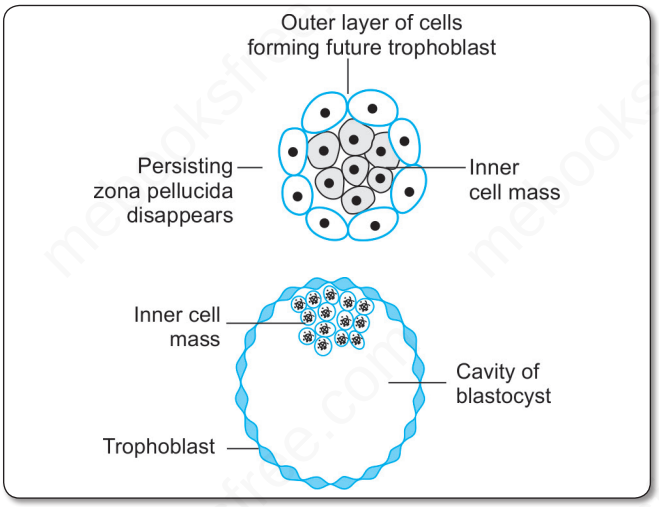


Fig. 3.1: Formation of blastocyst

Extra Edge

Questions asked on Morula

- **Zygote enters the uterine cavity in the form of** Morula
- **Zygote enters the uterine cavity** on 17-18th day of menstrual cycle, i.e 3-4 days after the fertilisation.

Questions asked on Blastocyst

- **Implantation of the zygote occurs in the form of-** Blastocyst
- **Implantation occurs on-6-8 days after fertilisation** = 20-22 nd day of menstrual cycle.

Formation of Placenta

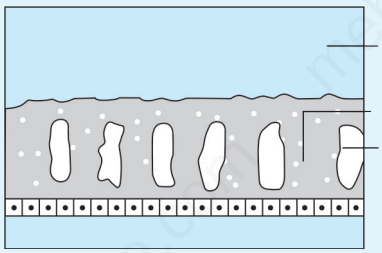


Fig. 3.2: Showing formation of lacuna

Placenta is formed by the trophoblast:

- The trophoblast differentiates into syncytiotrophoblast and cytotrophoblast.
- The cytotrophoblast rests on the mesoderm.
- Small cavities appear in the syncytiotrophoblast called as *Lacunae.*
- **The lacunae are separated from one another by partitions of syncytium called as trabeculae.**

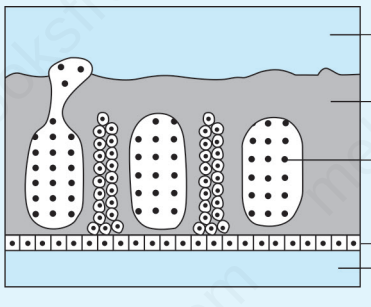


Fig. 3.3: Showing formation of primary villi

- **The syncytiotrophoblast grows into the endometrium (Decidua). As the endometrium is eroded, some of the maternal blood vessels are opened up and blood from them fills the lacunar space. So, lacunae have maternal blood.**
- **Each trabeculas is, initially made up entirely of syncytiotrophoblast. Later cells of cytotrophoblast begin to multiply and grow into each trabeculas. This is called as Primary villi.**

Note: These cells of cytotrophoblast are called as villous cells. Some cells of cytotrophoblast. The extravillous cells invade decidua and spiral arterioles of the mother and make spiral arterioles resistant to vasopressors called as trophoblastic invasion. This helps in maintaining uteroplacental circulation. If thus fails to happen female develops PIH (incomplete trophoblastic invasion).

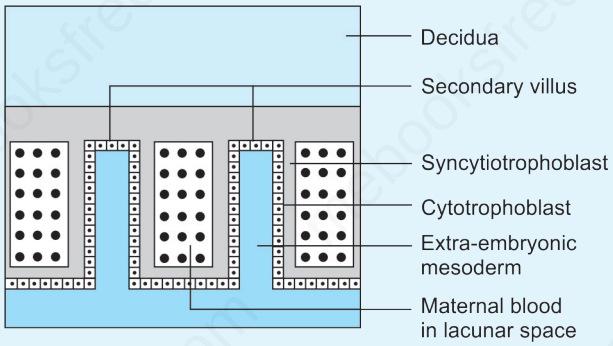


Fig. 3.4: Showing formation of secondary villi

Extra embryonic mesoderm then invades the centre of each primary villus. This is now called as secondary villus.

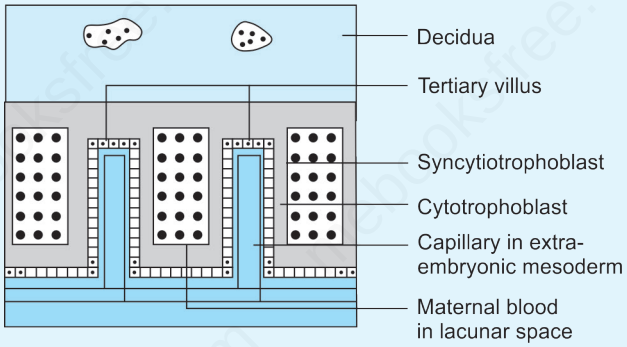


Fig. 3.5: Showing formation of tertiary villi

Soon thereafter, fetal blood vessels can be seen in the mesoderm forming the core of each villus. The villus is called as *Tertiary villus.* Thus the maternal blood in the lacuna is never in direct contact with fetal blood. They are separated by:

- Syncytiotrophoblast
- Cytotrophoblast
- Basement membrane
- Mesoderm
- Endothelium of fetal capillaries

Together called as **placental barrier or Placental membrane**

Note: (1) The placental barrier is about 0.025 mm thick. (2) An increase in thickness of the villous membrane is seen in cases with IUGR and cigarette smokers. (3) Initially villi are formed all over the trophoblast. Later villi at the embryonic pole proliferate and at abembryonic pole degenerate. The embryonic end is called as chorion frondosum and abembryonic end chorion laeve.

Remember

Primary villi can first be distinguished in the human placenta on about 13th day after fertilisation.
Secondary villi are seen 16th day after fertilization.
Tertiary villi are seen 21st day after fertilization.
Maternal arterial blood enters the intervillous space by 15th day after fertilization and by 17th day fetal blood vessels are functional and placental circulation is established.

The Placenta at Term

- The placenta, at term, is almost a circular disk with a diameter of 15–20 cm and thickness of 3 cms at its center.
- It weighs **500 gm**,[Q] the proportion to the weight of the baby being roughly **1 : 6 at term**[Q] **(At 17 weeks of gestation the weight of the placenta and fetus are equal)**[Q]
- Occupies about 30% of the uterine wall.
- **It presents two surfaces, fetal and maternal, and a peripheral margin.**

Fetal surface: The fetal surface is covered by the smooth and glistening amnion with the umbilical cord attached at or near its center. **At term, about four-fifths of the placenta is of fetal origin.**

Maternal surface: The maternal surface is rough and spongy. Maternal blood gives it a dull red color. The maternal surface has 10–38 convex polygonal areas known as **lobes** which are limited by fissures. Each fissure is occupied by the **decidual septum which is derived from the basal plate**. The total number of placental lobes remains the same throughout gestation and individual lobes continue to grow. Some people refer to lobes as cotyledons. This is not correct. **A cotyledon** or **lobule is the functional unit of placenta** originating from a main (stem villus primary). The maternal portion of the placenta amounts to less than one-fifth of the total placenta. **Only the decidua basalis and the blood in the intervillous space are of maternal origin.**

- **Separation:** Placenta separates after the birth of the baby and **the line of separation is through the decidua spongiosum.**
- **Nitabuch's membrane** is the fibrinoid deposition in the outer syncytiotrophoblast. It limits the further invasion of the decidua by the trophoblast. Absence of the membrane causes placenta accreta.
- **FFN (fetal fibronectin)** has been called **trophoblast glue** to suggest a critical role for this protein in the migration and attachment of trophoblasts to maternal decidua. The presence of FFN in cervical or vaginal fluid can be used as a prognostic indicator for preterm labor.
- The stroma of placenta has fetal macrophages called as **Hofbauer cells**.
- **The tumors** which can metastasize to placenta are melanoma, leukemias, lymphomas and breast cancer.
- Placental tumor which can metastasize to fetus also – melanoma.

Placental Circulation

Placental circulation consists of independent circulation of blood in two systems:

- **Uteroplacental circulation**
- **Fetoplacental circulation**

Uteroplacental circulation: It is concerned with the circulation of the maternal blood through the intervillous space. A mature placenta has a volume of about 500 mL of blood; 350 mL being occupied in the villi system and 150 mL lying in the intervillous space. The uteroplacental blood flow at term is 450-650 ml/min.

Table 3.1: Summary of Intervillous Hemodynamics

• Volume of blood in mature placenta	500 mL
• Volume of blood in intervillous space	150 mL
• Blood flow in intervillous space	500–600 mL/min
• Pressure in intervillous space:	
◦ During uterine contraction	30–50 mm Hg
◦ During uterine relaxation	10–15 mm Hg
• Pressure in the supplying uterine artery	70–80 mm Hg
• Pressure in the draining uterine vein	8 mm Hg

Fetoplacental circulation: The two umbilical arteries carry the impure blood from the fetus to the placenta. They enter the chorionic plate underneath the amnion and branch repeatedly to form the chorionic arteries which are end arteries. There branches are called as truncal arteries. Each truncal artery supplies one main stem villus and thus one cotyledon.

The oxygenated blood then returns to the fetus via single umbilical vein.

The fetal blood flow through the placenta is about 400 mL/min.

Table 3.2: Summary of fetal hemodynamics

• Fetal blood flow through the placenta	—	400 mL/min[Q]
• Pressure in the umbilical artery	—	60 mm Hg
• Pressure in the umbilical vein	—	10 mm Hg
• Fetal capillary pressure in villi	—	20–40 mm Hg
	Umbilical artery	**Umbilical vein**
• O_2 saturation	50–60%	70–80%
• PO_2	20–25 mm Hg	30–40 mm Hg

Points to Remember

- **The uteroplacental circulation is established 10–12 days after fertilization.**
- **Fetoplacental circulation is established 21 days postfertilization.**
- **Uterine blood flow at term = 750 ml/min (nonpregnant 50 ml/min)**
- **Uteroplacental blood flow at term = 450–650 ml/min**
- **Fetal placental blood volume at term = 125 ml/kg**

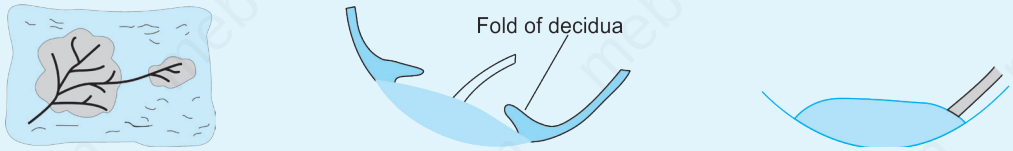
Placental Pathology

- **Placental infarction:** These are the most common placental lesion. If they are numerous, placental insufficiency may develop. When they are thick, centrally located and randomly distributed, they may be associated with **preeclampsia** or **lupus anticoagulant. They can also lead to placental abruption.**
- **Placentomegaly** (big placenta) is seen in:
  - Multiple pregnancies
  - Diabetes mellitus
  - Maternal anemia or a placenta >40 mm thick
  - Macrosomy
  - Hydrops fetails (immune and nonimmune)
  - Syphilis
  - Toxoplasma CMV infection.
- **Small placentas are seen in:**
  - Postdatism
  - IUGR
  - Placental infarcts

Abnormal Placenta

Table 3.3: Abnormality of the placenta

Abnormality	Feature	Diagram
Succenturiate placenta	When a small part of placenta is separated from the rest of placenta. A leash of vessels connecting the mass to the small lobe traverse through the membranes. In case the communicating blood vessels are absent, it is called as *Placenta spuria.* It can be retained leading to PPH, sub involution, uterine sepsis and polyp formation ***Note:*** The accessory labe in succenturiate placenta is developed from the activated villi on the chorionic laeva.	3.6 A
Circumvallate placenta	When the peripheral edge of the placenta is covered by a circular fold of amnion and chorion and fetal surface has a central depression. It can lead to abortion, APH[Q], IUGR[Q], Preterm[Q] delivery and hydrorrhea gravidarum.	3.6 B
Battle dore placenta	Placenta with umblical cord attached to its margin rather than in centre	3.6 C



Figs. 3.6A to C

FETAL MEMBRANES

1. Amnion – innermost fetal membrane, avascular. It provides almost all tensile strength of the fetal membranes. It lacks smooth muscle cells, nerves, lymphatics and blood vessels. It is now being considered as a derivative of fetal ectoderm. The layer is formed between 10-11 days after fertilization.
2. Chorion - Formed 8 days after fertilization. Chorion frondosum forms placental villi. Chorion leave gets merged with amnion
3. Yolk sac
4. Allantois- diverticulum which arises from hindgut and grows into the connecting stalk.

UMBILICAL CORD

- Umbilical cord (or funis) extends from the fetal umbilicus to the fetal surface of the placenta or chorionic plate.
- It develops from the connecting stalk.[Q]
- In the early fetal life, cord has 2 arteries and 2 veins but later right umbilical vein disappears, leaving only the original left vein (i.e. Left is left)[Q]. *Thus at term umbilical cord has 2 arteries and 1 vein.*[Q]

Structure and Function

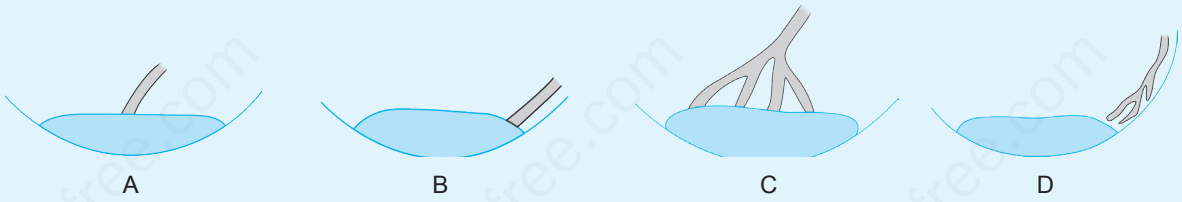
- Its length is ≈ 55 cm, Range is between 30-100 cm (If it is < 32 cm it is considered abnormally short).[Q]
- Folding and tortuosity of the vessels within the cord itself creates false knots (which are essentially varices).
- The two arteries are smaller in diameter than the veins.[Q]
- When fixed in their normally distended state, the umbilical arteries exhibit transverse **intimal folds of Hoboken**[Q] across their lumen.
- The extracellular matrix, which is specialized connective tissue consists of Wharton's Jelly.[Q]
- Anatomically umbilical cord can be regarded as a fetal membrane.[Q]
- The O_2 Supply to fetus is at the rate of 5 ml/kg min and this is achieved with cord blood flow of **105–320 ml/min**

Short Cord is associated with	Excessively long cord is associated with
• IUGR • Abnormal lie/presentation • Congenital malformations • Premature placental separation	• Cord entanglement • Cord around the neck of fetus • Fetal distress • Cord prolapse • Fetal anomalies

- Normally, the umblical cord is inserted at the centre of the fetal surface of the placenta.

Abnormalities of the Cord Insertion

Abnormality	Features	Diagram
Normal	The umblical cord is attached to the placenta near the centre	3.7 A
Marginal	Cord is attached to the margin of the placenta (this type of placenta is called **Battledore placenta.**	3.7 B
Furcate	Here the blood vessels divide before reaching the placenta.	3.7 C
Velamentous	Here the blood vessels are attached to the amnion, where they ramify before reaching the placenta.	3.7 D



Figs. 3.7A to C

Single umblical artery

- It is seen in 0.7-0.8% cases of single pregnancy and 5% of twin pregnancy.
- More common in diabetic patients, black patients, with eclampsia, hydramnios and oligohydramnios, epilepsy patients and in APH.
- Finding of a single umbilical artery is not insignificant and is associated with:
  - *Congenital malformations of the fetus in 20-25% cases amongst which cardiovascular anomalies (M/C) and Renal anomalities. If single umbilical artery is an isolated finding chances of aneuploidy in fetus are not increased but if SUA is associated with other major malformations – then chances of aneuploidy in the fetus are high and amniocentesis should be done are common.*
  - *M/c aneuploidy associated with SUA—Trisomy (Trisomy 18).*
  - *Increased chances of abortion, prematurity, IUGR and perinatal mortality.*

AMNIOTIC FLUID

Important Facts

- Specific gravity of Amniotic fluid: 1.008 to 1.010.
- Osmolality: 250 mosm/L.
- It is completely replaced in 3 hours.
- Rate of amniotic fluid turn over is 500 cc/hr.
- Volume of Amniotic fluid maximum is between 36-38 weeks (1l) and then decreases such that at term it is roughly 800-900 ml.

Composition of Amniotic Fluid

- Water-98-99%
- Solids-1-2%-include, organic solids like proteins, glucose, lipid,urea, uric acid, creatinine and hormones like—Prolactin, insulin and renin
- Inorganic solids are-Na, K and Cl

Origin of Amniotic Fluid

Amniotic fluid originates both from maternal and fetal sources:

- In early pregnancy – As an ultrafiltrate of maternal plasma.
- By beginning of the second trimester – It consists of extracellular fluid which diffuses through the fetal skin.
- After 20 weeks – Cornification of skin prevents this diffusion and amniotic fluid is composed of fetal urine.

Other minor contributors:

- Pulmonary fluid
- Fluid filtering through the placenta
- *The water in the amniotic fluid is completely changed and replaced in every 3 hours.*

Colour of Amniotic Fluid

- ***Early pregnancy*** – Colourless
- ***Near term*** – Pale straw coloured due to presence of exfoliated lanugo hairs and epidermal cells from the fetal skin.

Abnormal colour of amniotic fluid

- *Green* (meconium stained) - fetal distress/breech or transverse position/Listeria infection
- *Golden yellow* - Rh incompatibility (Because bilirubin levels are increased in amniotic fluid in case of Rhincompatibility).
- *Greenish yellow (saffron)* - postmaturity.
- *Dark coloured* - concealed hemorrhage.
- *Dark brown (tobacco juice)* - in case of IUD.

Volume of Amniotic Fluid

Weeks - gestation (Dutta obs. 7/e, p 38)	Amount of fluid	Weeks - gestation (Williams obs.)	Amount of fluid
12	50 ml	16	200 ml
20	400 ml	28	1000 ml
36-38	IL	38	900 ml
		40	800 ml

Function of Amniotic Fluid

Its main function is to protect the fetus.

- ***During pregnancy:*** (1) It acts as a shock absorber, protecting the fetus from possible extraneous injury; (2) Maintains an even temperature; (3) The fluid distends the amniotic sac and thereby allows for growth and free movement of the fetus and prevents adhesion between the fetal parts and amniotic sac; (4) It has some nutritive value.
- ***During labor:*** (1) The amnion and chorion are combined to form a hydrostatic wedge which helps in dilatation of the cervix.

- The assessment of amniotic fluid is an integral part of antepartum fetal assessment.
- Techniques used for measurement of Amniotic fluid - ultrasonographically:

Amniotic fluid index (AFI): is calculated by dividing the uterus into four quadrants and measuring the largest vertical pocket of liquor in each of the four quadrants. The sum of the four measurements is the AFI in cm. The range of 5-25 cm is considered normal. Less than 5 is considered significant oligohydramnios.

Single deepest pocket (SDP): is the depth of a single cord free pocket of amniotic fluid. The normal range is 2-8 cm. Over 8 cm is considered polyhydramnios. Less than 2 cm is considered as oligohydramnios.

ABNORMALITIES OF AMNIOTIC FLUID

Oligohydramnios

Oligohydramnios is a condition where liquor amnii is deficient (< 200 ml at term).

Sonographically it is defined as:

- Absence of amniotic fluid pocket.Q
- Maximum vertical diameter of amniotic fluid pocket less than 2 cm.Q
- Amniotic fluid index less than 5 cm.Q

Causes of Oligohydramnios

Mnemonic: Dil Mein Ppaar (read as pyaar)

Dil	• **D**rug (Prostaglandin Synthetase inhibitors and ACE inhibitors). **I**UGR **L**eaking of fluid following amniocentesis or chorionic villus sampling.
Mein	• **M**aternal conditions like hypertension and preeclampsia.
Ppaar	• **P**ost-term pregnancy • **P**remature rupture of membrane • **A**bruptiochronic • **A**mnion Nodosum.Q and chromosomal **a**nomaly like triploidy • **R**enal anomalies of fetus (leading to decreased urine production): – *Renal agenesis*Q – Urethral obstruction (posterior urethral valve) – Prune-Belly syndrome – Bilateral multicystic dysplastic kidneys.

Complications

Fetal: (1) Abortion (2) Deformity due to intra-amniotic adhesions or due to compression. The deformities include alteration in shape of the skull, wry neck, club foot, or even amputation of the limb (3) Fetal pulmonary hypoplasia (may be the cause or effect) (4) Cord compression (5) Fetal growth restriction.

Maternal: (1) Prolonged labor due to inertia (2) Increased operative interference due to malpresentation. The sum effect may lead to increased maternal morbidity.

Treatment

Isolated oligohydramnios in the third trimester with a normal fetus may be managed conservatively.

Oral administration of water increases amniotic fluid volume.

Amnioinfusion (prophylactic or therapeutic) for meconium liquor is found to improve neonatal outcome.

KEY CONCEPT

Amnioinfusion is the technique to increase the intrauterine fluid volume with normal saline (500 ml).

Indications are: *—Williams Obs. 22/e, p 462, 23/e, p 433*

- Treatment of variable or prolonged deceleration (i.e., fetal distress).
- Prophylaxis for cases of known oligohydramnios as with prolonged rupture of membrane.
- In an attempt to dilute or wash out thick meconium.

Besides the above mentioned therapeutic indications it can be used for diagnosis of:

i. Renal agenesis
ii. PROM (premature rupture of membrane)

Note:

- Temperature at which saline is infused = 37^{0}C.
- 250 ml of saline is infused in 30 minutes.

Intrauterine resting pressure should not be more than 25 mm of Hg at any time during infusion. *—Fernando Arias 3/e, p 94*

POLYHYDRAMNIOS

- It is a condition where liquor amnii is in excessive amount i.e., > 2 litres^Q. But since quantitative assessment of liquor amnii is impractical. Most common used definition is by ultrasound assessment i.e., when amniotic fluid index (AFI) is > 25 cm^Q or finding of a pocket of fluid measuring 8 cm^Q or more in vertical diameter.

Grades of Polyhydramnios^Q

- **Mild** defined as pockets measuring 8-11 cm in vertical dimension (seen in 80% cases).
- **Moderate** defined as pocket measuring 12-15 cm in vertical dimension (seen in 15% cases).
- **Severe** defined as free floating fetus found in pockets of fluid of 16 cm or more (seen in 5% cases).

Causes of Polyhydramnios

All of us know: The main contributor of amniotic fluid is fetal urine
Amount of amniotic fluid will be more (i.e. polyhydramnios) if:

- **Fetus produces more urine for e.g.:**
  a. Twin/multifetal pregnancy (number of fetus is more: more of urine)
  b. Maternal hyperglycemia/diabetes
     Maternal hyperglycemia → Fetalhyperglycemia → Fetal polyuria → increased amniotic fluid.
  c. Twin to Twin transfusion syndrome
- **Besides producing Amniotic fluid fetus also swallows amniotic fluid. The amount of amniotic fluid will increase if; fetal swallowing is impaired as in case of:**
  a. Cleft lip and cleft palate
  b. Esophageal atresia or stenosis
  c. Duodenal atresia or stenosis
  d. Bowel obstructione.
  e. Anencephaly (swallowing is decreased + increased transudation of CSF into amniotic fluid due to absence of cranial vault)
- **Other important causes of polyhydraminos which need to mugged up are:**
  1. Placental Causes
  a. Chorangioma of placenta and circumvallate placenta.
  2. Fetal Causes
  a. Hydropsfetalis
  b. Rubella, syphilis, Toxoplasma infection of fetus.
  c. Trisomy (note – Triploidy leads to oligohydraminos)
  d. Sacrococcygealteratoma
  e. Thallasemia of fetus.

Complications

Maternal

During pregnancy—There is increased incidence of: (1) Preeclampsia (25%) (2) Malpresentation and persistence of floating head (3) Premature rupture of the membranes (4) Preterm labor.

During labor: (1) Early rupture of the membranes (2) Cord prolapse (3) Uterine inertia (4) Increased operative delivery due to malpresentation (5) Retained placenta, postpartum hemorrhage and shock. The postpartum hemorrhage is due to uterine atony.

Puerperium: (1) Subinvolution (2) Increased puerperal morbidity due to infection.

Fetal: There is increased perinatal mortality. The deaths are mostly due to prematurity and congenital abnormality (40%).

Management

- **Serial amniocentesis** is the TOC[Q] if the patient is in distress (*Remember:* Amount of fluid removed is 500 ml/hr, maximum upto 1500–2000 ml).
- **Indomethacin therapy** is alternative management. It acts by decreasing fetal urinary output and by increasing reabsorption of fluid via lungs.

  Dose: 1.5–3 mg/kg/day.

  Potential hazard of Indomethacin therapy – Premature closure of fetal ductus arteriosus.

  So, the therapy should be stopped at 32 weeks.

QUESTIONS

1. The foetal blood is separated from syncytiotrophoblast with all *except*: **[AI 08, UP 07]**
a. Fetal blood capillary membrane
b. Mesenchyme of intervillous blood space
c. Cytotrophoblast
d. Decidua parietalis

2. The uterine blood flow at term: **[AIIMS Nov 09]**
a. 50 ml/min b. 100–150 ml/min
c. 350–375 ml/min d. 500–750 ml/min

3. The finding of a single umbilical artery on examination of the umbilical cord after delivery is: **[AIIMS Nov 09]**
a. Insignificant
b. Occurs in 10% of newborns
c. An indicator of considerably increased incidence of major malformation of the fetus
d. Equally common in newborn of diabetic and nondiabetic mothers

4. All are true regarding Duncan's placental separation *except*:
a. Peripheral separation
b. Maternal surface presents at vulva
c. More blood los
d. Most commmon method of separation

5. Amniotic fluid is mainly produced by:
a. Placenta **[AIIMS June 98]**
b. Fetus
c. Chorion
d. Amnion

6. The pH of amniotic fluid is: **[AIIMS Nov 01]**
a. 6.8 to 6.9
b. 7.1 to 7.3
c. 7.4 to 7.6
d. 6.7 to 6.8

7. Surfactant appears in amniotic fluid at the gestational age of: **[AIIMS Nov 01]**
a. 20 weeks
b. 32 weeks
c. 36 weeks
d. 28 weeks

8. The amniotic fluid is in balance by: **[PGI Dec 01]**
a. Excretion by fetal kidneys
b. Maternal hemostasis
c. Fetal intestinal absorption
d. Fetal membrane absorption
e. Fetal sweating

9. Oligohydramnios is seen in: **[AIIMS Nov 99]**
a. Renal agenesis b. Oesophageal atresia
c. Exomphalos d. Neural tube defect

10. Oligohydramnios is/are associated with:
a. Neural tube defect **[PGI May 2010]**
b. Renal agenesis
c. Postmature birth
d. Premature birth

11. Renal agenesis is associated with:
a. Hydramnios **[AIIMS Feb 97]**
b. Anencephaly
c. Tracheo-oesophageal fistula
d. Oligohydramnios

12. Which of the following conditions is associated with polyhydramnios? **[AIIMS May 2010]**
a. Posterior urethral valve
b. Cleft palate
c. Congenital diaphragmatic hernia
d. Bladder exostrophy

13. A pregnant woman is found to have excessive accumulation of amniotic fluid. Such polyhydramnios is likely to be associated with all of the following conditions *except*: **[AIIMS Nov 03; Nov 07]**
a. Twinning
b. Microencephaly
c. Oesophageal atresia
d. Bilateral renal agenesis

14. Causes of polyhydraminos include: **[PGI Dec 01]**
a. Diabetes mellitus
b. Preeclampsia
c. Esophageal atresia
d. Renal agenesis
e. Anencephaly

15. Causes of hydramnios: **[PGI June 04]**
a. Anencephaly
b. Oesophageal atresia
c. Renal agenesis
d. Posterior urethral valve
e. Twins

16. All are associated with hydramnios *except*:
a. Premature labour **[PGI Dec 00]**
b. Gestational diabetes
c. Renal agenesis
d. Increased amniotic fluid

17. Indication of amnioinfusion is: **[PGI Dec 06]**
a. Oligohydramnios
b. Suspected renal anomalies
c. To facilitate labour
d. In case of fetal distress

18. A case of 35 week pregnancy with hydramnios and marked respiratory distress is best treated by:
a. Intravenous frusemide **[AI 04]**
b. Saline infusion
c. Amniocentesis
d. Artificial rupture of membranes

19. Amount of liquor is maximum at: **[New Pattern Question]**
a. 32–34 weeks
b. 36–38 weeks
c. 34–36 weeks
d. 38–40 weeks

20. Golden colour amniotic fluid is seen in: **[New Pattern Question]**
a. Rhincompatibility
b. Foetal death
c. IUGR
d. Foetal distress

21. The major contribution of the amniotic fluid after 20 weeks of gestation: **[New Pattern Question]**
a. Ultrafiltrate and maternal plasma
b. Fetal urine
c. Fetal lung fluid
d. Fetal skin

22. Uteroplacental blood flow at term is: **[New Pattern Question]**
a. 300–500 ml/min
b. 500–700 ml/min
c. 700–900 ml/min
d. 900–1100 ml/min

23. The folds of Hoboken are found in: **[New Pattern Question]**
a. The amnion
b. The placenta
c. Uterus
d. Umbilical cord
e. Ductus venosus

24. Fetal blood loss in abnormal cord insertion is seen in: **[New Pattern Question]**
a. Vasa previa
b. Decidua basalis
c. Battle dore placenta
d. Succenturiate placenta

25. Human placenta is best described as: **[New Pattern Question]**
a. Discoidal
b. Hmochorial
c. Deciduate
d. All of the above

26. Placenta succenturiata may have all *except*: **[New Pattern Question]**
a. Preterm delivery
b. PPH
c. Missing lobe
d. Sepsis and subinvolution

27. Decidual space is obliterated by: **[New Pattern Question]**
a. 10th week
b. 12th week
c. 14th week
d. 16th week

28. Weight of placenta and fetus are equal at: **[New Pattern Question]**
a. 14 weeks
b. 15 weeks
c. 17 weeks
d. 21 weeks

29. What is a placental cotyledon? **[New Pattern Question]**
a. All branches from one stem villi
b. Area supplied by one spiral artery
c. Quarter of placenta
d. Area drained by one terminal villi

30. Blood flow in intervillous space at term: **[New Pattern Question]**
a. 150 ml
b. 250 ml
c. 300 ml
d. 500 ml

EXPLANATIONS & REFERENCES

1. Ans. is d i.e. Decidua parietalis *Ref. IB Singh, Embryology, p 66, 67*

The maternal blood in the lacuna is never in direct contact with fetal blood. They are separated by:

- Syncytiotrophoblast
- Cytotrophoblast
- Basement membrane
- Mesoderm
- Endothelium of fetal capillaries

} Together called as **placental barrier or membrane (0.025 mm)**

2. Ans. is d i.e. 500–750 ml/min *Ref: Dutta 8/e*

Hence:

Uterine blood flow in nonpregnant females = 50 ml/min
Uterine blood flow in pregnant females = 750 ml/min
Uteroplacental flow at term = 450-650 ml/min
Fetoplacental blood volume at term = 125 ml/kg
Placental volume at term = 500 ml
Fetal blood flow through placenta at term = 400 ml/min
Volume of blood in intervillous space = 150 ml

3. Ans. is c i.e. An indicator of considerably increased incidence of major malformation of the fetus
Ref: Williams Obs 23/e, p 582

Single Umblical Artery

- It is seen in 0.7–0.8% cases of single pregnancy and 5% of twin pregnancy
- More common in diabetic patients, black patients, with eclampsia, hydramnios and oligohydramnios, epilepsy patients and in APH.
- Finding of a single umblical artery is not insignificant and is associated with:
  - i. *Congenital malform ations of the fetus in 20–25% cases amongst which cardiovascular and genitourinary anomalies are common.*
  - ii. *Increased chances of abortion, prematurity, IUGR and perinatal mortality.*

4. Ans. is d i.e. Most comman method of separation *Ref: Williams obs 23/e, p 147*

Placental Separation:

There are 2 ways of palcental separation
- Central separation: Schultz mechanism
- Peripheral: Duncan mechanism.

"Most commonly during placental delivery, a retroplacental hematoma forms and pushes the center forward and causes it to separate toward the uterine cavity. Weighted by this hematoma, the placenta descends, drags the membranes, and peels them from their uterine attachment. Consequently, the glistening amnion, covering the placental surface, presents at the vulva. The retroplacental hematoma either follows the placenta or is found within the inverted sac. In this process, known as the Schultze mechanism of placental expulsion, blood from the placental site pours into the membrane sac and does not escape externally until after extrusion of the placenta. In the other method of placental extrusion, known as the Duncan mechanism, the placenta separates first at the periphery. As a result, blood collects between the membranes and the uterine wall and escapes from the vagina. In this circumstance, the placenta descends sideways, and the maternal surface appears first"... —Williams Obs. 23/e, p147

So according to Williams central separation is more common.

Also Remember: The plane of separation runs through deep spongy layer of decidua basalis.

5. **Ans. is b i.e. Fetus** *Ref. Dutta Obs. 7/e, p 37; Williams Obs. 22/e, p 102, 23/e, p 88, 89*

"The precise origin of the amniotic fluid remains is still not well understood. It is probably of mixed maternal and fetal origin." *—Dutta Obs. 8/e, p 43*

But this cannot help us to solve this question.

Let's see what *Williams Obs.* has to say on Origin of Amniotic fluid.

"In early pregnancy, amniotic fluid is an ultrafiltrate of maternal plasma. By the beginning of second trimester, it consists largely of extracellular fluid which diffuses through the fetal skin, and thus reflects the composition of fetal plasma".

After 20 weeks, however, the cornification of fetal skin prevents this diffusion and amniotic fluid is composed largely of fetal urine." *—Williams Obs. 23/e, p 88, 89*

Reading the above text, it can be concluded that in early pregnancy - Mother is the main contributor whereas during rest of the pregnancy - Fetus is the main contributor.

6. **Ans. is b i.e. 7.1 to 7.3** *Ref. COGDT 10/e, p 184*

"Amniotic fluid has a low specific gravity (1.008) and a pH of 7.2." *—COGDT 10/e, p 184*

"Amniotic fluid usually has a pH of 7.0 to 7.5." *—Fernando Arias 3/e, p 245*

Amongst the given options—7.1 to 7.3 seems to be the most appropriate option.

7. **Ans. is d i.e. 28 weeks**

Friends, I had to search a lot for this answer but all in vain.

By concensus the following facts on surfactant need to be remembered.

Surfactant synthesis begins at 20 weeks.

Surfactant appear in amniotic fluid by 28 weeks.

8. **Ans. is a, b, c,d and e i.e. Excretion by fetal kidneys; Maternal hemostasis; Fetal intestinal absorption; Fetal membrane absorption and Fetal sweating**

Ref. Dutta Obs. 7/e, p 37, 38; Williams Obs. 22/e, p 102; 23/e, p 88, 89; COGDT 10/e, p 184

Read the text for explaration

9. **Ans. is a i.e. Renal agenesis**.

10. **Ans. is b and c i.e. Renal agenesis and Postmature birth**

Ref. Dutta Obs. 7/e, p 215; Frnando Arias 2/e, p 321, 322; Williams Obs. 22/e, p 530, 532, 23/e, p 495

Causes of oligohydramnios:

Mnemonic: Dil Mein Ppaar (read as pyaar)

Dil	• **D**rug (Prostaglandin synthetase inhibitors and ACE inhibitors). **I**UGR **L**eaking of fluid following amniocentesis or chorionic villus sampling.
Mein	• **M**aternal conditions like hypertension and preeclampsia.
Ppaar	• **P**ostterm pregnancy • **P**remature rupture of membrane • **A**bruptio-chronic • **A**mnion Nodosum.^{Q} and chromosomal **a**nomaly like triploidy • **R**enal anomalies of fetus(leading to decreased urine production): – *Renal agenesis*^{Q} – Urethral obstruction (Posterior urethral valve) – Prune-Belly syndrome – Bilateral multicystic dysplastic kidneys.

Note: Most common complication of oligohydramnios is *Pulmonary hypoplasia*^{Q}.

11. **Ans. is d i.e. Oligohydramnios** *Ref. Dutta Obs. 7/e, p 215*

Fetal urine is the main contributor of Amniotic fluid beyond 20 weeks therefore. In case of Renal agenesis → decrease/no urine → oligohydramnios.

12. **Ans. is b i.e. Cleft palate**

13. **Ans. is d i.e. Bilateral renal agenesis**

Ref. Dutta Obs. 7/e, p 215; Fernando Arias 2/e, p 3201; Williams Obs 23/e, p 495, 496, Ultrasound in Obs and Gynee by Merz 2004, 11/e, p 411

Discussed in detail in preceeding text.

14. Ans. is a, c and e i.e. Diabetes mellitus; Esophageal atresia; and Anencephaly *Ref. Dutta Obs. 7/e, p 211, 212*

Friends, for a second - let's forget the lists of conditions leading to Oligohydramnios/Polyhydramnios (This happens quite often in exams).

Let's reason out each option one by one.

Option "a" **Diabetes mellitus**

We all know polyhydramnios is a complication of maternal diabetes.

Pathophysiology:

Maternal hyperglycemia
↓
Fetal hyperglycemia
↓
Polyuria (of fetus) and osmotic diuresis
↓
Polyhydramnios (***Option "a"*** is correct)

Option "b" **Preeclampsia**

Preeclampsia
↓
Decreased uteroplacental circulation
↓
Decreased fetal renal blood flow
↓
Decrease urine production by fetus
↓
Oligohydramnios

Option "c" **Esophageal atresia**

We all know - Amniotic fluid is kept in balance with the rate of production, by fetal swallowing of amniotic fluid.

In case of oesophageal atresia
↓
Decrease fetal swallowing
↓
i.e., Decrease absorption
↓
Polyhydramnios (***option "c"*** is correct)

Same is the case with congenital diaphragmatic hernia/Facial clefts/Neck masses.

Option "d" **Renal agenesis**

Renal agenesis
↓
Decrease urine production
↓
Oligohydramnios (***Option "d"*** is incorrect)

Same holds good for posterior urethral value in males.♀

Option "e" **Anencephaly**

In anencephaly (or meningomyelocele or spina bifida)
↓
Meninges are exposed
↓
Increase transudation of fluid from exposed meninges
↓
Polyhydramnios (***Option "e"*** is correct)

So friends, it is not essential to mug up most of the causes of oligo/polyhydramnios.

Some causes which need to mugged up are:

	Polyhydramnios	Oligohydramnios
Placental causes	• Placental chorioangioma[Q] • Circumvallate placental[Q]	• Amnion Nodosum[Q]
Chromosomal anomalies	• Trisomy 13, 18 and 21 Down syndrome	• Triploidy
Fetal tumors	• Sacrococcygeal tumors	
Hematological disorders	• Rh isoimmunization • Alpha thalassemia	
Intrauterine infections	• Rubella • Syphilis and Toxoplasma	

15. Ans. is a, b and e i.e. Anencephaly; Oesophageal atresia; and Twins *Ref. Dutta Obs. 7/e, p 211, 212*

16. Ans. is c i.e. Renal agenesis *Ref. Dutta Obs. 7/e, p 211, 212*

Already explained

17. Ans. is a, b and d i.e. Oligohydramnios; Suspected renal anomalies; In case of fetal distress

Ref. Dutta Obs. 7/e, p 614; Fernando Arias 3/e, p 94; Williams Obs. 22/e, p 462, 23/e, p 432 433

Amnioinfusion is the technique to increase the intrauterine fluid volume with normal saline (500 ml).
Indications are: *—Williams Obs. 22/e, p 462, 23/e, p 433*

- Treatment of variable or prolonged deceleration (i.e., fetal distress).
- Prophylaxis for cases of known oligohydramnios as with prolonged rupture of membrane.
- In an attempt to dilute or wash out thick meconium.

Besides the above mentioned therapeutic indications it can be used for diagnosis of:

i. Renal agenesis
ii. PROM (Premature rupture of membrane) *—Fernando Arias 3/e, p 94*

"Amnioinfusion in patients with oligohydramnios is not a simple procedure. The needle should be advanced slowly with continuous ultrasound visualization and when its tip has reached the interface between the fetus and the membranes warmed saline solution should be infused.

In majority of cases, 250-350 ml of saline solution will be necessary to achieve optimal ultrasound transmission and perform a careful level II examination. A normal fetus will swallow the infused fluid, and its bladder will be easily seen with ultrasound after 20 minutes. The bladder will not be seen in fetuses with renal agenesis.

Before ending the amnioinfusion, 1 ml of indigo carmine is injected inside the amniotic sac. The patient is instructed to wear a tampon for a few hours following the procedure and observe for evidence of blue discoloration. This finding will confirm the presence of PROM." *—Fernando Arias 3/e, p 94*

Note:

- Temperature at which saline is infused = 37^0C.
- 250 ml of saline is infused in 30 minutes.
- Intrauterine resting pressure should not be more than 25 mm of Hg at any time during infusion.

Remember-Mnemonic for aminoinfusion:

P- Premature rupture of membranes
R- Renal agenesis (diagnostic purpose)
O- Oligohydramnios
M-t o dilute or wash meconium in case of fetal distress

18. Ans. is c i.e. Amniocentesis *Ref. Dutta Obs. 7/e, p 214; Williams Obs. 22/e, p 529, 530, 23/e, p 494, 495*

The patient in the question has marked respiratory distress (i.e. it is a severe polyhydramnios and requires treatment) and gestational age is 35 weeks (i.e., fetal maturity is not yet achieved).

So our aim should be to relieve the distress of patient in hope of continuing the pregnancy till atleast 37 weeks.

This can be achieved by:

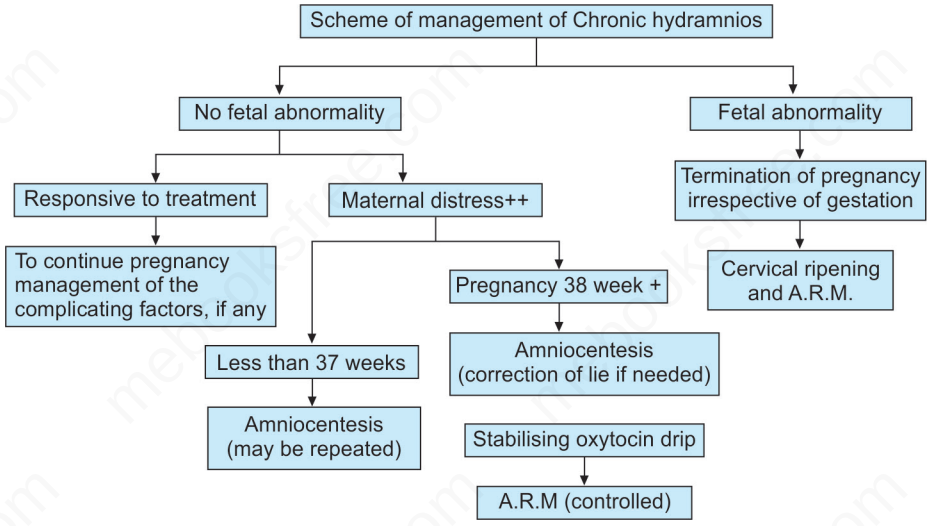
- Amniocentesis or
- Use of Indomethacin

Amniocentesis:

- The main aim of amniocentesis is to relieve maternal distress with the added advantage that lung maturity of fetus can be predicted by Lecithin/Sphingomyelin ratio in the expressed fluid.
- Slow decompression is done at the rate of 500 ml/hr.
- Maximum fluid removed is 1.5 – 2 litres.

Use of Indomethacin -Indomethacin should not be used inpregnanacy more than 32 weeks because it leads to premature closure of ductus arteriosus.

Amniotomy: The main disadvantage of amniotomy is the possibility of cord prolapse and placental abruption. Slow removal of fluid by amniocentesis helps to obviate these dangers. *—Williams Obs. 22/e, p 530, 23/e, p 495*



19. Ans. is b i.e. 36–38 weeks *Ref. Dutta Obs. 7/e, p 38; Williams Obs 22/ e, p 526, 23/e, p 494, 495.*

"Volume of amniotic fluid is maximum at 36-38 weeks ≈ 1 litre and then amniotic fluid decreases."

—Dutta Obs 7/e, p 37; 8/e, p 43

"Normally amniotic fluid volume increases to about IL by 36 weeks and decreases thereafter"

—Williams Obs. 22/e, p 526, 23/e, p 494

20. Ans. is a i.e. Rhincompatibility *Ref. Dutta Obs. 7/e, p 38*

Already explained

21. Ans. is b i.e. Fetal urine *Ref. Williams Obs. 22/e, p 102*

Origin of amniotic fluid:

Gestation	Major contributor of amniotic fluid
Early week	Maternal plasma
2nd trimester	Fetal skin
Beyond 20 weeks	Fetal urine

22. Ans. is c i.e. 700-900 ml/min *Ref. Williams Obs. 24/e, p 132*

I knew this is coming as a surprise for many of you but read for youself what Williams has to say–

"Uteroplacental blood flow near term has been estimated to be 700-900 ml/min, with most of the blood apparently going to the intervillous space". *—Williams Obs 24/e, p 132*

23. Ans. is d i.e. Umbilical cord *Ref. Williams Obs. 22/e, p 68, 69; 23/e, p 61, 62; 23/e, p 61, 62*

Here are few named structures frequently asked and the organ/structure where it is found.

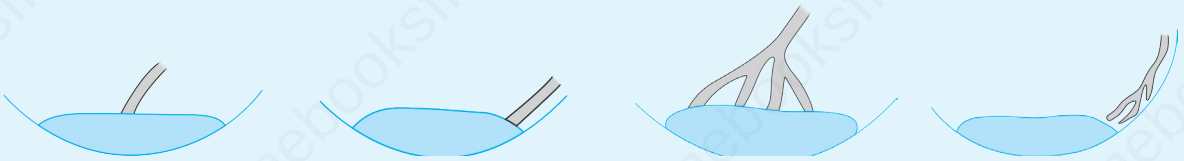
Named structure	Seen in
• Nitabuch's layer	It is the zone of fibroid degeneration where trophoblast and decidua meet. Seen in basal plate of placenta.
• Hoffbaeur cells	Phagocytic cell seen in connective tissue of chorionic villi of placenta.
• Folds of Hobokon	Umblical cord
• Whartons jelly	Connective tissue of umblical cord
• Peg cells	Fallopian tube
• Langhans cells	Cytotrophoblast

24. Ans. is a i.e. Vasa previa *Ref. Dutta Obs. 7/e, p 218, 259*

Normally, the umblical cord is inserted at the centre of the fetal surface of the placenta.

In velamentous insertion of cord

The blood vessels are attached to the amnion, where they ramify before reaching the placenta. Whenever patient goes into labour and cervix dilates, there are chances of umbilical cord being injured leading to fetal blood loss. This is called as vasa previa



25. Ans. is d i.e. All of the above *Ref: Dutta Obs 7/e, p 29*

- Human placenta is **discoid-disc like** in shape **hemchoroial** because of direct contact of chorion with blood maternal **deciduate**, i.e. it is shed at the time of partuirition.

26. Ans. is a i.e. Preterm delivery *Ref. Dutta Obs 7/e, p 216*

Abnormalities of the placenta.

Remember : Normal placenta is discoidal in shape.

Abnormality	Feature
Succenturiate placenta	When a small part of placenta is separated from the rest of placenta. A leash of vessels connecting the mass to the small lobe traverse through the membranes. In case the communicating blood vessels are absent, it is called as *Placenta spuria.* It can be retained leading to PPH, sub involution, uterine sepsis and polyp formation ***Note:*** The accessory labe in succenturiate placenta is developed from the activated villi on the chorionic laeva.

27. Ans. is d i.e. 16th week *Ref. Dutta Obs 7/e, p 216*

The decidual space (is the space between decidua capsularis and parietalis seen in early pregnancy because the gestational sac does not fill the uterine cavity. By 14-16 weeks gestational sac has enlarged to fill the uterine cavity completely by 4th month (16 weeks).

Note: These 2 layers become atrophied at term whereas decidua basalis retains its characteristic appearance till term

28. Ans. is c i.e. 17 weeks *Ref. Williams Obs 24/e, p 95*

"In the first trimester, placental growth is more rapid than that of the fetus. But by approximately 17 post menstrual weeks, placental and fetal weights are approximately equal" *Ref. Williams 24/e, p 95*

29. Ans is a i.e. All branches from one stem villi *Ref. Williams 24/e, p 94*

"Each of the truncal or main stem villi and their ramifications constitutes a placental lobule or cotyledon. Each lobule is supplied with a single truncal branch of the chorionic artery. And each lobule has a single vein so that lobules constitute functional units of placental architecture. *—Williams 24/e, p 94*

30. Ans is a i.e. 150 ml *Ref. Dutta Obs 8/e, p 36, 37, Table 3.1*

A mature placenta has 500 ml blood out of which 150 ml is in the intervillous space and 350 ml in villi system.

4 Maternal Adaptations to Pregnancy

QUESTIONS

1. **Weight gain in pregnancy is related to all *except*:**
   a. Ethnicity **[AI 2011/AIIMS May 2010]**
   b. Smoking
   c. Socioeconomic status
   d. Preconceptional weight

2. **Which of the following is the least likely physiological change in pregnancy?** **[AIIMS Nov 06]**
   a. Increase in intravascular volume
   b. Increase in cardiac output
   c. Increase in stroke volume
   d. Increase in peripheral vascular resistance

3. **What are maternal physiological changes in pregnancy?** **[PGI June 03]**
   a. ↑ed cardiac output
   b. ↑ed tidal volume
   c. ↑ed vital capacity
   d. ↓ed fibrinogen
   e. ↓ed plasma protein concentration

4. **Physiological changes in pregnancy:** **[PGI June 09]**
   a. ↓residual volume b. ↓GFR
   c. ↓CO d. ↓Haematocrit

5. **Which of the following cardiovascular change is abnormal in pregnancy?** **[PGI Dec 00]**
   a. Enlarged cardiac silhouette
   b. Increased S1 split
   c. Right axis deviation on ECG
   d. Early diastolic murmur
   e. HR increased by 10 to 15 per minute

6. **Which cardiovascular change is physiological in last trimester of pregnancy?** **[AIIMS Nov 01]**
   a. Middiastolic murmur
   b. Occasional atrial fibrillation
   c. Shift of apical impulse laterally and upwards in left 4th intercostal space
   d. Cardiomegaly

7. **All of the following changes are seen in pregnancy *except*:** **[AIIMS Nov 2011]**
   a. Increased stroke volume
   b. Increased cardiac output
   c. Increased Intravascular volume
   d. Increased peripheral vascular resistance

8. **All of the following may be observed in a normal pregnancy *except*:** **[AI 03]**
   a. Fall in serum iron concentration
   b. Increase in serum iron binding capacity
   c. Increase in blood viscosity
   d. Increase in blood oxygen carrying capacity

9. **Which of the following is increased in pregnancy?**
   a. Globulin **[PGI Dec 01]**
   b. Fibrinogen
   c. Uric acid
   d. Leukocytes
   e. Transferrin

10. **True about various changes in pregnancy is/are:**
    a. Fibrinogen levels are increased **[PGI Dec 00]**
    b. Uric acid levels are increased
    c. Sr. potassium is decreased
    d. Sodium retention

11. **Physiological changes of pregnancy include:**
    a. Insulin levels increase **[PGI June 02]**
    b. Increased BMR
    c. Hypothyroidism
    d. GH decreases
    e. Blood volume decreases

12. **Insulin resistance in pregnancy is because of:**
    a. Human placental lactogen **[PGI Dec 01]**
    b. Thyroid hormone
    c. Progesterone
    d. hCG
    e. Estrogen

13. Most common cause of platelet ↓ in pregnancy: **[PGI June 00]**
a. Immune
b. Incidental
c. Idiopathic
d. Infection
e. Benign gestational

14. During foetal life maximum growth is caused by :
a. Growth hormone
b. Insulin **[AI 99]**
c. Cortisol
d. Thyroxin

15. Following hormones secreted by placenta exclusively:
a. hCG **[PGI June 03]**
b. Estrogen
c. HPL
d. PRL

16. hCG is secreted by: **[AIIMS May 06/PGI June 08]**
a. Trophoblast cells
b. Amniotic membrane
c. Fetal yolk sac
d. Hypothalamus

17. False statement regarding hCG is: **[AI 01]**
a. It is secreted by cytotrophoblast
b. It acts on same receptor as LH
c. It has luteotrophic acton
d. It is a glycoprotein

18. True about hCG: **[PGI Nov 10]**
a. α subunit identical to LH, FSH and TSH
b. Causes involution of corpus luteum
c. Doubles in 7-10 days
d. Max. level seen at 60-70 days of gestation
e. Detected in serum and urine 8-9 days after ovulation

19. Best test for estimating hCG: **[AI 2011]**
a. Radioimmunoassay
b. ELISA
c. Radioreceptor assay
d. Bioassay

20. In normal pregnancy character of vagina is:
a. ↑ed pH **[AI 02]**
b. ↑ed number of lactobacilli
c. ↑ed glycogen content
d. ↑ed number of pathogenic bacteria

21. All of the following statements are true *except*: **[AI 01]**
a. Oxytocin sensitivity is increased during delivery
b. Prostaglandins may be given for inducing abortion during IIIrd trimester
c. In lactating women genital stimulation enhances oxytocin release
d. Oxytocin is used for inducing abortion in 1st trimester

22. Hormone responsible for decidual reaction and Arias stella reaction in ectopic pregnancy is: **[AIIMS June 00]**
a. Oestrogen
b. Progesterone
c. hCG
d. HPL

23. True regarding changes during pregnancy: **[PGI May 2010]**
a. Hyperplasia of parathyroid
b. Hyperplasia of thyroid
c. Increased pigmentation
d. Decreased BMR
e. Increased insulin

24. A 28-year-old primgravida had prepregnancy BMI of 30 kg/m^2. What is the recommended weight gain for her during pregnancy: **[New Pattern Question]**
a. 5-7 kg
b. 8-11 kg
c. 10-13 kg
d. 14-16 kg

25. Primigravida with full term, complains of faintness on lying down and se feels well when turns to side or sitting position. This is due to: **[New Pattern Question]**
a. Increased abdominal pressure
b. IVC compression
c. Increased intracranial pressure
d. After heavy lunch

26. The clotting factor which is not increased in pregnancy: **[New Pattern Question]**
a. Factor 2
b. Factor 7
c. Factor 10
d. Factor 11

27. A prosthetic valve patient switches to heparin at what time during pregnancy: **[New Pattern Question]**
a. 28 weeks
b. 32 weeks
c. 36 weeks
d. Postpartum

28. Schwangershaft protein is the other name of:
a. hCG **[New Pattern Question]**
b. Papp-1
c. Pregnancy specific beta1 glycoprotein
d. Activin

29. The following changes occur in urinary system in pregnancy *except*: **[New Pattern Question]**
a. Increased GFR
b. Increased RBF
c. Hypertrophy of bladder musculature
d. Increased activity of ureters

30. All of the following are true about regional blood flow in pregnancy *except*: **[New Pattern Question]**
a. Uterine blood flow at term is 750 ml/min
b. Blood flow through skin decreases
c. Renal blood flow increases by 50%
d. Pulmonary blood flow increase

31. Prolactin levels: **[New Pattern Question]**
a. Lowest in pregnancy and increases after delivery
b. Highest during pregnancy and fall during lactation
c. Unaffected by pregnancy and lactation
d. Variable in every pregnancy

32. The role of human placental lactogen is:
a. Stimulate milk production **[New Pattern Question]**
b. Fetal breast development
c. Growth of fetus
d. Endocrine regulation

33. α and β subunits are not seen in: **[New Pattern Question]**
a. FSH
b. hCG
c. Prolactin
d. Insulin

34. Intermediate cell predominance on a vaginal cytology is seen in: **[New Pattern Question]**
a. Pregnancy
b. Menstruation
c. Postovulatory
d. Premenstrual

35. Insulin is secreted by the fetal pancreas by: **[New Pattern Question]**
a. 12th week
b. 28th week
c. 32nd week
d. 38th weeks

36. The term "placental sign" denotes: **[New Pattern Question]**
a. Alteration of FHR on pressing the head into the pelvis
b. Spotting on the expected date of period in early months of pregnancy
c. Permanent lengthening of the cord in 3rd stage of labour
d. Slight gush of bleeding in third stage of labour

37. Relaxin during pregnancy is secreted by:
a. Corpus luteum **[New Pattern Question]**
b. Decidua
c. Both of the above
d. None of the above

38. The subcostal angle during pregnancy is:
a. 85° b. 95° **[New Pattern Question]**
c. 105° d. 75°

39. A G_2P_1 female carrying twin fetuses has BMI of 26. What is the ideal weight gain in for this female?
a. 37-54 lb **[New Pattern Question]**
b. 31-50 lb
c. 25-42 lb
d. None of the above

EXPLANATIONS & REFERENCES

1. Ans. is b i.e. Smoking *Ref. Williams 22/e, p 213, 1012, Maternal Nutrition Kamini Rao, p 21-23; Handbook of Obesity: Eitology and Pathophysiology after 2/e, p 968*

Average maternal weight gain during pregnancy is 11-12 kg

Factors which affect maternal weight gain during pregnancy are:

a. ***Pre pregnancy weight:*** If the pre pregnancy weight is more than normal (obese), there is a tendency to gain excessive weight during pregnancy.
b. ***Race and ethnicity:*** American women tend to put on more weight during pregnancy as compared to Asians and Africans.
c. ***Socio economic status:*** Women from higher socio economic group have more weight gain as compared to women from lower socio economic group. This is because malnutrition prevents optimum weight gain.
d. ***Associated conditions*** like women with gestational/over diabetes mellitus, twins and polyhydramnios have higher weight gain during pregnancy
e. Parity: Multigravida females tend to gain less weigh than primigravida

Smoking does not affect maternal weight gain during pregnancy, Smoking affects fetal weight gain and is one of the causes of IUGR.

"Studies have, indicated a lack of relationship between smoking and maternal weight gain while demonstrating a direct relationship between smoking and fetal grown rate." —*Health Consequences of Smoking for Women (1985), p 237, 238*

Remember:

Rapid weight gain, i.e. more than 0.5 kg a week[Q] or 2 kg per month[Q] is an early manifestation of preeclampsia.[Q]

- Stationary or falling weight suggests IUGR or IUD[Q].
- In pregnancy – the amount of water retained is 6.5 L at term.[Q]

2. Ans. is d i.e. Increase in peripheral vascular resistance

Ref. Dutta Obs. 7/e, p 52, 53; Fernando Arias 3/e, p 508, 509

3. Ans. is a, b, and e i.e. ↑ed cardiac output; ↑ed tidal volume; and ↓ed plasma protein concentration

Ref. Dutta Obs. 7/e, p 51, 53;

4. Ans. is a and d i.e. ↓ residual volume and ↓ hematocrit.

Ref. Dutta Obs. 7/e, p 51, 53; Williams Obs. 23/e, p 121, 122 (see Pulmonary Function)

The Important changes occuring in pregnancy in all system is given below:

Overall:

- BMR ↑'s by 10–20%
- Weight gain = 12.5 kg
- Total water retained = 6.5 L
- Na^+ and K^+ retention (due to E strogen) but seven Na^+_2 seven K^+ decrease due to more retention of water
- Plasma osmolality = decrease
- pH of blood – slightly increases.

HEMOTOLOGICAL SYSTEM

Parameters which increase in pregnancy		Parameters which decrease in pregnancy
• Blood volume – (30-40%) • Plasma volume – (40-50%) • Red blood cell volume – (20-30%) Since the increase in RBC volume is less in comparison to plasma volume → there is hemodilution during pregnancy. • Hb mass (in gm's) (as RBC volume increases) • WBC count (Neutrophilic leucocytosis) • O_2 carrying capacity of blood • All clotting factors (except 11 and 13) i.e. pregnancy is a hypercoagulable state • S. fibrinogen (Clotting factor I) increases by 50% • ESR (↑4 times)	→ Leads to	• ↓in hemotocrit • ↓ in packed cell volume • ↓ in viscosity of blood • Hb conc (i.e. g/dl) as increase in plasma volume is more • Platelet count (Benign gestational thrombocytopenia) • Clotting factor 11, 13

Remember :
- Clotting time and bleeding remain unaffected in pregnancy.

CARDIOVASCULAR SYSTEM

Parameters which increase in pregnancy	Parameters which decrease in pregnancy
• Cardiac output = Stroke volume x HR (↑ by 20%) All these increase in pregnancy. • **Remember :** Cardiac output increase by 40% during pregnancy, 50% during each uterine contraction in labour and 80% immediately postpartum ∴ Maxm risk of cardiac failure in pregnany → is in immediate postpartum period[Q] > intrapartum period[Q] > 28–32 weeks of pregnancy[Q].	• Peripheral vascular resistances (as progesterone has a smooth muscle relaxant effect) • Diastolic BP and systolic BP (Decrease in diastolic BP > systolic BP) • Mean arterial BP $\left[\frac{\text{Systolic BP} + (\text{Distolic BP} \times 2)}{3}\right]$ • Arterio venous O_2 gradient (venous blood causes more O_2)

PLASMA PROTEINS

Increase	Decrease
Total proteins (g) (+ 20 to 30%) Globulin (+5%)	Plasma proteins concentration (measured in gm%) (–10%) Albumin (–30%) [Albumin/globutin ratio in-pregnancy – 1:1] In nonpregnant– 17:1

RESPIRATORY SYSTEM

Increase	Decrease	Unaffected
• Tidal volume • Minute ventilation • Inspiratory capacity • Minute O_2 up take • O_2 demand of causes (20%)	• Functional residual capacity • Expiratory reverse volume • Residual volume • Total lung capacity • PCO_2 (∴ mild respiratory alkalosis)	• Respiratory rate • Vital capacity • Inspiratory reserve volume

Note: During pregnancy the pH is 7.42 (nonpregnant states – it is 7.9, Pregnancy is a state of respiratory alkalosis with metabolic acidosis.

RENAL SYSTEM

Increase	Decrease
Renal blood flow (+50%) GFR (+50%) Creatinine clearance Glucosuria	Plasma osmolality S. creatine S Uric acid S. $Ka,^{+}$ Na^{+} S. Cl^{-}

5. Ans. is c and d i.e. Right axis deviation on ECG and Early diastolic murmur

6. Ans. is c i.e. Shift of apical impulse laterally and upwards in the left 4th intercostal space

Ref. Dutta Obs. 7/e, p 52; Williams Obs. 23/e, p 118, 119, 960

Clinical findings related to cardiovascular changes occuring during pregnancy:

- *Heart rate (resting) increases by about 10 – 15 bpm.*Q
- *Apex beat shifts to the 4th intercoastal space, 2.5 cm outside the mid clavicular line (as heart is pushed upwards, outward, with slight rotation to left).*Q
- Slightly enlarged cardiac silhouette.Q (marked enlarged cardiac silhoute is not normal in pregnancy)
- Exaggerated splitting of the first heart sound (both components loud).Q
- Second heart sound : NormalQ
- Third heart sound : Loud and easily auscultated.Q
- ***Murmurs :*** – *Grade II systolic ejection murmur is* audible in aortic or pulmonary area at about 10-12 weeks due to expanded intravenous volume. It diappears in the begining of post partum period.
  – *Continuous hissing murmur*Q audible over tricuspid area in left 2nd and 3rd intercoastal spaces known as *Mammary murmur.*
- ECHO – Shows increased left atrial and ventricular diameters.Q
- *ECG* – *Shows left axis deviation.*Q
- Chest X-ray – Straightening of left heart border.

Note : None of the arrythmias are normal during pregnancy, rather their presence indicates heart disease during pregnancy.

7. Ans. is d i.e. Increased peripheral vascular resistance *Ref: Dutta Obs. 7/e, p 51-53*

As discussed in detail:

- Blood volume increases during pregnancy
- Cardiac output = Stroke volume × Heart rate
  All these three parameters increase during pregnancy
- In pregnancy since the main hormone is progesterone, which has a smooth muscle relaxant effect so peripheral vascular resistance **decreases during pregnancy** (and not increases).

8. Ans. is c i.e. Increase in blood viscosity *Ref. Dutta Obs. 7/e, p 52, 263; Williams Obs. 23/e, p 115*

In normal pregnancy – Since plasma volume increases more in comparison to Red cell volume so viscosity of blood decreases (not increases) i.e. ***option "c"*** is incorrect.Q

- Since total hemoglobin mass increases during pregnancy. Therefore, oxygen carrying capacity of blood also increases *(William 23/e, p 115).* Therefore, ***option "d"*** is correct. **BEWARE** - *In pregnancy hemoglobin mass increases(to the extent of 18-20%) but hemoglobin concentration decreases due to hemodilution.*
- Now let's have a look at **Iron metabolism in pregnancy.**
  - During pregnancy there is marked demand of extra iron especially in the second half.
  - Even an adequate diet cannot provide the extra demand of iron.

Thus pregnancy is always a state of physiological iron deficiency.

Changes in Iron Metabolism during Pregnancy:

Marker	Change
• Serum iron concentration	Decreases
• Serum ferritin (reflecting Iron stores)	Decreases
• Serum total iron binding capacity	Increases
• Percentage saturation (Serum ferritin/TIBC)	Decreases
• Serum transferrin	Increases

Remember

The two Ts i.e. Transferrin and TIBC increase during pregnancy, rest all parameters of iron metabolism decrease during pregnancy.

9. Ans. is a, b, d and e i.e. Globulin; Fibrinogen; Leukocytes; and Transferrin *Ref. Dutta Obs. 7/e, p 52, 55, 263*

Increase during pregnancy	Decrease during pregnancy
• Hemoglobin^{Q} mass	• Hemoglobin concentration
• Total plasma protein^{Q}	• Factor XI and XIII
• ***Globulin***^{Q}	• All parameters of iron metabolism except TIBC and transferrin
• ***Leucocytes*** (neutrophilic leucocytosis)	
• Fibrinogen^{Q}	• Serum Urea^{Q} — As their
• Factors II, VII, VIII, IX, X	• ***Serum uric acid***^{Q} — clearence
• Insulin^{Q}	• Serum creatinine^{Q} — increases (normal in pregnancy is 0.7-0.9 mg/dL
• Lipids, lipoproteins (LDL and HDL) and apolipoproteins	• Serum blood urea nitrogen^{Q}
	• Serum Na / K / Ca / Mg / I_2
• ***Serum Transferrin***^{Q} ***and TIBC.***	• Albumin
• C-reactive protein^{Q}	• Platelets
• Placenta phosphatase^{Q}	
• Total alkaline phosphatase^{Q}	

10. Ans. is a, c and d i.e. Fibrinogen levels are increased, Sr. potassium is decreased and Sodium retention

Ref. Dutta Obs. 7/e, p 52, 55, 57; William Obs. 23/e, p 114, 116, 117; Fernando Arias 3/e, p 490

- Pregnancy is a hyper coagulable state all clotting factors are increased so serum fibrinogen levels are raised by 50% from 200 - 400 mg% in non pregnant to 300 - 600 mg% in pregnancy (i.e. ***option "a"*** is correct).
- Glomerular filtration rate is increased by 50% which means filtering capacity of the kidney is increased so their is a decrease in maternal plasma levels of creatinine, blood urea nitrogen and uric acid (ruling out ***option "b"***).
- In pregnancy there is active retention of Na^+, K^+ and water due to increased estrogen, progesterone, aldosterone and renin angiotensin activity (i.e. ***option "d"*** is correct).

And although there are increased total accumulation of sodium and potassium, their serum concentrations are decreased slightly becasue of expanded plasma volume... *—Williams Obs 23/e, p 114*

This fact is further strengthened by *—Fernando Arias 3/e, p 490*

"The average plasma sodium concentration during pregnancy is 136 mEq/L. This slight decrease in plasma sodium concentration during pregnancy is a result of the increased amount of filtered sodium caused by the increased GFR. In fact during pregnancy the amount of sodium presented to the tubules for reabsorption is approximately 30240 mEq/L per day, whereas the nonpregnant woman filters only about 26160 mEq/L per day.

Although the efficiency of tubular sodium reabsorption during pregnancy is remarkable, the serum sodium equilibrates at slightly lower level than it does in nonpregnant status."

So though sodium retention and potassium retention occur in pregnant states, the serum concentrations are ultimately less than their non-pregnant status, i.e. ***option "c"*** and ***"d"*** both are correct.

11. Ans. is a and b i.e. Insulin levels increase; and Increased BMR *Ref. Dutta Obs. 7/e, p 54, 62, 63*

Hormones during pregnancy

Increased	Decreased	Unchanged
Growth hormone	LH	TSH
ACTH	FSH	ADH
Prolactin	S. iodine	
Thyroxine binding globulin	DHEA-S	
Total T3, T4		
Aldosterone		
Testosterone, androstenedione and cortisol		
Basal metabolic rate		
Insulin resistance		

Note:

- In pregnancy there is hyperinsulinemia (insulin resistance).
- In general plasma insulin level is increased, so as to ensure continuous supply of glucose to fetus.

To be specific : *The overall effect of pregnancy is such that there is maternal fasting hypoglycemia (due to fetal consumption), whereas postparandial hyperglycemia and hyperinsulinemia.*

12. Ans. is a, c and e i.e. Human placental lactogen; Progesterone; and Estrogen *Ref. Dutta Obs. 7/e, p 54*

During pregnancy insulin levels are increased because of increased insulin secretion as well as increase in insulin resistance due to a number of contra insulin factors.

These are :

- *Estrogen*
- *Progesterone*
- *Human placental lactogen (HPL)*
- Cortisol
- Prolactin

Note:

- The main hormone responsible for insulin resistance is HPL
- Insulin resistance is maximum between 24-28 weeks of pregnancy.

13. Ans. is e i.e. Benign gestational *Ref. Fernando Arias 3/e, p 475, Williams Obs, 23/e, p 1093*

Gestational thrombocytopenia/Benign Gestational Thrombocytopenia

It is the most common cause of thrombocytopenia accounting for 80-90% of all cases of thrombocytopenia occuring during pregnancy.

- Exact cause is not known (may be due to hemodilution and increased platelet consumption)
- Platelet count is rarely <70,000/mm^3.
- Women are asymptomatic and their is no H/O bleeding.
- Condition is benign and has no risk to mother or infant.
- The only problem associated with it is - that anaesthesiologists are reluctant to give epidural or spinal anaesthesia if platelet count is < 1 lakh/mm^3.
- Treatment with steroids and IgG or platelet transfusion before delivery is sometimes necessary.

14. Ans. is b i.e. Insulin *Ref. Ghai 6/e, p 2, Dutta obs 7/e, p 42*

Fetal growth is predominantly controlled by :

1. IGF-1
2. Insulin
3. Other growth factors

Growth hormone is required for postnatal growth of fetus :

15. Ans. is a and c i.e. HCG and HPL *Ref. Dutta Obs. 7/e, p 58; Williams Obs. 23/e, p 62, 63*

Placenta produces a number of hormones.

Hormones produced by syncytiotrophoblast	Hormone produced by cytotrophoblast
Protein hormones:	It produces hypothalamus like releasing factors:
• ***HCG***	• Corticotrophin releasing hormone (CRH)
• ***Human placental lactogen - HPL***	• Gonadotrophin releasing hormone (GnRH)
• Human chorionic thyrotropin (HCT)	• Growth hormone releasing hormone (GHRH)
• Pregnancy specific β-1 glycoprotein (psβg)	• Thyrotrophin releasing hormone (TRH)
• Pregnancy associated plasma protein A (PAPPA)	**Others:** Neuropeptide Y —*Williams Obs. 23/e, p 67*
Growth factors:	
• Inhibin	
• Activin	
Steroid hormones:	
• Estrogen (estriol, precursors of which come from fetus)	
• Progesterone	
Others:	
• Relaxin (also secreted by corpus luteum and decidua).	

The question says - hormones produced by placenta ***exclusively*** therefore we cannot include - estrogen which is produced by placenta but not exclusively because the precursors for synthesis of estrogen are made available to the placenta by the fetal adrenal cortex,without which it cannot synthesise estrogen:
The evidence is provided by anecephalic fetus where adrenal glands are absent or diminished in size therefore there is limited availability of steroid precursors and so rate of formation of placental estrogen is severely limited.

—Williams Obs. 23/e, p 70

As far as progesterone is concerned :

It is secreted by the corpus luteum until 6-7 weeks of gestation after which, placenta is the main source of production.

Extra Edge :
The form of estrogen produced mainly by placenta is estriol.
So the most common estrogen during pregnancy is estriol.
Placenta cannot synthesise estriol unless it gets precursors from the fetus, so estriol is the marker for Feto-maternalplacental well-being.

16. Ans. is a i.e. Trophoblast cells

17. Ans. is a i.e. It is secreted by cytotrophoblast

18. Ans. is a, and d i.e. α subunit identical to LH, FSH and TSH; and Max level seen at 60-70 days of gestation

Ref. Dutta Obs. 7/e, p 58, 59

I

hCG
- hCG is a glycoprotein[Q]
- **It is synthesized by syncytiotrophoblast of the placenta.[Q]**
- hCG has 2 subunits :
  - α - biologically similar in LH, FSH and TSH. (i.e nonspecific)
  - β subunit - unique to hCG. (i.e specific)
- Structurally it is similar to - FSH[Q], LH, TSH but functionally it is similar to LH (i.e luteotropic), i.e. helps in maintaining corpus luteum. So, the main hormone which maintains activity of corpus luteum during pregnancy is hCG and in non pregnant state is LH.[Q]
- **The half life of hCG is 36 hours.**
- **In early pregnancy the doubling time of hCG is 1.4-2 days.[Q]**
- **It can be detected in maternal serum as early as 8 days following fertilisation/day 22 of menstrual cycle/5 days before missed period by immuno assay.[Q]**
- The level is 100 IU/L or mIU/mL around the time of the expected menses.[Q]
- The levels progressively rise and reach maximum levels by about 8-10 weeks/70 days/1st trimester.[Q] It then falls until about 16 weeks and remains at low level up to term.
- hCG disappears from circulation by 2 weeks following delivery.

Action:
- Sustains the corpus luteum and thereby maintains the hormonal support to the pregnancy in early weeks.
- Stimulates the Leydig cells of the male fetus to produce testosterone and thereby induces development of the male external genitalia.
- Immunosuppressive action which helps in the maintenance of pregnancy.

Note: In Q 19, I have not included option 'c' as correct answer, i.e. detected in serum and urine 8-9 days after ovulation because it is detected in serum 8-9 days after ovulation but not in urine.

Extra Edge:

Clinical implication of the measurement of hCG

Increased hCG values	Decreased hCG values
• Pregnancy	• Thereatened/spontaneous abortion
• Successful therapeutic insemination and in vitro fertilization	• Ectopic pregnancy
• Hydatiform mole	• Trisomy 18
• Choriocarcinoma	

Contd…

Contd…

Increased hCG values	Decreased hCG values
• Multifetal pregnancy • Erythroblastotic fetus • Down syndrome • Ovarian, testicular teratoma , certain neoplasm of lung stomach and pancreas	

19. Ans. is a i.e. radio immunoassay *Ref. Internet search*

Before answering this questions, let us first understand what is bioassay, immunoassay and Radioimmunoassay

- **Bioassay** – A Bioassay is a test that uses animals or live tissues to look for a response to the hormone that is injected.
- **Immunoassay** – An Immunoassay is a test that uses antibodies detected against the hormone to "capture" the hormone. The test uses materials or substances that are related to or are a part of the immune system. To perform an immunoassay, cells are introduced from the immune system which may or may not have an antibody and cell clumping is observed.
- **Radioimmunoassay** – An radioimmunoassay uses a radioisotope as the label to detect and measure the amount of hormone present in the sample.

Bioassay for detecting hCG was developed in 1930's. wherein samples were injected in rabbits, frogs etc and ovulation was observed. These tests were expensive, slow and insensitive for hCG as they couldnot differentiate between LH and hCG.

Bioassay for hCG is an outdated test these days.

ELISA – It consists of immunosorbent assay of monocional antibodies to detect B-hCG. It forms the bases of home pregnancy tests. This is more sensitive and specific and can detect hCG in serum upto 1-2 mIU/ml. Radioimmunoassay and Radio receptor assay are more sensitive than ELISA and detect hCG Gupto .002 mLU/ml in serum (RIA) or .05 mLU/ml (IRMA)

But between the two, Radioimmunoassay is more specific as it doesnot cross react with luteinizing hormone and is the best test for detecting B-hCG

"Radioreceptor assays are more sensitive, but not much used as there is cross reactivity with LH." *Textbook of Obs, Sheila Balakrishnan 1/e, p 110*

20. Ans. is b i.e. ↑ed number of lactobacilli *Ref. Williams Obs. 23/e, p 111*

Changes in vagina during pregnancy:

- Increased vascularity and hyperemia (causes – violet colour characteristic of Chadwick sign).
- ***Vaginal pH:*** decreases i.e. becomes acidic and varies from 3.5 to 6.
- *Increase in number of lactobacillus acidophilus*[Q] *(which act on glycogen and cause increased production of lactic acid therefore, pH becomes more acidic).*
- As pH of vagina becomes acidic – it inhibits the growth of pathogenic bacteria.

Histopathology:

- Early in pregnancy, the vaginal epithelial cells are similar to those seen in the luteal phase.
- ***As pregnancy advances:***
  - Small intermediate cells known as ***Navicular cells*** are seen in abundance in small clusters.
  - Vesicular nuclei without cytoplasm or so called ***Naked nuclei,*** are also seen along with abundant Lactobacillus.

21. Ans. is d i.e. Oxytocin is used for inducing abortion in Ist trimester *Ref. Dutta Obs. 7/e, p 177; Ganong 20/e, p 238*

Lets see each option one by one

- Oxytocin causes contraction of smooth muscles of uterus. The sensitivity of uterine musculature to oxytocin is enhanced by estrogen and inhibited by progesterone. The sensitivity of uterus to oxytocin becomes very much increased in late pregnancy. Oxytocin levels reach maximum at the time of birth (i.e. ***option "a"*** is correct).
- In lactating women genital stimulation enhances oxytocin release (***option "c"*** is correct).
- Prostaglandins are used in Ist and IInd trimester for induction of abortion.

I can not understand what the examiner wants to say by *"IIIrd trimester abortion"* as beyond 28 weeks fetus is viable therefore, term abortion is never used. It may be a printing mistake.

As far as ***option "d"*** is concerned – It is absolutely incorrect as oxytocin is never used for Ist trimester abortions.

Friends don't get upset, if you don't remember *"methods used of inducing abortion" right now, as we have dealt with it in detail in chapter* ***"Abortion & MTP".***

22. Ans. is b i.e. Progesterone *Ref. Dutta Obs. 7/e, p 179, 180*

Arias stella reaction

- Arias stella reaction is characterized by adenomatous change of the endometrial glands.
- Cells loose their polarity, have hyperchromatic nucleus, vacuolated cytoplasm and occasional mitosis.
- The reaction is seen in ectopic pregnancy *(in 10 – 15% cases)* and indicates blightening of conceptus be it intrauterine or extrauterine. (therfore it is not specific for ectopic pregnancy)
- It occurs under the influence of progesterone.[Q]

Decidual reaction : *Ref. Williams Obs. 23/e, p 44, 45*

- Decidua is the specialised highly modified endometrium of pregnancy.
- Decidual reaction/decidualisation is the conversion of secretory endometrium into decidua and is dependant on estrogen and progesterone.
- Decidual reaction is completed only with blastocyst implantation.

So, hormone which is common to both Arias stella reaction and decidual reaction is progesterone which is our answer of choice.

23. Ans. is a, b, c and e i.e. Hyperplasia of parathyroid, Hyperplasia of thyroid, Increased pigmentation and Increased Insulin *Ref: Duttaobs 7/e, p 62 for a, b, d; p 50 for c and 63 for a Williams, Obs 23/e, p 128 for a, 127 for b, 111 for c and 113 for e*

- In pregnancy- there is hyperplasia of the Thyroid, Parathyroid, Pituitary and Adrenal Cortex
- Although the size of thyroid gland increases, patient remains euthyroid.
- Basal metabolic rate increases (i.e.**option 'd'** is incorrect)
- There is hyperinsulinemia during pregnancy (due to insulin resistance) so as to ensure continuous supply of glucose to fetus.

Skin changes during pregnancy

During pregnancy, skin undergoes varying degrees of pigmentation, which varies among individuals. The dark line running centrally below the umbilicus is **called the lineanigra.**

Chloasma: It is hyperpigmentation of the skin around the cheeks, forehead and eyes. The pigmentation is thought to be due to increased levels of endorphins and melanocyte stimulating hormone and disappears spontaneously after delivery.

24. Ans. is a i.e. 5-7 kg *Ref. Williams 24/e, p 117*

Recommended Ranges of Total Gain for Pregnant Women by Prepregnancy Body Mass Index (BMI) for Singleton gestation.

Weight – for – Height		Recommended Total Weight Gain		Weight gain/week
Category	BMI	kg	lb	In lb/week
Underweight	<18.5	12.5 – 18	28-40	1 (1-1.3)
Normal	18.5-24.9	11.5 – 14	25-35	1 (0.8-1)
Overweight	25-29.9	7 – 11.5	15-25	0.6 (0.5-0.7)
Obese	≥30	7	11-20	0.5 (0.4-0.6)

Note : 1 lb = 0.454 kg.

25. Ans. is b i.e. IVC compression *Ref. Dutta Obs 7/e*

SUPINE HYPOTENSION SYNDROME (POSTURAL HYPOTENSION): During late pregnancy, the gravid uterus produces a compression effect on the inferior vena cava when the patient is in supine position. In 90% cases this, however, results in opening up of the collateral circulation by means of paravertebral and azygos veins. In some cases (10%), when the collateral circulation fails to open up, the venous return of the heart may be seriously curtailed. This results in production of hypotension, tachycardia and syncope called as supine hypotensive syndrome. The normal blood pressure is quickly restored by turning the patient to lateral position. That is why pregnant females are advised to lie in lateral positions best being left lateral.

26. Ans. is d i.e Factor 11 *Ref: Dutta Obs 7/e, p 52*

Pregnancy is a hypercoaguable state, all clotting factors increase in pregnancy except factor 11 and 13. Another frequently asked question is what happens to fibrinogen levels during pregnancy-since fibrinogen is clotting factor number 1 therefore it also increase in pregnancy.

27. Ans. is c i.e 36 weeks

Anticoagulants in Pregnancy

2 main anticoagulants are:

	Warfarin	Heparin
Advantage	It is highly effective anticoagulant	Cannot cross placenta and so does not lead to fetal defects
Disadvantage	Can cross placenta and Lead to-short stature, Stippled epiphysis, Nasal hypoplasia, Saddle nose and frontal Bossing if used in 1st Trimester.	It is not as effective as warfarin and pregnancy is a hypercoaguble state. During pregnancy unfractionated heparin is used. LMWH can be used during pregnancy but should not be used in pregnant patients with valves replaced.

Keeping these things in mind, during pregnancy anticoagulants are used.

Period of gestation	Anticoagulant used
Uptil 12 weeks	**Unfractionated heparin**
12-36 weeks	Warfarin
36 weeks onwards and uptil 6 hours before delivery	IV heparin (since if warfarin is continued, there can be PPH after delivery)
From 6 hours after vaginal delivery and 24 hours after cesarean	Restart heparin
3rd day after delivery once INR is adjusted between 2-3	Start warfarin and stop heparin

28. Ans. is (c) i.e Pregnancy specific beta 1 glycoprotein *Internet search*

Schwangershaft Protein:

- It is the other name for pregnancy specific B1 glycoprotein.
- Produced by trophoblast.
- Can be detected 18 days after ovulation.
- Its concentration rises steadily and reaches 200 mg/ml at term.
- Role-measure of placental function for fertility control.

29. Ans. is d i.e Increased activity of ureters

As discussed previously, during pregnancy – Glomerular filtration rate and renal blood flow increases i.e. option a and b are correct. Amongst option c and d; option d i.e. increased activity of ureters cannot be correct as the main hormone during pregnancy is progesterone which leads to relaxation of the smooth muscles of ureter. Therefore activity of ureters decreases and leads to urinary stasis.

Anatomical changes in renal system during pregnancy.

- Both kidneys enlarge in pregnancy 1 cm.
- Hydroureter and hydronephrosis occurs due to relaxant effect progesterone (These changes are M/c on right side).
- Congestion of bladder leading to decreased bladder capacity.
- To compensate bladder pressure increases and intraurethral pressure increases.

30. Ans. is b i.e. Blood flow through skin decreases *Ref. Dutta Obs 7/e, p 54*

REGIONAL DISTRIBUTION OF BLOOD FLOW DURING PREGNANCY: **Uterine blood flow** is increased from 50 ml/min in non-pregnant state to about 750 ml near term. The increase is due to the combined effect of uteroplacental and fetoplacental vasodilatation. **Pulmonary blood flow** (normal 6000 ml/min) is increased by 2500 ml/min (i.e. 40% increase). **Renal blood flow** (normal 800 ml) increases by 400 ml/min (i.e. 50% increase) at 16th week and remains at this level till term. **The blood flow through the skin and mucous** membranes reaches a maximum of 500 mL/min by 36th week. **Heat sensation, sweating or stuffy nose complained by the pregnant women can be explained by the increased blood flow**.

31. Ans. is b i.e. Highest during pregnancy and fall during lactation *Ref. Williams Obs. 23/e, p 126, 127*

"Maternal plasma levels of prolactin increase markedly during the course of normal pregnancy, serum concentration levels are usually 10-fold greater at term (about 150 ng/ml) compared with normal non pregnant women. Paradoxically, after delivery, the plasma prolactin concentration decreases even in women who are breast feeding. During early lactation, there are pulsatile bursts of prolation secretion in response to sucking." *—Williams Obs. 23/e, p 126, 127*

Also know:

- Hormone responsible for lactation - Prolactin.
- Prolactin is synthesized by decidua.[Q]
- Prolactin suppresses GnRH, LH and FSH, causing lactational amenorrhea

32. Ans. is d i.e. Endocrine regulation *Ref. Dutta Obs. 7/e, p 60; Williams Obs. 23/e, p 64, 65*

Human Placental Lactogen

- It is also called human chorionic somatotropin.
- It is a polypeptide
- It is secreted by the syncytiotrophoblast.[Q]
- It is similar to pituitary growth hormone and prolactin.
- It is first detected at 3rd week after fertilisation or 5th week gestation age (both mean the same thing) and rises progressively until 36 weeks.[Q]

Role of HPL

- HPL is mainly responsible for diabetogenic state in pregnancy. It antagonises the action of insulin.
- It leads to maternal lipolysis ⇒ ↑ level of circulating Free Fatty Acid ⇒ provides a source of energy for maternal metabolism and fetal nutrition.
- *It is a potent angiogenic hormone therefore, may play important in fetal vasculature formation.*
- Levels of HPL are more in big babies and multiple pregnancies, making them all prone to develop gestational diabetes.
- As such HPL mainly plays role in maternal endocrinal changes during pregnancy but due to those changes like ↑ in free fatty acids and aminoacids, it can indirectly lead to fetal growth.
- Because hPL is secreted primarily into maternal circulation with only small amounts in cord blood, it appears that its role in pregnancy, if any is mediated through actions in maternal rather than in fetal tissues (williams Obs 23/e p 65).

33. Ans. is c i.e. Prolactin *Ref. Dutta Obs. 7/e, p 58*

hCG (Human chorionic gonadotropic hormone) has alpha and beta subunits. Its alpha subunit is similar to that of LH (leutinizing hormone), FSH (Follicular stimulating hormone) and TSH (Thyroid stimulating hormone) whereas beta subunits is specific. We have also studied that insulin hormone has alpha and beta subunits.

Remember

Hormones with alpha and beta subunits:

- hCG[Q]
- LH[Q]
- FSH[Q]
- TSH[Q]
- Insulin[Q]

34. Ans. is a i.e. Pregnancy *Ref. Dutta Gynae. 4/e, p 105*

This question has been explained in detail in 'Self Assessment and Review in Gynaecology' by the same author. In brief :

Vaginal epithelium is stratified squamous epithelium and has the following layers :

Layer	Cells seen	Characteristic
Basal and parabasal	Small, round and basophilic cells	This layer is dominant when there is *lack of any hormonal activity* as in **childhood[Q] uptil puberty[Q], postpartum[Q] and after menopause[Q].**
Intermediate cells	Transparent and basophilic cells	This layer is dominant under the influence of *Progesterone[Q], Androgen, Corticosteroid or, if patient is on OCP's.* It is the predominant layer **at birth[Q]**; during **pregnancy** or can be seen also at **menopause**.
Superficial cells	Large cells with pyknotic nucleus, Acidophilic on staining[Q]	This layer is dominant under the influence of *oestrogen[Q]* and is **predominant layer in reproductive period** and during **preovulatory phase**

35. Ans. is a i.e. 12th week *Ref. Dutta Obs 7/e, p 43*

Fetal Endocrinology	
Pituitary gland	ACTH-7 weeks LH_2 and GG-13 weeks All rest ant. pit gland harmones = 17 weeks Post pituitary harmones = 12 weeks
Thyroid gland	Thyroid harmones = 12 weeks
Pancreas	Iodine concentration = 12 weeks Insulin = 12 weeks Glucopon = 8 weeks

36. Ans. is b i.e. Spotting on the expected date of period in early months of pregnancy *Ref. Dutta Obs 7/e, p 64*

All pregnant females have amenorrhea. In a few pregnant females however, cyclic bleeding may occur upto 12 weeks of pregnancy, i.e. until the decidual space is obliterated by the fusion of decidua vera with decidua capsularis. Such bleeding is usually scanty, lasting for a shorter duration than her usual cycle and roughly corresponds with the date of the expected period. This is termed as **placental sign** or **Hartman sign**.

37. Ans is c i.e. Both of the above *Ref. Williams Obs 24/e, p 49*

Relaxin is secreted by corpus luteum, decidua and placenta.

38. Ans is c i.e. 105° *Ref. Dutta Obs 8/e, p 63*

Anatomic changes in respiratory system:

1. Elevation of diaphragm by 4 cm
2. Transverse diameter of chest increases by 2 cm
3. Subcostal angle increases from 68-103°
4. Chest circumference increases by 5-7 cm

39. Ans is b i.e., 31-50 lb

BMI = 26 = overweight female

BMI	Category
<19	Underweight
19.1 – 24.9	Normal
25 – 29.9	Overweight
>30	Obese

Recommended wt gain in twin pregnancy
Normal BMI = 37-54 lb
Overweight = 31-50 lb
Obese = 25-42 lb
1 lb = 0.454 kg

5 Diagnosis of Pregnancy and Antenatal Care

QUESTIONS

1. **Signs positive in early pregnancy are:** **[PGI Dec 00]**
   a. Hegar's sign b. Palmer's sign
   c. Goodell's sign d. Osiander's sign
2. **Hegar's sign of pregnancy is:** **[PGI June 97]**
   a. Uterine contraction
   b. Bluish discoloration of vagina
   c. Softening of isthmus
   d. Quickening
3. **Changes that are found in 2nd trimester of pregnancy:** **[PGI Dec 03]**
   a. Braxton-Hicks contraction
   b. Show
   c. Lightening
   d. Quickening
   e. Broad ligament pain
4. **Pregnancy is confirmed by:** **[PGI 04]**
   a. Morning sickness
   b. Amenorrhea
   c. Fetal heart activity
   d. Fetal movement by examiner
   e. Fetal sac in USG
5. **Best parameter for estimation of fetal age by ultrasound in 3rd trimester is:** **[AIIMS Nov 00]**
   a. Femur length
   b. BPD
   c. Abdominal circumference
   d. Intraoccular distance
6. **Transvaginal USG can detect fetal cardiac activity in:** **[PGI June 03]**
   a. 6 weeks b. 7 weeks
   c. 8 weeks d. 10 weeks
   e. 11 weeks
7. **Cardiac activity of fetus by transabdominal USG is seen earliest at what gestational age?** **[PGI Dec 00]**
   a. 5th week b. 6th week
   c. 8th week d. 9th week
8. **Earliest detection of pregnancy by ultrasound is by:** **[PGI June 00]**
   a. Gestation sac
   b. Fetal node
   c. FSH
   d. Fetal skeleton
9. **In transvaginal ultrasound, earliest detection of gestation sac is by:** **[PGI June 00]**
   a. 21 days after ovulation
   b. 21 days after implantation
   c. 28 days post ovulation
   d. 14 days after ovulation
10. **An expectant mother feels quickening at:** **[PGI Dec 09]**
    a. 12-18 weeks b. 16-20 weeks
    c. 26 weeks d. 24-28 weeks
    e. 28-32 weeks
11. **Periconceptional use of the following agent leads to reduced incidence of neural tube defects:** **[AIIMS May 03, UP 08]**
    a. Folic acid b. Iron
    c. Calcium d. Vitamin A
12. **Folic acid supplementation reduces the risk of:** **[PGI June 03]**
    a. Neural tube defect
    b. Toxaemia of pregnancy
    c. Down's syndrome
    d. Placenta previa

13. Use of folic acid to prevent congenital malformation should be best initiated: **[AIIMS Nov 03]**

a. During 1st trimester of pregnancy
b. During 2nd trimester of pregnancy
c. During 3rd trimester of pregnancy
d. Before conception

14. Kegels exercise should begin: **[AIPG 2012]**

Version 1:

a. immediately after delivery
b. 24 hours after delivery
c. 3 weeks after delivery
d. 6 weeks after delivery

Version 2:

a. Immediately after delivery
b. 3 weeks after delivery
c. Only after LSCS
d. During third trimester of pregnancy

15. The following are related to uterine souffle *except*: **[New Pattern Question]**

a. It is a soft blowing systolic murmur heard on the sides of pregnant uterus
b. The sound is synchronous with the maternal pulse
c. It is due to increased blood flow through the placental site
d. It can be heard even in a big fibroid

16. The following are related to fetal souffle *except*: **[New Pattern Question]**

a. It is soft blowing murmur synchronous with the fetal heart sounds
b. It is due to rush of blood through the intervillous space
c. It is heard in about 15% cases
d. When present is diagnostic of pregnancy

17. Ideal number of antenatal visits: **[New Pattern Question]**

a. 12-14 b. 6-8
c. 7-9 d. 10-11

18. Daily caloric needs in pregnancy is about…..... kilo cal: **[New Pattern Question]**

a. 1000 b. 1500
c. 2500 d. 3500

19. Which is not a feature of pseudocyesis? **[New Pattern Question]**

a. Amenorrhoea
b. Abdominal distension
c. Fetal heart sounds are audible
d. None of the above

20. Increased demand of following occurs in pregnancy *except*: **[New Pattern Question]**

a. Folic acid
b. Iron
c. Vitamin B_{12}
d. Zinc

21. An 18-year-old woman complains of lower abdominal pain and vaginal spotting for several days. She denies sexually transmitted disease although she is sexually active with her boyfriend; they use condoms for protection. Her last menstrual period was 6 weeks ago. Her blood pressure is 124/80 mm Hg, pulse is 90/min, and temperature is 37.2°C (99.0°F). Abdominal examination demonstrates vague left lower quadrant tenderness without rebound or guarding. Pelvic examination shows a normal vagina and cervix without cervical motion tenderness. No adnexal masses are appreciated. Results of a complete blood cell count and metabolic panel are within normal limits. Which of the following is the next best step in mgt? **[New Pattern Question]**

a. Transvaginal USG
b. Follow up after 3 months
c. Quantitative b hCG measurement
d. Rapid urine b hCG measurement
e. Methotrexate injection.

22. What is approx fetal weight, if height of uterus is above pubic symphysis is 35 cm and station of head –2? **[New Pattern Question]**

a. 2.5 kg b. 3 kg
c. 3.5 kg d. 4 kg

23. Appropriate treatment of women having oedema in pregnancy includes: **[New Pattern Question]**

a. Salt restriction b. Fluid restriction
c. Diuretics d. Bed rest

24. Teenage pregnancy is associated with all *except*: **[New Pattern Question]**

a. Caesarean section is more common
b. Eclampsia more common
c. Postdated pregnancy
d. ↑ maternal mortality rate

25. Term delivery implies that the gestational age of the foetus calculated from the time of onset of last menstrual period is: **[New Pattern Question]**

a. 40 weeks b. 42 weeks
c. 38 weeks d. 260 days

26. Use of one of the following vaccinations is absolutely contraindicated in pregnancy: **[New Pattern Question]**

a. Hepatitis-B b. Cholera
c. Rabies d. Yellow fever

27. Chadwick sign is seen in: **[New Pattern Question]**

a. Cervix b. Vagina
c. Uterus d. Ovary

28. Theca lutein cyst is not seen in: **[New Pattern Question]**

a. Twin pregnancy
b. Molar pregnancy
c. Chronic renal failure during pregnancy
d. Hypothyroidism during pregnancy

EXPLANATIONS & REFERENCES

1. Ans. is a, b, c and d i.e. Hegar's sign; Palmer's sign; Goodell's sign; and Osiander's sign

Ref. Dutta Obs. 7/e, p 65, 66

Definative signs for diagnosis of early pregnancy / first trimester are:

Sign	Feature	Seen in
Jacquemier's/ Chadwick's sign	Dusky hue of the vestibule and anterior vaginal wall due to local vascular congestion	8th week of pregnancy
Osiander's sign	*Increased pulsation felt through the lateral fornices*	*8th week of pregnancy*
Goodell's sign	*Softening of cervix (cervix feels like lip of mouth whereas in non pregnant state it feels like tip of nose)*	*6th week of pregnancy*
Hegar's sign	*On Bimanual examination with 2 fingers in anterior fornix and fingers of other hand behind the uterus, the abdominal and vaginal fingers seem to appose below the body of uterus. It occurs because of softening of isthmus*[Q]	*6-10 weeks of pregnancy*
Palmer's sign	*Regular and rhythmic uterine contraction which can be felt on bimanual examination*	*6-8 weeks of pregnancy*

Also know:

- In the first trimester ***uterus*** enlarges to the size of hens egg at 6th week, cricket ball size at 8th week and size of fetal head by 12th week. It remains an intrapelvic organ.
- **Other signs seen in early pregnancy:**
  - Hartman sign–bleeding present at the time of implantation in few females.

2. Ans. is c i.e. Softening of isthmus

Ref. Dutta Obs. 7/e, p 65

- Hegar's sign is present in 2/3rd cases and is demonstrated between 6 - 10 weeks.
- The sign is based on the fact that - upper part of the body is enlarged by the growing fetus whereas lower part of the body of the uterus, i.e. isthmus is empty and soft and cervix is comparatively firm. Because of these variations in consistency- on bimanual examination, the abdominal and vaginal fingers seem to appose below body of the uterus.

3. Ans. is a and d i.e. Braxton hicks contraction; and Quickening

Ref. Dutta Obs. 7/e, p 68, 69

Second trimester of pregnancy (13-28 weeks) can be diagnosed by:

Symptoms:

- ***Quickening:*** Perception of active fetal movements felt by 18 weeks of pregnancy in primipara and 2 weeks earlier in multiparae.
- ***Progressive enlargement:*** Of the lower abdomen by the growing uterus.

Signs:

Sign	Feature	Seen at
Chloasma	Pigmentation over forehead and cheeks	
Breast changes	Appearance of secondary areola	
	Secretion of colostrum	12 weeks of pregnancy
	Thickening of colostrum	

Uterine changes

– Size	Increases with increasing gestational age and uterus feels soft and elastic. Uterus becomes an abdominal organ	
– *Braxton hick contractions*	Irregular[Q], infrequent[Q] spasmodic and painless contractions without any effect on dilatation of the cervix.(Intrauterine pressure is <8 mm of Hg)	Begin in early pregnancy and continue till term
Palpation of fetal parts & active fetal movement	They are positive signs of pregnanc	Elicited by 20 weeks[Q]
Ballottement of uterus	Ballottement of uterus on bimanual examination gives the impression of a floating object inside the uterus. It may also be seen in case of uterine fibroid, ascites or ovarian cyst	Elicited between 16-20[Q] weeks of pregnancy
Auscultation of fetal heart sound	Most conclusive sign of pregnancy[Q]	Heard by stethoscope between 18–20 weeks of pregnancy[Q] Fetal cardiac motion can be detected by doppler by 10 weeks

Note: **Lightening - is a sense of relief from the pressure symptoms due to engagement of the presenting part. It is felt at *38th week in primigravida,* i.e. it is seen in 3rd trimester.**
Show is a sign of labour.

4. Ans. is c, d and e i.e. Fetal heart activity; Fetal movement by examiner; and Fetal sac in USG

Ref. Dutta Obs. 7/e, p 72

Positive or absolute signs of pregnancy:
- Palpation of fetal parts and perception of fetal movements by examiner, at about 20 weeks.
- Auscultation of fetal heart sounds.
- USG evidence of embryo (at 6th week) and later[Q] on of the fetus.
- Radiological demonstration of fetal skeleton at 16 weeks and onwards.

Friends there is no need to mug up the presumtive/probable signs of pregnancy. Generally it is not asked in exams.

Also remember: These positive or absolute signs of pregnancy are never seen in pseudocyesis or phantom pregnancy.

5. Ans. is a i.e. Femur length

Ref. Williams 24/e, p 198, 199

Best parameters for estimation of fetal age

• 1st trimester	Crown Rump length (CRL)
• 2nd trimester	Biparietal diameter (BPD)
• 3rd trimester	Femur length
• Overall	Crown rump length

- **BPD is measured in the trans thalamic view at the level of the thalami and cavum septum pellucidum. From outer table of skull to inner table.**

- Cephalic index = BPD divided by occipito frontal diameter (OFD)
- It head shape is flattened (dolichocephaly) or rounded (brachycephaly), then HC is more reliable than BPD. As BPD is affected by shape of head but not HC.

Also know: USG in Pregnancy
- Best time to assess gestational age by USG is 9-12 weeks (by crown rump length).[Q]
- Best indicator of fetal growth – Abdominal circumference.[Q]
- So the best USG parameter to detect IUGR is Abdominal circumference.[Q]
- The best USG parameter to detect macrosomia is abdominal circumference.[Q]

Contd…

Contd…

- **AC is measured at the junction of Left and Right portal vein or liver and cystic duct**[Q]
- Mean sac diameter (CMSD) is used to determine gestational age before CRL can be measured
- MSD = Length + height + width/3
- Normal MSD (in mm) + 30 = Days of pregnancy
- CRL (in mm) + 42 = gestation in days.
- The embryo should increase its CRL by 1 mm per day.
- Fetal anomaly which can be earliest detected by USG- Anencephaly.
- Lemon and Banan sign are seen in spina bifida on USG,
- The two best ultrasonographic markers of Down syndrome in first trimester:
  a. Absent or hypoplastic nasal bone
  b. Increased nuchal translucency
- The diameter which in mm when measured between 14 and 24 weeks corresponds to the gestational age in weeks – Inter cerebellar diameter.[Q]
- If a single ultrasound examination is planned for the purpose of evaluating fetal anatomy, ACOG (2011) recommends it to be performed at 18–20 weeks.

6. Ans. is a i.e. 6 weeks *Ref. Dutta Obs. 7/e, p 646; USG in Obs. & Gynae. by Callen 4/e, p 120; William's 24/e, p 382*

7. Ans. is c i.e. 8th week *Ref. USG in Obs. & Gynae. by Callen 4/e, p 120*

8. Ans. is a i.e. Gestational sac *Ref. USG in Obs. & Gynae. by Callen 4/e, p 114*

USG in early pregnancy

The first definitive sonographic finding to **suggest pregnancy** is visualization of the gestational sac.
The first sign of **intrauterine pregnancy** is presence of yolk sac within the gestational sac.

Fatal structure	Detected by TVS	Detected by TAS
Gestational sac	4 and half weeks	5 weeks 5 days
Yolk sac	5 weeks	7 weeks
Cardiac activity	6 weeks	7–8 weeks

So from above table it is clear – cardiac activity can be detected by TV S → at 5-6 weeks.

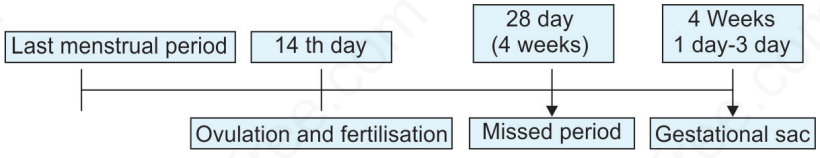
Also know: Critical titre of hcg at which gestational sac can be visualized within uterus-
TVS = 1000 micro IUI ml
TAS = 6500 micro IUI ml

- **True gestational sac** is eccentric in position and **double decidual or intradecidual sign is positive.**[Q]
- **Pseudo gestational sac** is seen in ectopic pregnancy. It is irregular in outline, usually centrally located and has no double decidual sac sign and uterus remains empty.

9. Ans. is d i.e. 14 days after ovulation *Ref. USG in Obs. & Gynae. by Callen 4/e, p 114*

"The first definitive sonographic finding to suggest early pregnancy is visualization of the gestational sac. Using transvaginal transducers with frequency of 5 MHz, the size threshold for sac detection is 2 - 3 mm, corresponding to 4 weeks + 1 day gestational age to 4 weeks + 3 days gestational age."
Ref. USG in Obs. & Gynae. by Callen 4/e, p 114

To understand how many days after ovulation, you should first understand that gestational age is calculated from 1st day of last menstrual period.



As is evident from above diagram gestational sac is visualised approximately 15-17 days after ovulation (or within 1-3 days of missed period) but since it is not given in options so the nearest possible answer is 14 days after ovulation.

10. Ans. is b i.e. 16-20 weeks *Ref. Dutta Obs 7/e, p 68-72: Reddy 27/e, p 434*

"Quickening (feeling of life) denotes the perception of active fetal movements by the women. It is usually felt about the 18th weekQ, 2 weeks earlier in multiparae. Its appearance is a useful guide to calculate the expected date of delivery with reasonable accuracy" *Ref. Dutta Obs, 7/e, p 68*

"Quickening is felt between 16th to 20th weekQ" *—Reddy 27/e, p 343*

Phenomenon	Time
Palpation of fetal part	20 weeks
Active fetal movement felt by placing a hand on abdomen	20 weeks
External ballotment	20 weeks
Internal ballotment	16-28 weeks
FHS audible by Stethoscope	18-20 weeks
Fetal movement can be detected by Doppler	10 weeks
Lightening	38 weeks

11. Ans. is a i.e. Folic acid *Ref. Dutta Obs. 7/e, p 409; COGDT 10/e, p 197*

12. Ans. is a i.e. Neural tube defect *Ref. Dutta Obs. 7/e, p 409; COGDT 10/e, p 197*

13. Ans. is d i.e. Before conception *Ref. Dutta Obs. 7/e, p 409; COGDT 10/e, p 197*

"Folic acid has been shown to effectively reduce the risk of neural tube defects (NTD's). A daily 4 mg dose is recommended for patients who have had a previous pregnancy affected by neural tube defects. It should be started atleast 1 month (ideally 3 months) prior to pregnancy and continued through the first 6-12 weeks of pregnancy." *Ref. COGDT 10/e, p 197*

Remember: Folic acid is used to reduce the risk of neural tube defect.

- More than half of NTDs could be prevented with daily intake of 400 µg of folic acid throughout the periconceptional period.
- *Thus dose* of folic acid which is given to all pregnant females = 0.4 mg, i.e. 400 mcg (also called as prophylactic dose).
- A woman with a prior pregnancy complicated by a neural tube defect can reduce the 23% recurrence risk by more than 70% if she takes 4 mg of folic acid for the month before conception and for the first trimester of pregnancy. This called a therapeutic dose of folic acid.
- *Therapeutic dose* of folic acid (to be given in females with previous history of baby with NTD)—4 mg.
- **Duration:** It should be started 1 month before conception and continued till first 6-12 weeks of pregnancy.
- **Dose of folic acid** given to pregnant women with megaloblastic anemia = 1 mg day.

14. Ans. Version 1 is b i.e 24 hours after delivery

The answer Version 2 is d i.e during third trimester of pregnancy *Ref. Jeffcoates 7/e, p 286*

Kiegels exercise are pelvic floor exercises which consists of contracting and relaxing the muscles that form part of the pelvic floor.

The aim of Kegel exercises is to improve muscle tone by strengthening the pubococcygeus muscles of the pelvic floor.

Kegel exercises are good for treating vaginal prolapse, preventing uterine prolapse and to aid with child birth in females and for treating prostate pain and swelling resulting from benign prostatic hyperplasia (BPH) and prostatitis in males.These exercises reduce premature ejacu latory occurrences in men as well as increase the size and intensity of erections.

Kegel exercises may be beneficial in treating urinary incontinence in both men and women (The treatment effect might be greater in middle aged women in their 40s and 50s with stress urinary incontinence alone...".)

Kegels exercises - Time for initiating kegels exercise:

- Pregnancy-1st trimester
- After vaginal delivery-after 24 hours
- After cesarean section-after 24 hours.

Thus in version 1 answer to the question is 24 hours after delivery and in version 2 answer since we donot have 1st trimester in option it would be 3rd trimester of pregnancy.

15. Ans. is c i.e. It is due to increase in blood flow through the compressed umblical arteries. *Ref. Dutta 7/e, p 69*

Uterine souffle is a soft blowing and systolic murmur heard low down at the sides of the uterus, best on the left side. The sound is synchronous with the maternal pulse and is due to increase in blood flow through the dilated uterine vessels. It can be heard in big uterine fibroid.

16. Ans. is b i.e. It is due to rush of blood through the compressed umblical arteries *Ref. Dutta 7/e, p 70*

Funic or fetal souffle is due to rush of blood through the umbilical arteries. It is a soft, blowing murmur synchronous with the fetal heart sounds.

17. Ans. is a i.e. 12-14 *Ref. Dutta Obs. 7/e, p 99; SPM Park 19/e, p 417, 20/e, p 450*

Ideally the schedule for antenatal visits should be:

- Monthly visits upto 28 weeks.
- Two weekly visit between 28 and 36 weeks.
- Weekly visit from 36 weeks onwards

This means a total of 12-15 visits. *Ref. Dutta Obs 6/e, p 99*

WHO recommends atleast 4 visits:

1st at – 16 weeks
2nd at – 24-28 weeks
3rd at – 32 weeks
4th at – 36 weeks

As per Indian scenario - minimum 3 visits are essential;

1st at – 20 weeks (or as soon as pregnancy is known)
2nd – 32 weeks
3rd – 36 weeks

- The first visit that a woman makes to a health care facility is called the **booking visit.**
- A **booked case** is one that has atleast 3 aantenatal visits with at least two in the last trimester.

18. Ans. is c i.e. 2500 kcal *Ref. Park 21/e, p 588; Dutta Obs. 7/e, p 101*

Recommended daily allowance: in pregnancy and lactation *Ref. Park 21/e, p 588*

Nutrient	RDA in nonpregnant female	RDA in pregnancy	RDA in lactation
Kilo calories (moderate work)	2200	2200 + 350	2200 + 600
Proteins	55 gm	78	74
Fat	20 gm	30 gm	30 gm
Calcium	600 mg	1200 mg	1200
Iron	21 mg	35 mg	21 mg

So it is clear in pregnant females extra 350 kcal should be added i.e 2200 + 350 = 2550 kcal/day

19. Ans. is c i.e. Fetal heart sounds are audible *Ref. Dutta Obs. 7/e, p 72*

Pseudocyesis: Phantom pregnancy/Spurious pregnancy/False pregnancy.

Definition: *It is a psychological disorder where the women has a false but firm belief that she is pregnant, although no pregnancy exists. Patient is often infertile and has an intense desire to have a baby.*

Patient presents with:

- Cessation of menstruation.
- Enlargement of abdomen (due to deposition of fat).
- Secretions from breasts.
- Fetal movement (actually intestinal movement).

On examination: No positive signs of pregnancy are found, i.e. fetal heart sound is not heard, no fetal movement felt and no fetal parts palpable by the examiner.

USG and X-ray do not reveal any signs of pregnancy.

20. Ans. is None *Ref. Dutta Obs. 7/e, p 101; Park 19/e, p 506*

Ideally the answer to this question should be none.

As all the option given in the question have increased demand, some have more whereas in others it is marginal.

The best answer here would be vitamin B_{12} as the increase in demand is marginal.

Daily dietary allowances for a woman of reproductive age, pregnancy and lactation.

	Nonpregnant	Pregnancy second half	Lactation	Sources
Energy (kcal)	2200 kcal	2500 kcal	2600 kcal	Protein, fat, carbohydrate
Protein (gm)	50 gm	60 gm	65 gm	Meat, fish, poultry, dairy product
Iron (mg)	18 mg	40 mg*	30 mg*	Meat, egg, grains [* to be supplemented]
Calcium (mg)	500 mg	1000 mg	1500 mg	Dairy products
Zinc (mg)	12 mg	15 mg	19 mg	Meat, egg, seafood
Iodine (μg)	150 μg	175 μg	200 μg	Iodized salt, seafood
Vitamin A (IU)	5000 IU	6000 IU	8000 IU	Vegetables, liver, fruits
Vitamin D (IU)	200 IU	400 IU	400 IU	Dairy products
Thiamine (mg)	1.1 mg	1.5 mg		Grains, cereals
Riboflavin (mg)	1.1 mg	1.6 mg		Meat, liver, grains
Nicotinic acid (mg)	15 mg	17 mg	Almost same	Meat, nuts, cereals
Ascorbic acid (mg)	60 mg	70 mg	as in pregnancy	Citrus fruits, tomato
Folic acid (μg)	200 μg	400 μg		Leafy vegetables, liver
Vitamin B_{12} (μg)	2 μg	2.2 μg		Animal proteins

21. Ans. is d i.e Rapid urine B-hCG measurement *Ref. Read below.*

In the question patient is presenting with amenorrhea of 6 weeks and she has history of being sexually active. Now all of you know the most common cause of secondary amenorrhea is pregnancy, so first rule it out by doing a rapid urine hCG test, i.e urine pregnancy test and then do USG to see whether the pregnancy is intrauterine or extrauterine (the question specifically asks which is the next step in manangement).

22. Ans. is c i.e. 3.5 kg *Ref. Dutta Obs. 8/e, p 84*

Estimation of fetal weight can be done using Johnson formula:

- **If station of head below ischial spine**
  [Height of uterus above pubic symphysis (in cm) – 11] × 155
- **If fetal head is at or above ischial spine–**
  [Height of uterus above pubic symphysis (in cm) – 12] × 155
  Here fetal head is at – 2, i.e. above ischial spine, so it will be
  (35 – 12) × 155 = 3.5 kg.

Also Know:

USG measurement of fetal weight =

Shephard formula = Log_{10} EFW (gm) =

1.2508 + [(0.166 × BPD) + 0.46 × AC] – (0.002646 × AC × BPD)

Hadlock formula = Log_{10} EFW (gm) =

1.3596 – 0.00386 (AC × FL) + 0.0064 (HC) + 0.00061 (BPD × AC) + 0.0425 (AC) + 0.0174 (FL)

23. Ans. is d i.e. Bed rest *Ref. Dutta Obs. 7/e, p 103*

- Femoral venous pressure is markedly raised in pregnancy especially in later months.
- *The pressure exerted by gravid uterus on the common iliac veins (more on right side due to dextrorotation of the uterus). causes pedal edema in pregnant women called as physiological edema of pregnancy.*

- **No treatment is required for physiological edema or orthostatic edema. It subsides on rest alone.**
- Diuretics should not be prescribed in case of physiological edema.

24. Ans. is c i.e. Postdated pregnancy *Ref. Textbook of Obsterics Shiela Balakrishnan 1/e, p 407*

Friends- Teenage pregnancy is not only a new topic for PGME exams but has envolved as an emerging problem in our daily OPD'S
Hence I am giving it details about

TEENAGE PREGNANCY

Definition: Teenage pregnancy is defined as pregnancy occurring in a girl below the age of 19.
Incidence: Teenage pregnancy accounts for about 10-12% of all births.

Complications Maternal

In general, maternal mortality and morbidity are more among teenage pregnancies especially in the below 15 group and the unwed mothers because there is lack of antenatal care and a tendency to conceal the pregnancy in many cases.

i. ***Criminal and septic abortions*** are more in these girls in spite of abortion being liberalized in India.
ii. **Antepartum complications** like anaemia, malnutrition and pre-eclampsia are also much more in teenage pregnancy.
iii. **Obstetric complications** are also increased like, preterm labour, fetal prematurity and IUGR. Cephalopelvic disproportion may be a problem in the very young teenagers, as they may not have attained complete skeletal maturity. Therefore, the incidence of caesarean section may be more in this group. Other labour complications are also increased if they present for the first time in labour, with out proper antenatal care.

Long-Term consequences

1. ***Physical***. Induced abortions may increase the risk of recurrent miscarriage, preterm labour and low birth weight babies in the subsequent pregnancy. There is also a higher chance of infertility later on due to infection and blocked tubes. Early age of onset of sexual intercourse and first pregnancy increases the risk of cancer cervix and preinvasive lesions of the cervix. There is also an increased chance of sexually transmitted diseases in unmarried mothers.
2. ***Psychological , Social and educational problems***/– High suicide rates and depressive illness are common. Guilt feelings about a previous abortion or having given the baby for adoption, may occur, sometimes even years later. The girl may have to face social outracism which would definitely affect her life.
   Problems of child – These mothers our not emotionally equipped to handle the responsibilities of motherhood. Hence there is poor maternal – child relationship, baby battering and behavioural disturbances in children of such mothers.

25. Ans. is a i.e. 40 weeks *Ref. Dutta Obs 7/e, p 64*

DURATION OF PREGNANCY: The duration of pregnancy has traditionally been calculated by the clinicians in terms of 10 lunar months or 9 calendar months and 7 days or 280 days or 40 weeks, calculated from the first day of the last menstrual period. This is called menstrual or gestational age.

But, fertilization usually occurs 14 days prior to the expected missed period and in a previously normal cycle of 28 days duration, it is about 14 days after the first day of the period. Thus, the true gestation period is to be calculated by subtracting 14 days from 280 days, i.e. 266 days. This is called fertilization or ovulatory age and is widely used by the embryologist.

26. Ans. is d i.e Yellow fever *Ref. Williams Obs. 23/e, p 208 Table 8-10; Sheila Balakrishnan, p 696, 697*

Vaccines in pregnancy

Remember:

A simple "FUNDA" - (Proposed by CDC Society - 2002).
- Killed vaccine are safe in pregnancy.
- Live vaccines are best avoided in pregnancy.

Safety of Vaccines in Pregnancy:

Safe	Only in epidemics	To be given in case of travel to highly endemic area or exposed to contacts	Contraindicated
• H -Hepatitis A/B	• Tab-Typhoid • P-Pneumococcus • C-Cholera	• Yellow fever • Japenese encephalitis • Polio (IPV)	• Rubella • Measles • Varicella
• I-Influenza • T-Tetanus • Rabies-Rabies **(mnemonic-HIT Rabies)**	• M-Meningococcus **(Tab PCM)**		• BCG • Mumps • Small pox

- Normally only tetanus toxoid is given in pregnancy.Q
- Antirabies vaccine, if indicated can be given as usual.Q
- Cholera immunisation may be given during epidemics.Q
- Hepatitis A and B vaccines are safe.Q
- Yellow fever vaccine is an attenuated live virus vaccine and is contraindicated in pregnancy. The latest edition of Williams says that if the woman is travelling through an endemic area and cannot postpone her travel it may have to be given.Q But still the answer to this question is yellow fever.

27. Ans is b i.e, Vagina *Ref. Williams Obs 24/e, p 50*

During pregnancy, due to increased vascularity and hyperemia their is bluish discoloration of vagina. **This is called as Chadwick sign (Jacqueimer sign).**

28. Ans is d i.e, Hypothyroidism during pregnancy *Ref. Williams Obs 24/e, p 50*

Theca lutein cysts are bilateral cysts seen in ovary associated with markedly elevated levels of hCG.
Conditions of pregnancy where theca lutein cysts are seen:
- Molar pregnancy] – ↑'ed level of hCG
- Diabetes
- Anti. D alloimmunization] – large placenta
- Multifetal gestation
- Chronic renal failure – decreased clearance of hCG
- Hyperthyroidism (hCG and TSH–anatomically similar)

6

Normal Labor

PHYSIOLOGY OF LABOR

Labor

Series of events that take place in the genital organs in an effort to expel the viable products of conception (fetus, placenta and the membranes) out of the womb through the vagina into the outer world is called as labor. **A parturient** is a patient in labor and parturition is the process of giving birth.

Normal Labor (EUTOCIA): Labor is called normal if it fulfills the following criteria. (1) Spontaneous in onset and at term. (2) With vertex presentation. (3) Without undue prolongation. (4) Natural termination with minimal aids. (5) Without having any complications affecting the health of the mother and/or the baby.

Abnormal Labor (DYSTOCIA): Any deviation from the definition of normal labor is called Abnormal labor.

Prelabor

- It is the premonitory stage of labor and begins 2-3 weeks before the onset of true labor in primigravida and a few days before in multipara.
- It is associated with an increase in oxytocin receptors in myometrium.
- The changes seen during pre labor are:
  - ***Lightening*:** i.e. the decrease in fundal height seen at term. This is due to the formation of the lower segment of the uterus which allows the presenting part to descend into the pelvis. It brings a sense of relief to the mother.
  - ***Cervical ripening*** i.e. softening of the cervix.
  - ***False labour pains.***

Features	True labour pains	False labour pains
Cervical changes (dilatation and effacement)	Present	Absent
Frequency and duration of contractions	Regular and gradually increase	Irregular
Pain	Lower abdomen and back, radiating to thighs	Lower abdomen only
Bag of water	Formed	Not formed
Show	Present	Absent
Relief with enema/sedation	No	No

True Labor

Onset of True labor is characterized by:

- Apearance of true labor pain
- Apearance of show

True labor is divided into four functional stages:

Stages of True Labor

First stage–It starts with onset of true labour pain and ends with full dilatation of cervix (10 cm)[Q]. Duration is 12 hours in primi[Q] and 6 hours in multipara[Q].

Second stage–It starts with full dilatation of cervix and ends with expulsion of fetus from birth canal. Duration is 0 minutes to 2 hours in primi and 30 minutes in multipara.

Third stage–It begins after expulsion of fetus and ends with expulsion of placenta and membranes (after births). Duration is about 15 minutes in both primi & multipara. The duration is, however, reduced to 5 minutes in active management.

Fourth stage–1 hour observation period after the delivery of placenta physiological chills are experienced by the mother in this stage.

Uterine Contractions:

- Throughout pregnancy, a pregnant female experiences contractions which are painless and irregular called as **Braxton Hicks contractions**.
- During labor: The contractions are painful and lead to dilatation of cervix.
- The pacemaker of uterine contractions is situated at the cornu (the right pacemaker predominates over the left).
- Contractions spread from pacemaker area throughout uterus at 2 cm/sec, depolarizing the whole organ within 15 secs.
- Contractions are predominant over the fundus.

- **Adequate uterine contractions** refer to 3 contractions in 10 mins each lasting for 45 secs.
- **Tachysystole** is defined as more than 5 contractions in 10 mins (averaged over 30 minutes).
- Term Tachysystole can be applied to spontaneous or induced labor.
- The term **hyperstimulation** has been abandoned.
- Six or more uterine contractions in 10 minutes can lead to fetal distress.
- **Hypotonic contractions** mean when intensity is less than 25 mm of hg or frequency less than 2 in 10 minutes..

Also know: Units for measuring uterine constractions:

1. mm of Hg
2. Montevideo unit (MV unit)

1 montevideo unit = Intensity of utenine contraction × number of contractions in 3 minutes.

Intrauterine Pressure during Labor

Stage	Pressure
1st	40–50 mm Hg
2nd	100–120 mg Hg
3rd	100–120 mm Hg

IMPORTANT CONCEPTS IN STAGES OF LABOR

First stage of Labor

First stage of labor, i.e. the stage of cervical effacement and dilatation is further divided into 2 phases.

Latent phase	Active phase
It starts at the point at which the mother perceives true labor pains and ends when cervix is 3 to 5 cm dilated (Williams 24/e, pg 446 and High Risk Preg 4/e, pg 334 ⇒ 4 cms) Its duration in nulliparous is 12 hours (avg 8.6 hours)[Q] and 8 hours (avg 5.6 hours) in multiparous females.[Q] • Mainly concerned with cervical effacement	It begins with cervical dilatation of 3–5 cm, with regular uterine contractions and normal minimum cervical dilatation rate of 1.2 cm/hr for nulliparous[Q] and 1.5 cm/hr for parous women[Q]. Minimum dilatation should be 1cm/hr[Q] • Mainly concerned with cervical dilatation

The pattern of cervical dilatation during the latent and active phase of normal labour is a sigmoid curve.

This curve is called as *Friedman curve.* (6.1)

Friedman subdivided the active phase into :

- Acceleration phase – 3-4 cm of cervical dilatation
- Phase of maximum slope – 4-9 cm
- Deceleration phase – 9-10 cm
- Abnormalities of latent phase

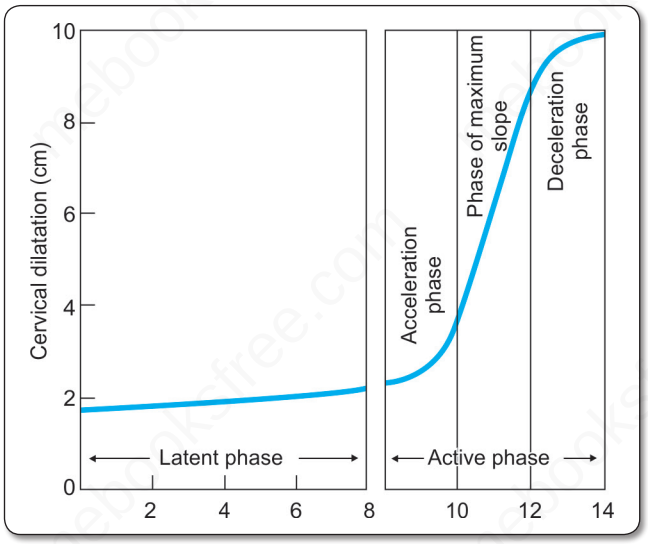


Fig. 6.1: Friedman curve

Abnormality of Latent Phase:

Prolonged Latent Phase:

Latent phase is said to be prolonged if it is :

- Greater than 20 hours in nullipara.Q
- Greater than 14 hours in multipara.Q

Causes of Prolonged Latent Phase:

- Excessive sedation or epidural analgesia.
- Poor cervical conditions *(e.g., Thick, uneffaced or undilated).*
- False labour (*most common* cause in multipara).

Diagnosis : The diagnosis of prolonged labour is made by observation of the Friedman's curve (Fig. 6.1).

Management : Either of the 2 options are used for managing prolonged latent phase.

(i) Therapeutic Rest	(ii) Oxytocin stimulation
15 mg of morphine is given intramuscularly. Most of the patients are asleep within 1 hour and awake 4 to 5 hours later, in active labour or in no labour.	

Abnormalities of Active Phase

- Active phase as we have discussed earlier, begins when cervix is 3–5 cm dilated.
- Minimum rate of cervical delatation in active phase is **1.2 cm/hour in nullipara females** or **1.5 cm in multipara**

Protracted active phase (i.e. slow rate of cervical dilatation or descent of head).

Features	Cervical dilatation	Descent of head	Management
Nulliparous	< 1.2 cm/hr	< 1 cm/hr	Preferred Management: Expectant and support If CPD is present–cesarean section is done
Multiparous	< 1.5 cm/hr	< 2 cm/hr	

- ***Arrest of dilatation:*** Cessation of dilatation for 2 or more hours.
- ***Arrest of descent:*** Cessation of descent for 1 or more hours.

Note: ACOG has suggested that before the diagnosis of first stage labor arrest is made, following criteria should be met.

(i) First the latent phase has been completed and cervix is 4 cm or more dilated.

(ii) Also a uterine contraction pattern of 200 MV units or more in a 10-minute period has been present for 2 hours without cervical change.

Now this '2 hours' rule is being challenged and Williams says it should be atleast 4 hours.

Factors contributing to arrest and dilatation are:

- Excessive sedation
- Epidural analgesia
- Fetal malposition
- CPD.

Recommended therapy for protracted disorders is expectant management and for arrest is oxytocin in absence of any cephalopelvic disproportion.

Second Stage of Labor

It begins from full dilatation of cervix and ends with expulsion of fetus.

In the second stage, the expulsive efforts by a woman play more important role than uterine contractions.

	Second stage		
	Normal	Prolonged without epidural	Prolonged with epidural
Nulli parous	1 hr	2 hrs (+1 for arrest)	3 hrs (+1 for arrest)
Multi parous	30 mins	1 hr (+1 for arrest)	2 hrs (+1 for arrest)

2nd stage arrest: When there is no change in descent of head for 1 hour more than prolonged.

Third Stage of Labor

Third stage of labour extends from the birth of child to complete expulsion of placenta and membranes and contraction and retraction of uterus.

Third stage can be managed by	
Expectant Management	**Active management**
• In this method the placental separation and its descent into vagina is allowed to occur spontaneously with minimal assistance • Duration of third stage is 15 mins, so increased bleeding, increased chances of PPH and increased maternal mortality.	• In this method the placenta separation is actively facilitated and powerful uterine conractions are initiated to reduce the incidence of third stage complications (like PPH) • Duration is reduced to 5 mins so less bleeding, less chances of PPH and less maternal mortality • Active management of labor includes - Administration of a uterotonic soon after birth of baby - Delayed cord clamping - Delivery of placenta by controlled cord traction - Uterine message

Note: Oxytocin (uterotonic of choice)should be offered for prevention of PPH.

The only drawback of active management of 3rd stage of labor is , since uterotonic agent is given at tha delivery of shoulder before the delivery of placanta, it can lead to increased chances of Retained placenta.

KEY CONCEPT

Normally in active management of third stage we do delayed cord clamping but in certain conditions early cord clamping is advocated.

Indications of Early Cord Clamping:

- Preterm or growth restricted fetus due to risk of hypervolemia even an extra 40-50 ml of blood can cause CHF in premature infants, thus the cord is clamped immediately
- Birth asphyxia (first immediately resuscitate the baby and then think about anything else)
- Rh isoimmunization
- HIV positive female
- Maternal diabetes.

Signs of Placental Separation

Per abdomen	Per vaginal
• Uterus becomes globular, firm and ballottable (earliest sign to appear). • Fundal height is slightly raised as the separated placenta comes down in lower segment and uterus rests over it (Schroeder's sign). • Slight suprapubic bulging may be seen due to separated placenta distending the lower segment. • On pushing the uterus cephalad with a hand on the abdomen, the cord no longer recedes **(Kustner's sign)**.	• Sudden gush of blood. • Permanent lengthening of cord.

These signs usually appear within 5 minutes after delivery of the infant.

MECHANISM OF LABOR

Mechanism of normal labour is defined as the manner in which the fetus adjusts itself to pass through the parturient canal with minimal difficulty.

There are 8 cardinal movements of the head in normal labour.

- **E**very – **E**ngagement (Synclitic or Asynclitic)
- **D**ecent – **D**escent
- **F**emale – **F**lexion
- **I** – **I**nternal rotation
- **C**hoose to – **C**rowning
- **E**mploy – **E**xtension
- **R**ises – **R**estitution
- **E**xtremely – **E**xternal rotation

Mnemonic:* *Every Decent Female I Choose to and Employ Rises Extremely.

Engagement

- ***Engagement is said to occur when the greatest transverse diameter of the presenting part, has passed through the pelvic inlet. In all cephalic presentations, the greatest transverse diameter is always the biparietal.*** *(Fig. 6.2)*
- Engagement occurs in Multipara with commencement of labour[Q] in the late Ist stage after rupture of membranes and in Nullipara during the last few weeks of pregnancy 38 weeks.

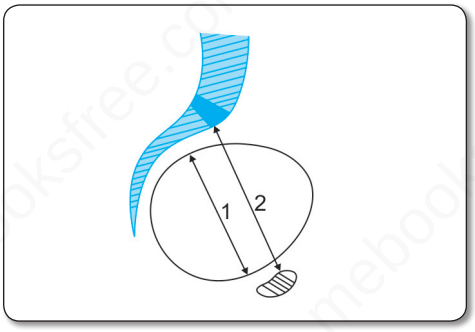


Fig. 6.2: Engagement in vertex showing that the BPD (1) has passed through the pelvic inlet, (2) and the lowermost part of the head is at the level of the ischial spines.

- In primi's the *most common* cause of non engagement at term is deflexed head, occipitoposterior position followed by cephalopelvic disproportion (CPD).[Q]

- Engagement of head rules out CPD at the level of pelvic inlet.
- If head is engaged, it means head is at 'O' station.

Engagement can be:

Synclitic	Asynclitic	
When sagittal suture of the head of fetus lies in the transverse diameter of pelvic inlet (midway between the pubic symphysis and the sacral promontory) It occurs in 25% cases	***Anterior:*** Sagittal suture is defected towards sacral promontory. Also k/a anterior parietal presentaion/Naegeles obliquity. It occurs commonly in multipara	***Posterior:*** Sagittal suture is defected towards pubic symphysis, the posterior parietal bone thus becomes the leading part. Also k/a Litzman obliquity/ parietal presentation It occurs commonly in nulliparous women.

Causes of nonengagement of head in a nullipara at term:

- Malpresentations[Q] / Occipitoposterior postition/deflexed head
- Cephalopelvic disproportion[Q]
- Placenta previa[Q] / Tumours in the lower segment[Q]
- Tumours of the fetal neck[Q]/Cord around the neck[Q]/Hydrocephalus[Q]
- Polyhydramnios[Q]
- Distended bladder and rectum.[Q]

Cephalopelvic disproprotion (CPD)

CPD can be true or relative

True CPD: Is relatively rare and occurs when the presenting part of the fetus is too big or pelvis is too small (pelvic dystocia). Pelvis dystocia is uncommon in developed countries but may occur after trauma. In developing countries, it is seen in vit D deficiency and rickets.

Relative CPD: is M/C and is associated with fetal malposition (occiptio posterior position or brow presentation).

Partogram

- It is the best method to assess the progress of labor.
- Partogram is the best method to assess progress of labour.

Partogram is the graphical recording of stages of labour including cervical dilatation, descent and rotation of the head (Fig. 6.3).

- It was introduced by WHO a part of the Safe Motherhood initiative.
- The ***main purpose*** of the partogram is to *avoid prolonged labour* and *intervene timely.*
- Once labour is diagnosed, its progress is charted on a partogram by abdominal and vaginal examination.
- The latent phase of labour is up to 3 cm dilatation, and should not be more than 8 hours. In the active phase which extends from 3 cm to complete cervical dilatation, labour is expected to progress at the rate of at least 1 cm cervical dilatation per hour which corresponds to the *alert line.*
- The ***action line*** is drawn 4 hours to the right and parallel to the alert line in the *WHO partogram.*
- Labour is considered normal as long as the progress of cervical dilatation is to the left of the alert line.
- Prolonged labour is diagnosed, once the alert line is crossed, i.e., there is a shift to the right. This is considered an indication for intervention.
- If the patient is in a peripheral hospital, once the alert line is crossed, it is an indication for referral to a higher centre.
- If action line is crossed , it is an inducation for cesarean section.

Thus, the partogram can be used to identify an abnormal labour pattern and to indicate the correct time for intervention by means of the alert and action lines.

How to use it —

A partograph must be started only when a woman is in labor.

The partograph is used to plot the following parameters for the progress of labor: (i) cervical dilatation, (ii) descent of fetal head, and (iii) uterine contractions. It will also be used for monitoring fetal conditions with the following parameters: fetal heart rate, membranes and liquor and moulding of fetal skull. Additionally, the partograph can be used to monitor maternal condition:

(i) Cervical dilatation: The rate of dilatation of the cervix changes during labor, this is represented by the bold lines in the graph.

Dilatation of the cervix is measured by the diameter in cm. This is recorded with an X in the center of the partograph, at the intersection of vertical and horizontal lines. The vertical scale represents dilatation by 10 squares of 1 cm each. The horizontal scale represents time by 24 squares of one hour each.

When labor goes from latent to active phase, the dilatation must be plotted on the alert line. The latent phase should normally not take longer than 8 hours. When admission takes place directly in the active phase, the dilatation is immediately plotted on the alert line.
If progress is satisfactory, the plotting of the cervical dilatation will remain on or to the left of the alert line (see graph).

2. Descent of fetal head: Descent of the fetal head may not take place until the cervix has reached about 7 cm of dilatation. This is measured by abdominal palpation and expressed in number of finger widths (fifths of the head) above the pelvic brim. It is also recorded in the central part of the partograph with an "O".

Cervical dilatation and descent of the head (which are the best parameters to assess the progress of labour) are plotted on y axis aixs and time in hours is plotted on × axis.

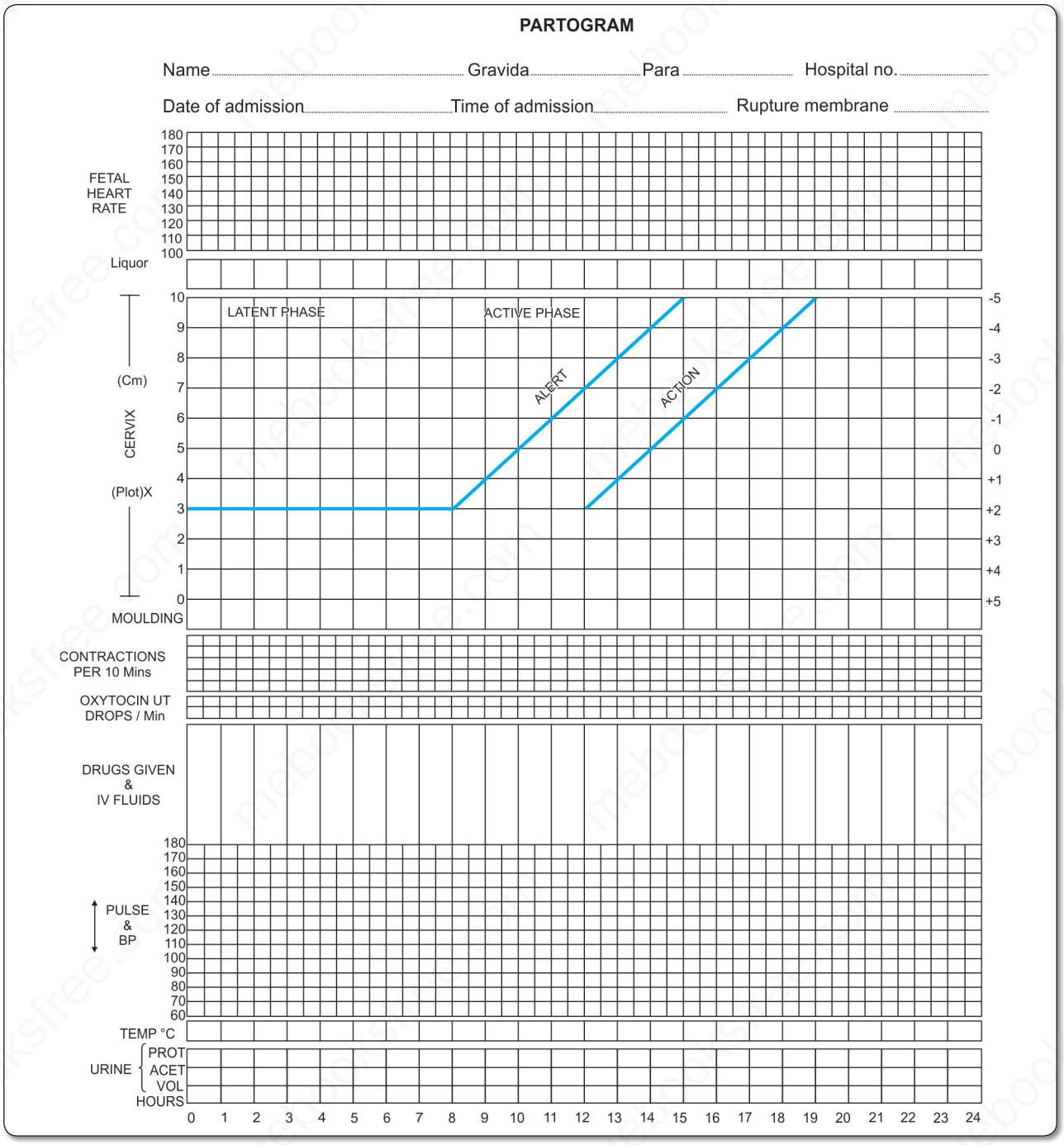
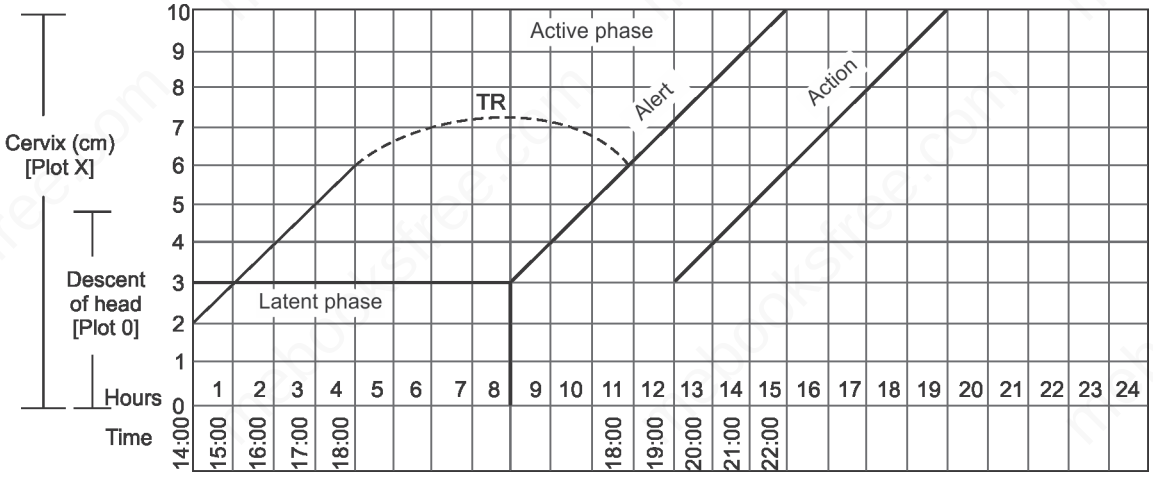


Fig. 6.3: Partogram

Lets draw partogram of a G2P1 female at 38 weeks gesation who presents to labor room with three contactionas in every 10 mins, lasting for 15-20 secs.

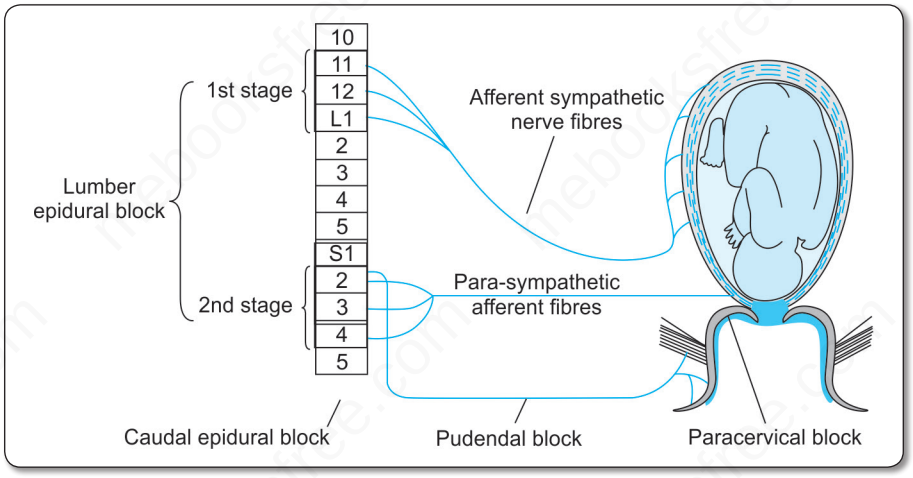
- Admission time was 14:00, the dilatation of the cervix was 2 cm and the head was 5/5 above the pelvic brim.

- At 18:00, the dilatation was 6 cm (active phase), and the head was 4/5 above the brim.
- Labor is now in active phase. Cervical dilatation is immediately transferred to the alert line; descent of the head and time are transferred to the vertical line intersecting the 5 cm line on the alert line.
- At 21:00, the cervix was fully dilated (10 cm). The total length of the first stage of labor observed in the unit was hours.



- Throughout this time the graph drawn has remained to the left of alert line, so progress is said to be normal.

PAIN PATHWAY IN LABOR



MANAGEMENT OF PAIN DURING LABOR

Pudendal nerve block:

- *Pudendal nerve arises from:* S2, S3, S4 and therefore pudendal nerve block - will block S2, S3, S4, nerve roots.
- It is used for perineal analgesia and relaxation.
- **Anaesthesia** used is 20 ml of 1% lignocaine.
- **Route** Transvaginal and perineal route
- **Site :** Pudendal nerve is blocked just above the tip of ischial spine
- **Indications:**
  - Prior to application of forceps or vacuum
  - To suture vaginal lacerations
  - In Assisted breech delivery.

Paracervical block:

Paracervical block

- ***Basis of use:*** Sensory nerve fibres from the uterus fuse bilaterally at the 4-6 O' clock and 6-8 O' clock position around the cervix in the region of cervico vaginal junction.
- In para cervical block, 5-10 ml of 1% lidocaina is injected into these areas to interrupt the sensory input from the cervix and uterus.
- **It relieves the pain of uterine contractions**[Q]
- Since the block is given in lateral fornix so it anaesthetizes upper 1/3rd of vagina also.[Q]
- It is not useful at the time of episiotomy as lower part of vagina is not anaesthetized.
- It is no longer considered safe as it causes fetal bradycardia.[Q]

Remember:

Pudendal nerve block	Blocks nerve roots S2, S3, S4. Used for perineal analgesia and relaxation prior to application of vacuum or forceps and for suturing vaginal lacerations
Saddle block	Spine punctured between L2 and L5 Low spinal anaesthesia confined to vagina and perineum Useful in midcavity forceps
Perineal infiltration	Useful for stitching of episiotomy.

Epidural block:

When complete relief of pain is needed throughout labor, epidural analgesia is the safest and simplest method for procuring it.

Advantages of regional anesthesia

- The patient is awake and can enjoy the birth time
- Newborn apgar score generally good
- Lowered risk of maternal aspiration
- Postoperative pain control is better.

- For complete analgesia a block from T10 to the S4 dermatomes is needed. For cesarean delivery a block from T4 to S1 is needed. Repeated doses (top ups) of 4 to 5 mL of 0.5 percent bupivacaine or 1 percent lignocaine are used to maintain analgesia.
- Epidural analgesia, as a general rule should be given when labor is well established.
- Maternal hydration should be adequate.
- The women is kept in semilateral position to avoid aortocaval compression.
- **Epidural analgesia is specially beneficial** in cases like pregnancy induced hypertension, breech presentation, twin pregnancy and preterm labor.
- Previous cesarean section is not a contraindication.
- Epidural analgesia when used there is no change in duration of first stage of labor. But second stage of labor appears to be prolonged. This might lead to frequent need of instrumental delivery like forceps or ventouse.

Contraindications of Epidural Analgesia	Complications of Epidural Analgesia
• Maternal coagulopathy or anticoagulant therapy • Supine hypotension • Hypovolemia • Neurological diseases • Spinal deformity or chronic low back pain • Skin infection at the injection site	• Hypotension due to sympathetic blockade. Parturient should be well hydrated with (IL) crystalloid solution beforehand • Pain at the insertion site. Back pain • Postspinal headache due to leakage of cerebrospinal fluid through the needle hole in the dura • Total spinal due to inadvertent administration of the drug in the subarachnoid space • Injury to nerves, convulsions, pyrexia • Ineffective analgesia

QUESTIONS

1. Cardinal movements of labour are: **[PGI 00]**
a. Engagement → descent → flexion → internal rotation → extension → restitution → external rotation → expulsion
b. Engagement → flexion → descent → internal rotation → extension → expulsion **[PGI Dec. 00]**
c. Engagement → flexion → descent → external rotation → expulsion
d. Engagement → extension → internal rotation → external rotation → expulsion

2. Which cardinal movements occur during labour? **[PGI June 08]**
a. Flexion
b. Extension
c. Internal rotation
d. Descent
e. Asynclitisms

3. Duration of latent phase of labour is affected by: **[PGI Dec 00]**
a. Early use of conduction anaesthesia and sedation
b. Unripe cervix
c. Hypertonic uterine contraction
d. Pre-eclampsia

4. Prolong latent phase is/are seen in: **[PGI May 2010]**
a. Placenta praevia
b. Unripe cervix
c. Abruptio placentae
d. Excessive sedation
e. Early epidural analgesia

5. A female at 37 weeks of gestation has mild labour pains for 10 hours and cervix is pessistently 1 cm dilated but non effaced. What will be the next appropriate management? **[AIIMS Nov 08]**
a. Sedation and wait b. Augmentation with oxytocin
c. Cesarean section d. Amniotomy

6. 37 weeks primi with uterine contraction for 10 hours, cervix is 1 cm dilated and poorly effaced management is: **[AI 2011]**
a. Cesarean section
b. Amniotomy
c. Oxytocin drip
d. Sedation and wait

7. Commonest cause of nonengagement at term, in primi is: **[PGI June 98]**
a. CPD
b. Hydramnios
c. Brow presentation
d. Breech

8. True labour pain includes all *except*: **[PGI June 09]**
a. Painful uterine contraction
b. Short vagina
c. Formation of the bag of waters
d. Progressive descent of presenting part
e. Cervical dilatation

9. Sensitivity of uterine musculature:
a. Enhanced by progesterone **[AIIMS May 06]**
b. Enhanced by estrogen
c. Inhibited by estrogen
d. Enhanced by estrogen and inhibited by progesterone

10. Which is not included in active management of III stage of Labour? **[AI 08]**
a. Uterotonic within 1 minute of delivery
b. Immediate clamping, cutting and ligation of cord
c. General massage of uterus
d. Controlled cord traction

11. Which is not included in active management of 3rd stage in labor to prevent PPH? **[AIIMS May 2013]**
a. Direct oxytocin injection after delivery of shoulder
b. Immediate cutting and cord clamping
c. Prophylactic misoprostol
d. Controlled and sustained cord traction

12. Pain in early labor is limited to dermatomes: **[AIIMS Nov 09]**
a. $T_{10} - L_1$ b. $S_1 - S_3$
c. $L_4 - L_5$ d. $L_2 - L_3$

13. Assessment of progress of labour is best done by: **[PGI Dec 97]**
a. Station of head
b. Rupture of membrane
c. Contraction of uterus
d. Partogram

14 Mrs AR G3 P1LIA a full term pregnant female is admitted in labor. On examination, she has uterine contractions 2 in 10 minutes, lasting for 30-35 seconds.

On P/A examination 3/5th of the head is palpable per abdomen.

On P/V examination-cervix is 4 cm dilated, membranes intact.

On repeat examination 4 hours later, cervix is 5 cm dilated, station is unchanged, and cervicograph remains to

the right of the alert line. Which of the following statements is true? **[AIIMS]**
a. The head was engaged at the time a of presentation
b. Her cervicographical progress is satisfactory
c. Her cervicographical status suggests intervention
d. On repeat examination, her cervicograph should have touched the action line

15. All of the following are indications for early clamping of cord *except*: [New Pattern Question]
a. Preterm delivery
b. Postdated pregnancy
c. Birth asphyxia
d. Maternal diabetes

16. During active labour cervical dilatation per hour in primi is: [New Pattern Question]
a. 1.2 cm
b. 1.5 cm
c. 1.7 cm
d. 2 cm

17. Living ligature of the uterus is: [New Pattern Question]
a. Endometrium
b. Middle layer of myometrium
c. Inner layer of myometrium
d. Perimetrium

18. Definite sign of placental separation in stage 3 of parturition is: [New Pattern Question]
a. Gushing of blood
b. Lengthening of cord
c. Filling of placenta in vagina
d. Increase of BP

19. Bag of membrane ruptures: [New Pattern Question]
a. Before full dilatation of cervix
b. After full dilatation of cervix
c. After head is engaged
d. With excessive show

20. Percentage of women who deliver on the expected date of delivery: [New Pattern Question]
a. 4%
b. 15%
c. 35%
d. 70%

21. Pressure of normal uterine contractions is between 190-300 units. Which unit is being referred to here? [New Pattern Question]
a. Montevideo units
b. mm of Hg
c. cm of water
d. joules/kg

22. Ritgen maneuver is done in: [New Pattern Question]
a. Shoulder dystocia
b. For delivery of head in breech presentation
c. For delivery of legs in breech
d. For delivery of head in normal labour

23. All are true about origin and propagation of contractions *except*: [New Pattern Question]
a. The right pacemaker predominates over left
b. Intensity of propagation is greatest at cervix
c. The contraction spreads from pacemaker tow ards cervix
d. Speed of contraction is 2 cm/sec

24. During the active phase of labour, the minimum effective dilatation of the cervix in primigravida should be at the rate of: [New Pattern Question]
a. 0.5 cm/hour
b. 1 cm/hour
c. 1.5 cm/hour
d. 2 cm/hour

25. Factors which help in descent of the presenting part during labour are all *except*: [New Pattern Question]
a. Uterine contraction and retraction
b. Straightening of the fetal axis
c. Bearing down efforts
d. Resistance from the pelvic floor

26. The prerequisites for internal rotation of the head are all *except*: [New Pattern Question]
a. Well-flexed head
b. Efficient uterine contraction
c. Favourable shape of the pelvis
d. Tone of the abdominal muscles

27. The following statement is true for internal rotation of the head: [New Pattern Question]
a. Rotation occurs mostly in the cervix
b. In majority rotation occurs in the pelvic floor
c. Rotation occurs commonly after crowning of the head
d. Rotation is earlier in primipara than multipara

28. The perineal injury can be prevented in normal labour by all *except*: [New Pattern Question]
a. Maintaining flexion of the head
b. Timely episiotomy as a routine
c. Slow delivery of the head in between contractions
d. Effective perineal guard

29. Intrauterine pressure is raised during labour to: [New Pattern Question]
a. First stage — 40–50 mm Hg
b. Second stage — 100–120 mm Hg
c. Third stage — 100–120 mm Hg
d. All of the above

30. Uterine contractions are clinically palpable when there intensity is more than? [New Pattern Question]
a. 10 mm of Hg b. 15 mm of Hg
c. 20 mm of Hg d. 40 mm of Hg

31. Which does not influence the factor in progress of labor is: [New Pattern Question]
a. Parity of female
b. BMI of female
c. Fetal sex
d. Number of fetuses
e. None of the above

32. The nerve roots blocked in pudendal nerve block is: [AI 93]
a. L1,2,3
b. L2,3
c. S2,3,4
d. S4

33. Paracervical block relieves pain from all but one of the following: **[New Pattern Question]**

a. Pain from dilatation of the cervix
b. Uterine pain
c. Relives pain from the lower third of vagina and episiotomy can be performed
d. Relieve pain from the upper third of vagina

34. A 35-year-old pregnant female at 40 weeks gestational age presents with pain and regular uterine contractions every 4-5 min. ON arrival, the patient is in a lot of pain and requesting relief immediately. Her cervix is 5 cm dilated. What is the most appropriate method of pain control for this patient? **[New Pattern Question]**

a. Intramuscular morphine
b. Pudendal block
c. Local block
d. Epidural block

35. The only disadvantage of active management of IIIrd stage of labor is: **[New Pattern Question]**

a. Increased maternal mortality
b. Increased duration
c. Maternal fatigue
d. Retained placenta

36. True regarding hypertonic dysfunction of labor is: **[New Pattern Question]**

a. M/C associated with occipitoposterior position
b. Oxytocin administration is beneficial with occipito pestonion position
c. Occurs in of 1st stage of labor
d. Leads to rapid dilatation of cervix

37. M/C cause of true CPD in developing countries is: **[New Pattern Question]**

a. OP position
b. Malpresentations
c. Rickets
d. Trauma

EXPLANATIONS & REFERENCES

1. **Ans. is a i.e. Engagement → descent → flexion → internal rotation → extension → restitution → external rotation → expulsion**

2. **Ans. is a, b, c, d and e i.e. Flexion, Extension, Internal rotation, Descent and Asynclitism**

Ref. Dutta Obs. 7/e, p 128

Series of events that take place in the genital organs in an effort to expel the viable products of conception out of the womb through the vagina into the outer world is called as *Labour.*

Mechanism of normal labour is defined as the manner in which the fetus adjusts itself to pass through the parturient canal with minimal difficulty.

There are 8 cardinal movements of the head in normal labour.

- **E**very – **E**ngagement (Synclitic or Asynclitic)
- **D**ecent – **D**escent
- **F**emale – **F**lexion
- **I** – **I**nternal rotation
- **C**hoose to – **C**rowning
- **E**mploy – **E**xtension
- **R**ises – **R**estitution
- **E**xtremely – **E**xternal rotation

Mnemonic : ***Every Decent Female I Choose to and Employ Rises Extremely.***

Also know: Other questions asked on cardinal movements:
- Most common presentation – cephalic (95%).
- Most common presenting part – vertex.
- In normal labour, the head enters the pelvis more commonly through the transverse diameter^{Q} (75% cases) or oblique diameters (20% cases) (IInd most common) and AP diameter (5% cases) at the onset of labour^{Q}.
- The most common position *(i.e. relation of occiput to quadrant of pelvis)* is left occipito-transverse.^{Q} followed by Left occipito anterior position (Ref Williams Obs. 23/e p 378).
- The engaging diameter of head is Suboccipito bregmatic diameter (9.5 cm) or^{Q}
- In slight deflexion is Sub occipito frontal (10 cm).^{Q}
- Internal rotation of fetal head occurs the level of ischial spine.
- In a vertex delivery the babys head is delivered by extension, whereas in breech it is born by flexion.
- Best time for giving episiotomy is after crowning has occured.

3. **Ans. is a and b i.e. Early use of conduction anaesthesia and sedation; and Unripe cervix**

4. **Ans. is b, d and e i.e. Unripe cervix, Excessive sedation and Early epidural analgesia**

Ref. Fernando Arias 3/e, p 376; Williams Obs. 24/e, p 446, 23/e, p 386-388

Read the text for explanation.

5. **Ans. is a i.e. Sedation and wait** *Ref. Fernando Arias 3/e, p 376*

6. **Ans. is d i.e. Sedation and wait** *Ref. Fernando Arias 3/e, p 376*

- The patient is presenting at 37 weeks with mild labor pains for 10 hours. Cervix is 1 cms dilated and is not effaced. Now this can either be a case of false labor pains or it can be prolonged latent phase of labor.
- Lack of progress during the latent phase is defined as lack of change or minimal change in cervical effacement and dilatation during a 2 hour period in a woman having regular uterine contractions.

- The patient in the question has been having mild labor pains for 10 hours with no change in cervical dilatation and effacement. But again the question does not specify whether she is having regular uterine contractions or not.

False labor can be differentiated from latent phase of labor by therapetuic rest i.e., patient is sedated with morphine.

Patient in false labor	Patient in latent phase
↓	↓
Sleeps for a few hours and wakes-up without contractions	Continues contracting and show cervical changes following the rest

So the correct option is Sedate and Wait.

As far as augmentation with oxytocin is concerned - it is done only in those patients who even after therapeutic rest continue to be in prolonged latent phase (once the diagnosis of lack of progress of latent phase is confirmed following therapeutic rest.) Amniotomy is not useful and should be avoided in patients in prolonged latent phase. Also, there is no indication of cesarean section in this case.

7. Ans. is a i.e. CPD *Ref. Dutta Obs. 7/e, p 81, 82, 352*

- ***Engagement is said to occur when the greatest transverse diameter of the presenting part, has passed through the pelvic inlet. In all cephalic presentations, the greatest transverse diameter is always the biparietal.***
- Engagement occurs in multipara with commencement of labour^{Q} in the late Ist stage after rupture of membranes and in Nullipara during the last few weeks of pregnancy, i.e. ≈ 38 weeks
- In primi's the *most common* cause of non engagement at term is deflexed head or occipitoposterior position followed by cephalopelvic disproportion (CPD).^{Q}
- Since deflexed head or occipitoposterior is not given in option, we will go for CPD as the answer.

8. Ans. is b i.e. Short vagina *Ref. Dutta Obs. 7/e, p 117*

Differences between true and false labour pains.

Features	True labour pains	False labour pains
Cervical changes (dilatation & effacement)	Present	Absent
Frequency and duration of contractions	Regular and gradually increase	Irregular
Pain	Lower abdomen and back, radiating to thighs	Lower abdomen only
Bag of water	Formed	Not formed
Show	Present	Absent
Relief with enema/sedation	No	No

9. Ans. is d i.e. Enhanced by estrogen and inhibited by progesterone

Ref. Jeffcoate 7/e, p 68, 71; Guyton 10/e, p 936; Ganong 22/e, p 441, 443, 444

Effect of estrogen and progesterone on uterus

Effect of estrogen	Effect of progesterone
• Estrogen causes marked proliferation of the endometrial stroma and greatly increased development of the endometrial glands^{Q}	• Promote secretory changes in the uterine endometrium during the later half of the monthly female sexual cycle, thus prepares the uterus for implan tation of the fertilized ovum.
• Estrogen causes hypertrophy of the myo metrium.^{Q} • *Estrogen stimulates the synthesis of myometrial contractile protein actinomycin through cAMP. Under the influence of estrogens the muscles become more active and excitable and action* potentials in the individual fibres become more frequent.^{Q} • The estrogen dominated uterus is also more sensitive to oxytocin.	• It aids estrogen in myometrial hypertrophy • Increase in the tortuosity of glands • ↑ lipid and glycogen deposits • Decreases the frequency and intensity of uterine contractions, thereby helping to preven texpulsion of the implanted ovum but increases the amplitude of contraction.

10. Ans. is b i.e. Immediate clamping, cutting and ligation of cord

11. Ans. is b i.e. Immediate cutting and cord clamp

Ref. Dutta Obs. 7/e, p 141, 142; Sheila Balakrishnan 1/e, p 149; Management of Labour by Arulkumaran; Penna & Rao 2/e, p 196, Recent Advances in Obs and Gynae Vol 24 edited by William Dunlop, p 93

Active management of the third stage of labour includes:

(i) Administration of a uterotonic soon after birth (best is oxytocin followed by misoprost

(ii) Delayed cord damping

(iii) Delivery of placenta by controlled cord traction

(iv) Uterine massage.

Now this leaves us with no doubt that ***'Early cord clamping***' should not be included in active management of labour.

Reason – why early cord clamping is being discouraged is because if cord is clamped immediately the cord blood present in it(80-100 ml) will go waste whereas, if delayed cord clamping is done, the cord blood goes to the newborn and their are less chances of anemia, intraventricular hemorrhage and late onset sepsis especially in preterm infants.

Also remember: Inorder to facilitate the cord blood to reach the newborn, the tray with the baby should be placed at a lower level than the mothers abdomen after delivery and before cord is cut.

The only drawback of active management of 3rd stage of labor is, since uterotonic agent is given at tha delivery of shoulder before the delivery of placanta, it can lead to increased chances of Retained placenta.

12. Ans. is a i.e. $T_{10} – L_1$ *Ref: Dutta Obs 7/e, p 117*

In the early stages of labour pain is mainly uterine in origin because of painful uterine contraction

"The pain of uterine contractions is distributed along the cutaneous nerve distribution of T_{10} to L_1

—Dutta Obs, 6/e, p 118

In later stages pain is due to dilatation of the cervix.

"The pain of cervical dilatation and stretching is referred to the back through sacral plexus."

—Dutta Obs, 6/e, p 118

13. Ans. is d i.e. Partogram *Ref. Dutta Obs. 7/e, p 530, Williams Obs. 23/e, p 406*

Partogram is the best method to assess progress of labour.

14. Ans. is c i.e. Her cervicograph suggests intervention *Ref: Read below*

In this patient at the beginning of the labor, three fifths of the head was palpable , which indicates head is not engaged as head is said to be engaged only if 1/5th is palpable per abdomen…

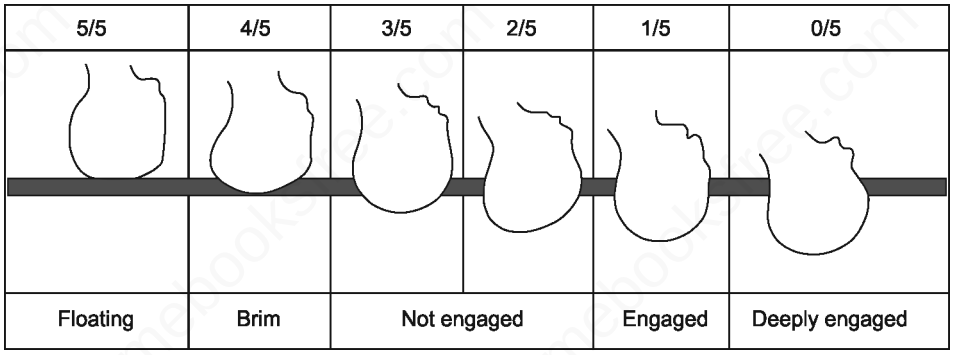
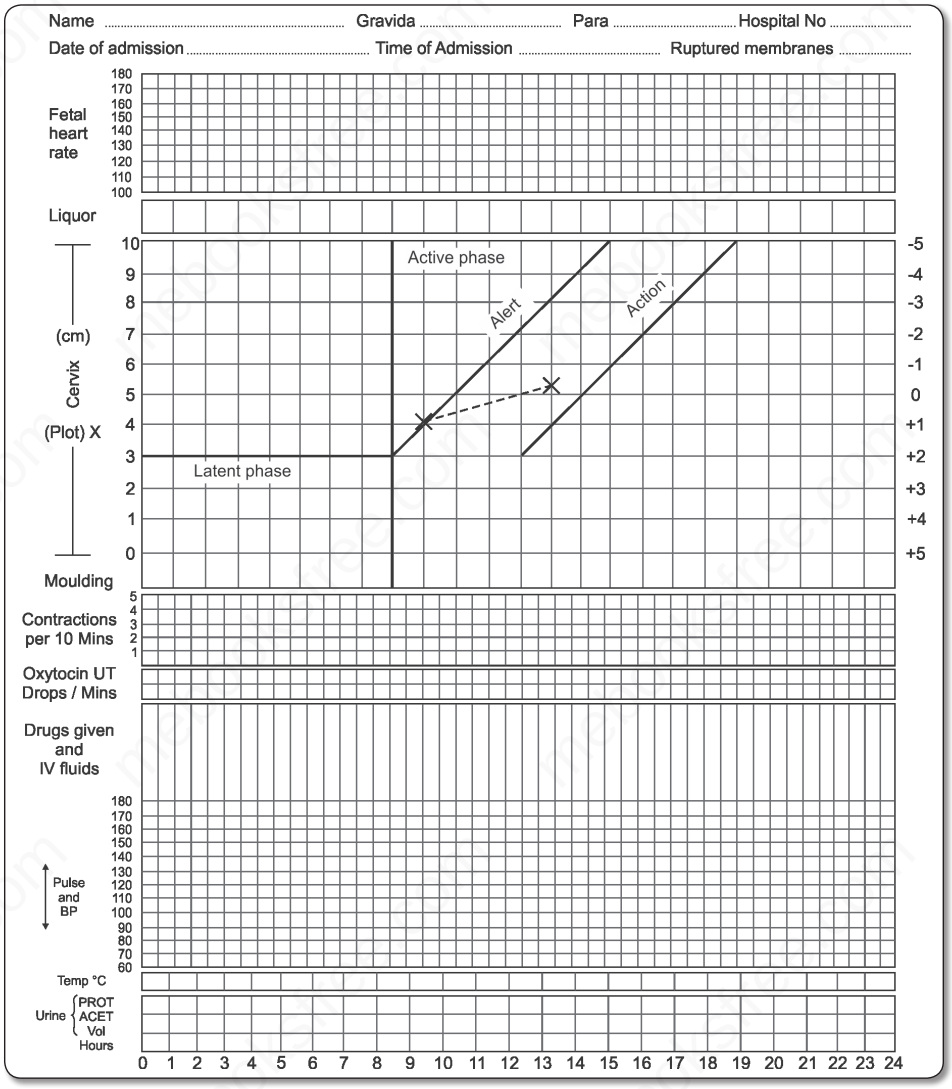


Fig. Crichton's method of assessing fetal head descent in fifths by abdominal palpation

Progressive descent of the fetal head can be assessed abdominally by estimating the number of "fifths " of the head above the pelvic brim(Crichton method): When one/fifth above, only the sinciput can be felt abdominally and head is said to be engaged and nought fifths represents a head entirely in the pelvis with no poles felt abdominally.

- Now in this female lets draw the partograph-remember in partograph on Y-axis, dilatation of cervix and desent of fetal head are noted and on X-axis time is noted in hours. If we measure only cervical dilatation, the term cervicograph can be used instead, thus both the terms mean approximately the same (for example if you see the partogram drawn in Dutta 7/e, p 403..they have used the term cervicograph instead of partograph…so don't get confused.)

- Another important thing to remember is –we use partogram proposed by WHO for all purposes and not any other partogram.
- **Now lets draw the partograph related to this patient**
- Mrs AR is coming to us with dilatation of cervix 4 cm i.e. she comes in active phase-so directly I am plotting her dilatation on the alert line (as it is we donot know how much time she would have taken to achieve this dilatation), now 4 hours later her dilatation is 5 cm, so next I have plotted that.



- As you can see from the graph Mrs AR progress is unsatisfactory as it lies towards the right of alert line, so some intervention is needed at this time either in terms of oxytocin, or doing ARM and reassessment of the fetal position and pelvis to rule out cephalopelvicdisproportion.
- When the cervicograph touches the action line or crosses it, pregnancy should be terminated by lower segment cesarean section.

Also know

- Normally in the active phase, cevical dilatation should proceed at the rate of 1.2 cm/hour in a nullipara and 1.5 cm/hour in a multipara. **Protracted active phase dilatation** is defined as a cervical dilatation of less than 1 cm per hour and is the commonest abnormal labor pattern seen. It is generally due to malposition (occipitoposterior position) or inadequate uterine contractions.

15. Ans. is b i.e Postdated pregnancy

Normally in active management of third stage we do delayed cord clamping but in certain conditions early cord clamping is advocated.

Indications of Early Cord Clamping:

- Preterm or growth restricted fetus due to risk of hypervolemia even an extra 40-50 ml of blood can cause CHF in premature infants, thus the cord is clamped immediately
- Birth asphyxia (first immediately resuscitate the baby and then think about anything else)
- Rhisoimmunization
- HIV positive female
- Maternal diabetes.

16. Ans. is a i.e. 1.2 cm *Ref. Williams Obs. 22/e, p 422, 423, 23/e, p 388*

Labour is said to active when:

- Cervix is dilated to at least 3 – 4 cm.Q
- Regular uterine contractions are present.Q
- Rate of dilatation is at least 1.2 cm/hrQ for nulliparous and 1.5 cm/hrQ for parous women.

17. Ans. is b i.e. Middle layer of myometrium *Ref. Dutta Obs. 7/e, p 46*

Arrangement of muscle fibres in uterus are arranged in 3 layers.

- Outer longitudinal
- Inner circular
- Intermediate:
  - Is the strongest and thickest layer arranged in criss-cross fashion.Q
  - Through this layer blood vessels run.
  - Apposition of two double curve muscle fibre gives the figure of 8 form.Q
  - When the muscle contract they occlude the blood vessels running through the fibres and hence called ***Living Ligature.***

18. Ans. is a and b i.e. Gushing of blood; and Lengthening of cord

Ref. Dutta Obs. 7/e, p 132; Williams Obs. 22/e, p 431, 432, 23/e, p 397

Read the text for explanation.

19. Ans. is b i.e. After full dilatation of cervix *Ref. Dutta Obs. 7/e, p 130*

Membranes usually rupture after full dilatation of cervix or sometimes even beyond, in the second stage.

Early Rupture of Membranes:

- *Rupture of membranes any time after the onset of labour but before full dilatation of cervix.*

Premature Rupture of Membrane:

- *Rupture of membranes before the onset of labour.*
- Sometimes the membranes remain intact until completion of delivery, the fetus is then born surrounded by them and the portion covering the head of the newborn infant is known as the *Caul.*

20. Ans. is a i.e. 4% *Ref. Dutta Obs. 7/e, p 113*

Expected date of delivery is calculated using Naegele's rule i.e.,

- EDD is 9 months + 7 days calculated from the 1st day of last menstrual period.
- This rulme is based on a normal 28 days cycle.
- In case of women with longer cycle additional number of days that the cycle extends beyond 28 days is added.

Based on the formula, labour starts approximately:

- On the expected date in 4% cases.
- One week on either side in 50% cases.
- 2 weeks earlier and 1 week later in 80% cases.

21. Ans. is a i.e. Montevideo units *Ref. Williams Obs, 23/e, p 437,*

1 montevideo unit = Intensity of constraction x number of contractions in 10 mins.

Montevideo unit is to define uterine activity.

As per this:

Clinical labour usually commences when uterine activity reaches values between 80-120 Montevideo units (This translates into approximate 3 contractions of 40 mm of Hg every 10 minutes).

During labour – Normal uterine contractions are between 190 – 300 Montevideo units
(At the time of delivery it is 300 Montevideo units)

Extra Edge

- Uerine contractions are clinically palpable only after their intensity exceeds > 10 mm of Hg
- Uterine contractions are not associated with pain unless their intensity is > 15 mm of Hg.

22. Ans. is d i.e. For delivery of head in normal labour *Ref. Dutta Obs. 4/e, p 137; Williams 23/e, p 395*

Ritgen (Ritzen) maneuver is done for delivery of head in normal labour to allow controlled delivery of the head.
When the head distends the vulva and perineum enough to open the vaginal introitus to a diameter of 5 cm of more, a towel-draped, gloved hand may be used to exert forward pressure on the chin of the fetus through the perineum just in front of the coccyx. Concurrently, the other hand exerts pressure superiorly against the occiput.
This maneuver allows controlled delivery of the head. It also favors neck extension so that the head is delivered with its smallest diameters passing through the introitus and over the perineum.

23. Ans. is b i.e. Intensity of propogation is greatest at cervix

Origin and propagation of contractions
The normal contractile wave of labor originates near the uterine end of one of the fallopian tubes, i.e. uterine cornua thus, these areas act as **"pacemakers."** The **right pacemaker** usually predominates over the left and starts the great majority of contractile waves. Contractions spread from the pacemaker area throughout the uterus at 2 cm/s, depolarizing the whole organ within 15 s. This depolarization wave propagates downward toward the cervix. Intensity is greatest in the fundus.
Characteristics of contraction occuring during labour:
There is good synchronization of the contraction waves from both halves of the uterus.

- There is fundal dominance with gradual diminishing contraction wave through midzone down to lower segment which takes about 10–20 seconds.
- The waves of contraction follow a regular pattern.
- Intra-amniotic pressure rises beyond 20 mm Hg during uterine contraction.
- Good relaxation occurs in between contractions to bring down the intra-amniotic pressure to less than 8 mm Hg.
- Contractions of the fundus last longer than that of the midzone.

24. Ans. is b i.e. 1 cm/hour *Ref. Dutta Obs. 7/e, p 130*
Repeat

25. Ans. is d i.e. Resistance from the pelvic floor *Ref. Dutta Obs. 7/e, p 124*
Descent: Descent is a continuous process provided there is no undue bony or soft tissue obstruction. It is slow or insignificant in first stage but pronounced in second stage. It is completed with the expulsion of the fetus. In primigravidae, with prior engagement of the head, there is practically no descent in first stage; while in multiparae, descent starts with engagement. Head is expected to reach the pelvic floor by the time the cervix is fully dilated.
Factors facilitating descent are—(1) uterine contraction and retraction, (2) bearing down efforts and (3) straightening of the fetal ovoid specially after rupture of the membranes.
Note: Resistance offered by the pelvic floor promotes flexion of head and not descent.

26. Ans. is d, i.e. Tone of abdominal muscles *Ref. Dutta Obs. 7/e, p 125*

27. Ans. is b i.e. In majority rotation occurs in the pelvic floor
The prerequisites of anterior internal rotation of the head are well-flexed head, efficient uterine contraction, favourable shape at the midpelvic plane and tone of the levator ani muscles.
The level at which internal rotation occurs is variable. Rotation in the cervix although favorable occurs less frequently. In majority of cases, rotation occurs at the pelvic floor. Internal rotation ocurs earlier in multipara than primipara Rarely, it occurs as late as crowning of the head.

28. Ans. is b i.e. Timely episiotomy as a routine. *Ref. Williams Obs. 23/e, p 395 and Dutta Obs. 7/e, p 137*
Now if you have ever been to labor ward and assisted or even seen a normal delivery, you know all the options given in the question are done to prevent perineal laceration.

The controversy lies in option b i.e. whether routine episiotomy should be performed: Well read for yourself what williams has to say on this issue.

"There once was considerable controversy concerning whether an episiotomy should be cut routinely. It is now clear that an episiotomy will increae the risk of a tear into the external anal sphincter or the rectum or both. Conversely, anteriortears involving the urethra and labia are more common in women in whom an episiotomy is not cut. Most, advocate individualization and do not routinely perform episiotomy." —Williams Obs 23/e, p 395

Hence option b is incorrect.

Steps done for prevention of perineal laceration (Ref. Dutta Obs 7/e p 125): More attention should be paid not to the perineum but to the controlled delivery of the head.
- Delivery by early extension is to be avoided. Flexion of the the sub-occiput comes under the symphysis pubis so that lesser suboccipitofrontal 10 cm (4") diameter emerges out of the introitus.
- Spontaneous forcible delivery of the head is to be avoided by assuring the patient not to bear down during contractions.
- To deliver the head in between contractions.
- To perform timely episiotomy (when indicated not routine).
- To take care during delivery of the shoulders as the wider bisacromial diameter (12 cm) emerges out of the introitus.

29. Ans. is d i.e. All of the above

Intrauterine pressure during labor:

Stage	Pressure
1st	40–50 mm Hg
2nd	100–120 mm Hg
3rd	100–120 mm Hg

30. Ans. is a i.e. 10 mm of hg *Ref Williams 24/e, p 498*

- Uterine contractions are palpable when intensity exceeds 10 mm of hg.
- Uterine contractions become painful when intensity exceeds 15 mm of hg.
- Minimum intrauterine pressure required for cervical dilatation = 15 mm of hg.
- intrauterine pressure at which uterus becomes so hard that it cannot be indented by fingure –40 mm of hg.
- Uterine contractions are called adequate when they generate an IUP of 200-220 Montevideo units.

31. Ans. is e i.e None of the above *Ref. High Risk Pregnancy Fernando Arias 4/e, p 338*

Factors affecting progress of labor

1. **Parity of female:** In multiparous females progress of labor is fast.
2. **CPD:** If CPD is present, progress of labor is slow.
3. **BMI:** In obese females, progress of labor is slow.
4. **Gestation at age**: Increasing gestational age also shows progress of labor.
5. **Fetal sex:** Male gender is associated with statistically longer active first stage.
6. **Twin pregnancy:** Is also associated with slower progress of labor.

32. Ans. is c i.e S2,3,4 *Ref. Dutta Obs 7/e, p 518*

Pudendal nerve arises from: $S_{2,3,4}$ roots
Pudendal block will block these roots

33. Ans. is c i.e Relieves pain from the lower third of Vagina and episioto my can be performed
Ref Dutta Obs 7/e, p 517-518 and William 23/e, p 450

Paracervical block relieves pain from upper third of Vagina, not lower third.

34. Ans. is d i.e Epidural block *Ref. Williams 24/e, p 513*

When complete relief of pain is needed throughout labor, epidural analgesia is safest and simplest.

35. Ans. is d i.e Retained palcenta *Ref. Williams 24/e, p 513*

Read the text for explanation.

36. Ans. is a i.e M/C associated with ocapito posterior position *Ref. Fernando Arias 4/e, p 33*

Hypertonic uterine dysfunction:

Labor Dysfunction:

Can be described as Hypotonic or Hypertonic

Hypertonic uterine dysfunction:

- It is rare spontaneous event (occuring in I in 3000 labors)
- M/C associated with **late active phase dysfunction (not latent phase).** In active phase also- it occurs during late phase i.e when cervix is almost 7 cm dilated.
- The labor curve shows a decelerative or arrest pattern from 7 cm to 10 cm.
- M/C cause (in 30 % cases) is occipitoposterior position.
- M/C in Nulliparous females.
- Hypertonic uterine dysfunction means- the uterine contractions are incoordinated and increased in frequency (4-5 per 10 minutes) without a rest period in between. The baseline tone is also increased.
- Since the M/C cause is OP position, hence wait and watch policy should be adopted.
- Attention should be paid towards maternal hydration status.
- Oxytoin infusion can be considered but it can lead to hyperstimulation/tachysystole.

Hypotonic dysfunction:

- Refers to the presence of inadequate uterine contractions.
- It is also seen in active phase- but early active phase, i.e poor progress is seen between 4 to 7 cm dilatation
- M/C in Nulliparous females.

37. Ans. is c i.e Rickets *Ref. Fernando Arias 4/e, p 3*

Read the text for expalanation.

7

Induction of Labor

QUESTIONS

1. **Induction at term is not done in:** **[AI 08]**
   a. Hypertension b. DM
   c. Heart disease d. Renal disease
2. **In bishop score all are included *except*:** **[AI 07]**
   a. Effacement of cervix
   b. Dilatation of cervix
   c. Station of head
   d. Interspinal diameter
3. **Bishop's score includes:** **[PGI Nov 07/PGI June 98]**
   a. Dilatation of cervix
   b. Effacement
   c. Cervical softening
   d. Condition of os
   e. Position of head
4. **All of the following are used for induction of labour, *except*:** **[AIIMS May 04]**
   a. PG $F_2 \alpha$ tablet b. PG E_1 tablet
   c. PG E_2 gel d. Misoprostol
5. **All of the following drugs are effective for cervical ripening during pregnancy *except*:** **[AI 04]**
   a. Prostaglandin E2
   b. Oxytocin
   c. Progesterone
   d. Misoprostol
6. **ARM is contraindicated in:** **[PGI Dec 98]**
   a. Placenta previa
   b. Hydramnios
   c. Accidental hemorrhage
   d. Twins
7. **All of the following are true about augmentation of labor *except*:** **[AIIMS Nov 14]**
   a. Twin pregnancy precludes the use of oxytocin
   b. Ammiotomy decreases the need for oxytocin use
   c. Methods of augmentation does not increase the risk of operational management
   d. Associated with a risk of uterine hyper stimulation
8. **Indication for induction of labour is:** **[New Pattern Question]**
   a. Placenta previa
   b. PIH at term
   c. Heart disease at term
   d. Breech
9. **Contraindication of induction of labour:** **[New Pattern Question]**
   a. PIH b. Bad obstetrical history
   c. Diabetes d. Heart disease
10. **Benefits of surgical induction (ARM) are all *except*:** **[New Pattern Question]**
    a. Lowers the blood pressure in preeclampsia
    b. Relieves the maternal distress in hydramnios
    c. Decreases incidence of amnionitis
    d. Reduces the need of caesarean section
11. **Best method of induction of labour in hydramnios:** **[New Pattern Question]**
    a. High rupture of the membranes
    b. Low rupture of the membranes
    c. Abdominal amniocentesis followed by stabilising oxytocin drip
    d. Prostaglandins
12. **Which one of the following methods for induction of labour should not be used in patient with previous lower segment caesarean section?** **[New Pattern Question]**
    a. Prostaglandin gel
    b. Prostaglandin tablet
    c. Stripping of the membrane
    d. Oxytocin drip

EXPLANATIONS & REFERENCES

1. Ans. is None *Ref. John Hopkins Manual of Obs and Gynae 4/e, p 77; COGDT 10/e, p 209, 210; Dutta Obs. 7/e, p 522; Williams 24/e, p 523*

Induction: Implies stimulation of contractions before the spontaneous onset of labor.
Often the cervix is closed and uneffaced ∴ labor induction is commenced by first making cervix soft, the process is called as **cervical ripening.**
Augmentation of labor implies increasing the strength of uterine contractions such that labor progresses fast.
Induction of labor is indicated in all those conditions when the benefits to either mother or fetus outweigh those of pregnancy continuation.

Contraindications of Induction of labour

They include all those conditions that preclude spontaneous labour and vaginal delivery. *—COGDT*

Absolute Contraindication

Most High CAPUT
Most – Macrosomia
High – Severe hydrocephalus
- **C** = **C**ontracted pelvis[Q]/advance **ca**ncer cervix
- **A** = **A**ctive genital herpes, high viral load of active HIV
- **P** = **P**lacenta previa[Q] cord **p**rolapse
- **U** = **U**terine scar due to: LSCS
  - Previous classical cesarean section
  - Myomectomy entering the endometrium
  - Hysterotomy
  - Unification surgery
- **T** = **T**ransverse lie, i.e. malpresentations

Other contraindications:
- Non-reassuring fetal heart rate pattern *—Williams Obs. 22/e, p 537; 23/e, p 500*
- Elderly primigravida with medical/obstetrics complications.

As far as Heart disease is concerned:
It is no more taken as a contraindication for induction of labour:
Heart disease-"induction is generally safe" *—Williams Obs. 23/e, p 962*
This is an older question where heart disease was taken a contraindication for IOL but nowadays it is not, so our answer is none.

2. Ans. is d i.e. Interspinal diameter

3. Ans. is a, b, c and e i.e. Dilatation of cervix; Effacement; Cervical softening; and Position of head *Ref. Williams Obs. 22/e, p 537; 23/e, p 502; COGDT 10/e, p 209; Dutta Obs. 7/e, p 523*

Bishop score is a quantitative method for prediction of successful induction of labour.

It includes the following parameters:
D = Cervical **D**ilatation (**most important parameter)**
P = Cervical **P**osition
E = Cervical **E**ffacement
S = Head **S**tation
C = Cervical **C**onsistency
Mnemonic: **D**elhi **P**olice **E**mployed **S**pecial **C**ommandos.

Bishop scoring in detail:

Score	Dilatation (cm)	Effacement (%)	Station*	Cervical Consistency	Cervical Position
0	Closed	0 – 30	– 3	Firm	Posterior
1	1 – 2	40 – 50	– 2	Medium	Midposition
2	3 – 4	60 – 70	– 1, 0	Soft	Anterior
3	> 5	> 80	+1, +2	—	—

** Station reflects a –3 to +3 scale.*

- Induction of labour is successful with a score of 9 or more and is less successful with lower scores.
- A score of < 4 means ripening of cervix is indicated before inducing labour.

4. Ans. is a i.e. $PGF_2\alpha$ tablet

5. Ans. is c i.e. Progesterone tablet

Ref. Dutta Obs. 7/e, p 524; Fernando Arias 3/e, p 284-286; Williams Obs. 24/e, p 525

Ripening of cervix is changing the cervical matrix from sol to gel state by dissolving the collagen bundles. Ultimately the cervix becomes soft.

Techniques for cervical ripening:

Pharmacological method	Nonpharmacological method
• Prostaglandin – *Dinoprostone gel (PGE_2)* - it is the gold standard for cervical ripening – Misoprostol (PGE1) tablet - vaginal or oral • Steroid receptor antagonist – Mifepristone – Onapristone • Relaxin • Glyceryl trinitrate, isosorbide mononitrate • Oxytocin	• Stripping the membrane • Mechanical dilators: – Osmotic dilators – Balloon catheter/Transcervical catheter placed through internal os • Extra-amniotic saline infusion *—Fernando Arias 3/e, p 286, Williams Obs 23/e, p 503*

Also Know: Ferguson reflex: mechanical stretching of the cervix enhances uterine activity in many species including humans manipulation of the cervix and stripping of fetal membranes leads to an increase in blood levels of prostaglandins.

Prostaglandins are very useful both for ripening of cervix and for induction of labour.

Important points on prostaglandins:
- The gold standard agent for cervical ripening is *PGE_2* i.e dinoprost gel
- The gold standard agent for inducing labour is *PGE_2*
- The analogue of prostaglandin recently approved by ACOG for cervical ripening-*PGE_1* (misoprost)
- The analogue of prostaglandin which is contraindicated in scarred uterus and should not be used in previous LSCS patients-*PGE_1*
- The analogue of prostaglandin which is not used for inducing labour-*PGF-2 alpha*
- The analogue of prostaglandin which is used in PPH-*PGF-2 alpha*

6. Ans. is b i.e. Hydramnios *Ref. Dutta Obs 7/e, p 525*

- ARM is a method for inducing and augmenting labour.
- It involves rupturing the membranes overlying the cervix using a Kocher's forceps.
- It is applicable when cervix is partially dilated and bischop score is high.

Advantages:
- Promotes labour by stimulating release of endogenous prostaglandins.
- Encourages application of the fetal head to the cervix.
- Colour of the liquor can be observed and meconium staining ruled out.
- Permits the use of fetal scalp electrode for intrapartum fetal surveillance.

Disadvantages:

- If performed before the presenting part is well fixed, so it can lead to cord prolapse.
- ARM can lead to-infection if frequent vaginal examinations are performed.
- It can cause abruption in case of polyhydramnios.

Contraindications:

- Intrauterine fetal death[Q]
- Genital active herpes infection
- Maternal AIDS
- Chronic hydramnios[Q]
  (In chronic hydrominos controlled ARM is done and not just simple ARM — as sudden decompression can lead to abruptioplacentae)

Also Know:

- ARM and stripping of membranes are different. Stripping of Membranes is the digital separation of membranes from the wall of the cervix and lower uterine segment.
- Immediately after ARM fetal heart sounds should be auscultated.
- Transient changes in the fetal heart rate, can occur due to resettlement of the cord after the liquor flows out.
- Early and variable deceleration[Q] of fetal heart rate is relatively common with amniotomy.

7. Ans. is a i.e. Twin pregnancy precludes the use of oxytocin *Ref. Williams 24/e, p 530-532*

Lets analyse each option:

Option b: Amniotomy decreases the need for oxytocin use

"Route and associates found that amniotomy with oxytocin augmentation for arrested active-phase labor shortened the time to delivery by 44 minutes compared with that of oxytocin alone". *—Williams 24/e, p 532*

Thus option b is correct.

Option c: Methods of augmentation does not increase the risk of operational management.

"Amniotomy does not alter the route of delivery" *—Williams 24/e, p 532*

Thus option c is correct.

Option d: Assiciated with risk of uterine hyperstimulation.

Dutta 7/e, p499: Clearly mentions-uterine hyperstimulation is an observed side effect of oxytocin.

i.e. option d is correct

Thus by exclusion our answer is 'a' i.e.

Twin pregnancy precludes the use of oxytocin

This is incorrect as proved by the following lines of williams

In twin pregnancy

"Provided women with twins meet all criteria for oxytocin administration, it may be used" *—Williams 24/e, p 916*

8. Ans. is b i.e. PIH at term

Ref. Dutta Obs. 7/e, p 522; COGDT 10/e, p 209, John Hopkins Manual of Obs and Gynae 4/e, p 77.

Indications of Induction of Labour *Williams 24/e, p 523*

Maternal	Fetal
• Preeclampsia/eclampsia • Maternal medical complications like – Diabetes mellitus – Chronic renal disease • Abruptio placenta • Premature rupture of membrane • Chorioamnionitis • Chronic hydramnios/Oligohydromnios	• Intrauterine fetal death • IUGR • Prolonged pregnancy • Rh incompatibility • Lethal malformation • Unstable lie after correction into longitudinal lie (versions) • Fetus with major congenital anomaly • Nonreassuring fetal status

Note: • Major degree of placenta previa is a contraindication for IOL.

- We are not taking heart disease as our answer because although induction of labour is not contraindicated in it but then it is not an indication also. No where it is given that heart disease is an indication for induction of labour, everywhere it is mentioned that IOL is safe or can be done.

9. Ans. is None or d i.e. Heart disease *Ref. COGDT 10/e, p 209, 210; Dutta Obs. 7/e, p 522*

As explained in answer 1–

Diabetes and PIH are indications for induction of labour and not contraindication.

In case of bad obstetrics history–

"It is a sound plan, if facilities are available, to terminate the pregnancy atleast one week prior to the period at which previous mishap has occured." *—Dutta Obs. 6/e, p 343*

Thus induction of labour has to be done in case of BOH.

Here heart disease is the answer by exclusion only, although now we know it is not a contraindication.

10. Ans. is c i.e. Decreases incidence of amnionitis *Ref. Dutta Obs. 7/e, p 525*

Immediate beneficial effects of ARM

- Lowering of the blood pressure in pre-eclampsia-eclampsia.
- Relief of maternal distress in hydramnios.
- Control of bleeding in APH.
- Relief of tension in abruptioplacentae and initiation of labour.

These benefits are to be weighed against the risks involved in the indications for which the method is adopted.

Hazards of ARM

- Chance of umbilical cord prolapse — The risk is low with engaged head or rupture of membranes with head fixed to the brim.
- Amnionitis
- Accidental injury to the placenta, cervix or uterus, fetal parts or vasa-previa
- Liquor amnio embolism (rare)

11. Ans. is c i.e. Abdominal amniocentesis followed by stabilising oxytocin drip *Ref. Dutta Obs 7/e, p 215*

Artificial rupture of membranes is C/I in polyhydramnios as it leads to sudden decompression of uterus which can cause abruptio placenta.

Method of induction in these patients is:

Amniocentesis → drainage of good amount of liquor → to check the favorable lie and presentation of the fetus → a stabilising oxytocin infusion is started → low rupture of the membranes is done when the lie becomes stable and the presenting part gets fixed to the pelvis. This will minimize sudden decompression with separation of the placenta, change in lie of the fetus and cord prolapse.

12. Ans. is b i.e. Prostaglandin tablet *Ref. Dutta Obs. 7/e, p 524; Fernando Arias 3/e, p 286*

Prostglandin tablet is misoprostol (PGE_1) which is contraindicated in women with previous cesarean births.

Misoprostol

It is an analogue of Prostaglandin E_1.

Indications:

- Medical abortion in the first trimester of pregnancy.
- Evacuation of uterus in case of anembryonic pregnancies or early fetal demise.
- Ripening of cervix prior to second trimester abortions.
- Ripening of cervix and induction of labour in term pregnancies.
- For treatment and prevention of postpartum bleeding.

Pharmakokinetics:

- It is available in tablet form.
- Metabolized in liver.

Complication:

- Nausea, vomitting, diarrhea.
- Uterine hyperstimulation.

Contraindication:

- Women with previous uterine surgery particularly cesarean section.

8

Puerperium and its Abnormalities

QUESTIONS

1. **Postpartum decidual secretions present are referred to as:** **[AI 97/ MAHE 05]**
   a. Lochia
   b. Bleeding per vaginum
   c. Vasa-previa
   d. Decidua-capsualris

2. **Lochia in correct order: during puerperium:** **[AIIMS Nov 2013]**
   a. Rubra, serosa, alba
   b. Serosa, rubra, alba
   c. Alba, serosa, rubra
   d. Alba, mucosa, serosa

3. **Likely size of uterus at 8 weeks postpartum is:** **[AI 97]**
   a. 100 gm b. 500 gm
   c. 700 gm d. 900 gm

4. **A pregnant female has past history of embolism in puerperium. What medical management she should take in next pregnancy to avoid this:**
   a. Cumpulsory prophylaxis with warfarin start at 10 weeks **[AIIMS Nov 99]**
   b. To take warfarin after delivery
   c. Chance of thromboembolism increases by 12% in next pregnancy
   d. Does not need anything

5. **Initiation of lactation is affected by:** **[PGI Dec 01]**
   a. Oxytocin
   b. Prolactin
   c. HPL
   d. Thyroid hormone
   e. Progesterone

6. **Decrease lactation seen in:** **[PGI Dec 03]**
   a. Maternal anxiety
   b. Antibiotic therapy
   c. Cracked nipple
   d. Breast abscess
   e. Bromocriptine therapy

7. **Contraindication to breast milk feeding:** **[PGI June 01]**
   a. Mother is sputum negative
   b. Bromocriptine therapy for mother
   c. Heavy breast engorgement
   d. Ca breast
   e. Mother on domperidone

8. **Contraindications for breast feeding are all *except*:** **[PGI June 00]**
   a. Hepatitis-B infection of mother
   b. Lithium treatment of mother
   c. Acute bacterial mastitis
   d. Tetracycline treatment of mother

9. **About colostrum true statements are:** **[PGI 03]**
   a. Secreted after 10 days of childbirth
   b. Rich in immunoglobulin
   c. Contains more protein
   d. Contains less fat
   e. Daily secretion is about 10 ml/day

10. **In comparison to breast milk, colostrum has higher content of:**
    a. Carbohydrates b. Fat
    c. Sodium d. Potassium

11. **Which of the following is more correct about breast infection during lactation?** **[AI 08]**
    a. Due to bacteria from Infant's GIT.
    b. Mastitis does not affect the child
    c. E.coli is the only organism
    d. Can lead to abscess and I and D may be required

12. **Contraceptive method of choice in lactating mothers is:** **[AI 09]**
    a. Barrier method
    b. Progesterone only pill
    c. Oral contraceptive pills
    d. Lactational amenorrhea

13. A 24-year-old P2+0 woman presents to the emergency department complaining of pain in her right breast. The patient is postpartum day 10 from an uncomplicated spontaneous vaginal delivery at 42 weeks. She reports no difficulty breast-feeding for the first several days postpartum, but states that for the past week her daughter has had difficulty latching on. Three days ago her right nipple became dry and cracked, and since yesterday it has become increasingly swollen and painful. Her temperature is 38.3°C (101°F). Her right nipple and areola are warm, swollen, red, and tender. There is no fluctuance or induration, and no pus can be expressed from the nipple. **[New Pattern Question]**

a. Continue breast feeding from both the breasts
b. Breastfeed from unaffected breast only
c. Immediately start antibiotics and breastfeed only when antibiotics are discontinued.
d. Pump and discard breastmilk till infection is over and then continue breatfedding
e. Stop breastfeeding immediately.

14. Sarita, a 30 year old woman develops a deep vein thrombosis in her left calf on fourth post operative day following cesarean section done for fetal distress. The patient is started on heparin and is scheduled to begin a 6 weeks course of warfarin therapy. The patient is a devoted mother who wants to breast feed her baby. What is the advice which is given to the patient: **[New Pattern Question]**

a. Patient may continue breast feeding at her own risk
b. Patient should breast feed her baby only if her INR is at <2.5
c. Patient can breast feed her baby after 6 weeks course of warfarin is over
d. Warfarin is not a contraindication for lactation
e. Warfarin is absolutely contraindicated during lactation.

15. You are called to a maternity ward to see a 23 year old primi patient who had delivered a 2.7 kg baby boy 2 days back.She had a normal vaginal delivery and placenta delivered spontaneously. Now she complains of bloody vaginal discharge with no other signs. O/E you notice a sweetish odour bloody discharge on the vaginal walls and introitus.Sterile pelvic examination shoes a soft non tender uterus.Her P/R-78/min, B/P-110/76 mm of hg, temp-37°C,R/R-16/min. Her WBC count =10,000 with predominant granulocytes. What is the most appropriate step? **[New Pattern Question]**

a. Currettage
b. Oral antibiotics
c. Reassurance
d. Order urinalysis
e. Vaginal culture

16. Which of the following sets of condition is attributed to normal physiology of puerperium? **[New Pattern Question]**

a. Tachycardia and weight gain
b. Retention of urine, constipation and weight gain
c. Constipation, tachycardia and retentio of urine
d. Retention of urine and constipation

17. The uterus becomes pelvic organ after delivery in: **[New Pattern Question]**

a. 10 to 12 days
b. 12 to 14 days
c. 14 to 16 days
d. 16 to 18 days
e. 18 to 20 days

18. Without breast feeding the first menstrual flow usually begins – weeks after delivery: **[New Pattern Question]**

a. 2-4 weeks
b. 4-6 weeks
c. 6-8 weeks
d. 8-10 weeks
e. More than 10 weeks

19. Common route of spread of puerperal sepsis: **[New Pattern Question]**

a. Lymphatic
b. Direct invasion
c. Skip lesion
d. Hematogenous

20. The cause of 'postpartum blues' is: **[New Pattern Question]**

a. Decreased estrogen
b. Decreased progesterone
c. Increased prolactin
d. Decreased estrogen and progesterone

21. All are complication of formula fed baby over human milk fed baby *except*: [New Pattern Question]

a. Necrotizing enterocolitis
b. Otitis media
c. Hypocalcemia
d. Vitamin K deficiency

22. Most common immunoglobulin secreted by mother in milk and colostrum is: **[PGI June 97]**

a. IgA
b. IgG
c. IgE
d. IgD

23. All of the following are true regarding after pains *except*: **[New Pattern Question]**

a. M/C in multiparous females
b. Pain worsens when infant suckles
c. Decreases in intensity by 5th day
d. They become more pronounced as parity increases

24. For first 2 hrs after delivery, temperature should be recorded: **[New Pattern Question]**

a. Every 5 mins
b. Every 15 mins
c. Every 30 mins
d. Hourly

25. M/C nerve injured during normal vaginal delivery is: **[New Pattern Question]**

a. Femoral N
b. Lateral femoral cutaneous N
c. Iliohypogastric N
d. Ilio inguinal N

26. Which of the following steps has proven benefit in decreasing puerperal infection following cesarean section: **[New Pattern Question]**

a. Non closure of peritoneum
b. Single layer uterine closure
c. Administration of single dose of ampicillin or 1st generation cephalosporin at the time of cesarean delivery.
d. Skin closure with staples than with suture

EXPLANATIONS & REFERENCES

1. **Ans. is a i.e. Lochia** *Ref. Dutta Obs. 7/e, p 146*
2. **Ans. is a, i.e. Rubra, serosa, alba** *Ref. Dutta Obs. 7/e, p146*

LOCHIA:

- It is the vaginal discharge for the first fortnight during puerperium
- The discharge originates from the uterine body, cervix and vagina.
- It has got a peculiar offensive fishy smell.
- Its reaction is alkaline tending to become acid towards the end.
- Depending upon the variation of the color of the discharge, it is named as:
  - Lochia rubra (red) 1-4 days.
  - Lochia serosa (5-9 days) — the color is yellowish or pink or pale brownish.
  - Lochia alba — (pale white) — 10-15 days.

Composition:

- **Lochia rubra** consists of blood, shreds of fetal membranes and decidua, vernix caseosa, lanugo and meconium.
- **Lochia serosa** consists of less RBC but more leukocytes, wound exudate, mucus from the cervix and microorganisms (anaerobic streptococci and staphylococci).
- **Lochia alba** contains plenty of decidual cells, leukocytes, mucus, cholestrin crystals, fatty and granular epithelial cells and microorganisms.

Note:

- The average amount of discharge for the first 5–6 days, is estimated to be 250 mL.
- The normal duration may extend up to 24–36 days (Williams 24/e, p 670). The red lochia may persist for longer duration especially in women who get up from the bed for the first time in later period.

Clinical importance:

- The discharge may be scanty, especially following premature labors or in case of infection or may be excessive in twin delivery or hydramnios, or subiinvolution of uterus and retained bits of conception.
- If malodorous, indicates infection. Retained plug or cotton piece inside the vagina can also be a cause should be kept in mind.
- Persistence of red color beyond the normal limit signifies subinvolution or retained bits of conceptus.

3. **Ans. is a i.e. 100 gm** *Ref. Dutta Obs. 7/e, p 145; Williams Obs. 24/e, p 669*

Weight of uterus :

- Immediately after delivery – 1000 gm
- At the end of 1 week – 500 gm
- At the end of 2 weeks – 300 gm
- At the end of 4 weeks it weighs – 100 gm (Pre-pregnant state).

Also Know :

- Immediately following delivery, the fundus is just below the umbilicus (13.5 cm above the symphysis pubis/ 20 weeks gestational age size.)Q

Involution of the uterus

- After 24 hours of delivery, height of uterus decreases by 1.25 cm/day.Q
- Uterus is a pelvic to organ.Q by the end of 2 weeks.
- Uterus returns almost to its normal size (pre pregnant size) by the end of 8 weeks.
- The process by which the postpartum uterus returns to its pre pregnant state is called as *Involution.*
- Involution is achieved by decrease in the size of muscle fibresQ (and not in the number).Q

Placental site involution: Immedietly after delivery placental site is palm size. By the end of 2 weeks it is 3–4 cm in diameter.

Note: Doppler USG shows continuously increasing uterine artery vascular resistance during first five days postpartum.

4. Ans. is b i.e. To take warfarin after delivery

Ref. Williams 23/e, p 1028, 29, Table 47.6

Friends venous thromboembolism in pregnancy, is one of those topics which we donot study in detail during undergraduation. So, I am giving in brief, all the important points you need to remember:

Venous thromboembolism in pregnancy

- Venous thromboembolism is the leading cause of maternal deaths in developed countries.
- Pregnancy increases the risk of thromboembolism 6 times as all components of *virchow's triad* are increased.[Q]

A. Deep vein thrombosis:

- Left sided DVT is more common than right sided DVT.
- Homans sign-i.e pain in calf muscles on dorsiflexion of foot is positive.

Investigations

- Recommended method during pregnancy: Doppler ultrasound
- Gold standard (in conditions other than pregnancy): Venography
- Though objective evidence is ideal, treatment should be started on clinical grounds, if confirmatory tests are not available.

Management

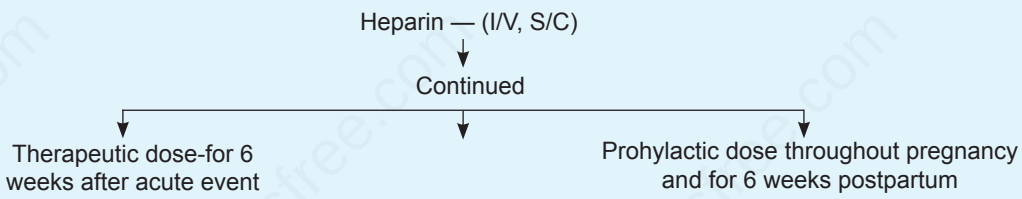
- **Drug of choice in pregnancy is** unfractionated heparin
- Low molecular weight heparins (enoxaparin, dalteparin) are safe during pregnancy and breast feeding. But they should not be used in
  - i. Women with prosthetic valves
  - ii. Renal failure
  - iii. With regional analgesia

Warfarin is not safe during pregnancy as it crosses placenta and can cause fetal malformations (Conradi syndrome).

The single undisputed use for warfarin in pregnancy is in women with prosthetic heart valves.

Monitoring is done by – APTT and Platelet count.

Protocol



For post partum venous thrombosis, treatment with i/v heparin and warfarin are started simultaneously 6-8 hours after vaginal delivery and 24 hours after cesarean section and once INR is between 2 and 3, heparin is discontinued and warfarin is continued for 6 weeks.

Note: Warfarin is absolutely safe in lactation.

Thromboprophylaxis :

Women at risk of venous thromboembolism during pregnancy have been grouped into different categories depending on the presence of risk factors. Thrombo prophylaxis to such a woman depends on the specific risk factor and the category. (1) A low risk woman has no personal or family history of VTE and are heterozygous for factor V Leiden mutation. Such a woman need no thromboprophylaxis, (2) A high risk woman is one who has previous VTE or VTE in present pregnancy, or antithrombin–III deficiency. Such a woman needs low molecular weight heparin prophylaxis throughout pregnancy and postpartum 6 weeks. Women with antithrombin-III deficiency can be treated with antithrombin-III concentrate prophylactically.

Now lets have a look at the question: It says a female with previous history of embolism becomes pregnant, what medical management should be given to her.

Option 'a' i.e. Compulsory prophylaxis with warfarin at 10 weeks.

- It is absolutely wrong as warfarin is not given during pregnancy.

Option 'b' i.e. to take warfarin after delivery - As discussed above, in all high risk patients, post partum prophylaxis with warfarin has to be given as peuperium is the time of greatest risk for embolism/thromboembolism. Thus option b is correct.

During pregnancy : A women with previous H/O embolism becomes high risk patient. In such patients prophylaxis with heparin needs to be given. Hence option 'd' is incorrect.

5. Ans. is a, b, c and e i.e. Oxytocin; Prolactin; HPL; and Progesterone

Ref. COGDT 10/e, p 238 239, Dutta 7/e, p 148-149, 239

Hormones acting on breast

For mammogenesis	For lactogenesis	For galactokinesis	For galactopoiesis
i.e. mammary growth and development	i.e. Initiation of milk secretion	i.e. ejection of milk or let down reflex	Mantainence of lactation
Main hormone	**Main hormone**	**Main hormone**	**Main hormone**
Estrogen (for Ductal growth) Progesterone (for alveolar growth)	prolactin. Supporting hormones- estrogen	– Oxytocin – Suckling of breast	– Prolactin – Continous suckling

Other hormone

- HPL
- Growth hormone
- Insulin thyroxine

Note : For milk secretion to occur nursing effort is not essential

6. Ans. is a, c, d and e i.e. Maternal anxiety; Cracked nipple; Breast abscess; and Bromocriptine therapy

Ref. Dutta Obs. 7/e, p 439

Causes of Inadequate Milk Production (Lactation Failure)

- Infrequent suckling.
- ***Depression or anxiety state in puerperium***
- Reluctance or apprehension to nursing.
- Poor development of nipples/retracted nipple.
- **Painful breast lesion viz cracked nipple/ breast abscess.**
- Endogenous suppression of prolactin.
- Prolactin inhibition (ergot preparation, diuretics, pyridoxine, bromocriptine).

Note: Lactation suppressors and galactagogues

Lactation suppressors	Galactagogues/drugs milk secreting
1. Bromocriptine/cabergoline	1. Nipple stimulation
2. Testosterone	2. Breast pump
3. Ethinyl estradiol	3. Metoclopramide
4. Pyridoxine	4. Intranasal oxytocin
5. Sulpiride	

7. Ans. is b and d i.e. Bromocriptine therapy for mother; and Ca breast

Ref. COGDT 10/e, p 242, 702; 23/e, p 652

Contraindications to Breast feeding

- Mother on IV drug abuse/excess alcohol.
- In females undergoing treatment for breast cancer (ACOG 2000)
- Mother on anticancer drugs or other teratogenic drugs.
- Active Herpes simplex lesions of the breast.
- Active/untreated pulmonary tuberculosis in mother.
- Galactosemia and congenital lactose intolerance in infant.
- *HIV-positive mother if she can afford formula feeds.*

Hepatitis B/C infections are concerned they are not contraindications to breast feeding.

Infants of seropositive hepatitis B mothers should be given Hepatitis B Immunoglobulin (IM) within 12 hours of birth.

Also know : HIV in developing countries is not a contraindication for breastfeeding .

Medications contraindicated during lactation. *—COGDT 10/e, p 242*

Medication	Reason
Bromocriptine	Suppresses lactation; may be hazardous to the mother
Cocaine	Cocaine intoxication
Cyclophosphamide	Possible immune suppression; unknown effect on growth or association with carcinogenesis;
Cyclosporine	neutropenia
Doxorubicin	Possible immune suppression; unknown effect on growth or association with carcinogenesis;
Ergotamine	Possible immune suppression; Unknown effect on growth or association with carcinogenesis;
Lithium	Vomiting, diarrhea, convulsions (at doses used in migraine medications)
Methotrexate	Possible immune suppression; unknown effect on growth or association with carcinogenesis;
Phencyclidine	Neutropenia
Phenindione	Potent hallucinogen
Radioactive iodine	–

8. Ans. is a, c and d i.e. Hepatitis B infection of the mother; Acute bacterial mastitis; and Tetracycline

Ref. COGDT 10/e, p 242; Williams Obs. 22/e, p 702, 704; 23/e, p 652-654

Breast feeding is not contraindicated in case of maternal hepatitis B infection as explained in previous question.

Option 'b' Lithium is contraindicated during pregnancy and lactation (*see* Answer 7)

Option 'c' i.e. Acute bacterial mastitis.

"In case of acute bacterial mastitis breast feeding should be continued as it is helpful in avoiding abscess formation. If the infected breast is too tender to allow suckling, gentle pumping until nursing can be resumed is recommended." *—Williams Obs. 22/e, p 704*

Option 'd' Tetracycline : according to KDT

"Tetracycline is secreted in breast milk and can cause teeth discoloration and impaired growth in infants and children therefore is contraindicated during lactation." *—KDT 5/e, p 850*

But all other books and extensive internet search (*see* Drug.com/Rxlist.com) says that tetracycline is not contraindicated during lactation but should be used cautiously in nursing mothers.

9. Ans. is b, c and d i.e. Rich in immunoglobulin; Contains more protein; and Contains less fat

Ref. Dutta Obs. 7/e, p 148; Ghai 6/e, p 150; COGDT 10/e, p 240;

10. Ans. is c i.e. Sodium *Ref. Dutta Obs 7/e, p 148*

Colostrum is a deep yellow serous fluid secreted from breasts *starting from pregnancy and for 2-3 days after delivery.*

Composition

- It has higher specific gravity and *higher protein, Vitamin A, D, E, K, immunoglobulin, sodium and chloride content than mature breast milk.*
- It has lower *carbohydrate, fat and potassium* than mature milk.

Advantages

- Antibodies (IgA, IgG, IgM) and humoral factor (lactoferrin) provide immunological defence to the new born.
- Laxative action due to fat globules.
- It is an ideal natural starter food.

Extra edge

	Protein	Fat	Carbohydrate	Water
Colostrum	8.6	2.3	3.2	86
Breast milk	1.2	3.2	7.5	87

11. Ans. is d i.e. Can lead to abscess formation for which I and D may be required

Ref. Dutta Obs 7/e, p 439; William Obs 24/e, p 691; COGDT 10/e, p 245

Mastitis is parenchymatous infection of breast.

Most common organism causing breast infection: *Staphylococcus aureus*

Others:
- Coagulase negative Staphylococci
- Viridian Streptococci.
- Symptoms appear in the 3rd or 4th week. Infection is almost always unilateral

"The immediate source of organism that cause mastitis is almost always the infant's nose and throat."
—William Obs. 24/e, p 691

(Not GIT so ***option "a"*** is incorrect)
- Predisposing factors : fissures/abrasions or cracks in nipples.
- Mastitis is not a contraindication for breast feeding.

Treatment

In patients not sensitive to penicilin	Patients allergic to penicillin
Dicloxacillin (DOC for emperical therapy)	Erythromycin

– Treatment to be given for 10-14 days.
– About 10% of women with mastitis develop an abscess due to variable destruction of breast tissue. If abscess is formed - surgical drainage is done under general anaesthesia (i.e. ***option "d"*** is correct).

12. Ans. is b i.e. Progesterone only pill *Ref: Williams Obs, 23/e, p 694, Dutta Obs, 7/e, p 558*

"According to the American college of obstetries and gynaecologist (2000), progestin only contraceptives are the preferred choice in most of the cases. In addition IUD's may be recommended for the lactating sexually active woman after uterine involution."
—Williams, Obs 24/e, p 715

Lactational amenorrhea

"For mothers who are nursing exclusively, ovulation occurring during the first 10 weeks after delivery is unlikely. But it is not a reliable method if mother is nursing only in day time. Waiting for first menses involves a risk of pregnancy because ovulation usually antedates menstruation."
—Willams 24/e, p 715

Safe period method – In this method the fertile period is calculated and the female should refrain from having sex during that period

The basic prerequisite of this method is that cycles should be regular which is usually not the case with lactating mothers – safe period method is not applicable in them.

IUCD's – According to Williams 23/e p 644 IUCD's can be used as an alternative to progesterone only pills by lactating mothers but only following complete uterine involution in woman who are sexually active.

Remember in Nutshell
1st contraceptive of choice in lactating mother – Progesterone only pill or progesterone implant or DMPA injection. IUCD can also be used.

13. Ans. is a i.e. Continue breast feeding from both the breasts

Ref. Dutta Obs, 7/e, p 439; William Obs, 22/e, p 703, 23/e, p 653; COGDT 10/e, p 245

A postpartum lady coming with H/o pain in breast and fever and nipples being warm, red, swollen, with no induration, fluctuance and no pus extruding from them - leaves no doubt that the patient is having mastitis. As discussed in question 9, mastitis is not a contraindication for breast feeding. She should continue feeding from both the breasts.

14. Ans. is d i.e. Warfarin is not a contraindication for lactation

Remember:

- Warfarin is contraindicated in the first trimester of pregnancy as it can lead to contradi syndrome comprising of microcephaly, optic atrophy, nasal hypolplasia and chondrodysplasia punctate.It can also lead to IUGR, abortions and IUD.
- But warfarin is absolutely safe during lactation as an extremely minute quantity of it is excreted in breast milk.

15. Ans. is c ie. Reassurance *Ref. Dutta Obs 7/e, p 146*

This patient is a purperal female who is complaining of bloody vaginal discharge with no other significant abnormal signs. On examination there is a sweetish odour bloody discharge on the vaginal walls and introitus.Her vitals are normal suggesting that this cannot be PPH (The most common cause of secondary PPH is retained bits of placenta for which curettage is done, but here it is not required).

Slight amount of bloody discharge called as lochia is absolutely normal for the first 15 days after delivery and doesnot require any treatment, so we will reassure the patient and do nothing.

Donot get confused with the finding of WBC count, 10,000 with predominant granulocytes as this is a normal finding in the puerperal period Note- leucocytes can rise to as high as 25000 during puerperium probably as a response to the stress of labor). Since lochia has no foul smell it means no infection and so no need for culture or antibiotics.

16. Ans. is d i.e. Retention of urine and constipation *Ref. Dutta Obs. 7/e, p 146*

General Physiological Changes in Puerperium

Pulse	– It increases for few hours after delivery and then settles down to normal.
Temperature	– In the first 24 hrs-temp should not be above 99°F – On day 3, due to breast engorgement there may be slight rise of temperature. (***Note :*** Rule out UTI if there is rise of temperature).
Weight	– Loss of 2 kg (5 lb) occurs due to diuresis.
Blood Volume	Decreases after delivery and returns to pre pregnant levels by the second week.[9]
Cardiac Output	Rises after delivery to 60% above the pre-labour value, and returns to normal within one week.
Fibrinogen levels and ESR	– Remain high upto the second week of puerperium, ESR levels also remain high.
Urinary tract	– Retention of urine is common. – Patient should be encouraged to pass urine following delivery.
GIT tract	– Thirst increased – Constipation (due to intestinal paresis)

17. Ans. is a i.e. 10 to 12 days *Ref. Dutta Obs. 7/e, p 145; COGDT 10/e, p 222, 223, Fig 12-1*

Now, this is a tricky one :

Till now we have studied that by the end of 2 weeks uterus becomes a pelvic organ i.e. involution is complete. But as far as number of days are concerned some of you may think, 12-14 days as the correct answer.

COGDT 10/e, p 222 says—

"At the end of first postpartum weeks, it (uterus) will have decreased to the size of a 12 week gestation and is just palpable at pubic symphysis. At 7th day it is at the level of pubic symphysis and by 10th day it is an intrapelvic organ.

Suppose even if we didnt have COGDT reference still-

Dutta says– Just after delivery uterus is 13.5 cm above pubic symphysis and thereafter its size decreases by 1.25 cm/day which means by 10-12 days it will be an intrapelvic organ (i:e below the level of pubic symphysis).

18. Ans. is c i.e. 6-8 weeks *Ref. Williams 24/e, p 678, p 147*

Women not breast feeding have return of menses usually within 6 to 8 weeks. *—Dutta Obs. 7/e, p 147*

Also know:

Ovulation occurs at a mean of 7 weeks, but ranges from 5–11 week.

The Rule of 3's :

- In the presence of FULL breast feeding, a contraceptive method should begin in the ***3rd postpartum month.***
- With PARTIAL breast feeding or no breast feeding, a contraceptive method should begin during the ***3rd postpartum week.***

19. Ans. is b i.e. Direct invasion *Ref. Dutta Obs 7/e, p 433; Williams Obs. 22/e, p 714, 23/e, p 663*

- ***Puerperal pyrexia*** – is defined as a rise of temperature reaching 100.4° F (38° C) or more (measured orally) on 2 separate occasions at 24 hours apart (excluding first 24 hours) within first 10 days following delivery.
- Any infection of genital tract which occurs as a complication of delivery is called as ***Puerperal sepsis.***
- ***Most common site*** of Puerperal infection – Placental site. In vaginal delivery and uterine incision in cesarean section.
- ***Most common manifestation*** of Puerperal infection – Endometritis.
- ***Most common cause*** of Puerperal sepsis – Streptococcus.
- ***Most common route*** of infection – Direct spread.
- Single most significant risk factor for development of puerperal sepsis (uterine infection) = Route of delivery (It is M/C in cesarean delivery than vaginal delivery)
- ***Mgt:*** Clindamycin + Gentamycin ± Ampicillin

20. Ans. is d i.e. Decreased estrogen and progesterone *Ref. Dutta Obs 7/e, p 443; COGDT 10/e, p 1020*

Puerperal Blues/3 Days Blues/Baby Blues

- It is transient state of mental illness observed 4–5 days after delivery in nearly 50% of postpartum women.
- Postpartum blues occurs at the height of hormonal changes. *—COGDT 10/e, p 1025*
- Patients present with *depression, anxiety, fearfulness, insomnia, helplessness and negative feelings towards infant.*
- It may last from a few days to 2–3 weeks.
- Generally self limited, 20% of women may develop depression in the first postpartum year.

Treatment: Reassurance and psychological support of family members.

Post-partum Depression

- It is observed in 10-20% of mothers.
- It is more gradual in onset over the first 4-6 months following delivery or abortion.
- Changes in hypothalamo-pituitary-adrenal axis may be a cause.
- Manifested by loss of energy and appetite, insomnia, social withdrawal, irritability and even suicidal attitude.
- **Risk of recurrence 50-100% in subsequent pregnancies.**

Treatment: Should be started early. Fluoxetine or paroxetine is effective and has fewer side effects.

According to kaplan, the cause of postpartum blues is :

"The sudden decrease in estrogen and progesterone immediately after delivery may also contribute to the disorder, but treatment with these hormones are not effective."

21. Ans. is d i.e. Vitamin K deficiency

Ref. Net Search (www.uspharmacist.com) Infant Formula vs Breast Milk; Ghai 6/e, p 164, 177, 331

Formula feeds contain a host of vitamin and minerals, as well as trace elements (zinc, mangnese, copper, iodine) and electrolytes.

In formula feeds vitamin K is added in higher levels than in breast milk to reduce the risk of hemorrhagic diseases in new born. So, vitamin K deficiency can never be a complication of formula fed babies.

Now let's see what *Ghai 6/e, p 164, 331, 177* has to say on the rest of options.

Option "a" i.e. **Necrotizing enterocolitis**

"Almost all patients of neonatal necrotizing enterocolitis (NEC) are artificially fed prior to the onset of illness. Breast milk is protective for NEC." *—Ghai 6/e, p 164*

Option "b" i.e. **Otitis media**

"Otitis media is one of the most common infections of early childhood. Anatomic features which make this age group particularly susceptible to ear infection include shorter, more horizontally placed and compliant eustachian tube, which permits reflux of nasopharyngeal secretions into the middle year. A high incidence of bacterial carriage in the adenoids may also contribute to the frequency of otitis media in children. Other risk factors include exposure to cigarette smoke, over crowding, bottle feeding, cleft palate, allergic rhinitis, Down's syndrome and disorders of mucocilliary transport." *—Ghai 6/e, p 331*

Option "c" i.e. **Hypocalcemia**

"In the neonatal period there is transient hypoparathyroidism. As a result, less phosphate is excreted in the urine. Human milk is low in phosphate, but cow's milk is rich in phosphate. Immature parathyroid in the neonates can not easily cope with excess phosphate in cow's milk leading to hypocalcemia in top fed babies". *—Ghai 6/e, p 177*

22. Ans. is a i.e. IgA *Ref. Dutta Obs. 7/e, p 148; Ghai 6/e, p 97*

Composition of Breast Milk:

Carbohydrate – Lactose is present in high concentration in breast milk.

Protein content is low, as the baby cannot metabolise a high protein diet. The proteins are mainly lactalbumin and lactoglobulin, which are easily digestible. It is also rich in the aminoacids taurine and cysteine, which are necessary for neurotransmission and neuromodulation.

Fats - Breast milk is rich in polyunsaturated fatty acids (PUFA) needed for myelination.

Water and electrolytes - The water content is 86-87%.

Immunological superiority - Breast milk contains immunoglobulins, especially IgA and IgM, lysozyme, lactoferrin (which protects against enterobacteria), bifidus factor (to protect against E.coli), PABA (which protects from malaria).

"Breast milk has a high concentration of secretory IgA, IgM". *—Ghai 6/e, p 97*

"Colostrum –Contains antibody (IgA) produce locally". *—Dutta Obs. 6/e, p 149*

Therefore, IgA is the option of choice.

23. Ans. is c i.e. Decreases in intensity by 5th day *Ref. Williams 24/e, p 670*

- **After pains** – In primiparous women, uterus tends to remain tonically contracted following delivery. In multiparas, however, it often contracts vigorously and gives rise to after pains.
- After pains are similar to uterine contractions but milder than them.
- More pronounced as parity increases.
- Worsen with suckling of breast by infant.
- Decrease in intensity and become mild by 3rd day following delivery.

24. Ans. is b i.e. Every 15 minutes *Ref. Williams 24/e, p 675*

Hospital care after delivery:

- For 2 hiours after delivery, BP and pulse should be taken every 15 minutes.
- Temperature assessed every 4 hours for the first 8 hours and then 8 hourly subsequently.
- Amount of vaginal bleeding should be monitored.
- Fundus of uterus palpated to ensure that it is well contracted (uterus should be closely monitored for atleast 1 hour after delivery because of risk of PPH)

25. Ans. is b i.e. Lateral cutaneous femoral N *Ref. Williams 24/e, p 677*

Obstetrical neuropathies:

- M/C nerve injured during vaginal delivery- **Lateral femoral cutaneous nerve** followed by femoral nerve
- Risk factors: Nulliparity, prolonged second stage of labor, pushing for a longer period in semifowler position
- M/C nerves injured during cesarean section- Iliohypogastric N and Ilioinguinal N.

26. Ans. is c i.e. Administration of single dose of ampicillin or 1st generation cephalosporin at the time of cesarean delivery *Ref. William 24/e, p 685*

- The only proven way of decreasing uterine infection following cesarean section is administering a single dose of ampicillin or 1st generation cephalosporin at the time of cesarean delivery.
- Rest none of the steps like single layer closure of uterus, closure of peritoneum, use of stapler to close skin incision instead of surtures, etc. are not proven to have any benefits as far as incidence of infection is considered following surgery.

9

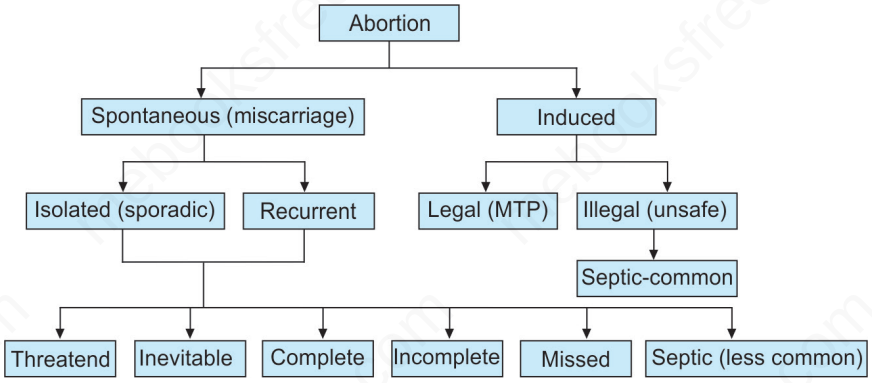
Abortion and MTP

SPONTANEOUS ABORTION

Abortion is the expulsion or extraction from its mother of an embryo or fetus weighing 500 g or less when it is not capable of independent survival (WHO). This 500 g of fetal development is attained approximately at **22 weeks (154 days) of gestation**.

Incidence: 10–20% of all clinical pregnancies end in miscarriage 75% abortions occur before the 16th week and of those, about 75% occur before the 8th week of pregnancy.

Classification



Nomenclature

- ***Blighted ova:*** Those early pregnancy losses in which fetal development is not observed with ultrasound (so that only a gestational sac is present with or without a yolk sac) and fetal tissue is absent on histologic examination of the products of conception.
- ***Early fetal demise:*** Those early pregnancy losses in which fetal development is clearly observed by ultrasound and fetal tissue is found on the histologic examination.

The difference between these two types of abortion is of fundamental importance. The lack of development of fetal structures defines a subset of abortions of genetic origin.

In contrast, the early interruption of fetal life is a complex phenomenon with multiple etiologies. Therefore, the patients with blighted ova do not require extensive work up, whereas patients who have aborted cytogenetically normal fetuses need an extensive search for non genetic factors responsible for the pregnancy loss.

- **Recurrent abortion:** It is defined as a sequence of three or more consecutive spontaneous abortion before 20 weeks. Some however, consider two or more as a standard.

Common Causes of Abortion

Fetal factors	Maternal factors
• Chromosomal abnormalities • Hydropic degeneration of villi • Multiple pregnancy	• *Maternal infections* like: TORCH infections, malaria, ureoplasma, chlamydia, brucella, spirochaetes • *Maternal medical disorders like:* – Hypertension – Chronic renal disease – Cyanotic heart disease – Hemoglobinopathies • *Environmental factors like:* – Alcohol, caffeine. – Exposure to radiation (> 5 rads) and anaesthetic gases • *Endocrine problems* like: (M/C cause of 2nd trimester abortions) – Luteal phase defect (deficiency of progesterone) – Thyroid abnormalities - hypothyroidism. – Poorly controlled diabetes mellitus – PCOD • *Immunological causes:* – Antiphospholipid antibody syndrome – Inherited thrombophilias • *Uterine factors like:* – Cervical incompetence – Mullerian anomalies (M/C uterine anomaly is bicornuate uterine, but M/C associated with abortions is septate uterus) – Large and multiple submucous leiomyoma – Ashermann syndrome – DES exposure in utero • *Others:* Trauma; Subchorionic hematoma; Defective placentation

Mnemonic to remember maternal causes of abortion—**TIMED**

T = Trauma
I^2 = Infections/immunological causes
M = Maternal medical diseases
E^2 = Environmental factors/endocrine problem
D = Developmental/anatomical problems

KEY CONCEPT

- M/C cause of spontaneous abortion–chromosomal abnormality/genetic factor/defective germplasm.
- M/C chromosomal abnormality causing spontaneous abortion – Autosomal trisomy
- Trisomies have been identified in abortuses for all except chromosome number 1 and those with 13, 16, 18, 21 and 22 are most common.
- M/C specific chromosomal anomaly associated with abortions → Monosomy X (20%) > Trisomy 16 (16%)
- M/C cause of 1st trimester recurrent abortion–chromosomal anomaly (balanced translocation of chromosomes)
- M/C cause of 2nd trimester recurrent abortion (or overall M/C cause of recurrent abortion) – Cervical Incompetence
- Infections do not lead to recurrent abortions
- Investigative measures useful in the evaluation of recurrent early pregnancy loss:

—Novak 14/e, p 1302; Leon Speroff, p 1090

  - Parental peripheral blood karyotyping[a] with banding technique.
  - Assessment of the intrauterine cavity with either office hysteroscopy or hysterosalpingography.
  - Thyroid function tests, serum prolactin levels if indicated.
  - Anticardiolipin antibody and lupus anticoagulant testing (aPTT or Russell Viper venom testing).
  - *Complete blood counts with platelet count.*
  - Thrombophilia testing:
  - *Factor V leiden, prothrombin gene mutation, Protein S activity.*

Contd…

Contd…

KEY CONCEPT

– *Serum homocysteine level.*
– In the presence of a family or personal history of venous thromboembolism, ***protein C and antithrombin*** activity.

- The American college of obstetricians and Gynaecology recognizes only 2 types of tests as having clear value in the investigation of recurrent miscarriages:
  1. Parental cytogenetic analysis
  2. Lupus anticoagulant and anticardiolipin antibodies assay. —*Williams Obs 23/e, p 241*

Note: Karyotype of parents is more important in recurrent pregnancy loss whereas karyotype of conceptus is more important in 1st trimester abortion.

Types of Abortion

Types of Abortion	Definition
Threatened Abortion	It is a clinical entity where the process of abortion has started but has not progressed to a state from which recovery is impossible.
Inevitable Abortion	It is a clinical entity where process of abortion has progressed to a state from where continuation of pregnancy is impossible.
Complete Abortion	Here the products of conception are expelled en masse.
Incomplete Abortion	Here the entire products of conception are not expelled but a part is left inside the uterine cavity.
Missed Abortion	When the fetus is dead and retained inside the uterus for a variable period, it is known as *missed abortion.*

Clinical features and diagnosis of different types of Abortions

Abortion	Clinical picture	Size of uterus	Internal os	Ultrasound
1. Threatened	Slight bleeding	Corresponds	Closed	Live fetus, subchorionic hemorrhage
2. Inevitable	Bleeding and pain, shock	Equal or less	Open with products of conception felt	Dead fetus
3. Incomplete	Bleeding	Smaller	Open	Retained products
4. Complete	Bleeding stopped	Smaller	Closed	Cavity empty
5. Missed	Absent or minimal bleeding	Smaller	Closed	Dead fetus

Septic Abortion

Septic abortion: Any abortion associated with clinical evidences of infection of the uterus and its contents is called *Septic abortion.*

Criteria for Septic Abortion:

Abortion is considered septic when:

- *Rise of temperature is at least 100.4 degree F for 24 hours or more.*
- Presence of offensive or purulent vaginal discharge.
- Presence of other evidence of pelvic infection such as lower abdominal pain and tenderness.
- In majority of the cases the infection occurs following illegal induced abortion[Q] but may occur following spontaneous abortion.
- Infection is *polymicrobial from* the normal flora of genital tract and is due to gram positive, gram negative and anaerobic pathogens.
- Patients will present with fever, abdominal pain, purulent offensive vaginal discharge and vomiting.

On per vaginal examination:

- Offensive purulent discharge present.
- Cervix feels soft with an open os.

- Fornices are tender.
- Uterus is tender.
- In case a pelvic abscess is formed, a soft boggy mass may be felt (in addition to spiky rise in temperature and mucus diarrhea).
- There may be signs of uterine perforation or bowel injury.

Complications:

- Uterine infection, i.e. endomyometritis (M/C manifestaion - Williams Gynae, p 142, Williams Obs. 23/e, p 222), parametritis, peritonitis, septecemia
- ARDS
- DIC
- Acute renal failure. —*Jeffcoates 7/e, p 138*

Sequelae:

- Chronic pelvic pain
- Tubal block and infertility.

CERVICAL INCOMPETENCE

Cervical incompetence is characterised by painless[Q] cervical dilatation in the second[Q] or early third trimester[Q] with ballooning of the amniotic sac into the vagina[Q], followed by rupture of membranes and expulsion of a usually live fetus. The usual timing is 16 to 24 weeks.

Note: With every loss, the gestational age at which abortion occurs keeps on decreasing in contrast to syphilis.

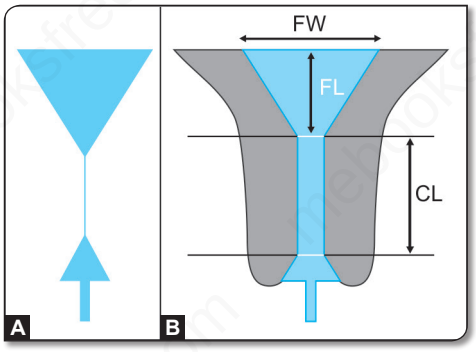
Aetiology:

- ***Congenital***
  - Developmental weakness of cervix.
  - Associated with uterine anomalies like septate uterus.
  - Following in utero exposure to diethyl stilbestrol.
- ***Acquired due to previous cervical trauma***
  - Forcible dilatation during MTP and D and C.
  - Conisation of cervix.
  - Cauterisation of cervix.
  - Amputation of cervix or Fothergill's operation.

Diagnosis:

- **History:** The typical history of painless rupture of membranes[Q] followed by the quick delivery of a live fetus in midtrimester is very suggestive.[Q]
- **Nonpregnant state:**
  - The internal os allows the passage of a No. 8 Hegar's cervical dilator or Foley's catheter filled with 1 ml water without resistance.[Q]
  - Premenstrual Hysterocervicography will show the typical funneling of the internal os[Q] (Fig. 9.1)
- **In Pregnancy:**
  - Transvaginal ultrasound is the ideal method to follow up and detect early incompetence.
  - The normal cervical length at 14 weeks is 35 – 40 mm. A cervical length less than 25 mm, funneling of the os, and os diameter > 1 cm on USG indicates cervical incompetence.

Note: Funneling is the ultrasound finding of herniation of the fetal membranes into the upper part of the endocervical canal.



Figs. 9.1A and B: Hysterographic shadow obtained in the premenstrual phase. (A) Competent cervix (B) Incompetent cervix showing funneling. (FW = Funnel width, FL = Funnel length, CL = Cervical length)

Management

*The treatment is surgical by a **cervical circlage**, which can be done prophylactically or in emergency (Rescue cerclage)*

Time of operation: Prophylactic cervical circlage is usually delayed up to 12-14 weeks so that miscarriage due to other causes can be eliminated or it should be done atleast 2 weeks earlier than the lowest period of earlier wastage (but never earlier than 10 weeks).

Note: Sonography should be done prior to circlage to confirm a live fetus and to rule out anomalies.

Procedures:

- **Vaginal circlage**

Mc Donald's operation	Shirodkar's operation
• It has good success rate and less blood loss. • The most commonly performed procedure nowadays.	• The Shirodkar operation is technically more involved and takes longer to perform.

- ***Abdominal cerclage***

  Indications
  - Women with incompetent cervix due to severe trauma to cervix such as deep laceration, extensive conization or repeated LEP for treatment of Ca in situ.
  - H/O repetitive 2nd trimester loss and failed vaginal circlages.
  - In women with 2nd trimester losses and anatomic impossibility to place a vaginal circlage.

Removal of Cerclage Stitch: The Stitch should be removed at 37 weeks or earlier if labour pain starts or features of abortion appear.

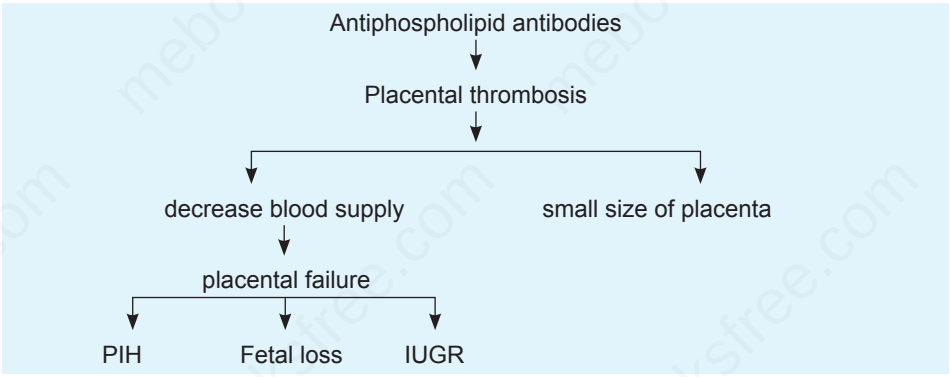
Contraindications	Complications
• Intra uterine infection • Ruptured membranes • H/o vaginal bleeding • Severe uterine irritability • Cervical dilatation > 4 cm	• Chorioamnionitis • Rupture of membranes • Preterm labour • Necrosis of cervix • Rupture uterus

ANTIPHOSPHOLIPID ANTIBODY SYNDROME

- It is a treatable, autoimune disorder associated with recurrent *second trimester pregnancy loss.*[Q]
- It accounts for 15% cases of recurrent pregnancy loss.
- Antiphospholipid antibodies are acquired antibodies targeted against a phospholipid β_2 glycoprotein. They can be IgM, IgG or IgA isotopes.
- Most important antiphospholipid antibodies are:

Lupus anticoagulant (LAC)	Anticardiolipin antibody	Anti β_2 Glycoprotein antibodies
– It was named so because it was first found in patients with SLE and prolonged partial thromboplastin time – But the name is a misomer as though it increases PTT (i.e., similar to anticoagulant) but functions as a procoagulant and causes thrombosis	– It is most commonly seen in patients with repetitive early pregnancy loss	i.e. antibody which causes biologically false positive syphilis test

Pathogenesis



Clinical Features

Vascular thrombosis

- Recurrent arterial or venous thrombosis in any tissue or organ is the most common presentation

Pregnancy complications

- Recurrent spontaneous abortions
- Pregnancy induced hypertension (preeclampsia and eclampsia)
- Placental insufficiency/Abruption
- Intrauterine growth retardation
- Choreaa gravidarum
- Post partum comlicatons like pulmonary infiltrates, fever and cardiac symptoms

Venous thrombosis (more common)

- DVT is the most common manifestation
- Pulmonary embolism
- Pulmonary hypertension from thrombo-embolic disease.

Arterial thrombosis (less common)

CNS	Heart	Lungs	Kidney	Bones	Others
– Stroke (cerebral vessel occlusion) – Transient ischemic attacks	Myocardial infarction (coronary occlusion)	Pulmonary hypertension (pulmonary occlusion)	Glomerular Thrombosis Renal artery artery occlusion)	Avascular Necrosis	

Diagnostic Criteria for APS: Revised Sapporo Criteria

A. Clinical Criteria

1. **Vascular thrombosis** (one or more clinical episode of arterial, venous or small vessel thrombosis, in any tissue or organ).
2. **Pregnancy morbidity:**
   (i) One or more unexplained deaths of a morphologically normal fetus at or beyond the 10th week of gestation with normal fetal morphology documented by ultrasound.
   (ii) One or more premature births of a morphologically normal neonate before the 34th week of gestation because of (a) eclampsia or severe preeclampsia defined according to standard definition or (b) recognised features of placental insufficiency
   (iii) Three or more unexplained consecutive spontaneous abortions before the 10th week of gestation, with maternal anatomic or hormonal abnormalities and paternal and maternal causes excluded.

B. Laboratory Criteria

1. Lupus anticoagulant present in plasma, on two or more occasion atleast 12 weeks apart, detected according to the guidelines of the International Society on Thrombosis and Hemostasis.
2. aCL antibody of IgG and/or IgM isotype in serum or plasma, present in medium or high titre.
3. Anti β_2 glycoprotein–1 antibody of IgG and/or IgM isotype in serum or plasma.

Lab Diagnosis

General diagnosis

- Hemolytic anemia
- Thrombocytopenia
- Elevated anti β-2 glycoprotein antibody

Specific diagnosis

A. For lupus anticoagulant

- It cannot be measured directly but assessed by its effect on PTT, kaolin clotting time and russel viper venom time.
- **Lupus anticoagulant—prolongs APTT while prothrombin time remains normal**
- Kaolin clotting time is delayed
- **Russel viper venom time is prolonged**
- Diagnosis of lupus anticoagulant is confirmed by adding plasma which doesnot correct APTT whereas addition of excess of phospholipids corrects APTT.

B. Anticardiolipin antibody

- Measured by ELISA testing.
- IgM, IgG and IgA antibodies can be demonstrated.
- IgG antibodies > 20 U are significant

For diagnosis of antiphospholipid antibody syndrome there should be two positive tests 6 weeks apart.

Management

Treatment as proposed by ACOG is a combination of **low dose aspirin** (81 mg) daily and **low molecular weight heparin** (LMWH) in prophylactic doses (e.g. enoxaparin), started as soon as pregnancy is confirmed. Aspirin can be initiated preconceptionaly and is usually discontinued at 36 weeks. LMWH is continued up to term and for 5 days postpartum.

Women with previous history of thrombosis will usually already be on maintenance therapy with warfarin. In such cases as soon as pregnancy is confirmed, by UPT–start aspirin and once intrauterine pregnancy is confirmed and cardiac activity noted start low molecular weight heparin.

Both the drugs are continued throughout pregnancy and heparin is stopped at onset of labor or in planned cases 24 hours before delivery or cesarean and aspirin stopped 5–10 days before labor.

Anticoagulation is resumed 6 hrs after delivery or 12 hrs after cesarean section. APS pregnancies or those with prior preeclampsia should be given thromboprophylaxis in postpartum period for atleast 6 weeks by starting warfarin Ocps are conaining. estrogen are GI.

MTP

Medical Termination of Pregnancy Act, 1971

- In India, the MTP act was passed in August 1971 and came into effect from April 1972.
- In extends to the whole of India except in the state of Jammu and Kashmir.

Indications

A. Therapeutic: When the continuation of pregnancy endangers the life of woman or may cause serious injury to her physical or mental health.

B. Eugenic: When there is risk of the child being born with serious physical or mental abnormalities. This may occur.

- If the pregnant woman in the first three months suffers from:
  - German measles, (incidence of congenital defects 10 to 12%).
  - Smallpox or chicken pox.
  - Toxoplasmosis.
  - Viral hepatitis.
  - Any severe viral infection.
- If the pregnant woman is treated with drugs like thalidomide, cortisone, aminopterin, antimitotic drugs, or if she consumes hallucinogens or antidepressants.

- Mother is treated by X-rays or radioisotopes.
- Insanity of the parents.

C. Humanitarian: When pregnancy has been caused by rape.Q

D. Social:

- When pregnancy has resulted from the failure of contraceptive methods in case of a marriedQ woman, which is likely to cause serious injury to her mental health.
- When social or economic environment, actual or reasonably expected can injure the mother's health.

Rules

- Only a *qualified registered medical practitioner*Q possessing prescribed experience can terminate pregnancy. Chief Medical Officer of the district is empowered to certify that a doctor has the necessary training to do abortions. *A medical practitioner can qualify if he has assisted in performance of twenty-five cases of*Q *M.T.P. in a recognised hospital.*
- The pregnancy should be terminated in *Government hospitals*Q*, or in the hospitals recognised by the Government for this purpose*Q*.*
- *Non-governmental institutions* may take up abortion if they obtain *a licence from* Chief Medical Officer of the district.Q
- The consent of the womanQ is required before conducting abortion. Written consent of the guardian is required if the woman is a minor (<18 years)Q or a mentally ill person.Q Consent of husband is not necessary.
- Abortion cannot be performed on the request of the husband, if the woman herself is not willing.
- The woman need not produce proof of her age. The statement of the woman that she is over eighteen years of age is accepted.
- It is enough for the woman to state that she was raped, and it is not necessary that a complaint was lodged with the police.
- Professional secrecy has to be maintained. The Admission Register for the termination of pregnancies is secret document, and the information contained therein should not be disclosed to any person.
- If the period of pregnancy is below 12 weeks, it can be terminated on the opinion of a single doctor.Q
- *If the period of pregnancy is between 12 and 20 weeks, two doctors must agree that there is an indication.*Q *Once the opinion is formed, the termination can be done by any one doctor.*
- Termination is permitted upto 20 weeks of pregnancy.Q
- In an emergency, pregnancy can be terminated by a single doctor, even without required training (even after twenty weeks), without consulting a second doctor, in a private hospital which is not recognised.
- The termination of pregnancy by a person who is not registered medical practitioner (person concerned), or in an unrecognised hospital (the administrative head) shall be punished with rigorous imprisonment for *a term which shall not be less than two years, but which may extend to seven years.*

Methods of Performing Medical Termination of Pregnancy

First Trimester (Up to 12 Weeks)	Second Trimester (13–20 Weeks)
Medical • Mifepristone • Mifepristone and Misoprostol (PGE_1) • Methotrexate and Misoprostol • Tamoxifen and Misoprostol **Surgical** • Menstrual regulation • Vacuum Aspiration (MVA/EVA) • Suction evacuation and/or curettage • Dilatation and evacuation: – Rapid method – Slow method	• **Prostaglandins** PGE_1 (Misoprostol), 15 methyl $PGF_2\alpha$ (Carboprost), PGE_2 (Dinprostone) and their analogues (used-intravaginally, intramuscularly or intra-amniotically) • **Dilation and evacuation** • **Intrauterine instillation of hyperosmotic solutions** – Intra-amniotic hypertonic urea (40%), saline (20%) – Extra-amniotic—Ethacrydine lactate, Prostaglandins (PGE_2, $PGF_2\alpha$) • **Oxytocin infusion** high dose used along with either of the above two methods • **Hysterotomy** (abdominal)— less commonly done

Important Points to Remember

Medical Abortion

Regimen:

FDA approved protocol – (Original protocol):

- 600 mg of Mifepristone (i.e. 3 tablets) given orally on day 1 followed 2 days later by oral misoprostol 400 μg (2 tablets) on day 3.

- The treatment should be started no more than 49 days from the start of the last menstrual period.

But according to the recent protocol:

- 200 mg of mifepristone (it is as effective as 600 mg of mifepristone) is given orally on day 1 followed 2 days later by vaginal misoprostol 800 μg (4 tablets of 200 μg each).
- This regime provides highest efficacy within 63 days of amenorrhea.

The combipack of 1 tablet mifepristone and 4 tablets misoprostol (i.e. 5 tablets) is approved by DGHS, Govt. of India.

Role of mifepristone in Medical abortion:

- Mifepristone blocks progesterone receptors in the endometrium which leads to disruption of the embryo, production of prostaglandins and a decrease in human chorionic gonadotropin levels.

Contraindications of Medical abortion with mifepristone / misoprostol:

- ectopic pregnancy[Q]
- an IUCD in place[Q]
- chronic adrenal failure[Q]
- concurrent long term corticosteroid[Q] therapy
- history of allergy to mifepristone, misoprostol or other prostaglandins[Q]
- inherited porphyrias
- Severe anemia, coagulopathy or anticoagulant use.
- Active liver disease
- Uncontrolled seizure disorder. *—William Gynae. 1/e, p 153, Williams 23/e, p 232*
- Cardiovascular disorder.

Relative Contraindication—renal disease

Suction Evacuation

- It is the most suitable method for Ist trimester abortions from **7 weeks to 15 weeks**.
- It is done under local anaesthesia/paracervical block.[Q]
- The cervical os is first dilated using Hegar's dilators.[Q]
- Instrument used for evacuation is Karman suction cannula.[Q]
- Diameter of suction cannula should be equal to the weeks of gestation.[Q]
- Suction pressure is 60-70 cm of Hg (600 mm of Hg)[Q]
- The end point of suction is denoted by:
  - No more material sucked out.
  - Gripping of the cannula by the contracting smaller uterus.
  - Grating sensation.
  - Appearance of bubbles in the cannula.

Advantages of Suction evacuation

- Done as an out patient procedure.
- Low failure rate (< 1%).
- Complications like incomplete evacuation, infection, uterine perforation and excessive bleeding are < 2%.
- Mortality is < 2%.

Note: Injury by suction evacuation is more dangerous than by Hegar's dilators. If injury is by–dilator–wait and watch. If Injury is by–suction–Laparotomy/Laparoscopy should be done

Menstrual regulation

Consists of aspiration of contents of uterine cavity by means of plastic cannula (Karman's cannula) and a plastic 50 cc syringe.

It is carried out effectively within 14 days of missed period.

- A paracervical block or preoperative sedative alone suffices but sometimes in apprehensive patient GA is required.
- Blood loss is less.
- It is included in methods of performing MTP.

Manual vacuum aspiration

It is done upto 12 weeks. A 60 mL syringe is used and 60 mm of hg pressure is generated.

Note: After 15 weeks best method of MTP is by using oxytocin followed by prostaglandin.

QUESTIONS

1. Most common cause of first trimester abortion is:
a. Chromosomal abnormalities **[AI 03]**
b. Syphilis
c. Rhesus isoimmunization
d. Cervical incompetence

2. Commonest cause of first trimester abortion is:
a. Monosomy b. Trisomy **[PGI June 99]**
c. Triploidy d. Aneuploidy

3. A lady has recurrent abortions in Ist trimester with history of autosomal recessive disorder in family. The true statement regarding this is: [AIIMS Nov 99]
a. Consanguinity may be the cause
b. Complete penetrance is common
c. Affected members in the family
d. All are correct

4. Spontaneous abortion in 1st trimester is caused by:
a. Trisomy 21 b. Monosomy **[PGI June 00]**
c. Trauma d. Rh-incompatibility

5. MC cause of abortion in first trimester is, defect in:
a. Placenta b. Uterus **[PGI June 98]**
c. Embryo d. Ovarian

6. Recurrent abortion in 1st trimester is most often due to: [PGI Dec 97]
a. Chromosomal abnormalities
b. Uterine anomaly
c. Hormonal disturbance
d. Infection

7. Recurrent spontaneous abortions are seen in all *except*: [PGI June 03]
a. TORCH infection
b. Uterine pathology
c. Herpes infection
d. Balanced paternal translocation
e. None of the above

8. All of the folowing are known causes of recurrent abortion except: [AI 08]
a. TORCH infections
b. SLE
c. Rhincompatibility
d. Syphilis

9. 26 years old lady with H/o recurrent abortion which of the following investigations you will do to confirm the diagnosis? [AIIMS Nov 06]
a. PT
b. BT
c. Anti-Russel viper venom antibodies
d. Clot solubility test

10. Recurrent abortion in Ist trimester, investigation of choice: [PGI Dec 06]
a. Karyotyping b. SLE Ab
c. HIV d. TORCH infection

11. In a case of recurrent spontaneous abortion, following investigation is unwanted:
a. Hysteroscopy **[AIIMS Nov 02]**
b. Testing antiphospholipid antibodies
c. Testing for TORCH infections
d. Thyroid function tests

12. A lady presented to your with a history of recurrent early pregnancy loss. What are the investigations to be ordered: [PGI Dec 09]
a. VDRL
b. Toxoplasma serology
c. Hemogram/blood grouping
d. Rubella screening
e. Blood Sugars

13. A woman with 20 weeks pregnancy presents with bleeding per vaginum. On speculum examination, the os is open but no products have come out. The diagnosis is: [AIIMS Nov 2013]
a. Missed abortion b. Incomplete abortion
c. Inevitable abortion d. Complete abortion

14. A 25 years old female reports in the casualty with history of amenorrhoea for two and half months and abdominal pain and bleeding per vaginum for one day. On examination, vital parameters and other systems are normal. On speculum examination, bleeding is found to come from Os. On bimanual examination, uterus is of 10 weeks size, soft and Os admits one finger. The most likely diagnosis is:
a. Threatened abortion **[New Pattern Question]**
b. Missed abortion
c. Inevitable abortion
d. Incomplete abortion

15. A woman with H/o recurrent abortions presents with isolated increase in APTT. Most likely cause is:
a. Lupus anticoagulant **[New Pattern Question]**
b. Factor VII
c. Von willebrand's disease
d. Hemophilia A

16. Anti phospholipid syndrome (APS) is associated with all of the following *except*: [AI 08/AIIMS May 11]
a. Pancytopenia
b. Recurrent abortions
c. Venous thrombosis
d. Pulmonary hypertension

17. All of the following are true about the lupus anticoagulants *except*: [AI 09]
a. ↑ in APTT
b. Recurrent second trimester abortion in pregnancy females
c. Can occur without other symptoms of antiphospholipid antibody syndrome
d. Severe life threatening hemorrhage

18. Cervical incompetence is characterised by:
a. 1st trimester abortion **[PGI June 03]**
b. 2nd trimester abortion
c. Premature rupture of membrane
d. Circlage operation done

19. In cervical incompetence, encirclage operation done are: [PGI Dec 03]
a. Mc Donald operation
b. Shirodkar operation
c. Purandare's operation
d. Khanna's sling operation
e. Abdominal sling operation

20. A gravida 3 female with H/o 2 previous 2nd trimester abortion presents at 22 weeks of gestation with funneling of cervix. Most appropriate management would be: [AIIMS Nov 07]
a. Administer dinoprostone and bed rest
b. Administer misoprostol and bed rest
c. Apply fothergill stretch
d. Apply McDonald stitch

21. Mcdonald stitch is applied in the following conditions except:
a. Incompetent os
b. Septate uterus
c. Placenta previa
d. Bad obstetrical history

22. A 28-year-old female with a history of 8 weeks amenorrhoea complains of vaginal bleeding and lower abdominal pain. On USG examination there is gestational sac with absent fetal parts. The diagnosis is: [AIIMS May 01]
a. Ectopic pregnancy
b. Incarcerated abortion
c. Threatened abortion
d. Corpus luteum cyst

23. Antiprogesterone compound RU-486 is effective for inducing abortion, if the duration of pregnancy is:
a. 63 days b. 72 days **[AI 04]**
c. 88 days d. 120 days

24. All of the following drugs have been used for medical abortion *except*: [AIIMS May 03]
a. Mifepristone b. Misoprostol
c. Methotrexate d. Atosiban

25. In extra amniotic 2nd trimester medicolegal termination of pregnancy, which of the following is used? [PGI June 04]
a. Ethacrydine lactate
b. Prostaglandin
c. Hypertonic saline
d. Glucose

26. According to MTP Act, 2 doctor's opinion is required when pregnancy is: [PGI June 03]
a. 10 weeks
b. 6 weeks
c. > 12 weeks
d. > 20 weeks
e. 8 weeks

27. For medical termination of pregnancy, consent should be obtained from? [AI 2012]
a. The male partner
b. The male as well as the female partner
c. The female partner
d. Consent is not required

28. Mifepristone is not used in: [AI 09]
a. Threatened abortion
b. Fibroid
c. Ectopic pregnancy
d. Molar pregnancy

29. Blighted ovum is: [New Pattern Question]
a. Synaptic knobs
b. Avascular villi
c. Intervillous hemorrhage
d. None of the above

30. The most life threatening complications of septic abortion includes: [New Pattern Question]
a. Peritonitis
b. Renal failure
c. Respiratory distress syndrome
d. Septicaemia

31. The method most suitable for MTP in 3rd month of pregnancy is: [New Pattern Question]
a. Dilatation and curettage
b. Extra amniotic ethacrydine
c. Hysterectomy
d. Suction and evacuation

32. Pregnancy which continues following threatened abortion is likely to have increased incidence of?
a. Preterm laber **[New Pattern Question]**
b. Fetal malformation
c. IUGR
d. All of the above

33. The best method of evacuation of a missed abortion in uterus of more than 12 weeks: [New Pattern Question]
a. Oxytocin infusion
b. Intramuscular prostaglandin (15 methyl PGF2α)
c. Prostaglandin E1 vaginal misoprostol followed by evacuation of the uterus
d. Suction evacuation

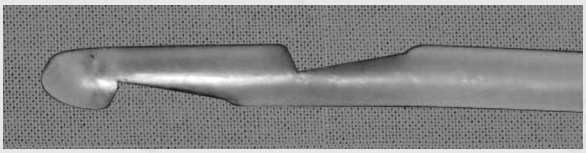
34. Suction evacuation can be done up to: **[New Pattern Question]**

a. 6 weeks b. 10 weeks
c. 15 weeks d. 18 weeks

35. A P2 + 1 female comes with amenorrhea of 5 weeks. Her UPT is +ve. On USG, Gestational and yolk sac are seen in uterus. No fetal pole is visible. No fetal cardiac activity is seen. CRL is 8 mm and MSD = 28 mm. What is the next best step? **[New Pattern Question]**

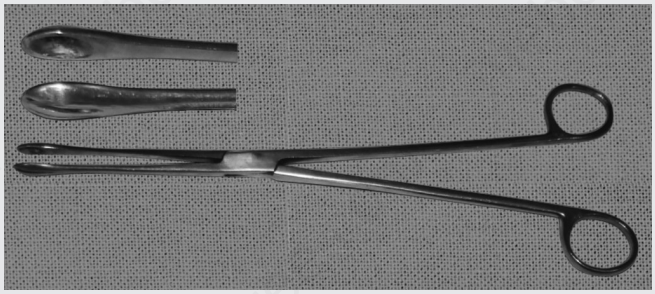
a. Advise MTP as it is nonviable pregnancy
b. High probability of nonviable pregnancy- but still repeat scan after 7 days to confirm
c. Can be ectopic pregnancy – give methotrexate
d. High probability of viable pregnancy-repeat scan after 7 days

36. The figure shows karman cannula. The number of cannula corresponds to: **[New Pattern Question]**



a. Diameter of cannula in mm
b. Diameter of cannula in cm
c. Surface area of cannula
d. Length of cannula

37. Identify the instrument: **[New Pattern Question]**



a. Sponge holding forceps
b. Haywood Smiths ovum forceps
c. Allis tissue forceps
d. Lanes tissue forceps

38. Levels of progesterone indicating unviable pregnancy and viable intrauterine pregnancy are: **[New Pattern Question]**

a. 5 ng/ml; 20 ng/ml
b. 10 ng/ml; 20 ng/ml
c. 5 ng/ml; 50 ng/ml
d. 10 ng/ml; 50 ng/ml

39. Best method for MTP in 2nd trimester abortion: **[New Pattern Question]**

a. Oxytocin b. Prostaglandin
c. Ethacridil d. Hypertonic saline

EXPLANATIONS & REFERENCES

1. Ans. is a i.e. Chromosomal abnormalities

Ref. Dutta Obs. 7/e, p 159,160; COGDT 10/e, p 259; Williams Obs. 23/e, p 215

Abortion is spontaneous termination of pregnancy before 22 weeks or weight of fetus less than 500 gm.

Incidence: About 15% of all conceptions end up in spontaneous abortions. Out of these 80% occur before 12 weeks i.e. in 1st trimester and among these 50-75% are due to chromosomal anomalies (Germplasm defect).

2. Ans. is d i.e. Aneuploidy *Ref. Williams 24/e, p 351*

- The M/C cause of early miscarriages is aneuploidy (i.e. chromosomal anomaly).
- Amongst the aneuploid abortions—autosomal trisomy is the most frequently identified chromosomal anomaly.
- Trisomies have been identified in abortuses for all except chromosomal number 1 and those with 16, 13, 18, 21 and 22 are most common.
- **The single most specific chromosomal abnormality after abortions is Monosomy X (45X).**

3. Ans. is d i.e. All are correct *Ref. Robbin's 7/e, p 151*

Autosomal recessive inheritance is the single largest category of Mendelian disorders.

They have following features:

- *The trait does not usually affect the parents but siblings may show the disease* ***(Option "c"*** is correct).
- Siblings have one chance in four of being affected (i.e. recurrence risk is 25% for each birth).
- *Consanguineous marriage may be the cause* (***Option "a"*** is correct).
- The expression of the defect tends to be more uniform than in autosomal dominant disorders.
- *Complete penetrance is common* ***(Option "b"*** is correct).
- Onset is frequently early in life.

In the question the lady has recurrent abortions and H/o autosomal recessive disorder in the family, therefore all features of autosomal recessive disorders apply to her.

4. Ans. is a, b and c i.e. Trisomy 21; Monosomy; and Trauma *Ref. Dutta Obs. 7/e, p 160*

Common causes of abortion

First trimester	Mid trimester
1. Defective germplasm (most common)/chromosomal anomalies: • ***Trisomy*** (most common overall problem) • Triploidy • ***Monosomy*** X (most specific) • Tetraploidy Structural rearrangements including: *translocation, deletion, inversion*	1. Anatomical abnormalities • Cervical incompetence • Uterine malformation/mullerian anomalies • Uterine synechiae 2. Autoimmune disorders • Antinuclear antibodies • Antiphospholipid antibodies • Maternal thrombophelia
2. Endocrine disorders: • Luteal phase defect • Thyroid abnormalities (rare) • Diabetes	3. Rh and blood group incompatibility 4. Low implantation of placenta 5. Twins/hydramnios
3. Maternal medical illness including – Cyanotic heart disease – Hemoglobinopathies – Inherited thrombophilia	6. Endocrine abnormalities – Progesterone deficiency – Thyroid deficiency – Maternal diabetes – PCOD
4. ***Trauma***	7. Genetic abnormalities – Seen in 5-10% of 2nd trimester losses *(Fernando Arias 3/e, p 326)*
5. Maternal excessive use of alcohol, caffine	8. Sub chorionic bleeding 9. Maternal/uterine infections *(Fernando Arias 3/e, p 329)*

Note: ***"According to ACOG (2001), Infections are an uncommon cause of early abortions. Even in their study of IDDM–women–presumbly more susceptible to infection–simpson and coworkers (1996) found no evidence of infection induced miscarriage."*** *—Williams gynae, 1/e, p 139*

5. Ans. is c i.e. Embryo *Ref. Dutta Obs. 7/e, p 159, 160; Williams Gynae 1/e, p 138*

As explained earlier most common cause of abortion in first trimester are chromosomal abnormalities involving the zygote or embryo.

6. Ans. is a i.e. Chromosomal abnormalities *Ref. Dutta Obs. 7/e, p 167; Leon Speroff 7/e, p 1072*

Most common cause of recurrent abortions:

1st trimester	• Genetic factor/defective germplasm.
	• *Most common type of chromosomal abnormality* is balanced translocation.
2nd trimester	• Cervical incompetence

7. Ans. is a and c i.e. TORCH infection; and Herpes infection

Ref. Williams Obs. 21/e, p 868, 23/e, p 224; Williams Gynae. 1/e, p 144-149; Leon Speroff 7/e, p 1090

Remember all causes of abortions given earlier in the chapter for spontaenous abortions hold good for recurrent abortions also except for infections be it — TORCH infections or any other infection.

According to Williams Gynae 1/e, p 149—

"Few infections are firmly associated with early pregnancy loss. Moreover, if any of those infections are associated with miscarriage, they are even less likely to cause recurrent miscarriage because maternal antibodies usually develop with primary infection."

Leon Speroff says:

"Overall, data regarding the possibility that cervicovaginal infections might be a cause of early pregnancy loss are relatively scarce. Despite periodic reports that have implicated specific infectious agents as risk factors for miscarriages, there remains no compelling evidence that bacterial or viral infections are a cause of recurrent pregnancy loss." *—Leon Speroff*

It further says on *page 1091*

"Routine serological tests, cervical cultures and endometrial biopsy to detect genital infections in women with recurrent pregnancy loss can not be justified. Evaluation should be limited to women with clinical cervicitis, chronic or recurrent bacterial vaginosis or other symptoms of pelvic infection."

8. Ans. is a i.e TORCH infection *Ref. 'Pre test' Obstetrics and Gynaecology 11/e, p 68 (Question 77)*

As discussed in previous question TORCH infection do not lead to recurrent abortion.

SLE is an established cause for recurrent abortion

SLE is associated with antiphospholipid syndrome (anti-cardiolipin antibodies) and is known to cause recurrent abortions.

RH incompatibility is a known cause for spontaneous abortion and may lead to recurrent abortions if it remains unrecognized.

Syphillis also does not lead to recurrent abortions but if you have to rule out one option between TORCH infection and syphillis go for TORCH infection.

9. Ans. is c i.e. Anti-Russell viper venom antibodies *Ref. Dutta Obs. 7/e, p 343*

10. Ans. is a i.e. Karyotyping

11. Ans. is c i.e. Testing for TORCH infections. *Williams Gynae 1/e, p 149, Novaks 14/e, p 1302*

- Chromosomal abnormality is the *commonest cause* for repeated first trimester loss.
- In 3-5% of couples with recurrent miscarriage, one of the partners will have a chromosomal anomaly.
- The most common type is a balanced translocation of the chromosomes, more likely in the mother. In such cases, the genetic information is intact and so there is no problem for the parents. But this can lead to an unbalanced translocation in the conceptus, causing an early miscarriage.

Hence karyotyping of the both partners is recommended in recurrent miscarriage. Prenatal diagnosis is usually advised in the next pregnancy. Therefore Ans of Q. 10 is karyotyping.

As discussed earlier, infections be it HIV / TORCH are not a cause of recurrent abortion.

Because TORCH infections are not a cause of recurrent abortions:

TORCH profile should not be included in the set of investigations done to find out the cause of recurrent abortion (Ans. 14)

Investigative measures useful in the evaluation of recurrent early pregnancy loss:

—Novak 14/e, p 1302; Leon Speroff, 1090

- Parental peripheral blood karyotyping[a] with banding technique.
- Assessment of the intrauterine cavity with either office hysteroscopy or hysterosalpingography.
- Thyroid function tests, serum prolactin levels if indicated.
- Anticardiolipin antibody and lupus anticoagulant testing (aPTT or Russell Viper venom testing).
- *Complete blood counts with platelet count.*
- Thrombophilia testing:
  - *Factor V leiden, prothrombin gene mutation, Protein S activity.*
  - *Serum homocysteine level.*
  - In the presence of a family or personal history of venous thromboembolism, ***protein C and antithrombin*** activity.

  The American college of obstetricians and Gynaecology recognizes only 2 types of tests as having clear value in the investigation of recurrent miscarriages:
  1. Parental cytogenetic analysis
  2. Lupus anticoagulant and anticardiolipin antibodies assay. *—Williams Obs 23/e, p 241*

12. Ans. is c i.e. Hemogram/blood grouping: *Ref. Novaks 14/e, p 1302, Leon Speroff 7/e, p 1090*

As discussed in previous answer:

Complete blood counts along with platelet count are done in case of recurrent pregnancy loss.

VDRL-To test for syphilis
Rubella-virus screening
Toxoplasma serology
} are not done because as discussed earlier, infections rarely lead to recurrent pregnancy loss.

"Few infection are firmly associated with early pregnancy loss- moreover, if any of these infections are associated with miscarriage, they are even less likely to cause recurrent miscarriage because maternal antibodies usually develop with primary infection. Thus, there appears no concrete indication to screen for infection in asymptomatic women with recurrent miscarriage" *—Williams Gynae 1/e, p 101*

"Routine serological lests, cervical cultures and endometrial biopsy to detect genital infections in women with recurrent pregnancy loss cannot be justified. Evaluation should be limited to women with clinical cervicits, chronic or recurrent bacterial vaginosis or other symptoms of pelvic infections" *—Leon Speroff 7/e, p 1091*

As far as blood glucose testing is concerned- Neither Novaks, Leon speroff, nor Williams- say that blood glucose levels should be tested in patients with recurrent pregnancy loss.

Leon speroff says:

" In women with recurrent pregnancy loss, evaluation with blood glucose and HbA_1C AIC level is indicated for those with known or suspected diabetes, but otherwise it is unwarranted" *—Leon Speroff 7/e, p 1090*

So for our exams purposes we have to learn and remember the list of investigations mentioned in previous question in case of recurrent abortions.

13. Ans. is c i.e. Inevitable abortion *Ref. Dutta Obs 7/e, p 161, 162*

14. Ans. is c i.e. Inevitable abortion *Ref. Dutta Obs 7/e, p 161, 162*

Clinical features and ***diagnosis*** of **different types of Abortions**

Abortion	Clinical picture	Size of uterus	Internal os	Ultrasound
1. Threatened	Slight bleeding	Corresponds	Closed	Live fetus, subchorionic hemorrhage
2. Inevitable	Bleeding and pain, shock	Equal or less	Open with products felt	Dead fetus
3. Incomplete	Bleeding	Smaller	Open	Retained products
4. Complete	Bleeding stopped	Smaller	Closed	Cavity empty
5. Missed	Absent or minimal bleeding	Smaller	Closed	Dead fetus

In both the question, os is open, size of uterus corresponds to period of amenorrhea and product of conception cannot be seen coming out from os. Thus, it indicates inevitable abortion.

15. Ans. is a i.e. Lupus anticoagulant. *Ref. Dutta Obs. 6/e, p 343; Fernando Arias 3/e, p 327; Leon Speroff 7/e, p 1082*

Isolated increase in APTT is suggestive of lupus anticoagulant.

16. Ans is a i.e Pancytopenia *Ref. API Textbook of Medicine 8/e, p 306, 307; Harrison 17/e, p 732, 1579, 2082*

Venous thrombosis, recurrent abortions and pulmonary hypertension are all seen in case of antiphospholipid syndrome.

Antiphospholipid antibody syndrome leads to thrombocytopenia (in 40-50% cases) and hemolytic anemia in 25% cases but leucopenia is not seen in it. Also in causes of pancytopenia - No where is antiphospholipid syndrome mentioned so, it is the best answer.

17. Ans. is d i.e. Severe life threatening hemorrhage *Ref. CMDT 2009, p 735, Williams Obs 23/e, p 151-1154*

Lupus anticoagulant

- Antiphospholipid antibodies is seen in 5-10% of cases of SLE
- **May be found in asymptomatic patients with or without lupus or it may be associated with the antiphospholipid syndrome (APS)** *—Williams Obs, 23/e, p 1152*
- The term 'anticoagulant' is a misnomer as lupus anticoagulant acts as a procoagulant, causing increased tendency of thromosis and does not act as an anticoagulant (it does not lead to life-threatening haemorrhages).

Clinical presentation		Laboratory findings
Presents as Antiphospholipid syndrome		• Prolonged APTT **Isolated prolongation of APTT with normal (or slightly elevated) PT is characteristic of Lupus anticoagulant**
Recurrent thrombosis	**Pregnancy morbidity**	
• Arterial • Venous • Vasculopathy	• Recurrent obortions • IUGR • Pregnancy associated hypertension • Placental abruption	• False positive VDRL • Thrombocytopenia may be associated as part of the Antiphospholipid syndrome due to consumption of platelets from recurrent thrombosis and the presence of antiphospholipid autoantibodies directed against the platelets.

18. Ans. is b, c and d i.e. 2nd trimester abortion; Premature rupture of membrane; and Circlage operation done

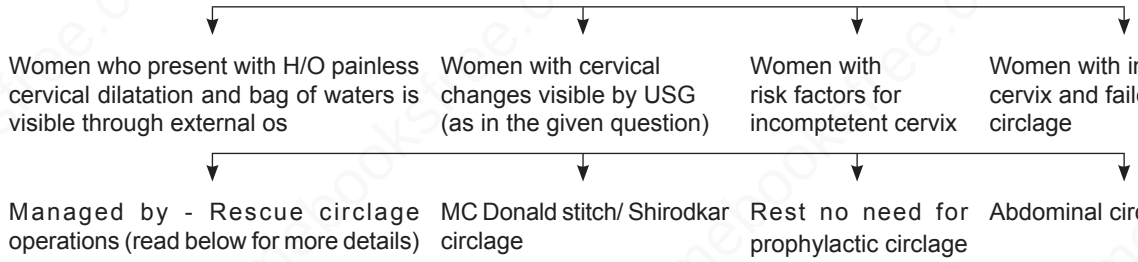
19. Ans. is a and b i.e. Mc Donald operation and Shirodkar operation

Ref. Dutta Obs. 7/e, p 170; Williams Obs. 23/e, p 218, 219

Read the text for explanation

20. Ans. is d i.e. Apply Mc Donald stitch *Ref. Dutta Obs. 7/e, p 168-171*

- In this question: A third gravida female is presenting with 2 previous 2nd trimester losses and with funneling of cervix at 22 weeks of gestation which means that the patient has incompetent cervix.
- Management of this condition as discussed in previous question is application of Mc Donald stitch.
- Women who may have incompetent cervix and require treatment can be divided into 4 groups:



21. Ans. is c i.e. Placenta previa *Ref. Dutta Obs. 7/e, p 171*

Contraindications to Circlage operation:

- Intra uterine infection
- Ruptured membranes
- *H/o vaginal bleeding*
- Severe uterine irritability
- Cervical dilatation > 4 cm

22. Ans. is b i.e. Incarcerated abortion *Ref. Dutta Obs. 7/e, p 163*

Friends, let's consider each option one by one.

Option 'a': i.e. **Ectopic pregnancy**

Points in favour	Points against
• Amenorrhea of 8 weeks • C/o vaginal bleeding and lower abdominal pain	• USG examination showing *gestational sac in the uterus* rules out ectopic pregnancy

Option "c" : i.e. **Threatened abortion**

It is a clinical entity where the process of abortion has started but has not progressed to a state where recovery is impossible.

Points in favour	Points against
• Amenorrhea of 8 weeks. • C/o vaginal bleeding (normally - the bleeding is usually slight but on rare occasion, the bleeding may be brisk and sharp suggestive of low implantation of placenta).	• USG examination showing gestational sac with absent fetal parts. (In threatened abortion USG shows a well formed gestational sac with central echoes from the embryo indicating healthy fetus and observation of fetal cardiac motion).

So, threatened abortion ruled out.

Option "d" : i.e. **Corpus luteum cyst** *—Jeffcoate 7/e, p 527*

Points in favour	Points against
• Amenorrhea followed by vaginal bleeding and lower abdominal pain	• USG examination showing gestational sac (in the uterus) with absent fetal parts (rules out corpus luteum cyst, as an adnexal mass should be visible).

So, corpus luteum cyst ruled out.

Option "b" : i.e. **Incarcerated abortion,** Incarcerated abortion is a variant of missed abortion.

Points in favour	Points against
• Amenorrhea of 8 weeks (incarcerated abortion is seen in fetus before 12 weeks). • USG showing gestational sac with no fetal part. (In incarcerated abortion - small repeated hemo-rrhage occur in the choriodecidual space, dis-rupting the villi from its attachment. The clotted blood with the contained ovum in called as blood mole. The ovum is dead and is either absorbed or remains as a rudimentary structure. So on USG - although gestational sac is seen, no fetal parts are seen.	• The only point which goes against incarcerated abortion is that patient does not present with vaginal bleeding and pain but friends, this can be explained on the basis that initially in missed abortion there is no bleeding or pain but later on the uterus itself tries to expel the dead fetus and patient at that time may present with bleeding and pain.

So our answer is incarcerated abortion.

23. Ans. is a i.e. 63 days *Ref. Novak 14/e, p 298, Dutta Obs. 7/e, p 174;*

RU–486, i.e. Mifepristone, is an analogue of the progestin "norethindrone", which has strong affinity for progesterone receptors but acts as an antagonist of progesterone.

Given alone, the drug was moderately useful in causing abortion of early pregnancy, however the combination of mifepristone with analogue of prostaglandin E_1 i.e. misoprostol is very effective.

Combination of mifepristone and misoprostol is effective for inducing abortion within 63 days of amennorhea

24. Ans. is d i.e. Atosiban *Ref. Dutta Obs. 7/e, p 173*

Drugs used for Medical abortion:

- Prostaglandins:
  - Misoprostol
  - Gemeprost
- Mifepristone
- Methotrexate
- Tamoxifen

25. Ans. is a and b i.e. Ethacrydine lactate; and Prostaglandin *Ref. Dutta Obs. 7/e, p 173*

Methods of Medical Termination of Pregnancy

First Trimester (Up to 12 Weeks)	Second Trimester (13–20 Weeks)
Medical • Mifepristone • Mifepristone and Misoprostol (PGE_1) • Methotrexate and Misoprostol • Tamoxifen and Misoprostol **Surgical** • Menstrual regulation • Vacuum Aspiration (MVA/EVA) • Suction evacuation and/or curettage • Dilatation and evacuation: – Rapid method – Slow method	• **Prostaglandins** PGE_1 (Misoprostol), 15 methyl $PGF_2\alpha$ (Carboprost), PGE_2 (Dinprostone) and their analogues (used-intravaginally, intramuscularly or intra-amniotically) • **Dilation and evacuation** (13–15 weeks) • **Intrauterine instillation of hyperosmotic solutions** – Intra-amniotic hypertonic urea (40%), saline (20%) – Extra-amniotic—Ethacrydine lactate, Prostaglandins (PGE_2, $PGF_2\alpha$) • **Oxytocin infusion** high dose used along with either of the above two methods • **Hysterotomy** (abdominal)— less commonly done

Note: *Ethacridine lactate is drug of choice for extra-amniotic instillation*

- Available as injection Emcredil (0.1%)
- Foleys catheter is introduced into extra-amniotic or extraovular space and bulb is inflated by 10-20 ml. of Ethacridine solution.
- Dose is calculated as **10 ml/week of gestation upto maximum of 150 ml**
- Catheter is left for 6 hours.
- Uterine action begins in 16-18 hours.

In 30% cases abortion is incomplete and requires oxytocin drip or supplementation with prostaglandin.

26. Ans. is c i.e. > 12 weeks *Ref. Dutta Obs. 7/e, p 173; Reddy 26/e, p 368, 369*

According to MTP act–

If the period of pregnancy is below 12 weeks, it can be terminated on the opinion of a single doctor.[a]

If the period of pregnancy is between 12 and 20 weeks, two doctors must agree that there is an indication.[a] Once the opinion is formed, the termination can be done by any one doctor.

27 Ans. is c. i.e. The female partner *Ref. Park's Textbook of PSM 21/e, p 468, 469*

For MTP:

Only female's consent is required

Husbands consent is not required. (The confidentiality about name is maintained)

Consent of parent/guardian is required when age of patient is < 18 years and in case of lunatic females

Person who can perform MTP -

- RMP with 25 MTPS done in approved institution
- 6 month housemanship in Obstetrics and Gynecology
- Post graduate qualification in Obstetrics and Gynecology
- 3 years practice in Obstetrics and Gynecology who are registered before 1971
- 1 year practice in Obstetrics and Gynecology for those registered on or after the date of commencement of the act.

28. Ans. is a i.e. Threatened abortion *Ref. Read below*

Threatened Abortion is a clinical entity where the process of abortion has started but has not progressed to a state from which recovery is impossible. The treatment of threatened abortion is aimed at preserving pregnancy and not at terminating pregnancy.

Mifepristone is an abortificient that will cause termination of pregnancy and should not be used in cases of threatened abortion.

Mifepristone may be used for Ectopic pregnancy and for shrinking of Fibroids

"Mifepristone injected into the unruptured ectopic pregnancy causes its resolution" *Ref. Shaws 13/e, p 307*

'Shrinkage of uterine leiomyoma has been observed following Mifepristone therapy'

Ref. Dutta Gynae 5/e, p 911.

29. Ans. is b i.e. Avascular villi *Ref. Dutta Obs. 7/e, p 161; Fernando Arias 2/e, p 56*

According to the clinical and echographic findings, it is possible to separate early pregnancy losses into two groups:

- ***Blighted ova:*** Those early pregnancy losses in which foetal development is not observed with ultrasound (so that only a gestational sac is present with or without a yolk sac) and fetal tissue is absent on histologic examination of the products of conception.
- ***Early Fetal demise:*** Those early pregnancy losses in which fetal development is clearly observed by ultrasound and fetal tissue is found on the histologic examination.

The difference between these two types of abortion is of fundamental importance. The lack of development of fetal structures defines a subset of abortions of genetic origin.

In contrast, the early interruption of fetal life is a complex phenomenon with multiple etiologies. Therefore, the patients with blighted ova do not require extensive work up, whereas patients who have aborted cytogenetically normal fetuses need an extensive search for non genetic factors responsible for the pregnancy loss.

30. Ans. is c i.e. Respiratory distress syndrome *Ref. Dutta Obs. 7/e, p 164, 165; COGDT 10/e, p 987*

According to *COGDT 10/e, p 987*

"The most common cause of death in patients with this condition is respiratory insufficiency secondary to ARDS."

According to Williams Obs. 23/e, p 222

"With severe sepsis syndrome, acute respiratory distress syndrome or DIC may develop and supportive care is essential".

31. Ans. is d i.e. Suction and Evacuation

Ref. Shaw 14/e, p 221; Clinical Obstetrics by Mudaliar and Menon 10/e, p 406; Dutta Obs. 7/e, p 174, 175

Friends, let's first have a second look at the question. The question asks the most suitable method of MTP in the 3rd month i.e., between 8-12 weeks approximately.

Among the options given – Dilatation and curettage i.e. **option a** and suction evacuation i.e. **option d** are the methods of first trimester pregnancy termination.

Between the two:

"Vacuum evacuation is the most efficient method of terminating pregnancy up to 12 weeks of gestation. It has gained rapid worldwide acceptance." *... Shaw Gynae. 14/e, p 221*

Suction and Evacuation—

"This is a widely practised method today".

"Dilatation and currettage—It is the second most common method of first trimester abortion".

—Operative Obs and Gynae — Randhir Puri and Narendra Malhotra 1/e, p 476, 477

Also know: Most suitable method for 2nd trimester abortions is by prostaglandins.[9]

32. Ans. is d i.e. All of the above *Ref. Dutta Obs 7/e p161*

Prognosis of threatened abortion

In about two-third, the pregnancy continues beyond 28 weeks. In the rest, it terminates either as inevitable or missed miscarriage. **If the pregnancy continues, there is increased frequency of preterm labor, placenta previa, intrauterine growth restriction of the fetus and fetal anomalies.**

33. Ans. is c i.e. Prostaglandin E1 vaginal misoprostol followed by evacuation of the uterus *Ref. Dutta Obs 7/e, p 175*

In all midtrimester abortion, cervical preparation must be done before performing evacuation, to make the process easy and safe.

Intracervical tent, mifeprestone or misoprostol are used as the cervical priming agents. Suction evacuation is not suitable for bigger size of uterus more than 10 weeks as chances of retained products are more.

34. Ans. is c i.e. 15 weeks *Ref. Dutta Obs. 7/e, p 174; Shaw Gyane. 13/e, p 243, 14/e, p 221*

Method	Period of Gestation
Menstrual regulation	Within 14 days of missed periods (done using flexible 6 mm Karman canula attached to a 50 ml syringe).
Suction evacuation/dilatation and currettage	Upto 15 weeks of gestation (Best is, if it is done up to 10 weeks, between 10-12 weeks blood loss rises sharply)
Dilatation and evacuation	16 weeks
Intra amniotic instillation of hypertonic saline	Done after 16 weeks of gestation
Prostaglandins	Method of choice for MTP in second trimester i.e., after 12 weeks.

Friends— there are 2 different methods — **menstrual regulation** and **manual vacum aspiration**. Both of them are based on same principle i.e. creating a vaccum which helps in extracting out the products of conception. But menstrual regulation is done within 6 weeks whereas, manual vaccum aspiration is a safe method uptil 12 weeks.

—William Obs 24/e, p 367

35. Ans. is b i.e. High probability of nonviable pregnancy but still repeat scan after 7 days to confirm

Ref. Williams 24/e, p 355

First Remember:

- G estational sac is visible by TVS at ≈ 4.5 weeks when BhCG is 1500 to 2000 mIu/ml
- Y olk sac is visible by TVS at ≈ 5.5 weeks when MSD (mean sac diameter) is 10 mm
- Embryo is visible by TVS at 5-6 weeks when MSD = 15-20 mm
- Fetal cardiac activity can be detected at 6-6.5 weeks with an embryonic length (CRL=) 1-5 mm and MSD of 13-18 mm.

Remember:

An **an embryonic** gestation is diagnosed when the mean gestational sac diameter measures ≥ 20 mm and no embryo is seen. Embryonic death is also diagnosed if an embryo measuring ≥ 10 mm has no cardiac activity. So in the question – MSD is 28 mm and CRL 8 mm and still no cardiac activity or fetal pole is visible. It has to be a nonviable pregnancy.

In this case whether we should perform immediate MTP or repeat scan after 7 days is suggested by High Risk Pregnancy 4/e, p 108.

- If fetal pole is not seen and MSD ≥ 25 mm then there is high probability of a non viable pregnancy. Repeat scan with another examiner or after 7 days to confirm.
- If fetal pole is seen then measure CRL. If CRL ≥ 7 mm there is high probability of nonviable pregnancy. Repeat scan should be done after 7 days to confirm.

36. Ans. is a i.e. Diameter of cannula in mm

Karman cannula

A long tubular structure made of plastic or metal.

- *Types:* Rigid or flexible
- *Sizes:* 4–12 mm
- Parts
  - *Distal end:* Double whistle at the terminal end.
  - *Proximal end:* Fixes into syringe.
  - Superior overhanging edge acts as a curette.

The number of cannula corresponds to diameter of cannula in millimeters. A plastic cannula is preferred because it is less traumatic, transparent and disposable.

37. Ans. is b i.e. Haywood Smiths ovum forceps

Haywood Smiths ovum forceps

Designed by Haywood Smiths.

Parts

Blades

- Blades are spoon-shaped, fenestrated and have blunt ends
- Longitudinal fenestrations can hold good amount of tissue.

Lock

- It is absent.
- Anything held in blades is firmly caught but not nipped and so no crushing.

Ovum forceps is differentiated from sponge holding forceps by following points:

- It has no lock
- It has no serrations

Catch lock is absent so less chances of injury to intra-abdominal structures.

Uses

- Evacuation of products of conception in abortion and vesicular mole.
- Evacuation of products of conception in secondary PPH.

38. Ans. is a i.e 5 ng/ml; 20 ng/ml *Ref. Williams 24/e, p 355*

Serum progesterone concentration <5 ng/ml suggest a dying pregnancy and ≥ 20 ng/ml support the diagnosis of a healthy pregnancy.

39. Ans. is a i.e. Oxytocin *Ref Williams 24/e, p 370*

Both oxytocin and prostaglandin are good for mid trimester abortion. But if one has to be chosen- I would choose oxytocin as it is given in Williams–Read for yourself

"A 20 mg prostaglandin E_2 suppository placed in the posterior vaginal fornix is an effective means inducing a second trimester abortion. It is not more effective than high dose oxytocin and it causes more frequent side effects such as nausea, vomiting, fever and diarrhea." *Ref. Williams 24/e, p 370*

10

Ectopic Pregnancy

QUESTIONS

1. **Basanti, a 28 years aged female with a history of 6 weeks of amenorrhoea presents with pain in abdomen; USG shows fluid in pouch of douglas. Aspiration yields dark color blood that fails to clot. Most probable diagnosis is:** **[AI 01]**
   a. Ruptured ovarian cyst
   b. Ruptured ectopic pregnancy
   c. Red degeneration of fibroid
   d. Pelvic abscess

2. **A young woman with six weeks amenorrhoea presents with mass abdomen. USG shows empty uterus. Diagnosis is:** **[AI 01]**
   a. Ovarian cyst
   b. Ectopic pregnancy
   c. Complete abortion
   d. None of the above

3. **A woman presents with amenorrhoea of 2 months duration; lower abdominal pain, facial pallor, fainting and shock. Diagnosis is:** **[AI 01]**
   a. Ruptured ovarian cyst
   b. Ruptured ectopic pregnancy
   c. Threatened abortion
   d. Septic abortion

4. **A 21 years old girl with 8 weeks amenorrhoea, now comes in shock. The likely diagnosis is:** **[AI 00]**
   a. Ruptured ectopic pregnancy
   b. Incarcerated amnion
   c. Twisted ovarian cyst
   d. Threatened abortion

5. **Young lady presents with acute abdominal pain and history of 1½ months amenorrhoea, on USG examination there is collection of fluid in the pouch of douglas and empty gestational sac. Diagnosis is:** **[AIIMS Nov 01]**
   a. Ectopic pregnancy
   b. Pelvic hematocele
   c. Threatened abortion
   d. Twisted ovarian cyst

6. **Causes of ectopic pregnancy includes A/E:** **[PGI June 97]**
   a. IUCD
   b. Tubal ciliary damage
   c. Blighted ovum
   d. Late fertilization

7. **True about tubal pregnancy:** **[PGI Dec 09, June 09, 07]**
   a. Prior h/o tubal surgery
   b. Prior tubal pregnancy
   c. Prior h/o PID/Chlamydia infection
   d. IUCD predisposes
   e. OCP predisposes

8. **Ectopic pregnancy is most commonly associated with:** **[PGI Dec 01]**
   a. Endometriosis
   b. Congenital tubal anomalies
   c. Tuberculosis
   d. Tubal inflammatory diseases
   e. Retroverted uterus

9. **Most common symptom present in undisturbed ectopic:** **[PGI June 98]**
   a. Pain in lower abdomen
   b. Amenorrhea
   c. Bleeding P/V
   d. Fainting attack

10. **Most common manifestation of ectopic pregnancy is:** **[PGI June 97]**
    a. Vomiting
    b. Bleeding
    c. Pain abdomen
    d. Shock

11. **In which part of fallopian tube ectopic pregnancy will have longest survival:** **[AIIMS Nov 01]**
    a. Isthmus
    b. Ampulla
    c. Cornua
    d. Interstitium

12. The cause of fetal death in ectopic pregnancy is postulated as: **[AIIMS May 08]**
a. Vascular accident
b. Nutritional adequacy
c. Endocrine insufficiency
d. Immune response to mother

13. In ectopic pregnancy decidua is shed as: **[AI 98]**
a. Decidua vera b. Decidua basalis
c. Decidua capsularis d. Decidua rubra

14. Modern diagnostic aid to diagnose ectopic pregnancy: **[PGI June 06]**
a. hCG b. Transvaginal USG
c. AFP d. Gravindex

15. Most important investigation for ectopic pregnancy: **[PGI May 2013]**
a. TVS b. Serial β-hCG levels
c. Doppler USG d. Progesterone
e. Culdocentesis

16. Most valuable diagnostic test in case of suspected ectopic pregnancy: **[AIIMS Nov 09, May 08]**
a. Serial β-hCG revels
b. Transvaginal USG
c. Progesterone measurement
d. Culdocentesis

17. True statement regarding ectopic pregnancy: **[PGI Nov 2012]**
a. Serum progesterone >25 ng/ml exclude ectopic
b. β-hCG levels should be >1000 mIU/ml for earliest detection by TVS
c. β-hCG levels should be <1000 mIU/ml for earliest detection by TVS
d. Methotrexate is used for treatment
e. β-hCG double in 48 hours

18. True about ectopic pregnancy: **[PGI June 08]**
a. Transvaginal USG-first imaging test of choice
b. Associated with decidual reaction
c. Doppler is of no significance
d. In ectopic interstitial ring sign is seen
e. hCG level is sufficient for diagnosis

19. About ectopic pregnancy true statements are:
a. Rising titre of hCG **[PGI Dec 03]**
b. Negative pregnancy test excludes the diagnosis
c. Common after tubal surgery
d. Seen in patients taking GnRH therapy
e. Common in patients taking OCP

20. Drugs used for treatment of ectopic pregnancy are: **[PGI June 03]**
a. MTX b. Actinomycin-D
c. hCG d. RU-486
e. KCl

21. Which of the following drug is not used for medical management of ectopic pregnancy? **[AIIMS Nov 03]**
a. Potassium chloride b. Methotrexate
c. Actinomycin D d. Misoprostol

22. In which of the following conditions, the medical treatment of ectopic pregnancy is contraindicated:
a. Sac size is 3 cm **[AIIMS May 04]**
b. Blood in pelvis is 70 ml
c. Presence of fetal heart activity
d. Previous ectopic pregnancy

23. Indications of medical managemnt in ectopic pregnancy: **[PGI June 07]**
a. Presence of fetal heart activity
b. Size <4 cm
c. Gestation <6 weeks
d. α-hCG >1500
e. β-hCG <15000

24. A hemodynamically stable nulliparous patient with ectopic pregnancy has adnexal mass of 2.5 x 3 cm and Beta hCG titer of 1500 miu/ml. What modality of treatment is suitable for her? **[AI 03]**
a. Conservative management
b. Medical management
c. Laparoscopic surgery
d. Laparotomy

25. A female has history of 6 weeks amenorrhea, USG shows empty sac, serum β-hCG 6500 IU/L. What would be next management? **[AIIMS Nov 08]**
a. Medical management
b. Repeat hCG after 48 hours
c. Repeat hCG after 1 weeks
d. Surgical management

26. A 20 years old woman has been brought to casualty with BP 70/40 mm Hg, pulse rate 120/min. and a positive urine pregnancy test. She should be managed by: **[AIIMS Nov 02]**
a. Immediate laparotomy
b. Laparoscopy
c. Culdocentesis
d. Resuscitation and medical management

27. Which of the following treatment is not done in ectopic pregnancy? **[AI 98]**
a. Salpingectomy
b. Salpingo-oophorectomy
c. Salpingostomy
d. Resection of involved segment

28. In a nulliparous woman, the treatment of choice in ruptured ectopic pregnancy is: **[PGI June 00]**
a. Salpingectomy and end to end anastomosis
b. Salpingo-oophorectomy
c. Wait and watch
d. Linear salpingostomy

29. Management of unruptured tubal pregnancy includes: **[PGI Nov 2010]**
a. Methotrexate
b. Prostaglandins
c. Hysterectomy
d. Laparoscopic salpingostomy
e. Salpingectomy

30. Not true about ectopic pregnancy: **[PGI Nov 2010]**
a. Previous ectopic is greatest risk
b. Pregesterone only pills doesn't increase risk
c. Increased risk with pelvic infections
d. Increased risk with IVF
e. IUCD use increases the risk

31. True statement regarding ectopic pregnancy:
a. Pregnancy test positive **[PGI May 2010]**
b. hCG levels should be >1000 mIU/ml for earliest detection of gestational sac by TVS
c. hCG levels should be <1000 mIU/ml for earliest detection of gestational sac by TVS
d. Methotrexate is used

32. A female presents with 8 weeks amenorrhea with pain left lower abdomen. On USG, there was thick endometrium with mass in lateral adnexa. Most probable diagnosis: **[AIIMS Nov 2012]**
a. Ectopic pregnancy
b. Torsion of dermoid cyst
c. Tubo-ovarian mass
d. Hydrosalpinx

33. Test not useful in case of tubal pregnancy:
a. Pelvic examination **[AIIMS Nov 2012]**
b. USG
c. hCG
d. Hysterosalpingography

34. Arias stella reaction is not seen in: **[New Pattern Question]**
a. Ovarian pregnancy
b. Molar pregnancy
c. Interstitial pregnancy
d. Salpingitis isthmica nodosa

35. What is the treatment of choice of unruptured tubal pergnancy with serum β-hCG titre 2000 IU/ml: **[New Pattern Question]**
a. Single dose of methotrexate
b. Vairable dose of methotrexate
c. Expectant management
d. Laparoscopic salpingostomy

36. Diagnostic criteria for primary abdominal pregnancy: **[New Pattern Question]**
a. Spigelberg criteria
b. Rubin's criteria
c. Studiford criteria
d. Wrigly criteria

37. Angular pregnancy refers to: **[New Pattern Question]**
a. Ectopic pregnancy of interstitial part of FT
b. Intrauterine pregnancy
c. Heterotopic pregnancy
d. Ectopic pregnancy of broad ligament

EXPLANATIONS & REFERENCES

1. Ans. is b i.e. Ruptured ectopic pregnancy *Ref. Dutta Obs. 7/e, p 182; Williams Obs. 22/e, p 258, 259, 23/e, p 242, 243*

The picture given in the question classically represents a case of ruptured ectopics pregnancy.

Symptoms – In Ectopic pregnancy triad of:

- Amenorrhea *(seen in 75% cases)* followed by:
- Abdominal pain *(seen in 100% cases, it is the most consistent symptom of ectopic pregnancy).*
- Appearance of vaginal bleeding are seen:
- The above triad may be accompanied by nausea, vomiting, fainting attacks or syncope.
- Patient may present in shock with pallor, tachycardia, hypotension and cold clammy extremities, if ectopic pregnancy has ruptured

Examination:

- General examination: In case of rupture—
  - P/R ↑
  - Pallor +nt
  - BP ↓
  - Slight intermittent pyrexia due to absorption of products of degeneration.
- Per Abdomen - Abdomen is tense, tender and distended.
  - Shifting dullness may be present (depending on the amount of hemorrhage in ruptured ectopic).
  - Rigidity/muscle guarding +/–,
  - Cullen's sign - bluish discolouration around the umbilicus may be present.
- ***On Bimanual examination***
  - Vaginal mucosa appears blanched.♀
  - Uterus: normal size/slightly bulky.
  - Extreme tenderness on cervical movement
  - Fornices-tender (***Remember -*** tenderness in pelvis is the most constant sign of Ectopic pregnancy).
  - U/L adnexal mass: is palpable in one third to half of patient.

Culdocentesis:

- It is a simple technique used to identify hemoperitoneum.
- Fluid is aspirated from cul-de-sac via posterior fornix with the help of a needle.
- If non clotting blood is obtained, it is indicative of an intraperitoneal bleed and probably a ruptured ectopic.

Note: If the aspirated blood clots, it may have been obtained from an adjacent blood vessel rather than from bleeding ectopic pregnancy.

The women in the question is presenting with amenorrhea of 6 weeks and pain in abdomen.

On USG - fluid is seen in POD and aspiration of dark coloured blood which fails to clot - all these features leave no doubt of ectopic pregnancy.

"Sonographic absence of uterine pregnancy, a positive pregnancy test (β -hCG), fluid in cul-de-sac and an abnormal pelvic mass, ectopic pregnancy is almost certain." *—Williams Obs. 22/e p 259*

Also know = D/D of fluid in POD:

1. Mid cycle 2. PID 3. Tubal abortion (ectopic)

2. Ans. is b i.e. Ectopic pregnancy *Ref. Dutta Obs 7/e p 182, 183; Shaw 14/e, p 244, 245*

Well friends—a young woman presenting with 6 weeks of amenorrhea and USG showing empty uterus could either mean it is an ectopic pregnancy or abortion. In abortion – patient will give history of bleeding, pain but mass in abdomen does not favour it.

3. Ans. is b i.e. Ruptured ectopic pregnancy *Ref. Dutta Obs 7/e, p 182*

4. Ans. is a i.e. Ruptured ectopic pregnancy *Ref. Dutta Obs. 7/e, p 182*

Always remember: *History of acute abdominal catastrophe with fainting attack and collapse i.e. shock following short period of amenorrhea, in a woman of child bearing age always points towards ectopic pregnancy (ruptured) and no other diagnosis.*

5. Ans. is a i.e. Ectopic pregnancy *Ref. Dutta Obs. 7/e, p 182, 183*

Young lady presenting with history of:
- Amenorrhea
- Abdominal pain

On USG:
- Collection of fluid in pouch of douglas
- Empty gestational sac

Indicate:
- Ectopic pregnancy

Also Know:

USG findings in case of ectopic pregnancy:
- Transvaginal/ultrasound is the investigation most commonly done to diagnose ectopic pregnancy.Q

Diagnostic features are: *—Dutta Obs. 6/e, p 186*
- Absence of intrauterine pregnancy with positive pregnancy test.Q
- Fluid in the pouch of Douglas (Cul-de-sac).Q
- Adnexal mass clearly separated from the ovary.Q
- Gestational sac in the adnexa surrounded by a hyperechoic ring (Bagel sign/ tubal ring sign).
- Rarely cardiac motion may be seen in an unruptured tubal ectopic pregnancy.

Sometimes: In more advanced ectopics, decidual sloughing with resultant intracavitary fluid or blood may create a so called *"pseudogestational sac",* a small and irregular structure that may be confused with an intrauterine gestation.

In such a case - true and pseudogestational sac can be differentiated by:

True gestational sac	Pseudo gestational sac	
• Location within the uterus	Eccentric	Central
• Shape	Round and regular in outline	Irregular
• Double ring sign due to chorion	Present	Absent
• Identification of structures: yolk sac, fetal pole	Present	Absent
• Increase in sac size	1 mm/day	Absent

USG + β–hCG: When USG findings are combined with β-hCG values: it gives a greater accuracy for diagnosing ectopic pregnancy.
- An intrauterine sac should be visible by transvaginal ultrasound when the β HCG level is approximately 1500-2000IU/L and by transabdominal ultrasound approximately 1 week later, when the β-HCG level is 6000–6500 mIU/ml. If empty uterine cavity is seen with a β-hCG titer above this threshold, an ectopic pregnancy should be suspected.

6. Ans. is c and d i.e. Blighted ovum; and Late fertilisation *Ref. Dutta Obs 7/e, p 178*

7. Ans. is a, b, c and d i.e. Prior h/o tubal surgery; Prior tubal pregnancy; Prior h/o PID/Chlamydia infection and IUCD predisposes *Ref. Dutta Obs. 7/e, p 178; Novak 14/e, p 605-608; Williams Obs. 22/e, p 254, 23/e, p 239*

Risk factors for ectopic pregnancy

Highest risk: Previous H/O ectopic pregnancy (Recurrence rate after 1 ectopic pregnancy is 15%)
- Tubal surgeries (for prior tubal pregnancy or recanalization surgery)
- **M/C Risk factor-Pelvic infections/*present salpingitis prior STD***
- **Peritubal adhesions subsequent to salpingitis, appendicitis or endometriosis**
- Salpingitis isthmica nodosa. (it is a noninflammatory condition in which tubal epithelium forms a diverticulum in the myosalpinx – in which fertilized ova can lodge)
- Developmental defects of the tube
- In utero DES exposure.
- Infertility treatments: – IVF
  – Ovulation induction using clomiphene and gonadotropin.

- Current cigarette smoking (> 20 cigarettes per day).
- Contraception use:

According to Williams obs 24/e

- With any form of contraceptive, the absolute number of ectopic pregnancies is decreased because pregnancy occurs less often. However with some contraceptive failures, the relative number of ectopic pregnancies is increased.
- Examples include tubal sterilization > Progestasert > Mirena > CUT > progesterone only pill.
- Least risk is with OCPs

8. Ans. is d i.e. Tubal inflammatory disease

Ref. Dutta Obs. 7/e, p 178; Shaw 14/e, p 239; Williams Obs. 22/e, p 254, 23/e, p 239

Read the question carefully, it says ectopic pregnancy is most commonly associated with:

"Pelvic inflammatory disease (PID) increases the risk of ectopic pregnancy by 6-10 fold." *—Dutta Obs. 7/e, p 178*

"The most common cause (of ectopic pregnancy) is previous salpingitis due to sexually transmitted disease such as gonococcal and chlamydial infection or salpingitis that follows septic abortion and puerperal sepsis."

—Shaw 14/e, p 239

- After one episode of PID – 13%
- After two episode of PID – 35%
- After three episode of PID – 75%

Note: M/C cause of ectopic pregnancy is PID but Maximum risk of ectopic pregnany is after tubal damage, either due to previous ectopic pregnancy or tubal surgery amongst which previous ectopic is more common.

"Prior tubal damage either; from a previous ectopic pregnancy or from tubal surgery to relieve infertility or for sterilization confers the highest risk for ectopic pregnancy." *—Williams Obs 23/e, p 238*

9. Ans. is a i.e. Pain in lower abdomen *Ref. Dutta Obs 7/e, p 180*

10. Ans. is c i.e. Pain in abdomen *Ref. Dutta Obs. 7/e, p 180; Shaw 14/e, p 244*

- Most common and the most consistent symptom of ectopic pregnancy (undisturbed) is *Abdominal pain.*
- It is seen in 95-100% cases.
- Pain is located in the lower abdomen/pelvic region.
- It can be *unilateral* or *bilateral.*
- *In case of ruptured ectopic pregnancy: pain is due to hemoperitoneum and* when internal hemorrhage floods the peritoneal cavity and irritates the undersurface of diaphragm and phrenic nerve, the patient also complains of shoulder tip and epigastric pain.
- In case of unruptured ectopic pain is due to stretching of Fallopian tube.

11. Ans, is d i.e. Interstitium *Ref. Dutta Obs. 7/e, p 179; CODGT 10/e, p 267*

- M.C site of ectopic pregnancy – Fallopian tubes[Q].
- In Fallopian Tubes – M/C sites in descending order are:

Ampulla > mus > infundibulum > interstitium

- Rarest overall site of ectopic pregnancy is cervix or cesarean section scan
- Average period of survival of ectopic pregnancy is 8 weeks.
- Ectopic pregnancy survives for longest time in its annual pregnancy.

12. Ans. is a i.e. Vascular accident *Ref. Williams Gynae 1/e, p 158*

- Ectopic pregnancy is the leading casue of early pregnancy related deaths.
- Most common casue of death in ectopic pregnancy is tubal rupture → severe hemorrhage → death.

Ectopic pregnancy can have 2 outcomes:

1. Tubal abortion – M/C outcome. Most common outcome income–ectopic pregnancy in ampulla end by Tubal abortion
2. Tubal rupture–ectopic pregnancy of isthmus are the ones which usually rupture.

13. Ans. is a i.e. Decidua vera *Ref. Shaw 14/e, p 244*

Decidua vera is the parietal layer of decidua, that lines most of the uterine cavity.

In ectopic pregnancy
⇓
Under the hormonal influence of
Progesterone and estrogen
⇓
Uterine endometrium is converted to
⇓
Decidua (similar to Intrauterine pregnancy)
⇓
When the ectopic is interrupted
Levels of progesterone and estrogen decrease
⇓
Withdrawal of support to uterine endometrium
⇓
Endometrium (decidua) Shed off in the form of
⇓
Decidual cast

- The passage of decidual cast is pathognomic of ectopic pregnancy.[Q]
- Chorionic villi are characteristically absent in the decidua.[Q]
- The presence of chorionic villi in the cast however rules out ectopic pregnancy and denotes uterine pregnancy.

Also know:

Arias stella Reaction is characterised by typical adenomatous changes of the endometrial glands seen under the influence of progesterone.

"It is not specific for ectopic pregnancy but rather indicates the blightening conceptus, either interauterine or extrauterine." *—Dutta Obs 6/e, p 183*

14. Ans. is a and b i.e. hCG; and Transvaginal USG *Ref. Dutta Obs 7/e, p 182, 183*

15. Ans. a and b i.e. TVS and Serial β-hCG levels *Ref. Dutta Obs. 7/e, p 182, 183; Leon Speroff 7/e, p 1280-1285; Novak 14/e, p 611; Williams Gynae, p 162-163*

Diagnostic Aids in Ectopic Pregnancy

In hemodynamically stable patient presenting with a triad of amenorrhea, abdominal pain and vaginal bleeding

↓

1st Test: UPT (+ve in 90% cases of ectopic)

↓

TVS (IOC)

↓

Supportive Investigations:
- Doppler USG
- B-hCG levels
- S. progesterone levels
- Culdocentesis

↓

Gold Standard: Laparoscopy

16. Ans. is b i.e. Transvaginal USG *Ref. Dutta Obs. 7/e, p 182, 183; Williams Gynae 1/e, p 162, 163; Novak 14/e, p 611; Williams Obs. 22/e, p 259, 23/e, p 242, 43*

"As explained earlier transvaginal ultrasound is the best available diagnostic modality for diagnosing ectopic

pregnancy. Vaginal sonography yields correct pre-operative diagnosis of ectopic pergnancy in 91% cases. It decreases the need for diagnostic laproscopy or curettage or both to etablish the diagnosis of ectopic pregnancy"
—Williams Gynae 1/e, p 163

"Vaginal sonography has become the imaging method of choice." *—Williams Obs. 22/e, p 259*

17. Ans. is a, b and d i.e. Serum progesterone >25 ng/ml exclude ectopic, β-hCG levels should be >1000 mIU/ml for earliest detection by TVS and Methotrexate is used for treatment *Ref. Dutta Obs. 7/e, p 182*

"Serum progesterone—Level greater than 25 ng/ml is suggestive of viable intrauterine pregnancy whereas level less than 5 ng/ml suggests an ectopic or abnormal intrauterine pregnancy." *—Dutta Obs 7/e, p 183*

So option a is correct

"The lowest level of serum β-hCG at which a gestational sac is consistently visible using TVS (discriminatory zone) is 1500 IU/L. The corresponding value of serum β-hCG for TAS is 6000 IU/L. When the β-hCG value is greater than 1500 IU/L and there is an empty uterine cavity, ectopic pregnancy is more likely."

So options c is absolutely incorrect, option d can be taken as partial correct\

Methotrexate is the drug of choice for medical management of ectopic pregnancy i.e. option d is correct

"Estimation of β-hCG in ectopic pregnancy: Urine pregnancy test—ELISA is sensitive to 10-50 mIU/ml and are positive in 95% of ectopic pregnancies. A single estimation of β-hCG level either in the serum or in urine confirms pregnancy but cannot determine its location. The suspicious findings are: (1) Lower concentration of β-hCG compared to normal intrauterine pregnancy (2) Doubling time in plasma fails to occur in 2 days."

So option e is incorrect *—Dutta Obs 7/e, p 183*

18. Ans. is a, b and d i.e. Transvaginal USG is the imaging of choice; Associated with decidual reaction; and In ectopic interstitial ring sign seen *Ref. Dutta Obs. 7/e, p 183; Shaw 14/e, p 247*

- In ectopic pregnancy under the influence of estrogen, progesterone and chorionic gonadotrophin, there is varying amount of enlargement of the uterus with increased vascularity. Decidua develops all the characteristics of intra-uterine pregnancy except that it contains no evidence of chorionic villi. **This is called decidual reaction. (i.e. option b is correct)**
- TVS is the imaging modality of choice in ectopic pregnancy.
- Color Doppler sonography can identify the placental shape (ring of fire pattern) and blood flow pattern outside the urine cavity. It is used to diagnose those cases of ectopic pregnancy which cannot be identified by TVS **(i.e. option c is incorrect).**
- USG findings in ectopic pregnnacy include demosntration of an extra uterine gestational sac appearing as fluid containing structure with an echogenic ring, "the tubal ring sign" **(i.e. option d is correct).**
- A single estimation of β-hCG level either in serum or in urine confirms pregnacy but can not determine its location **(i.e. option e is incorrect).** When the β-hCG value is greater than 1500 mIU/ml and there is an empty uterine cavity, ectopic pergnancy is more likely. Failure to double the value by 48 hours along with an empty uterus is very much suggestive.

19. Ans. is a, c and d i.e. Rising titre of hCG; Common after tubal surgery; and Seen in patients taking GnRH therapy *Ref. Dutta Obs. 7/e, p 178-182; Shaw 14/e, p 247 for 'b'; Leon Speroff 7/e, p 1278 for option 'e'*

Well friends we have already discussed risk factors for ectopic pregnancy in detail and seen that:

- Tubal surgery ***(option "c")***
- GnRH therapy ***(option "d")***

are risk factors for ectopic pregnancy.

As far as ***option "a"*** is concerned – In ectopic pregnancy- β HCG does not double in 48 hours as in intrauterine pregnancy but a slow rise in hCG is suggestive of ectopic pregnancy.

This is the reason why after performing D and C in cases where a non viable and ectopic pregnancy cannot be differentiated, β-HCG is estimated. If β-hCG levels continue to rise after D and C, ectopic pregnancy is confirmed.

Option "b": Negative pregnancy test excludes the diagnosis- *Shaw 14/e, p 247*

"A negative pregnancy test is of no value in ruling out an ectopic pregnancy."

Option "e": It is common in patients taking OCPs.

OCPs donot increase the risk of ectopic pregnancy.

"Amongst the most common methods of contraception, oral contraceptives and vasectomy are associated with the lowest absolute incidence of ectopic pregnancy." *Leon Speroff 7/e, p 1278*

20. Ans. is a, b, d and e i.e. MTX; Actinomycin-D; RU-486; and KCl *Ref. Dutta Obs. 7/e, p 186*

21. Ans. is d i.e. Misoprostol *Ref. Dutta Obs. 7/e, p 186; Shaw 14/e, p 251, Jeffcoates 7/e, p 154*

A number of chemotherapeutic drugs have been used either systemically or directly (surgically administered medical management - SAM under sonographic or laparoscopic guidance) for the medical management of ectopic pregnancy.

Drugs commonly used for medical management:

Mnemonic	Surgically administered medical management	Systemic
Most	**M**ethotrexate[Q] (20%)	Methotrexate (+ leucoverin)
Post	**P**rostaglandins[Q] (PGF 2α)	
Graduate	Hyperosmolar **G**lucose[Q]	
Males	**M**ifepristone (RU486)	
Are	**A**ctinomycin D[Q]	
Very	**V**asopressin[Q]	
Knowledgeable	**K**Cl (Potassium Chloride)	

Jeffcoates 7/e, p 154

22. Ans. is c i.e. Presence of fetal heart activity

Ref. Dutta Obs. 7/e, p 186; Leon Speroff 7/e, p 1287, 1288; Novak 14/e, p 624; Williams Gynae 1/e, p 166

Many questions are asked on Medical management of ectopic pregnancy. This particular question is one of the most controversial question. To clear all your doubts I am summarizing important points on medical management of ectopic pregnancy.

Medical management of ectopic pregnancy

- Drug most commonly used: Methotrexate[Q]

Methotrexate: It is a folic acid analogue which inhibits dehydrofolate reductase[Q] and prevents synthesis of DNA.[Q]

Candidates for methotrexate (Williams 24/e, p 384, Table 19.2): *—Leon Speroff 7/e, p 1290*

Absolute requirements

- Hemodynamic stability[Q]
- No evidence of acute intra-abdominal bleeding[Q]
- Reliable commitment to comply with required follow-up care[Q]
- No contraindications to treatment viz woman should not be breast feeding/renal/hepatic dysfunction.

Preferable requirements

- Absent or mild pain
- Serum beta hCG level less than 10,000 IU/L (best results seen with HCG < 2000 IU/L)[Q]. **It is the single best prognostic indicator of treatment success.**
- Absent embryonic heart activity[Q]
- Ectopic gestational mass less than 4 cm in diameter without cardiac activity and < 3.5 cm with cardiac activity[Q]

Friends, there is no doubt on this issue that presence of cardiac activity is a relative contraindication according to books like Williams Obs 23/e, Williams Gynae 1/ed and Leon Speroff 7/ed.

"Fetal cardiac activity – Although this is a relative contraindication to medical therapy, the admention is based on limited evidence." *—William Obs. 23/e, p 247*

"The presence of embryonic heart activity is not an absolute contraindication for medical management but the likelihood of failure and the risk of tubal rupture are substantially increased (therefore it is a relative contraindication)." *—Leon Speroff 7/e, p 1287*

***As far as* fluid in cul-de-sac is concerned:** Earlier, it was also considered a relative contraindication to medical treatment, but studies have shown that free peritoneal fluid can be seen in almost 40% of women with early unruptured ectopic pregnancy and so it's presence and absence does not accurately predict the success or failure of medical treatment.

Contraindications to methotrexate treatment: (Williams 24/e, p 384, Table 19.2)

- Breast feeding[Q]
- Immunodeficiency states[Q]
- Alcoholism or evidence of chronic liver disease (elevated transaminases)[Q]
- Renal disease (elevated serum creatinine)[Q]
- Hematological abnormalities (severe anemia, leukopenia or thrombocytopenia)[Q]
- Known sensitivity to methotrexate[Q]
- Active pulmonary disease[Q]
- Peptic ulcer disease.[Q]
- Evidence of tubal rupture

Also Know:

- Medical therapy fails in 5-10% cases.
- Until the ectopic pregnancy is resolved, sexual intercourse is prohibited, alcohol should be avoided, and folic acid supplements—including prenatal vitamins—should not be taken.

Single dose Medical treatment protocol for ectopic pregnancy

Day 0/Day I	=	Measure serum β-hCG, TLC, DLC, Liver Function Test and Renal Function Test
Day 2	=	Single dose Methotrexate 50 mg/m^2 IM given
Day 4	=	S. β-hCG and counts repeated
Day 7	=	S. β-hCG and counts repeated

Now if the decline in serum βhCG on Day 7 from day 4 is—

≥ 15%	< 15%/Fetal cardiac activity present
↓	↓
No further treatment is required βhCG levels are repeated weekly until detectable	Repeat methotrexate dose and begin new Day 1 ↓ Surgical treatment is indicated if β-hCG levels not decreasing or fetal cardiac activity persists after three doses of methotrexate

Surgically administered medical management:

- Methotrexate can also be administered by direct local injection (1 mg/kg) into an ectopic gestation sac under laparoscopic or ultrasonographic guidance.
- The method delivers a high concentration of the drug to the site of implantation
- Results with this therapy are inconsistent.
- Direct local injection is more invasive, more costly, and requires greater technical skills.
- With the above disadvantages, and no clear advantages, systemic methotrexate treatment is the more logical choice.

23. Ans. is b i.e. Size < 4cm *Ref. Dutta Obs. 7/e, p 186; Leon Speroff 7/e, p 1287, 1288; Novak 14/e, p 624 Williams Gynae 1/e, p 166, Williams Obs. 23/e, p 247.*

Repeat

24. Ans. is b i.e. Medical management *Ref. Dutta Obs. 7/e, p 186; Novak 14/e, p 620-624; Williams Obs. 24/e, p 387 , 23/e, 247, 248*

Management of Ectopic pregnancy:

Treatment modalities available with their indications

Expectant management

Only observation is done in hope of spontaneous resolution.

Indication:

- Decreasing serial β-HCG titres
- Tubal pregnancies only
- No evidence of intra-abdominal bleeding or rupture assessed by vaginal sonography
- Diameter of the ectopic mass< 3.5 cm (Preferably < 3 cm) *... Williams 24/e, p 387*

Medical management

- Using methotrexate
- Criteria:

Absolute requirements

- Hemodynamic stability
- No evidence of acute intra-abdominal bleeding
- Reliable commitment to comply
- No contraindications to treatment

Preferable requirements

- Absent or mild pain

Surgical management

- It is done in all those patients who ***do not fulfill the criteria laid down for medical management***
- It should be done in all cases of ***ruptured ectopic***

Surgical management:

Laparoscopy
In all hemodynamically stable patients, Laparoscopy is preferred

Laparotomy
Indications

- Patient is hemodynamically unstable pregnancy.
- Ruptured ectopic pregnancy

Contd...

Contd...

Treatment modalities available with their indications		
Expectant management	***Medical management***	***Surgical management***
Additional criteria: • Baseline hCG < 1000 IU/L and falling for best resutls ..... *Leon Speroff, p 1286; Jeffcoates, p 220. Best results are* obtained if β-hCG < 200 MIU/ml.	• Serum beta-hCG level less than 10,000 IU/L (best results seen with hCG < 2000 IU/L) • Absent embryonic heart activity • Ectopic gestational mass less than 4 cm in diameter. ... *Leon Speroff, p 1290*	• Extensive abdominal and pelvic adhesion making laparoscopy difficult • Cornual pregnancy/ interstitial pregnancy Abdominal/ovarian pregnancy.

Note: In expectant management–no treatment is given, patient is admitted & vitals are monitored. β-hCG levels are measured every 48 hours till they become 'N' (i.e. ≤ 5 Iv).

Coming on to the question:

The patient in the question is - Nulliparous.

Her general condition is stable, size of ectopic pregnancy is 2.5-3 cms. β-hCG levels are low, i.e. 1500 mIU/ml. All the criteria required for medical management are being fulfilled, therefore go for medical management.

The question now arises - why not expectant management, i.e. keep her under observation for spontaneous resolution. This is because of 2 reasons -

1. For expectant management, the most important criteria is "falling or decreasing levels of hCG, this important information is missing in this question.
2. More importantly - She is a nulliparous woman - We cannot take a chance of rupture of ectopic in her.

If medical and expectant managements are to be compared, medical management is always a better option.

"The potentially grave consequences of tubal rupture, coupled with the established safety of medical and surgical therapy, require that expectant therapy be undertaken only in appropriately selected and counseled women."

—Williams Obs. 22/e, p 265, 23/e, p 249

"Minimal side effects of methotrexate make it preferable to avoid the prolonged surveillance (of expectant management) and associated patient anxiety."

—Williams Gynae 1/e, p 169

25. Ans. is a i.e. Medical management *Ref. William Obs. 23/e, p 244, Williams Gynae 1/e, p 164*

Now, this is a tricky question.

Patient is presenting with–

- Amenorrhea of 6 weeks
- Absence of gestation at Sac in uterus.
- β-hCG levels 6500 MIU/ml

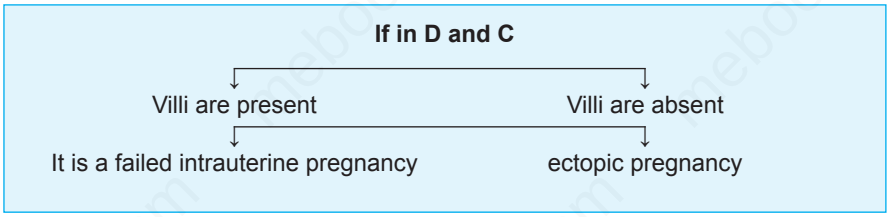
It is important to note that value of β-hCG is 6500 MIU/ml–much high above the discriminatory zone (1500 MIU/ml) and still gestational sac is not visualised.

So it could mean → Ectopic pregnancy
So it could mean → Failed intrauterine pregnancy

The diagnosis goes more in favour of ectopic pregnancy because values of β-hCG are very high – In case of failed intrauterine pregnancy – at this high level of β-hCG, either the dead fetus or the Yolk Sac etc. would have been visible (if the case was of missed abortion) or patient would have given history of bleeding and passage of product of conception (if it would have been a case of complete abortion → then only the gestational sac can be empty). But here is no such history.

So the chances of ectopic pregnancy are more.

To distinguish between the two – best is do a dilatation and curettage.



But since, this option is not given so I will directly do medical management in this case.
If there is any doubt – see the following flow chart given both in williams obs and gynae–which clearly shows– if the value of βhCG is more than the discriminatory zone then either a D and C should be done or ectopic should be managed straight away.

26. Ans. is a i.e. Immediate laparotomy *Ref. Dutta Obs. 7/e, p 184; Jeffcoates 7/e, p 152*

Patient is being brought to the casualty with - BP = 70/40mm, P/R = 120/min (i.e. she is in shock).
Her urine pregnancy test is positive i.e. she is a case of ruptured ectopic.

Remember a simple **FUNDA -**

Ectopic pregnancy	
Ruptured	**Unruptured**
Immediate laparotomy Should be done along with - general resuscitative measures Surgery of choice- Salpingectomy	Depending on the patient's condition and other criterias Expectant management Medical management Laparoscopy Laparotomy

Also Know:
Even in those cases where there is doubt of ruptured ectopic pregnancy - Laparotomy should be done to ***"open and see"***
"***Immediate laparotomy and clamping of the bleeding vessels may be the only means of saving the life of a moribund patient".***
—Jeffcoate 7/e, p 152

27. Ans. is b i.e. Salpingo-ophorectomy *Ref. Dutta Obs. 7/e, p 186; Shaw 14/e, p 249*

Surgical management of Ectopic pregnancy (laparoscopy or laparotomy)

Conservative surgery	Radical surgery
Salpingostomy: • It is the procedure of choice when the patient is hemodynamcially stable and wishes to retain her future fertility ***Salpingotomy:*** • Seldom done nowadays ***Segmental resection and anastomosis:*** • It is done in case of isthmic praegnancy. ***Fimbrial expression of the ectopic pregnancy:*** • Risk of recurrence of ectopic pregnancy are high therefore not commonly performed.	***Salpingectomy*** **Indications** **Ruptured ectopic** • The patient has completed her family, • The tubes are grossly damaged • Ectopic pregnancy has recurred in a tube already treated conservatively. • Uncontrolled bleeding • Sac size > 5 cm.

Salpingo-oophorectomy i.e. removal of tubes along with the ovaries is not recommended in young patients—
"Presently salpingo-oophorectomy is never recommended unless the ovary itself is grossly diseased or damaged".
—Jeffcoate 7/e, p 154
"The ipsilateral ovary and its vascular supply is preserved. Oophorectomy is done only if the ovary is damaged beyond salvage or is pathological".
—Dutta Obs. 6/e, p 188

Extra Edge:

Following surgical/medical management:

- Estimation of β-HCG should be done weekly till the values become less than 5 mIU/ml.
- Additional monitoring by TVS is preferred.
  This is done to rule out persistent ectopic pregnancy due to incomplete removal of trophoblast (in such a case single dose methotrexate 1 mg/kg should be given).

28. Ans. is a i.e. Salpingectomy and end to end anastomosis *Ref. Dutta Obs 7/e, p 185*

In the question the patient is presenting with ruptured ectopic pregnancy therefore surgical management is a must and we have to do laparotomy. (***option "c"*** ruled out)

Always remember- In ruptured ectopic , the tube is already damged so the only surgery which has to be done is Salpingectomy, whether the patient is a young /old or whether she is nulliparous or multiparous. Their is no role of Salpingostomy (i.e. ***option "d"*** ruled out). As discussed in previous question in case of ectopic pregnancy salpingo opherectomy is never done (i.e. ***option "b"*** ruled out).

29. Ans. is a, b and d i.e. Methotrexate, Prostaglandins, Laparoscopic and salpingostomy.
Ref. Dutta Obs. 7/e, p 185; Jeffcoates 7/e, p 154 for option b

Repeat

30. Ans. is b i.e. Progesterone only pills does not increase risk
Ref. Williams Gynae 1/e, p 160; Williams Obs. 23/e, p 238, 239

Repeat

31. Ans. is a, b and d i.e. Pregnancy test positive, HCG level should be > 1000 ml/U/ml for earliest detection of gestational sac by TVS, Methotrexate is used. *Ref. Dutta Obs, 7/e, p 182, 183, 186, 207, Williams Obs. p 242, 245.*

Lets see each option separately-

Option a-

"Urine pregnancy test - ELISA is sensitive to 10-50 MIU/ml and are positive in 95% of ectopic pregnancies."
—Dutta Obs. 7/e, p 182

"Current serum and urine pregnancy test that use enzyme - linked immunosorbent assays (ELISA) for -hcG are sensitive of levels of 10 to 20 MIU/ml and are positive in greater than 99% of ectopic pregnancies." *—Williams Obs. 23/e, p 242,*

Thus option 'a' is correct.

"The lowest level of serum hCG at which a gestation sac is consistently visible using TVS (discriminatory zone) is 1500 IU/L. the corresponding value of serum hCG for TAS is 6000 IU/L. When the hCG value is greater than 1500 IU/L and there is an empty uterine cavity, ectopic pregnancy is more likely". *Ref Dutta Obs. 7/e, p 183*

"A number of investigation have described discriminatory hCG levels above which failure to visualize a uterine pregnancy indicates with high reliability that pregnancy is not alive or ectopic. Banhart and colleagues (1994) reported that an empty uterus with serum hCG concentration 1500 MIU/ml was 100% accurate in excluding a live pregnancy.
Williams Obs. 23/e, p 244

Thus option 'b' is correct and option 'c' incorrect.

32. Ans. is a i.e. Ectopic pregnancy *Ref. William's Obstetrics 23/e, p 242, 243; Dutta Obs. 7/e, p 181*

A female **with 8 weeks amenorrhea** with **pain left lower abdomen** and on **USG, thick endometrium** with **mass in lateral adnexa** is suggestive of **ectopic pregnancy.**

33. Ans. is d i.e. Hysterosalpingography *Ref. Dutta Obs. 7/e, p 181*

HSG should never be done in a suspected case of ectopic coz, if by chance it is intrauterine pregnancy, you would be disrupting it.

34. Ans. is d i.e. Salpingitis isthmica nodosa *Ref. Novak 14/e, p 608*

Arias stella reaction

- Arias stella reaction is characterized by adenomatous change of the endometrial glands.
- There is intraluminal budding.
- Cells loose their polarity, have hyperchromatic nucleus, vacuolated cytoplasm and occasional mitosis.
- The reaction is seen in ectopic pregnancy *(in 10 – 15% cases)* and indicates blightening of conceptus either intra or extra uterine.

Arias Stella Reaction is not specific for ectopic pregnancy but for blightening of conceptus either intra uterine or extrauterine.

In the options given:

- Ovarian pregnancy
- Interstitial pregnancy

} Are examples of ectopic pregnancy and therefore Arias stella reaction will be seen in them.

Molar pregnancy will lead to blightening of ovum and therefore, Arias stella reaction may be seen.

Salpingitis isthmica nodosa: Salpingitis Isthmica Nodosa (SIN) is a noninflammatory pathologic condition of the tube in which tubal epithelium extends into the myosalpinx and forms a true diverticulum. This condition is found more often in the tubes of women with an ectopic pregnancy than in nonpregnant women. Whether tubal pregnancy is caused by SIN or whether the association is coincidental is unknown.

So by itself in SIN, Arias Stella Reaction is not seen. Only when SIN will lead to Ectopic pregnancy then Arias Stella Reaction will be seen.

35. Ans. is a i.e Single dose of methotrexate *Ref. Williams Gyane 1/e, p 166, 167*

The lady in the question is presenting with unruptured ectopic pregnancy with β-hCG levels - 2000 IU/L. So there is no doubt we can manage the patient medically (i.e. option d - ruled out)

Expectant management as explained earlier is not better than medical management as it carries a risk of rupture of ectopic pregnancy (i.e. option C ruled out) and also it is done when β-hCG levels are < 1000 IUL

Now - The question arises whether we should give single dose MTx or multidose methotrexate treatment. In the trials which have been conducted - No difference was found in treatment duration, β-hCG levels and side effects in single dose vs multidose methotrexate therapy.

Single dose therapy is more commonly used becasue of simplicity. It is less expensive, requires less invasive post therapy monitoring and does not require leucovorin supplementation.

One trial has shown that multidose therapy has greater chance of success than single dose but this is not supported by any other trial so, single dose methotrexate is being used commonly. (So, it is our option of choice.)

36. Ans. is c i.e. Studiford's criteria *Ref. Dutta Obs. 7/e, p 188*

Site of Ectopic pregnancy	Name of criteria	Detailed criteria	Management
Primary Abdominal Pregnancy	Studiford's criteria	Both the tubes and ovaries should be normal (without evidence of recent pregnancy). • Absence of uteroperitoneal fistula. • The pregnancy must be related exclusively to the peritoneal surface.	Surgical management
Ovarian Pregnancy	Spigelberg's criteria	• The tube on the affected site must be intact. • The gestational sac must occupy the position of ovary. • The gestational sac is connected to the uterus by ovarian ligament. • Definite ovarian tissue must be found in the sac wall.	Surgical management
Cervical Pregnancy	Rubin's criteria (Palmatic's criteria)	• The uterus is smaller than the surrounding distended cervix. • The internal os is not dilated. • Curettage of the endometrial cavity is nonproductive of placental tissue. • The external os opens earlier than in spontaneous abortion.	• Medical management if vitals are stable • Surgical management if vitals are unstable

37. Ans. is b i.e. Intrauterine pregnancy

Angular pregnancy is defined as a pregnancy implanted in one of the lateral angles of the uterine cavity.

Unlike an interstitial pregnancy, which implants in the intraneural part of fallopian tube, an angular pregnancy can progress to term.

11 Trophoblastic Diseases Including Choriocarcinoma

TROPHOBLASTIC DISEASE

Definition

Gestational Trophoblastic Disease (GTD) encompasses a spectrum of proliferative abnormalities of trophoblasts associated with pregnancy. Persistent GTD (persistently raised β–hCG) is referred as gestational trophoblastic neoplasia (GTN).

Classification

- **Conventional:**
  - Hydatidiform mole
  - Invasive mole
  - Choriocarcinoma
  - Placental dite trophoblastic tumor (PSTT).
- **Modified WHO classification (1998)**

Classification of GTD

- **Hydatidiform mole: – Complete – Partial**
- Invasive mole
- Placental site trophoblastic tumor
- Choriocarcinoma
  - Nonmetastatic disease (confined to the uterus)
  - **Metastatic disease:**

A. Low risk (good prognosis)
- Disease is present < 4 months duration
- Initial serum hCG level < 40,000 mIU/ml
- Metastasis limited to lung and vagina
- No prior chemotherapy
- No preceding term delivery

B. High risk (poor prognosis)
- Long duration of disease (> 4 months)
- Initial serum hCG > 40,000 mIU/ml
- Brain or liver metastasis
- Failure of prior chemotherapy
- Following term pregnancy
- WHO score ≥ 8

HYDATIDIFORM MOLE

- **Hydatidiform mole is a benign neoplasm of chorion with malignant potential.**
- It is the most common form of gestational trophoblastic disease.
- It is an abnormal condition of the placenta where there are partly degenerative and partly proliferative changes in the young chorionic villi.
- **Grossly:** It is characterised by multiple grape like vesicles filling and distending the uterus, usually in absence of an intact fetus. The vesicles are filled with interstitial fluid similar to ascitic or oedema fluid but is rich in hCG.
- Microscopically it is characterised by :
  - Marked proliferation of the syncytial and cytotrophoblastic epithelium.
  - Thinning of the stromal tissue due to hydropic degeneration (edema of villous stroma).
  - Avascular villi.
  - Maintenance of villus pattern.

Incidence and Risk Factors

- Incidence is maximum in Asia and South America and least in US.
- Maximum incidence is in Philippines (1 in 80). In India it is 1 in 400 pregnancies.
- Risk is more in women too elderly (> *35*) or too younger (< *18 years*).
- Low ***socioeconomic status.***
- ***History*** of molar pregnancy.
- ***Diet*** deficient in protein, folic acid and vitamin A.
- ***Blood group A*** *women* married to group *O men*.

Note: Maternal age > 35 years and dietary deficiencies are risk factors for complete mole whereas partial mole is linked to the use of oral contraceptive pills and history of irregular menstruation.

Also know

Familial repetitive hydatidiform mole has been linked to a missense mutation in the ***NLRP7*** **locus on chromosome 19;** in one report, this mutation was present in 60% of patients who had two molar pregnancies.

Partial Mole	Complete Mole
Karyotype Triploid: i.e Chromosome number is 69 (69 XXY or 69 XXX). The extra haploid set of chromosomes usually is derived from father.	• **D**iploid: (M/C= 46 XX (90%) in 10% – 46 XY or 45 xo). The chromosomes are entirely of paternal origin as an empty ova is fertilised by a single sperm. The chromosomal set of sperm undergoes duplication i.e how all chromosomes are of paternal origin (process **called as androgeniesis**). • In 80% a single sperm fertilises an empty ovum i.e mono-spermic. In 20% fertilisation is by 2 sperms i.e.dispermic.
Pathology:	
• Trophoblastic proliferation is less marked.	Extensive Trophoblastic proliferation
• Some villi are present.	• No villi formation
• Some blood vessels are present.	• No blood vessels
• Some fetal tissue is present (incompatible with life)	• No fetal tissue
Histopathological examination:	
• Trophoblastic inclusion body present.	Absent
• Scalloping of chorionic villi present.	Absent
Clinical features:	
• M/C presenting feature is bleeding per vagina following a period of amenorhea.	Same
• Passage of grape like vessels—less in partial mole.	More in complete mole
Examination:	
Ht of uterus equal to or less than the period of gestation.	Ht of uterus more than period of gestation.

Contd...

Contd...

Partial Mole	Complete Mole
Complications:	
• Thyrotoxicosis • Preeceampsia • Hyperemesis gravidarum • Preminary embolic leading to ARDS. } Less common	All complications are more common in complete mole.
IOC: USG	
• On USG partial mole is often confused with missed abortion.	It gives the typical **'snow storm'** appearance.
Gold standard for diagnosis:	
• Histopathological examination.	Histopathological examination.
hCG levels:	
• Raised but not markedly raised.	Markedly raised (≥ 10^5 mlu/ml)
Theca lutein cysts	
Not seen in ovary	B/L cysts, present in ovary.
Persistent Gestational Trophoblastic Disease or (GTN)	
Chances 3-5%	15-20%
Risk of choriocarcinoma= < 1%	4%

Note: Whenever hypertension (precelampsia occurs before 24 weeks, it is important to rule out. H. mole has on P/A palpation–uterus has doughy consistency).

Management of H. Mole

Spontaneous expulsion occurs at around 16 weeks and is rarey delayed beyond 28 weeks.

- **TOC in H. mole**
  - **Suction evacuation or curettage** (It is the treatment of choice irrespective of uterine size)
    Suction evacuation is done first. After most of the molar tissue has been removed by aspiration, oxytocin is given. Once the myometrium has contracted, thorough but gentle curettage with a large sharp curette (10–12 mm)[Q] is performed. Intraoperative ultrasonographic examination may help document that the uterine cavity has been emptied.
- **Hysterectomy: It is indicated only in case of:**
  - Female has completed her family irrespective of age
  - Age of patient - >35 years (as chances of malignancy are more).
  - Uncontrolled haemarrhage during scutum evacuation
- **Hysterotomy:** Indicated in cases complicated by haemorrhage.

Follow-up Molar Pregnancy

Routine follow-up is mandatory for all cases for at least 6 months following molar pregnancy. Doing hysterectomy dose not negate the need for follow-up.

First β-hCG level is obtained 48 after evacuation.

- Then monitor serum hCG levels every week till they become normal for three consecutive weeks.
- Once the hCG level falls to a normal level for 3 weeks, test the patient monthly for 6 months; then follow-up is discontinued and pregnancy allowed.
- During the 6 month surveillance period, patient is advised not to become pregnant.

Median time for resolution of partial mole is 7 weeks and for complete mole is 9 weeks.

Prophylactic Chemotherapy

Routine prophylactic chemotherapy is not advocated now days after evacuation of molar pregnancy (Williams 24/e, p 401).

Contraceptive Advice

- Estrogen-progestin contraceptives or depot medroxyprogesterone is usually used to prevent a subsequent pregnancy during the period of surveillance.

- Contraceptive of choice being combined oral pills.
- **Note:** Earlier the contraceptive of choice was Barrier method.
- Earlier patient was advised not to be pregnant for at least 1 year after H mole evacuation but now it is restricted to 6 months following a negative hCG titre.

Theca Lutein Cyst

- **Theca lutein cysts are seen in H. mole due to high circulating levels of hCG (seen in 25-60% cases of complete mole).**
- They vary in size from microscopic to 10 cm size.
- Yellow coloured.
- They are the result of overstimulation of lutein cysts by large amount of hCG.
- Theca lutein cyst are also seen in case of :
  - *Fetal hydrops*
  - *Placental hypertrophy*
  - *Multifetal pregnancy.*
- Theca lutein cyst regress spontaneously after suction evacuation and do not need any specific management.
- It may undergo torsion, infarction and hemorrhage, however oophorectomy is not recommended.
- Patients with theca lutein cysts of > 6 cm, have high risk of developing choriocarcinoma.

GESTATIONAL TROPHOBLASTIC NEOPLASIA

Introduction

- **Gestational trophoblastic neoplasia** includes invasive mole, choriocarcinoma, placental site trophoblastic tumor and epithelioid trophoblastic tumor.
- Gestational trophoblastic neoplasia almost always develops with or follows some form of pregnancy.
- Among all the cases of choriocarcinoma:
  - 50% develop following a hydatidiform mole
  - 25% develop following an abortion
  - 20% develop following a full-term pregnancy and
  - 5% develop following an ectopic pregnancy.

- Choriocarcinoma M/C develops after–molar pregnancy.
- High risk choriocarcinoma develops after = full term pregnancy.

Complete mole has 15–20% chances of developing GTN; partial mole has 3–5% chance of developing GTN.

Risk Factors

a. Age of female ≥ 40 years
b. β-hCG levels > 10^5 mIu/ml
c. Uterine size larger than gestational age
d. B/L Theca luter cyst > 6 cm
e. Slow decline in β-hCG levels

Criteria for diagnosis of postmolar gestational trophoblastic neoplasia.

Criteria for diagnosis of gestational trophoblastic neoplasia
1. When **4** consecutive hCG values are plateau D_1, D_7, D_{14}, D_{21} (± 10% of previous value)
2. **3** consecutive hCG values are rising (> 10% of previous value) D_1, D_7, D_{14}
3. β-hCG level remain above normal even after 6 months of evacuation
4. Histological criteria for choriocarcinoma

Clinical Features

- Patients present with continuous bleeding P/V even after evacuation.
- Uterine subinvolution.
- Invasive mole can lead to myometrium perforation and intraperitoneal haemorrhage.
- Persistence of theca lutein cysts.
- Metastasis- In choriocarcinoma M/C site of metastasis is lungs.

CHORIOCARCINOMA

- Most malignant tumor of uterus.[Q]
- MC mode of spread is ***hematogenous***
- **Most common sites of metastases in choriocarcinoma are:**
  Lung (80%) > Vagina (30%) > Pelvis (20%) > Liver (10%) and Brain (10%)
- **Symptoms:** Mostly presents as irregular bleeding or uterine hemorrhage following an abortion, a molar pregnancy or a normal delivery.

Metastasis

Lung Metastasis

- It is seen in 80% cases
- Patient presents with respiratory symptoms like dyspnoea, hemoptysis, chest pain, etc.
- On X-ray it may produce the following four patterns:
  - An alveolar **snow storm pattern**[Q] (Remember snowstorm appearance on USG– means H mole; snowstorm appearance on chest X-ray– means choriocarcinoma)
  - Discrete rounded densities or **canon ball appearance**[Q]
  - Pleural effusion[Q]
  - An embolic pattern caused by pulmonary arterial occlusion.[Q]

Vaginal Metastasis

- It is seen in 30% cases
- Metastasis occurs in suburethra[Q] or in fornices[Q]
- Metastasis appears as purple hemorrhagic projections which are highly vascular and bleed on touch (pathognomic of choriocarcinoma).

Tumor Markers

- Tumor marker for choriocarcinoma: β-hCG.
- Tumor marker for placental site trophoblastic tumor hPL.

Staging

FIGO anatomic staging for GTT	
Stage I	The lesion is confined to the uterus.
Stage II	The lesion spreads outside the uterus but within pelvis
Stage III	The lesion metastasizes to the lungs.
Stage IV	The lesion metastasizes to sites such as brain, liver or gastrointestinal tract.

WHO prognostic scoring system for gestational trophoblastic disease *Williams 24/e, p 402*

	Score			
Parameter	**0**	**1**	**2**	**3**
Age (y)	< 40	≥ 40	—	—
Antecedent pregnancy	Mole	Abortion	Term	—
Interval in months from index pregnancy and chemotherapy started within	<4 months	4-6 months	7-12 months	>12 months
Pretreatment β-hCG level	$<10^3$	10^3-10^4	10^4-10^5	$>10^5$
ABO group (female x male)		O or A,	A or AB	
Largest tumor (cm)	<3	3-4 cm	≥ 5	
Site of metastases	Lungs	Spleen, kidney	Gastrointestinal	Brain, Liver
Number of metastases	—	1-4	4-8	>8
Prior chemotherapy	—	—	Single	>2
Total score:				

Patients having a score of 6 or less are considered as having low risk or good prognosis and patient having a score of 7 or more are considered as having high risk or good prognosis.

In general a patient belonging to good prognosis or low risk group (score 0-6) means that they can be treated by a single agent chemotherapy which is usually successful in them, whereas a patient belonging to poor prognosis/ high risk group (score > 7) respond badly to chemotherapy and require prolonged hospitalization with multiple courses of chemotherapy.

Management

Chemotherapy

- Chemotherapy is the treatment of choice for choriocarcinoma
- **Methotrexate is the drug of choice.**
- In low risk patients-single drug, i.e. methotrexate is given.
- If the patient has **jaundice then actinomycin D** should be given.

Single Drug Regimen in Low-risk Cases			
Methotrexate	1–1.5 mg/kg	IM/IV	Days 1, 3, 5 and 7
Folinic acid	0.1–0.15 mg/kg	IM	Days 2, 4, 6 and 8

The course is to be repeated at interval of 7 days till hCG levels return to normal followed by 3 more cycles of Chemotherapy after the value normalises.

- In high risk patients, i.e. if score ≥ 7 and or Multidrug Chemotherapy is given. Multidrug therapy used most commonly is **Bagshaw regime** consisting of:

E = etoposide
M = methotrexate
A = actinomycin D
C = cyclophosphamide
O = vincristine (oncovin)

BAGSHAW REGIME

Radiation

Patients with **brain metastases** require whole-brain radiation therapy (3000 cGy over 10 days). Intrathecal high dose methotrexate may be administered to prevent hemorrhage and for tumor shrinkage.

Liver metastasis: Interventional radiology (hepatic artery ligation or embolization) or whole liver radiation (2000 cGy over 10 days) along with chemotherapy may be effective. Hepatic metastasis has a poor prognosis.

Prognosis

The cure rate is almost 100 percent in low risk and about 70 percent in high risk metastatic groups.

Follow up is mandatory for all patients in low risk patients: period of surveillance is 12 months and is high risk for 24 month. Serum hCG is measured weekly until it is negative for three consecutive weeks. Thereafter it is measured monthly for 6 months and then 6 monthly.

Recurrences

For non-metastatic GTN : 2–3 percent;
Good prognosis' metastatic disease : 3–5 percent and
Poor prognosis' disease : 21 percent.
Recurrence following 12 months of normal hCG level is < 1 percent.

PLACENTAL SITE TROPHOBLASTIC TUMOR (PSTT)

Characteristics of PSTT

- The tumor arises from the intermediate trophoblasts of the placental bed and is composed mainly of cytotrophoblastic cells.
- These tumors have been associated with modestly elevated serum β-hCG levels but they produce variant forms of β-hCG. In these tumors identification of a high proportion of free β-hCG (>30%) is considered diagnostic.
- hPL (human placental lactogen) is also a tumor marker for these tumors.
- Patient presents with vaginal bleeding.
- Local invasion into the myometrium and lymphatics occurs.
- PSTT is not responsive to chemotherapy. Hysterectomy is the preferred treatment.

QUESTIONS

1. **True about H. mole:** **[PGI Dec 03]**
   a. Complete mole seen in human only
   b. Trophoblastic proliferation
   c. Hydropic degeneration
   d. Villus pattern absent

2. **True about complete hydatidiform mole is:**
   a. Chromosome pattern is XX **[PGI Dec 01]**
   b. It is of maternal origin
   c. Enlarged ovarian cyst occurs
   d. It is common in developed countries
   e. Associated with preeclampsia

3. **Complete H. mole are:** **[PGI June 03]**
   a. Triploid b. Diploid
   c. Increased β-hCG
   d. 2% cases may convert to carcinoma
   e. Chance of malignant conversion less than partial mole

4. **False about partial mole:** **[AI 10]**
   a. Caused by triploidy
   b. Can be diagnosed very early by USG
   c. Can present as missed abortion
   d. Rarely causes persistent GTD

5. **The highest incidence of gestational tropho-blastic disease is in:** **[AI 05]**
   a. Australia b. Asia
   c. North America d. Western Europe

6. **Follow-up in a patient of H mole is done by:**
   a. Serum Beta-hCG monitoring **[AIIMS Feb 97]**
   b. Serum CEA level estimation
   c. Serum amylase level
   d. Serum α-fetoprotein estimation

7. **Snow storm appearance on USG is seen in:** **[AI 01; PGI Dec 03, PGI Nov 2010]**
   a. Hydatidiform mole b. Ectopic pregnancy
   c. Anencephaly d. None of the above

8. **True about H mole:** **[PGI June 08]**
   a. Always associated with raised uterine size for gestational age
   b. Raised hCG
   c. Hysterectomy in selected cases
   d. Chemotherapy is the treatment of choice
   e. Thyrotoxicosis rare

9. **Prophylactic chemotherapy is indicated after evacuation of H. mole in all, *except*:** **[AI 00]**
   a. Initial level of urine hCG is 40000 IU after 6 week of evacuation
   b. Increase in hCG titre 24000 IU after 10 week of evacuation
   c. Metastasis
   d. Nulliparous lady

10. **Indication of methotrexate in molar pregnancy:**
    a. Fetal heart activity present **[PGI June 09]**
    b. Theca lutein cysts size <4 cm
    c. β-hCG 4000 MIU/ml
    d. Evidence of metastasis
    e. Age 50 years

11. **Treatment of the lutein cyst in hydatiform mole is:**
    a. Ovarian cystectomy b. Ovariectomy **[AI 99]**
    c. Suction evacuation d. Ovariotomy

12. **A 40 years old P4+2 female has been diagnosed to have H. mole. The treatment would be:** **[AI 96]**
    a. Radiotherapy b. Chemotherapy
    c. Total hysterectomy d. Radiochemotherapy

13. **A case of Gestational trophoblastic neoplasia belongs to high risk group, if disease develops after:**
    a. Hydatidiform mole **[AI 03]**
    b. Full term pregnancy
    c. Spontaneous abortion
    d. Ectopic pregnancy

14. **In a case of vesicular mole all of following are high risk factors for the development of choriocarcinoma *except*:** **[AIIMS Nov 02]**
    a. Serum hCG levels > 100000 miu/ml
    b. Uterus size larger than 16 week
    c. Features of thyrotoxicosis
    d. Presence of bilateral theca lutein cysts of ovary

15. **Prognosis of gestational trophoblastic disease depends on all, *except*:** **[AI 00]**
    a. Number of living children
    b. Blood group
    c. Parity
    d. Previous hCG titre

16. **Bad prognostic markers of choriocarcinoma treatment are:** **[PGI June 04]**
    a. Liver metastasis b. Lung metastasis
    c. Previous H. mole d. High HCG titre
    e. Chemotherapy started 12 months after pregnancy

17. **A case of gestational trophoblastic neoplasia is detected to have lung metastasis. She should be staged as:** **[AIIMS May 04]**
    a. Stage – I b. Stage – II
    c. Stage – III d. Stage – IV

18. **Most common site for metastasis in choriocarcinoma is:** **[AI 07; 98]**
    a. Lungs b. Brain
    c. Liver d. Spine

19. **Choriocarcinoma commonly metastasize to:**
    a. Brain b. Lung **[PGI June 06]**
    c. Vagina d. Ovary
    e. Cervix

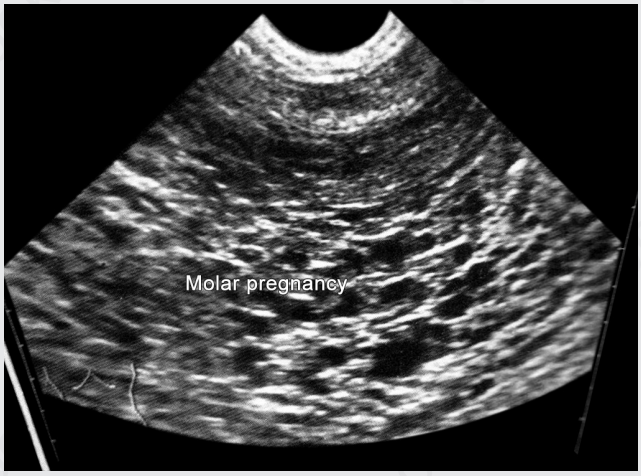
20. A 25 years old female was diagnosed to have choriocarcinoma, management is: [PGI June 06]
a. Chemotherapy
b. Radiotherapy
c. Hysterectomy
d. Hysterectomy and then radiotherapy

21. 35 years old female with choriocarcinoma treatment of choice is: [AIIMS June 00]
a. Dilatation and evacuation
b. Radiotherapy
c. Hysterectomy
d. Chemotherapy

22. The ideal treatment for metastatic choriocarcinoma in the lungs in a young women is: [PGI June 99]
a. Chemotherapy b. Surgery with radiation
c. Surgery d. Wait and watch

23. True about complete mole: [PGI Nov 2010]
a. Presence of foetal parts and cardiac activity
b. Normal uterine size
c. Beta-hCG doubling time is 7-10 days
d. Preeclampsia at <24 weeks
e. Per vaginal bleeding is commonest presentation

24. A 36-year-old G1P0 woman presents for her first prenatal visit late in her first trimester of pregnancy; she complains of persistent vaginal bleeding, nausea, and pelvic pain. Physical examination is notable for a gravid uterus larger than expected for gestational age. Fetal heart tones are absent. [New Pattern Question]



Which of the following is most likely to be true?
a. B hCG levels will be higher than normal
b. B hCG levels will be lower than normal
c. uterus will be of normal levels
d. TSH levels will be increased

25. Molar pregnancy is diagnosed in: [New Pattern Question]
a. I trimester b. II trimester
c. III trimester d. All of the above

26. Hydatidiform – mole is characterized histologically by: [New Pattern Question]
a. Hyaline membrane degeneration
b. Hydropic degeneration of the villous stroma
c. Nonproliferation of cytotrophoblast
d. Nonproliferation of syncytiotrophoblast

27. The advantages of hysterectomy in molar pregnancy are: [New Pattern Question]
a. Chance of choriocarcinoma becomes nil
b. Follow up is not required
c. Enlarged ovaries can be removed during operation
d. Chance of pulmonary embolisation is minimal

28. Hydatidiform mole is principally a disease of: [New Pattern Question]
a. Amnion b. Chorion
c. Uterus d. Decidua

29. Prophylactic chemotherapy in hydatidiform mole should preferably be given: [New Pattern Question]
a. Prior to evacuation as a routine
b. Following evacuation as a routine
c. Selected cases following evacuation
d. As a routine 6 weeks postevacuation

30. The following are related to prophylactic chemotherapy in molar pregnancy: [New Pattern Question]
a. It may be given in 'at risk' patients
b. Multiple agents are preferred
c. Malignant sequelae becomes nil
d. Follow-up is not required

31. Risk of recurrence of H mole in future pregnancy is: [New Pattern Question]
a. 1–4% b. 4–8%
c. 8–10% d. 10–12%

32. A female with H/O trophoblastic has _____% chances of developing trophoblastic disease in next pregnancy:
a. 2% b. 5%
c. 8–12% d. 15–20%

33. Percentage of complete moles progressing to persistent GTN: [New Pattern Question]
a. 1–4% b. 4–8%
c. 8–12% d. 15–20%

34. Choriocarcinoma is differentiated from invasive mole (chorioadenoma destruens) by: [New Pattern Question]
a. Presence of high titre of urinary chorionic gonadotrophin
b. Presence of cannon ball shadow in the lungs
c. Absence of villi structure on histological examination of the lesion
d. All of the above

35. The criteria for diagnosing GTN are all except: [New Pattern Question]
a. Persistently increasing β-hCG for 3 weeks
b. Plateau levels of β-hCG for 4 weeks
c. Theca lutein cyst ≥ 6 cm
d. Histological criteria for choriocarcinoma

EXPLANATIONS & REFERENCES

1. **Ans. is b and c i.e. Trophoblastic proliferation; and Hydropic degeneration** *Ref. Dutta Obs. 7/e, p 191*

H mole:

Microscopically: It is characterised by :

- Marked proliferation of the syncytial and cytotrophoblastic epithelium.
- Thinning of the stromal tissue due to hydropic degeneration (edema of villous stroma).
- Avascular villi.
- Maintenance of villus pattern.

Absence of villus pattern is characteristic of choriocarcinoma and not H mole:

2. **Ans. is a, c and e i.e. Chromosome pattern is XX; Enlarged ovarian cyst occurs; and Associated with preeclampsia** *Ref. Shaw 14/e, p 227; Dutta Obs. 7/e, p 191 - 193; Novak 14/e, p 1582 - 1584*

- The incidence of H. mole is maximum in oriental and south east countries (maximum incidence is in Philippines: 1 in 80 pregnancies) i.e., it is more common in developing countries *(**option 'd'** ruled out).*
- H. mole can be categorized as either complete or partial mole on the basis of Gross morphology, histopathology and karyotype.

Complete H. mole - shows no evidence of fetal tissue at all.

- Complete hydatiform moles exhibit characteristic swelling and trophoblastic hyperplasia.
- *Most common karyotype is 46XX (10% may have a 46XY karyotype).*
- The molar chromosomes are ***entirely of paternal origin,*** although mitochondrial DNA is of maternal origin.
- The complete moles arises from an ovum that has been fertilized by a haploid sperm, which then duplicates its own chromosomes called as *Androgenesis.* The ovum nucleus may be either absent or inactivated.

Theca lutein cysts in ovary and preeclampsia (Early onset) are seen in H mole

3. **Ans. is b, c, and d i.e. Diploid; Increased β-hCG; and 2% cases may convert to carcinoma** *Ref. Dutta Obs. 7/e, p 191, 198; William 24/e, p 397*

Differences between complete and partial mole

Features	Complete mole	Partial mole
Karyotype	46XX, (90%) or 46XY (10%) i.e. it is diploid	69 XXX or 69XXY i.e. it is triploid
Pathology		
• Diagnosis	Molar gestation	Missed abortion
• Embryo/fetus	Absent	Present
• Hydropic degeneration of villi	Pronounced and diffuse	Variable and focal
• Trophoblastic hyperplasia	Diffuse	Focal
• Fetal RBC	Absent	Present
• Scalloping of chorionic villi	Absent	Present
• Trophoblastic stromal inclusion	Absent	Present
Clinical features		
• Uterine size	Large for date	Small for date
• Theca lutein cysts	Common (25–30%)	Rare
• Medical complications	Common	Rare
• Initial β-hCG	Very high (>100,000 mIu/ml)	Slight increase (<100,000 mIu/ml)
• Persistent GTD	15–20%	3–5%
• Malignant potential	High (4%)	Low (1%)
• p57k1p2	Negative	Positive

4. Ans. is b i.e. Can be diagnosed very early by USG or d. Rarely causes GTD *Ref. Novac 14/e p 1587, 1588 Willams 23/e p 260, 263*

A. Patients with partial mole do not have dramatic clinical features of complete molar pregnancy. In general these patients have signs and symptoms of incomplete or missed abortion and on USG after they are confused with incomplete abortion.

B. Partial mole can cause GTN in 3–5% cases

C. Thus both, option d and b are incorrect, you can choose between the two.

> Presence of focal cystic spaces in the placental tissue and increase in the transverse diameter of the gestational sac has a positive predictive value of 90% for the diagnosis of partial mole.

Extra Edge

> The most significant recent development in the pathological analysis of H. mole is the use of **$P^{57}kip^2$** immunostaining to make a definitive diagnosis of androgenetic complete H. Mole as opposed to an hydropic abortion or a partial mole. **$P^{57}kip^2$** is a paternally imprinted gene, which is maternally expressed. The absence of maternal genes in androgenetic complete mole means that the gene cannot be expressed in a complete mole cytotrophoblast.
>
> Hence **p^{57} kip^2** staining is negative in complete mole in contrast to partial moles, hydropic abortion and normal placenta. This technique is well validated, easy and inexpensive to perform.

5. Ans. is b i.e. Asia *Ref. Shaw's 14/e, p 226; Devita 7/e, p 1360*

"Incidence of gestational trophoblastic disease varies widely with figures as high as 1 in 120 in some areas of Asia and South America, compared to 1 in 1200 in the united states." *—Devita 7/e, p 1360*

6. Ans. is a i.e. Serum Beta hCG monitoring *Ref. Dutta Obs. 7/e, p 195, 196; Novak 14/e, p 1590*

The chances of persistent trophoblastic disease and choriocarcinoma are high after evacuation of H. mole therefore regular follow-up is mandatory.

"After molar evacuation, patients should be monitored with weekly determinations of β-subunit hCG levels until these levels are normal for 3 consecutive weeks, followed by monthly determinations until the levels are nomrmal for 6 consecutive months. The average time to achieve the first normal hCG level after evacuation is about 9 weeks. At the completion of follow-up, pregnancy may be undertaken. After a patient achieves a nondetectable hCG level, the risk of developing tumour relapse is very low and may approach zero." *—Novak 14/e, p 1590*

7. Ans. is a i.e. Hydatidiform mole *Ref. Dutta Obs. 7/e, p 193; Shaw 14/e, p 230*

Ultrasound shows ***"Snow storm"*** appearance in the uterus: Diagnosis is H mole.

Chest X-ray shows snow storm appearance in lungs–Diagnosis choriocarcinoma.

8. Ans. is b, c and e i.e. Raised hCG; Hysterectomy in selected cases; and Thyrotoxicosis rare

Ref. Dutta Obs. 7/e, p 193 for a and b, 192 for e, 195 for c and 196 for d; COGDT 10/e, p 889

Lets have a look at each option separately -

Option 'a': Always asociated with raised uterine size for gestational age.

This statement is incorrect as :

"The size of the uterus is more than that expected for the period of amenorrhea in 70%, corresponds with the period of amenorrhea in 20% and smaller than the period of amenorrhea in 10%." *—Dutta Obs. 7/e, p 193*

Option 'b': Raised hCG -

H. mole is characterised by raised levels of hCG (levels > 10^5 MIU/ml) *—Dutta Obs. 7/e, p 193*

Option 'c': Hysterectomy in selected cases :

Management of H.mole :

- TOC in H. mole – Suction evacuation followed by gentle but thorough currettage.
- Hysterectomy – It is indicated only in case of :
  - Female has completed her family
- Hysterotomy – Indicated in cases complicated by haemorrhage.

So, ***option 'c'*** i.e. hysterectomy is done in selected cases is correct whereas ***option 'd'*** i.e. chemotherapy is the TOC is incorrect.

Option 'e':

As far as thyrotoxicosis is concerned :

It is seen in only 2% cases of H.mole. *It is rare (so, **option 'e'** is correct).*

"Clinically apparent thyrotoxicosis is unusual." *—William 23/e, p 260*

9. Ans. is d i.e. Nulliparous lady *Ref. Dutta Obs. 7/e, p 196*

10. Ans. is d and e i.e. Evidence of metastasis and age > 50 years

Ref. Dutta Obs. 7/e, p 200, 196; COGDT 10/e, p 890; Shaw 14/e, p 231

Protocol for management of H. mole

Investigations { USG, Serum Beta-hCG Levels, Chest X-ray }
↓
Suction evacuation/curettage
(it is the treatment of choice in molar pregnancy irrespective of uterine size)[9]
↓
Products of conception to be sent for histopathological examination
↓
Regular follow up using serum β-hCG

Prophylactic chemotherapy: Routine prophylactic chemotherapy is not advocated now at all. Earlier in the following conditions chemotherapy was given.

Conditions:

- Initial high levels of β-hCG (> 100,000 mIU/ml)
- Reelevation of serum hCG at 4–6 weeks or hCG values fail to come back to normal by stipulated true (10-12 weeks).
- Evidence of metastasis irrespective of hCG levels.
- Age of patient > 35 years.
- Theca lutein cyst ≥ 6 cm
- Post evacuation haemorrhage.

Drug used : Methotrexate/Actinomycin D is given for 5 days.

11. Ans. is c i.e. Suction evacuation *Ref. COGDT 10/e, p 889*

Management of theca lutein cysts:

Theca lutein cysts are seen in H. mole due to high circulating levels of hCG.

As such they donot need any separate treatment. Suction evacuation of H. mole results in diminishing hCG titre, which leads to spontaneous regression of theca lutein cysts.

"Because theca lutein cysts regress following suction evacuation, expectant management is preferred".

—William 24/e, p 398

12. Ans. is c i.e. Total hysterectomy *Ref. Dutta Obs. 7/e, p 195; COGDT 10/e, p 889, William Obs. 23/e, p 261, 24/e, p 401*

"If no further pregnancies are desired, hysterectomy may be preferred to suction curettage. It is a logical procedure in women aged 40 or older because atleast a third of these women will go on to develop gestational trophoblastic neoplasia."

—William Obs 23/e, p 261

Remember: Hysterectomy only decreases the chances of malignancy in cases of hydatidiform mole and does not eliminate the necessity of follow-up.

13. Ans. is b i.e. Full term pregnancy *Ref. COGDT 10/e, p 892, 893; Novak 14/e, p 1593, 1594*

Well friends, the question is specifically asking about high risk gestational trophoblastic disease.

***FIGO in 2000** devised a staging system for categorisation of gestational trophoblastic neoplasia into good prognostic (low risk) and bad prognostic (high risk) disease.*

Good prognosis (Low Risk)	Poor prognosis (High Risk)
– Short duration (< 4 months)	– Long duration (> 4 months)
– Serum β-hCG < 40,000 mIU/ml	– Serum β-hCG > 40,000 mIU/ml
– Metastasis limited to lung and vagina	– Metastasis to brain or liver
– No significant prior chemotherapy	– Unsuccessful prior chemotherapy
No preceeding term pregnancy	***Gestational trophoblastic neoplasia following term pregnancy.***

Also if we have a look at the WHO prognostic scoring system: GTN following a term prgnancy comes under high risk.

Remember:

- **High risk GTN** occus after term pregnancy.
- GTN occurs most commonly after H mole.

14. Ans. is c i.e. Features of thyrotoxicosis *Ref. William 24/e, p 401*

Risk factors for malignant change

- Complete mole (15–20% case)
- **Patient's age** ≥ 40
- **Serum hCG** ≥ 100,000 mIU/mL
- **Uterine size** ≥ large for gestational age
- **Thecaleutin cysts:** large (> 6 cm diameter)
- Slow decline in β-hCG

Sono graphic appearance of myometrial nodules or hypervascularity postevacuation is also a predictor of subsequent neoplasia.

From the above list it is clear that ***option "a"*** is correct.

Coming on to ***option "d"*** i.e. Presence of bilateral theca lutein cyst *Williams Obs. 23/e, p 259*

"***Montz and colleagues (1988) reported that gestational trophoblastic neoplasia was more likely in women with theca-lutein cysts, especially if bilateral." (i.e. option "d" is correct).***

*So that leaves us with 2 **options 'b'** and **'c'**. As far as uterine size larger than 16 weeks is concerned-*

According to Dutta p 197 – Size of uterus > 20 weeks is considered as a risk factor and not > 16 weeks, but according to other books excessive uterine enlargement is one of the risk factor- no specific size hasbeen mentioned.

As far as thyrotoxicosis is concerned I did not get any literature regarding, it being one of the risk factors.

So, ***option 'c'*** is the answer of choice.

15. Ans. is a i.e. Number of living children

16. Ans. is a, d and e i.e. Liver metastasis; High HCG titre; and Chemotherapy started 12 months after pregnancy *Ref. COGDT 10/e, p 892, 893; Novak 14/e, p 1593, 1594*

Again we are referring to the prognostic factors of GTN, i.e. scoring system and also to the prognosis proposed by FIGO., given in the preceeding text.

17. Ans. is c i.e. Stage III *Ref. COGDT 10/e, p 893*

Staging of Gestational trophoblastic disease:

Stage-I	Disease confined to uterus.
Stage-II	Disease extending outside of the uterus but limited to the genital structures (adnexa, vagina, broad ligaments).
Stage-III	Disease extending to the lungs, with or without known genital tract involvement.
Stage-IV	Disease at other metastatic sites viz brain, liver, kidney or gastrointestinal tract.

18. Ans. is a i.e. Lungs

19. Ans. is b and c i.e. Lungs and vagina *Ref. Shaw 14/e, p 233; Novak 14/e, p 1591, 1592; Williams Obs. 23/e, p 262*

Most common sites of metastases in choriocarcinoma are:

Lung (80%) > Vagina (30%) > Pelvis (20%) > Liver (10%) and Brain (10%)

20. Ans. is a i.e. Chemotherapy

21. Ans. is d i.e. Chemotherapy

22. Ans. is a i.e. Chemotherapy *Ref. Shaw 14/e, p 235; COGDT 10/e, p 892, 893*

"Unlike other malignant lesion, the treatment of choriocarcinoma is mainly chemotherapy, both for local and distant metastasis." *—Shaw 14/e, p 235*

23. Ans. is b, d and e i.e. Normal uterine size; preeclampsia at < 24 weeks and pervagina bleeding is the commonest presentation *Ref. Dutta Obs 7/e, p 193 for b, c and e Novak 14/e, p 1582, 1587*

Complete Mole – Is that variety of H. mole in which no evidence of fetal tissue is seen. (i.e. option a is incorrect)

M/C presenting symptom in H. mole is vaginal bleeding.

"Vaginal bleeding is the most-common symptom causing patient to seek treatment for complete mole pregnancy." Novak 14/e, p 1585 (i.e. option 'e' is correct)

Early onset preeclampsia – if features of precampsia are present in < 24 weeks, complete mole should always be suspected (i.e. option 'd' is correct)

– On P/A examination in molar pregnancy –size of the uterus in more than the expected period of amenorrhea in 70%,it corresponds with the period of amenorrhea in 20% and is smaller than the period of amenorrhea in 10% cases Thus normal size uterus may be seen in case of H. mole.

"Excessive uterine enlargement relative to gestational age is one of the classic signs signs of complete mole, although it is present in only about one half of the patients. —Novak 14/e, p 1585.

The clinical presentation of a complete mole has changed considerably over the past few decades.

"More than half of the patients diagnosed in the 1960's and 1970's had anemia and uterine size in excess of that predicted for gestational age. Complete moles, however, present infrequently today with these traditional signs and symptoms."

—Willimams Gynae 1/e, p757

So from above lines, it is clear that uterine size more than the period of amenorrhea, was earlier a more common and typical presentation of complete H. moles. These days more common picture is uterine size corresponding of the period of amenorrhea. Thus, I am including option 'b' in correct answers.

As far as hCG levels are concerned :

In case of molar pregnancy, levels of β-hCG are higher than that which are expected for that gestational age (due to trophoblastic proliferation), but the doubling time is same i.e. 1.4-2 days.

24. Ans. is a i.e β-hCG levels will be higher than normal

In the given question patient is presenting late in her first trimester of pregnancy with complains of persistent vaginal bleeding, nausea, and pelvic pain. Physical examination is notable for a gravid uterus larger than expected for gestational age. Fetal heart tones are absent.

D/D of height of uterus larger than the period of gestation:
• Wrong dates • Twin pregnancy • Molar pregnancy • Concealed variety of Abruptio placenta • Polyhydramnios.

– **Twin pregnancy** can be ruled out because it doenot explain persistent vaginal bleeding and moreover in twin/multiple pregnancy fetal heart tones are not absent…2 or more FHS are heard depending on the number of fetuses.

– Concealed variety of APH doesnot occur in late first trimester. APH by definition means any bleeding which occurs after 28 weeks of pregnancy and uptil the birth of the child and hence it can be ruled out although absent fetal tones and Fundal height more than the gestational age are seen.

– Polyhydramnios again can be ruled out since bleeding cannot be explained by it …so we are left with molar pregnancy which explaids all the findings.

Always remember: Patient complaining of extremes of nausea, vomiting + bleeding in first trimester+size of uterus more than the period of amenorrhea–think of Molar pregnancy.

The USG shown in the plate is typical snow storm appearance. Hence diagnosis is confirmed.

25. Ans. is a i.e. 1st trimester *Ref. COGDT 10/e, p 888*

In H. mole:

"Abnormal uterine bleeding usually during the first trimester is the most common presenting symptom, occuring in more than 90% of patients with molar pregnancies. Three fourths of these patient present prior to the end of the first trimester."

26. Ans. is b i.e. Hydropic degeneration of the villous stroma *Ref. Dutta Obs. 7/e, p 191*

Pathological features of H. mole :	Naked eye appearance
• Uterus is filled with multiple clusters of grape like cysts.Q • No trace of embryo/amniotic sac.	• Marked proliferation of synctio and cysto trophoblast • Marked thinning of stromal tissue due to hydropic degeneration. • Absence of blood vessels is villi.Q • Villous pattern is maintained.Q

27. Ans. is d i.e. Chances of pulmonary embolisation is minimal *Ref. Dutta Obs. 7/e, p 195*

- Hysterectomy when performed in molar pregnancy significantly decreases the chances of developing choriocarcinoma (by 5 fold times) but does not make it nil and hence follow up is required (so both options a and b are incorrect)

This is supported by following lines from Dutta-

"It should be remembered that following hysterectomy, persistent GTD is observed in 3–5% cases. As such, it does not eliminate the necessity of follow up.The enlarged ovaries (theca lutein cysts) found during operation should be left undisturbed as they will regress following removal of mole. But, if complication arises, like torsion, rupture or infarction, they should be removed." *—Dutta 7/e, p 195*

Thus from above lines it is also clear that ovaries even if they are enlarged should not be removed during hysterectomy for h mole.

As far as pulmonary embolisation in concerned -acute pulmonary insufficiency due to pulmonary embolization of trophoblastic cells, is a complication seen with suction evaculation and not hysterectomy.

28. Ans. is b i.e. Chorion *Ref. Dutta 7/e, p 190*

Now don't tell me you want me to explain this—

H mole is a benign neoplasm of chorion with malignant potential

29. Ans. is c i.e. Selected cases following evacuation

30. Ans. is a i.e. It may be given in at risk patients *Ref. Dutta Obs. 7/e, p 196*

Prophylactic chemotherapy in H mole

- Is given only to high risk patients (as discussed earlier) and to not all patients following suction evaculation because these drugs are toxic and can increase the risk of premature ovarian failure and menopause.
- Monotherapy with methotrexate is prefered (not multiple agents).
- The use of prophylactic chemotherapy reduces the chances of developing choriocarcinoma but doest not make it nil.

31. Ans. is a i.e. 1–4% *Ref. Dutta Obs. 7/e, p 194*

32. Ans is a i.e. 2% *Ref. Williams 24/e, p 404, Dutta Obs. 8/e, p 226*

Friends: Remember both the values–specifically–risk of recurrence of trophoblastic disease in future pregnancies is 2% range is 1–4%

33. Ans. is d i.e. 15–20% *Ref. Dutta Obs. 7/e, p 194*

34. Ans. is c i.e. Absence of villi structure on histological examination of the lesion *Ref. Dutta Gynae 6/e, p 362*

Choriocarcinoma is characterised by absence of villi

High titre of urinary chorionic gonadotrophin and cannon ball shadow in the X-ray lungs are found in both choriocarcinoma and invasive mole.

35. Ans. is c i.e Theca lutein cysts ≥ 6 cm *Ref. Williams 24/e, p 402*

Criteria for diagnosis of postmolar gestational trophoblastic neoplasia.

Criteria for diagnosis of gestational trophoblastic neoplasia
1. When **4** consecutive hCG values are plateau D_1, D_7, D_{14}, D_{21} (± 10% of previous value)
2. **3** consecutive hCG values are rising (> 10% of previous value) D_1, D_7, D_{14}
3. β-hCG level remain above normal even after 6 months of evacuation
4. Histological criteria for choriocarcinoma

12 Antepartum Haemorrhage (APH) and DIC

ANTEPARTUM HAEMORRHAGE

Antepartum haemorrhage is defined as bleeding from the genital tract after fetal viability and before delivery. In the past viability was considered to be from 28 weeks onwards, but due to the improvements in neonatal survival, this has been changed. The cut off point for fetal viability is now considered as 22 weeks by the WHO and 24 weeks by IAP.

Causes

- Placenta praevia
- Abruptio placenta
- Local causes like polyp, cancer cervix, varicose veins and local trauma
- Circumvallate placenta
- Vasa praevia
- Unclassified or indeterminate

PLACENTA PRAEVIA

Definition: Placentra praevia is defined as a placenta located partly or completely in the lower uterine segment. The bleeding is called ***inevitable*** or ***unavoidable haemorrhage*** as dilatation of the internal os inevitably results in haemorrhage.

Older classification

Browne's classification for placenta previa		
Type 1	*Lateral*	Placenta dipping into the lower segment but not reaching upto the os.
Type 2	*Marginal*	Placental edge reaches the internal os
Type 3	*Incomplete central*	Placenta covers the internal os when closed, but not when fully dilated
Type 4	*Central*	Placenta covers the internal os even when fully dilated

- Type 1 and 2 are called minor degrees and type 3 and 4 called major degrees of placenta previa.
- Type 1 and 2 can be anterior or posterior.
- Type 2 posterior placenta is also called the 'dangerous type' as it is more likely to be compressed producing cord compression. This can cause fetal asphyxia and even death.
- **Recent classification.**
- In a recent Fetal Imaging Workshop sponsored by the National Institutes of Health (Dashe, 2013), the following classification was recommended.
- **Placenta Previa:** The internal os is covered partially or completely by placenta. In the past, these were further classified as either total or partial previa.

- **Low-lying placenta:** Implantation in the lower uterine segment is such that the placental edge does not reach the internal os and remains outside a 2 cm wide perimeter around the os. A previously used term, marginal previa, described a placenta that was at the edge of the internal os but did not overlie it.

Risk Factors

- Previous history of placenta previa (12 times more risk)-most important risk factor.
- Multiparity and increased maternal age
- H/O any previous uterine surgery—like cesarean (risk increases as number of cesarean increases)
- Previous uterine currettage
- Increased placental size as in multifetal pregnancy
- Succenturiate lobe
- Smoking

Clinical Features

Symptoms

The classical presentation is painless antepartum haemorrhage. The typical history is of the woman waking up lying in a pool of blood.

Signs

- Pallor, if present, will be proportionate to the amount of bleeding.
- Size of the uterus corresponds to the period of amenorrhoea.
- Uterus is soft and non tender.
- Malpresentations are common and if it is a cephalic presentation, the head if usually floating.
- Fetal heart sounds will usually be heard (c.f. abruption). Slowing of the fetal heart rate on pressing the head down into the pelvis and prompt recovery on release of the pressure is termed ***Stallworthy's sign*** and is suggestive of posterior placenta praevia.[Q]

Vaginal Examination should not be done in Suspected Placenta Praevia

Management

- Never do per vaginal examination
- **Investigation of choice: TVS** (transvaginal scan... surprised don't be- because in placenta previa P/V examination is contraindicated since our finger has to inserted inside the internal os inorder to know the exact location of the placenta, which in turn can lead to torrential haemorrhage but in Transvaginal ultrasound, the probe is never taken beyond the internal os, it is kept in the cervical canal and obviously there are no chance of disturbing the placenta). Read for yourself what Dutt's has to say.
- **"Transvaginal (TVS): Transducer is inserted within the vagina without touching the cervix. The probe is very close to the target area and higher frequencies could be used to get a superior resolution. It is safe, obviates the discomfort of full bladder and is more accurate (virtually 100%) than TAS".**
- **Double set up examination** (i.e Per vaginal examination in the operation theatre with all arrangements of cesarean section) can be done in placenta previa.

Management options in a Case of Placenta Previa	
Expectant management– (Called as Macaffee regime) Goal is to carry pregnancy till term without putting mothers life at risk with an aim to achieve fetal lung maturity.	**Active management–**To terminate pregnancy immediately irrespective of gestational age.
Indications	**Indications**
• No active bleeding present • Hemodynamically stable • Gestation age <37 weeks • CTG-should be reactive • No fetal anomaly on USG	• If active bleeding is present • Hemodynamically unstable/shock • Gestational age >37 weeks and patient in labour • Fetal distress present/ FHS absent • USG shows fetal anomaly or dead fetus

In expectant management-Patient is admitted till bleeding stops, inj betamethasone (12 mg 1/m for 2 doses, 24 hours apart, if POG < 34 weeks). is given, to hasten the lung maturity of the fetus and blood is crossmatched and kept ready just in case patient starts bleeding again. Tocolytics are given, if uterine contractions are present and gestational age is <34 weeks. Tocolytics are given, for 48 hours. Anti D is given, if female is Rh-negative.
Note: Cervical cerclage is never done in placenta previa patients. The expectant management which is also called as **Macaffee and Johnson regime** should be continued till **37 weeks**, but if anytime during expectant management patient rebleeds, pregnancy should be reterminated immediately.
Patient should be advised readmission at 34 weeks.

In active management: Pregnancy is immediately terminated.

Mode of delivery

"Mode of delivery practically in all patients of placenta previa is–Cesarean section".

RCOG recommends cesarean delivery for women with placental edge—internal or distance is of less than 2 cm.

Compication: A major problem with placenta previa, is that after delivery of fetus, it leads to PPH as bleeding occurs from placenta site. This should be managed like PPH & if all conservative measures fail–hysterectomy is done.

Remember: Placenta previa and placenta accreta are M/C causes of peripartum hysterectomy.

Also know: M/C fetal complication of placenta previa: Low birth weight baby

ABRUPTIO PLACENTA

Abruptio placenta is defined as haemorrhage occurring in pregnancy due to the separation of a normally situated placenta. It is also called ***accidental haemorrhage or premature separation of placenta.***

Risk Factors

- Increased maternal age
- Pre eclampsia
- Preterm ruptured membranes
- Cigarette smoking
- Cocaine abuse
- External trauma
- Uterine leiomyoma
- Increased parity
- Chronic hypertension
- Sudden uterine decompression as in hydramnios and twin pregnancy
- Thrombophilia and lupus anti coagulant
- Previous abruption
- Folic acid deficiency

Classification

Page: Clinical classification of placental abruption.

Parameter	Grade 0	Grade 1	Grade 2	Grade 3
External bleeding	Absent	Slight	Mild to moderate	Moderate to severe
Uterine tenderness	Absent	Uterus irritable, uterine tenderness may or may not be present	Uterine tenderness is usually present	Tonic uterine contractions and marked uterine tenderness
Abdominal pain	Absent	Abdominal pain may or may not be present	Abdominal pain is usually present	Severe degree of abdominal pain may be present
FHS	Present, good	Present, good	Fetal distress	Fetal death
Maternal shock	Absent	Absent	Generally absent	Present
Perinatal outcome	Good	Good	May be poor	Extremely poor
Complications	Absent	Rare	May be present	Complications like DIC and oliguria are commonly present
Volume of retro-placental clot	–	Less than 200 mL	150–500 mL	More than 500 mL

Abbreviations: FHS, fetal heart sound; DIC, disseminated intravascular coagulation

Clinical Features

Symptoms

- Severe and constant abdominal pain (more in the concealed and less in the revealed types).
- Bleeding is present in the revealed and mixed types, but may be absent inthe concealed type.

Signs

- Pallor, which is usually out of proportion to the extent of bleeding
- Hypertension (if there is associated pre-eclampsia)
- The uterus will be larger than expected for the period of amenorrhoea
- Uterus may be tense and tender and even rigid (woody hard)
- Difficulty in palpating the underlying fetal parts easily
- Fetal distress or absent fetal heart sounds

Management

- Once Abruptio is diagnosed you have to manage it actively irrespective of the gestational age.
- In case of abruption: The abruptio delivery interval is important.
- Do not prolong this interval as complications like DIC/Renal failure (acute cortical necrosis) can occur.
- Never give tocolytics in patients of abruptio (no matter how tempted you may feel)
- Pritchard rule for management of abruption is keep hematocrit atleast 30% and maintain urine output-30ml/hr

Mode of Delivery

- Fetus living
  - Fetal distress present - LSCS
  - No fetal distress and vaginal delivery is imminent - then vaginal delivery otherwise LSCS
- Fetus dead
  - Vaginal delivery is preferred unless hemorrhage is so severe that it cannot be managed even by vigorous blood replacement or there is the presence of some other obstetrical factor.

M/C fetal complication of abruptio is prematurity.

DIC

- Release of thromboplastin in placental abruption leads to DIC in abruptio placenta.
- **M/c cause of DIC in obs is abruption.**

Other obstetrical causes of DIC are:
- IUD
- Sepsis
- Amniotic fluid embolism
- Severe PIH/HELLP syndrome

- In managing DIC – use fresh frozen plasma-1unitof FFP raises – 5–10 mg/dL of fibrinogen.
  Note: A fibrinogen level less than 100 mg/dl or sufficiently prolonged PT/PTT in a woman with surgical bleeding is an indication for FFP in doses of 10–15 ml/kg
- Cryoprecipitate – also increase fibrinogen but volume of blood lost is not replenished
- Platelet should be given may if count < 50,000/ml . Single unit transfusion raises platelet by 5000-10,000/ml.
- If Female is Rhnegative give 300 μg of anti d after platelet transfusion
- Side by side in abruptio delivery should be done
- Uncorrected DIC is a contraindication for vaginal delivery/LSCS.

Normal Values of DIC Profile
- Fibrinogen 150 – 600 mg/dL
- PT-11-16 sec
- PTT 22–37 sec
- Platelet – 1.5 to 3.5 lac D dimer /mm^3
- D dimer – <0.5 mg/l
- Fibrin degradation products (FD) <10 μg/dL

In case of DIC: All clotting factors are consumed so levels of fibrinogen decrease; PT and PTT and FDP, D dimer all increase.

Distinguishing features of placenta previa and Abruptio Placentae

	Placenta previa	Abruptio placenta
Symptoms		
Bleeding and pain	Sudden, painless and recurrent Always revealed Bright red in colour	Severe abdominal pain Revealed or concealed
Signs		
Pallor	Proportionate to loss	May be out of proportion
Fundal height	Corresponds to gestation	May be more
Palpation	Soft and relaxed uterus	Tense, tender and rigid
Fetal parts	Easily palpated	Difficult to palpate
Head	High and floating head	Head usually fixed
Malpresentations	Common	Uncommon
Fetal heart sounds	Usually normal	Distress or absent
Pre-eclampsia	Normal incidence	Increased
Coagulopathy	Rare	Frequent

VASA PREVIA

- It occurs due to velamentous insertion of the cord (i.e. cord inserted onto the fetal membranes)
- Blood loss which occurs is fetal in origin and so there is increased fetal mortality – (75 to 90%), maternal mortality is not increased.
- Can be diagnosed antenatally by Doppler study
- When bleeding occurs: Sinusoidal fetal heart rate pattern seen
- Diagnosis made at the time of bleeding is by-**Singers alkali denaturation test/Apt test**
- Management- Emergency Cesarean section.

Apt test/Singers alkali denaturation test
Principle: Fetal blood has fetal hemoglobin (HbF) and maternal blood has adult hemoglobin (HbA). HbF is resistant to acid and alkali denaturation (not HbA). therefore when water and blood are mixed with KOH/NaOH, it remains pink if blood is of fetal origin i.e. condition is vasa previa. If it is maternal blood it turns yellow brown in 2 minutes as HbA is denatured easily. i.e. condition is placenta previa.

QUESTIONS

1. **All are causes of Antepartum hemorrhage (APH) *except*:**
   a. Placenta previa
   b. Abruptio placenta
   c. Circumvallate placenta
   d. Battledore placenta

2. **Placenta previa mouth is associated with all of the following *except*:** **[AI 98]**
   a. Large placenta
   b. Previous C. S. scar
   c. Primigravida
   d. Previous placenta previa

3. **Placenta previa is characterized by all *except*:**
   a. Painless bleeding
   b. Causeless bleeding
   c. Recurrent bleeding
   d. Presents after first trimester

4. **Placenta previa true are:** **[PGI Nov 07]**
   a. Incidence increases by two fold after LSCS
   b. More common in primipara
   c. Most common in developed countries
   d. 1 per 1000 pregnancies
   e. Most common cause of PPH

5. **A positive "Stallworthy's sign" is suggestive of which of the following conditions:**
   a. Twin pregnancy
   b. Breech presentation
   c. Vesicular mole
   d. Low lying placenta
   e. Pregnancy induced hypertension

6. **Regimen followed in expectant management of placenta previa:** **[AIIMS Nov 2010]**
   a. Liley's method
   b. Crede's method
   c. Macafee and Johnson regime
   d. Brandt-Andrews Method

7. **Expectant management of placenta previa includes all *except*:** **[AI 2011]**
   a. Anti-D
   b. Cervical encirclage
   c. Blood transfusion
   d. Steroids

8. **A primigravida at 37 week of gestation reported to labour room with central placenta previa with heavy bleeding per vaginum. The fetal heart rate was normal at the time of examination. The best management option for her is:** **[AI 03]**
   a. Expectant management
   b. Cesarean section
   c. Induction and vaginal delivery
   d. Induction and forceps delivery

9. **A lady with 37 weeks pregnancy, presented with bleeding per vagina. Investigation shows severe degree of placenta previa. The treatment is:**
   a. Immediate C S **[AI 01]**
   b. Blood transfusion
   c. Conservative
   d. Medical induction of labour

10. **Conservative management is contraindicated in a case of placenta previa under the following situations, *except*:** **[AIIMS May 04]**
    a. Evidence of fetal distress
    b. Fetal malformations
    c. Mother in a hemodynamically stable condition
    d. Women in labour

11. **In placenta previa conservative treatment is not done in case of:** **[PGI June 06]**
    a. Active labour
    b. Anencephaly
    c. Dead baby
    d. Severe placenta previa
    e. Premature fetus

12. **Termination of pregnancy in placenta previa is indicated in:** **[PGI Dec 03]**
    a. Active bleeding
    b. Active labour
    c. Gestational age > 34 weeks with live fetus
    d. Fetal malformation
    e. Unstable lie

13. **All the following are indications for termination of pregnancy in APH patient *except*:** **[AI 01]**
    a. 37 weeks
    b. IUD
    c. Transverse lie
    d. Continuous bleeding

14. **A 21 year old primigravida is admitted at 39 weeks gestation with painless antepartum hemorrhage. On examination uterus is soft non-tender and head engaged. The management for her would be:** **[AIIMS May 03]**
    a. Blood transfusion and sedatives
    b. A speculum examination
    c. Pelvic examination in OT
    d. Tocolysis and sedatives

15. **A 34-year-old G1P0 woman at 29 weeks' gestation presents to the emergency department complaining of 2 hours of vaginal bleeding. The bleeding recently stopped, but she was diagnosed earlier with placenta previa by ultrasound. She denies any abdominal pain, cramping, or contractions associated with the bleeding. Her temperature is 36.8°C (98.2°F), blood pressure is 118/72 mm Hg, pulse is 75/min, and respiratory rate is 13/min. She reports she is Rh-positive, her hemoglobin is 11.1 g/dL, and coagulation tests, fibrinogen, and D-dimer levels are all normal. On examination her gravid abdomen is nontender. Fetal heart monitoring is reassuring, with a heart rate of 155/min, variable accelerations, and no decelerations. Two large-bore peripheral intravenous lines are inserted and two units of blood are typed and crossed. What is the most appropriate next step in management:**
   a. Admit to antenatal unit for bed rest and betamethasone.
   b. Admit to antenatal unit for bed rest and blood transfusion.
   c. Induction of labour
   d. Perform emergency cesarean section.

16. **Savita is 32 weeks pregnant presents in causality and diagnosed as a case of APH. Vitals are unstable with BP 80/60 which of the following is next step in M/n: [AIIMS Nov 00]**
   a. Careful observation
   b. Blood transfusion
   c. Medical induction of labour
   d. Immediate cesarean section

17. **A 32 weeks pregnant women presents with mild uterine contraction and on examination her vitals are stable and placenta previa type III is present. Best m/n is: [AIIMS June 00]**
   a. Bed rest + Dexamethasone
   b. Bed rest + Nifedipine and Dexamethasone
   c. Bed rest + Sedation
   d. Immediate caesarean section

18. **A lady with 38 weeks pregnancy and painless vaginal bleeding comes to casualty. On examination head is engaged and uterus is non tender and relaxed. The next line of treatment is: [AIIMS Nov. 99]**
   a. Perspeculum examination
   b. Conservative management
   c. Termination of pregnancy
   d. Ultrasonography

19. **All of the following are true of placenta previa except: [New Pattern Question]**
   a. Postpartum hemorrhage infrequent
   b. First trimester bleeding is not uncommon
   c. Premature labour is common
   d. Higher incidence in women with lower segment cesarean section
   e. Malposition and malpresentation are common

20. **Abruptio placentae occurs in all except:**
   a. Smokers **[PGI June 97; 89]**
   b. Alcoholics
   c. PET
   d. Folic acid deficiency

21. **Commonly used grading for abruption placenta:**
   a. Page **[AIIMS Nov 2010]**
   b. Johnson
   c. Macafee
   d. Apt

22. **A woman at 8 months of pregnancy complains of abdominal pain and slight vaginal bleed. On examination the uterine size is above the expected date with absent fetal heart sounds. The diagnosis:**
   a. Hydramnios **[AIIMS May 01]**
   b. Concealed hemorrhage
   c. Active labour
   d. Uterine rupture

23. **A hypertensive pregnant woman at 34 weeks comes with history of pain in abdomen, bleeding per vaginum and loss of fetal movements. On examination the uterus is contracted with increased uterine tone. Fetal heart sounds are absent. The most likely diagnosis is: [AI 03]**
   a. Placenta previa
   b. Hydramnios
   c. Premature labour
   d. Abruptio placenta

24. **In accidental hemorrhage, TOC: [PGI Dec. 98]**
   a. Induction of labour
   b. Rx of hypofibrinogenemia then blood transfusion
   c. Simultaneous emptying of uterus and blood transfusion
   d. Wait and watch

25. **A pregnant woman at 34 weeks pregnancy, comes with bleeding P/V, B. P. 80: [AI 98]**
   a. Examination in OT and termination of pregnancy
   b. Blood transfusion
   c. Observation
   d. LSCS

26. **A 29-year-old G3P2 woman at 34 weeks' gestation is involved in a serious car accident in which she lost consciousness briefly. In the emergency department she is awake and alert and complains of a severe headache and intense abdominal and pelvic pain. Her blood pressure is 150/90 mm Hg, heart rate is 120/min, temperature is 37.4°C (99.3°F), and respiratory rate is 22/min. Fetal heart rate is 155/min. Physical examination reveals several minor bruises on her abdomen and limbs, and vaginal inspection reveals blood in the vault. Strong, frequent uterine contractions are palpable. Which of the following is most likely a complication of this pts present condition: [New Pattern Question]**
   a. DIC
   b. IUGR
   c. Subarachnoid hemorrhage
   d. Vasa previa

27. **A 27-year-old G2P1 woman at 34 weeks' gestation presents to the emergency department following a motor vehicle collision. In the trauma bay her heart rate is 130/min and blood pressure is 150/90 mm Hg. She is alert and oriented to person, place, and time. She complains of severe abdominal pain that began immediately after the collision. Physical examination reveals bruising over her abdomen, along with a hypertonic uterus and dark vaginal bleeding. A sonogram reveals a placental abruption, and the fetal heart tracing reveals some decelerations. Emergency laboratory tests reveal an International Normalized Ratio of 2.5, with elevated fibrin degradation products. Which of the following is the most appropriate first step in management?** **[New Pattern Question]**

a. Administer a tocolytic
b. Administer a corticosteroid.
c. Administer fresh frozen plasma.
d. Deliver the fetus immediately by LSCS
e. Observe closely.

28. **Which of the following is true about vasa previa except?** **[New Pattern Question]**

a. Incidence is 1: 1500
b. Mortality rate of 20% with undiagnosed case
c. Associated with low lying placenta
d. Cesarean section is indicated

29. **A 29-year-old G3 P2 female at 32 weeks of gestation presents to the emergency dept. with a small amount of vaginal bleeding. She doesn't have any pain.**

- On examination **[New Pattern Question]**
- Her PR: 66/min
- B/P: 100/70 mm of Hg
- RR: 10/min

FHS tracings show fetal distress and shows late decelerations. What is the best course of action?

a. Emergent cesarean section
b. Fetal umbilical blood transfusion
c. Expectant management
d. Induction of labour with prost aglandins

30. **Which test differentiates maternal and fetal blood cell?** **[AIIMS MAY 2013]**

a. APT test b. Kleihauer test
c. Bubble test d. Lilly's test

31. **IOC to detect abnormally located placenta:** **[New Pattern Question]**

a. TVS b. TAS
c. Doppler d. MRI

32. **All of the following can cause DIC during pregnancy *except*:** **[AIIMS May 05]**

a. Diabetes mellitus b. Amniotic fluid embolism
c. Intrauterine death d. Abruptio placentae.

33. **The following test may be abnormal in disseminated intravascular coagulation *except*:** **[AIIMS Nov 04]**

a. Prothrombin
b. Activated partial thromboplastin time
c. D-timer levels
d. Clot solubility.

34. **True regarding abruption placentae with DIC is:** **[AIIMS Nov 99]**

a. Decreased factor V
b. Decreased factor VIII
c. All clotting factor decreased and bleeding time prolongs.
d. Decrease blood flow to nephrons

35. **Which of the following is not used in DIC?**

a. Heparin **[AIIMS 90]**
b. Epsilon amino caproic acid
c. Blood transfusion
d. Intravenous fluids.

36. **26 years old female suffers from PPH on her second postnatal day. Her APTT and PTT are prolonged while BT, PT and platelet counts are normal. Likely diagnosis is:** **[AIIMS Nov 01]**

a. Acquired hemophilia
b. Lupus anticoagulant
c. DIC
d. Inherited congenital hemophilia.

37. **Amniotic fluid embolism cause:** **[New Pattern Question]**

a. Shock
b. DIC
c. Bleeding tendency
d. All of the above

38. **An elderly multiparous woman with intrauterine foetal death was admitted with strong labour pains. The patient suddenly goes in shock with cyanosis respiratory disturbances and pulmonary oedema. The most likely clinical diagnosis is:** **[New Pattern Question]**

a. Rupture of uterus
b. Congestive heart failure
c. Amniotic fluid embolism
d. Concealed accidental hemorrhage

39. **The following tests are related to blood coagulation disorders in obstetrics *except*:** **[New Pattern Question]**

a. Thrombocytopenia is a feature of fibrinolytic process and not of DIC
b. In DIC, RBC will be 'helmet' shaped or fragmented but in fibrinolytic process, the cell morphology is normal
c. Weiner clot observation test gives a rough estimate of total blood fibrinogen level
d. Thrombocytopenia can be diagnosed from the peripheral smear

40. **At 28 weeks on USG-(TVS) a G2P1 female was detected as having major placenta previa. A confirmatory scan should be performed:** **[New Pattern Question]**

a. At 32 weeks b. At 34 weeks
c. At 36 weeks d. At onset of labor

41. **M/C cause of APH is:** **[New Pattern Question]**

a. Placenta previa
b. Abruptio placenta
c. Vasa previa
d. Placenta accreta

EXPLANATIONS & REFERENCES

1. Ans. is d i.e. Battledore placenta

Ref. Dutta Obs. 7/e, p 214, 216, 217; Textbook of Obs. by Sheila Balakrishnan, p 155

Causes of Antepartum Hemorrhage

- ***Placenta previa***
- ***Abruptio placenta***
- ***Vasa previa***
- ***Circumvallate placenta***
- Local causes like:
  - Polyp
  - Carcinoma cervix
  - Varicose veins
  - Trauma
- Unclassified or indeterminate

Circumvallate placenta

- It is an uncommon cause of antepartum hemorrhage.[Q]
- In this condition, the chorionic plate which is on the fetal side of the placenta is smaller than the basal plate on the maternal side.[Q]
- The fetal surface of the placenta presents a central depression surrounded by a thickened grayish white ring.
- These pregnancies may be complicated by IUGR and an increased chance of fetal malformations.
- Bleeding is usually painless[Q].
- Antenatal diagnosis is unlikely and the diagnosis is usually made after examination of the placenta post delivery[Q].

Note: Battledore placenta = It is a condition in which the umblical cord is attached to the margin of placenta.

2. Ans. is c i.e Primigravida *Ref. Dutta Obs 7/e, p 242; Fernado Arias 3/e, p 333*

Placenta previa is implantation of the placenta partially or completely over the lower uterine segment. Damage to the endometrium or myometrium due to previous surgery or infection can predispose to low implantation and placenta previa.

Risk factors for placenta previa:

- Prior surgery[Q] (cesarean section / Myomectomy Hysterotomy)
- Previous uterine curettage[Q]
- Endometritis[Q]
- Increasing maternal age (>35 years)[Q]
- Increasing parity[Q]
- Placental size –increased (as in multiple pregnancy)
- Placental abnormality –Succenturiate lobe
- Smoking (due to defective decidual vascularisation)
- Elevated prenatal maternal serum alpha fetoprotein levels (unexplained)

Note:

- The probability of placenta accreta and need for cesarean hysterectomy is increased in patients with prior cesarean section and placenta previa.
- Smoking increases the risk of placenta previa by two fold times.
- Previous cesarean section increases the risk of placenta previa by 4 fold time.

3. **Ans. is d i.e. Present after first trimester** *Ref. Dutta Obs. 7/e, p 243*

Antepartum hemorrhage is defined as bleeding from or into the genital tract after the period of viability and but before the birth of the baby (the first and second stage of labour included). Hence option d is incorrect.

4. **Ans. is a i.e. Incidence increaes by two fold after LSCS**

Ref. Fernando Arias 3/e, p 333, 334; Dutta Obs. 7/e, p 242, 243

Chances of placenta previa are increased in case of history of prior cesarean section—

"The probability of placenta previa is four times greater in patients with prior cesareans than in patients without uterine scars." *—Fernando Arias 3/e, p 333, 334*

Therefore, option a is correct (partly though) because the option says two-fold increase

As far as - other options are concerned:

Option 'b' i.e. it is more common in primipara is absolutely wrong as - placenta previa is more common in multipara.

Option 'c' It is more common in developed countries.

Now that is incorrect because -

"Increased family planning acceptance with limitation and spacing of birth, lowers the incidence of placenta previa." *—Dutta obs 6/e, p 243*

Which clearly means it is less common in developed countries than in developing countries.

Option 'd' - Incidence is 1 per 1000 pregnancies:

According to *Dutta Obs 6/e, p 243*

"Incidence of placenta previa ranges from 0.5 to 1% among hospital deliveries."

"According to 2003 birth certificate data in the US, placenta previa complicated almost 1 in 300 deliveries"

—Williams Obs 23/e, p 770

i.e. ***option 'd'*** is incorrect.

As far as **option e** is concerned placenta previa is a cause of APH and not PPH.

So, amongst all options - ***option 'a'*** is partly correct, so it is the answer of choice here

5. **Ans. is d i.e. Low lying placenta** *Ref. Dutta Obs. 7/e, p 244*

Stallworthy's sign: Slowing of the fetal heart rate on pressing the head down into the pelvis and prompt recovery on release of the pressure is termed ***Stallworthy's sign*** and is suggestive of posterior placenta previa.

Note: Presence of this sign is not always significant because it may be due to fetal head compression even in an otherwise normal case.

6. **Ans. is. c i.e. Macafee and Johnson regime.** *Ref. Dutta Obs 7/e, p 248*

7. **Ans. is b i.e. Cervical encirclage.** *Ref. Dutta Obs. 7/e, p 248, 249, Fernando arias 3/e, p 341, 342*

Macafee and Johnson regime is the name given to the expectant management of placenta previa as it was advocated by McAfee and Johnson

Aim of expectant management in case of placenta previa is to continue pregnancy for fetal maturity without compromising the maternal health.

Prerequisites for expectant management:

- Availability of blood for transfusion whenever required
- Facilities for caesarean section should be available throughout 24 hours.

Candidates: Suitable for expectant management are:

- Mother in god health status- Hemoglobin > 10 gm%
- Hematocrit > 30% and she should bev hemodynamically stable.
- Duration of pregnancy less than 37 weeks
- Active vaginal bleeding is absent
- Fetal well being is assured by USG and cardiotocography

The expectant management is carried upto 37 weeks of pregnancy until baby matures.

Expectant management includes (i.e. MacAfee and Johnson regime includes)

- Hospitalisation till active bleeding stops and then readmission at 34 weeks
- Complete bed rest
- Anaemia corrected with blood transfusion (if necessary), but blood should always to be kept ready as placenta previa is a recurrent condition.

- Antenatal steroids to promote fetal lung maturity
- Anti D if patient is Rh negative
- If uterine contractions are present - tocolytics (magnesium sulphate/nifedipine) can be given as it leads to more advanced gestational age at delivery, greater birth weight of fetus, less neonatal complications, and decreased cost of hospitalization. Tocolytics should not be used for more than 48 hours.
- Some obstetricians do cervical encirclage in case of placenta previa.

  The rationale behind the use of cervical cerclage in placenta previa, is that it limits the development of the low uterine segment brought about by advancing gestation and the effect of uterine contraction. But other studies have failed to confirm these findings. Thus, RCOG doesnot recommend the use of cervical cerclage in placenta previa till further data is available.

8 Ans. is b i.e. Cesarean section *Ref. Dutta Obs 7/e, p 249, 250; Fernando Arias 3/e, p 337, 339*

The patient in the question:

1. Has gestational age = 37 weeks i.e. fetus has attained maturity so immediate termination of pregnancy is recommended.
2. Has central placenta previa Type IV i.e. vaginal delivery is contraindicated, cesarean section has to be done.
3. Patient is having heavy bleeding.

According to *Fernando Arias 3/e, p 337*

"In patients with heavy bleeding an efficient management plan including life support measures and immediate operative intervention is the only way to avoid a maternal death."

It further says – on *p 339*

"Patients with placenta previa and severe bleeding should be delivered by cesarean section irrespective of the type of placenta previa."

So, from the above discussion, it is very much clear that in this patient, immediate cesarean section is the best resort.

Friends, here I want to point out that earlier it was said that for minor degrees of placenta previa, vaginal delivery can be tried, but now, irrespective of degree of placenta previa, cesarean section is done and recommended.

9. Ans. is a i.e. Immediate C.S. *Ref. Dutta Obs 7/e, p 249, 250; Fernando Arias 3/e, p 337, 339*

As Explained in the previous question– Patient presenting with bleeding, at 37 weeks of gestation with central placenta previa, management should be *immediate emergency cesarean section.*

10. Ans. is c i.e. Hemodynamically stable condition *Ref. Dutta Obs 7/e, p 248, 249; Fernando Arias 3/e, p 342*

All are contraindications for conservative management except hemodynamically stable condition.

11. Ans. is a, b, c and d i.e. Active labour; Anencephaly; Dead baby; and Severe placenta previa

Ref. Dutta Obs. 7/e, p 249

Well friends, there is no need to ***"rattoo"*** the conditions where expectant management is required and where active management. For a while - forget all the lists and just think you are a gynae casualty medical officer and a pregnant female with vaginal bleeding in the late months of pregnancy comes to you (suspected case of placenta previa). How will you manage if:

a.	**She is in active labour**	Obviously you will either do cesarean section or if bleeding is not much and no other adverse circumstances are present, proceed with vaginal delivery but you will never think of arresting her labour and managing conservatively
b.	**If the patient is diagnosed of carrying anencephalic fetus.**	The aim of conservative management is to continue pregnancy for attaining fetal maturity without compromising the maternal ealth. But in this case when fetus is anencephalic there is no point in continuing pregnancy i.e active management / termination should be done.
c.	**If fetus is dead**	Same is the case with dead fetus, there is no point in continuing pregnancy i.e. active management should be done
d.	**Severe placenta previa**	In this case patient must be bleeding heavily. Remember always A gynaecologists first aim should be to save the life of mother. If fetus can be saved nothing like it, but in order to save the fetus, mother's life should not be put at risk. So, in this case expectant management (conservative management) should not be done. Immediate termination of pregnancy by cesarean section is the correct management.
e.	**Premature fetus**	If maternal condition is good, and fetus is premature, patient can be kept under observation. Betamethasone (to hasten fetal lung maturity) and blood transfusion (to raise mother's hematocrit), shoud be given i.e in this case conservative management can be done.

12. Ans. is a, b and d i.e. Active bleeding, Active labour and Fetal malformation *Ref. Dutta Obs. 7/e, p 249*

13. Ans. is c i.e. Transverse lie *Ref. Dutta Obs. 7/e, p 249*

In these questions, there is no confusion about any option except for 'lie of the fetus'.

As far as lie is concerned:

Friends, why would you terminate pregnancy just because of unstable lie or transverse lie, unless and until there is some other complication associated with it. Transverse lie/unstable lie in a patient of placenta previa simply means that whenever termination of pregnancy is considered cesarean section has to be done.

14 Ans. is c i.e. Pelvic examination in OT *Ref. Dutta Obs. 7/e, p 249*

- Patient is presenting with painless vaginal bleeding and uterus is soft and nontender. These findings point towards the diagnosis of placenta previa (In abruptio-bleeding is accompanied by pain, uterus is tense, tender and rigid).
- The gestational age of patient is 39 weeks i.e., fetal maturity is attained so pregnancy has to be terminated, either vaginally or by cesarean section.
- Before termination of pregnancy, vaginal examination should be done in OT (keeping everything ready for cesarean section) to confirm the diagnosis of placenta previa.

Remember:

- Vaginal examination should not be done outside the operation theatre as it can provoke further separation of placenta with torrential bleeding which may be fatal.
- These days the need for carrying out vaginal examination in OT has decreased as the placental location can always be ascertained sonographically.

Also Know:

Conditions where vaginal examination should not be done (even in OT):

1. Patient is in exsanguinated state[Q].
2. Diagnosed case of placenta previa on USG[Q]
3. Associated complicating factors such as *malpresentation, elderly primigravida, previous cesarean section, contracted pelvis etc[Q] which prevent vaginal delivery.*

As in all these conditions cesarean section is mandatory *(so no point in wasting time to know the type of placenta previa by vaginal examination and taking the risk of occurrence of brisk hemorrhage).*

15. Ans. is a i.e Admit to antenatal unit for bed rest and betamethasone. ***Ref. Dutta Obs. 7/e, 248, 249***

G1P0 woman at 29 weeks' gestation presents to the emergency department complaining of 2 hours of vaginal bleeding, the bleeding recently stopped, her vitals are stable(temperature is 36.8°C (98.2°F), blood pressure is 118/72 mm Hg, pulse is 75/min, and respiratory rate is 13/min), FHS are present and reassuring i.e there is no fetal distress.

All this means we will manage this patient expectantly and there is no need to immediately terminate her pregnancy..ruling out options c and d

- So now we have to choose between option:
  - Admit to antenatal unit for bed rest and betamethasone. And option
  - Admit to antenatal unit for bed rest and blood transfusion.
- The patients Hb is 11.1, there is no need for immediate blood transfusion (ruling out option b), just crossmatch and arrange blood and give betamethasone for hastening lung maturity.

16. Ans. is b i.e. Blood transfusion *Ref. Dutta Obs. 6/e, p 259; Fernando Arias 3/e, p 342, fig. 13.2*

Unstable vitals (BP = 80/60) belong most probably to moderate category bleeding.

In ***Mild cases*** – Vitals remain stable.

Severe cases – Patient is in shock with very low or unrecordable B.P.

The gestational age of patient is 32 weeks: As discussed, beyond 36 weeks with moderate bleeding - terminate the pregnancy.

Between 32-36 weeks moderate bleeding - *Management depends on* whether pulmonary maturity is achieved or not.

- If maturity is not achieved, patient is managed conservatively on:
  - *Close monitoring*
  - *Blood transfusions*
  - *Betamethasone (to accelerate lung maturity)*

This is done for 24-48 hours.

- If patients condition improves: expectant management is continued.

- If patients condition does not improve: pregnancy is terminated.

As the patient in the question is 32 weeks pregnant with moderate bleeding, first we will try to improve the general condition of the patient by giving blood transfusion.

17. Ans. is b i.e. Bed rest, Nifedipine and Dexamethasone *Ref. Fernando Arias 3/e, p 341*

At 32 weeks patient is presenting with uterine contraction which is a warning symptom of preterm labour.

Management of patient with placenta previa and preterm labour:

- Tocolytic agent: "Uterine contractions are common in patients with placenta previa. Since uterine contractions have the potential to, disrupt the placental attachment and aggravate the bleeding, most obstetricians favor the use of tocolytic agents in the expectant management of patient with placenta previa".
- Most commonly used tocolytics in case of placenta previa.
  - Nifedipine
  - Magnesium sulphate
- Tocolytics which are not used –
  - Terbutaline and Ritodrine: They cause tachycardia and make the assessment of patient's pulse rate unreliable.
  - Indomethacin: It causes inhibition of platelet cyclo oxygenase system and prolongs the bleeding time.
- Besides this - patient should be:
  - Put on bed rest in left lateral position.
  - Glucocorticoids are given to hasten lung maturity.

18. Ans. is c i.e. Termination of pregnancy *Ref. Dutta 7/e, p 249, 250*

- Painless vaginal bleeding and absence of other significant findings confirm the diagnosis of placenta previa.
- Gestational age of the patient is 38 weeks i.e. fetal maturity is attained so termination should be done.

In case of severe bleeding pregnancy is terminated by cesarean section irrespective of gestational age.[Q]

Note: Here I have ruled out **option a** i.e. per speculum examination because in case of placenta previa a double set up examination (i.e. examination in OT) is done and not simple P/S or P/V.

19. Ans. is a and b i.e. Postpartum hemorrhage infrequent; and First trimester bleeding is not uncommon.

Ref. Dutta Obs. 7/e, p 247, 248

Placenta previa is a cause of APH which means bleeding from or into the genital tract after the 28th week of pregnancy i.e. it is not a cause of first trimester bleeding. (i.e. option b is incorrect).

As discussed earlier, previous cesarean section increase the chances of placenta previa in next pregnancy (i.e. option d is correct).

As far as other options are concerned - they are all complications of placenta previa.

Complications of placenta previa

A. Maternal

- Antepartum
- Intrapartum } Hemorrhage
- Postpartum
- Malpresentation
- Cord prolapse
- Retained placenta
- Preterm labour
- Premature rupture of membranes
- Slow dilatation of cervix

B. Fetal

- Asphyxia
- Birth injuries
- Low birth weight
- Congenital malformation
- Intrauterine death

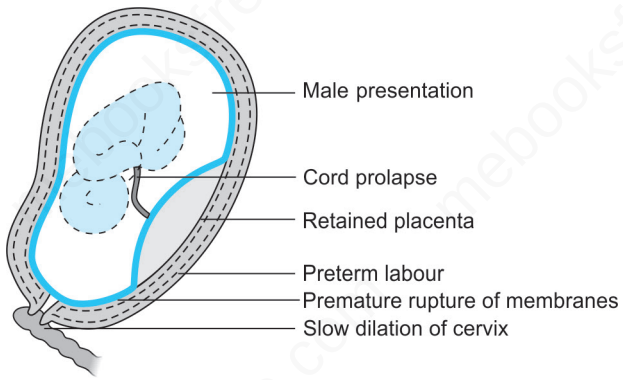


Fig. 1: Maternal complications of placenta previa

20. Ans. is b i.e. Alcoholics *Ref. Dutta Obs. 7/e, p 252, 253; Williams Obs. 22/e, p 813, 814, 23/e, p 763-765*

Abruptio placenta is premature separation of normally situated placenta*[Q] *resulting in hemorrhage.

Risk factors:

- Increased maternal age
- Pre eclampsia
- Preterm ruptured membranes
- Cigarette smoking
- Cocaine abuse
- External trauma
- Uterine leiomyoma
- Increased parity
- Chronic hypertension
- Sudden uterine decompression as in hydramnios and twin pregnancy
- Thrombophilia
- Previous abruption
- Folic acid deficiency

My –My- I pity all of you out there as you have to memorise so many lists (not only in gynae, obs but in other subjects as well). Even I have gone through the same phase. Friends I had devised a simple method to learn these lists. For some lists, I used to draw diagrams and then at the time of exam that diagram was reproduced in my mind. Try it out for yourself. e.g.

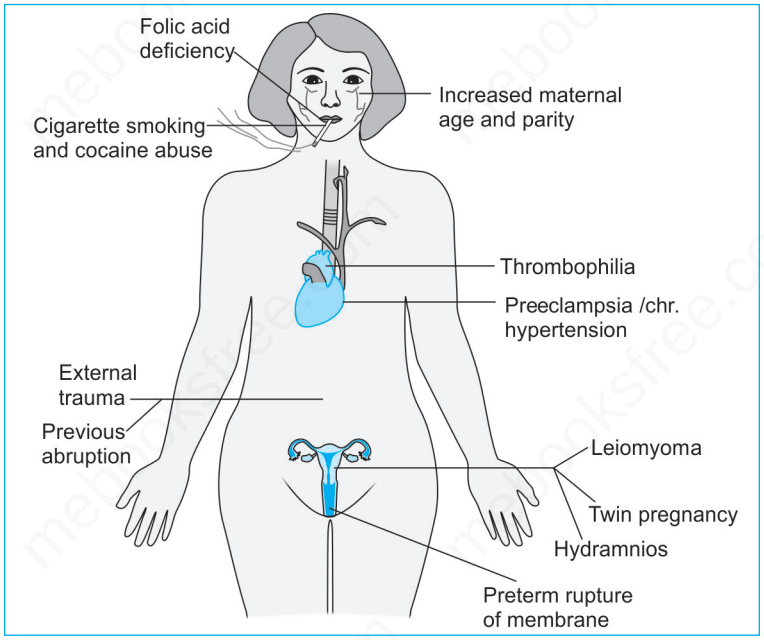


Fig. 2: Risk factors for abruptio placentae

Besides these there is a hereditary risk of acquiring abruptio also.

21. Ans. is a i.e. Page *Ref. Dutta's Obstetric Haemorrhage: Made Easy, p 144, 145*

The clinical grading of accidental haemorrhage was suggested by Page in 1951 and still continues to be a very practical, useful and quick bedside assessment of the patient

Table 12.1: Clinical classification of placental abruption

Parameter	Grade 0	Grade 1	Grade 2	Grade 3
External bleeding	Absent	Slight	Mild to moderate	Moderate to severe
Uterine tenderness	Absent	Uterus irritable, uterine tenderness may or may not be present	Uterine tenderness is usually present	Tonic uterine contractions and marked uterine tenderness
Abdominal pain	Absent	Abdominal pain may or may not be present	Abdominal pain is usually present	Severe degree of abdominal pain may be present
FHS	Present, good	Present, good	Fetal distress	Fetal death

Contd…

Contd…

Parameter	Grade 0	Grade 1	Grade 2	Grade 3
Maternal shock	Absent	Absent	Generally absent	Present
Perinatal outcome	Good	Good	May be poor	Extremely poor
Complications	Absent	Rare	May be present	Complications like DIC and oliguria are commonly present
Volume of retro-placental clot	–	Less than 200 mL	150–500 mL	More than 500 mL

Abbreviations: FHS, fetal heart sound; DIC, disseminated intravascular coagulation

Another classification for abruption was proposed by Sher in 1978

Shers classification	
Grade I	Diagnosis of abrptio made retrospectively
Grade II	Classical features of Abruptio are present. Fetus is alive
Grade III	Fetal death without (A) or with (B) coagulopathy

Also Know:

Some other named classifications and Regimes

Named classification/Regine	Used in
Macaffee and Johnson Regime	Expectant management of placement previa
Page classification	Abruptio plcenta
Sher classification	
Clarke's classification	Classification of heart disease based on maternal mortality
Lytic cocktail regime (used 3 drugs - chlorpromazine, Promethazine and pethidine)	Proposed by Menon for management of convulsion in eclampsia
Whites classification	Earlier used for classification of diabetes in pregnancy
Caldwell and Mohoy classification	Types of pelvis

22. Ans. is b i.e. Concealed hemorrhage *Ref. Dutta Obs. 7/e, p 255, 212, 429*

Let's analyse all options separately to see which suits the best.

Options	Points in favour	Points against
• Option "a" Hydramnios	• Size of uterus > gestational age. • Absent fetal heart sounds (in polyhydramnios fetal heard sound is not distinctly heard)05	• Abdominal pain and vaginal bleeding (Main complain of patient with hydraminos is difficulty in breathing and swelling over legs **Option "a" ruled out**
• Option "c" Active labour	• Complain of abdominal pain and slight vaginal bleed (Which can be show of active labour)	• Height of uterus > than the period of gestation (Height of uterus = period gestation in normal labour) • Absent fetal heart sound (FHS is present in normal labour
Option "d" **Rupture uterus** Since period of of gestation is 8 month i.e. rupture is occurring during pregnancy and since no H/o scared uterus is given we are taking it as spontaneous rupture during pregnancy	• Height of uterus more than period of gestation • Absent fetal heart sounds	• In rupture patient complains of acute pain in abdomen accompanied by fainting attack / collapse • Acute tenderness on abdominal examination • Palpation of superficial fetal parts Spontaneous rupture during pregnancy of un-scarred uterus occurs in high parous women and is not common
Option "b" Concealed hemorrhage	• Abdominal pain and vaginal bleeding • Height of uterus more than period of gestation • Absent fetal heart sound	

So, concealed hemorrhage is the diagnosis.

23. Ans. is d i.e. Abruptio placenta *Ref. Dutta Obs. 7/e, p 255*

The patient in the question is hypertensive and presenting with:

- History of pain in abdomen.
- Bleeding per vaginum.
- Loss of fetal movements.
- O/E = uterus is contracted.
- Increased uterine tone.
- Fetal heart sounds are absent.

All these features confirm the diagnosis of ***abruptio placenta***.

As far as premature labour is concerned – *Complains of abdominal pain and vaginal bleeding will be present but loss of fetal movement, absence of fetal heart sounds and increased uterine tone go against it. (In normal labour - uterus contracts and relaxes intermittently i.e. tone increases and decreases intermittently).*

24. Ans. is c i.e. Simultaneous emptying of uterus and blood transfusion

Ref: Williams Obs 23/e, p 767; Dutta Obs. 7/e, p 257, 258; COGDT 10/e, p 333

- The basic principle in the management of abruptio is termination of pregnancy along with correction of hypovolemia and restoration of blood loss.

"With massive external bleeding, intensive resuscitation with blood plus crystalloids and prompt delivery to control haemorrhage are life saving for mother and hopefully fetus". *—Williams Obs. 23/e, p 767*

This means option c is correct

"Expectant management of suspected placental abruption is the exception, not the rule. This management pathway should be attempted only with careful observation of the patient and a clear clinical picture." (Option "d" ruled out) *—COGDT 10/e, p 333, 334*

- Correction of hypofibrinogenemia (i.e. Option "b")
  - ***"A rational approach (in abruptio) should be to withhold any specific therapy to rectify the coagulation disorders except in the circumstances such as overt bleeding or clinically evaluated thromboembolic process".***

—Dutta Obs. 6/e, p 260

25. Ans. is b i.e. Blood transfusion *Ref. Read Below*

The question is incomplete, we cannot make any diagnosis with this much information only except that – It could be a case of ante partum hemorrhage.

If such a patient comes to the casualty, our first and foremost step will be to save the life of patient as patient's BP is 80 systolic i.e. patient is in shock. Blood transfusion to correct hypovolemia and replenish blood loss should be done.

Extra Edge:

- Guide to adequate blood replacement.[Q]
  - Maintainence of central venous pressure at 10 cm of water.[Q]
  - Hematocrit = 30%[Q]
  - Urinary output = 30 ml/hour[Q]

26. Ans. is a i.e. DIC *Ref. Dutta Obs. 7/e, p 254*

In the question patient at 34 weeks of gestation is involved in a car accident. (Note: trauma is a risk factor for APH).

Her BP is 150/90 mm (High BP is a Risk factor for abruptio).

On vaginal inspection - bleeding is present along with strong uterine contractions so the diagnosis of abruptio confirmed.

DIC due to release of thromboplastin by damaged placenta is a well known complication of abruptio.

27. Ans. is c i.e. Administer fresh frozen plasma *Ref. Dutta Obs. 7/e, p 258*

In the question again patient at 34 weeks of gestation is involved in a car accident and presented with high B/P and abdominal pain. Her USG shows placental abruption. As discussed in the previous question. DIC is a complication of abruptio. In this patient INR is 2.5 and fibrin degradation products are raised which means she already is in DIC.

Remember

In DIC – Immediate vaginal delivery/LSCS is contraindicated .Whenever a pregnant patient has DIC - always correct DIC first by giving fresh frozen plasma, then think about delivery.

28. Ans. is b i.e. Mortality rate of 20% with undiagnosed case

Ref. Williams Obs 23/e, p 583-584, High risk pregnancy" Fernando Arias 3/e p 348, progress in Obs. and Gynae- John Studd vol. 17/e p 209

Vasa previa – It is a condition in which the fetal blood vessels unsupported by either umbical cord or placental tissue, overlies the internal os and is vulnerable to rupture when supporting membrane rupture.

Thus bleeding in case of vasa previa is of fetal origin and not maternal origin (unlike placenta previa and abruptio)

- It is rare condition and occurs in 1 in 2000 – 3000 deliveries (i.e. option ais correct).
- Vasa previa should be suspected if any of the following condition exists
  - Velamentous cord insertion
  - Bilobed placenta
  - Succenturiate lobed placenta
  - Placenta previa /low lying placenta in second trimester (option 'c' is correct)
  - Pregnancy resulting from IVF
  - Multiple pregnancies
- Vasa previa is associated with high fetal mortality – (75- 100%) because—
  - Wharton's jelly is absent around the fetal vessels, hence they can be easily lacerated at the time of rupture of membranes leading to severe fetal bleeding.
  - Vessels can be easily compressed by the fetal presenting part during uterine contractions leading to fetal exsanguination.

This explains that **option b** i.e. mortality rate is 20% in undiagnosed case is incorrect (mortality is 75-100%)

- Maternal mortality is not increased
- **Diagnosis** of vasa previa – In all cases of antepartum and intrapartum hemorrhage, the possibility of vasa previa should be kept in mind and blood should be tested for fetal hemoglobin characterized by resistance to denaturation by alkaline reagent (Singer alkali denaturation test/Apt test)
- Doppler examination can also reveal fetal blood vessels traversing below the presenting part

Management– In a diagnosed case of vasa previa elective cesarean section should be done or emergency LSCS should be done if it is diagnosed intrapartum.

29. Ans. is a i.e. Emergent cesarean section

Now this question can be explained in 2 ways but answer still remains the same:

Expl 1: Patient is presenting at 32 weeks of gestation to the emergency department with a small amount of vaginal bleeding. She doesn't have any pain., this could be a case of placenta previa.. now since there is fetal distress , we will do active management and terminate the pregnancy immediately by doing a cesarean section.

Expl 2: In this question patient has experienced small amount of painless vaginal bleeding…but the fetal distress doesnot coincide with the amount of blood loss, so probably this small amount of blood loss is fetal in origin this is why it has led to fetal distress i.e it is a case of vasa previa.

Management of vasa previa-Emergency cesarean section.

30. Ans. is a i.e. APT text *Ref. Willams 24/e, p 617, 618; Dutta 7/e, p 234, 651*

Both Apt test and Kleihauer-Betke test can be used to detect the presence of fetal blood within a sample.

Apt Test/Singers Alkali Denaturation Test:

- Used to detect the **presence or absence of fetal blood (qualitative)** in a **vaginal discharge to rule out vasa previa late in pregnancy** or to detect the **origin of a neonatal blood vomiting,** whether iti s a genuine upper GI hemorrhage/ hemoptysis or simply swallowed matternal blood during delivery or from cracked nipple.

Kleihauer-Betke Test:

- The sample is **maternal peripheral smear** and is **used to see how much of fetal blood (quantitative)** has been transfused into the maternal serum in order to **assess the risk of isoimmunization** and then the **risk of hemolytic disease of newborn**

Both of them relly on the fact that **HbF is resistant to alkali (Apt)** and **acids (Kleihauer-Betke)** and so the **HbA containing RBCs (Maternal) will be hemolyzed but not the fetal RBCs** as they have the **HbF.**

When **fetal blood needs to be differentiated from Maternal blood or Apt test is used (Qualitative estimation)**
When the **amount of fetal bleeding needs to be estimated Kleihauer-Betke test is used** (Quantitative estimation)
When **fetal RBC** is to be diferentiated from **maternal RBC**–Kleihauer betke test is used

	Apt test	Kleihauer-Betke test
• Source of sample	• **Maternal**	• Maternal
• Reagent used	• NaOH	• Citric acid phosphate buffer
• Principle	• Adding 1% NaOH destroys adult HbA but not fetal HbF	• Adding acid destroys adult HbA but not fetal HbF
• Assessment type	• **Qualitative**	• **Quantitative**

31. Ans. is a i.e. TVS *Ref. Willams 24/e, p 802*

TVS is the investigation of choice for detecting abnormally located placenta.

32. Ans. is a i.e. Diabetes mellitus *Ref. Dutta Obs. 7/e, p 628; COGDT 10/e, p 996,997; Harrison 17/e, p 729,*

DIC is a pathological condition associated with inappropriate activation of coagulation and fibrinolytic system. It is a secondary phenomenon resulting from an underlying disease state.

Obstetric conditions associated with DIC:

More common	Less common
• Intrauterine fetal death	• Chorioamnionitis
• Amniotic fluid embolism	• Pyelonephritis in pregnancy
• Pre eclampsia- Eclampsia	• H. mole
• HELLP syndrome	• Instillation of intraamniotic hypertonic saline
• Placenta Abruption	• Feto maternal bleed
• Septic Abortion	• Incompatible blood transfusion
	• Viremia –HIV, varicella, CMV hepatitis..COGDT p 997

Pathogenesis –

Endothelial injury
↓
Tissue distruction
↓
Thromboplastin released
↓
Intravascular Coagulation activated
↓
Deposition of fibrin in small vessels
↓
Microvascular occlusion

Leads to consumption of clotting factors and platelets (Hence also k/a consumptive coagulopathy)	Due to fibrin deposition plasminogen is activated & converted to plasmin
↓	↓
Bleeding	Fibrin degradation products
	↓
	Bleeding

33. Ans. is d i.e. Clot solubility *Ref. Harsh Mohan 5/e, p 437; Dutta Obs. 7/e, p 628, 629*

Laboratory findings in case of DIC are:
- The platelet count is low.
- Blood film shows the features of microangiopathic hemolytic anaemia. There is presence of schistocytes and fragmented red cells (helmet shaped) due to damage caused by trapping and passage through the fibrin thrombi.
- **Prothrombin time, thrombin time and activated partial thromboplastin time, are all prolonged.**
- Plasma fibrinogen levels are reduced due to consumption in microvascular coagulation.
- Fibrin degradation products (FDPs) are raised due to secondary fibrinolysis.
- **D-dimer levels are raised in DIC.**

Contd…

Contd…

Clot observation test (Weiner)—It is an useful bed side test. It can be repeated at 2–4 hours intervals. 5 ml of venous blood is placed in a 15 ml dry test tube and kept at 37°C. Usually, blood clot forms within 6-12 minutes. This test provides a rough idea of blood fibrinogen level. If the clotting time is less than 6 minutes, fibrinogen level is more than 150 mg percent. If no clot forms within 30 minutes, the fibrinogen level is probably less than 100 mg percent.

Clot stability test/Clot lysis test: It is gross way of observing the fibrinolytic system.

If a clot is stable for 24 hours	If clot dissolves within 24 hours
↓	↓
Normal	DIC

In DIC clot stability test and not clot solubility test is abnormal. Clot solubility test is to estimate factor XIII & will not be increased in DIC.

34. Ans. is c i.e. All clotting factor decreased and bleeding time prolongs *Ref. Dutta Obs. 7/e, p 629*

In abruption placentae leading to DIC due to a massive retroplacental clot-not only fibrinogen but other clotting factors are also decreased and bleeding time prolonged.

DIC is called as consumptive coagulopathy.

35. Ans. is b i.e. Epsilon amino caproic acid. *Ref. COGDT 10/e, p 999; Williams Obs. 23/e, p 787*

Well friends, we have discussed the causes and investigations of DIC. Now here let's take a look at its management.\

Management of DIC

- The most important step is to terminate the pregnancy- vaginal delivery without episiotomy is preferred to cesarean section
- Volume replacement by crystalloids or colloids will reduce the amount of whole blood needed to restore the blood volume.
- 500 ml of fresh blood raises the fibrinogen level approximately by 12.5 mg/100 ml and platelets by 10,000–15,000 cu mm. Fresh blood- helps in flushing out fibrin degradation product and improving the micro circulation.
- To replace fibrinogen- Fresh frozen plasma should be given:
  Fresh frozen plasma (FFP) is extracted from whole blood. It contains fibrinogen, anti-thrombin III, clotting factors V, XI, XII. FFP transfusion provides both volume replacement and coagulation factors. One unit of FFP (250 mL) raises the fibrinogen by 5-10 mg/dL. FFP does not need to be ABO or Rh compatible.
- **Cryoprecipitate** is obtained from thawed FFP. It is rich in fibrinogen, factor VIII, Von Willebrand's factor, and XIII. Cryoprecipitate provides less volume (40 mL) compared to FFP (250 mL). So it should not be used for volume replacement. One unit of cryoprecipitate increases the fibrinogen level by 5-10 mg/dL.
- In case of active bleeding with platelet counts < 50,000/μl or prophylactically with platelet count 20–30,000/μl – platelet replacement should be done. Platelet should ABO and Rh specific. 1 units (50 ml) raises the platelet count by 7500/ ml
- **Recombinant activated factors VIIA:** (60-100 μg/kg IV) can reverse DIC within 10 minute as it is a precusor for extrinsic clotting cascade which is replaced.
- ***Role of Heparin***

According to Williams Obs. **"Heparin is not used in DIC."**

According to *COGDT 10/e, p 999*

"Heparin acts as an anticoagulant by activating antithrombin III but has little effect on activated coagulation factors. Anticoagulation is contraindicated in patients with fulminant DIC and central nervous system insults, fulminant liver failure, or obstetric accidents. The one instance, however, in which heparin has been demonstrated to benefit pregnancy-related DIC is in the case of the retained dead fetus with intact vascular system, where heparin may be administered to interrupt the coagulation process and thrombocytopenia for several days until delivery may be implemented."

As far as EACA is concerned- *Williams Obs. 22/e, p 844 says* –

"EACA is not recommended in case of DIC."

According to *Williams Obs 23/e, p 787*

"It use in most types of obstetric coagulopathy has not been efficacious & not recommended"

36. Ans. is a i.e. Acquired hemophilia *Ref. Ghai 6/e, p 322, 323; Harrison 16/e, p 342, 685*

Test	Significance	Abnormal in
• Bleeding time	Indicates abnormality in number and function of platelets	Idiopathic thrombocytopenic purpura, anaphylactoid purpura, leukemia
• Clotting time viz ╥ Prothrombin time	Indicator of extrinsic and common pathway of coagulation	Factor VII deficiency
• Activated partial thromboplastin time (APTT) or partial thromboplastin (PTT)	Indicator of intrinsic and common pathway of coagulation	Factor VIII, IX, XI and XIII deficiency, von Willebrand's disease

Both PT and APTT are prolonged in case of vitamin K deficiency, severe liver disease, factor V, X, and Fibrinogen deficiency and disseminated intravascular coagulation.

Disorder	Laboratory findings	
Lupus anticoagulant *…Leon speroff 7/e, p 1082*	• PT prolonged • PTT prolonged • Kaolin clotting time prolonged • Dilute Russel's Viper venom time prolonged	Not corrected by addition of plasma but by addition of excess phospholipid
DIC	• Platelet count decrease • PT prolonged • PTT prolonged • Thrombin time prolonged • Fibrinogen decreased • Fibrin degradation products increased	
Hemophilia	• PTT prolonged (due to deficiency of factor VIII) • PT normal • BT normal • Platelet count normal	

This means the patient is suffering from hemophilia. The question now arises whether it is acquired or inherited/congenital hemophilia.

Inherited congenital hemophilia:

- Is extremely rare in females.
- It is an x linked disorder seen mainly in males.

Acquired hemophilia

- It is a disorder in which antibodies develop against coagulation factors.
- Antibodies can develop against one coagulation factor or several factors.
- The most common target protein is factor VIII.
- Anti-factor VIII antibodies are seen in:
  - Hemophiliacs (apart from the congenital factor VIII or IX deficiency)
  - Post partum females
  - Due to drugs
  - SLE
  - Normal elderly individuals
- The patient in the question is a post –partum female who has developed antibodies against factor VIII (i.e. she is a case of Acquired hemophilia).
- The patients coagulation profile matches exactly with that of acquired hemophilia confirming our diagnosis.

37. Ans. is d i.e. All of the above *Ref. COGDT 10/e, p 992, for a and c, 997, for d; Sheila Balakrishnan, 1/e, p 490, 491*

Amniotic fluid embolism:
- It is usually fatal and is characterised by an abrupt onset of respiratory distress and coagulopathy.
- It should be considered in all cases of peripartum collapse.
- It is diagnosed clinically

Clinical features: *are due to 2 components:*
i. Embolic component causes acute respiratory distress syndrome and ultimately death.
ii. Coagulation failure causes hemorrhage, DIC and consumptive coagulopathy.
- Classically a woman in late labor or immediate postpartium gasps for air, has bronchospasm, becomes cyanotic and undergoes immediate collapse and cardiorespiratory arrest usually accompanied by haemorrhage.[Q]
- Sudden death is usual.

Timing:
- After ARM and at cesarean section.
- In labor with strong uterine contractions.
- Immediate postpartum.

38. Ans. is c i.e. Amniotic fluid embolism
Ref. COGDT 10/e, p 991, 992; Sheila Balakrishnan p 490, 491, Dutta Obs. 7/e, p 324, 325

In the question, the female is : – *Multiparous*
– *Advanced maternal age*
– *Fetus is dead.*

The patient is having strong uterine contractions and suddenly goes in shock with cyanosis, respiratory disturbance and pulmonary edema. All these favour the diagnosis of amniotic fluid embolism.

Amniotic fluid embolism : It is characterised by an abrupt onset of respiratory distress and coagulopathy.
- Amniotic fluid enters the circulation and sets up a disseminated intravascular coagulation, leading to consumptive coagulopathy.
- Classically a woman in late labour or immediate postpartum gasps for air, has bronchospasm, becomes cyanotic and undergoes immediate collapse and cardiorespiratory arrest, usually accompanied by hemorrhage. Sudden death is usual.
- It is diagnosed clinically.

Risk factors:

• Advanced maternal age	• Multiparity
• Tetanic uterine contraction	• Use of uterine stimulants
• Uterine rupture	• Cesarean section
• Premature separation of placenta	• Intra uterine fetal death.

Remember-Amniotic fluidenters maternal circulation as a result of breech in the physiological barrier that normally exists between maternal and fetal compartments-so any cause leading to this mixing like cesarean section,premature separation of placenta , rupture uterus etcpredisposes to amniotic fluid embolism.

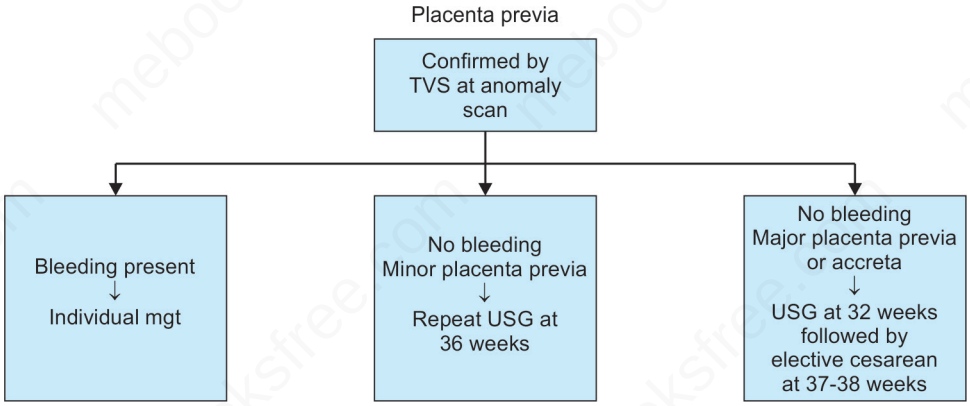
Most common timing for- Amniotic fluid embolism-
i. After ARM
ii. At cesarean section
iii. In labor with strong uterine contractions.
iv. Immediate postpartum.

Management: Aimed at minimizing hypoxemia with supplemental oxygen, mantaining blood pressure and managing associated coagulopathy.

39. Ans. is a i.e. Thrombocytopenia is a feature of fibrinolytic process and not of DIC *Ref. Dutta Obs. 7/e, p 628*

In DIC: Thrombocytopenia is seen i.e. on peripheral smear less than 4 platelets per high power field are present. Thrombocytopenia is a feature of DIC but not of fibrinolytic process (i.e. option a is incorrect and option d is correct). In DIC–RBC's are helmet shaped or fragmented but in fibrinolytic process RBC's are normal. As discussed earlier clot observation test is done in DIC.

40. Ans. is a i.e. 32 weeks *Ref. Fernando Arias 4/e, p 154*



41. Ans. is b i.e. Abruptio placenta *Ref. Williams 24/e, p 794, 801*

Incidence of:
Abruptio = 1 in 200 deliveries
Placenta previa = 1 in 300–400 deliveries
Vasa previa = 1 in 2000–3000 deliveries
Placenta accreta = 1 in 533 deliveries.

Postpartum Haemorrhage (PPH), Uterine Inversion and Shock

13

POSTPARTUM HAEMORRHAGE

Post Partum Hemorrhage (PPH) is blood loss of more than 500 ml from the genital tract following vaginal delivery and more than 1000 ml following cesarean.

Note: PPH is said to be minor if blood loss is between 500-1000 ml & major if it is >1000 mL. Major PPH is further divided into moderate if blood loss is 1000-2000 mL and massive if it is >2000 mL.

According to ACOG - ***PPH is defined as a drop in hematocrit of 10%.***

Table 13.1: Types of PPH

Primary PPH	Secondary PPH
Hemorrhage occurring within 24 hours following child birth Most common cause: Atonic PPH	Hemorrhage occurring after 24 hours and upto 6 weeks postpartum Most common cause: Retained placenta

Table 13.2: Causes of PPH

Atonic PPH (Tone)	It is the most common cause of primary PPH accounting for 90% of cases. The bleeding occurs as the blood vessels are not obliterated by contraction and retraction of uterine muscle fibres
Traumatic PPH (Trauma)	Genital tract injuries like: Lacerations of the cervix, vagina and perineum; Colporrhexis and Rupture uterus
Coagulopathy (Thrombin)	Disseminated intravascular coagulation (DIC) and hypofibrinogenemia are rare causes of PPH
Other causes (Tissue)	Retained products of conception

Remember: 4T's

Table 13.3: Predisposing factors of PPH

Atonic PPH	Traumatic PPH	Blood coagulopathy
• Grand multipara[Q] • Malnutrition / Anemia • Previous H/o atonic PPH • Antepartum hemorrhage < pl-previe placenta abruptio • Overdistended uterus due to multiple pregnancy[Q], hydramnios[Q] and macrosomia[Q] • Preeclampsa/hypertension • Obesity • Uterine malformations or fibroid uterus[Q] • Precipitate labour and prolonged labour[Q] (>12 hours) • Mismanaged third stage of labour • Inadvertent use of oxytocin • Use of general / epidural anaesthesia especially halothane • Retained placental fragments	• Instrumental delivery • Vaginal birth after cesarean • Face to pubis delivery • Precipitate labour • Macrosomia	• Abruption • Sepsis • Intrauterine death • Severe preeclampsia • HELLP syndrome

Diagnosis of PPH

$$\textbf{Shock Index} = \frac{\text{HR}}{\text{systolic BP}}$$

- Normal value = 0.5 – 0.7
- This has been used in intensive treatment units and trauma centre as a guide to estimate the amount of blood loss.
- If it increases above 0.9 – 1.11 then intensive resuscitation may be required.

Obstetric shock index (OSI):

- During pregnancy its normal value = 0.7 – 0.8
- OS9 >1– indicates massive haemorrhage and need for blood transfusion.

Urgency Grid: Based on OSI and shock index an urgency gridd has been proposed.

Table 13.4: Degree of blood loss and clinical findings in obstetric haemorrhage–the urgency grid

Loss of blood volume/% of blood volume	Systelic BP	Symptoms and signs	OSI	Degee of shock urgency
500–100 ml 10–15%	Normal BP	Palpitation, mild chycaidia, dizziness	< 1	Compensated
1000–1500 ml 15–30%	Slight fall in SBP (SBP = 80–100 mm of Hg). A, rise in diastolic BP leading to increased pulse pressure	Weakness, marked tachycardia, sweating	> 1	Mild grade 3
1500–200 30–40%	Moderate fall in SBP (70–80 mm of Hg)	Restlessness, marked tachycardia, pallor, oliguria	> 1.5	Moderate grade 2
> 2000 ml > 40%	Marked fall in SBP (50–70 mm of Hg)	Collapse, air hunger, anuria	> 2	Severe grade 1

Management

Step 1: General Measures: Including Resuscitative Measures + Investigations + Confirmation of Diagnosis

- The first and basic step in the management of PPH is resuscitation of the patient which includes:
  - Securing I/V lines
  - Volume restoration by crystalloids (normal saline / Ringer lactate)
  - Oxygen inhalation
  - Crossmatching and arranging for blood.
- At the same time investigations like Blood group, Hemoglobin, Clotting time, Coagulation profile, Electrolytes should be sent.
- The Cause of PPH i.e., whether it is atonic (diagnosed by abdominal palpation) or traumatic should be looked and managed accordingly.
- When diagnosis of Atonic PPH is confirmed – Uterus should be massaged continuously and medical methods should be adopted.

Step 2: **Medical management:** Atonicity is the most common cause of PPH. Any drug which increases the tone of uterus or the force of contraction is used to control PPH and is called oxytocic. *Ref. Dutta Obs. 7/e, p 416*

Commonly used oxytocics in the management of PPH

Table 13.5:

Drug	Dose	Route	Dose frequency	Side effects	Contraindications
Oxytocin (drug to prevent and treat PPH)	30–40 units in 500 mL of crystalloid solution and start at 125 ml/hr	First line: IV, second line: IM (10 units)	Continuous IV	• Nausea • Water intoxication	• Not to be given as IV bolus, but as infusion otherwise no complication

Contd...

Contd...

Methergin (drug to prevent and treat PPH)	0.5 mg IM or IV	First line IM/IV, second line PO	Every 2–4 hours	• Nausea • Vomiting • Hypertension	• Hypertension • Preeclampsia
15 methyl $PGF_{2\alpha}$ or carbo prost (Best drug to control PPH)	0.25 mg Never IV	First line IM, second line intrauterine	Every 15–90 min. (8 doses maximum)	• Nausea • Vomiting • Diarrhea • Chils	• Bronchial asthma • Active cardiac, renal of hepatic disease
Misoprostol (PGE_1)	200–1000 mcg (FIGO = 800 mcg oral)	Firstl line PR, second line PO	Single dose	• Nausea, vomiting, fever tachycardia	• Scarred uterus like previous cesarean scar

Remember: Initially for PPH, oxytocin or ergometrine (methergin) is given. If it fails to control the bleeding then 15 methyl $PGF_{2\alpha}$ or misoprostol is given.

Step 3: Mechanical methods: When medical methods fail to control PPH the following mechanical methods are adopted:

- Bimanual compression
- Uterine packing under anesthesia
- Balloon tamponade with a sengstaken tube inserted into the uterus.

} To create tamponade effect and compress placental bed

- **Shivkars pack** i.e condom inflated with saline and tied to a nasogastric tube can also be used as a tamponade.

Step 4: Surgical methods: When all other methods fail – Surgical intervention should be carried.

Surgical methods

If Family is not completed

- Application of B lynch sutures (COGDT 10/e, p 482, William Obs 23/e, p 776)
- Radiographic embolization of pelvic vesels (COGDT 10/ed p 481)
- Uterine and ovarian artery ligation
- Internal iliac artery ligation

↓

If these methods fail then hysterectomy is done as final resort.

Family is completed

↓

Hysterectomy

Details of Surgical method.

- ***B lynch Suture (Brace suture) is an alternative to vessel ligation technique in the surgical management of PPH. B lynch suture involves the use of vertical brace sutures, which appose the anterior and posterior walls of the uterus, which leads to compression of the fundus and the lower uterine segment, thereby controlling the hemorrhage.***
  - The main advantage is that it is very easy to perform and may obviate the need for a hysterectomy.
  - It is commonly performed at cesarean section but can also be done after vaginal delivery.
- ***Application of block sutures (multiple square sutures):*** The anterior and posterior uterine walls are approximated until no space is left in uterine cavity using block sutures / multiple squares.

Other sutures which can be used:
Hayman suture
Cho square
Gunshella suture.

- ***Uterine and ovarian artery ligation:*** It is easier than internal iliac artery ligation and can be tried as the first resort .
- **Internal iliac artery ligation (anterior division):** It should be considered before hysterectomy, especially in nullipara, as the uterus can be preserved.

  The artery is ligated about *3 cm from common iliac artery*. It will ensure that posterior division is not included in the ligature, as it may lead to loss of lower limb sensation (femoral artery and dorsalis pedis artery are branches of posterior division.

- ***Arterial embolisation:*** Done when patient is hemodynamically stable and good radiological facilities are available. Under fluoroscopic guidance femoral artery is catheterised, the bleeding vessel identified and embolisation is carried out using gel foam.
- ***Hysterectomy:*** It is the most definative method of controlling PPH and should be the last resort.

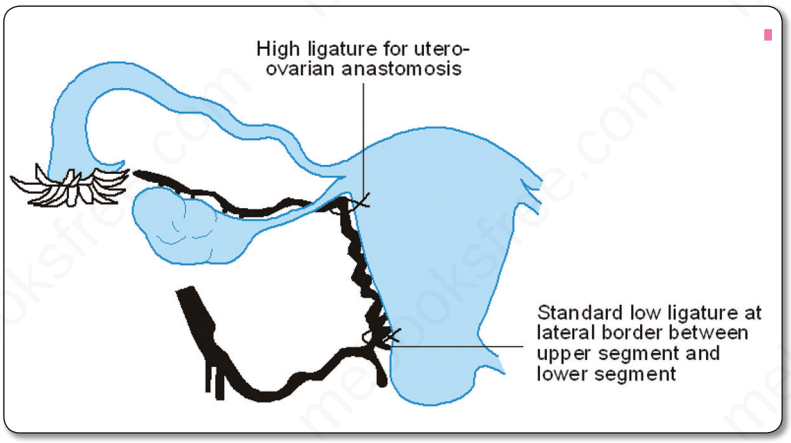


Fig. 13.1: Uterine and ovarian artery ligation

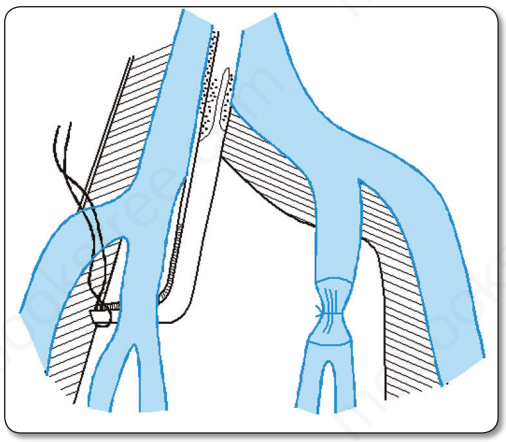


Fig. 13.2: Internal iliac artery ligation

EXTRA EDGE

Table 13.6:

Management algorithm for PPH (HEMOSTASIS) Proposed by Chandraharan and Arulkumaran	
H	Ask for help and hands on uterus
E	Establish aetiology, ensure ABC, ensure availability of blood and ecobolics (drugs that contract the uterus)
M	Massage of uterus
0	Oxytocin infusion/Prostaglandins
S	Shift to theatre – aortic pressure or antishock garment.
T	Tamponade balloon/ uterine packing (consider tranexemic acid 1 gm)
A	Apply compression suture
S	Systemic pelvic devascularization – uterine/internal iliac artery
I	Interventional radiology
S	Subtotal /total hysterectomy

TRAUMATIC PPH

- **2nd M/C cause of PPH** is Genital tract trauma
- M/C site for pelvic hematoma—vulva
- M/C artery to form vulvar hematoma—Pudendal A
- M/C artery to form vaginal hematoma—Uterine A and its branches

Management:

- A small hematoma (<5 cm) is managed conservatively using cold compress and analgesics.
  Indications for surgical management:
  - Hemodynamic instability
  - Increasing size of the hematoma
  - External pain.

- Surgical management consists of drainage of clot and obliteration of dead space using deep mattress sutures.

Extra Edge:
British committee of standards in hematology recommendations for maintaining coagulation parameters in massive haemorrhage

- Haemiglobin > 8 g/dl
- Platelet count > 75 × 10^9
- Fibrinogen > 1.0 g/dl
- Prothrombin < 1.5 mean control

PLACENTA ACCERETA

Placenta accreta is a type of morbidly adherent placenta where the placenta is firmly adherent to the uterine wall due to partial or total absence of the decidua basalis[Q] and the fibrinoid layer (Nitabuch layer)[Q].

The main aetiology is defective decidua formation.

Pathological Findings

- Absence of decidua basalis
- Absence of Nitabuch's fibrinoid layer

Classification/Variants

- **Placenta accreta** – chorionic villi are attached to the superficial myometrium.
- **Placenta increta** – villi invade the myometrium.
- **Placenta percreta** – villi penetrate the full thickness myometrium up to the serosal layer.

Risk Factors

- Placenta previa in present pregnancy (Note: previous placenta previa is not a risk factor[Q])
- History of operative interference like:
  - Previous cesarean section
  - Previous curettage
  - Previous manual removal
  - Previously treated Ashermann syndrome
  - Synaechiolysis
  - Myomectomy
- Multiparity
- Advanced maternal age > 35 years

Note
Highest rise of adherent placenta is with previous LSCS

Diagnosis

It is made mostly during attempted manual removal of placenta when the plane of cleavage between the placenta and uterine wall cannot be made out.[Q]

Prior to delivery: presumptive diagnosis may be made by:

- Transvaginal sonography—Visualization of irregular vascular sinuses with turbulent flow, myometrial thickness less than 1mm and absence of the subplacental sonoluscent zone[Q] (which represents the normal decidua basalis) indicates a placenta accreta.

- Doppler imaging-shows
  - A distance less than 1mm between the uterine serosal bladder interface and retroplacental vessels.
  - Presence of large intraplacental lakes.
  - It is useful in making diagnosis
  - MR9 is recommended when USG is inconclusive or if there is posterior previa.

Complications

- Antepartum haemorrhage (due to associated placenta previa)
- Uterine rupture before labour (due to myometrial invasion by placental villia at the site of previous C.S. scar.
- Postpartum haemorrhage
- Infection
- Inversion of uterus (rare).

Management

In partial morbid adherent placenta

- Removal of placental tissue in piecemeal
- The uterus should be actively contracting.Q (So GA is not used)
- Oxytocics should be used for this purpose
- Hemostasis should be maintained

In total placenta accreta

If female has completed her family → Hysterectomy

If female has not completed her family → *Conservative approach:* Cut the umblical cord as high as possible and leave the placenta as such. This is now the most recommended approach. The patient should be given antibiotics and methotrexate in hope of autolysis. β-hCG

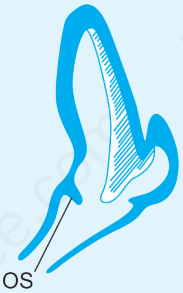
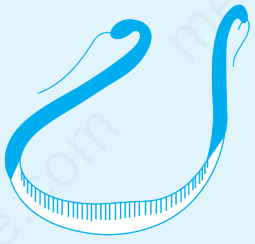
UTERINE INVERSION

- Uterine inversion is a condition in which there is inside out turning of the uterus.
- ***It is a rare cause of postpartum collapse but collapse occurs suddenly after labour.***
- It is acute in onset.

Aetiology

- **Mismanagement of the third stage (M/C cause)** – Attempting to deliver a placenta by cord traction that has not yet separated (Crede's method).
- Spontaneous inversion can occur with an atonic uterus (in 40% cases).
- Placenta accreta is a rare cause.

Varieties

First degree or dimpling	Second degree or partial	Third degree or complete
 OS Dimpling of the fundus	 Fundus protrudes through the internal os to enter the vagina	 Fundus protrudes through the vagina introitus

Clinical Features

- **Patient present with shock immediately after delivery,** degree of shock being out of proportion to the amount of bleeding.
- Shock is both neurogenic and later haemorrhagic because uterus becomes atonic.
- Bleeding is due to attempts to detach the placenta before correcting the inversion.
- Vaginal examination reveals a soft, globular swelling in the vagina or cervical canal.
- On abdominal palpation, the fundus of the uterus is felt to be absent[Q].

Management

- Resuscitation and replacement of inverted uterus should be done simultaneously.
- Manual replacement -Best step, if diagnosis is made immediately. The part which comes out first i.e fundus should be last to reposit. After replacing oxytocics should be given to promote contraction. This is called as **'Johnsons maneuver'.**
- **Hydrostatic O sullivan method**-Warm saline is run into vagina with labia apposed to prevent leakage. The vagina ballons withbthe fluid and the inversion corrects on ots own.
- Surgery-is done if above mesures fail.Huntingtons repair is by traction on the round ligaments with Allis forceps to pull up the inverted uterus. If this method fails **Haultains** method is adopted.

QUESTIONS

1. Most common cause of postpartum hemorrhage is: **[AIIMS Feb 97]**
a. Uterine atony
b. Retained products
c. Trauma
d. Bleeding disorders

2. The following complications during pregnancy increase the risk of postpartum hemorrhage (PPH) *except*: **[AI 06]**
a. Hypertension b. Macrosomia
c. Twin pregnancy d. Hydramnios

3. Atonic uterus is more common in: **[PGI Dec 97]**
a. Cesarean section b. Multigravida
c. Primigravida d. Breech delivery

4. All of the following are used in the treatment of postpartum hemorrhage *except*:
a. Misoprostol **[AI 03; AIIMS May 02]**
b. Mifepristone
c. Carboprost
d. Methyl ergometrine

5. Treatment of postpartum hemorrhage is all *except*: **[AIIMS Dec 97]**
a. Oxytocin b. Syntometrine
c. Oestrogen d. Prostaglandins

6. Which of the drug is not comonly used in PPH?
a. Mifepristone b. Misoprostol **[AI 08]**
c. Oxytocin d. Ergotamine

7. Massive PPH may warrant following interventions:
a. Hysterectomy **[PGI Dec 09]**
b. Thermal endometrial ablation
c. Internal iliac A. ligation
d. Balloon tamponade
e. Uterine artery embolisation

8. B Lynch suture is applied on: **[AI 03]**
a. Cervix b. Uterus
c. Fallopian tube d. Ovaries

9. True regarding PPH: **[PGI Nov 07]**
a. Type B lynch suture used
b. With new advances both atonic and traumatic PPH can be reduced
c. More common in multipara
d. Associated with polyhydramnios
e. Mifepristone used

10. A 30-year-old G3P2 woman with a history of hypertension presents to the birthing floor in labor. Following a prolonged labor and delivery with no fetal complications, she continues to bleed vaginally but remains afebrile. On bimanual examination, her uterus is soft, boggy, and enlarged. There are no visible lacerations. Uterine massage only slightly decreases the hemorrhage, and oxytocin is only mildly effective. Q Which of the following is the next best step in mgt:
a. Dilatation and curretage
b. PGF2A
c. Methylergometrine
d. Misoprost
e. Platelet transfusion

11. True about placenta accreta is: **[AIIMS Nov 99]**
a. Seen in cesarean scar
b. Removal should be done under GA in piecemeal
c. Chorionic villi invade serosa
d. It is an etiological factor for amniotic fluid embolism

12. Which is not a common cause of Placenta Accreta?
a. Previous LSCS **[AI 08/MP 09]**
b. Previous currettage
c. Previous myomectomy
d. Previous placenta previa/abrupto placenta

13. Placenta accreta is associated with:
a. Placenta previa **[PGI June 08]**
b. Uterine scar
c. Multiple pregnancy
d. Multipara
e. Uterine malformation

14. Minimum duration between onset of symptoms and death is seen in: **[AI 09]**
a. APH b. PPH
c. Septicemia d. Obstructed labor

15. A patient went into shock immediately after normal delivery, likely cause is: **[AIIMS Nov 2010]**
a. Amniotic fluid embolism **[AIIMS May 2013]**
b. PPH
c. Uterine inversion
d. Eclampsia

16. All of the following drugs are used for prevention and treatment of PPH *except*: **[PGI May 2013]**
a. Misoprostol
b. Oxytocin
c. Ergometrine
d. Carbiprost
e. Mifepristone

17. A female presents with significant blood loss due to postpartum haemorrhage (PPH). What would be the shock index (HR/systolic BP)? **[AIIMS Nov 12]**
a. 0.7–0.9 b. 0.5-0.7
c. 0.9-1.1 d. 0.1–0.5

18. The following statements are related to obstetric inversion: **[New Pattern Question]**

a. It is usually insidious in onset
b. It is usually acute
c. It is usually incomplete
d. In majority, it is spontaneous in nature

19. Which one of the following is not an operation for uterine inversion? **[New Pattern Question]**

a. O sullivan b. Haultain
c. Spincelli d. Fentoni

20. A 30-year-old woman para 6 delivers vaginally following normal labour with spontaneous delivery of an intact placenta. Excessive bleeding continues, despite manual exploration, bimanual massage, intravenous oxytocin and adminis-tration of 0.2 mg methergin IV, which one of the following would be the next step in the management of this patient? **[New Pattern Question]**

a. Packing the uterus
b. Immediate hysterectomy
c. Bilateral internal iliac ligation
d. Injection of PGF 2α

21. Common cause of retained placenta: **[New Pattern Question]**

a. Atonic uterus
b. Constriction ring
c. Placenta accreta
d. Poor voluntary expulsive effort

22. A 30-year-old G3P2 woman delivered a term baby and started bleeding after delivery. She was given in fluids but bleeding did not stop. The EMO advised blood transfusion. After how many blood trans-fusions should be given FFP: **[New Pattern Question]**

a. 1 b. 2
c. 3 d. 4

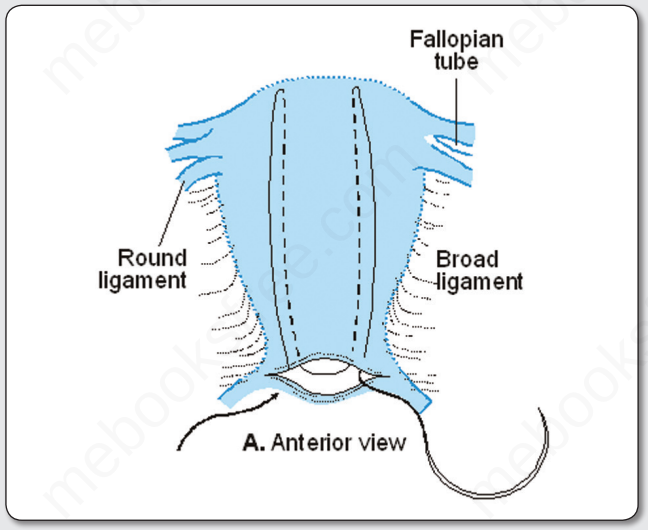
23. All of the following are used in management of PPH *except*: **[New Pattern Question]**

a. Blood
b. FFP
c. Cryoprecipitate
d. NOVO-7

24. The triple P procedure for placenta percreta involves all *except*: **[New Pattern Question]**

a. Pelvic devascularization
b. Placental localization using USG
c. Peripartum hysterectomy
d. Myometrial excision for placental nonseparation

25. Identify the suture shown plate–used for management of PPH: **[New Pattern Question]**



a. B lynch suture
b. Haymann suture
c. Cho square suture
d. Gunshella suture

EXPLANATIONS & REFERENCES

1. Ans. is a i.e. Uterine atony *Ref. Dutta Obs. 7/e, p 410*

- Most common cause of PPH or primary PPH is Atonic uterus
- Most common cause of secondary PPH is retained placenta

2. Ans. is a i.e. Hypertension *Ref. Dutta Obs. 7/e, p 411*

3. Ans. is b i.e. Multigravida *Ref. Dutta Obs. 7/e, p 411*

Friends, in the text question I have listed the predisposing factors for Atonic PPH. The list is long, but I remember I did not use any mnemonic for memorising it during my undergraduate and postgraduate exams. I memorized it by:

Obstetric history which points towards PPH:
- Grand multipara[Q] due to laxed abdomen
- H/o atonic PPH[Q] or adherant placenta

Examination findings which point towards PPH:

Obesity:
- Malnutrition and / or anemia
- Overdistended uterus due to:
  - Hydramnios[Q]
  - Multiple pregnancy[Q]
  - Macrosomia[Q]
- Gynaecological disorders:
  - Fibroid uterus
  - Uterine malformations

Factors increasing the risk of PPH at the time of delivery:
- Precipitate labour
- Prolonged labour
- Inadvertent use of oxytocics
- Use of general anaesthesia
- Mismanagement of third stage of labour
- Retained placental bits.

As far hypertension ***(Option 'a')*** is concerned.

Remember: Hypertension can lead to Antepartum hemorrhage (abruptio placenta), but not PPH.

4. Ans. is b i.e. Mifepristone

5. Ans. is c i.e. Oestrogen

6. Ans. is a i.e. Mifepristone *Ref. Dutta Obs. 7/e, p 415, 416; Williams Obs. 23/e, p 775; COGDT 10/e, p 481; Munro Kerr's 10/e, p 426, 427*

Atonicity is the most common cause of PPH. Any drug which increases the tone of uterus or the force of contraction is used to control PPH and is called oxytocic.

Commonly used oxytocics in the management of PPH are:
- Oxytocin
- Methergin
- Syntometrine – oxytocin + methergin
- 15 methyl $PGF_{2\alpha}$ (carboprost)
- Misoprostol (PGE_1)

7. Ans. is: a, c, d, and e i.e. Hysterectomy; Internal iliac A. ligation; Balloon tamponade and Uterine artery embolisation.

Discussed in detail in the text

8. Ans. is b i.e. Uterus *Ref. COGDT 10/e, p 482, 483*

- ***B lynch Suture (Brace suture) is an alternative to vessel ligation technique in the surgical management of PPH. B lynch suture involves the use of vertical brace sutures, which appose the anterior and posterior walls of the uterus, which leads to compression of the fundus and the lower uterine segment, thereby controlling the hemorrhage.***
- The main advantage is that it is very easy to perform and may obviate the need for a hysterectomy.
- It is commonly performed at cesarean section but can also be done after vaginal delivery.

Besides B lynch sutures, other sutures which can be applied on the uterus for managing PPH are:

- Haymann suture
- Cho square suture
- Gunshella suture

9. Ans. is a, b, c and d i.e. B lynch suture used; With new advances both atonic and traumatic PPH can be reduced; More common in multipara; and Associated with polyhydramnios *Ref. Dutta Obs. 7/e, p 411, 412, 417*

- PPH is more common in multipara due to laxed abdomen and associated factors like adherent placenta and anemia (i.e., ***option "c"*** is correct).
- Overdistension of uterus as in multiple pregnancy, hydraminos and large baby also lead to PPH (i.e., ***option "d"*** is correct).
- Incidence of atonic and traumatic PPH can be reduced with new advances or rather by intelligent anticipation, skilled supervision, prompt detection and effective institution of therapy. *—Dutta Obs. 6/e, p 413*
- B lynch suture are used for management of PPH *(Dutta Obs. 7/e, p 418).* ***(For more details about B lynch suture, see answer)***
- Mifepristone is not used in the management of PPH.

10. Ans. is b i.e PGF2A

This is a case of Atonic PPH as the patient has presented with vaginal bleeding immediately after delivery and uterus is not palpable per abdominally, i.e it has lost its tone.

In Atonic PPH the first step in management should be uterotonic agents like oxytocin or methylergometrine and if bleeding is not controlled by using either of it, straightaway PGF2α i.e carboprost should be used.

Note:

- If patient would have been an asthamatic then our answer would have been misoprostol since PGF2a is contraindicated in asthamatics.
- If patient would have presented 24 hours after delivery then the answer would have been Dilatation and curettage as the most common cause of secondary PPH, is retained placental bits.

11. Ans. is a i.e. Seen in cesarean scar *Ref. Dutta Obs. 7/e, p 419*

12. Ans. is d i.e. Previous placenta previa/abruptio placenta *Ref. Dutta Obs. 7/e, p 419*

13. Ans. is a, b and d i.e. Placenta previa; Uterine scar; and Multipara.

Ref. Dutta Obs. 7/e, p 419; Williams Obs. 23/e, p 776, 777; Munro Kerr's 10/e, p 432, 434

Discussed in detail in the text

14. Ans. is b i.e. PPH *Ref: Textbook of Prenatal Medicine by Kurjak and Chervenak 2/e, p 1945*

Friends – the most common of rapid death in obstetrics is PPH. In PPH, we can lose a patient within minute

"In sharp contrast to APH, which usually claims life after 10 hrs if left untreated. PPH kills swiftly often in less than 2 hrs if not properly treated" *—Textbook of Perinatal Medicine 2/e, p 1945.*

15. Ans. is c i.e. Uterine inversion *Ref. Sheila Balakrishna, Textbook of Obs 1/e, p 489, 490, 491*

Friends this is one of those questions where we can derive the answer by excluding other options as very little information has been provided to us.

Sudden post partum collapse – may be seen in all the four cases viz – amniotic fluid embolism, PPH, uterine inversion and eclampsia.

But in case of PPH antecedent H/O excessive blood loss, in eclampsia – H/O antecedent convulsions and in amniotic fluid embolism – H/O abrupt onset of respiratory distress before collapse should be present, which is not given in the question so these options are being excluded.

The clinical picture of acute inversion occurring in the third stage of labour is characterised by shock and haemorrhage, the shock being out of proportion to the bleeding.

Since this a problem which occurs due to mismanaged third stage of labour, patient doesnot have any complain in the antenatal period or during labour.

Uterine inversion – ***"It should be suspected whenever a woman has unexplained postpartum collapse."***

Textbook of Obs, Sheila Balakrishnan, p 489

Note: Although PPH is a more common cause of postpartum collapse than uterine inversion, but still the word 'shock immediately after normal delivery' prompts me to choose uterine inversion as the answer.

Remember

- If Q says-A female presents with shock after delivery: Most probable cause – **Answer is** PPH
- If Q says – A female presents with shock immediately after delivery. Most probable cause–**Answer** is uterine inversion.

16. Ans. is e i.e. Mifepristone

Repeat

17. Ans. is c i.e. 0.9 to 1.1 *Ref. Fernando Arias 4/e, p 391*

- **Shock index = heartrate/systolic BP**
- Normal = 0.5–0.7
- If it becomes 0.9–1.1 it indicates massive blood loss and need for intensive resuscitation.

18. Ans. is b i.e. It is usually acute *Ref. Williams Obs. 23/e, p 780, 781; Dutta Obs. 7/e, p 420*

- Uterine inversion is a condition in which there is inside out turning of the uterus.
- ***It is a rare cause of postpartum collapse but collapse occurs suddenly after labour.***
- It is acute in onset.
- Mostly uterine inversion is complete i.e. of third degree
- Most common cause of uterine inversion is mismanagement of the third stage of labour
- Spontaneous inversion can occur with an atonic uterus (in 40% cases).
- Placenta accreta is a rare cause of uterine inversion.

19. Ans. is d i.e. Fentoni *Ref. Dutta Obs. 7/e, p 422; IAN Donald Obstetrics 7/e, p 592*

Surgical Procedures to Correct Uterine Inversion

Vaginal operations	Abdominal operations	Hydrostatic method
• Spincelli • Kustner • Oejo	• Huntingtons procedures • Haultain	• O sullivan method • Oguch method

20. Ans. is d i.e. injection of PGF 2α

Ref. Dutta Obs. 7/e, p 416, Recent Advances in Obs and Gynae 24 Vol. edited by William Dunlop, p 93.

Management of Postpartum Hemorrhage follows an algorithm, but it is important to understand that PPH is an obstetrical emergency where resuscitative measures, specific measures as well as investigations should all be done at the same time.

Stepwise Management of PPH is given in detail in the text kindly go through it

Now coming on to the question:

- In the question, the female suffering from PPH is Para 6 (i.e., family completed). She has received injection oxytocin and methergin.

The question asks:

- Next step in the Line of Management – Which should be I/M injection of PGF2α.

"PGF2α —It is a second line agent for uterine atomy. This is 80-90% effective in stopping PPH in cases that are refractory to oxytocin and ergometrine". *—Recent Advances in Obs and Gynae 24 Vol. edited by William Dunlop, p 93.*

If the question would have said:

- Best management – It would definitely be *'hysterectomy'* in this case.

21. Ans. is a i.e. Atonic uterus *Ref. Textbook of Obstetrics by Shiela Balakrishnan, p 486; Dutta Obs. 7/e, p 418*

Retained placenta is defined as failure of the placenta to be expelled within 30 min of delivery of the fetus.

Retained placenta can be due to: – Trapped placenta
– Morbidly adherent placenta (described in detail earlier)

Trapped placenta: Here the placenta, is trapped in the uterus, but is not adherent.

- **The commonest cause of retention of separated placenta is atonic uterus.**
- Placenta can also get trapped due to constriction ring (hour glass contraction) or premature attempts to deliver the placenta before it is separated.
- Hour glass contraction of the uterus is a type of constriction ring and is usually produced by prophylactic use of ergometrine or unnecessary manipulation of the uterus. The uterus is hard and contracted and the internal os is usually closed.

22. Ans. is d i.e. 4 *Ref. Practical Guide to High Risk Pregnancy – Fernando Arias 4/e, p 395*

- The most important initial resuscitating step of PPH is fluid management.Till blood is not available this is done using colloids and crystalloids which although replaces fluid but worsens existing coagulopathy.
- Therefore blood transfusion should be followed by transfusion of fresh frozen plasma and platelets. This is done after 4 units of blood transfusion i.e. ratio of FFP : Platelets: RBC = 1:1:4. These days latest recommendations for massive PPH are 1:1:1, i.e. after every unit of blood transfusion, 1 unit of FFP and 1 unit of platelets should be given to correct the ongoing coagulopathy. But this is still to be implemented.

23. Ans. is d i.e. NOVO-T *Ref. Fernando Arias 4/e, p 393*

For fluid resuscitation after PPH following are used

1. Colloids and cryst alloids
2. Blood
3. Fresh frozen plasma – to correct clotting factor deficiency given, if 4U of blood has been given or, if PT>1.5
4. Cryoprecipitate
5. Platelets (if platelet count <50,000 or, if 4 units of blood have been transfused).

NOVO T is activated factor 7. Its role is well, established in haemophilia. Activated factor VII (NOVOT) acts by binding with tissue factor to augment intrinsic clotting pathway by activating factor IX and X. However its role is obstetrical haemorrhage is uncertain and moreover it is not used in these cases due to risk of thromboembolic events like MI.

24. Ans. is c i.e. Peripartum hysterectomy *Ref. Fernando Arias 4/e, p 396*

Triple P procedure has been developed for placenta percreta as a conservative surgical alternative to peripartum hysterectomy. It consists of following 3 steps:

1. Perioperative placental localization and delivery of fetus via transverse uterine incision above the upper border of placenta.
2. Pelvic devascularization
3. Placental nonseparation is dealt with myometrial excision and reconstruction of uterine wall.

25. Ans. is a i.e. B lynch suture

The sutures shown in the figure, are B lynch sutures–applied on uterus for managing PPH.

14

Multifetal Pregnancy

QUESTIONS

1. According to Hellin's law chances of twins in pregnancy are: **[PGI Dec 00]**

a. 1 in 60 b. 1 in 70
c. 1 in 80 d. 1 in 90
e. 1 in 100

2. Monochorionic monoamniotic twin occurs if division occurs: **[New Pattern Question]**

a. Before 24 hours b. 1-4 days
c. 4-8 days d. > 8 days

3. Twin peak sign seen in: **[PGI Dec 05]**

a. Monochorionic diamniotic
b. Dichorionic monoamniotic
c. Conjoined twins
d. Diamniotic dichorionic
e. None of the above

4. Which of the following statements about twinning is true? **[New Pattern Question]**

a. The frequencies of monozygosity and dizygosity are the same
b. Division after formation of the embryonic disk result in conjoined twins
c. The incidence of monozygotic twinning varies with race
d. A dichorionic twin pregnancy always denotes dizygosity
e. Twinning causes no appreciable increase in maternal morbidity and mortality over singleton pregnancies

5. Twin pregnancy predisposes to: **[New Pattern Question]**

a. Hydramnios
b. Pregnancy induced hypertension
c. Malpresentation
d. All of the above

6. Complication specific to monoamniotic twins is: **[New Pattern Question]**

a. TTTS b. Cord entanglement
c. TRAP d. Acardiac twin

7 Absolute proof of monozygosity is determined by:

a. DNA finger printing **[New Pattern Question]**
b. Intervening membrane layers
c. Sex of the babies
d. Reciprocal skin grafting

8. Correct statement about establishing the chorionicity in twin pregnancy is: **[AI 10]**

a. Same sex rule out dichorionicity
b. Twin peak in dichorionicity
c. Thick membrane is present in monochorionic
d. Best detected after 16 weeks

9. Best time for detecting chorionicity twin pregnancy on USG is: **[New Pattern Question]**

a. 8–12 weeks
b. 10–14 weeks
c. 14–18 weeks
d. 16–24 weeks

10. The placenta of twins can be: **[New Pattern Question]**

a. Dichorionic and monoamniotic in dizygotic twins
b. Dichorionic and mooamniotic in monozygotic twins
c. Monochorionic and monoamniotic in dizygotic twins
d. Dichorionic and diamniotic in monozygotic twins

11. A 26-year-old primigravida with a twin gestation at 30 weeks presents for a USG.The sonogram indicates that the fetuses are both male and the placenta appears to be diamniotic and monochorionic.Twin B is noted to have oligohydramnios and to be much smaller than twin A.In this clinical scenario ,all of the following are concerns for twin A *except*: **[New Pattern Question]**

a. CHF
b. Anemia
c. Hydramnios
d. Widespread thromboses

12. Most common type of twin pregnancy is:
a. Vertex + transverse **[PGI June 97, MP 08]**
b. Both vertex
c. Vertex + breech
d. Both breech

13. True statement regarding twin delivery is: [AI 12]
a. First twin has more chances of asphyxia
b. Second twin has more chances of developing polycythemia
c. Second twin has more chances of developing hyaline membrane disease
d. Increased mortality in first twin

14. Vaginal delivery is allowed in all *except*:
[AI 09/AIIMS May 11]
a. Monochorionic monoamniotic twins
b. First twin cephalic and second breech
c. Extended breech
d. Mento anterior

15. Blood chimerism is maintained by: [AI 11]
a. Monochorinonic dizygotic twins
b. Dichorionic dizygotic twins
c. Vanishing twins
d. Singleton pregnancy

16. To say twin discordance the differences in the two twins should be: [AIIMS May 02]
a. 15% with the larger twin as index
b. 15% with the smaller twin as index
c. 25% with the larger twin as index
d. 25% with the smaller twin as index

17. Indications of urgent delivery of the second baby in twin are all *except*: [New Pattern Question]
a. Abruptio placentae
b. Cord prolapse of the second baby
c. Inadvertent use of IV ergometrine with the delivery of the anterior shoulder of the first baby
d. Breech presentation of the second baby

18. In superfecundation which of the following is seen: [New Pattern Question]
a. Fertilization of 2 ova released at same time, by sperms released at intercourse on 2 different occasions
b. Fertilization of 2 ova released at same time by sperms released at single intercourse
c. Both of the above
d. None of the above

19. A double headed monster is known as a: [New Pattern Question]
a. Diplopagus b. Dicephalus
c. Craniopagus d. Heteropagus

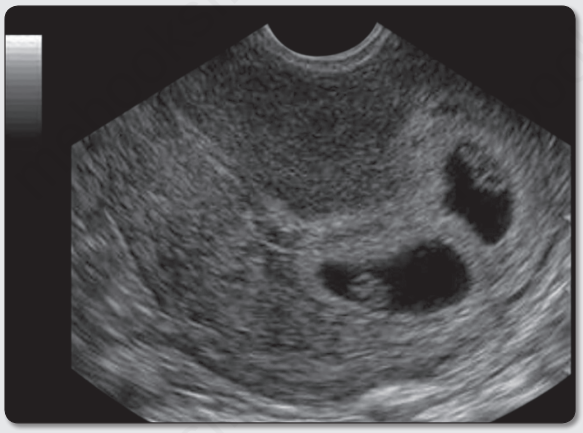
20. In multiple pregnancy, foetal reduction is done by: [AIIMS June 98]
a. KCl
b. Mifepristone
c. PGF2-alpha
d. Methotrexate

21. Embryo reduction of multiple pregnancy is done at: [New Pattern Question]
a. 8–10 weeks
b. 11–13 weeks
c. 13–15 weeks
d. 16–18 weeks

22. Lowest frequency of twin pregnancy is seen in: [New Pattern Question]
a. Nigeria b. Philippines
c. India d. Japan

23. Uncomplicated triplet should be delivered by: [New Pattern Question]
a. 34 weeks b. 35 weeks
c. 37 weeks d. 38 weeks

24. Identify the type of twin pregnancy as seen in the USG–plate: [New Pattern Question]



a. Monochorionic monoamniotic
b. Monochorionic diamniotic
c. Dichorionic diamniotic
d. Conjoint twin

EXPLANATIONS & REFERENCES

1. Ans. is c i.e. 1 in 80 *Ref. Dutta Obs. 7/e, p 202*

According to Hellin's rule

The mathematical frequency of multiple pregnancy is:

- Twins — 1 in 80
- Triplets — 1 in $(80)^2$
- Quadruplets — 1 in $(80)^3$ and so on

Also know:

- The incidence of twins is highest in Nigeria (1 in 20)Q
- It is lowest in Japan
- Incidence in India - 1 in 80Q
- Incidence of twins is increasing in India because of the use of ovulation inducing drugs like clomiphene, gonadotrophins.Q

- The incidence of monozygotic twins is constant throughout the world - 1 in 250.
- The incidence of dizygotic twins changes and is responsible for world wide variation in incidence.
- The incidence of dizygotic twins increases with:
  - Increasing maternal age
  - Increasing parity
  - Family history of twinning
  - Ovulation induction with clomiphene citrate or gonadotrophins.

2. Ans. is d i.e. >8 days *Ref. Dutta Obs. 7/e, p 200*

Monozygotic Twins

↓ Division of single fertilised ovum

<3 days	**4-8 days**	**>8 days**	**>14 days**
dichorionic diamniotic	monochorionic diamniotic	monochorionic monoamniotic	conjoined twin

3. Ans. is d i.e. Diamniotic dichorionic *Ref. Dutta Obs. 7/e, p 203; Williams Obs. 23/e, p 864, 865*

Friends, before going into the details of **twin peak sign** – It is important to understand some important terms related to twin pregnancy.

Zygosity - refers to the type of conception.

Twins can be:

Dizygotic (75%)	*Monozygotic (25%)*
Arising from fertilisation of two ova by different spermatozoa.	They arise from splitting of single fertilized ovum and hence are always of the same sex and look like.

Chorionicity - denotes the type of placentation:

- In dizygotic twins - each twin has its own placenta, chorion and amnion, i.e. dizygotic twins are always dichorionic diamniotic. (i.e. 2 chorions and 2 amnions).
- In monozygous twins, the time at which the fertilised ovum divides - decides the chorionicity.

Monozygotic twins

↓ Division of single fertilised ovum

< 3 days	4 - 8 days	> 8 days	> 14 days
dichorionic diamniotic	monochorionic diamniotic (most common)	monochorionic monoamniotic	conjoined twin

- Chorionicity is of clinical significance as dichorionic twins, whether monozygous or dizygous, develop as two distinct individuals and are hence not at increased risk of complications. Whereas monochorionic twins are at increased risk because of the vascular anastomosis between the two circulations.
- Chorionicity can be detected prenatally by ultrasound (Best time – 6 to 9 weeks of gestation).

Ultrasound Differentiation of Chorionicity

Criterion	Monochorionic	Dichorionic
• Placenta	Single	Double
• Fetal sex	Concordant	Discordant/Concordant
• Membrane	< 2 mm	> 2 mm
• Number of layers in membrane	Two (2 amnion)	Four (2 amnion, 2 chorion)
• Twin peak sign	Absent	Present

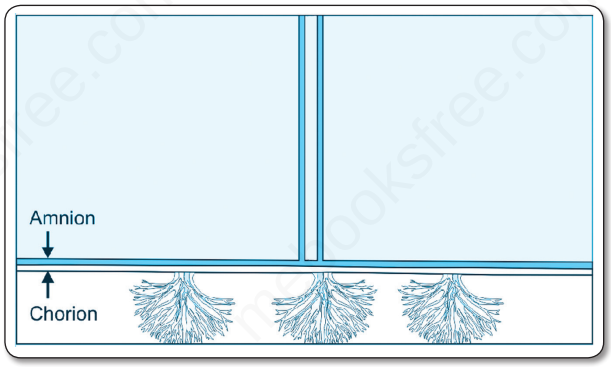


Fig. 14.1: USG appearance in monochorionic twins

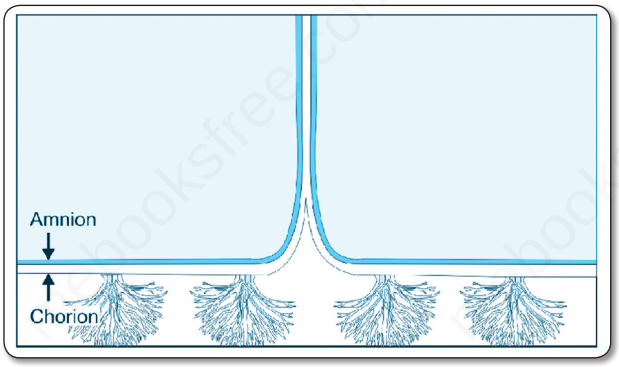


Fig. 14.2: Twin peak sign seen in dichorionic twins

Ultrasound Determination of Chorionicity

- **Number of sacs:** This is applicable only before 10 weeks when 2 sacs indicate dichorionic and single sac indicates monochorionic pregnancy.
- **Placenta:** Two placentae indicate a dichorionic pregnancy.
- **Sex:** Discordant sex indicates dichorionicity but concordant sex does not imply monochorionicity.
- Intertwin membrane: is thicker and more echogenic in dichorionic twins, whereas it is thin in monochorionic.

Note: It is best examined between 16-24 weeks, near the placental insertion of membranes.

- **Twin peak or lambda sign:** It is characteristic of dichorionic pregnancies and is due to the chorionic tissue between the two layers of the intertwin membrane at the placental origin. A potential space exists in the intertwin membrane which is filled by proliferating plancental villi, giving rise to a twin peak sign. Twin peak appears as a triangle with base at chorionic surface and apex in interwin membrane. In monochorionic twins there is no chorionic tissue, and interwin membrane is composed of 2 amnion only giving rise to the "T" sign on ultrasound.

4. Ans. is b i.e Division after formation of the embryonic disk result in conjoined twins

Dutta Obs 7/e, p 200,202, 204, 205

- As discussed in answer 1–frequency of MZ and DZ twins is not same, DZ twins are more common.
- The incidence of MZ remains same throughout the would (1 in 250 pregnancies) whereas incidence of DZ twins varies with race.
- As discussed in previous answer: DZ twins are always dichorionic but MZ twins can either be monochorionic on dichorionic

∴ It is incorrect to say dichorionic twins one always dizygotic (i.e. option d is incorrect).

- In twin pregnancies: there is a higher risk of low birth weight babies and preterm labor. Multiple pregnancies are commonly associated with moderate to severe anemia, gestational hypertension, malpresentation, polyhydramnios, cord prolapse,abruption or placenta previa in mother (i.e. option e is incorrect).

5. Ans. is d i.e. All of the above *Ref. Dutta Obs. 7/e, p 206*

Complications of Twin Pregnancy

Maternal Complications	
Antepartum	***Intrapartum***
• Hyperemesis • Hydramnios[Q] • Pre-eclampsia[Q] • Pressure symptoms • Anaemia • Antepartum hemorrhage[Q]	• Dysfunctional labour • Malpresentations • Increased chance of operative delivery[Q] • Postpartum hemorrhage[Q] • Retained placenta

Fetal Complications	
Antepartum	***Intrapartum***
• Prematurity[Q] • IUGR[Q] • Single fetal demise • Monochorionic monoamniotic twins • Twin-twin transfusion syndrome[Q] • Vanishing twin and abortion[Q] • Congenital anomalies including *acardiac fetus and conjoined twins*[Q]	• PROM and cord prolapse[Q] • Abruption in the second twin[Q] • Interlocking of twins (extremely rare)

Complications Specific to Monochorionic Twins
- Twin-twin transfusion syndrome[Q]
- Conjoined twinning[Q]
- Acardiac fetus
- Selective IUGR
- Single fetus demise.

Complications Specific to Monoamniotic Twins
- Cord entaglement

6. Ans. is b i.e. Cord entanglement *Ref. Williams 24/e, p 902*

Monochrionic twin pregnancy is associated with a specific complication i.e. cord intanglement because both twins lie in the same sac.

Remember: In monoamiotic twins, detailed fetal heart rate monitoring should begin from 26–28 weeks.

- They should be delivered at **34 weeks by cesarean section**.

Note: Acardiac twin, Twin to Twin Transfusion Syndrome (TTTS) and Twin Reversed Arterial Perfusion (TRAP–another name for acardiac twin) are complications seen in monochorionic diamniotic twins

7. Ans. is a i.e. DNA finger printing *Ref. Dutta Obs. 7/e, p 201*

The most definite proof of monozygosity is DNA finger printing by DNA microprobe technique.

Summary of Determination of Zygosity

	Placenta	Communicating vessels	Intervening membranes	Sex	Genetic features (dominant blood group) DNA finger printing	Skin grafting (Reciprocal)	Follow-up
Monozygotic	One	Present	2 (amnions)	Always identical	Same	Acceptance	Usually identical
Dizygotic	Two (most often fused)	Absent	4 (2 amnions 2 chorions)	May differ	Differ	Rejection	Not identical

8. Ans. is b i.e. Twin peak in dichorionicity *Ref: Dutta Obs.. 7/e, p 204, Williams Obs 23/e, p 864, 865*

"Chorionicity of the placenta is best diagnosed by ultrasound at 6 to 9 weeks of gestation. In dichoronic twins there is a thick septum between the chorionic sacs. It is best identified at the base of the membrane, where a triangular projection is seen. This is known as lambda or twin peak sign. Presence of lambda or twin peak sign indicates dichorionic placenta"
—Dutta Obs. 7/e, p 207

So it is clear that lambda/Twin peak sign clearly indicates dichorionic placenta and is hence the correct **option 'b'**.

As far as other options are concerned.

Option a – Same sex rules out dichorionicity, this is incorrect because—

Twins of opposite sex are almost always dizygotic dichorionic but same sex does not rule out dichorionicity.

Option c – Thick membrane is present in monochrionic twins—

This is also incorrect because monochorionic means there is a single chorion whereas dichorionic means there are 2 chorions so obviously dichorionic membrane will be thick.

"Monochorionic pregnancies have a dividing membrane that is so thin, it may not be seen until the second trimester. The membrane is generally less than 2mm thick and magnification reveals only 2 layers (of amnion)"
—Williams Obs. 23/e p 864

Option d – Chorionicity is best detected after 16 weeks—

Again this statement is incorrect because the best time to detect chrorionicity by USG is between 6 to 9 weeks.

—Dutta Obs. 7/e, p 207

9. Ans. is b i.e. 10–14 weeks *Ref. High risk pregnancy areas 4/e, p 177*

Best time to detect chorionicity by USG is between 11–14 weeks, although twin peak sign can be seen until 20 weeks.

10. Ans. is d i.e Dichorionic and diamniotic in monozygotic twins

Ref. Dutta Obs. 7/e, p 200, 201, Williams 23/e, p 861 figure 39.2

- As discussed in previous questions dizygotic twins always have dichorionic and diamniotic placentas (i.e option a and c are incorrect).
- Monozygotic twins can have monochorionic/monoamniotic placentas depending upon the time of division…but always remember- Amnion develops after the chorion, so dichorionicity implies diamnionicity … it can never be that a twin is dichorionic but monoamniotic (i.e option b is incorrect).

11. Ans. is b i.e Anemia *Ref. Dutta Obs. 7/e, p 206-207, Williams Obs. 23/e, p 874*

This scenario represents a typical case of twin to twin transfusion syndrome.

Twin to twin transfusion syndrome (TTTS)

- **It is always seen in monochorionic placenta. M/C in monochorionic diamniotic pregnancy than monochorionic monoamniotic pregnancy.**
- There is an arteriovenous malformation such that there exists a communication from the umbilical arterial system of the "donor" twin to the umbilical vein of the "recipient" twin.
- The donor twin is growth restricted, hypovolemic, has oligohydramnios and is anemic because it gives blood to the recipient twin. The recipient is larger, hypervolemic, has polyhydramnios and is plethoric. It has also been termed as **Twin Oligohydramnios/Polyhydramnios Sequence (TOPS).**
- The earlier the TOPS appears, worse will be the prognosis.
- TTTS is more common in female fetuses.
- TTTS can cause preterm delivery due to polyhydramnios, IUGR or fetal demise.
- Coming to the question—Twin A is the recipient twin and Twin B is the donor twin since it has oligohydramnios. Thus twin A can have CHF—due to volume overload, can have hydramnios and can have thrombosis since it has polycythemia which can lead to thrombosis, but it will never have anemia.

Also Know

Diagnosis of TTTS

According to the **Society for Maternal-Fetal Medicine (2013)**, TTTS is diagnosed based on two criteria:

- Presence of a monochorionic diamnionic pregnancy, and
- Hydramnios defined if the largest vertical pocket is > 8 cm in one twin and oligohydramnios defined if the largest vertical pocket is < 2 cm in the other twin.

Once identified, TTTS is typically staged by the **Quintero (1999) staging system:**
- Stage I—discordant amnionic fluid volumes as described above, but urine is still visible sonographically within the bladder of the donor twin.
- Stage II—criteria of stage I, but urine is not visible within the donor bladder.
- Stage III—criteria of stage II and abnormal Doppler studies of the umbilical artery, ductus venosus, or umbilical vein.
- Stage IV—ascites or frank hydrops in either twin.
- Stage V—demise of either fetus.

Prognosis

The prognosis for multifetal gestations complicated by TTTS is related to Quintero stage and gestational age at presentation. More than three-fourths of stage I cases remain stable or regress without intervention. Conversely, outcomes in those identified at stage III or higher are much worse, and the perinatal loss rate is 70 to 100 percent.

Management

The preferred management these days is **fetoscopic laser ablation of the anastomosis**. Selective reduction can be considered if severe amniotic fluid and growth disturbances develop before 20 weeks.

12. Ans. is b i.e. Both vertex *Ref. Dutta Obs. 7/e, p 202, 203*

- In twins most common lie of both the fetus at term is longitudinal.[Q]
- Rarest lie is both the twins transverse.[Q]

Presentations

• Both vertex (Most common)	60%
• Vertex (Ist) – Breech (IInd)	20%
• Breech (Ist) – Vertex (IInd)	10%
• Both Breech	8-10%

Note: **Interlocking of twins is a rare complication seen in twins with Ist Breech presentation and IInd vertex presentation.**

13. Ans.is b i.e Second twin has more chances of developing polycythemia

Ref. Fernando Arias 3/e, p 312, Dutta Obs. 7/e, p 206

- Twin pregnancy in general is associated with higher incidence of perinatal morbidity and mortality.
- Perinatal mortality in twins is 5 times greater than in singleton pregnancies.
- Perinatal mortality in twins varies with birth order and the type of placentation.
- "Second twins do not do as well as the first twin…perinatal mortality being 9% for the first twin and 14% for the second twin". *—Fernando Arias 3/e, p 297*
- Also monochorionic—monoamniotic twins have a poor prognosis, perinatal mortality being 50%.
- Now with this background lets see each option separately.

Option a: *First twin has more chances of asphyxia*—incorrect as:

- *"Asphyxia and stillbirth are more common (in twin pregnancy) due to increased prevalence of pre-eclampsia, malpresentations, placental abruption and increased operative interferences. The second baby is more atrisk.* *—Dutta Obs. 7/e, p 206*

Option b: Second twin has more chances of developing polycythemia:

- This statement can be true as second baby has more chances of asphyxia which can stimulate erythropoeisis in the second twin. Also there are chances of bleeding from the first twin into the second twin in case of monochorionic twins which can cause polycythemia.

Option c: Second twin has more chances of developing hyaline membrane disease—this is incorrect as is evident from the following lines of Williams:

- *"As measured by determination of the lecithin and sphingomyelin ratio, pulmonary maturation is usually synchronous in twins."* *—Williams 23/e, p 880*
- Hence second twin does not have increased chances of developing hyaline membrane disease.
- **Remember:** This does not apply to discordant twins, in discordant twins the growth retarded fetus usually has a more advanced degree of lung maturity than the other, therefore timing of delivery of the discordant twin should be based on the testing of amniotic fluid surrounding the larger twin *—Fernando Arias 3/e, p 312*
- Coming to the last option—Increased mortality in first twin (option d)

As discussed in the begining:

- *"Second twins donot do as well as the first twin…perinatal mortality being 9% for the first twin and 14% for the second twin"* —Fernando Arias 3/e, p 297
- Thus **option d** is also incorrect.

14. Ans. is a i.e. Monochorinoic monoamniotic twins *Ref. Fernando Arias 3/e, p 314; Dutta Obs. 7/e, p 210*

- In face presentation the best presentation is mento anterior, especially left mento anterior and delivery is possible. (i.e. option a is correct)
- In twins, the chances of vaginal delivery are high if the first twin or presenting twin is cephalic. (i.e. option b is correct)
- Extended breech is the commonest breech presentation and is also the best possible presentation for a normal vaginal delivery in breech (option c is correct)
- In Monochorionic monoamniotic presentations the twins share a single amniotic sac and placate so there is almost a 50% incidence of cord accidents and that is one reason which even prompts to do a preterm cesarean to many practioners to avoid a sudden fetal cord entrapment and fetal death.

"A situation requiring cesarean delivery in twin pregnancy is a monoamniotic placentation. The fetal mortality in these pregnancies is greater than 50% and the overwhelming cause is cord accidents such as cord prolapse or entaglement." —Fernando Arias 3/e, p 314

Also Know

Indications of Cesarean in Twins and Malpresentations.

Twins	Malpresentations
a. Twins with bad prognosis viz—Conjoint twins and b. Monochorionic and monoamniotic twins c. Twin to twin transfusion syndrome(seen in monochorionic twins) d. Discordant twin with weight of smaller twin less than 1500 gm e. Severe IUGR of one or both twins f. First twin non vertex *Obstetrical factors like-contracted pelvis, fetal distress*	a. Transverse lie b. Brow presentation c. Face-mentoposterior presentation d. Breech-Footling/Knee presentation

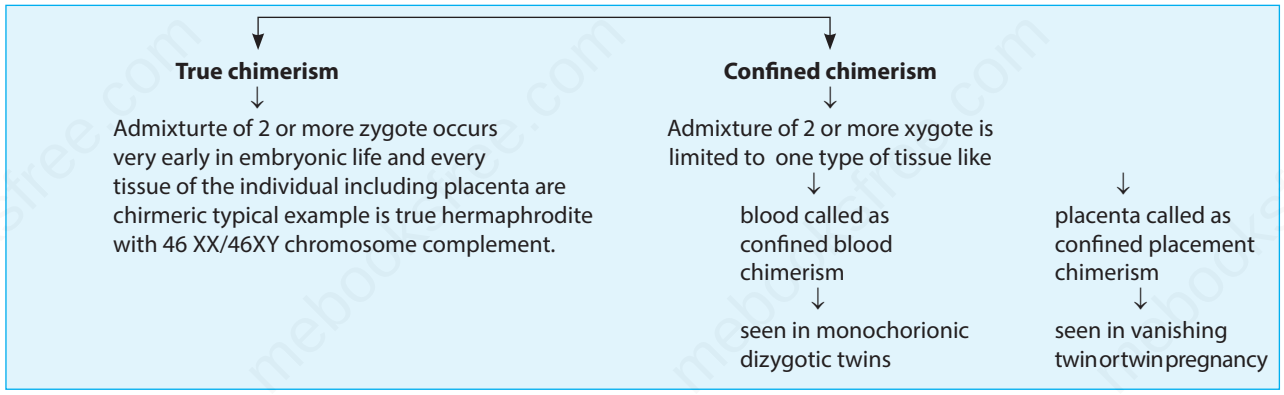
Note: There is no valid reason to perform LSCS in all cases of second twins for noncephalic presentation.

15. Ans. is a i.e. Monochoronic dizygotic twins

Ref. Placental Chimerism in Early Human Pregnancy. Indian Journal of Human Genetics, Year 2005 Vol 11, Issue 2, p 84, 85

In biology, the word chimerism is used when an organism contains cell population from two or more zygote.

This may be:



From the above text, the answer to our question is quite obvious that blood chimerism is seen in monochorionic dizygotic twins.

But here I would like ot point out that in the chapter on multifetal pregnancy we have read dizygotic twins aer dichorionic so how do we explain the phenomenon of monochorionic dizygotic twinning.

Monochorionic Dizygotic Twins

Monochorionic diamniotic placeneta is rate in dizygotic twins. All cases which have been documented are observed by induction of ovulation along or during IVF cycle.

The most possible cause explaining this phenomenon is formation of 2 placentas originating from two zygotes early in pregnancy which unite to form an architecturally single placenta. The newly formed blood vessels create an anastomosis between the dizygotic twins and allow reciprocal blood chimerism. Since the incidence of IVF is on increase, cases of monochorionic dizygotic twins is also increasing recently.

16. Ans. is c i.e. 25% with the larger twin as index *Ref. Williams Obs. 23/e, p 876, 877*

Unequal sizes of twin fetuses with a difference of 25% (larger twin being used as the index), is called as Discordant growth.

- It is a sign of pathological growth restriction in the smaller fetus.
- As the weight difference within a twin pair increases and the earlier the growth discordance is evident, perinatal mortality increases.
- Most common cause of discordance:
  In dichorionic twins – unequal placental mass.
  In monochorionic twins – Twin-twin transfusion syndrome/genetic syndrome.
- Hazards of discordant growth.
  The smaller fetus is at increased risk of perinatal mortality due to:
  - Respiratory distress
  - Intra ventricular hemorrhage
  - Seizure
  - Sepsis
  - Periventricular leukomalacia
  - Necrotising enterocolitis.

At a difference of more than 30%—Risk of fetal death increases.

Extra Edge

- Besides weight—other ultrasonographic parameters indicating discordance:
  - Difference in biparietal diameter is 6 mm or more.
  - Difference in head circumference is 5% or more.
  - Difference in abdominal circumference is 20 mm or more.
  - On colour Doppler ultrasound in umbilical arteries systolic to diastolic (S/D) ratio difference is 15% or more.

But amongst all criterias best is fetal weight difference i.e. more than equal to 25%.

- Route of delivery: In case of discordant growth vaginal delivery is indicated if:
  - Cervix is ripe
  - Presentation is vertex/vertex
  - Weight of smaller twin is > 1500 gm.

17. Ans. is d i.e. Breech presentation of the second baby *Ref. Dutta Obs. 7/e, p 208*

> The interval between delivery of twins should be less than 30 minutes. If there is a delay of more than 30 minutes, interference should be done..

But there are some conditions in which urgent delivery of the second baby is required –

Indications of urgent delivery of the second baby: (1) Severe (intrapartum) vaginal bleeding (2) Cord prolapse of the second baby (3) Inadvertent use of intravenous ergometrine with the delivery of the anterior shoulder of the first baby (4) First baby delivered under general anesthesia (5) Appearance of fetal distress.

Management: In all these conditions, the baby should be delivered quickly. A rational scheme is given below which depends on the lie, presentation and station of the head.

- Head
  - If low down, delivery by forceps
  - If high up, delivery by internal version under general anesthesia.
- Breech should be delivered by breech extraction
- Transverse lie—internal podatic version followed by breech extraction under general anesthesia.

If, however, the patient bleeds heavily following the birth of the first baby, immediate low rupture of the membranes usually succeeds in controlling the blood loss.

Remember:
The only indication for internal podatic version these days is:
- Second twin transverse lie

18. *Ans. is a i.e. Fertilization of 2 ova released at same time, by sperms released at intercourse on 2 different occasions* *Ref. Dutta Obs. 7/e, p 202*

Superfecundation

It is the fertilization of two different ova released in the same cycle, by separate acts of coitus within a short period of time.

Superfetation

- It is the fertilization of two ova released in different menstrual cycles.
- This is theoretically possible until the decidual space is obliterated by 12 weeks of pregnancy.

19. Ans. is b i.e. Dicephalus *Ref. Munro Kerr's 10/e, p 115*

Twin related terminology	Feature
Conjoined/siamese twin – types[Q]	Twins which are joined to each other
Thoracopagus (most common)[Q]	Twins joined in region of thorax
Ischiopagus[Q]	Twins joined in the region of pelvis
Pyopagus[Q]	Twins joined in the region of back
Craniopagus[Q]	Twins joined the region of head
Dicephalus[Q]	Double headed monsters in which the lower parts are more or less fused into one
Syncephalus[Q]	Single headed monster which show duplication of the lower limb and some times of the lower part of the trunk
Fetal papyraceous or compressus[Q]	It is a state which occurs if one of the fetus dies early The dead fetus is compressed between the membranes of the living fetus and the uterine wall It can occur in dizygotic as well as monozygotic twins (*most common*)
Fetal acardiacus[Q]	Here one fetus does not possess a heart and the development of upper part of the body almost absent. The normal twin is called "pump twin". It occurs only in monozygotic twin.

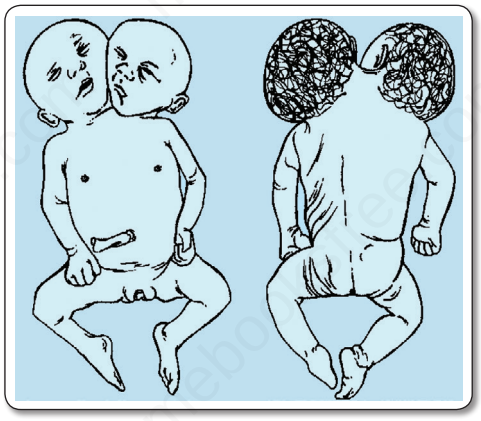


Fig. 14.3: Dicephalus double monster

Fig. 14.4: Syncephalus double monster

20. Ans. is a i.e. KCl *Ref. Dutta Obs. 7/e, p 211*

Multifetal pregnancy reduction is done in high order pregnancies (> 4 fetus) to minimise complications like:

- Preterm delivery
- Fetal growth retardation
- Anemia
- PPH
- Pre-eclampsia
- Increased neonatal mortality

→ Associated with high fetal numbers

Procedure : It is done by intracardiac injection of potassium chloride,[Q] under ultrasound guidance.
Time : Between 10-12 weeks of gestation.
Usually, two fetuses are left undisturbed and rest reduced.

Complications of Reduction

- Preterm labour
- Amnionitis
- Chances of losing all fetuses.

Also know: *Selective fetal reduction* is done when one fetus in a multiple gestation is abnormal. It is done similar to *multifetal reduction.*

21. Ans. is b i.e. 11-13 weeks *Ref. Dutta Obs. 7/e, p 211*

Selective reduction: If there are 4 or more fetuses, selective reduction of the fetuses leaving behind only two is done to improve outcome of the cofetuses. This can be done by intracardiac injection of **potassium chloride between 11 and 13 weeks under ultrasonic guidance using a 22 gauge needle**. It is done transabdominally. Umbilical cord of the targeted twin is occluded by fetoscopic ligation or by laser or by bipolar coagulation, to protect the cotwin from adverse drug effect. Multiple pregnancy reduction improves perinatal outcome in women with triplets or more.

Risk of miscarriage = 5-7%.

Selective termination of a fetus with structural or genetic abnormality may be done in a dichorionic multiple pregnancy in the second trimester.

22. Ans. is d i.e. Japan *Ref. High Risk Pregnancy Areas 4/e, p 170*

Highest incidence of twin pregnancy is in Nigeria, lowest incidence of twin pregnancy is in Japan.

23. Ans. is b i.c. 35 weeks *Ref. Fernando Arias 4/e, p 180*

Uncomplicated dichorionic twin are delivered by 38 weeks
Uncomplicated monochorionic twin are delivered by 37 weeks
Uncomplicated triplets are delivered by 35 weeks.

24. Ans. is c i.e. Dichorionic diamniotic *Ref. High Risk Pregnancy Areas 4/e, p 170*

The USG shown in the figure–if you see it carefully you can see placental tissue between the 2 sacs–this means twin peak sign is positive, i.e. it is an example of dichorionic diamniotic pregnancy.

SECTION 2

Medical, Surgical and Gynaecological Illness Complicating Pregnancy

15

Anemia in Pregnancy

ANEMIA IN PREGNANCY

Definition: World Health Organization (WHO) has defined anemia during pregnancy as hemoglobin concentration of less than 11 gm% and a hematocrit of less than 33%. CDC (Center for Drug Control) proposes a cut off point of 11 gm% in 1st and 3rd trimester and 10.5 gm% during 2nd trimester.

Severity of Anemia

According to ICMR, severity of anemia is graded as:

Mild degree	10-10.9 gm%
Moderate degree	7-10 gm%
Severe degree	Less than 7 gm%
Very severe degree	Less than 4 gm%

Physiological Anemia during Pregnancy

- The increase in plasma volume (30–40%) is much more than the increase in red cell mass (10–15%) during pregnancy, leading to **hemodilution** and an apparent decrease in hemoglobin level called as **physiological anemia of pregnancy**. This hemodilution during pregnancy serves to reduce maternal blood viscosity, thereby enhancing placental perfusion and facilitating nutrient and oxygen delivery to the fetus.
- **Characteristics of physiological anemia:**
  - Starts at 7th–8th weeks
  - Maximum by 32 weeks
  - Does not go below 11 gm% in 1st trimester, 10 gm% in 2nd and 3rd trimester (The rise in RBC volume begins at 20 weeks continues till term therefore, in 3rd trimester there is slight rise I in hemoglobin concentration).

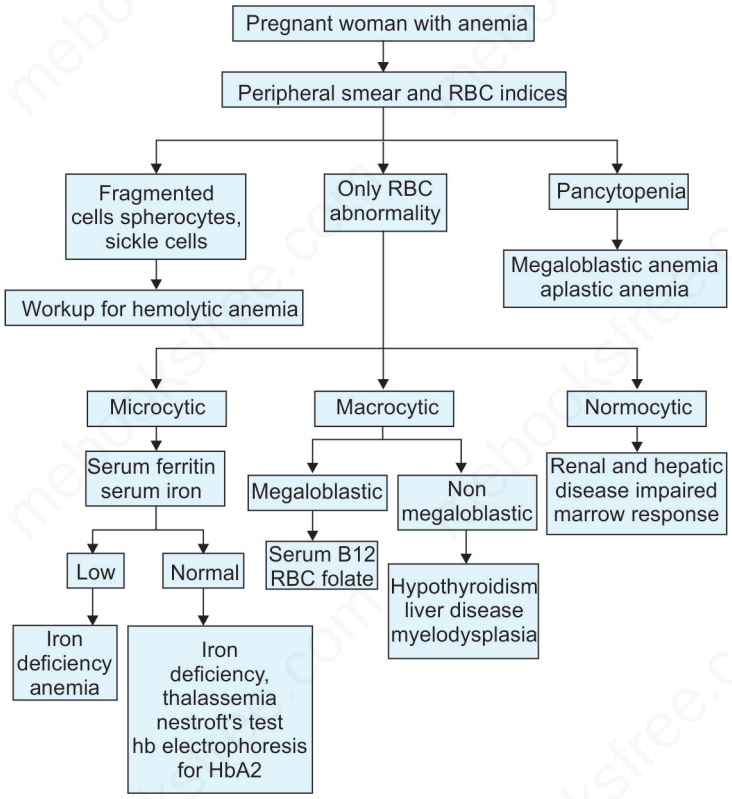
Causes of Anemia during Pragnancy

Table 15.1: Causes of anemia during pragnancy

Acquired	Hereditary
Iron deficiency anemia	Thalassemias
Anemia caused by acute blood loss	Sickle-cell hemoglobinopathies
Anemia of inflammation or malignancy	Other hemoglobinopathies
Megaloblastic anemia	Hereditary hemolytic anemias
Acquired hemolytic anemia	
Aplastic or hypoplastic anemia	

- **M/c anemia in pregnancy:** In developing countries it is dimorphic anemia i.e anemia due to both iron and folic acid deficiency.

Diagnosis of Anemia



Complications of Anemia

Maternal	Fetal
Preaclampsia	Low birthweight
Infection	Intrauterine death
Heart faliure at 30-32 weeks	
PPH	
Shock	
Subinvolution	
Pulmonary embolism during puerperium	

Prognosis

Maternal: Anemia either directly or indirectly contributes to about 20% of maternal deaths in the third world countries.
Fetal: If detected early and responsive to treatment, the fetal prognosis is not too bad. Baby born at term, to severely anemic mother will not be anemic at birth, but as there is little or no reserve iron, anemia develops in neonatal periods. Mean cord blood levels of serum iron, ferritin, B_{12} and folate are higher than that of mother. However, total iron binding capacity and serum level of vitamin E are lower than that of mother.

IRON DEFICIENCY ANEMIA

Iron Requirements during Pregnancy

Total amount of iron required during pregnancy is 1000 mg:

- Fetus and placenta require – 300 mg
- Growing RBC of the mother require – 500 mg
- Lost through sweat, urineand faeces – 200 mg
- Lost at the time of delivery – 200 mg
- Amount of iron s aved d/t amenorrhea – 300 mg

So approximately (1200-300 =) 900-1000 mg is required during pregnancy. This means approximately 0.8 mg iron in the first trimester and between 4.5 mg in second and over 6 mg daily in third trimester.

KEY CONCEPT

- All parameters of iron metabolism decrease during pregnancy except for the two Ts viz **T**otal iron binding capacity and serum **T**ransferrin levels, which increase.
- No matter in what form iron is being taken–only 10% of it is absorbed, which means in order to fulfill the requirement of 4-6 mg/day, approximately 40–60 mg of iron should be taken in diet daily during pregnancy. Which is not possible , this is the reason why Iron supplementation is absolutely necessary in pregnancy **for atleast 6 months.**

In National Anemia Control Program under Ministry of Health and Family Welfare, all pregnant women who are not anemic are given folifer tablet containing 100 mg elemental iron (salt-ferrous sulphate) along with 500 μg folic acid for at least 100 days.

- **Earliest/most sensitive indicator of iron deficiency:** Decrease in the levels of serum ferritin (Normal values are between 50–155 μg/L. Levels < 20 indicate deficient iron stores, < 12 μg/L indicate complete depletion. Levels < 50 indicate need for iron supplementation).

Stages in Iron Deficiency Anemia

Stage I	Depletion of iron stores	- ↓ Serum ferritin (< 20 ng/ml) (measured by radioimmunoassay) - Normal hemoglobin/hematocrit - Normal RBC incides
Stage II	Iron deficient hematopoeisis (i.e. iron deficiency without clinical anemia)	- Ferritin < 20 ng/ml - ↓ in serum iron < 60 μg/dL (N = 60–175 μg/dL) - ↑ in free serum protoporphyrin - ↑ in TIBC - ↑ in S. transferrin levels (> 360 μg/dL N = 200–360 μg/dL)
Stage III	Frank iron deficiency anemia	- All indices of stage II + - Hemoglobin <10 g/dL - ↓ MCV and ↓ MCH - Hematocrit <28% - Red cell distribution width> 14.5%

Diagnosis of Iron Deficiency Anemia

- **Peripheral blood smear:** Shows microcytic hypochromic anemia. Reticulocyte count may be slightly raised.
- **Hematological indices:** A typical iron deficiency anemia shows the following blood values
  - Hemoglobin—less than 10 gm%,
  - Red blood cells —less than 4 million/mm^3
  - PCV—less than 30%
  - MCHC — less than 30%
  - MCV — less than 75 μ^3
  - MCH—less than 25 pg
  - Serum iron is <30 μg/100 mL
  - Total iron binding capacity is raised (>400 μg/dL)
  - Percentage saturation is 10% or less
  - Serum ferritin below 30 μg/L (confirms iron deficiency anemia)

Management of Iron Deficiency Anemia in Pregnancy

Prophylactic Tharapy

- Avoidance of frequent child-births
- Supplementary iron tablets—as discussed above
- Early detection of falling hemoglobin level-hemoglobin level should be estimated at the first antenatal visit, at the 30th week and finally at 36th week.

Curative Therapy

A. Oral Iron Therapy

- Oral iron-180-200 mg elemental iron (approx 3 tablets/day) is given till blood parameters become normal (the earliest parameter to increase after giving oral iron is reticulocyte count) followed by one tablet per day as mantainence dose which should be continued throughout pregnancy and for 100 days (3 months) after pregnancy for replenishing the stores.

Response to Oral Iron:

Laboratory parameters:	
5–7 days:	Increase in reticulocyte count to up to 5%. Note-It is the first parameter to increase after iron therapy
2–3 weeks:	Increase in hemoblobin level @ 0.8-1.0 gm/dL/week after 3 weeks. Improvement in RBC indices – MCV, MCH, MCHC
6–8 weeks:	Hemoglobin level comes to normal level Peripheral smear shows normocytic normochromic RBC's Increase in serum ferritin level.

B. Parenteral Iron Therapy

Important points:

- In patients on hemo/peritioneal dialysis , malabsorption syndrome and in pregnant females with severe anemia, seen for the first time during last 8-10 weeks—parenteral iron is indicated.
- Rise in hemoglobin concentration after parenteral therapy is same as that with oral iron i.e 0.7 to 1 gm % per week, so remember parenteral iron is not given for rapid rise of Hb.
- The main advantage of parenteral therapy over oral iron is certainity of administration.

Routes of administration:

Intramuscular	Intravenous
• Salts used – Iron dextran – Iron sorbitol complex • Test dose – 50 mg • Full dose – 100 mg daily/allternate day Site – upper outer quadrant of buttock *Note:* Injection should be given deep 1/m, using Z technique and thick needle	Salt used - iron dextran. • Test dose = 0.5 m • Full dose is given either in the form of - *multidose therapy*-2 ml of iron dextran/day (1 ml – 50 mg of elemental iron) • Single dose therapy- Total dose is diluted in 500 ml of saline and given slow i/v. **If the required amount of iron is > 50 ml i.e. 50 × 50 – 2500 mg^{Q} (as 1 ml has 50 mg iron), then half of dose is infused on one day and remaining half on second day**

Dose of paranteral iron

Total iron requirement is calculated by the following formulae:

a. 4.4 × body weight (kg) × Hb deficit (g/dl)—This formula includes iron needed for replenishment of stores
b. 0.3 × weight (lb) × (100-Hb%) = iron req in mg. Add 50% of this for stores
c. 250 mg of elemental iron for each gm% of Hb deficit
d. 2.21 × body weight (kg × Hb deficit (g/dL) + 100 mg (replenishment of stores)

Note : Weight in kg = wt in lb x 2.2
Normal Hb is taken as 14 g/dL

C. Blood Transfusion

One unit of blood raises the Hb levels by 0.8-1 gm% within 24 hours.

Indications of Blood Transfusion:

- Severe anemia seen beyond 36 weeks of pregnancy
- Anemia due to active blood loss
- Refractory anemia
- Associated infection.

Note: The Hb levels at the time of delivery should be atleast 7 gm%.

DIMORPHIC ANEMIA

- **This is the most common type of anemia met with in the tropics.**

- As such, anemia results from deficiency of both iron and folic acid or vitamin B_{12}.
- While there is polydeficiency state, the hematological findings or the bone marrow picture usually show predominance of one deficiency. **The red cells** become macrocytic or normocytic and hypochromic or normochromic.
- Bone marrow picture is predominantly megaloblastic as the folic acid is required for the development of the number of red cell precursors.
- The treatment consists of prescribing both the iron and folic acid in therapeutic doses.

SICKLE CELL ANEMIA

- The M/C form of hemolytic anemia seen during pregnancy is the intravascular microangiopathic hemolysis which is a part of HELLP syndrome. Less frequently it is due to sickle cell disease.
- Sickle cell disease is the most common hemoglobinopathy encountered during pregnancy.

Basics of Sickle Cell Anemia

Sickle cell hemoglobinopathies are hereditary disorders. It is caused by a point mutation in the β-globin gene on chromosome II. **This results in substitution of valine for glutamic acid at position 6 of the β-chain of normal hemoglobin.**

- When Gene mutation is **homozygous,** the individual has **sickle cell anemia (Hb-SS)**. She has a small quantity of fetal hemoglobin (HbF) but no HbA.
- **Heterozygous** individual for sickle cell hemoglobin has **sickle cell trait (HbAS)**. Such an individual has about 55–60% of HbA and 35–40% of HbS. Sickle cells have a life span of 5–10 days compared to normal RBCs of 120 days.

Sickle Cell Trait

- In these patients Hb-S comprises 30–40% of the total hemoglobin, the rest being Hb–A, Hb–A_2 and Hb–F. If the husband is a carrier, there is 25% chance that the infant will be homozygous sickle cell disease and 50%—sickle cell trait. As such, preconceptional counseling should be done to know whether the husband also carries the trait or not.
- There is no special problem so far as reproductive performance is concerned. The patient will require iron supplementation.
- As the concentration of Hb–S is low, crisis is rare but can occur in extreme hypoxia. Hematuria and urinary infection venous thrombolism pre-eclampsia, are quite common.

Sickle Cell Disease

- Homozygous sickle cell disease (Hb–SS) is transmitted equally by males and females. Partner must be tested. Termination of pregnancy is an option, if fetus is diagnosed to have major hemoglobinopathy on prenatal diagnosis by CVS.

Sickle Cell Crisis: It is characterised by intense bone pain due to intense sequiestration of sickled erythrocytes and infarction in various organs.

- Pregnancy can precipitate sickle cell crisis in both women with sickle cell trait and sickle cell disease.

Management:

- IV fluids
- O_2
- Epidural analgesia
- Antibiotics:
- Thromboprophylaxis
- Red cell transfusion after the onset of pain donot have much benefit but prophylactic transfusions before the crisis, helps in decreasing the pain and shortening the duration of crisis.

Effect of Pregnancy on Disease	Effect of Disease on Pregnancy
• Sickle cell crisis • Severe bone pain • Acute chest syndrome • Pulmonary infarction • Pulmonary embolism • Pyelonephritis • Pneumonia • UTI	• Preterm labor • IUGR • Fetal death • Abortion • Increased incidence of - Preaclampsia - PPH - Infection

Management during Pregnancy

- Folic acid supplementation 4 mg to 5 mg daily (ACOG 2013) is given to support rapid blood cell turnover.
- Prophylactic penicillin (penicillin V 250 mg twice daily).
- Prophylactic blood transfusions during pregnancy to maintain hemotocrit above 25% and Hbs below 60% – are controversial.

If a transfusion is given, leukocyte depleted packed red cell, pherotyped for major and minor antigens should be used.

- Hydroxyurea is not recommended in pregnancy.
- During every antenatal visit, Hb, hematocrit, platelet count, bilirubin, transaminase and lactose dehydrogenase levels should be checked (fortnightly).
- Vaginal delivery is preferred.
- Epidural analgesia is given during labour to relieve pain.
- Postnatal thromboprophylaxis for upto 6 weeks may be needed.

Contraception:

- Low dose oral progestins or DMPA or progesterone implants are ideal as they prevent painful sickle cell crises.
- OCP's (low dose) and Cu containing IUCDs–earlier considered contraindicated, are now regarded as safe by CDC (2013 b).

THALASSEMIA

- The term **thalassemia** encompasses a group of inherited blood disorders that can cause severe microcytic hypochromic anemia.
  - Alpha **(α)-thalassemia and Beta (β)-thalassemia** result from absent or decreased productin of structurally normal α- and β-globulin chains, respectively, generating an abnormal ratio of α to non-α chains.
  - The excess chains form aggregates that lead to ineffective erythropoiesis and/or hemolysis.
  - A broad spectrum of syndromes is possible, ranging from no symptoms to transfusion-dependent anemia and death.
  - Both diseases are transmitted as autosomal recessive traits.

Alpha-thalassemia

- It is associated with Southeast Asian, African, Caribbean, and Mediterranean origin and results from a delection of one to all α-genes, located on chromosome 16.
  - Excess β-globins then form β-globin tetramers called HbH.
  - A fetus would be affected because fetal Hb also requires α-chains.

Alpha Thalassemias		
Silent carrier	–α/α α	Normal or slight microcytosis.
α-thalassemia	- –/α α (Asian) – α/ – α (African)	Mild microcytic, hypochomic. Normal Hbg electrophoresis.
HbH disease	– –/– α	Moderate-severe microcytic, hypochromic anemia. The beta chains in this case are relatively in excess and form an unstable tetramers called **HbH**. **These people can have normal life expectancy. Although multiple transfusions are required.**

Contd...

Contd...

Alpha Thalassemias	
Hydrops fetalis "Hb Bart's Disease"	– –/– – In these individuals the excessive Y-chains form **fetal hemoglobin Bart**. Affected fetus has marked anemia. Hydrops, heart failure, pulmonary edema, transverse limb reduction defects, hypospadias, can also be seen. **This is not compatible with life**.

Beta-thalassemia

- It is associated with Mediterranean, Asian, Middle Eastern, Caribbean, and Hispanic origin.
  - The cause is (mostly point mutations) in β-globin genes, located on chromosome 11.
  - The two consequences of these gene defects are β°, which is the complete absence of the β-chain; and β^{+}, which is decreased synthesis of the β-chain.
  - In both these cases there is excess alpha chain which binds to red cell membrane and causes membrane damage.

Hematological Findings in Thalassemia

- There is **low MCV and MCH but normal MCHC** (Difference from iron deficiency anemia where all are low).
- Serum iron and total iron binding capacity are normal or elevated.
- Hemoglobin electrophoresis shows raised concentration of HbA2 ($\alpha^2\,\alpha^2$) to more than 3.5% with normal or raised Hb-F.
- Serum bilirubin may be raised to about 2–3 mg%.

Pregnancy and Thalassemia

- Important obstetrical aspects of some α-thalassemia syndromes depend on the number of gene deletions in a given women and has been discussed above.
- Inheritence of all four abnormal α-genes leads to either still birth or babies die very soon after birth and have typical features of nonimmune hydrops fetalis NIHF.

KEY CONCEPT

Sonographic measurement of the fetal cardiothoracic ratio at 12 to 13 weeks gestiation has 100% sensitivity and specificity for identifying fetuses with NIHF.

Management

- Women with trait status for either thalassemia require no special care.
- Women at high risk for or diagnosed with thalassemia should be offered preconcepton counseling and chorionic villi sampling should be done to see whether fetus is affected or not.
- *Iron supplements should be prescribed only if iron deficiency is present, otherwise hemochromatosis can occur. Parenteral iron is contraindicated.*
- *Chelation with desferoxamine in later months of pregnancy can be helpful.*
- Thalassemia may confer an increased risk of neural tube defects secondary to folic acid deficiency, so up to 4 mg/day periconceptual folic acid supplementation is recommended.
- If asplenic, vaccinations need to be given and penicillin given.
- **Antepartum fetal testing** should be undertaken in anemic thalassemia patients.
  - Periodic fetal sonography to asses fetal growth as well as nostress testing to evaluate fetal well-being is recommended.
  - Ultrasonography is also useful to detect hydrops fetalis but usually at a later gestational age.

QUESTIONS

1. According to WHO, anemia in pregnancy is diagnosed, when hemoglobin is less than?
a. 10.0 gm% b. 11.0 gm% **[AIIMS Dec 97]**
c. 12.0 gm% d. 9.0 gm%

2. Which of the following tests is most sensitive for the detection of iron depletion in pregnancy?
[AI 04; AIIMS Nov 05]
a. Serum iron
b. Serum ferritin
c. Serum transferrin
d. Serum iron binding capacity

3. A 37 years multipara construction labourer has a blood picture showing hypochromic anisocytosis. This is most likely indicative of: **[AI 04]**
a. Iron deficiency
b. Folic acid deficiency
c. Malnutrition
d. Combined iron and folic acid deficiency

4. In pregnancy, which type of anemia is not common in India? **[PGI June 97]**
a. Vitamin B_{12} anemia
b. Folic acid anemia
c. Iron + folic acid anemia
d. Iron deficiency anemia

5. Most common cause of maternal anaemia in pregnancy: **[PGI Nov 2010]**
a. Acute blood loss
b. Iron deficiency state
c. GI blood loss
d. Hemolytic anaemia
e. Thalassemia

6. A pregnant female presents with fever. On lab investigation her Hb was decreased (7 mg%), TLC was normal and platelet count was also decreased. Peripheral smear shows fragmented RBCs. Which is least probable diagnosis? **[AIIMS Nov 12]**
a. DIC
b. TTP
c. HELLP syndrome
d. Evans syndrome

7. Tablets supplied by government of india contain:
[New Pattern Question]
a. 60 mg elemental iron +500 μg of folic acid
b. 200 mg elemental iron +1 mg of folic acid
c. 100 mg elemental iron +500 μg of folic acid
d. 100 mg elemental iron +5 mg of folic acid

8. Total amount of iron needed by the fetus during entire pregnancy is: **[New Pattern Question]**
a. 500 mg b. 1000 mg
c. 800 mg d. 300 mg

9. Thirty years old G4P3L3 with 32 weeks pregancy with single live fetus in cephalic presentation, Patient complains of easy fatiguability and weakness since last 3 months which has gradually increased over last 15 days to an extent that she gets tired on doing household activities. Patient also complaints of breathlessness on exertion since last 15 days. Patient gets breathless on climbing 2 flight of stairs. It is not associated with palpitations or any chest pain. There is no history of pedal edema, sudden onset breathlessness, cough or decreased urine output. There is no history of asthma or chronic cough. There is no history of chronic fever with chills or rigors. There is no history of passage of worms in stool nor blood loss from any site. There is no history of easy bruisability or petechiae. There is no history of yellow discoloration of urine, skin or eyes. She did not take iron folate prophylaxis throughout her pregnancy. **[New Pattern Question]**
- She is suspected to be anemic and her blood sample was ordered for examination which showed.
- Hb 7.4 gm% (12–14 gm%)
- Hct 22% (36–44%)
- MCV 72 fL (80–97 fL)
- MCH 25 pg (27–33 pg)
- MCHC 30% (32–36%)
- Peripheral smear shows microcytic hypochromic RBCs with anisopoikilocytosis
- Naked eye single tube red cell osmotic fragility test (NESTROFT) is negative. What is the most probable diagnosis:

a. Thallesemia
b. Iron deficiency anemia
c. Megaloblastic anemia
d. Vitamin B12 deficiency anemia.

10. The following statements are related to the therapy of iron deficiency anaemia *except*:
[New Pattern Question]
a. Oral iron can be given only if anemia is detected before 20 weeks of pregnancy
b. Parenteral iron therapy markedly increases the reticulocytic count within 7–14 days
c. Parenteral therapy is ideal during 30–36 weeks
d. Blood transfusion may be useful in severe anaemia beyond 36 weeks

11. The following are related to the treatment of thalassaemia *except*: **[New Pattern Question]**
a. Fresh (relatively) blood transfusion
b. Folic acid
c. Routine iron therapy
d. Deferoxamine improves pregnancy outcome

12. All are used for contraception in sickle cell anaemia *except*: [New Pattern Question]
a. Oral 'Pill'
b. IUCD
c. Progestin only pill or implant
d. None of the above

13. With oral iron therapy, rise in Hb% can be seen after: [New Pattern Question]
a. 1 week b. 3 weeks
c. 4 weeks d. 6 weeks

14. Formula used for estimation of the total iron requirement is: [New Pattern Question]
a. 4 × body weight (kg) x Hb deficit (g/dL)
b. 4.4 × body weight (kg) x Hb deficit (g/dL)
c. 0.3 × body weight (kg) x Hb deficit (g/dL)
d. 3.3 × body weight (kg) x Hb deficit (g/dL)

15. How much iron a patient can tolerate at a time given intravenously? [New Pattern Question]
a. 1000 mg b. 2000 mg
c. 2500 mg d. 3000 mg
e. 3500 mg

16. Not an indicator for blood transfusion: [New Pattern Question]
a. Severe anemia at 36 weeks
b. Moderate anemia at 24-30 weeks
c. Blood loss anemia
d. Refractory anemia

17. Which of the following hematological criteria remains unchanged in pregnancy? [New Pattern Question]
a. Blood volume
b. TIBC
c. MCHC
d. S. ferritin

18. Which of the following parameters will fall the earliest in iron deficiency? [New Pattern Question]
a. MCV
b. MCH
c. MCHC
d. Red cell distribution width

19. Raised MCV in pregnancy can be due to: [New Pattern Question]
a. Megaloblastic anaemia
b. Alcohol use
c. Hypothyroidism
d. All of the above

20. Dose of folic acid per day for treating megaloblastic anemia in pregnancy: [New Pattern Question]
a. 400 μg
b. 4 mg
c. 1 mg
d. 2 mg

21. Blood transfusion is indicated in following conditions associated with sickle cell anemia: [New Pattern Question]
a. Frequent sickling episodes
b. Twin pregnancy
c. Poor obstetrical outcome
d. All of the above

EXPLANATIONS AND REFERENCES

1. **Ans. is b i.e. 11.0 gm%** *Ref. Dutta Obs. 7/e, p 260, Mgt of High Risk Pregnancy-Manju Puri,SS Trivedi, p 274*

"According to the standards laid by WHO – Anemia in pregnancy is defined as when hemoglobin is 11 gm/100 ml or less or hematocrit is less than 33%".

Also Know

ICMR – Grades of Anemia in Pregnancy	
Mild anaemia	10-10.9 gm%
Moderate anaemia	7-9.9 gm%
Severe anaemia	6.9-4 gm%
Very severe anemia	< 4 gm %

2. **Ans. is b i.e. Serum ferritin** *Ref. Harrison 17/e, p 630; Fernando Arias 3/e, p 467*

Serum ferritin is the most sensitive test as it correlates best with iron stores and is the first test to become abnormal in case of iron deficiency.

Remember:
- Storage form of iron : – Ferritin
- Transport form of iron – Transferrin

As per CDC serum ferritin less than 15 μg/l confirms iron deficiency anemia.

3. **Ans. is d i.e. Combined iron and Folic acid deficiency** *Ref. Dutta Obs. 7/e, p 270*

Anisocytosis is variation in size of the red blood cells.

The patient in the question has hypochromic anemia along with anisocytosis which can be seen in case of

- **Iron deficiency anemia** *—Harshmohan 5/e, p 372*

  Blood picture:
  - Red cells are hypochromic and microcytic
  - There is anisocytosis and poikilocytosis
  - In severe cases target cells, elliptical forms and polychromatic cells are present.
- **Dimorphic anemia**

  Blood picture:
  - Cells may be normocytic, microcytic or macrocytic (i.e. anisocytosis is seen)
  - Hypochromia or Normochromia.

Therefore in both iron deficiency anemia and dimorphic anemia anisocytosis with hypochromia may be seen.

But since dimorphic anemia is the *commonest type* of anemia seen in tropics so we are taking it as the correct answer.

Dimorphic anemia:

- It is the **commonest type** of anemia seen in the underprivileged sections of society specially in the tropics.
- It results either from dietary inadequacy or intestinal malabsorption and thus anemia is associated with deficiency of iron as well as vitamin B_{12} **and folic acid.**
- Bone marrow is predominantly megaloblastic (as folic acid is required for the development of the red cell precursors).
- Treatment consists of prescribing both iron and folic acid in the diet.

4. **Ans. is a i.e. Vitamin B_{12} anemia**

Ref. Dutta Obs. 7/e, p 268; Williams Obs. 22/e, p 1147, 23/e, p 1082; Fernando Arias 3/e, p 469

- In countries **like India,** anemia due to iron and folic acid deficiency commonly occur during pregnancy.
- Only Vitamin B_{12} deficiency as a cause of *anemia is rare.*
- *"Megaloblastic anemia caused by lack of vitamin B_{12}, that is cyanocobalamin, during pregnancy is exceedingly rare".*

—Williams Obs. 22/e, p 1147, 23/e, p 1082

5. Ans. is b and d i.e. Iron deficiency state and Haemolytic anemia

Ref. William's Obstetrics 2/e, p 1080; Dutta Obs. 7/e, p 262; Park 20/e, p 556

"The two most common cause of anemia during pregnancy and puerperium are iron deficiency and acute blood loss[Q]"

6. Ans is d i.e. Evans syndrome *(Read the text below)*

The clinical scenario of the patient shows the following signs and symptoms:

- Fever
- Anemia
- Thrombocytopenia
- Normal total leukocyte count
- Fragmented RBCs (Schistocytes) on peripheral smear.

Now let us review each option one by one

Option (a): DIC *—Harrison 20/e, p 979*

- DIC may present with sudden onset of **fever** (as the M/c cause of D/c is sepsis)
- Excessive bleeding may lead to **anemia**
- Platelet consumption may lead to **thrombocytopenia**
- Leukocyte count is not affected
- Intravascular microangiopathic hemolysis can lead to **schistocytes on peripheral smear.**

—Williams Obs 23/e, p 786

Option (b): TTP i.e Thrombotic thrombocytopenic purpura.

TTP presents with a pentad of:

- Fever
- Microangiopathic haemolytic anemia, leading to **anemia** and **fragmentation of RBCs**
- Thrombocytopenia
- Neurologic symptoms
- Renal failure.

Option (c): HELLP syndrome

HELLP syndrome presents with the combination of:

- **Hemolysis** because of which fragmented RBC's may be seen
- Elevated liver enzymes and
- Low platelet count
- Fever may or may not be present.

Oprion (d): Evans syndrome *—Hoffman: Hematology: Basic Principle and Practice, 5/e*

- Evans syndrome is an **autoimmune disease** in which an individual's antibodies attack their own red blood cells and platelets.
- Its overall pathology resembles a combination of autoimmune haemolytic anemia and idiopathic thrombocytopenic purpura.
- Autoimmune hemolysis leads to the formation of spherocytes and not schistocytes.
- Schistocytes are fragmented RBCs that are the result of microangiopathic hemolysis.
- Autoiminune destruction of RBCs leads to the formation of spherocytes.

Hence, **Evans syndrome is the least likely possibility in this clinical scenario.**

7. Ans. is c i.e.100 mg elemental iron + 500 μg folic acid *Ref. Park 21/e, p 594*

Inorder to prevent nutritional anemia among mothers and children, the Govt of India sponsored a **National Nutritinal Anemia Prophylaxis Programme** during the Fourth Fifth Year Plan. As per the programme the vulnerable groups for anemia viz pregnant females and children were given daily supplements of iron and folic acid tablets.The suggested prophylactic doses were initially 60 mg of elemental iron and 500 μg of folic acid for pregnant females.These tablets were distributed free of cost at all PHCs. But survey done during the years 1985-1986 showed poor results and no impact was seen on the prevalence of anemia in pregnant females. So the dosage of elemental iron was increased.

Presently the tablets supplied contain 100 mg of elemental Iron and 500 μg of folic acid.
Routine supplementation of thes tablets is recommended daily for all pregnant females in India for atleast 100 days in the second half of pregnancy.

8. Ans is d i.e. 300 mg *Ref. Dutta Obs. 7/e, p 55, Shiela Balakrishnan TB of Obstetrics 1/e, p 336*

In a normal pregnancy, the total amount of iron required by a pregnant female is 900-1000 mg. This is because of the following needs—

Total amount of iron required during pregnancy is 1000 mg, i.e 4-6 mg/day which can be calculated as:

- Fetus and placenta require – 300 mg
- Growing RBC of the mother require – 500 mg
- Lost through sweat, urineand faeces – 200 mg
- Lost at the time of delivery – 200 mg

(1200 mg)

- Amount of iron s aved d/t amenorrhea – 300 mg

So approximately (1200-300 =) 900-1000 mg is required during pregnancy.

From the above calculations, it is clear that **amount of iron required by fetus is 300 mg.**

9. Ans is b i.e. Iron deficiency anemia

- In the question patient has Hb 7.4 gm%, hematocrit 22% and symptoms of early fatigue, which indicate she is anemic. Her complete blood picture shows MCV and MCH are low indicating microcytic anemia. Thus differential diagnosis could either be be Iron deficiency anemia or thallassemia.

Her Nestrofts test (screening test for thallasemia) is negative, hence thallasemia is ruled out and diagnosis is confirmed as Iron deficiency anemia.

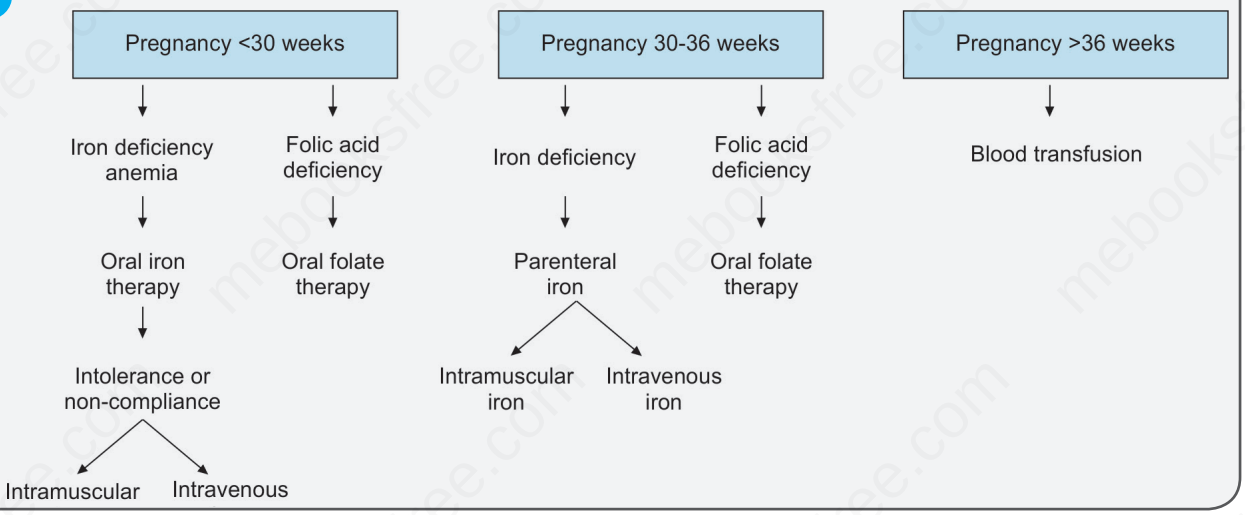
NESTROFT Test. It is 'naked eye single tube red cell osmotic fragility test'. In this test 2 ml of 0.36 buffered saline solution is taken in one tube and 2 ml of distilled water in another tube. A drop of blood is added to each test tube and both the tubes are left undisturbed for 20 minutes. Both the tubes are then shaken and held against a white paper on which a black line is drawn. Normally, the line is clearly visible through the contents of tube containing distilled water. If the line is clearly visible similarly through the contents of tube with buffered saline, the test is negative. If the line is not clearly visible the test is considered positive. The principle is that normocytic normochromic cells when put in hypotonic solution will undergo lysis wheras in thalassemia trait, the cells are microcytic and hypochromic which are resistant to hemolysis due to decreased fragility. It has 91% sensitivity and 95% specificity and the negative predictive value is 99%.

Note: NESTROFT test is only a screening test for thalassemia. The definite test is the estimation of HbA2 levels by high liquid performance chromatography. In thalassemia HbA2 levels are > 3.5%.

10. Ans. is a i.e. Oral iron can be given only if anemia is detected before 20 weeks of pregnancy

Ref: Dutta Obs. 7/e, p 266

Overview of Management of Iron Deficiency Anemia in Pregnancy:



From the chart it is clear that parenteral iron is ideal during 30–36 weeks, blood transfusion is useful in severe anemia beyond 36 weeks (i.e. option c and d are correct). Oral iron is useful in anemias before 30 weeks of pregnancy and not 20 weeks.

11. Ans. is c i.e. Routine iron therapy

Ref. Willans 23/e, p 1090, 1091; Dutta 7/e, p 274; JH Manual of Obs. and Gynae 4/e, p 225, 226

- As discussed in detail in preceeding text– on thalassemia, routine iron therapy should not be given in patients of thalassemia as it leads to hemochromatosis. Only if there is documented iron deficiency then given iron. Rest all options are correct

12. Ans. is d i.e. None of the above. *Ref. Williams 24/e, p 1111*

Contraception and sterilization (in sickle cell anemia)

"***Because of chronic debility, complications caused by pregnancy, and the predictably shortened life span of women with sickle-cell anemia, contraception and possibly sterilization are important considerations. Many clinicians do not recommend combined hormonal pills because of potential adverse vascular and thrombotic effects after a systematic review, however, it was concluded that there was no increase in complications with their use in women with sickle cell syndromes. The CDC (2013b) regards the contraceptive pill, patch, and ring along with the copper intrauterine device (IUD) as having "advantages that generally outweigh theoretical or proven risks".***

All progesterone only mathods may be used without restrictions. Because progesterone has been long known to prevent painful sickle-cell crises. Low-dose oral progestins or progesterone injections, or implants seem ideal. In one study, de Abood and associates (1997) reported significantly fewer and less intense pain crises in women given depot medroxyprogesterone intramuscularly. *—Wiliams 24/e, p1111*

13. Ans. is b i.e. 3 weeks *Ref. Dutta Obs. 7/e, p 266*

Rise in hemoglobin with oral iron – 0.7 gm-1 gm per week, which is seen after ***3 weeks*** of initiation of oral therapy.[Q]

(According to COGDT, 10/ed, p 407 — Hemoglobin levels should increase by atleast 0.3g/dl/week if the patient is responding to therapy)

If there is no significant clinical or hematological improvement within 3 weeks, diagnostic re-evaluation is needed.

14. Ans. is b i.e. 4.4 × body weight (kg) × Hb deficit *Ref. KDT 6/e, p 585; Dutta Obs. 7/e, p 269*

Total iron requirement is calculated by the following formulae:

a. 4.4 × body weight (kg) × Hb deficit (g/dL)-This formula includes iron needed for replenishment of stores.
b. 0.3 × weight (lb) × (100-Hb%) = iron req in mg. Add 50% of this for stores.
c. 250 mg of elemental iron for each gm% of Hb deficit
d. 2.21 × body weight (kg0 × Hb deficit (g/dL) + 100 mg (replenishment of stores)

Note : Weight in kg = wt in lb × 2.2
Normal Hb is taken as 14 g/dL

15. Ans. is c i.e. 2500 mg *Ref. Dutta Obs. 7/e, p 269*

The dose of parenteral iron is calculated using formula given in Q. 14. If the dose is more than 50 ml (each ml has 50 mg of iron i.e. 2500 mg iron), then half the dose is given on day one and second half on next day. Thus maximum iron which can be given in a day is 2500 mg.

ACOG recommends the use of iron sorbitol as it is safer than iron dextran.

16. Ans. is b i.e. Moderate anemia at 24-30 weeks *Ref. Dutta Obs,7/e, p 267*

Indications of Blood transfusion in anemia during pregnancy:

- To correct anemia due to blood loss and to combat PPH
- Severe anemia is seen beyond 36 weeks of pregnancy
- Refractory anemia – i.e. anemia not responding to oral or parenteral iron
- Associated infection.

Important points to remember:

- In case of severe anemia with cardiac failure, packed cell transfusion is preferred to avoid overload and pulmonary edema.
- If required blood transfusion should be repeated only after 24 hours.
- Improvement in Hb is seen after 3 days.

17. Ans. is c i.e MCHC *Ref. High Risk Pregnancy Fernando Arias 4/e, p 234*

MCHC (mean corpuscular haemoglobin concentration) remains unchanged during pregnancy.

MCV increases minimally during pregnancy.

18. Ans. is a i.e MCV *Ref. High Risk Pregnancy Fernando Arias 4/e, p 235*

The first indicator of Fe deficiency as you know is drop in S. ferritin levels. But amongst the red cell indices the first change is usually a drop in the MCV.

Note: Red cell distribution width (RDW) increases (> 15%) in iron deficiency.

19. Ans. is d i.e All of the above *Ref. High Risk Pregnancy, Fernando Arias 4/e, p 236, 237*

The first indication of megaloblastic anemia in pregnancy is usually an elevated red cell MCV. This finding is also seen alcohol or azathpriopine use, hypothyroidism and in normal pregnancy.

Imp. Points:
- Diagnostic feature of megaloblastic anemia of pregnancy on blood smear is presence of hypersegmented neutrophils.
- Megaloblastic anemia can be either due to deficiency of folic acid or vitamin B_{12}.
- **Diagnostic test for:**
  - Vitamin B_{12} deficiency—Decreased serum levels of vitamin B_{12}.
  - Folic acid deficiency—Red cell folate levels.

Mgt:
- Folic acid deficiency = 1 mg/day Folic acid.
- Vitamin B_{12} deficiency = 1000 µg of parenteral cyanocobalamin every week for 6 weeks, followed by 100 µg intramuscular injections every month.

20. Ans. is c i.e 1 mg *Ref. High Risk Pregnancy, Arias 4/e, p 237*

Dose of folic acid in Pregnancy: Per day:
- To prevent neural tube defect – 400 µg.
- In pregnant females with previous H/O NTD – 4 mg
- To treat megaloblastic anemia – 1 mg
- In patients with sickle cell disease – 4 mg

21. Ans. is d i.e All of the above *Ref. Fernando Arias 4/e, p 238*

Prophylactic blood transfusions are not routinely advocated in all pregnant females with sickle cell anemia.

Indications:
1. Frequent severe sickling episodes.
2. Low haematocrit levels.
3. Twin pregnancy.
4. Poor past obstetrical history.

Target: HbS levels becomes < 20%.

16

Heart Disease in Pregnancy

NORMAL FINDINGS IN CVS DURING PREGNANCY

- Pulse rate increases
- Diastolic BP decreases
- First heart sound is prominent and split
- Second heart sound–normal
- Third heart sound–normally not heard but in pregnancy it is prominent
- **Murmurs**
  - Ejection systolic murmur heard normally in aortic or pulmonary area at 10–12 weeks due to expanded intravenous volume
  - Continous murmur heard normally over the tricuspid area in left 2–3rd intercostal space
- Apex beat is heard in the fourth ICS 2.5 cm left to midclavicular line
- Slight cardiomegaly
- Ecg- left axis deviation.

MET CALFE'S CRITERIA FOR HEART DISEASE IN PREGNANCY

Indicators of Heart Disease during Pregnancy:

Signs

- Persistently dilated neck veins (↑ JVP)
- Cyanosis/clubbing
- Systolic murmur greater than grade 3
- Diastolic murmur
- Marked cardiomegaly
- Sustained arrhythmia
- Persistent split second heart sound.

Symptoms

- Orthopnea
- Nocturnal cough
- Chestpain
- Hemoptysis
- Syncope

Most Common Heart Disease

Most common in pregnancy	Lesion
Acquired valvular disease	Mitral stenosis
Congenital heart disease	Atrial septal defect
Cynotic congenital heart disease	Fallots terology

Clarkes Classification of Heart Disease in Pregnancy

Group I–Minimal risk (Mortality 0-1%)	Group III (Mortality 25-50%)
• ASD, VSD, PDA (congenital heart diseases)	• Pulmonary hypertension – primary or secondary, an example of secondary being—Eisenmenger syndrome
• Fallot tetralogy (corrected)	• Marfan syndrome with aorta involvement (> 40 mm)
• Any disease involving pulmonary and tricuspid valve	• Coarctation of aorta
• Bioprosthetic valve replacement	
• Mital stenosis belonging to class I, II according to NYHA	

Note:

- There is no need to remember Class 2 of the Clarkes classification.

- Since in group III maternal mortality is high, hence these are also the indications of termination of pregnancy in heart disease patients or they conditions they are those of heart diseases in which pregnancy is contraindicated.

Heart Diseases in which Termination of Pregnancy is Advised:

1. Marfans syndrome with aorta involvement (> 45 mm)
2. Coarctation of aorta
3. Eiser Menger syndrome
4. Any heart disease which belongs to NYHA class 4 or class 3
5. Ejection fraction < 40%
6. Severe mitral stenosis or severe symptomatic aortic stenosis
7. Previous peripartum cardiomyopathy with any residual impairment of LV function.

Predictors of Cardiac Event during Pregnancy

Potential for an adverse cardiac event in a pregnant female as pulmonary edema, sustained arrhythmia, stroke, cardiac arrest or cardiac death can be estimated by following parameters.

N New York Heart Association (NYHA) class >2

O Obstructive lesions of the left heart (Mitral valve area <2 cm^2 or aortic valve area <1.5 cm^2, peak LV outflow tract gradient >30 mm of Hg).

P Prior cardiac event before pregnancy—Heart failure, arrhythmia, transient ischemic attack, stroke

E Ejection fraction <40%

The risk of cardiac complications is 5%, 30% and 75% when none, one or more than one of these complications are present.

NYHA classification (revised 1979):

- **Class I:** No limitation of physical activity
- **Class II:** Slight limitation of physical activity
- **Class III:** Marked limitation of physical activity
- **Class IV:** Severely compromised—Inability to perform any physical activity without discomfort.

Management of Heart Disease in Pregnancy

Antepartum Management

Time of hospitalisation:

- Class I of NYHA – 36 weeks
- Class II 28 weeks
- Class III and IV – If seen in the first trimester. **MTP should be advised ideally but if patient wants to continue** pregnancy, then the women are hospitalized for the remainder of the pregnancy.

Remember: In India MTP is normally legal uptil 20 weeks but in heart disease patients MTP should not be done beyond 12 weeks as after 12 weeks the risk involved with delivery and abortion are the same.

Intrapartum Management

- Patients should be allowed to go into spontaneous labour, if required induction with vaginal PGE2 may be done **(Induction is safe in case of heart** disease). *—Williams Obs. 23/e, p 962*
- Trial of labour is contraindicated in patients of heart disease.
- Patients should be advised to the in propped up position.
- Restrict 1/v fluids @ 75 ml/hr.
- Vaginal delivery is preferred with the use of outlet forceps or vacuum. Between the two, vacuum is better.
- Epidural analgesia is given during labor for pain relief.

Note: In heart disease patients-even, if there is no fetal distress, maternal distress or prolonged second stage of labour still we use forceps (or vacum), this is called as prophylactic use of forceps (or vacuum).

KEY CONCEPT *Williams Obs. 24/e p 978*

Heart disease where vaginal delivery is contraindicated/cesarean section is done:

- Aortic aneurysm or dilated aortic root ≥ 4 cm
- Marfans syndrome with aortic involvement
- Severe symptomatic aortic stenosis
- Acute severe congestive heart failure
- Recent MI
- Need for emergency valve replacement immediately after delievery
- A patient who is fully anticoagulated with warfarin at the time of labor needs to be counseled for cesarean section because the baby is also anticoagulated and vaginal delivery carries increase risk to the fetus of intracranial hemorrhage.

- **Anaesthesia given during LSCS in heart disese**: Epidural anaesthesia.

- If cesarean is being done for intracardiac shunts severe, aortic stenosis or pulmonary arterial hypertension, General Anaesthesia is given to prevent hypotension.

Postpartum Management

After delievery ergometrine or methyl ergometrine is contraindicated. To control bleeding oxytocin can be given.

Conditions where Methyl Ergometrine is Contraindicated. *—Dutta Obs. 7/e, p 503*

- **Twin pregnancy:** If given after the delivery of first baby, the second baby will be compromised
- **Organic cardiac disease:** Can cause overloading of right heart and precipitate heart failure
- **Severe pre-eclampsia and eclampsia:** Can cause sudden rise in BP
- **Rh negative mother:** Increased chances of fetomaternal transfusion.

Contraception in Heart Disease

- **Contraception of choice: Temporary**–Barrier contraceptives (condoms)
- **Contraception to be avoided:**
  - OCPs (can precipiatate thromboembolic event)
  - Intrauterine devices (can lead to infection).

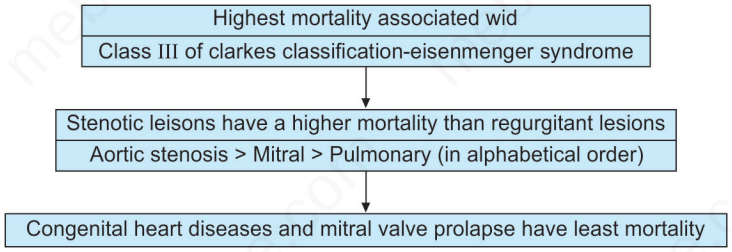
Contraception of choice—Permanent:

- If the heart is not well—compensated, the patient's husband is advised for vasectomy.Q
- If heart is well—compensated–tubal sterilisdation can be carried out.

Sterilisation should be considered with the completion of the family at the end of first week in the puerperium under local anaesthesia through abdominal route by minilap technique.

Prognosis of Heart Disease in Pregnancy

General Fundae



Important Points

- Best time for cardiac surgery in Mitral Stenosis 14–18 weeks
- Surgery of choice–Balloon valvuloplasty–if valves are not calcified
- If valves are calcified–valve replacement is required. This should be done ideally before conception, because during pregnancy it carries a high risk of maternal and perinatal morality.
- Septic abortion–m/c valve affected is tricuspid valve
- M/C fetal complication in heart disease is IUGR
- M/C time of heart failure in pregnant females.

Immediate postpartum>at the time of delivery>at 30–32 weeks of gestation.

INFECTIVE ENDOCARDITIS

- Bacterial infection of a heart valve involves cardiac endothelium and usually results in valvular vegetations.
- Organisms that cause indolent endocarditis are most often viridans-group streptococci or Staphylococcus or Enterococcus species.
- Among intravenous drug abusers and those with catheter-related infections, Staphylococcus aureus is the predominant organism.
- Staphylococcus epidermidis frequently causes prosthetic valve infections.

Diagnosis

Diagnosis is made using the **Duke criteria**, which include positive blood cultures for typical organisms and evidence of endocardial involvement. Echocardiography may be diagnostic, but lesions < 2 mm in diameter or those on the tricuspid valve may be missed. If uncertain, transesophageal echocardiography (TEE) is accurate and informative.

Management

Most streptococci are sensitive to penicillin G, ceftriaxone, or vancomycin given intravenously for 4 to 6 weeks, along with gentamicin for 2 to 4 wedeks. Complicated infections are treated longer, and women allergic to penicillin are either desensitized or given intravenous ceftriaxone or vancomycin for 4 weeks.

Antibiotic Prophylaxis Against Infective Endocarditis

Recommendation of American College of Cardiology/American Heart Association for Endocarditis Prophylaxis Regimens.

(AHA 2007)

- The American Heart Association recently updated its guidelines regarding which patients should take a precautionary antibiotic to prevent infective endocarditis (IE).
- Prophylactic antibiotics are no longer recommended for gastrointestinal or genitourinary tract procedures. This recommendation follows from the observation that most cases of IE result from bacteremia caused by routine activities such as chewing food, brushing teeth, and flossing.

Contd...

Contd...

It is recommended that IE prophylaxis may be given during labor in the following subgroups of patients:
- Prosthetic cardiac valve
- Previous endocarditis
- Unrepaired congenital heart disease (including palliative shunts and conduits)
- Completely repaired congenital heart defect with prosthetic material or device, during the first 6 months after the procedure
- Repaired congenital heart disease with residual defects at the site or adjacent to the site of aprosthetic patch or device
- Cardiac transplantation recipients who develop cardiac valvulopathy.

- ACOG does not recommend endocarditis prophylaxis for either vaginal or cesarean delievery in absence of pelvic infection.

Antibiotic Regimen for IE Prophylaxis

- Only a few regimens are recommended by the American College of Obstetricians and Gynecologists (2008) for prophylaxis which is given preferably 30-60 minutes before the procedure.

- Either ampicillin, (amoxicillin) 2 gm, or cefazolin or ceftriaxone, 1 gm, is given intravenously.
- For penicillin sensitive patients, cefzolin, ceftriaxone is given or if there is history of anaphylaxis, then clindamycin, 600 mg is given intravenously. If Enterococcus infection is of concern, vancomycin is also given.

QUESTIONS

1. Maximum cardiac output in pregnancy is at: **[AIIMS Nov 2013]**
a. 20 weeks
b. 24 weeks
c. 26 weeks
d. 28 weeks
e. Nervousness or syncope on exertion

2. Signs of heart disease in pregnancy: **[PGI June 03]**
a. Diastolic murmur
b. Systolic murmur
c. Tachycardia
d. Dyspnea on exertion
e. Nervousness or syncope on exertion

3. Which of the following features indicates the presence of heart disease in pregnancy and which is not seen in normal pregnancy? **[AIIMS Nov 12, 13]**
a. Exertional dyspnea
b. Distended neck veins
c. Systemic hypotension
d. Pedal edema

4. Maximum strain of parturient heart occurs during: **[AIIMS Nov 07, 06]**
a. At term
b. Immediate postpartum
c. Ist trimester
d. IInd trimester

5. In a pregnant woman with heart disease, all of the following are to be done *except*: **[AIIMS June 00; AI 02]**
a. IV methergin after delivery
b. Prophylactic antibiotic
c. IV frusemide postpartum
d. Cut short 2nd stage of labour

6. In a patient with heart disease, which of the following should not be used to control PPH? **[AIIMS Nov 07, AI 11]**
a. Methyergometrine
b. Oxytocin
c. Misoprostol
d. Carboprost

7. In which of the following heart diseases is materanl mortality during pregnancy found to be the highest: **[AIIMS Nov 07, 06]**
a. Coarctation of aorta
b. Eisenmenger syndrome
c. AS
d. MS

8. Normal pregnancy can be continued in: **[AIIMS May 09/AI 11]**
a. Primary pulmonary hypertension
b. Wolf-Parkinson-White syndrome
c. Eisenmenger syndrome
d. Marfan syndfome with dilated aortic root

9. Indications for termination of pregnancy include: **[PGI May 2013]**
a. Aortic stenosis
b. Eisenmengers syndrome
c. Tricuspid stenosis
d. Severe mitral stenosis + NYHA grade II
e. NYHA grade 4 heart disease with history of decompensation in the previous pregnancy

10. Most common heart disease associated with pregnancy is: **[AI 97]**
a. Mitral stenosis
b. Mitral regurgitation
c. Patent ductus arteriosus
d. Tatralogy of fallot's

11. In which of the following heart diseases maternal mortality is found to be highest?
a. Eisenmenger's complex **[AIIMS May 06; May 07]**
b. Coarctation of aorta
c. Mitral stenosis
d. Aortic stenosis

12. Indications for caesarean section in pregnancy are all *except*: **[AIIMS May 09]**
a. Eisenmenger syndrome
b. Aortic stenosis
c. Aortic aneurysm
d. Aortic regurgitation

13. In heart patient the worst prognosis during pregnancy is seen in: **[AIIMS June 00]**
a. Mitral regurgitation
b. Mitral valve prolapse
c. Aortic stenosis
d. Pulmonary stenosis

14. Kalindi 25 years female admitted as a case of septic abortion with tricuspid valve endocarditis. Vegetation from the valve likely to affect is: **[AIIMS Nov 01]**
a. Liver
b. Spleen
c. Brain
d. Lung

15. True about is/are: **[PGI June 06]**
a. MS surgery better avoided in pregnancy
b. MR with PHT-definite indication for termination of pregnancy
c. Aortic stenosis in young age is due to Bicuspid valve
d. Isolated TR always due to infective endocarditis
e. MS with pressure gradient 10 mm Hg indication for surgery

16. Lady wth MS + MR with full term gestation, obstetrician planning to conduct normal delivery, what would be anesthesia of choice? **[AIIMS May 2012]**
a. Parenteral opioids
b. Spinal anesthesia
c. Inhalational analgesia
d. Neuraxial analgesia

17. Tubectomy in a heart patient who has recently delivered is best done after: **[New Pattern Question]**
a. 48 hours
b. 1 week
c. 2 weeks
d. Immediately

18. A para 2 poorly compensated cardiac patient has delivered 2 days back. You will advice her to: **[New Pattern Question]**

a. Undergo sterilization (tubectomy) after 1 week
b. Undergo sterilization after 6 weeks
c. Suggest her husband to undergo vasectomy
d. Take oral contraceptive pills after 6 months

19. A prosthetic valve patient switch to heparin at which time of pregnancy? **[New Pattern Question]**

a. 28 weeks
b. 32 weeks
c. 36 weeks
d. Postpartum

20. Patients with organic heart disease in pregnancy most commonly die during: **[New Pattern Question]**

a. 20–24 weeks of pregnancy
b. First stage of labour
c. Soon following delivery
d. Two weeks postpartum

21. The best method of curtailing the second stage of labour in heart disease is by: **[New Pattern Question]**

a. Prophylactic forceps
b. Prophylactic ventouse
c. Spontaneous delivery with episiotomy
d. Caesarean section

22. Congenital heart disease is most likely in the newborn of mothers suffering from all *except*: **[New Pattern Question]**

a. Systemic lupus erythematosus
b. Rheumatoid arthritis
c. Diabetes in pregnancy
d. Congenital heart disease of the mother

23. Chances of adverse outcome in a heart disease patient are increased in all of the following periods *except*: **[New Pattern Question]**

a. 28–32 weeks of pregnancy
b. At the time of labor
c. 4–5 days after delivery
d. Immediately after delivery
e. None of the above

24. All of the following rules are increased in infants of heart disease patient *except*: **[New Pattern Question]**

a. Prematurity
b. IUGR
c. Increased incidence of cardiac disease
d. Neural tube defect

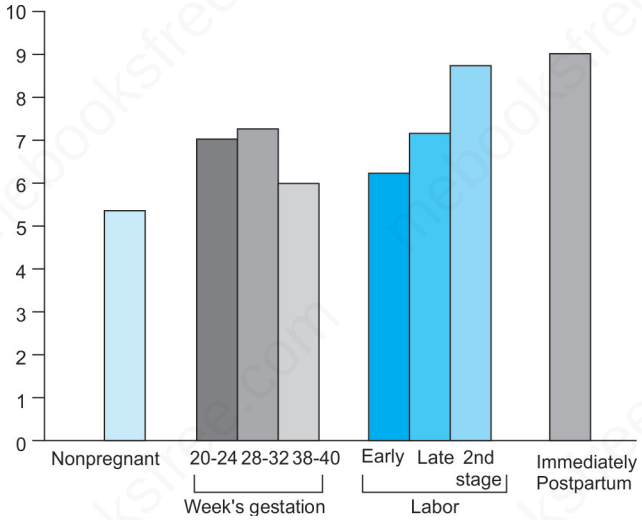
25. In severe mitral stenosis during pregnancy area of mitral valve is: **[New Pattern Question]**

a. 4-6 cm^2
b. 1.5-2.5 cm^2
c. 1-1.5 cm^2
d. 0.8-1 cm^2

EXPLANATIONS & REFERENCES

1. Ans. is d i.e. 28 weeks *Ref. William 24/e, p 59*

The following graph of williams shows cardiac output during pregnancy and labor.



As is clear from the graph cardiac output is maximum at 28–32 weeks of gestation.

2. Ans. is a, d and e i.e. Diastolic murmur, Dyspnea on exertion and Nervousness or syncope on exertion

3. Ans. is b i.e. Distended neck veins *Ref. Williams Obs. 22/e, p 1019, 23/e, p 960, Dutta Obs. 7/e, p 275*

- Many of the physiological adaptations of normal pregnancy and physical findings resemble heart disease symptoms and signs, making the diagnosis of heart disease more difficult.
- For example, in normal pregnancy, functional systolic heart murmurs are quite common; respoiratory efforts is accentuated, at times suggesting dyspnea and edema in the lower extremities usually develops after midpregnancy.
- It is important not to diagnose heart disease during pregnancy when none exists, and at the same time not to fail to detect and appropriately treat heart disease when it dose exist.

Clinical indicators of Heart disease during Pregnancy: Metcalfes criteria for Heart disease in pregnancy

Symptoms	Clinical findings
• Progressive dyspnea or orthopnea	• Cyanosis
• Nocturnal cough	• Clubbing of fingers
• Hemoptysis	• Persistent neck vein distension
• Syncope with exertion	• Systolic murmur greater than grade 3
• Chest pain related to effort or emotion	• Diastolic murmur
• Symptoms of pulmonary hypertension	• Cardiomegaly
	• Persistent arrythmia
	• Persistently split second sound
	• Criteria for pulmonary hypertension

***Note*:** In question 3 – exertional dyspnea, and pedal edema are seen normally during pregnancy and do not indicate heart disease. During pregnancy due to relaxation of the smooth muscles of the arteries by the progesterone, blood pressure decreases (Ref. Dutta 7/e, p 53) i.e. systemic hypotension normally occurs during pregnancy.

- Distended neck veins are suggestive of heart disease in pregnancy and are not a normal physiological condition.

4. Ans. is b i.e. Immediate postpartum *Ref. Williams Obs. 22/e, p 1018, 23/e, p 958, 959; Dutta Obs. 7/e, p 53*

"Significant hemodynamic alterations are apparent early in pregnancy, women with severe cardiac dysfunction may experience worsening of heart failure before mid pregnancy. In others, heart failure develops after 28 weeks, when pregnancy induced hypervolemia is maximal (32 weeks). In the majority, however heart failure develops peripartum when the physiological capability for rapid changes in cardiac out put may be overwhelmed in presence of structural cardiac disease." *—Williams 22/e, p 1018, 23/e, p 958, 959*

Reading the above text, from *Williams Obs.,* it is clear that maximum chances of heart failure are in the peripartum period. But it is not clear whether maximum chances are during labour or immediate postpartum.

Dutta Obs. 7/e, p53 provides answer to this:

"The cardiac output starts to increase from 5th week of pregnancy, reaches its peak 40-50% at about 30-34 weeks. Thereafter the cardiac output remains static till term".

"Cardiac output increases further during labour (+50%) and immediately following delivery (+70%) over the pre labour values."

So, maximum chances of heart failure are in immediate postpartum period when cardiac output is maximum.

Remember: Periods of maximum risk of cardiac failure:
Immediate postpartum (best option) > During delivery > at 32 weeks (when hemodynamic changes are maximum).

5. Ans. is a i.e. IV methergin after delivery *Ref. Dutta Obs. 7/e, p 278*

As discussed in the chapter overview all the options given in the question are correct except for 'c' i.e. methergine after delivery. Methyl ergometine is contra indicated in patient of heart desease.

6. Ans. is a i.e. Methylergometrine

Ref. Dutta Obs. 7/e, p 278; Fernando Arias 3/e, p 511, 512; Williams Obs. 22/e, p 1021, 1022, 23/e, p 962, 963

Repeat

7. Ans. is b i.e. Eisenmenger syndrome

8. Ans. is b i.e. Wolf Parkinson white syndrome

9. Ans. is b and e i.e. Eisenmengers syndrome and NYHA grade 4 heart disease with history of decompensation in the previous pregnancy *Ref. Williams Obs. 23/e, p 980, 981; Fernando Arias 3/e, p 507; Dutta Obs. 7/e, p 276*

Clarkes classification for risk of maternal mortality caused by Various heart disease

Group I- Minimal risk	Group II (Mortality 5–15%)	Group III (Mortality 25–50%)
(Mortality 0-1%) ASD, VSD, PDA Fallot tetralogy (corrected) Any pulmonary and tricuspid disease Bioprosthetic valve replacement MS class I, II (NYHA).	AS Aortic coarctation without valvular involvement, uncorrected fallot tetralogy Marfan syndrome with normal aorta MS class III, IV Previous MI MS with AF Artificial valve.	• Primary pulmonary hypertension • Complicated aortic coarctation • Marfan's with aortic involvement • Eisenmenger syndrome.

"Maternal mortality may be raised to even 50% in case of Eisenmenger syndrome." *—Dutta Obs. 6/e, p 278*

"The outcome of pregnancy in patients with Eisenmengers syndrome is very poor maternal mortality is 52% and total fetal wastage is 41.7%." *—Fernando Arias 3/e, p 520*

10. Ans. is a i.e. Mitral stenosis *Ref. Dutta Obs. 7/e, p 275; Fernando Arias 3/e, p 522*

In developing countries like India:

- Most common heart disease in pregnancy is of rheumatic origin, followed by the congenital heart disease.
- Most common rheumatic valvular lesion is mitral stenosis *(in 80%)* folowed by mitral regurgitation and aortic stenosis.

In developed countries:

- Most common heart disease is *congenital heart disease.*[Q]
- Most common lesion is *Atrial septal defect.*[Q]

11. Ans. is a i.e. Eisenmenger's complex *Ref. Williams Obs. 22/e, p 1028, 23/e, p 970; Sheila Balakrishnan, p 283*

Eisenmenger's syndrome is the presence of secondary pulmonary hypertension that develops from any cardiac lesion.[Q]

- The syndrome develops when increased pulmonary blood flow due to left to right shunt produces a right side pressure more than left side and hence reversal of shunt occurs and subsequently cyanosis develops.

- It is the heart disease with the worst prognosis during pregnancy with a maternal mortality of 50%.[Q] Hence, pregnancy is contraindicated is patients of eisenmengers.
- If diagnosis of Eisenmenger is made in the first trimester, termination of pregnancy is advised.
- Most common cause of death in Eisenmenger's syndrome is right ventricular failure with cardiogenic shock.[Q]

12. Ans. is a i.e. Eisenmenger's syndrome *Ref: Williams 24/e, p 978*

Cardiac indications for cesarean section:
- Aortic aneurysm or dilated aortic root ≥ 4 cm
- Marfans syndrome with aortic involvement
- Severe symptomatic aortic stenosis
- Acute severe congestive heart failure
- Recent MI
- Need for emergency valve replacement immediately after delievery
- A patient who is fully anticoagulated with warfarin at the time of labor needs to be counseled for cesarean section because the baby is also anticoagulated and vaginal delivery carries increase risk to the fetus of intracranial hemorrhage.

13. Ans. is c i.e. Aortic stenosis

Ref. Williams Obs. 22/e, p 1026, 1027, 1030;23/e, p 966, 967, 968, 971 Sheila Balakrishna, p 281

Remember 3 'FUNDAS: *Highest maternal mortality is associated with Class III of clarkes cl;assification, so any of those diseases are given they will have the worst prognosis. Amongst them also Eisenmengers syndrome has the worst prognosis.*

↓

2. *Stenotic heart disease have a worse prognosis than regurgitant lesions.*
   Among stenotic disease-(in alphabetical order)-Aortic stenosiswill have the worst> Mitral stenosis>Pulmonary stenosis.

↓

3. *Congenital heart disease and Mitral valve prolapse have the best prognosis*
   So now this question becomes very easy-Mitarl vave prolapse has the best prognosis, so it is ruled out; Regurgitant lesions have a better prognosis than stenotic lesions so mitral regurgitation is also ruled out.
   Now we are left with 2 options, aortic stenosis and pulmonary stenosis-as I said go alphabetically, aortic stenosis will have a worse prognosis than pulmonary.

Let's consider each of the options one by one and see what Williams has to say about each of them.

Option "a" **Mitral regurgitation**

"M R is well-tolerated during pregnancy probably due to decreased systemic vascular resistance which actually results in less regurgitation. Heart failure only rarely develops during pregnany."
—Williams Obs. 22/e, p 1026, 23/e, p 966

Option "b" **Mitral valve prolapse**

"Pregnant women with mitral valve prolapse rarely have cardiac complications. In fact pregnancy induced hypervolemia may improve alignment of mitral valve."
—Williams Obs. 22/e, p 1030, 23/e, p 971

Option "c" **Aortic stenosis**

"Although mild to moderate degree of aortic stenosis is well tolerated but severe degree is life threatening." *—Williams Obs. 22/e, p 1026, 23/e, p 967*

Option "d" **Pulmonary stenosis**

"It is well tolerated during pregnancy and rarely causes any complication."
—Williams Obs. 22/e, p 1027, 23/e, p 968

14. Ans. is d i.e. Lung *Ref. CMDT '07, p 1447*

"Right sided endocarditis which usually involves the tricuspid valve causes septic pulmonary emboli occasionally with infarction and lung abscesses."

15. Ans. a, b and c i.e. MS surgery better avoided in pregnancy; MR with PHT- definite indication for termination of pregnancy; and Aortic stenosis in young age is due to Bicuspid valve

Ref. Harrison 17/e, p 1472, 1473, 1479; Williams Obs. 22/e, p 1023, 23/e, p 964, 965; Sheila Balakrishnan, p 279

Let us consider each option separately.

Option "a" **MS surgery better avoided in pregnancy.**
Cardiac surgery in pregnancy: *—Williams Obs. 22/e, p 1023, 23/e, p 964, 965; Sheila Balakrishnan p 279*

"Cardiac surgery should usually be postponed until after delivery but if required can be performed safely in the second trimester."
i.e. option 'a' is correct

Remember: **Indications of performing a surgical procedure in pregnancy:**
- Failure of medical treatment in intractable heart failure.
- Recurrent episodes of acute pulmonary oedema.

Procedure of choice: Balloon valvuloplasty (If valves are pliable and noncalcified and regurgitation is minimal).

Option "b" **MR with PHT-definite indication for termination of pregnancy:**
"Women with pulmonary hypertension from any cause are at increased risk and such women ideally should not become pregnant. If they do, termination is offered in the first trimester". (absolute indications for termination). *—Sheila Balakrishnan p 275*
Therefore, MR with PHT is a definite indication for termination of pregnancy.
Remember: **Absolute indications for termination of pregnancy:**
All, conditions included under Class III of Clarkes classification
Relative indication:
- Any heart disease belonging to Grade III/IV NYHA
- Any heart disease belonging to Grade I/II NYHA with heart failure.

Option "c" **Aortic stenosis in young age is due to Bicuspid valve**
"Aortic stenosis (AS) in adults may be due to degenerative calcification of the Aortic cusps. It may be congenital, or it may be secondary to rheumatic infection." *—Harrison 17/e, p 1472, 1473*
"Aortic stenosis is essentially a disease of aging and hence rare in pregnancy unless associated with a congenital lesion like bicuspid aortic valve". *—Sheila Balakrishna p 281*

Option "d" **Isolated TR is always due to infective endocarditis**
Tricuspid regurgitation (TR) is most commonly functional and secondary to marked dilatation of the tricuspid annulus. Isolated TR occurs in:
- Infarction of the right ventricular papillary muscles.
- Tricuspid valve prolapse.
- Carcinoid heart disease.
- Endomyocardial fibrosis.
- Infective endocarditis.
- Trauma. *—Harrison 17/e, p 1479*

i.e. *option 'd'* is incorrect becasue isolated TR is not just caused by infective endocarditis.

Option "e" **MS with pressure gradient 10 mm Hg-indication for surgery**
I did not get much information on this one except that valve replacement for MS during pregnancy is done electively.
"When pump flow rate is >2.5 l/min/m², perfusin pressure is >70 mm of Hg and hematocrit is >28%" —Williams 23/e, p 965

Extra Edge:
- The normal mitral valve area is about 4 cm².
- *Critical or severe stenosis is a valve area less than 1 cm², moderate stenosis 1–2.5 cm² and mild stenosis 2.5–4 cm².*
- **Symptoms** most common–**dyspnea** it develop when stenosis is < 2.5 cm².
- Best surgery for MS during pregnancy is Balloon valvuloplasty and best time to do surgery during pregnancy is 14-18 weeks, i.e second trimester.
- M/C fetal complication of heart disease is IUGR.
- **Fetal growth restriction** seen when stenosis is ***< 1 cm².***

16. Ans. is d i.e. Neuraxial analgesia *Ref. Williams, 22/e, p 483*
Pain relief is important for heart disease patients as pain can cause tachycardia, which in turn can cause cardiac failure. Epidural and spinal techniques are the most effective means of providing pain relief for labor. These are also known as regional techniques because pain relief is limited to a specific anatomical region. *These modalities are also known as neuraxial techniques, since both the approaches involve administration of drugs that exert their effects in the axial portion of the CNS.*

17. Ans. is b i.e. 1 week *Ref. Dutta Obs. 7/e, p 278*

18. Ans. is c i.e. Suggest her husband to undergo vasectomy *Ref. Dutta Obs. 7/e, p 278*

Contraception in patient of heart disease:

Temporary contraception of choice:
- Barrier contraceptives (condoms) but they have high failure rate, so nowadays progesterone only contraceptives like minipills are being advised (Ref Mgt of high risk pregnancy, Manju puri, S Strivedi p376)

Contraception to be avoided: – OCPs
– Intrauterine devices

Permanent contraception of choice:

- **Best:** Husband should be advised vasectomy especially in patients whose heart is not well-compensated.
- If husband refuses or, if heart of the patient is well-compensated-Tubectomy is advised.

Female sterilisation:

- **Best time**: At the end of first post partum week.
- Method: Mininlaparotomy (never do laproscopic sterilisation in heart disease patient).
- Anaesthesia of choice: Local anaesthesia.

19. Ans. is c i.e. 36 weeks *Ref. Williams Obs. 23/e, p 964; Dutta Obs. 7/e Management of High Risk Pregnancy by SS Trivedi, Manju Puri 1/e, p 383*

Pregnancy following valve replacement:

Mechanical valve replacement is not preferred these days as anticoagulation is required throughout pregnancy.

Problem of anticoagulation: During pregnancy, the main problem is of anticoagulation.

Warfarin is safe for the mother but can result in warfarin embryopathy of the fetus, miscarriage, IUGR and stillbirths.

Heparin is safe for the fetus as it does not cross the placenta, but is less effective than warfarin in preventing thromboembolic events.

Low molecular weight heparin is inadequate and ACOG does not recommend its use in pregnant women with prosthetic heart valves.

Period of gestation	Anticoagulant used
Uptil 12 weeks	Unfractionated heparin
12-36 weeks	Warfarin
36 weeks onwards and uptil 6 hours before delivery	IV heparin
For 6 hours after vaginal delivery and 24 hours after casarean	Restart heparin
	3rd day after delivery start warfrain and stop heparin once IN R is adjusted to between 2 and 3

Note: Warfarin is not contraindicated for breast feeding.

20. Ans. is c i.e. Soon following delivery *Ref. Dutta Obs 7/e, p 225*

This is another way of asking, cardiac failure occurs most common at what time as the M/C cause of death in pregnant females with heart disease is congestive heart failure.

21. Ans. is b i.e. Prophylactic ventouse *Ref. Dutta Obs 7/e, p 278*

Management of heart disease patient in 2nd stage:

No maternal pushing and the tendency to delay in the second stage of labor is to be curtailed by forceps or ventouse under pudendal and/or perineal block anesthesia. Ventouse is preferable to forceps as it can be applied without putting the patient in lithotomy position (raising the legs increases the cardiac load). —Dutta Obs 7/e, p 278

22. Ans. is b i.e. Rheumatoid arthritis *Ref. Dutta Obs 7/e, p 276, 293, 284*

Lets analyse each option separately

"Fetal congenital cardiac disease is increased by 3–10% if either of the parents have congenital heart lessons." —Dutta 7/e, p 276. (so option d is correct)

"Neonatal lupus syndrome is due to crossing of maternal lupus antibodies (anti-Ro or anti-La) to the fetus causing hemolytic anemia, leukopenia and thrombocytopenia. Isolated congenital heart block is present in about one-third of cases. An apparently healthy woman delivering a baby with congenital heart block should be observed for the development of SLE." —Dutta 7/e, p 293 (i.e. option a is correct)

Matenal diabetes we all know leads to fetal heart disease (Dutta 7/e, p 284), so our answer by exclusion is rheumatoid arthritis.

23. Ans. is e i.e. None of the above *Ref. Fernando Arias 4/e, p 271, 272*

Period of pregnancy during which a heart disease patient has high chances of adverse outcome are:

1. 12–16 weeks of pregnancy
2. 28–32 weeks of pregnancy
3. At the time of delivery
4. Immediately after delivery
5. 4–5 days after delivery (chances of sudden death due to pulmonary embolization)

24. Ans. is d i.e. Neural tube defects *Ref. Fernando Arias 4/e, p 272*

Effect of maternal cardiac disease on fetus:

- Fetal death
- IUGR
- Prematurity
- increased incidence of heart diseases in fetus (by 4–6%).

25. Ans. is c i.e. 1-1.5 cm^2

Severe mitral stenosis as per 2014 guidelines is mitral valve area 1.5 cm^2 or less.

17 Diabetes and Thyroid in Pregnancy

DIABETES IN PREGNANCY

Pregnancy is a diabetogenic state because of:

- Insulin resistance
  - Production of Human Placental Lactogen (HPL)
  - Increased production of cortisol, estrogen, and progesterone
  - Increased destruction of insulin by Kidneys and placenta
- Increased lipolysis
- Altered gluconeogenesis

Diabetes in Pregnancy can be Following Two Types:

Gestational Diabetes	Overt Diabetes i.e. Patients of DM type I and type II
• Normoglycemic female develops diabetes in pregnancy due to insulin resistance (insulin resistance in pregnancy is maximum at 24-28 weeks and is mainly due to the effect of hormone human placental lactogen) • These females will thus have high sugar levels at or after approx. 24 weeks of pregnancy ***Note:*** In diabetic patients high blood sugar levels lead to formation of free radicals which in turn lead to fetal malformations, now in gestational diabetic patients free radicals will be formed approx. after 24 weeks (i.e when blood sugar levels will rise) • By 24 weeks almost the organogenesis is complete in the fetus so it does not lead to congenital malformation in fetus.	• Hyperglycemic female becomes pregnant • Switch them from oral hypoglycemic to insulin as oral hypoglycemic can cross the placenta • These females have high sugar levels from Day 1 of pregnancy so free radicals are formed from Day 1 and thus it can lead to congenital malformations in fetus

Diagnostic Criteria for Diabetes during Pregnancy

According to American Diabetes association the criteria for diagnosis of overt diabetes during pregnancy is:

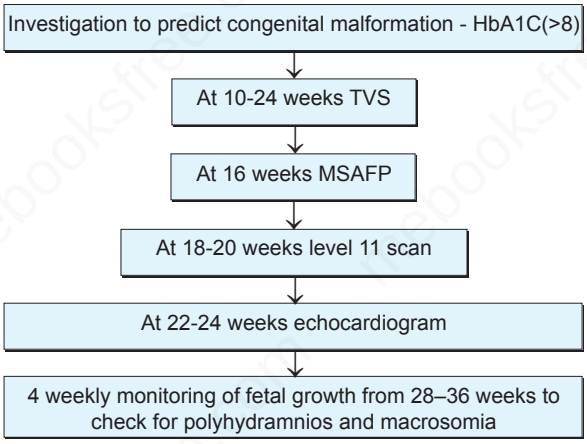
a. Random plasma glucose >200 mg/dl + classic symptoms of diabetes
b. Fasting blood glucose >125 mg/dl
c. HbA1C > 6.5%
d. Two or more abnormal values on 100 gm oral glucose tolerance test during pregnancy.

Important: Gestational diabetes does not lead to congenital malformations in fetus. Overt diabetes leads to congenital malformations in fetus.

Incidence: M/C = GDM > Type I diabetes > Type II diabetes in pregnancy

- **In Overt diabetic patients –the test which can predict the chances of congenital malformations in the fetus is HbA1C.** HbA1C is a product of nonenzymatic glycosylation of hemoglobin. It reflects average blood sugar in preceding 6 to 8 weeks. HbA1c should be ≤6 gm% during pregnancy for good glycemic control. High HbA1c during the first trimester is associated with increased risk of gross congenital malformations and during second trimester is associated with macrosomia (HbA1c <8.5 gm% risk of malformation is 5%, HbA1c > 10 gm% risk of malformation is 22%).
- **The investigation of choice for detecting congenital malformation in Diabetic patients is USG.**

Tests Done in Diabetes Patients during Pregnancy



Screening for Diabetes during Pregnancy

Glucose Challenges Test (O Sulivan blood sugar screening test)

- Performed by orally administering 50 g of glucose irrespective of previous meal and measuring venous plasma glucose 1 hour later.
- Interpretation of result:

Plasma glucose	Interpretation
< 140 mg/dl	Further testing by GTT not required
≥ 140 mg/dl	Further testing required.
≥ 200 mg/dl	No further testing required as values > 200 mg/dl confirm the diagnosis of diabetes

- **Time for screening:** *Between 24 and 28 weeks of gestation (patients at high risk should be screened between 18-22 weeks* and if initial screenings is negative it can be repeated between 26 and 30 weeks). Ideally it should be performed in all pregnant females but all those who have average/high risk for diabetes should definitely be screened. **ACOG recommends universal screening for diabetes in India population**.

Average risk:
- Members of ethnic group with high prevalence of GDM,
- diabetes in first degree relatives
- Age > 25 years
- overweight before pregnancy,
- weight high at birth

→ Blood sugar testing done at 24–28 weeks

High risk:
- Marked obesity
- Previous history of GDM
- History of delivery of large baby (> 4 kg)
- H/o congenital malformation
- H/o traumatic delivery with associated neurological disorder in infant
- H/o > 3 spontaneous abortions
- Age > 30 years
- Strong family history of type 2 DM
- History of stillbirth/unexplained neonatal death
- Glycosuria/ Impaired glucose metabolism
- Polyhydramnios
- Recurrent monoliasis,

→ Blood sugar testing done between 18–22 weeks and repeated at 26–30 weeks

Diagnostic Test

Glucose Tolerance Test

- Patients with abnormal screening test are followed by a 3 hour glucose tolerance test (GTT)
- The test is performed with 100 gm of glucose or 75 gm of glucose.

Table 17.1: Upper limit of normal for the 3 hour glucose tolerance test during pregnancy

Time	100-g Glucose[b] (Carpenter coustan criteria)	75-g Glucose[b] (1 step approach)
Fasting	95 mg/dl	92 mg/dl
One hour	180 mg/dl	180 mg/dl
Two hours	155 mg/dl	153 mg/dl
Three hours	140 mg/dl	—

The test should be performed in the morning after an overnight fast of at least 8 hour but not more than 14 hour and after at least 3 days of unrestricted diet (≥ 150 g/d) and physical activity. The subject should remain seated and should not smoke during the test.

- **If two or more of these values are abnormal:** Gestational diabetes is confirmed.
- **If one value is abnormal:** Increased risk of complications like macrosomia and preeclampsia - eclampsia. This method is thus a 2 step approach where initially screening is done followed by diagnostic test. ACOG recommends 2 step approach. (Though gestational diabetes is not present)
- **WHO and IADPSG recommend use of single step approach,** which is both for screening and diagnosis. Here patient is advised unrestricted diet for 72 hrs, which is followed by fasting sample. Then 75 gm glucose given and 2 sample, taken—after 1 hour and after 2 hrs.
- In the single step approach, even if one value is abnormal, GDM is diagnosed.
- ACOG does not recommend single step approach.

Note: The glucose used in test is anhydrous 75 gm glucose. The commercially available glucose is glucose monohydrate and hence 82.5 gm of which equals 75 gm of the anhydrous form. .

Management of Diabetes in Pregnancy

Antepartum Management

- **Diet: Medical nutrition therapy (MNT): It is the cornerstone of treatment of diabetes in** pregnancy. Caloric requirement is 25-35 kcal/kg body weight/ day according to body mass index (see Table below). It is advisable to take 3 major and 3 minor meals so that there is no intermittent **hypoglycemia and still ideal blood sugars are maintained.**

Body mass index(BMI) kg/m^2	Calories intake
18.5-24.9 (Normal)	30 kcal/kg/day ≈ 3000 cal/day
16.5-18.4 (Underweight)	35 kcal/kg/day ≈ 3500 call/day
25-30 (Overweight)	25 kcal/kg/day ≈ 2500 cal/day
> 40 (Morbid obesity)	12 kcal/kg/day ≈ 1250 cal/day

Diet composition should be 45% of carbohydrates, 30% proteins and 25% fats

- **Exercise: Planned physical activity for 30 minutes/day** is recommended

Diet and exercise should be continued for at least 2-3 weeks with the aim to achieve the following metabolic goals:

Metabolic Goals during Pregnancy:

- Premeal value- 70-90 mg/dl > (95 mg/dl)
- Postmeal 1 hr PP = < 148 mg/dl, 2 hr PP < 120 mg/dl
- HbA1c <6% .
  - If these goals are not achieved patient should be put on Insulin.
  - Oral hypoglycemics are not advised during pregnancy as they can cross the placenta and cause fetal hypoglycaemia.The only oral hypoglycemic drug approved for use in pregnancy is Glyburide and metformin.

Contd...

Contd...

- **Insulin:** is the drug of choice for management of DM/GDM in pregnancy as it does not cross the placenta.
  - Patient should be advised self checking of Glucose levels.

Indication for starting insulin in pregnancy:
- If FBS is more than 95 mg/dL or if 1 hour postparandial value is more than 140 mg/dL or 2 hour postparandial value is more than 120 mg/dL.
- Dose = 0.7 to 1 units per kg/day in divided doses.
- Rapid acting insulin NPH (aspart and lispro), and intermediate acting insulin are safe in pregnancy. The total daily requirement of insulin = 2/3 in morning + ⅓ at Night such that
- Morning dose = ⅔ NPH + ⅓ short acting
- Pre dinner dose = ½ NPH + ½ short acting

Intrapartum Management

Time of delivery

- Low risk patients-wait for spontaneous labor till maximum 40 weeks
- High risk patients-38 weeks- induce labor as IUD occurs mostly in last 2 weeks of pregnancy.
- Mode of delivery—vaginal delivery

Indications of Elective LSCS in GDM Patients

- Macrosomia with weight > 4.5 kg (for predicting macrosomia, shoulder width > 14 cm, EFW > 4.5 kg on ultrasound)
- Demonstrable fetal compromise (Severe IUGR)
- Bad obstetric history
- Other obstetric indications
- Elderly primigravida

Note:
- Suspected macrosomia is not a C/I for VBAC.
- Insulin requirement decrease during labor and since patient is on liquid diet—insulin is stopped during labor.

Postpartum Management

Revaluation of glycemic status using 75 g oral GTT at 6 to 12 weeks postpartum.

Complications of Diabetes

Maternal	Fetal	Neonatal
• Infection • PIH • Polyhydramnios • Preterm labor • 35-50% chances of developing • Diabetes mellitus	• Congenital malformation • Hyperglycemia • Macrosomia • Shoulder dystocia • Abortions/IUD/stillbirth (due to sudden hypoglycemia)	• Prematurity • RDS (Respiratory distress syndrome) • Hypoglycemia • Hypocalcemia ┐ Occur within 72 hrs of birth • Hypomagnesemia ┘ • Hypokalemia • Hyperviscosity syndrome (hyperbilirubinemia and polycythemia) **Late effects:** • Obesity • Future diabetes. • Cardiovascular disease

Congenital Malformations in Infants of Diabetic Mothers

Congenital malformation of fetus occurs in overt diabetics.

- ***Cardiovascular:*** Cardiovascular abnormalities are the most common abnormalities in infants of diabetic mothers.
  - Ventricular septal defect and atrial septal defect

- Transposition of the Great Vessels (TGV)—Most specific CVS–anomaly
- Hypoplastic left ventricle
- HOCM

Note: VSD is the most common cardiac anomaly and TGV is the most specific cardiac anomaly in infants of diabetic mothers. M/C finding in infants of diabetic mothers: HOCM.

- **Central Nervous System**
  - Anencephaly and spina bifida
  - Encephalocele
  - Meningomyelocele and holoprosencephaly
  - Microcephaly
- ***Skeletal***

Caudal regression syndrome (sacral agenesis)—It is the most specific anomaly seen in babies of diabetic mother.

- ***Genitourinary***
  - Absent kidneys
  - Polycystic kidneys
  - Double ureter
- Gastrointestinal
  - Tracheoesophageal fistula
  - Imperforate anus
  - Bowel atresia

Though most congenital anomalies occur early in gestation, a condition called small left colon syndrome occurs in second half of gestation in Type I diabetics.

Also know

- Lung maturity is delayed in DM/GDM.
- L/S > 2:1 in amniotic fluid is not reliable to detect fetal lung maturity in diabetic mother.
- **Phosphatidyl glycerol** in amniotic fluid is 100% confirmatory of lung maturity in these cases.
- In diabetic patients – the dose of folic acid is 4 mg – therapeutic dose.

Effect of diabetes on pregnancy:

During pregnancy	During labor	Puerperium
Abortion	Prolongation of labour due to big baby	Puerperal sepsis
Pre-eclampsia	Shoulder dystocia	Wound infection
Polyhydramnios	Genital tract trauma	Lactation failure
Preterm delivery	Increased chances of cesarean section	
Infections: (Urinary infection & vulvovaginal candidiasis)	Postpartum hemorrhage	
Ketoacidosis		

Remember: Females with gestational diabetes have 35-50% chance of developing type II diabetes later in life.[Q]

THYROID DISORDERS IN PREGNANCY

THYROID PHYSIOLOGY AND PREGNANCY

- Physiological changes of pregnancy cause the thyroid gland to increase production of thyroid hormones by 40 to 100 percent to meet maternal and fetal needs.
- Anatomically, the **thyroid gland undergoes moderate enlargement during** pregnancy caused by glandular hyperplasia and increased vascularity. Such enlargement is not pathological, but normal pregnancy does not typically cause significant thyromegaly. Thus, any goiter should be investigated.
- Early in the first trimester, levels of the principal carrier protein–**throxine-binding globulin (TBG)–increase**, reach their zenith at about 20 weeks, and stabilize at approximately double baseline values for the remainder of pregnancy.
- These elevated TBG levels increase **total serum thyroxine (T_4) and triiodothyronine (T_3)** concentrations, but do not affect the physiologically important serum free T_4 and T_3 levels. Specifically, total serum T_4 increases sharply beginning between 6 and 9 weeks and reaches a plateau at 18 weeks.
- **Thyrotropin-releasing hormone (TRH)** is secreted by the hypothalamus and stimulates thyrotrope cells of the anterior pituitary to release thyroid-stimulating-hormone (TSH) or thyrotropin. TRH levels are **not increased** during normal pregnancy.
- ***Thyrotropin*, also called *thyroid-stimulating hormone (TSH)***, currently plays a central role in screening and diagnosis of many thyroid disorders. Serum TSH levels in early pregnancy decline because of weak TSH-receptor stimulation from massive quantities of human chorionic gonadotropin (hCG) secreted by placental trophoblast. Because TSH does not **cross the placenta, it has no direct fetal effects**.
- Throughout pregnancy, maternal thyroxine is transferred to the fetus. Maternal thyroxine is important for normal fetal brain development, especially before development of fetal thyroid gland function. And even though the fetal gland begins concentrating iodine and synthesizing thyroid hormone after 12 weeks gestation, maternal thyroxine contribution remains important. Infact, maternal sources account for 30 percent of thyroxine in fetal serum at term.

Autoimmunity and Thyroid Disease

- Most thyroid disorders are inextricably linked to autoantibodies against various cell components.
- *Thyroid-stimulating autoantibodies*, also called *thyroid-stimulating immunoglobulins (TSIs)*, bind to the TSH receptor and activate it, causing thyroid hyperfunction and growth.
- *Thyroid peroxidise* (TPO) is a thyroid gland enzyme that normally functions in the production of thyroid hormones. *Thyroid peroxidase antibodies*, previously called *thyroid microsomal autoantibodies*, are directed against TPO and have been identified in 5 to 15 percent of all pregnant women.

HYPOTHYROIDISM IN PREGNANCY

- It is the commonest thyroid dysfunction in pregnancy.
- The majority of cases of hypothyroidism are due to autoimmune disease[Q] – Hashimoto thyroiditis and are associated with presence of thyroid peroxidase antibodies.

Effect of Pregnancy on Hypothyroidism

- Thyroxine requirements increase in pregnancy.

Effect of Hypothyroidism on Pregnancy

Hypothyroidism can lead to:
Mnemonic:

A	= **A**nemia
Precious	= **P**reterm labour / prematurity
P	= **P**reeclampsia
R	= **R**ecurrent abortion
I	= **I**UGR
I	= **I**nfertility due to anovulation
S	= **S**till birth
M	= **M**ental retardation

Diagnosis and Management

- Diagnosis is made by measuring maternal T3, T4 and TSH levels.
- Treatment is with levothyroxine, begining in dose of 100 mcg daily. (after 4 to 6 weeks TSH levels are measured again and dose adjusted)

HYPERTHYROIDISM IN PREGNANCY

- Most common cause of hyperthyroidism during pregnancy is autoimmune hyperthyroidism. i.e. Graves' disease
- In Graves disease – Thyroid stimulating antibodies are present.

Complications

- Hyperthyroidism during pregnancy can lead to:

Maternal: Miscarriage, preterm delivery, pre-eclampsia, congestive cardiac failure, placental abruption, thyroid storm and infection.

Fetal/Neonatal: IUGR, prematurity, stillbirth.

A fetus who was exposed to excessive maternal thyroxine can present as:

a. **Goitrous thyrotoxicosis:** Due to placental transfer of maternal thyroid stimulating immunoglobulin.
   Best predictor: is presence of TSH receptor antibodies (>3 times) in mother with Graves disease.
b. **Goitrous hypothyroidism:** Due to fetal exposure to maternally administered thyronamides (antithyroid drugs).
c. **Nongoitrous hypothyroidism:** Due to transplacental passage of maternal TSH receptor blocking antibodies.

Management

- Medical management is the management of choice[Q]
- Both propylthiouracil and methimazole/carbimazole are effective and safe[Q] and are not C/I during lactation also.
- Side effects of propylthiouracil
  - Transient leucopenia
  - Agranulocytosis
  - Fetal hypothyroidism
- Side effects of methimazole/carbimazole:
  - Aplasia cutis of neonate.
  - Esophageal atresia
  - Choanal atresia
- Till date antithyroid drug of choice was propylthiouracil[Q] because it:
  - Inhibits conversion of T4 to T3[Q]
  - Crosses placenta less rapidly than methimazole[Q]
- *The latest edition of williams: 24/e p 1151 says "Until recently, PTU has been the preferred thionamide in the United States (Brent, 2008). In 2009, however, the Food and Drug Administration issued a safety alert on PTU-associated hepatotoxicity. This warning prompted the American Thyroid Association and the American Association of Clinical Endocrinologists (2011) to recommend PTU therapy during the first trimester followed by methimazole beginning in the second trimester. The obvious disadvantages is that this might lead to poorly controlled thyroid function."*
- Radioactive iodine is an absolute contraindication in the treatment of thyrotoxicosis in pregnancy. In fact, it should not be given to patients even wanting pregnancy within 1 year

- Beta blockers like propranolol are used for management of tremors and tachycardia. They are safe in pregnancy

Surgical Management: Thyroidectomy may be carried out[Q] after thyrotoxicosis has been brought under medical control. Because of increased vascularity of thyroid gland during pregnancy, such surgery is more complicated than in non-pregnant state. It is indicated in women who cannot adhere to medical treatment or in whom drug therapy proves toxic or who develop stridor, respiratory distress because of the disease. Best time to perform thyroid surgery in pregnancy is 2nd trimester.

Note: Cord blood should be collected at the time of delivery for estimation of TSH, T_3, T_4 to detect neonatal thyroid disorders. Fetal thyroid gland is able to synthesize thyroid hormone by 10-12 weeks of gestation.

Remember:

Maternal hormones which do not cross placenta

- Insulin
- TSH
- Erythropoietin
- PIH
- Calcitonin

QUESTIONS

1. **A pregnant, diabetic female on oral hypoglycemics is shifted to insulin. All of the following are true regarding this, *except*:** **[AIIMS June 99; Dec 98]**
   a. Insulin does not cross placenta
   b. During pregnancy insulin requirement increases and cannot be provided with sulphonylureas
   c. Tolbutamide crosses placenta
   d. Tolbutamide causes PIH

2. **A pregnant diabetic on oral sulphonylureas therapy is shifted to insulin. All of the followings are true regarding this, *except*:** **[AI 01]**
   a. Oral hypoglycaemics cause PIH
   b. Insulin does not cross placenta
   c. Cross placenta and deplete foetal insulin
   d. During pregnancy insulin requirement increases and cannot be met with sulphonylureas

3. **A lady with 12 weeks of pregnancy having fasting blood glucose 170 mg/dl, the antidiabetic drug of choice is:** **[AIIMS May 01]**
   a. Insulin b. Metformin
   c. Glipizide d. Glibenclamide

4. **True about diabetes in pregnancy are all *except*:** **[AIIMS May 08]**
   a. Glucose challenge test is done between 24-28 weeks
   b. 50 gm of sugar is given for screening test
   c. Insulin resistance improves with pregnancy
   d. Diabetes control before conception is important to prevent malformation

5. **Late hyperglycemia in pregnancy is associated with:** **[AIIMS Nov 06; May 06]**
   a. Macrosomia
   b. IUGR
   c. Postmaturity
   d. Congenital malformation

6. **A G2 P1+0+0 diabetic mother present at 32 weeks pregnancy, there is history of full term fetal demise in last pregnancy. Her vitals are stable, sugar is controlled and fetus is stable. Which among the following will be the most appropriate management?** **[AIIMS Nov 00]**
   a. To induce at 38 weeks
   b. To induce at 40 weeks
   c. Cesarean section at 38 weeks
   d. To wait for spontaneous delivery

7. **Most sensitive screening test in diabetic mothers for congenital malformation is:** **[AIIMS Dec 98]**
   a. MS AFP
   b. Blood glucose
   c. Amniotic fluid AFP
   d. Hb A1C (Glycosylated haemoglobin)

8. **Which is best method to assess fetal damage in a diabetes mother in Ist trimester is:**
   a. Blood sugar estimation **[AIIMS June 99]**
   b. Urine ketone assay
   c. Amniocentesis to see level of sugar in amniotic fluid
   d. Glycosylated Hb

9. **Glucose tolerance test is indicated in pregnancy becasue of:** **[PGI June 06, 03]**
   a. Big baby
   b. Eclampsia
   c. Previous GDM
   d. H/O diabetes in maternal uncle

10. **Which of the following histories is not an indication to perform oral glucose tolerance test to diagnose gestational diabetes mellitus?** **[AIIMS Nov 2011]**
    a. Previous eclampsia
    b. Previous congenital anomalies in the fetus
    c. Previous unexplained fetal loss
    d. Polyhydramnios

11. **All are seen in gestational diabetes *except*:**
    a. Previous macrosomic baby **[AIIMS May 2010]**
    b. Obesity
    c. Malformations
    d. Polyhydramnios

12. **Commonest congenital malformation in infant of a diabetic mother is:** **[AIIMS June 97]**
    a. Neural tube defect
    b. Hydrocephalus
    c. Anencephaly
    d. Sacral agenesis

13. **The commonest congenital anomaly seen in pregnancy with diabetes mellitus is:**
    a. Multicystic kidneys **[AIIMS May 03]**
    b. Oesophageal atresia
    c. Neural tube defect
    d. Duodenal atresia

14. **Most common congenital malformation seen in a diabetic pregnant woman amongst the following are:** **[AI 97]**
    a. Cardiac defect b. Renal defect
    c. Liver defect d. Lung defect

15. **Infants of diabetic mothers are likely to have the following cardiac anomaly:** **[AI 05]**
    a. Coarctation of aorta
    b. Fallot's tetralogy
    c. Ebstein's anomaly
    d. Transposition of great arteries

16. **Which of the following is seen in the infant of a diabetic mother?** **[AI 02]**
    a. Hyperkalemia
    b. Hypercalcemia
    c. Macrocytic anemia
    d. Polycythemia

17. The effects of diabetic mother on infants is/are: **[PGI June 09]**
a. Brain enlargement as a part of macrosomia
b. Hyperglycemia in infant
c. First trimester abortion
d. Unexplained fetal death
e. Caudal regression

18. Caudal regression syndrome is seen in babies of mother having:
a. Diabetes
b. PIH
c. Cardiac disease
d. Anaemia

19. A diabetic female at 40 weeks of gestation delivered a baby by elective cesarean section. Soon after birth the baby developed respiratory distress. The diagnosis is: **[AIIMS May 01]**
a. Transient tachypnea of the newborn
b. Congenital diaphragmatic hernia
c. Tracheo oesophageal fistula
d. Hyaline membrane disease

20. Complication seen in fetus of a diabetic mother is: **[AIIMS Feb. 97]**
a. B cell hyperplasia
b. Hyperglycemia
c. Small fetus
d. A-cell hyperplasia

21. True about diabetic mother is: **[AIIMS Nov. 01]**
a. Hyperglycemia occurs in all infants of diabetic mothers
b. High incidence of congenital heart anomalies is common
c. Small baby
d. Beta agonist drugs are CI during delivery

22. True about diabetes in pregnancy:
a. Macrosomia **[PGI Dec. 06]**
b. IUGR
c. Congenital anomalies
d. Oligohydramnios
e. Placenta previa

23. Feature of diabetes mellitus in pregnancy:
a. Postdatism **[PGI June 06]**
b. Hydramnios
c. Neonatal hyperglycemia
d. ↑ congenital defect
e. PPH

24. Complications of diabetes in pregnancy includes all *except*: **[PGI May 2013]**
a. Macrosomia
b. Shoulder dystocia
c. Hyperglycemia in newborn
d. IUGR
e. Caudal regression

25. Which is/are not fetal complication of uncontrolled diabetes during pregnancy: **[PGI Nov 2012]**
a. Stillbirth
b. Chromosomal anomaly
c. NTD
d. Abruptio placenta
e. Fetal anomalies

26. All are features of infant born to diabetic mother *except*: **[AIIMS Dec 98]**
a. Obesity
b. Learning disability
c. Ketotic hypogylycemia
d. Future diabetes mellitus

27. True about congenital diseases in diabetes mellitus is all *except*: **(AIIMS May 09)**
a. Results due to free radical injury
b. 6-10% cases are associated with major congenital abnormality
c. 1-2% of newborns are associated with single umbilical artery
d. Insulin can be given

28. Best test for fetal maturity in a diabetic mother is:
a. L:S ratio **[AIIMS June 99]**
b. Lecithin-cephalin ratio
c. Phosphatidyl choline
d. Phosphatidyl glycerol

29. The one measurement of fetal maturity that is not affected by a 'bloody tap' during amniocentesis is:
a. L/S ratio **[AIIMS Nov 05]**
b. Phosphatidyl glycerol
c. α-fetoprotein
d. Bilirubin as a measured by DOD 450

30. A 30-year-old woman with diabetes mellitus presents to her physician at 19 weeks' gestation. She is obese and did not realize that she was pregnant until recently. She also has not been "watching her sugar" lately, but is now motivated to improve her regimen. A dilated ophthalmologic examination shows no retinopathy. An ECG is normal. Urinalysis is negative for proteinuria. Laboratory studies show: **[New Pattern Question]**

- Hemoglobin A 1c: 10.8%
- Glucose: 222 mg/dL
- **Thyroid-stimulating hormone: 1.0 µU/mL**
- **Free thyroxine: 1.7 ng/dL**
- **Creatinine: 1.1 mg/dL.**

Q. In which of the following condition the risk of developing it is same in diabetics as the general population:
a. Asymptomatic bacteriuria
b. Preeclampsia
c. Congenital adrenal hyperplasia
d. PPH after delivery
e. Shoulder dystocia

31. 30-year-old G3P2 patient visits an antenatal clinic at 20 weeks. She reveals during history that her first baby was 4.6 kg delivered by cesarean section, second baby was 4-8 kg delivered by c/section. Gynaecologists suspect gestational diabetes and orders a GCT. The blood sugar levels after 50 gms of oral glucose are 206 mg/dl and the patient is thus

confirmed as a case of gestational diabetes. All of the following are known complications of this condition *except*: **[New Pattern Question]**

a. Susceptibility for infection
b. Fetal hyperglycemia
c. Congenital malformations in fetus
d. Neonatal hypoglycemia

32. A 30-year-old G3P2 obese woman at 26 weeks' gestation with no significant past medical history states that diabetes runs in her family. Her other pregnancies were uncomplicated. The results of a 3-hour glucose tolerance test show the following glucose levels: **[New Pattern Question]**

- 0 (fasting): 90 mg/dL 1 hour: 195 mg/dL
- 2 hours: 155 mg/dL 3 hours: 145 mg/dL

As a result, she is diagnosed with gestational diabetes. She is counselled to start diet modification and exercise to control her glycemic levels. 3 weeks after her diagnosis, she presents her values:

- Fasting: 95 mg/dL 1hr pp: 185 mg/dL

What is the best management?

a. Continue diet modification
b. Start insulin
c. Repeat GTT
d. Start metformin

33. Fasting Blood sugar should be maintained in a pregnant diabetic female as: **[New Pattern Question]**

a. 70 – 100 mg% b. 100 – 130 mg%
c. 130 – 160 mg% d. 160 – 190 mg%

34. Gestational diabetes is diagnosed by: **[New Pattern Question]**

a. Glucose tolerance test (GTT)
b. Random blood sugar
c. Fasting and postprandial blood sugar
d. 24 hours blood glucose profile

35. Glycosuria during routine investigation of antenatal visit indicates that there is need for: **[New Pattern Question]**

a. Gestational diabetes treatment
b. Dietary control
c. Insulin treatment
d. Glucose tolerance test

36. For antenatal fetal monitoring in a diabetic pregnancy all of the following are useful *except*: **[New Pattern Question]**

a. Non-stress test
b. Biophysical profile
c. Doppler flow study
d. Fetal kick count

37. Hypothyroidism in pregnancy is least likely associated with **[AI 07]**

a. Recurrent abortions b. Polyhydramnios
c. PIH d. Preterm labour

38. Hypothyroidism in pregnancy causes: **[PGI Nov 2012]**

a. Macrosomia
b. Polyhydromnias
c. Prematurity
d. Abortion

39. Hypothyroidism is associated with the following clinical problems, *except*: **[UPSC 04]**

a. Menorrhagia b. Early abortions
c. Galactorrhoea d. Thromboembolism

40. One of the following is an absolute contraindication for treatment of Thyrotoxicosis in pregnancy of 6 months duration: **[New Pattern Question]**

a. Antithyroid drug b. I^{131} therapy
c. Telepaque d. Surgery

41. Rani a 24-year-old woman presents to her gynaecologist as she has chronic hypothyroidism and wants to conceive now. Her hypothyroidism is well controlled at 75 microgram of Thyroxine. She doesn't smoke or drink and doesn't have any other medical ailment. She would like to know if she should keep taking her Thyroxin. Which of the following is the best advice to give to this patient? **[New Pattern Question]**

a. Stop taking Thyroxine and switch to methimazole as we would like to control your baby's thyroid levels
b. Thyroxine is safe during pregnancy but it is not absolutely necessary during pregnancy to continue thryoxine.
c. Thyroxine is not safe during pregnancy and it is better for your baby to be hypothyroid than hyperthyroid
d. Thyroxine is absolutely safe and necessary for you in pregnancy but we would like to decrease your dose as pregnancy is accompanied by mild physiological hyperthyroidism
e. Thyroxine is safe in pregnancy and the dose of thyroxine would be increased during pregnancy to avoid hypothyroidism, which may affect the baby adversely

42. Prolactinoma in pregnancy, all are true *except*: **[New Pattern Question]**

a. Most common pituitary tumor but rarely symptomatic
b. Increase in prolactin levels worse prognosis
c. Macroadenoma> 1 cm is associated with bad prognosis
d. Regular visual checkup

43. Neonate of a hyperthyroid mother can present with all *excepts*: **[New Pattern Question]**

a. Goitrous thyrotoxicosis
b. Goitrous hypothyroidism
c. Non goitrous hypothyroidism
d. None of the above

44. The following drug is used in management of thyroid storm during pregnancy: **[New Pattern Question]**

a. Sodium iodide
b. Dexamethasone
c. Propanalol
d. All of the above

EXPLANATIONS & REFERENCES

1. Ans. is d i.e. Tolbutamide causes PIH

2. Ans. is a i.e. Oral hypoglycemics cause PIH

Ref. Dutta Obs. 6/e, p 288; Williams Obs. 22/e, p 1182, 23/e, p 1119, 1120; Fernando Arias 2/e, p 288

A pregnant female with diabetes is switched from.

Oral hypoglycemics to insulin because:

- Insulin does not cross placenta[Q].
- Insulin requirement is increased in pregnancy which cannot be fulfilled by oral hypoglycemics[Q].
- Oral hypoglycemic drugs cross placenta and have teratogenic effect especially ear defects[Q].
- Oral hypoglycemic drugs cause severe fetal hyperinsulinemia and hypoglycemia[Q].
- Oral hypoglycemics aggravate neonatal hyperbilirubinemia by competing for albumin binding sites.

Note: The only hypoglycemic drug used during pregnancy are: (1) Metformin (2) Glyburide both these drugs are used as a first line therapy for diet failure in woman with gestational diabetics similar to insulin (Williams 24/e, p 1142)

3. Ans. is a i.e. Insulin *Ref. Dutta Obs. 7/e, p 285*

Fasting blood glucose 170 mg/dl, in a pregnant female indicates diabetes

In such cases insulin, glyburide or metformin should be started.

4. Ans. is c i.e. Insulin resistance improves with pregnancy

Ref. Dutta 7/e, p 282 for option a, b, 283 for option c and 285 for option d; Fernando Arias 3/e, p 440, 442, 443

- In pregnancy, the insulin sensitivity decreases i.e. insulin resistance increases as the gestation advances mainly due to anti insulin signals produced by placenta (mainly human placental lactogen).
- Congenital malformations in a diabetic mother occur within first 8 weeks of gestation when most women are just beginning prenatal care. Therefore preconceptional counselling is very essential in a diabetic mother
- Screening for diabetes during pregnancy is done by glucose challenges test at 24–28 weeks of pregnancy.

Note: Instead of **'universal screening'**, a **'selective screening'** should be adopted

5. Ans. is a i.e. Macrosomia *Ref. COGDT 10/e, p 316*

"Hyperglycemia at the time of conception results in enhanced rates of spontaneous abortion and major congenital malformations. Hyperglycemia in later pregnancy increases the risk for macrosomia, hypocalcemia, polycythemia, respiratory difficulties, cardiomyopathy, and congestive heart failure." *COGDT 10/e, p 316*

Macrosomia:

- Fetal macrosomia is defined by ACOG as fetal birth weight is > 4500 g.
- Macrosomic fetuses have extensive fat deposits on the shoulder[Q] and trunk[Q] which is associated with increased incidence of shoulder dystocia.[Q]
- Organ which is not affected in macrosomia is brain.[Q]
- Control of postparandial blood sugar levels is very important for preventing macrosomia.
- *For diagnosing macrosomia:* USG is performed every 4 weeks, starting at 20 weeks of gestation.
- *First sign of developing macrosomia is:* increase in abdominal circumference more than other measurements.
- *Management :* If wt of fetus is > 4.5 kg in diabetic mothers or > 5 kg in non diabetic mothers–section is recommended.

6. Ans. is a i.e. To induce at 38 weeks *Ref. COGDT 10/e, p 315; Fernando Arias 3/e, p 449*

The most common time of IUD in a diabetic patient is last two weeks of pregnancy, since in this patient there is history of a full term demise as well, so logically speaking we should terminate her pregnancy at 38 weeks.This is what logic says, now let us see what references have to say-

High risk gestational diabetes:

- History of stillbirth[Q]
- History of neonatal death[Q]
- History of fetal macrosomia[Q]
- Concomitant obesity and/or hypertension[Q]
- Development of oligohydramnios, polyhydramnios preeclampsia or fetal macrosomia
- Inadequate metabolic control with diet alone.

"High risk gestational diabetic patients should have their labor induced when they reach 38 weeks with exception of those with a macrosomia fetus (Efw > 4000 g) who should be delivered by cesarean section because of the increased risk of shoulder dystocia". *—Ref. Fernando Arias 3/e, p 449*

Induction of labor: The indications are— (i) Diabetic women controlled on insulin (GDM or class B diabetes) are considered for induction of labor after 38 completed weeks (ii) Women with vascular complications (pre-eclampsia, IUGR) often require induction after 37 weeks.

Also know:

- In case of low risk gestational diabetes - patient may be allowed to go into spontaneous labour.
- In any case, the pregnancy should not be allowed to overrun the expected date.

Route of Delivery:

- Diabetes per se is not an indication for caesarean section.
- Vaginal delivery may be allowed if there are no maternal or fetal complications, the cervix is favourable, the baby is of average size and the presentation is vertex with no cephalopelvic disproportion. In such cases, labour may be induced.
- Continuous CTG monitoring in labour is mandatory.
- Shoulder dystocia must be anticipated in labour.
- *Macrosomic fetus with weight ≥ 4500 g at term cesarean section is indicated.*
- If weight is between 4000 g–4500 g vaginal delivery or cesarean section, the decision depends on the obstetrician (According to ACOG).

7. Ans. is d i.e. Hb AIC (Glycosylated haemoglobin) *Ref. Dutta Obs. 7/e, p 284*

8. Ans. is d i.e. Glycosylated haemoglobin *Ref. Dutta Obs. 7/e, p 284; Fernando Arias 3/e, p 452; COGDT 10/e, p 312*

In diabetic patients:

- Most sensitive test/best test to assess the risk of fetal malformation is maternal HbA1 c levels
- The best test to detect fetal malformations is USG.

Now question 8 says - which is the most sensitive screening test to detect congenital malformations.
Undoubtedly ultrasound should be the first choice but it is not given in the options.

9. Ans. is a, c and d i.e. Big baby; Previous GDM; and History of diabetes in maternal uncle

10. Ans. is a i.e Previous eclampsia

Ref. Fernando Arias 3/e, p 442; Williams Obs. 24/e, p 1137, Table 52 Dutta Obs. 7/e, p 281

Indications for performing GCT: All those conditions in which there is risk of having diabetes.

On the basis of risk factors females are categorised into 3 category:

Low risk	Average risk	High risk
All of the folowing: • Member of an ethnic group with a low prevalence of GDM • No known diabetes in first degree relatives • Age <25 years • Weight normal before pregnancy • Weight of previous baby normal at birth • No history of abnormal glucose metabolism • No H/o poor obstetrical outcome	*One or more of the following:* • Member of an ethnic group with a high prevalence of GDM • *Diabetes in a first degree relative* • Age ≥ 25 years • Overweight before pregnancy • *Weight high at birth (previous baby)*	• Marked obesity • Strong family history of type II DM • Previous history of GDM impaired glucose metabolism or glucosouria • Unexplained stillbirth • H/o previous congenitally malformed baby

Time for performing screening test (glucose challenge test):
- **In low risk patients:** Blood glucose screening is not routinely required.
- **In average risk patients:** Blood glucose testing done at 24-28 weeks.
- **In high risk patients:** Perform glucose testing as soon as feasible.

Thus, average risk and high risk patients are indications for performing screening test and they will also be the indications for performing glucose tolerance test.

11. Ans. Is c i.e. Malformations *Ref. Textbook of Obs. Sheila balakrishnan 1/e, p 288; Fenando Arias 3/e, p. 445, p 441*

As explained in the preceding text, congenital malformations are seen in fetuses of overt diabetics and not gestational diabetics.

12. Ans. is a/c i.e. Neural tube defect/Anencephaly

13. Ans. is c i.e. Neural tube defect

Ref. Fernando Arias 3/e, p 454; COGDT 10/e, p 312; Sheila Balakrishnan, p 288; Wiilliams Obs. 21/e, p 1369

Friends, this is one of the most frequently asked and most controversial topic of PGMEE Exams.

I am giving you all the information I could lay my hands and the rest is up to you.

Congenital malformation in Diabetes: *—Fernando Arias 3/e, p 454*

- "The most frequent abnormalities involve the heart and the central nervous system. Most common are anencephaly, spinabifida, transposition of the great vessels, and ventricular septal defects".
- *"The lesion classically associated with diabetic embryopathy, the 'caudal regression syndrome', is rare, with an incidence of 1.3 per 1000 diabetic pregnancies".* *—Fernando Arias 3/e, p 454*

Most common Anomalies in Infants of Diabetic mothers:

Central nervous system	Heart & great vessels	Skeletal & spinal system	Genitourinary system	Gastrointestinal system
Anencephaly Holoprosencephaly Encephalocele	Transposition of the great vessels Ventricular septal defect Aortic coarctation Atrial septal defect	Caudal regression syndrome	Renal agenesis Ureteral duplication	Anal atresia

Sheila Balakrishnan p 288 says —
- **Cardiac defects are the commonest (transposition of great vessels and VSD).**
- **Neural tube defects like anencephaly and spinabifida.**
- **C**audal regression syndrome or sacral agenesis, which is very rare, is the congenital defect which is specific to diabetes.

"The most common single-organ system anomalies were cardiac (38%), musculoskeletal (15%) and central nervous system (10%)." *—Williams Obs. 21/e, p 1369*

Remember:
- Most common system involved = Cardiovascular system.
- IInd most common system involved = Nervous system
- Most common anomalies = VSD, ASD, TGA, Anencephaly, Spinabifida
- In cardiac anomalies M/C is VSD but most specific is TGA.
- Anomaly most specific for gestational diabetes - Caudal regression syndrome/sacral agenesis.
- Congenital anomalies are seen in overt diabetes and not gestational diabetes
- Investigation of choice to predict the risk of congenital anomalies in diabetic patients-HbA1C
- Investigation of choice to detect the risk of congenital anomalies in diabetic patients-USG

14. Ans. is a i.e. Cardiac defect

Ref. Williams Obs. 24/e, p 1128; Fernando Arias 2/e, p 289; COGDT 10/e, p 312; Sheila Balakrishnan, p 288,

Cardiac anomalies are the most common single organ anomalies in case of diabetes. *—Williams 21/e, p 1369*

This is supported by 24/e Williams which specifically mention, that cardiovascular anomalies are much common that CNS anomalies in babies of diebatic mothers (p 1128).

Most common cardiac anomalies seen are:

- Ventricular septal defect[Q]
- Atrial septal defect[Q]
- Transposition of the great vessels[Q]
- Aortic coarctation[Q]

15. Ans. is d i.e. Transposition of great arteries *Ref. Fernando Arias 3/e, p 454*

As VSD is not given in the options, transposition of great vessels is the single best answer.

16. Ans. is d i.e. Polycythemia *Ref. Dutta Obs. 7/e, p 285*

17. Ans. is c, d and e i.e. First trimester abortion, Unexplained fetal death and Caudal regression

Ref. Dutta Obs. 7/e, p 285; Sheila Balakrishnan, p 288, 291; Fernando Arias 3/e, p 445

Effect of diabetes on:

Fetus	Neonate
Increased chances of abortion[Q]	Respiratory distress syndrome (RDS)[Q]
Unexplained intrauterine deaths[Q]	Hypoglycemia[Q]
(M/C time of IUD in diabetic patients	Hypocalcemia[Q]
is -last 2 weeks of pregnancy)	Hypomagnesemia
Congenital malformations[Q]	Polycythemia
including caudal regression syndrome	Hyperbilirubinemia
Macrosomia[Q]	Hyperviscosity syndrome
Shoulder dystocia[Q]	Hypertrophic cardiomyopathy
	Birth trauma – Erb's and Klumpke's paralysis
	& fractures of the clavicle and humerus
	Feeding problems

In Q16---

As far as hyperkalemia is concerned - It is not given directly whether there is hyperkalemia or hypokalemia in neonate of diabetic mother, but we all know that in neonate of diabetic mother hyperinsulinemia is seen.

"Insulin causes potassium to shift in to the cells by Na^+ H^+ antiporter and Na^+ K^+ ATPase pump thereby lowers plasma potassium concentration." *—Harrison 16/e, p 262*

So, there is hypokalemia in infants of diabetic mother and not hyperkalemia.

In Q17---

Option a i.e. brain enlargement as a part of macrosomia- is not true because be it IUGR, be it macrosomia—brain is the last organ to be affected

Most common organ affected = Abdomen

Most common USG parameter affected = Abdominal circumference *—Ref. Fernando Arias 3/e, p 495*

18. Ans. is a i.e. Diabetes *Ref. Fernando Arias 3/e, p 454; COGDT 10/e, p 312*

"The lesion classically associated with diabetic embryopathy, the 'caudal regression syndrome', is rare, with an incidence of 1.3 per 1000 diabetic pregnancies". *—Fernando Arias 3/e, p 454*

19. Ans. is a i.e. Transient tachypnea of the newborn

Ref. Ghai 6/e, p 166, 168; COGDT 10/e, p 316; Williams Obs. 22/e, p 1178, 23/e, p 1116

Friends don't get shocked by the answer, even I was perplexed *when I went through the texts given in all the standard reference books.*

Let's see what they have said.

Respiratory distress syndrome (RDS) or hyaline membrane disease (HMD) *—Ghai 6/e, p 166*

- **RDS almost always occurs in preterm babies often less than 34 weeks of gestation.**
- It is the commonest cause of respiratory distress in a preterm neonate.

According to *Ghai* – RDS is seen in preterm babies and not the term babies (as is given in our question).

Now let's see what Ghai says about transient tachypnea of newborn:

Transient tachypnea of newborn (TTN) *—Ghai 6/e, p 168*

- Transient tachypnea of the newborn is a benign self-limiting disease occurring usually in **term neonates** and is due to delayed clearance of lung fluid.
- These babies have tachypnea with minimal or no respiratory distress.
- Chest X-ray may show prominent vascular marking and prominent interlobar fissure.
- Oxygen treatment is often adequate and ventilatory support is necessary and prognosis is good.

But *Ghai* didn't mention any correlation between TTN and Diabetes. So, I had to search other books for more information.

COGDT 10/e, p 316 says:

Neonatal complications: *RDS and transient tachypnea are more common in infants of women with poorly controlled diabetics.*

In this way we can derive some correlation between diabetes and TTN.

Our answer is *further strengthened by Williams Obs. 22/e, p 1178, 23/e, p 1116 which says -*

Respiratory distress:

"Conventional obstetrical teaching through the late 1980s generally held that fetal lung maturation was delayed in diabetic pregnancies. Thus, these infants were at increased risk for respiratory distress (Gluck and Kulovich, 1973). Subsequent observations have challenged this concept, and gestational age rather than overt diabetes is likely the most significant factor associated with neonatal respiratory distress (Berkowitz and colleagues, 1996; Kjos and colleagues, 1990b)".

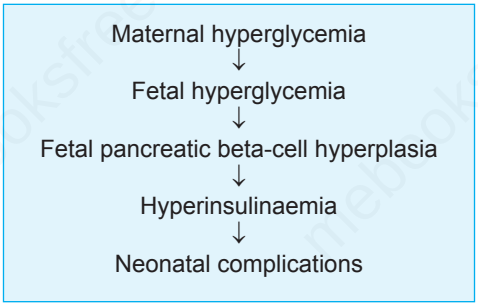
So, it is the gestational age and not diabetes which is the main factor causing neonatal respiratory distress.

In our question the baby is delivered at 40 weeks gestation (Full term) so, the answer cannot be Hyaline membrane disease rather it is transient tachypnea of newborn (***i.e. option 'a' is correct)***.

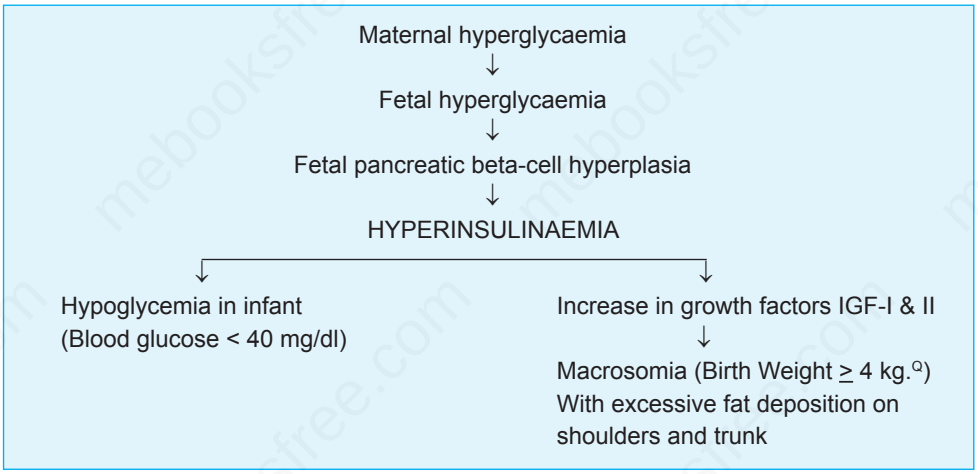
20. Ans. is a i.e. B cell hyperplasia *Ref. Williams Obs. 22/e, p 1173, 23/e, p 1109; Sheila Balakrishnan p 288, 289*

It is seen that all fetal and neonatal complications are more in poorly controlled diabetes and are mainly due to the fetal hyperinsulinaemia.

This can be explained by the ***Pederson hypothesis*** which says - *Maternal hyperglycemia leads to fetal hyperglycemia which in turn stimulates the fetal pancreatic beta cells to produce more insulin. The fetal hyperinsulinemia is responsible for most of the perinatal problems.*



21. Ans. is b and d i.e. High incidence of congenital heart anomalies is common; and Beta agonist drugs are contraindicated during delivery *Ref. Fernando Arias 3/e, p 454; Williams Obs. 22/e, p 1173, 1178, 23/e, p 1109, 1115, 1116*



*So, **option 'a'** **i.e. hyperglycemia occurs in all infants of diabetic mother and** **'c'** i.e. small baby are incorrect.*

Coming on to ***option 'b'*** *Fernando Arias 3/e, p 454 Says*

"The most frequent abnormalities involve the heart and the central nervous system."

*Thus **option 'b'** is correct*

*As far as **option 'd'** i.e. "Beta agonist drugs are contraindicated during delivery"* is concerned.

"The use of intravenous beta adrenergic drugs to stop preterm labour in pregnant diabetic patients is to be discouraged. These agents increase glycogenolysis and lipolysis and, consequently, also increase the tendency toward metabolic acidosis. Most diabetic patients require continuous intravenous insulin to antagonize the diabetogenic effect of the labour-inhibiting medication. The potential morbidity from the intravenous administration of beta-adrenergic agents to diabetic pregnant patients contraindicates their use." *—Fernando Arias 3/e, p 454*

*There fore **option 'd'** is also correct.*

Also Know:

- The drug of choice for initial tocolysis in the pregnant diabetic patient is magnesium sulfate[Q].
- Once the contractions have subsided, the patient may be maintained on oral nifedipine[Q].

22. Ans. is a, b and c i.e. Macrosomia, IUGR; and Congenital anomalies *Ref. Dutta Obs. 7/e, p 284, 285*

"Growth restriction is less commonly observed and is associated with maternal vasculopathy."

—Dutta Obs. 6/e, p 287

"Fetal growth restriction in women with diabetes may be seen and may be related to substrate deprivation from advanced maternal vascular disease or to congenital malformations". *—Williams Obs. 24/e, p 1129*

Rest all details about Fetal and Neonatal complications of Maternal diabetes have been discussed earlier.

23. Ans. is b, d and e i.e. Hydramnios; Increased Congenital defect; and PPH *Ref. Dutta Obs. 7/e, p 284, 285*

- *As explained in the previous question maternal hyperglycaemia leads to fetal hyperglycaemia, which in turn causes polyuria and thus causes polyhydramnios.*
  - Polyhydramnios leads to preterm delivery and not post datism.
  - Excessive uterine enlargement because of polyhydramnios and macrosomia causes increased incidence of atonic PPH.
- Diabetes leads to increased incidence of congenital defects in fetus.
- Maternal hyperglycemia → to ***fetal hyperglycemia*** → hyperinsulinemia → to ***neonatal hypoglycemia*** at birth.

Remember:	**In Diabetes:** There is:	• Maternal and fetal – hyperglycemia • Neonatal – hypoglycemia.

24. Ans. is c i.e. Hyperglycemia in newborn *Ref. Dutta Obs. 7/e p 285*

Already explained

25. Ans. is b and d i.e. Chromosomal anomaly and Abruptio placenta

Ref. Dutta Obs. 7/e, p 284, Williams 23/e, p 1114

All the options given in the question – stillbirth, NTD and fetal anomalies are know fetal complications of diabetes.

Chromosomal anomalies are not seen associated with diabetes.

The only data which I could get on it was from internet

"Chromosomal Abnormalities: Studies addressing the risk of aneuploidy with diabetes suggest that chromosomal abnormalities occurring with preexisting diabetes are likely associated with the risks of increasing maternal age. However, the paucity of data that include second trimester pregnancy terminations for chromosomal abnormalities may bias these finding"

26. Ans. is b i.e. Learning disability *Ref. Dutta Obs. 7/e, p 285; Williams Obs. 22/e, p 1178, 1179, 23/e, p 1115, 1116; Sheila Balakrishnan, p 291; Fernando Arias 3/e, p 445*

Late effects of maternal diabetes on children:

- *Increased risk of diabetes in children if:*
  - If mother is diabetic – Risk 1–3%
  - If father is diabetic – Risk 6%
  - If both are diabetic – Risk 20%

- Increased risk of Cardiovascular disease (Cardiomyopathy).
- Increased risk of obesity —*Williams Obs. 23/e, p 1109*

As far as learning disability is concerned, —*Williams 22/e, p 1178 says*

"It is seen that maternal diabetes has a negligible impact on cognitive development of child."

Williams 23/e, p 1116 says "RIZZO and colleagues (1995) used multiple tests of intelligence and psychomotor development to assess 196 children of diabetic mother upto age 9 years. They concluded that maternal diabetes had a negligible impact on cognitive development".

27. Ans. is b i.e. 6- 10% cases are associated with major congenital abnormality

Ref: Dutta Obs. 7/e, p 218 for option c 284 for option a, Williams Obs. 24/e, p 1128

Lets see each option separately -

Congenital disease in diabetes mellitus

Option a i.e. Results due to free radical injury - True -

Congenital malformation in a case of diabetes can be due to variety of reasons like, *Dutta Obs. 6/e, p 287*

- Genetic susceptibility
- Hyperglycemia - It is seen that good glycemic control indicated by HbAIC levels < %.9 can significantly lower the risk of fetal malformation.
- Arachidonic acid deficiency
- Ketone body formation
- Free Radical injury
- Somatomedin inhibition.

Option b–6 to 10% cases are associated with major congenital abnormality

Here we will have to read the option very carefully - the option is talking about Major congenital anomalities and not all anomalies.

Dutta Obs 6/e, p- 287 says overall incidence of congenital Malformations is 6-10%.

Williams 24/e p 1128. "The incidence of major malformations in women with type I diabetes is ~ 5%"

Hence **option b is incorrect**

Option c - 1 - 2% of newborns are associated with single umbilical artery

This option can be taken in + /– status because no where the incidence of single umbilical artery in a case of diabetes has been mentioned separately.

Whatever little information we have is from Dutta Obs. 6/e, p 220

Single umbilical artery:

- It is present in 1-2% cases (overall)
- May be due to failure of development of artery or due to its atrophy in later months
- It is seen in case of
  i. Twins
  ii. Babies born to diabetic mothers
  iii. In polyhydramines
- Single umbilical artery has been associated with congenital malformations of the fetus in 10-20% cases viz- Renal & Genital anomalies and fetal Trisomy
- There is increased incidence of abortions, prematurity, IUGR and increased perinatal mortality.

Option d- insulin can be given

There is no doubt as far as this option is concerned as insulin is the TOC for controlling hyperglycemia in case of diabetes in pregnancy.

So from above discussion it is clear that option 'b' is absolutely incorrect, so we are opting it out.

28. Ans. is d i.e. Phosphatidyl glycerol

29. Ans. is b i.e. Phosphatidyl glycerol *Ref. Fernando Arias 3/e, p 204; COGDT 10/e, p 256*

The best test to detect fetal lung maturity in diabetic mothers is presence of phophatidyl glycerol (PG) in amniotic fluid. If PG is present in amniotic fluid fetal lungs are considered mature and vice versa.

30. Ans is c i.e. Congenital adrenal hyperplasia *Ref. Williams Obs. 23/e, p 1113-1115; Dutta Obs. 7/e, p 283*

In the question, patient is presenting with overt diabetes mellitus i.e. she had diabetes before pregnancy also. The question says, in which the following conditions the risk of developing the condition is same in diabetic as well as nondiabetic patients in other words, which of the options is not a complication of diabetes during pregnancy.

Option 'a' – asymptomatic bacteriuvea – Diabetes during pregnancy, increases the chances of infections including asymptomatic bacteriuria *Dutta Obs. 7/e, p 283*

Option 'b' – preeclampsia – In all diabetic patients, there are increased chances of preeclampsia (25%) *Dutta Obs. 7/e p 283*

Option 'c' – Congenital adrenal hyperplasia – It does not have any relation whatsoever with diabetes.

Option 'd' – PPH after delivery – Diabetic pregnancy leads to polyhydramnios which can lead to PPH after delivery.

Option 'e' – Shoulder dystocia is a result of macrosomia during pregnancy.

31. Ans is c i.e. Congenital Malformation in fetus.

Ref. Textbook of Obs. Shiela Balakrishnan 1/e, p 288; Fernando Arias 3/e, p 445, 441

In the question, patient is presenting to the antenatal clinic at 20 weeks and is diagnosed as a case of gestational diabetes.

Note: Patients blood sugar levels after 50 gms of glucose i.e. after glucose challenge test are 206 mg/dl. Recall that if, after GCT blood sugar values are ≥ 200 mg/dl, there is no need for further testing by GTT and patient is diagnosed as a case of gestational diabetes.

As discussed in the text – in gestational diabetes, blood sugar levels are raised beyond 20-24 weeks of pregnancy, due to insulin resistance and hence free radicals (responsible for causing congenital malformations) are formed after 20-24 weeks and therefore it does not lead to congenital malformation as organogenesis is already complete by this age. Rest all options are complications of diabetes.

32. Ans is b i.e. start insulin *Ref. Dutta Obs. 7/e, p 285*

In the question patients GTT showed

- Fasting = 90 mg/dl (upper limit = 95 mg/dl i.e. normal)
- 1 hour pp = 195 mg/dl (upper limit = 180 mg/dl i.e. abnormal)
- 2 hour pp = 155 mg/dl (upper limit = 155, i.e. normal)
- 3 hour pp = 145 mg/dl (upper limit = 140, i.e. abnormal)

Thus 2 values are abnormal i.e. patient is a confirmed case of gestational diabetes.

As indicated, she was put on diet modification for 3 weeks and after 3 weeks her

Fasting value	=	95 mg/dl
2 hour post parandial	=	180 mg/dl

Remember: Metabolic goals of diabetes are

Fasting	≤	95 mg/dl
2 hour PP	≤	120 mg/dl

If these goals are not achieved by diet alone, **insulin should be started.**

33. Ans is a i.e. 70-100 mg/% *Ref. Dutta Obs. 7/e, p 285*

Metabolic goals of diabetes

Metabolic Goals during Pregnancy:

- Fasting < 95 mg/dl
- 1 hr PP < 140 mg/dl
- 2 hr PP < 120 mg/dl (average 100 mg/dl)
- HbA1c-6%.
  - If these goals are not achieved patient should be put on Insulin.

34. Ans. is a i.e. Glucose tolerance test (GTT)

Ref. Fernando Arias 3/e, p 442, 443; Dutta Obs. 7/e, p 281, 282; Williams Obs. 23/e, p 1107, 1108

See the preceding text for explanation.

35. Ans. is d i.e. Glucose tolerance test *Ref. Dutta Obs. 7/e, p 281*

Glycosuria in Pregnancy

- During pregnancy, **renal threshold for glucose is diminished**.
- If glucose tolerance test is done glucose leaks out in the urine even though the blood sugar level is well below 180 mg per 100 ml (normal renal threshold).
- Glycosuria is specifically detected by testing a **second fasting morning specimen of urine,** collected a little later, after discarding the overnight urine.
- Fasting glycosuria in the above sample if present is omnious.
- Glycosuria on one occasion before 20th week and on two or more occasions, thereafter, is an indication for glucose tolerance test.
- Glycosuria occurring any time during pregnancy with a positive history of diabetes or past history of having a baby weighing 4 kg or more should be tested by GTT.

36. Ans. is c i.e Doppler flow study *Ref. Fernando Aris 3/e, p 449; COGDT 10/e, p 315*

Fetal surveillance in gestational diabetes:

"Low risk gestational diabetic patiens who achieve adequate control with diet alone and do not develop macrosomia, polyhydramnios or preeclampsia do not requre antepartum fetal surveillance testing before 40 weeks. In fact, the risk of fetal distress in those patients is as low as in non diabetics and fetal well being can be assessed by teaching the patients about fetal movements and asking them to fill up a chart for kick counts. On the other hand, high risk gestational diabetics and patients on glyburide and/or insulin should have antepartum fetal surveillance testing starting at 32-34 weeks of gestation. There is no conscensus as to what is the best test for these patients.

Weekly or twice weekly NST are the most popular. However biophysical profile (BPP) the modified biophysical profile and CST are also used." *—Fernando Arias 3/e, p 449*

According to *COGDT 10/e, p 315*

"Surveillance for fetal well being often begins at 32 weeks gestation in patients with end organ disease using a twice weekly NST or modified BPP done twice weekly by measuring the fetal heart rate an the amniotic fluid volume. A weekly BPP is similarly useful. Women without end organ disease who requrie insulin often begin fetal monitoring at 32-34 weeks. Women with diet controlled gestational diabetes usually begin testing at 36-40 weeks until delivered. Maternal fetal movement monitoring check count using a count to 10 or similar method is recommended for all pregnant women, including those with diabetes to reduce the stillbirth rate. *—COGDT 10/e, p 315*

So from above 2 texts it is very clear that: – Fetal kick count
- – NST – Non stress test
- – CST – Contraction stress test
- – BPP – Biophysical score/profile

are done for anteratal fetal surveillance in diabetes.

As far as Doppler is concerned **"The current evidence suggests the use of Doppler flow studies in patients with diabetes mellitus who have pregnancies complicated by hypertensive disease, fetal growth restriction or vasculopathy. It is not recommended as a routine method of fetal surveillance".**

—Management of High Risk Pregnancy, SS Trivedi and Manju Puri, p 338

37. Ans. is b i.e. Polyhydramnios *Ref. Dutta Obs. 7/e, p 290*

38. Ans. is c and d i.e. Prematurity and Abortion *Ref. Dutta Obs. 7/e, p 288*

Hypothyroidism can lead to –

Mnemonic:

A	= **A**nemia
Precious	= **P**reterm labour / prematurity
P	= **P**reeclampsia
R	= **R**ecurrent abortion
I	= **I**UGR
I	= **I**nfertility due to anovulation
S	= **S**till birth
M	= **M**ental retardation

39. Ans. is d i.e. Thromboembolism *Ref. Dutta Obs. 7/e, p 288; Harrison 17/e p, 2205; Shaws 14/e, p 269*

Untreated hypothyroidism in early pregnancy has a high fetal wastage in the form of abortion, stillbirth and prematurity and deficient intellectual development of the child. However, pregnancy complications like pre-eclampsia and anemia are high.
—Dutta Obs. 7/e, p 288

"Galactorrhea is caused by hyperprolactenemia of which an important cause is hypothyroidism." *Harrison 17/e, p 2205*

"Hypothyroidism causes menorrhagia." *High Risk Pregnancy, SS Trivedi, Manju Puri, p 413*

40. Ans. is b i.e. I^{131} therapy *Ref. Dutta Obs. 6/e, p 290; Williams Obs 23/e, p 1130*

Radioactive iodine is an absolute contraindication in the treatment of thyrotoxicosis in pregnancy. In fact, it should not be given to patients even wanting pregnancy within 6 months.

41. Ans. is e i.e Thyroxine is safe in pregnancy and the dose of thyroxine would be increased during pregnancy to avoid hypothyroidism, which may affect the baby adversely

Hypothyroidism in Pregnancy

- M/C cause-Autoimmune cause-Hashimoto thyroiditis
- Hypothyroidism can lead to Mental retardation in baby, abortion, stillbirth, IUGR, prematurity
- Since maternal Hypothyroidism in pregnancy (whether overt or subclinical) may impair fetal neuropsychological development, hypothyroidism should be treated adequately in pregnancy.
- Thyroxine requirement increase during pregnancy and this increased requirement begins as early as 5 weeks (i.e. option e is correct).

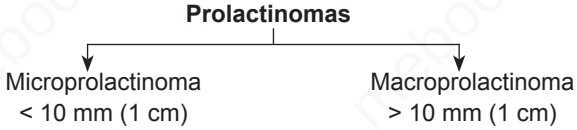
42. Ans. is b i.e. Increase in prolactin levels worse prognosis

Ref. Leon Speroff 8/e, p 481, Dewhurt's Textbook of Obs. and Gynae, 7/e, p 255, 256; Williams Obs. 23/e, p 1139, 1140

PROLACTINOMA

- Prolactinoma is a prolactin secreting tumours of the pituitary
- It is a benign tumor
- It is most common type of primary tumour[Q]
- It is more common in women than in men

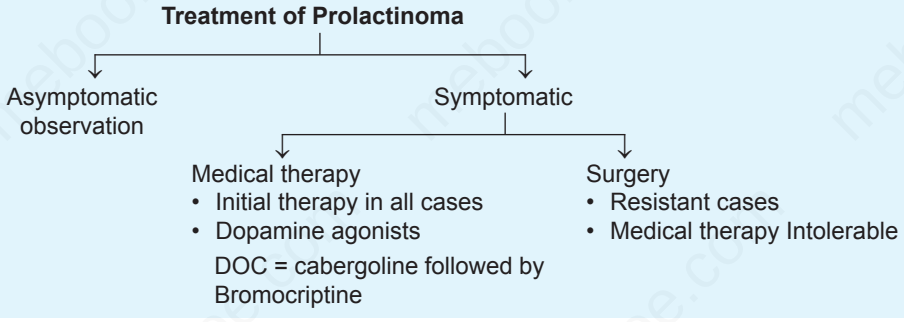
Prolactinomas are classified according to the size



The Clinical features of prolactinomas consists of the endocrine effects due to the hyperprolactinomic state, and local tumor mass effects.

Endocrine effect due to hyperprolactinemia	Local tumour mass effects
• Infertility[Q] • Menstrual irregularity[Q] • Decreased libido • Galactorrhoea	• Visual field defect

Treatment of Prolactinoma



- **Prolactinomas in Pregnancy**

During pregnancy normal pituitary gland doubles in size by third trimester and estrogen levels increase which leads to growth of the prolactinomas during pregnancy.

"The risk for clinically significant growth in women with microadenomas is extremely low-only 1-2%. About 5% will develop asymptomatic tumor enlargement (as determined by imaging), and essentially none will ever require surgical intervention. The risk is significantly higher (15-20%) in those with macroadenomas." —*Leon Speroff 8/e, p 481*

Thus option 'C' macroadenomas >1 cm is associated with bad prognosis is absolutely correct. (as macroadenoma means only it is ≥ 1 cm)

- It is recommended that pregnant women with microdenomas should be regularly inquired for headache and visual symptoms.

"Those with macroadenomas should have visual field testing during each trimester. CT or MRI is recommended only if symptoms develop" —*Williams 23/e, p 1139*

Thus option d-regular visual checkup is also correct

As far as option 'b' i.e. increase in prolactin levels means worse prognosis is concerned. In pregnancy prognosis does not depend on the levels of prolactin, this is because during pregnancy the levels of circulating estrogen is very high.

This results in a parallel increase in the circulating levels of prolactin. Prolactin levels begin to rise at 5-8 weeks of gestation period and it parallels the increase in the size and number of lactotrophs. At the end of the first trimester, serum prolactin levels are approximately 20-40 ng/mL. It further increases to 50-150 ng/mL and are 100-400 ng/mL at the end of the second and third trimesters, respectively.

So per increase in prolactin levels does not indicate poor prognosis, as during pregnancy, there is going to be increase in prolactin levels. Thus option b is incorrect

Also know

Management of prolactinomas during pregnancy- (Leon Speroff 8/e, p 481)

- Regardless of the size of adenomas there is no indication for treatment with dopamine agonist or for imaging in absence of symptoms, treatment maybe safely discontinued when pregnancy is established.
- In women with microadenomas serum prolaction should be measured approximately 2 months after delivery or the cessation of nursing and if still elevated, treatment with a dopamine agonist can be resumed.
- In women with macroadenomas, an interval of treatment with dopamine agonist before pregnancy is advisable, to shrink the tumor. In those macroadenomas that fail to shrink with treatment, pregnancy should be avoided until after surgical debulking

According to Williams 23/e, p 1139

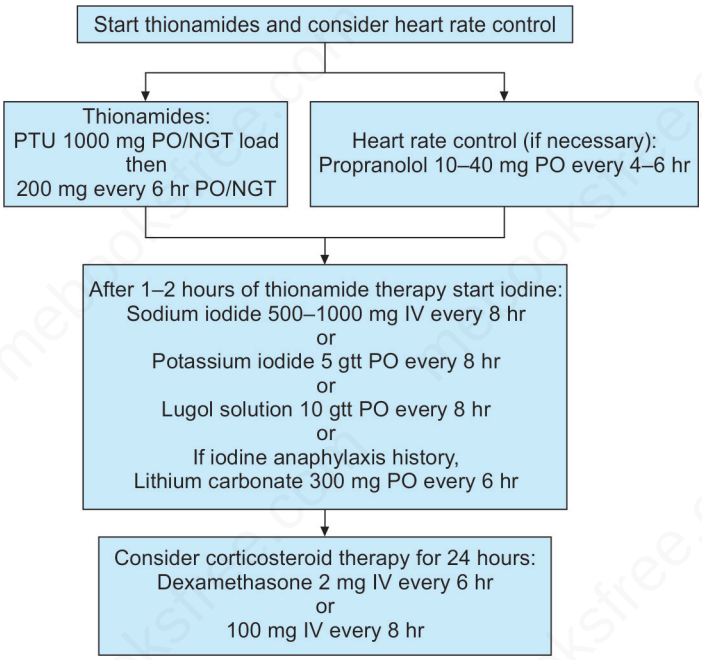
If required DOC for Prolactinomas during pregnancy is—Bromocriptine and surgery of choice is– Transnasal transeptal endoscopic resection.

43. Ans. is d i.e. None of the above *Ref. Williams Obs. 24/e, p 1150*

Read the preceding text for explanation.

44. Ans. is d i.e. All of the above *Ref. Williams Obs. 24/e, p 1152*

Management of Thyroid Storm in Pregnancy



18 Hypertensive Disorders in Pregnancy

Definition

Hypertension in pregnancy is defined as systolic **BP ≥ 140 mm of Hg or diastolic BP ≥ 90 mm of Hg** on two occasions atleast 6 hours but no more than 7 days apart.

Diastolic BP is determined by the disappearance of sound (Korotkoff ph V). Korotkoff V is chosen as opposed to Korotkoff IV (muffing) as it is more reproducible and shows better correlation with the DBP in pregnancy. For accuracy, mercury sphygmomanometer is preferred over automated ones.

Pregnancyinduced hypertension		Chronic hypertension in pregnancy
(Means–a normotensive patient has conceived and due to some placental pathology, her B/P increases)		Literally means a hypertensive female has conceived
Preeclampsia	**Gestational Hypertension**	
• Rise in B/P seen after 20 weeks of pregnancy. + • Proteinuria (>300 mg in 24 hour urine collection or >30 mg/dl in a random urine sample or ≥ + 1 on.) + • B/P comes back to normal within 12 weeks of delivery	• Like Preeclampsia but no proteinuria is associated	• Rise in B/P seen before 20 weeks + • No proteinuria + • B/P does not come back to normal within 12 weeks of delivery.

***Note*:** 1. In dipstick = trace = 0.15 to 0.3 g/L proteinuria
1 + = 0.3 g/L
2 + = 1 g/L
3 + = 3 g/L

2. Continued 24 hour urine protei measurement is gold standard in diagnosis of proteinuria.

3. Proteinuria of preeclampsia is non selective.

A diluted or concentrated urine or an aeraline specimen can give false should be dipstick.

Concept of Delta Hypertension: It is condition where B/P of a pregnant patient remains within normal range but a cutely increases from her own baseline levels. Such females can develop eclamptic seizures or HELLP syndrome, inspite of being normotensive.

Risk Factors for Pre-eclampsia

- **Primigravida:** Young or elderly (first time exposure to chorionic villi)
- **Family history:** Hypertension, or pre-eclampsia in previous pregnancy

- **Placental abnormalities:**
  - Hyperplacentosis: Excessive exposure to chorionic villi—(molar pregnancy twins, diabetes)
  - Placental ischemia.
- **Obesity:** BMI >35 kg/m^2, Insulin resistance.
- **Pre-existing vascular disease**
- **New paternity**
- **Thrombophilias** (antiphospholipid syndrome, protein C, S deficiency, Factor V Leiden
- Multifetal gestation
- Metabolic syndrome
- Homocysteinemia

Preeclampsia can Further be Divided into

	Mild preeclampsia	Severe Preeclampsia
B/P	≥ 140/90 mm of Hg but less than 160/110 mm of Hg	≥ 160/110 mm of Hg
Proteinuria	≥ 300 mg in 24 hour urine collection or ≥ + 1 on stick but < + 3	≥ 5 g in 24 hour urine collection or ≥ + 3 persistently on dipstick.
Symptoms:		
Visual symptoms	Absent	Present
Oliguria (< 500 ml of urine in 24 hours)	Absent	Present
Epigastric pain	Absent	Present
Headache	Absent	Present
Features like HELLP syndrome:	Absent	Present
Hemolysis,	Absent	Present
Serum transminase level	Absent	Present
Low platelet count	Absent	Present
Renal functiontest:		
S uric acid	Normal	Elevated
Blood urea nitrogen	Normal	Elevated (N = 15 mg/dl, In these = 20–25 mg/dl)
S creatinine	Normal	Elevated (N = 0.8 mg/dl, In these = 1.2 mg/dl)
IUGR	Not seen	Seen

- Eclampsia is seizure or unexplained coma in a patient with preeclampsia

- Signs of impending eclampsia
  - Headache
  - Oliguria
  - Epigastric pain
  - Nusea, vomiting
  - Blurring of vision

- **HELLP syndrome** is a variant of preeclampsia defined by following criteria:
  - **Hemolysis** identified by Burr cells and schistocytes on an abnormal peripheral smear, an elevated serum bilirubin (>1.2 mg/dl) or LDH level (>600IU/L), or a low serum haptoglobin.
  - **Thrombocytopenia** with platelets <100,000/microl is the most consistent finding in HELLP syndrome.
  - **Elevated Liver function tests** (i.e transaminases) greater than two times the upper limit of normal (≥ 72 IU/L).

Etiology of Preeclampsia

A number of mechanisms have been proposed to explain its cause. Those currently considered important include:

- Placental implantation with abnormal trophoblastic invation of uterine vessels.

- Immunological maladaptive tolerance between maternal, paternal (placental), and fetal tissues.
- Maternal maladaptation to cardiovascular or inflammatory changes for normal pregnancy.
- Genetic factors including inherited predisposing genes and epigenetic influences.

Pathology

Significant Hemodynamic Changes in Preeclampsia

- In mild preeclampsia—most prominent change is ↑ cardiac output and normal peripheral vascular resistance (PVR). As soon as clinically severe preeclampsia occurs—CO decreases and PVR increases. Therefore there is vasoconstriction.
- Vasoconstriction along with leaky microcirculation leads to fluid shift into extracellular interstitial space causing depleted intravascular volume and hypovolemia.
- This leads to hemoconcentration which is a hallmark of severe preeclampsia and eclampsia.
- This is manifested as ↑ Hb and ↑ hematocrit. Hypovolemia results in IUGR and oligophydramnios.
- M/C hematological abnormality associated with preeclampsia is thrombocytopenia. Platelet count correlates with disease severity.

Kidney Changes

- RBF and GFR decrease in preeclampsia.
- Hallmark renal lesion is **Glomerular endotheliosis**.
- Acute renal failure is a rare complication of preeclampsia but preeclampsia is the M/C cause of obstetric ARF. ARF in preeclampsia is due to Acute Tubular necrosis.

Remember

- M/C visual symptom in preeclampsia is = scotoma.
- Blindness mostly is due to vasospasm. Blindness can be due to pathology in occipital cortex or retina.
  a. Occipital blindness is called Amaurosis and occurs due to occipital cortex edema.
  b. Blindness secondary to retinal ischemia or infraction is called Purtscher's retinopathy.
  c. Blindness can occur secondary to retinal detachment. It is U/L and partial.
- Mostly blindness is reversible and corrects automatically after delivery.
- M/C ophthalmoscopic finding in a patient with severe preeclampsia is an increase in veingasto-artery ratio and segmental vasospasm.

Management Principles

- Always remember Pregnancy induced hypertension (Preeclampsia/Gestational hypertension) are raised BP conditions due to placental pathology (incomplete trophoblastic invasion) and always their definitive treatment would be Termination of pregnancy (and throw out the defective placenta).
- Antihypertensive of choice for Chronic hypertension in pregnancy—earlier Methyldopa, now being replaced by Labetalol.
- Antihypertensive of choice for pregnancy-induced hypertension (Preeclampsia/Gestational hypertension) is Labetalol
- Antihypertensive of choice for Hypertensive crisis is-Labetalol.

Antihypertensives in Pregnancy

Safe	Contraindicated
• Labetalol	• ACE inhibitors
• Calcium channel blockers	• Diuretics
• Hydralazine	• Reserpine
• Alpha methyldopa	• Loratidine
• Sodium nitroprusside+/-	

Management of PIH/eclampsia

Mild PIH	Severe PIH	Eclampsia
• Antihypertensives- Role is doubtful. No proven efficacy. Generally bed rest and some diet restrictions are done.	• 1st step in management is seizure prophylaxis-$MgSO_4$	• 1st step in management- Airway management • Drug to control seizures- $MgSO_4$
• Definitive management- (as discussed earlier will always be) Termination of pregnancy done at 37 completed weeks of pregnancy	• Antihypertensives should be given to decreas BP in a controlled manner without compromising the utero-placental perfusion. Aim-Systolic BP should be between-140 to 155 mm of Hg and Diastolic BP should be between 90 to 105 mm of Hg • Glucocorticoids-for lung maturation • Definitive management is - termination of pregnancy at 34 completed weeks. If a pregnant woman comes with severe PIH before 23 weeks = terminate immediately.	• Anti hyppertensives to control BP • Definitive management- immediate termination of pregnancy. • Delivery should occur within 24 hours of 1st seizure

- ***Route of delivery*:** Patients in labor or with a favorable cervix can deliver vaginally. If induction fails LSCS is indicated. Anesthesia–Regional anesthesia

- **Indications for termination of pregnancy irrespective of the weeks of gestation in case of preeclampsia are:**
  - Severe preeclampsia, with impending eclampsia
  - Eclampsia (give MgSO4 first, followed by induction of labor)
  - HELLP syndrome.
  - Pulmonary edema
  - Significant renal dysfunction, coagulopathy
  - Abruption
  - Previable fetus
  - Fetal compromise

After delivery: BP should be measured atleast 4 times a day for first—days after delivery and once daily for next 2 weeks.

Prevention and Treatment of Convulsions with $MgSO_4$

- $MgSO_4$ is the drug of choice for prevention and management of convulsions in eclampsia.[Q]

Mechanism of action:

- It decreases the acetylcholine release from the nerve endings and decreases the sensitivity of motor end plate to Ach.
- Blocks the calcium channel and decreases intracranial edema.

Regimens for $MgSO_4$:

- IM loading dose Pritchard Regimen-5 gm (50% solution) in each buttock deep i.m. maintenance dose – 5 gm (50%) deep i.m. on alternate buttock every 4 hours.
- IV loading dose 4—6 slow over 3–5 minutes at rate not more than 1 g/min. Maintenance dose – 1–2 gm/hr i.v. infusion

Therapeutic range – 4 to 7 mEq/L

- There is a narrow range at which therapeutic effect and toxic effects of Magnesium occurs, therefore monitoring for magnesium toxicity is very essential.

Monitoring for magnesium toxicity

- Urine output should be at least 30 ml/hr[Q]
- Deep tendon reflexes (Patellar reflex) should be present[Q]
- Respiration rate should be more than 14/min.[Q]
- Pulse oximetry should be ≥ 96%

Remember

Repeat injection are given only if:
- Knee jerks are present
- Urine output > 30 ml/hour
- Respiratory rate ≥ 14/min

Absolute contraindication of $MgSO_4$
- Myasthenia gravis.[Q]
- Renal function.[Q]

Also Know

- Disappearance of patellar reflex is the first sign of impending toxicity of MgSO4.[Q]
- Patellar reflex is lost when Mg^{++} concentration reaches 10 mEq / L. –12 mEq/L (12 mg/dl).[Q]
- Respiratory depression occurs with Mg concentration > 12 mEq / L and arrest when > 15 mEq/L.
- Cardiac arrest occurs when > 30 mEq/L.
- Best marker of magnesium toxicity is pulse oximetry as oxygen saturation begins to drop before there is evidence of respiratory depression.
  - Magnesium sulfate acts synergistically with the muscle relaxants used for general anaesthesia.[Q]
  - It decreases FHR variability in NST tracings.
  - The neuromuscular blocking action of $MgSO_4$ may be potentiated by calcium channel blockers. So, $MgSO_4$ should be used cautiously with nifedipine.
  - It should be used with caution with general anaesthetics.

Antidote for $MgSO_4$ toxicity 10 ml Injection of 10% calcium gluconate (Alternative-Calcium Chloride)

Predictive Test for PIH

My	Microalbuminuria – The test is not very reliable.
Husband	Hyperhomocysteinemia. In woman with preclampsia levels of homocysteine are increased 3-4 fold times at midpregnancy.
U	Uric acid —*Williams Obs. 22/e, 779* Uric acid excretion is decreased in women with preeclampsia. Hyperuricemia is one of the earliest Manifestation of preeclampsia Plasma uric acid values > 5.9 mg/dl at 24 weeks have a positive predictive value for preeclampsia.
Play	Mean arterial ***P**ressure* in second trimester if mean arterial pressure is ≥ 90 mmHg in second trimester chances of developing preeclampsia increase.
C	Urinary **C**alcium Urinary calcium < 12 mg /dl in 24 hrs. indicate impending preeclampsia (Preeclampsia is associated with hypocalciuria)
A	***A**ngiotensin sensitivity test* It is based on the fact that women destined to develop preeclampsia lose their refractoriness to angiotensin between 28-32 weeks If a pressure response occurs with <8 ng/kg/min of infused angiotensin, 90% are likely to develop pre-eclampsia.

Contd…

Contd…

R	***R**oll over test* *The test is done at 28-32 weeks.* *It measures angiotensin sensitivity in susceptibles when they lie supine* The woman is turned from the left lateral to the supine position If there is an increase in the diastolic blood pressure by 20 mm or more, the test is considered positive
D	***D**oppler ultrasound* Presence of diastolic notch between 22-24 weeks by Doppler velocimetry in the uterine artery predicts the development of preeclampsia. *It is probably the best available test.*
First	• ***F**ibronectin* – It is released from endothelial cells following endothelial injury. Patients with preeclampsia have elevated levels of plasma fibronectin, a glycoprotein. • Fetal DNA – Identification of fetal DNA in maternal serum also predicts preeclampsia.

Prophylactic Measures for Prevention of Pre-eclampsia

- **Dietary manipulation**–low-salt diet, **calcium** or fish oil supplementation
- **Exercise**–physical activity, stretching
- **Antioxidants**–ascorbic acid (vitamin C), α-tocopherol (vitamin E), vitamin D
- **Antithrombotic drugs**–low-dose aspirin.

QUESTIONS

1. Risk factors for preeclampsia: **[PGI 06]**
a. Chronic hypertenstion
b. Obesity
c. Placental ischaemia
d. Multigravida
e. Antiphospholipid syndrome

2. Risk factor for preeclampsia: **[PGI 07]**
a. Chronic hypertension
b. Smoking
c. Obesity
d. Multiparity
e. Placenta previa

3. Risk factor for pre-eclampsia includes:
a. Age >35 years **[PGI May 2010]**
b. Obesity
c. Previous h/o preeclampsia
d. Multigravida
e. Antiphospholipid syndrome

4. Which of the following seen in preeclampsia? **[PGI 01]**
a. Hypertension b. Proteinuria
c. Convulsions d. Pedal edema

5. Indicator of severe pre-eclampsia: **[PGI Dec 09]**
a. IUGR
b. Diastolic BP>110 mm of Hg
c. Pulmonary edema
d. Systolic BP> 160
e. Oliguria

6. All are prognostic indicators of pregnancy induced hypertension, *except*: **[AIIMS May 01]**
a. Low platelets
b. Serum Na
c. Elevated liver enzymes m
d. Serum uric acid

7. All of the following indicate superimposed pre-eclampsia in a pregnant female of chronic hypertension *except*: **[AIIMS May 14]**
a. New onset proteinuria
b. Platelet count < 75,000
c. Increase in systolic BP by 30 mm Hg and diastolic by 15 mm Hg
d. Fresh retinal hypertensive changes

8. In PIH an impending sign of eclampsia is:
a. Visual symptoms **[PGI Dec 98]**
b. Weight gain of 2 lb per week
c. Severe proteinuria of 10 g
d. Pedal edema

9. All of the following may be used in pregnancy associated hypertension *except*: **[AI 04]**
a. Nifedipine b. Captopril
c. Methyldopa d. Hydralazine

10. Which of the following antihypertensives is not safe in pregnancy? **[AIIMS Nov. 05; May 05]**
a. Clonidine b. ACE inhibitors/Enalapril
c. α-Methyldopa d. Amlodipine

11. Which of the following antihypertensives is not given in pregnancy? **[AIIMS May 14]**
a. Enalapril b. α-rhethyldopa
c. Labetalol d. Nifedipine

12. All of the following can be administrated in acute hypertension during labour *except*: **[AIIMS May 14]**
a. IV labetalol b. IV niroprusside
c. IV dihydralazine d. IV diazoxide

13. Which is the drug of choice for severe preeclampsia?
a. Labetalol b. Metaprolol **[AI 08]**
c. A-methyldopa d. Nifidipine

14. A 27 year primigravida presents with pregnancy induced hypertension with blood pressure of 150/100 mm of Hg at 32 weeks of gestation with no other complications. Subsequently, her blood pressure is controlled on treatment. If there are no complications, the pregnancy should be terminated at: **[AIIMS May 06]**
a. 40 completed weeks
b. 37 completed weeks
c. 35 completed weeks
d. 34 completed weeks

15. 30 year old primi with 36 weeks of pregnancy with blood pressure 160/110 and urinary albumin is 3+ & platelet count 80000/mm^3. What will be the management?
a. Betamethasone **[PGI June 09]**
b. $MgSO_4$
c. Labetalol
d. Urgent LSCS
e. Labour induction

16. A gravida 2 patient with previous LSCS comes at 37 weeks, has BP = 150/100 mm of Hg. And on pervaginal examination, cervix is 50% effaced station-3, os is closed and pelvis is adequate. Protein uria is +1, Most appropriate step at the moment would be:
a. Antihypertensive regime and wait for spontaneous labor **[AIIMS Nov 2010]**
b. Wait and watch
c. Induce labour
d. Caesarean section

17. A female of 36 weeks gestation presents with hypertension, blurring of vision and headache. Her blood pressure reading was 180/120 mm Hg and 174/110 mm Hg after 20 minutes. How will you manage the patient? [AIIMS Nov 12]

a. Admit the patient and observe
b. Admit the patient, start antihypertensives and continue pregnancy till term.
c. Admit the patient, start antihypertensives, $MgSO_4$ and terminate the pregnancy
d. Admit oral antihypertensives and follow up in out-patient department

18. A 28 year old eclamptic woman develop convulsions. The first measure to be done is: [AIIMS June 99]

a. Give $MgSO_4$
b. Sedation of patient
c. Immediate delivery
d. Care of airway

19. Which is not a feature of HELLP syndrome:

a. Thrombocytopenia [AIIMS Feb 97]
b. Eosinophilia
c. Raised liver enzyme
d. Hemolytic anemia

20. Which of the following is not a part of HELLP syndrome?

a. Hemolysis [AIIMS May 2014]
b. Elevated liver enzymes
c. Thrombocytopenia
d. Retroplacental hemorrhage

21. All are true about pre eclampsia *except*: [AI 09]

a. Cerebral hemorrhage
b. Pulmonary edema
c. ARF
d. DVT

22. Concentration of $MgSO_4$ in the treatment of eclampsia in mEq/L: [PGI 99]

a. 7-10 b. 10-15
c. 2-4 d. 4-7

23. Side effects of magnesium sulfate includes

a. Hypotension [PGI Dec 08]
b. Anuria
c. Coma
d. Pulmonary edema

24. Earliest sign of Mg toxicity: [AI 2011]

a. Depression of deep tendon reflexes
b. Respiratory depression
c. Cardiac arrest
d. Anuria

25. Best drug for management of eclampsia:

a. $MgSO_4$ [AIIMS Nov 2010]
b. Lytic cocktail regime
c. Phenytoin
d. Diazepam

26. True about $MgSO_4$: [PGI May 2010]

a. Tocolytic
b. Used in management of eclempsia
c. Cause neonatal respiratory depression

27. $MgSO_4$ is/are indicated in: [PGI Nov 2012]

a. Severe pre eclampsia
b. Eclampsia
c. Pre term labour
d. Prevention of cerebral palsy

28. All statements(s) is/are about use of magnesium sulphate *except*: [PGI May 2013]

a. Therapeutic level is 4-7 mEq/L
b. Used in spinal anesthesia
c. Used in seizure prophylaxis
d. Decrease neuromuscular blockage
e. Used in Pre-emptive analgesia

29. A 31-year-old G2P1 woman at 24 weeks' gestation presents for a routine prenatal visit. She reports an uneventful pregnancy other than early morning nausea and vomiting, which has subsided since her last visit. She denies vaginal bleeding or contractions. Blood pressure and routine laboratory values at previous visits had been normal. Today her temperature is 37°C (98.6°F), pulse is 74/min, blood pressure is 162/114 mm Hg, and respiratory rate is 14/min. Her uterine size is consistent with her dates, and her physical examination is unremarkable. Laboratory tests show: [New Pattern Question]

- WBC count: 9000/mm³
- Hemoglobin: 13 g/mL
- Hematocrit: 39%
- Platelet count: 240,000/mm³
- Blood urea nitrogen: 11 mg/dL
- Creatinine: 1.0 mg/dL
- Aspartate aminotransferase: 20 U/L Alanine aminotransferase: 12 U/L.
- Urinalysis reveals 3+ protein but no blood, bilirubin, bacteria, leukocyte esterase, or nitrites. The patient is sent directly from the clinic for a nonstress test and an ultrasound. Six hours later her blood pressure is rechecked, and it is 162/110 mm Hg.

Which of the following is the most likely diagnosis?

a. Chronic hypertension
b. Preeclampsia
c. Eclampsia
d. Gestational hypertension
e. Severe preeclampsia

30. A 32-year-old G3P2 woman at 35 weeks' gestation has a past medical history significant for hypertension. She was well-controlled on hydrochlorothiazide and lisinopril as an outpatient, but these drugs were discontinued when she found out that she was pregnant. Her blood pressure has been relatively well controlled in the 120-130 mm Hg systolic range without medication, and urinalysis has consistently

been negative for proteinuria at each of her prenatal visits. She presents now to the obstetric clinic with a blood pressure of 142/84 mm Hg. A 24-hour urine specimen yields 0.35 g of proteinuria. Which of the following is the most appropriate next step? **[New Pattern Question]**

a. Start iv furosemide
b. Induce labor after doing Bischop score
c. Put her on hydralazine
d. Initial inpatient evaluation followed by restricted activity and outpatient management.
e. Start her prepregnancy regime

31. A 35 years old $G_1 P_0$ women at 28 weeks of pregnancy complaints of severe headache for 4 days. She doesn't have any photophobia, vomiting and nausea but had dizzness. Her BP is 155/85 mm of Hg, R/R-18/min, P/R-120/min.

Urinalysis reveals +1 glycosuria, +2 proteinuria and 24 hours urine collection shows 5 g protein.

P/A Examination: ht of uterus ~ 28 weeks:

- FHS regular
- Fetal parts palpable

She is admitted and monitored after 6 hours her condition is unchanged which of the following is the next best step in management: **[New Pattern Question]**

a. Emergency cesarean section
b. Oral glucose tolerance test
c. I/V $MgSO_4$
d. Stabilisation of vital signs and bed rest
e. Follow up after 2 weeks

32. A 25-Year-old female is 5 months pregnant and presents to her obstetrician along with her first child. She has not received any prenatal care. She thinks she has gained adequate weight and her pregnancy has been uncomplicated till date. Her past medical history is notable for hypertension for which she is currently taking enalapril.

- She is 168 cm (5' 6") tall, weight is 59 kg, B/P = 120/84 mm of hg and fundal ht is 17 cm. Fetal movements are appreciated and FHR = 140/min.
- Results of dipstick are negative.

Which of the following tests should be performed? **[New Pattern Question]**

a. CVS
b. Grp B streptococcal testing
c. Triple test
d. USG of fetal kidneys

33. All of the following are predictive tests for PIH except **[New Pattern Question]**

a. Rolling over test
b. Serum uricacid
c. Gain in weight > 2 kg in one month
d. Shake test

34. Proved to be effective in the management of preeclampsia: **[New Pattern Question]**

a. Zinc
b. Calcium
c. Magnesium
d. None of the above

35. A 24-year-old woman with 36 weeks of pregnancy, suddenly complains of headache and blurring of vision. Her B.P. is 170/110 mm of Hg. Urinary albumin is +++ and fundus examination shows areas of retinal hemorrhage. The line of further management would be: **[New Pattern Question]**

a. Conservative treatment
b. Anticonvulsive therapy
c. Induction of labour
d. Cesarean delivery

36. Which type of eclampsia has the worst prognosis: **[New Pattern Question]**

a. Antepartum
b. Postpartum
c. Intrapartum
d. Imminent

37. Cause of convulsion in eclampsia: **[New Pattern Question]**

a. Cerebral anoxia due to arterial spasm
b. Hypovolemia
c. Hypocalcemia
d. Shock

38. A pregnant woman in 3rd trimester has normal blood pressure when standing and sitting. When supine, BP drops to 90/50. What is the diagnosis? **[New Pattern Question]**

a. Compression of uterine artery
b. Compression of aorta
c. Compression of IVC (inferior vena cava)
d. Compression of internal iliac vessels

39. The following are related to preeclampsia: **[New Pattern Question]**

a. It is a totally preventable disease
b. Systolic rise of blood pressure is more important than the diastolic
c. Eclampsia is invariably preceded by acute fulminating preeclampsia
d. Endothelial dysfunction is the basic pathology

40. In a pregnant female with BP 150/100 mm Hg, a protein/creatinine ratio of _____ suggests development of preeclampsia: **[New Pattern Question]**

a. > 0.20
b. > 0.30
c. < 0.20
d. < 0.30

41. High-risk factor for gestational hypertension include all *except*: **[New Pattern Question]**

a. BP ≥ 150/100 mm of Hg
b. Gestation age < 30 weeks
c. IUGR
d. Polyhydramnios

42. A chronic hypertensive pregnant female with BP controlled using antihypertensives should be delivered at: **[New Pattern Question]**

a. 38–39 weeks
b. 37–39 weeks
c. 36–37 weeks
d. 35–36 weeks

EXPLANATIONS & REFERENCES

1. Ans. is a, c and e i.e. Chronic hypertension; Placental ischemia; and Antiphospholipid syndrome

Ref. Dutta Obs. 7/e, p 220

2. Ans. is a and c i.e. Chronic hypertension and Obesity

3. Ans. is a,b, c,d and e i.e. Age > 35 years, Obesity, Previous h/o preeclampsia, Multigravida and Antiphospholipid antibody syndrome.

Ref. Dutta Obs. 6/e, p 222; Williams Obs. 22/e, p 764, 765, 23/e, p 708, 709 ; COGDT 10/e, p 321

Preeclampsia is the development of ,(BP ≥ 140/90 mm of Hg) with ***proteinuria*** after 20 weeks of gestation in a previously normotensive and non proteinuric patient.

Risk factors for Preeclampsia:

Gentic factors:	– Family history (of preeclampsia, eclampsia, hypertension)	
Maternal factors:	– Nulliparous female – New paternity – Age < 20 years or > 35 years	*—Williams Obs. 22/e, p 765, 23/e, p 709; COGDT 10/e, p 321*
	– Obesity	
	– African american ethinicity	
Obstetrical factors:	– Previous history of preeclampsia	
	– Multiple pregnancy	
	– Hydrops fetalis with a large placenta	
	– Molar pregnancy	
Medical factors:	– **Chronic hypertension**	*—COGDT 10/e, p 321*
	– **Antiphospholipid antibody syndrome**	
	– Inherited thrombophilias (Protein C, S, factor V leiden deficiency)	
	– Diabetes mellitus/Gestational diabetes	
	– Renal disease	
	– Thyroid disease	*—COGDT 10/e, p 321*
	– Collagen vascular disease	*—COGDT 10/e, p 321*
Placental factors:	– **Poor placentation and placental ischemia**	

Note:
- Though preeclampsia is considered as a disease of primigravida, if the first pregnancy was complicated by preeclampsia the risk in the next pregnancy is increased.
- Early onset preeclampsia should raised the suspicion of molar pregnancy[Q].

As far as smoking is concerned.

"Although smoking during pregnancy causes a variety of adverse pregnancy outcomes, ironically, smoking has consistently been associated with a reduced risk of hypertension during pregnancy. Placenta previa has also been reported to reduce the risk of hypertensive disorders in pregnancy." *—Williams 23/e, p 709*

- Smoking is also protective for fibroids and endometriosis

4 Ans. is a and b i.e. Hypertension; and Proteinuria *Ref. Fernando Arias 3/e, p 415; COGDT 10/e, p 320*

Hypertension: It is defined as systolic BP ≥ 140 mm of Hg or diastolic BP ≥ 90 mm of Hg on 2 occasions atleast 6 hours apart seen in previously normotensive female after 20 weeks of gestation or mean arterial pressure ≥ 105 mm of Hg.

Note: A systolic rise of 30 mm Hg or a diastolic rise of 15 mm Hg is no longer a diagnostic criterion.

Proteinuria: Irreversible excretion of 300 mg of protein in 24 hours urine collection or atleast 30 mg/dl or 1+ dipstick in atleast 2 random urine samples collected atleast 6 hours apart but no more than 7 days apart is significant proteinuria.

Edema: In pregnancy can be physiological or patholigical.

	Physiological		Pathological
–	It is seen normally during pregnancy	–	Seen in case of preeclampsia
–	Non pitting in nature	–	Pitting in nature
–	Disappears after rest	–	Does not disappear after 12 hours of bed rest
		–	Associated with a weight gain of > 5 lb/month or > 1 lb/weak

Note: **Oedema is no longer a diagnostic criterion according to** *COGDT 10/e, p 320, Table 19-2* **and according to** *Fernando Arias 3/e, p 415 -*

"Excessive weight gain and edema are no longer considered signs of preeclampsia. Large increases in body weight as well as edema of hands, face or both are common in normal pregnancy and the incidence of preeclampsia is similar in patients with or without generalised edema."

5. Ans. is a, b, c, d and e i.e. IUGR; Diastolic BP > 110 mm of Hg; Pulmonary edema; Systolic BP> 160 and Oliguria

Ref. Dutta Obs. 7/e, p 224

6. Ans. is b i.e. Serum sodium

Ref. Fernando Arias 3/e, p 417; Williams Obs. 22/e, p 764, 23/e, p 765; COGDT 10/e, p 325

Preeclampsia can be classified into mild and severe variety.

Mild preeclampsia: It is defined as B:P ≥ 140 / 90 mm of Hg but ≤ 160 / 110 mm Hg on 2 occasions atleast 6 hours apart while the patient is on bed rest and proteinuria ≥ 300 mg/24 hours but ≤ 5 g/24 hours.

Severe preeclampsia: It is defined as BP ≥ 160 mm of Hg systolic or ≥ 110 mm Hg diastolic on 2 occasions atleast 6 hours apart while the patient is on bed rest and proteinuria of 5 g or more in 24 hours urine specimen or 3 + or more in 2 random urine samples collected atleast 4 hours apart.

Abnormality	Mild	Severe
Diastolic blood pressure	<110 mg Hg	≥110 mm Hg or higher
Systolic blood pressure	<160 mg Hg	≥160 mm Hg
Proteinuria	Trace to 1 +	Persistent 3 + or more (or ≥ 5 g/L)
Headache	Absent	Present
Cerebral or visual disturbances	Absent	Present
Upper abdominal pain	Absent	Present
Oliguria	Absent	Present (< 500 ml/24 hours)
Serum creatinine, BUN, uric acid	**Normal**	**Elevated**
Thrombocytopenia	**Absent**	**Present**
Liver enzyme elevation	***Minimal***	***Marked***
Fetal growth restriction	Absent	Obvious
Pulmonary edema	Absent	Present

As far as answer 6 is concerned, the prognostic indicators of preeclampsia are not given anywhere but low platelet count, increased liver enzymes and increased serum uric acid are all seen in case of severe preeclampsia. Therefore, if these are present, the prognosis is not good.

7. Ans is c i.e. Increase in sytolic BP by 30 mm Hg and diastolic by 15 mm Hg

Ref. Fernando Arias 4/e, p 187
Williams 24/e, p 730, 1007

Criteria for diagnosing Preeclampsia superimposed on chronic hypertension:

- It is diagnosed when one or more features of preeclampsia (e.g. elevated lower enzymes, low platelets, proteinuria) develop for the first time during pregnancy after 20 weeks in a woman with pre-existing chronic hypertension.

—Fernanado Arias 4/e, p 187

In the options:

New onset proteinuria Platelet count < 75,000.
Fresh retinal hypertensive changes.] all indicate new onset preeclampsia

Note: Worsening of hypertension is also a criteria for diagnosing this condition but not increase in systolic BP > 30 mm Hg and diagnostic by 15 mm Hg (This criteria has been abandoned)

Remember

- The incidence of superimposed preeclampsia for women with chronic HT is 20–30%
- As compared to pure preeclampsia, superimposed preeclampsia occus earlier in gestation.
- It is associated with fetal growth restriction.
- ACOG recommends the use of $MgSO_4$ for patients with this condition to prevent sezures.

8. Ans. is a i.e. Visual symptoms

Ref. Dutta Obs. 6/e, p 226; Sheila Balakrishnan 305; Williams Obs. 22/e, p 781, 23/e, p 729

As you know, severe preeclampsia progresses to eclampsia if not treated promptly,hence symptoms of severe preeclampsia can also be called as indicators of Impending eclampsia.

Signs of Impending or Imminent eclampsia/: Symptoms of severe preeclampsia/ Symptoms associated with poor prognosis

- Headache (severe)
- *Blurring of vision/flashing lights*
- Epigastric pain
- Brisk deep tendon reflexes and ankle clonus
- *Diminished urinary output (<400 ml/24 hours).*

Note: Friends, please do not get confused by the language here. Though headache, visual symptom and epigastric pain are symptoms of preeclampsia but they are also the indicators or signs of impending eclampsia.

9. Ans. is b i.e. Captopril *Ref. Dutta Obs. 7/e, p 228; Williams Obs. 22/e, p 782, 23/e, p 731-732; KDT 5/e, p 517*

Common antihypertensives used in PIH

Name	Mode of action	Side effects
Labetalol (DOC)	Combined α and β-blocker	Postural hypotension, tremulousness, do not use in asthmatics
Hydralazine	Peripheral vasodilatation	Headache, flushing, tachycardia, lupus
Nifedipine	Ca^{++} channel blocker	Headache, flushing, palpitations
α-methyldopa	Central action	Postural hypotension, depression, hemolytic anemia
Atenolol	β-blocker	Bradycardia, hypotension, hypoglycemia, fatigue, IUGR Should be avoided as long as possible.

ACE inhibitors *(Captopril/Enalapril/Ramipril/Lisinopril/Perindopril)* are contraindicated in pregnancy as they can impair renal function causing fetal Oliguria and oligohydramnios. They also cause congenital defects in fetus viz.

- Bony malformation
- Persistent patent ductus arteriosus
- Respiratory distress syndrome
- Limb contracture
- Pulmonary hypoplasia
- Prolonged neonatal hypotension
- Neonatal death

—Williams Obs. 22/e, p 782

10. Ans. is b i.e. ACE inhibitors/Enalapril

11. Ans. is a i.e. Enalapril

Ref. Williams Obs. 23/e, p 731, 732, High Risk Pregnancy, Fernando Arias 4/e, p 196

Friends, answer to this question is given in KDT 5/e, p 517 where a list of antihypertensive to be avoided/safe during pregnancy is given.

In pregnancy-antihypertensives:

Avoided	Safe
• Diuretics[Q]	• Labetalol,
• ACE inhibitors[Q] (Enalapril)	• Hydralazine[Q]
	• Methyldopa[Q]
	• Nifedipine

Contd...

Contd...

Avoided	Safe
• Reserpine[Q] • Sodium nitroprusside[Q]	• Verapamil • Nimodipine • β-blockers (Atenolol/Pindolol/Acebutolol) and Propranolol • Prazosin and Clonidine (provided postural hypotension can be avoided)[Q]

12. Ans. is d i.e. IV diazoxide

Ref. http;//www.drugs.com/pregnancy/diazoxie.html; http;//www.rxlist.com/nitropress-drug/warnigs-precaution.htm

***Both nitroprusside** and **diazoxide are pregnancy category C drugs, and should not be used during pregnancy**. But as the question specifically asks **'during labour', if diazoxide is given during labor, it may stop uterine contractions, requiring use of an oxytocic agent.** The better answer to go with is **diazoxide**.*

Warning for Nitroprusside During Pregnancy

- **Nitroprusside** belongs to **pregnancy category C.**
- There are no adequate, will-controlled studies of nitroprusside sodium in either laboratory animals or pregnant women.
- It is not know whether it can cause fetal harm when administered to a pregnant woman or can affect reproductive capacity.
- Nitroprusside sodium should be given to a pregnant woman only if clearly needed.
- In three studies in pregnant ewes, nitroprusside was shown to **cross the placental barrier** and **cause fetal cyanide poisoning**.

Warning for Diazoxide During Pregnancy

- **Diazoxide** has been assigned to **pregnancy category C** by the FDA.
- It is **not indicated for use during pregnancy**.
- Animal studies have shown evidence of **reduced fetal growth** and fetal and/or pup **survival** in addition to **prolonged parturition**.
- There are no adequate or controlled data from human pregnancy studies.
- Diazoxide should only be used during pregnancy when need has been clearly established.
  - **If given during labor, diazoxide may stop uterine contractions, requiring use of an oxytocic agent.**

13. Ans. is a i.e. Labetalol *Ref. Fernando Arias 4/e, p 213*

"Labetalol is the medication of choice for the treatment of acute severe hypertension in pregnancy and for maintenance treatment of hypertensive disorders in pregnancy. The reasons for being the first choice drug are its effectiveness, low incidence of side effects and the availability of oral and parenteral preparations."

... Fernando Arias 4/e, p 213

So this leaves no doubt that -

- *Antihypertensive of choice for severe preeclampsia is* - labetalol.

Hydralazine Versus Labetalol *Williams 24/e, p 762*

Comparative studies of these two antihyperrensive agents show equlivalerar results (Umans, 2014). Labetalol lowered blood pressure more rapidly, and associated tachycardia was minimal. However, hydralazine lowered mean arterial pressures to safe levels more effectively. Maternal and neonatal outcomes were similar. Hydralazine caused significantly more maternal caused maternal hypotension and bradycardia. Both drugs have been associated with a reduced frequency of fetal heart rate accelerations (Cahill, 2013).

Also Know:

The objective of antihypertensive use in seizure preeclampsia is to prevent intracranial bleed and left ventricular failure.

14. Ans. is b i.e. 37 completed weeks

Ref. Dutta Obs. 7/e, p 229; Fernando Arias 3/e, p 418-419,Bedside Obs. and Gynae-Richa Saxena 1/e, p 217

The patient in the question has BP = 150/100 mm of Hg i.e. mild hypertension (severe hypertension is when systolic BP is ≥ 160 mm or diastolic BP ≥ 110 mm of Hg) and has no other complications. Her BP is controlled on treatment i.e. she is being managed expectantly.

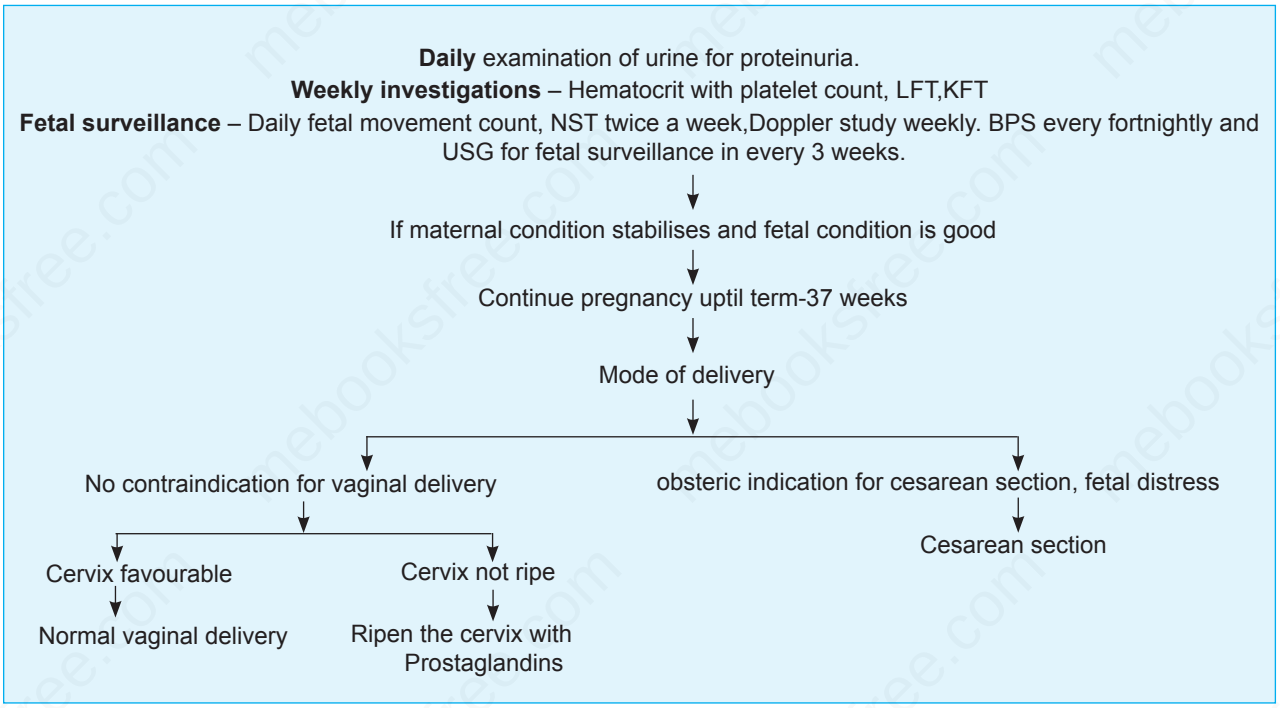
In such patients pregnancy should be terminated at 37 weeks.

"If Pregnancy is beyond 37 completed weeks termination is to be considered without delay."

... Dutta Obs. 7/e, p229

Management of Mild Preeclampsia: *—Fernando Arias 3/e, p 419*

Detailed examination for symptoms indicative of severe preeclampsia should be done daily.



15. Ans. is b, c, and e i. e. $MgSO_4$; Labetalol; Labour induction

Ref. Fernando Arias 3/e, p 420-424, Flowchart 16-4 on p 424

In the Question patient has -
Blood pressure = 160/110 mm Hg
Urinary albumin = 3+
Platelet count = 80, 000/mm^{31}
} indicating severe Preeclampsia

The gestational age is 36 weeks

Management of severe preeclampsia in Gestational age ≥ 34 weeks

Ref. Dutta Obs. 6/e, p 231; Fernando Arias 3/e, p 418, 419

" If Gestational age is ≥ 34 weeks, the best approach is to treat with magnesium sulphate for the prevention of seizures, give antihypertensive to control the blood pressure and delivery after stabilization."

—Fernando Arias 4/e, p 210

So this leaves us with no doubt that

- Magnesium sulphate
- Labetalol (the antihypertensive of choice in preeclampsia)
- Labor induction are all correct options as per Fernando Arias.
- As far as mode of delivery is concerned, vaginal delivery is preferred. If cervix is not ripe–prostaglandins are used to refer cause. If it fails then cesarean is done.

Betamethasone to hasten lung maturity is not required at 36 weeks as lungs are already mature by this time.

—According to Williams Obs. 23/e, p 729

Now let's see what Williams has to say:

"Termination of pregnancy is the only cure for preeclampsia. Severe preeclampsia demands anti convulsant and usually antihypertensive therapy followed by delivery."

"Labor induction is carried out usually with pre induction cervical ripening with a prostaglandin or osmotic dilator. Wherever it appears that induction almost certainly will not succeed or attempts have failed, cesarean delivery is indicated for more severe cases". *—Williams Obs. 23/e, p 729*

So again

- Magnesium sulphate (anticonvulsant)
- Labetalol (antihypertensive)
- Induction of Labour

] are correct

Cesarean section has to be done but not urgent LSCS are correct according to williams Obs also.

Remember:

- According to Williams: Ideal for severe preeclampsia is induction of labour followed by vaginal delivery, but in recent years number of LSCS being performed in case of severe preeclampsia are increasing due to obstetricians anxiety.

Also Know:

Gestational age wise management of severe PIH:

Gestational age > 34 weeks	Gestational age between 28 - 33 weeks	Gestational age between 24 - 28 weeks	Gestation age < 24 weeks
• $MgSO_4$ + • Antihypertensive therapy + Delivery	Same as GA > 34 weeks + Injections of steroid to mother to promote fetal lung development followed by delivery	Expectant management	Immediate termination is advised as maternal morbidity is high and chance of favourable outcome are low

16. Ans. is c i.e. Induced Labour

Ref. Fernando Arias 3/e, p 420-424, Flowchart 16-4 on p 424, Williams Obs 23/e, p 729.

This patient has

- BP: 150/100 mm hg
- Proteinuria: +1

Therefore it is classified as mild preeclampsia

In mild preeclampsia – if gestational age is > than labour induced should be 37 wks (here in the question = gestational age is >37 weeks). Here BP is 150/100, (Therefore, it is not necessary to start antihypertensive).

The NICE clinical guidelines suggest treating moderate hypertension (BP-150/100-159/109 mm Hg) with antihypertensives to keep B I P <150/80-100 range. The benefits or disadvantages of this intervention have not been elucidated by adequate clinical trials. *—Fernando Arias 4/e, p 209.*

"There is a consensus that if BP is below 150/100 mm Hg, there is no need for antihypertensive therapy. An exception may be if mild hypertension is associated with markers of potential severe disease or sign of organ dysfunction, (heavy proteinuria, liver dysfunction, hematological dysfuntion)". *—Fernando Arias 4/e, p 209.*

Thus, in this patient, the role of antihypertensive is not confirmatory as BP is 150/100 mm Hg. But role of induction of labor is confirmed, as patient is 37 weeks pregnant with mild hypertension.

PIH is not a contraindication for VBAC (Vaginal birth after cesarean) and further more that the pelvis of this patient is adequate – so there is no harm in inducing labour, rather it is advantageous, because it will help in developing lower uterine segment. At any point of time; if there is scar tenderness or if patients BP rises immediately perform cesarean section' therefore the best answer here is – Antihypertensive regime and then induce labour.

17. Ans. is c i.e. Admit the patient, start antihypertensives, $MgSO_4$ and terminate the pregnancy

Ref. Fernando Arias 'Practical Guide to High Risk Pregnancy and Delivery 3/e, p 417, 420, 424'

In the question, patient is pres enting with

- Headache
- Blurring of vision
- B/P = 180/120 mm of Hg (later 174/110 mm of Hg)

i.e. she is a case of severe pregnancy induced hypertension.

First step in the management of this case would be to prevent seizures i.e. give $MgSO_4$.

Her B/P should be controlled with antihypertensive and since pregnancy is >34 weeks, therefore terminate pregnancy (which is the definitive management).

18. Ans. is d i. e. Care of airway *Ref. Dutta Obs 6/e, p 235, COGDT 10/e, p 326*

Preeclampsia when complicated with convulsion and / or coma is called *eclampsia.*

Fits occurring in eclampsia are *Generalised tonic clonic seizure.*

In most cases seizures are self limited, lasting for 1 to 2 minutes.

Management:

"The first priorities are to ensure that the airway is clear and to prevent injury and aspiration of gastric content
—COGDT 10/e, p 326

Initial management during eclamptic fit:

- Patients should be kept in an isolated room to protect from noxious stimulus which might provoke further fits.
- Mouth gag is placed between teeth to prevent tongue bite.
- Air passage is cleared off the mucus.
- Oxygen is given.
- Catheterization is done to monitor urine output.

Specific management:

A. *Medical management*

i. *Seizure treatment*

- The drug of choice for the control and prevention of convulsions is magnesium sulphate (Pritchard's regimen)
  Previously used anticonvulsant regimen for eclampsia was 'Lytic cocktail regimen' given by Menon[Q] using pethidine[Q], chlorpromazine and phenargen.[Q], but now it is not used.

ii. Treatment of hypertension
- DOC in eclampsia is labetalol.
- 2nd DOC in eclampsia is hydralazine.

B. *Obstetric management in antepartum cases:*

- Immediate termination of pregnancy should be done.[Q]
- Vaginal delivery is preferred[Q] but ***"In current obstetrical practice the large majority of eclamptic women are delivered by cesarean section. The most common exception to cesarean delivery are women with a fetal demise and the rare ones with a very ripe cervix."*** *—Fernando Arias 3/e, p 427*

Note:

- *Prophylactic ergometrine or methergin following the delivery of anterior shoulder should not be given in cases of PIH.*
- Anaesthesia of choice in eclamptic patients – Regional / spinal or epidural.
- The only contraindication to epidural block anaesthesia is platelet count < 50,000 / mm^3.
- For status eclampticus thiopentone sodium is given.
- Most common causes of maternal death in eclampsia are intracranial bleeding and acute renal failure caused by abruptio placentae[Q].
- **Most common causes of fetal death are prematurity[Q] and fetal asphyxia[Q].**
- Post partum – $MgSO_4$ should be continued for a minimum of 24 hours following delivery.
- Diuretics should be given following delivery.

19. Ans. is b i.e. Eosinophilia *Ref. Dutta Obs. 7/e, p 222; Fernando Arias 3/e, p 427, 428*

20. Ans. is d i.e. Retroplacental hemorrhage

- HELLP syndrome is a variant of severe preeclampsia, comprising of **H**emolysis, **E**levated **L**iver enzymes and a **L**ow **P**latelet count.
- Regardless of the blood pressure, these cases are at increased maternal and fetal risk
- Most common symptoms are epigastric or right upper quadrant pain, nausea and vomiting.
- The hallmark of the disorder is micro-angiopathic hemolysis leading to elevated of serum lactate dehydrogenase level and fragmented red blood cells on peripheral smear.[Q]

Criteria for the diagnosis of HELLP syndrome

Hemolysis

- Burr cells, schistocytes in the blood smear
- Bilirubin ≥ 1.2 ml/dl
- Absent plasma haptoglobin

Elevated liver enzymes

- SGOT (AST) > 72 IU/L
- LDH > 600 IU/L

Low platelet count

- Platelet <100 x 10^3/mm^3

Management

- It is an obstetric emergency and should be managed by Immediate termination of pregnancy[Q] in maternal interest
- High dose steroid therapy with dexamethasone hasten the fetal improvement.[Q]
- Supportive treatment in the form of platelet transfusion, fresh frozen plasma[Q] and plasmapheresis[Q] may be required.

Extra Edge:

- Overall most common time of occurence of HELLP syndrome – Antepartum (between 28-36 weeks).
- Most common cause of maternal death in HELLP syndrome – Abruptio placentae and DIC.

21. Ans. is d i.e. DVT *Ref. Femando Arias 3/e, p 429, 431; COGDT 10/e, p 997*

Severe complications of Preeclampsia:

- **Pulmonary edema**
  - It is a common complication of severe preeclampsia and eclampsia affecting ~3% of patients.
  - Most cases are a result of aggressive use of crystalloid solutions, for intravascular volume expansion
  - It usually occurs in the post partum period and is characterized by profound respiratory distress, severe hypoxemia and diffuse rales.

Treatment:

  - Administering oxygen by nasal prongs.
  - Restriction of I/V or oral fluids.
  - Furosemide 20-40 mg I/v every 6 hours.

- **Acute renal Failure:**
  - Oliguria is common in patients with severe preeclampsia
  - It is mostly prerenal in origin.
- **Intracranial bleeding:** It is the leading cause of death in preeclampsia. It is seen that main connection of this event is with systolic BP and not with diastolic B/P.
- **Visual disorder:** Blindness may occur in patients with severe preeclampsia and eclampsia and may persist for several days, although quick recovery after delivery is the rule.

As far as DVT is concerned – I know some of you may think that DIC is a result of preeclampsia which in turn can lead to DVT – But –

- DIC is a complication of eclampsia and HELLP syndrome, perse preeclampsia does not lead to DIC. Only if preeclampsia is associated with abruption of placenta it leads to DIC,

Read the following lines from COGDT 10/e, p 997

"Eclampsia is associated with DIC 11% of the time, with HELLP syndrome this increases to 15%. Peeclampsia together with placental abruption also significantly increases this association."

22. Ans. is d i.e. 4 - 7 mEq/L

23. Ans. is b and d i.e. Anuria and Pulmonary edema

24. Ans. is a i.e. Depression of deep tendon reflexes

25. Ans. is a i.e $MgSO_4$

26. Ans. is a, b and c i.e. Tocolytic, Used in management of eclampsia, Cause neonatal respiratory depression

Ref. Dutta Obs. 7/e, p 234, Fernando Arias 3/e, p 420, 421, Williams Obs. 23/e, p 738, 739

These all questions are easy, if you read the preceeding text carefully.

Remember

- Magpie trial (2002) showed prophylactic use of Magnesium sulphate to lower the risk of eclampsia in severe preeclampsia patietnts.
- First step in the management of eclamptic patient is "care of airway."[Q]

- Lytic cocktail regime – was proposed by Menon for control of seizures in eclampsia. This regime used 3 drugs viz.
  i. Chlorpromazine
  ii. Promethazine
  iii. Pethidine

But for controlling of seizures the best drug in eclampsia is $MgSO_4$.

27. Ans. is All *Ref. Dutta Obs. 7/e, p 508, 509; Willams 23/e, p 737-739*

$MgSO_4$ is used in eclampsia and severe preclampsia both for prophyllaxis and treatment of convulsions. It is a tocoloytic agent also. As far as its role in preventing cerebral palsy is concerned the data which I could get from ncb through internet is:

"Cerebral palsy is a nonprogressive disorder of movement and posture and a leading cause of childhood disability. Preterm birth is a major risk factor for the development of cerebral palsy; gestational age at delivery has an inverse relationship to the risk of cerebral palsy. Observational studies over the past 15 years have suggested a possible protective role for $MgSO_4$. In some studies, children born preterm who were exposed prenatally to $MgSO_4$ for obstetric indications such as seizure prophylaxis or tocolysis had decreased rates of cerebral palsy as compared with children born preterm to women who were not exposed to $MgSO_4$. Randomized trials have been conducted to test the hypothesis that maternal $MgSO_4$ exposure had neonatal neuroprotective effects. These studies included women thought to be at risk of preterm delivery within 24 hours."

Thus option d is correct.

28. Ans. is d i.e. Decrease neuromuscular blockage

Ref. Dutta Obs. 7/e, p 234, 235 and Intenet search Lee's Anaesthesia 13/e, p 674

We have read a lot about $MgSO_4$ so I will explain only the difficult options. You know option a and c are correct.

"The use of magnesium sulfate can induce prolong neuromuscular block" – Lee 13/e, p 674 i.e. option d is incorrect

"Preemptive analgesia is an antinociceptive treatment that prevents establishment of altered processing of afferent input, which amplifies postoerative pain" – http://journals.lww.com/anesthesiology

"Preemptive use of epidural magnesium sulfate to reduce narcotic requirements in orthopedic surgery" – http://www.egyptja.org/articles/S1110 i.e option e is correct

"The addition of intrathecal (IT) magnesium to spinal fentanyl prolongs the duration of spinal analgesia for vaginal delivery" i.e. option b is correct

29. Ans. is e i.e Severe preeclampsia

In the question patient is presenting at 24 weeks of gestational age with BP 162/114 mm of Hg and proteinuria +3 ,earlier her BP was normal as suggested by the lines that she has come for routine prenatal visit and her pregnancy has remained uneventful till now. This means it is a case of Pregnancy induced hypertension (either Preeclampsia or gestational hypertension). Since she is having proteinuria also it rules out gestational hypertension and favours Preeclampsia.

The B/P of the patient even 6 hours after initial checking is 162/110 mm of hg and her proteinuria is +3 which shifts the diagnosis to **severe preeclampsia**.

30. Ans. is d Initial inpatient evaluation followed by restricted activity and outpatient management.

- In the question patient has past history of hypertension which was controlled on diuretics and ACE inhibitors prior to pregnancy.Till date her B/P was normal, she was not using any antihypertensive and now all of a sudden her BP is 142/84 mm of hg and proteinuria is 0.35 g all this suggests a possibility of superimposed preeclamplsia on chronic hypertension.
- In this situation since BP is not much raised falling in the category of mild preeclampsia and gestational age is 35 weeks, no need to induce labor (labor should be induced at 37 weeks in mild preeclampsia) i.e **option 'b'** ruled out.
- I/V Furosemide and hydralazine again are not justified in mild preeclampsia patients (Role of antihypertensives is controversial in the setting of mild preeclampsia) i.e. **option 'a'** and **'c'** ruled out.
- Her pre pregnancy regime which consisted of a diuretic along with ACE inhibitor cannot be started as ACE inhibitors are contraindicated during pregnancy ruling out **option 'e'**.
- So we are left with option d-initial inpatient evaluation followed by restricted activity and outpatient management, which is the most logical step .
- **Also know:** Worsening chronic hypertension is difficult to distinguish from superimposed pre eclampsia .If seizures, thrombocytopenia, pulmonary edema, unexplained hemolysis or elevation in liver enzymes develop, superimposed preeclampsia should be diagnosed. Monitoring trends in BP and urine protein may be helpful. A 24 hour urine calcium measurement may also be helpful in detecting preeclampsia, as levels of urine calcium are lower (< 195 mg total urine calcium in 24 hours) in preeclampsia patients than in patients with hypertension alone.

31. Ans. is c i.e. I/V $MgSO_4$ *Ref. John Hopkins Manual of Gynae and Obs. 4/e, p 186*

- In the question patient is presenting at 28 weeks with rise in BP and proteinuria which confirms her as a case of preeclampsia.
- The only confusion is whether she is a having mild preeclampsia or severe preeclampsia because that has a bearing on the management also.
- Lets say this patient has severe preeclampsia:

Points in favour of the diagnosis	Points against the diagnosis
• Severe headache	• B/P-155/85 mm of Hg
• 24 hour urine collection – 5 g protein	• Proteinuria + 2

Read for youself what John Hopkins has to say on this issue.

"Severe preeclampsia is classified by the following criteria:

BP during bedrest of >160 mm of Hg systolic or >110 mm of Hg diastolic

OR

Proteinuria > 300 mg on a 24 hour urine collectioneven if BP is in the mild range"

Ref. John Hopkins Manual of Obs. and Gynae 4/e, p 186

- In our patient BP is in mild range but 24 hour urine is 5 gms, thus favouring severe preeclampsia…now the second confusion is – this patients dipstick result favours mild preeclampsia whereas 24 hour urine result favours severe preeclampsia.

Again read for yourself what JH manual has to say on this issue:

"Preeclamptic patients often have a wide variation in urine protein values over time, possibly from renal vasospasm. Discrepancies between the random urine dipstick and 24 hour urine collection measurements have been well described. The 24 hour urine collection, therefore remains the preferred measure for diagnosing preeclampsia".

Ref. John Hopkins Manual of Obs. and Gynae 4/e, p 186

- Our patient is thus a confirmed case of severe preeclampsia, and should be first managed by giving Mg SO_4 as a prophylaxis against seizures.
- Since she is only 28 weeks pregnant we will not perform cesarean immediately and try to carry the pregnancy uptil 34 weeks.

32. Ans. is d i.e USG of fetal kidneys *Ref. John Hopkins Manual of Obs. and Gynae 4/e, p 189*

ACE inhibitors are not recommended in pregnancy due to severe fetal malformations and neonatal renal failure, pulm onary hypolplasia and fetal death.So if a female has taken ACE inhibitors in pregnancy, all the above side effects should be ruled out and USG of fetal kidneys should be performed.

33. Ans. is d i.e Shake test *Ref. Dutta Obs. 7/e p 227; Femando Arias 3/e, p 413, 414; Williams Obs 22/e, p 79*

As discussed in the preceeding test: Roll over test and S. uric acid levels are preductive tests for PIH.

Shake test or Bubble test: is useful for bedside assessment of fetal pulmonary maturity. It is not useful either to predict or to diagnose PIH. *—Dutta Obs. 7/e, p 112*

As far as **weight gain** is concerned "***Rapid gain in weight of > 1 lb a week or > 5 lb a month in the later months of pregnancy may be the earliest evidence of preeclampsia".*** *—Dutta Obs. 7/e, p 222*

But according to newer concept – Excessive weight and edema are no longer considered signs of preeclampsia. *(Fernando Arias 3/e, p 415)* but since this is the latest concept when this question was framed then weight gain was included in the diagnostic triad of preeclampsia, so we are taking it as correct option here.

34. Ans. is b i.e. Calcium *Ref. Dutta Obs. 7/e, p 227; COGDT 10/e, p 326*

Drugs used in Prophylaxis of Preeclampsia:

- Low dose aspirin: Calcium: Role +/– Folic acid supplementation. Antioxidants–Vitamin C, Vitamin E, and Lycopene

35. Ans. is b i.e. Anticonvulsive therapy *Ref. Fernando Arias 3/e, p 420*

The patient in the question has BP 170 / 110 mm of Hg (i.e. > 160 / 110 mm), Urine albumin +++, Headache, Blurring of vision and fundal examination shows areas of retinal hemorrhage. All these features point towards severe preeclampsia. Now there is a lot of controversy regarding this question. Some feel cesarean section should be done while others feel induction of labor is the correct answer. Rest all believe anticonulsive therapy with $MgSO_4$ is the option of choice.

Putting an end to all the controversies. I am quoting text from the latest edition of High Risk Pregnancy by Fernando Arias 3/e, p 420 – ***"If the gestational age is ≥ 34 weeks the best approach is to treat with magnesium sulfate for the prevention of seizures, give antihypertensives to control the blood pressure and deliver by cesarean section or by induction of labor if the cervix is ripe."***

So this leaves no doubt that further line of management in this question is Anticonvulsive therapy.
If the question would have been – best management then termination of pregnancy would have been the answer.

Remember:

- Most common drug used for prevention and treatment of seizures is $MgSO_4$.
- Other drug which can be used for this purpose – Phenytoin.
- Antihypertensive of choice for treatment of acute severe hypertension in pregnancy – Labetalol.
- In women with preeclampsia without contraindication to labor, vaginal delivery is the preferred approach.

36. Ans. is a i.e. Antepartum *Ref. Dutta Obs. 7/e, p 233*

Eclampsia if associated with the following features has bad prognosis:

- Long interval between onset of fit and commencement of treatment
- *Antepartum eclampsia especially with long delivery interval*
- Number of fits > 10
- Coma in between fits
- Temperature > 102^0 F with pulse rate > 120/min
- BP > 200 mm of Hg systolic
- Oliguria (< 400 ml/24 hr) with proteinuria > 5 gm/24 hr
- Non response to treatment
- Jaundice.

37. Ans. is a i.e. Cerebral anoxia due to arterial spasm *Ref. Dutta Obs. 7/e, p 231*

Cause of convulsion is a case of eclampsia is cerebral irritation. This irritation may be provoked by:

Anoxia
↓
spasm of cerebral vessels due to HTN
↓
increased cerebral vascular resistance
↓
decrease in cerebral oxygen consumption
↓

Anoxia:
- Cerebral edema
- Cerebral dysrythmia

38. Ans. is c i.e. Compression of IVC (Inferior Vena Cava) *Ref. Dutta Obs. 7/e, p 53, 54*

Supine hypotension syndrome:

- During **late pregnancy**^{Q} the gravid uterus produces a compression effect on the inferior vena cava, when the patient is the supine position.
- This, generally results in opening up of collateral ciculation by means of paravertebral and azygous veins.
- In some cases (10%) when the collateral circulation fails to open, the venous return of the heart may be seriously curtailed which results in production of hypotension, tachycardia and syncope. Normal blood pressure is quickly restored by turning the patient to lateral position.

39. Ans. is d i.e. Endothelial dysfunction is the basic pathology *Ref. Dutta Obs. 7/e, p 221*

Lets see each option separately:

Option a: It is a totally preventable disease incorrect as quoted by Dutta 7/e, on p 227.
"Pre-eclampsia is not a totally preventable disease" Dutta obs 7/e, p 22.

Option b: Systolic rise of BP is more important than diastolic—incorrect.
The rise in diastolic BP is more significant and first to occur.

Option c: Eclampsia is invariably preceeded by acute fulminant preeclampsia—incorrect as in majority –80%. This is true but not in all.

Option d: Endotheliosis leading to vasospasm is the basic underlying pathology. Hence option d is correct.

40. Ans. is b i.e >0.30 *Ref. Fernando Arias 4/e, p 189*

In patients with gestational hypertension, there are high chances (15-25%) of progressing to preeclampsia. Preeclampsia is heralded by the development of proteinuria.

Proteinuria ≥ + 2 in a random urine sample is diagnostic of preeclampsia in these patients. When proteinuria is + 1 or traces, it is necessary to send random sample to lab for determination of protein/ creatinine ratio and calcium/ creatinine ratio.

Protein/creatinine ratio = >0.30 → indicates preeclampsia

Calcium/creatinine ratio = <0.06 → indicates preeclampsia

Although the gold standard would be measuring protein in 24 hours urine sample, but it is cumbersome.

41. Ans. is d i.e. Polyhydramnios *Ref. Fernando Arias 4/e*

Friends, first let's solve this MCQ by using common sense, even though we have not studied any risk factors for gestational hypertension.

As you know, in any kind of hypertension =

Matenal BP ↑
⇓
Now pressure and volume are inversely related
Therefore, volume of blood flowing to fetus decreases
⇓
Fetal blood flow ↓
⇓
Fetal renal blood flow ↓
⇓
GFR ↓
⇓
∴ Urine output of fetus ↓
⇓
Oligohydramnios (as fetal urine is the major contributor of amniotic fluid).

Therefore, in no case can polyhydramnios be seen in gestational HT. Hence it cannot be a high-risk factor.

Now coming to References:

Fernando Arias 4/e, page 188.

Criteria to Identify High Risk Women with Gastational Hypertension

- Blood pressure ≥ 150/100
- Gestational age < 30 weeks
- Evidence of end organ damage (Raised: S. Creatinine, liver enzymes, LDH; decreased platelet count)
- Oligohydramnios
- Fetal growth restriction
- Abnormal uterine/umbilical artery Doppler

42. Ans. is b i.e 37-39 weeks *Ref. Fernando Arias 4/e, p 199*

Hypertensive condition	Time of delivery
• Gestational hypertension	38-39 weeks
• Mild preeclampsia	≥ 37 weeks
• Severe preeclampsia	≥ 34 weeks
• Chronic HT not requiring any antihypertensive	38-39 weeks
• Chronic HT, in which BP is controlled on antihypertensives	37-39 weeks
• Severe chronic HT in which BP is uncontrolled	36-37 weeks

In all cases of hypertension during pregnancy, mode of delivery is vaginal delivery.

Cesarean is indicated due to obstetrical reason or if induction fails.

19 Pregnancy in Rh-Negative Women

Rh-ANTIGEN

- The Rh-system was discovered by **Landsteiner in 1940**. The rhesus blood group antigens comprise of 5 antigens C, c, D, E and e. These antigens are located on short arm of chromosome 1.
- Most immunogenic among them is the Rh (D). Its presence or absence (D) designates a person as Rh-positive or negative.
- Lewis and I antigen do not cause erythroblastosis fetalis and differ from all of the other red cell antigens in that they are not synthesized in the red cells membrane but are absorbed into it.
- Fetal Rh-antigen are present by 38th day after conception.
- Although incompatibility for the major blood group antigens A and B is the most common cause of hemolytic disease in the newborn, the resulting anemia is usually very mild. About 20% of all infants have an ABO maternal blood group incompatibility, but only 5% are clinically affected.
- Most species of anti-A and anti-B antibodies are immunoglobulin **M (IgM)**, **which cannot cross** the **placenta** and therefore cannot gain access to fetal erythrocytes. In addition, fetal red cells have fewer A and B antigenic sites than adult cells and are thus less immunogenic. The disease is invariably milder than D-isoimmunization and rarely results in significant anemia.

Rh-NEGATIVE PREGNANCY—AN OVERVIEW

Rh-isoimmunization occurs when a Rh-negative woman bears a Rh-positive fetus. Normally, the fetal red cells containing the Rh-antigen enter the maternal circulation during first trimester in 5% cases, during third trimester in 46% cases. Maximum occurs at the time of delivery. There are a few conditions which predispose to fetomaternal hemorrhage.

Conditions predisposing to isoimmunization in Rh –ve female/fetomaternal hemorrhage/Indications of giving Anti D.	
• Abortion[Q], ectopic pregnancy, molar pregnancy	• Trauma
• Cordocentesis	• Antepartum hemorrhage
• Amniocentesis[Q]	• Vaginal delivery
• Chorionic villous sampling[Q],	• Cesarean section
• Attempted version[Q]	• Forceps delivery
• Manual removal of placenta	• Placental abruption
	• Blood transfusion

Fetal Problems in Rh-Negative Pregnancy

As a result of above conditions, fetal blood carrying Rh-antigen enters maternal circulation and stimulates production of antibodies.

Immunization is unlikely to occur unless at least 0.1 mL of fetal blood enters the maternal circulation.

Detectable antibodies usually develop after 6 months following larger volume of feto-maternal bleed.

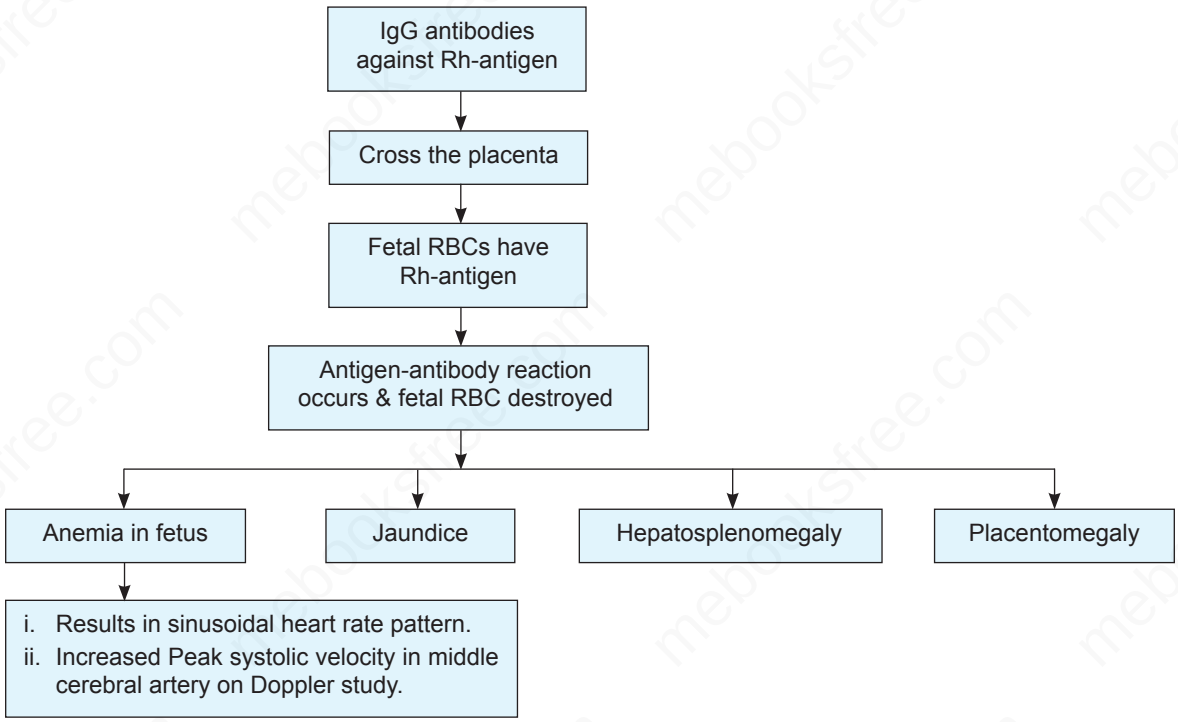
Antibodies once formed remain throughout life.

TYPES OF ANTIBODIES—*Two types of antibodies are formed:*

- **IgM**—This type of antibody is the first to appear in the maternal circulation and agglutinates red cells containing D when suspended in saline. **IgM being larger molecules cannot pass through the placental barrier and is not harmful to the fetus**.
- **IgG—**It is also called incomplete or blocking antibody. **Because of its small molecule, it can cross the placental barrier and cause damage to the fetus**. **It appears at a later period than does the IgM antibody.** This is the reason why first pregnancy is not affected in Rh-negative females.

Fetal Affection by the Rh-Antibody

The antibody formed in the maternal system (IgG) crosses the placental barrier and enters into the fetal circulation. **The antibody will not have any effect on Rh-negative fetus**. If the fetus is Rh-positive, the antibody becomes attached to the antigen sites on the surface of the fetal erythrocytes. The affected cells are rapidly removed from the circulation by the reticuloendothelial system. **Depending upon the degree of agglutination and destruction of the fetal red cells, various types of fetal hemolytic diseases appear.**



Clinical manifestations of the hemolytic disease of the fetus and neonate are:

- **Hydrops fetalis**
- **Icterus gravis neonatorum**
- **Congenital anemia of the newborn**

Hydrops Fetalis

This is the most serious form of Rh-hemolytic disease. Excessive destruction of the fetal red cells leads to severe anemia, tissue anoxemia and metabolic acidosis.

These have adverse effects on the fetal heart and brain and on the placenta.

Hyperplasia of the placental tissue occurs in an effort to increase the transfer of oxygen but the available fetal red cells (oxygen carrying cells) are progressively diminished due to hemolysis.

Ultimately this leads to **hypoproteinemia** which is responsible for generalized edema **(hydrops fetalis)**, ascites and hydrothorax.

Fetal death occurs sooner or later due to cardiac failure.

Congenital Anemia of the Newborn: This is the mildest form of the disease where the hemolysis is going on slowly. Although the anemia develops slowly within first few weeks of life, the jaundice is not usually evident.

The destruction of the red cells continues up to 6 weeks after which the antibodies are not available for hemolysis.

The liver and spleen are enlarged, as they are sites of extramedullary erythropoiesis.

Thus in Rh-negative pregnancy antibodies formed in mother eventually harm the fetus, so it becomes important to know whether antibodies are present in pregnant female or not.

Antenatal investigation protocol of Rh-negative mothers: If the woman is found Rh-negative, Rh-grouping of the husband is to be done If the husband is also Rh-negative, there is no problem so far as Rh-factor is concerned. If the husband is found to be Rh-positive, further investigations are to be carried out which aim at:

- To detect whether the woman has already been immunized to Rh-antigen;
- To determine the likely affection of the baby;
- To anticipate and formulate the line of management of a likely affected baby

Methods to know whether antibodies have been formed or not:

- **Indirect Coombs test:** It is done on maternal blood and if it is positive it indictes, Rh-antibodies are formed in mother whereas a negative test indicates that Rh-antibodies are not formed i.e isoimmunisation has not occurred.
- If the test is found negative at 12th week, it is to be repeated at 28th in primigravida. In multigravida, the test is to be repeated at monthly intervals from 24 weeks onwards. The need for 4 weekly antibody screening in nonimmunized Rh-negative women is not unusually accepted because Rh-autoimmunization rarely happens during antenatal period and the first immunized pregnancy rarely produces severe fetal hemolytic disease.
- If the test is found positive. Patient should be followed up as a case of Rh-negative immunised pregnancy.

Now here it is very important to understand one very important concept:

Anti D is given to all pregnant Rh-negative mothers:

Principle behind giving Anti D is, that if anti D is given to a Rh-negative mother and if due to any reason fetal blood with Rh antigen enters mothers circulation, this Anti D will lead to an antigen antibody reaction and fetal RBC will be destroyed before it could stimulate mothers immune system to produce Rh antibodies.

- Thus the usefulness of administering Anti D is only before maternal Rh-antibodies are formed. If maternal antibodies are already formed then there is no point in giving Anti D.
- *In other words Anti D should only be give if Indirect Coombs test is negative.*
- *If Indirect Coombs test is positive then donot give Anti D.*
- **In females who have a positive Indirect Coombs test it becomes important to know how much these antibodies have affected the fetus for which the following investigations are done:**
- **Genotype of the husband** is to be determined. If he is found to be **homozygous**, the fetus is likely to be affected and in **heterozygous**, the fetus may be affected in 50% cases. In that case fetal blood group is determined. **If the fetus is found to be Rh(D) negative, no further tests are required and routine care is continued**.
- **Fetal Rh-status:** Do amniocentesis or chorionic villi (CVS) and obtain uncultured amniocytes or trophoblasts → PCR for fetal DNA testing to detect fetal blood group. **Fetal DNA, present in maternal plasma can also be genotyped. This method has replaced amniocentesis which is an invasive method**.
- The concentration of antibodies can be measured while performing ICT using dilution method.

- Antibody litre of > 1 : 8 denotes isoimmunization.
- Antibody litre of > 1 : 16 denotes severe hemolyses (critical titre)

Note: The Gel microcolumn assay (GMa) card is a promising alternative to traditional tests for detaining antibody title.

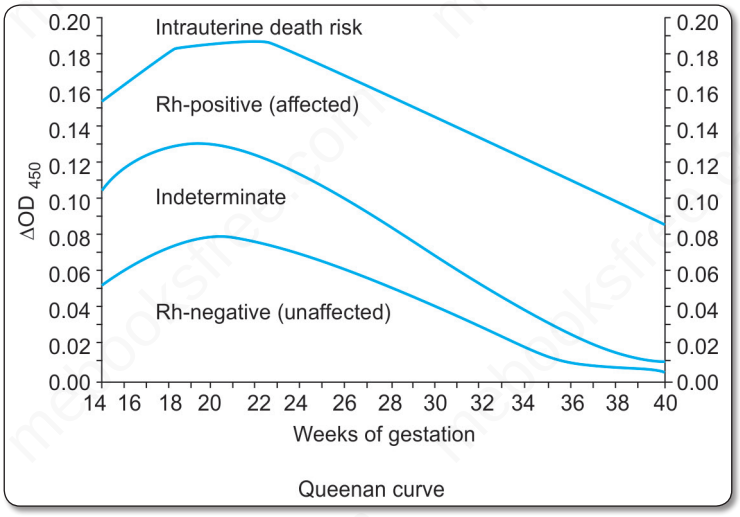
- **Automated measurement** of antibody (specific anti-D) is a more accurate test. The safe level of antibody in the maternal serum is < 4 IU/ml. Those females with levels of < 4 IU/mL should have antibody measurement monthly till 28 weeks and then every 2 weeks. Those with levels > 10 IU/ml (UK and Europe > 15) should have amniotic fluid optical density measurements at 450 nm wave length (OD 450). Levels >10 IU/ml should also have weekly ultrasound assessment to detect fetal hydrops. Again this test can only be done in females who have first immunized pregnancy as the correlation between antibody titers and transfer of fetal cells into maternal circulation that exists in first pregnancy is lost in subsequent pregnancies.
- **Amniotic fluid evaluation:** When fetal blood cells undergo hemolysis, breakdown pigments, mostly bilirubin, are present in the supernatant of amniotic fluid. The amount of amniotic fluid bilirubin correlates roughly with the degree of hemolysis and thus indirectly predicts the severity of the fetal anemia. Because the amniotic fluid bilirubin level is low compared with serum levels, the concentration is measured by a continuously recording spectrophotometer and is demonstrable as a change in absorbance at 450 nm, referred to as **ΔOD450**, and the value is plotted on **Liley's graph.**

Results fall into one of the 3 Zones of Liley curve

Zone	Management
Zone 1 (i.e. fetus is mildly affected)	• Repeat amniocentesis at 4 weeks and delivery at term 38 weeks
Zone 2 (i.e. fetus is moderately affected) In the lower zone 2-anticipated Hb level is 11-13.9 mg/dl, in the upper zone 2 it is 8-10.9g/dl	• Repeat amniocentesis at 1–2 weeks
Zone 3 (i.e. fetus is severely affected) anticipated Hb = < 8 g/dl	• Intrauterine transfusion if preterm or delivery at 34 weeks if fetus is salvageable

Ref. Fernando Arias 3/e, p 366-367

- The main limitation of the Liley's curve is that it starts at 26 weeks of gestation and extrapolation of the lines to earlier gestational ages is inaccurate. Queenan have developed a curve for fetal assessment from 14 to 40 weeks, divided into 4 zones.



Queenan curve

- **Middle cerebral artery Doppler:** Fetal anemia can be predicted noninvasively using **middle cerebral artery Doppler**. The anemic (amount of blood = 160 ml/kg) fetus shunts blood preferentially to the brain to maintain adequate oxygenation. This response can be identified by measuring PSV in the middle cerebral artery. Nowadays this method is preferred over amniocentesis. If the PSV is above the cutoff **(more than 1.5 MOM)** IUT/delivery is recommended depending upon the weeks of gestation. IUT is done for gestational age < 34 weeks and delivery for ≥ 34 weeks. MCA scanning can begin from 18 weeks onwards till 35 weeks. Beyond 36 weeks, it is not recommended as it gives false results.

Note:

- **IUT:** Fresh (< 7 days old) **O-negative** blood is given to the fetus by doing a cordocentesis. The amount of blood required to be transfused is calculated by various formulas depending upon fetal Hct and donor Hct.
- Nicolaides and coworkers recommend that transfusions be commenced when the hemoglobin is at least 2 g/dl below the mean for normal fetuses of corresponding gestational age. Other clinicians perform transfusion when the **fetal Hct is below 30%**, (Hb < 8 gm/dL).
- **Note:** M/C complication of cordocentesis is bleeding.

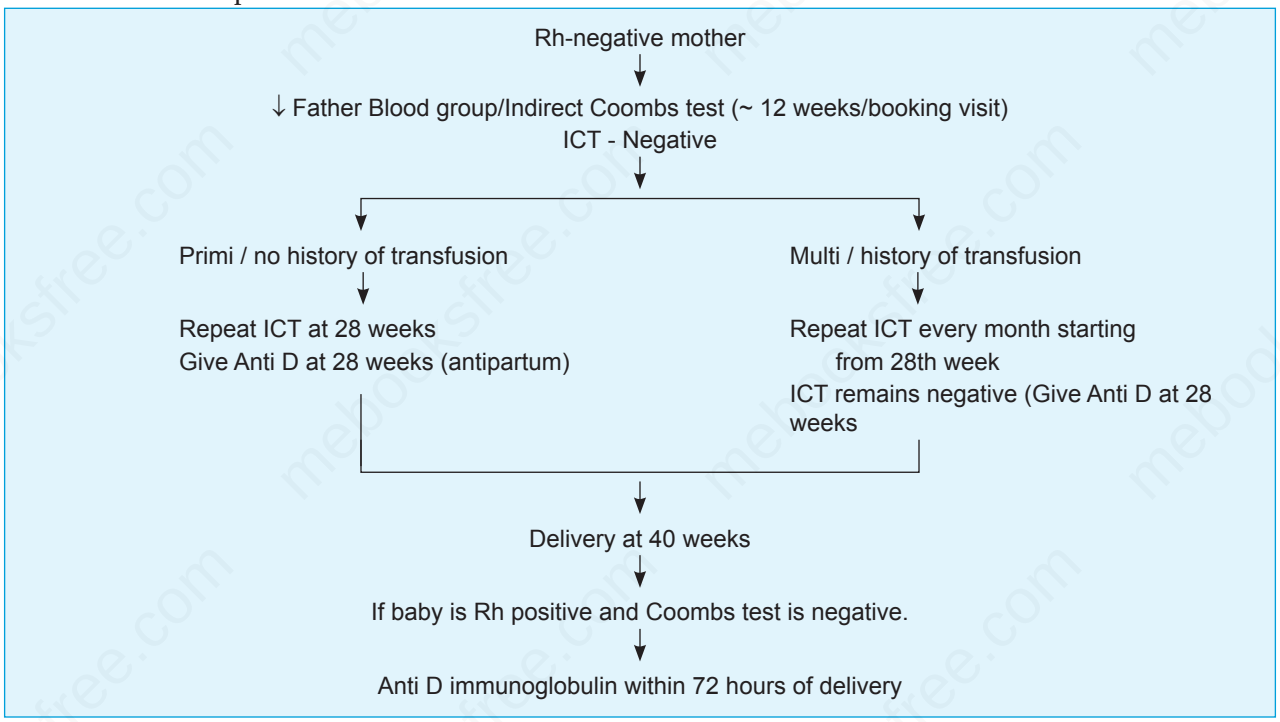
Management of Rh-Negative Pregnancies

Rh-negative women presenting for obstetrical care can be categorized in two different groups:

- Rh-negative nonimmunized women.
- Rh-negative immunized women.

Management of Rh-Negative NonImmunized Mother

Here the basic can is to perevent also immunization.



Note: Possibility of Rh-sensitization during antenatal period is very small, thus -Indirect Coombs test is performed at 28 weeks before the administration of anti-D immunoglobulin.

- After giving Anti D, antibody titre should be performed at regular intervals in the pregnant female.
- After the antepartum administration of anti-D immunoglobulin, the antibody screening will detect anti-D antibodies in the patient's serum, but the titer should not be greater than 1:4 at term. An antibody titer greater than 1:4 at term most probably results from alloimmunization/isoimmunization rather than anti-D immunoglobulin administration and such females again should be dealt in the same way like other isoimmunised females i.e category ii.
- The Rh-negative female who remains unsensitized i.e her antibodiy titre is always lower than 1:4 during pregnancy and have received anti-D immunoglobulin antenatally should be administered anti-D immunoglobulin in the postpartum period only when the following conditions are fulfilled:
- Infant is Rh-positive
- Direct Coombs test on umbilical cord blood is negative.

Note: Just like Indirect coombs test is done antenatally on maternal blood and if it is negative then only Anti Dis given similarly, Direct Coombs test is done on infants blood after birth and Anti D given to mother if DCT is negative.

Management of Rh-Negative Immunized Pregnant Women

- Management in this category requires the determination of whether it is a first affected pregnancy or woman already had a previously affected pregnancy.

First Affected Pregnancy

- If this is a female first affected pregnancy that means first time ever in her obstetric history she is getting ICT positive- in such cases the moment their ICT is positive, antibody titre should be done.
- Antibody titre of 1:16 is called as **critical titre** which means fetus is definitely affected.
- An accurate measurement of antibodies should then be done using automated technique.

Note: Only in these patients i.e who have first immunized pregnancy , Rh-antibody titers can be used to determine the risk of fetal anemia, not in females who in earlier pregnancies also had ICT positive or females with history of hydrops fetalis.

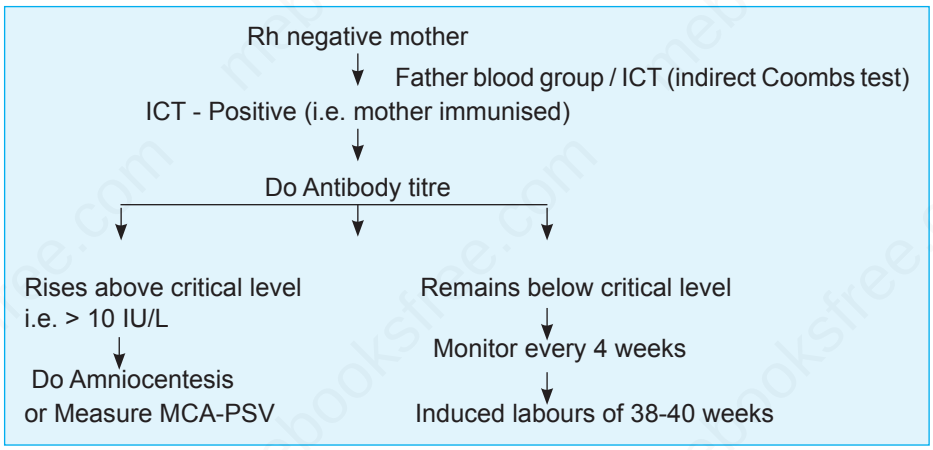
This is because the association between the antibody titers and fetal affection that exists in the first affected pregnancy is lost during subsequent gestations. Also, in majority of first immunized pregnancies the anti-Rh-antibody concentration is low and rarely exceeds the critical level of most laboratories.

The critical level is that level below which no death due to fetal hemolytic disease has occurred within 1 week of delivery:

The critical titer is taken as 10 IU/L in India and in Europe and UK as 15 IU/L.

- Serum antibody titers are done in these women every 4 weeks till 28 weeks and then every 2 weeks until the titers are found to be at or above the critical level (1:16).If titres are above critical level, there is no further use of antibody titer and the pregnancy is further monitored by middle cerebral artery peak systolic velocity (MCA-PSV) or amniotic fluid bilirubin concentration.
- If antibody titers remains below critical level up to 36 weeks, the patient should be delivered by elective induction between 38-40 weeks and the birth of unaffected or mildly affected fetus should be anticipated.

Management of Rh-negative immunised female (1st affected pregnancy)



- If there is sudden rise of antibody titers above the critical level after 34 weeks but before 37 weeks of gestation, amniocentesis is done to assess the fetal lung maturity. Pregnancy should be terminated if the lungs are mature, but if the lungs are immature and the bilirubin level is low (less than 0.5 mg/dl), the pregnancy should be allowed to continue as long as weekly amniocentesis shows fetal pulmonary immaturity and a low bilirubin concentration. Delivery is contemplated as soon as these fetuses achieve lung maturity.

Women with Previous Affected Pregnancy

- After the first affected pregnancy, the ability to predict fetal anemia from the maternal anti-D antibody titers is lost and now these pregnancies should be monitored by MCA-PSV and amniotic fluid bilirubin concentration.

ANTI D

- It is a IgG antibody that is given by i.m. route.
- It binds to fetal RBCs and prevents stimulation of maternal immune system.
- 300 µg will protect the mother from fetal hemorrhage of up to **15 ml of D-positive red cells or 30 ml of fetal whole blood.**
- The dose of anti D is calculated by assessing the fetomaternal haemorrhage by performing kleihauer betke test
- It should be given at 28 weeks if indirect coombs test is negative to all unsensitized Rh-negative mother and postpartum within 72 hours if the baby's blood group is Rh-positive and direct Coombs test is negative.
- It is seen without administration of Anti D-immunoglobulin, an Rh-negative woman has 7.2% risk of developing rhesus antibodies within 6 months of giving birth.
- It should also be given after abortion, MTP, and ectopic pregnancy and all those events where feto maternal mixing of blood is possible.

Indication and Recommended Dose of Anti-D

Indications	Recommended Dose (mcg)
First trimester abortion/MTP	50
First trimester ectopic pregnancy	50
Second trimester abortion/MTP	300
Second trimester amniocentesis	300
Prophylaxis at 28 weeks	300
After delivery	300

Note:

- 300 mcg of Anti D is equivalent to 1500 IU of Anti D.
- 300 mcg (1500 IU) is enough to suppress 15 mL of Rhesus positive fetal blood cells (= 30 mL of fetal blood).

Kleihauer betke test/Acid Elution Test:

- It is performed on maternal blood to assess the amount of fetomaternal bleed. In order to calculate the dose of Anti-D prophyllaxis required.
- Principle: HbF is more resistant to acid elution than HbA.[Q]
- The maternal blood is subjected to an acid solution (citric acid phosphate buffer).[Q]
- Acid will elute the adult hemoglobins but not the fetal haemoglobin from the red cells. Hence, the fetal red cells appear stained dark red, unlike the light coloured maternal red cells or ghost cells.[Q]
- The number of fetal red cells in 50 low power fields is assessed.
- If there are 80 fetal red cells in 50 low power fields, it represents a fetomaternal bleed of 4 ml of fetal blood.
- 100 µg of anti-D will neutralise 4 ml of fetomaternal bleed.
- If the volume of fetomaternal hemorrhage is > 30 ml of whole blood, the dose of Rh-immunoglobulin is calculated as 10 µg for every 1 ml of fetal whole blood.
- Note: Alternative to Kleihauer Betke test is flow cytometry, which gives more accurate result and can be used for high volume of fetomaternal hemorrhage.

QUESTIONS

1. The consequences of Rh-incompatibility are not serious during first pregnancy because: **[AI 04]**
a. In first pregnancy only IgM antibody is formed
b. Antibody titer is very low during primary immune response
c. IgG generated is ineffective against fetal red cells
d. Massive hemolysis is compensated by increased erythropoiesis

2. All predisposes to isoimmunisation in a Rh-ve female *except*: **[AIIMS Dec 97]**
a. Advanced maternal age
b. Antepartum hemorrhage
c. Cesarean section
d. Post dated pregnancy

3. Which type of Hb is not affected by Rh isoimmunisation: **[AIIMS Dec 97]**
a. Anti C
b. Anti E
c. Anti lewis
d. Anti D

4. Correct statement regarding Rh-incompatibility is: **[AIIMS Nov 99]**
a. Serial USG can diagnose hydrops early
b. Antibody titre > 4 IU/ml in mother indicate severe risk of hemolysis
c. Prognosis does not depend on parity
d. Increase with ABO incompatibility

5. At 28 weeks gestation, amniocentesis reveals a ΔOD 450 of 0.20 which is at the top of third zone of the liley curve. The most appropriate management of such a case is: **[AIIMS May 05, Nov 04]**
a. Immediate delivery
b. Intrauterine transfusion
c. Repeat Amniocentesis after 1 week
d. Plasmapheresis

6. Anti-D prophylaxis should be given in all of the following conditions *except*: **[AI 04]**
a. Medical abortion for 63 days pregnancy
b. Amniocentesis at 16 weeks
c. Intrauterine transfusion at 28 weeks
d. Manual removal of Placenta

7. Indication of anti-D immunoglobulin is/are:
a. Vaginal bleeding **[PGI Dec 03]**
b. ECV
c. Mid trimester abortion
d. After amniocentesis

8. True about Anti-D postpartion prophylaxis: **[PGI June 02]**
a. Given to the newborn within 72 hrs of birth
b. Required when baby is Rh+ and mother Rh-
c. Can be helpful in ABO incompatibility
d. Can be given upto one month of age of baby

9. Which is not the complication of Rh incompatibility:
a. APH **[AIIMS Dec 98]**
b. PPH
c. Oligohydramnios
d. Pregnancy induced hypertension

10. Mother's blood group is Rh-ve. Indirect Coombs is +ve. The following will be seen in baby: **[PGI Dec 09]**
a. Anemia
b. Abnormal umbilical artery waveform decelera tion
c. Hydrops fetails
d. IUGR
e. Oligohydramnics

11. Nonimmume hydrops foetalis is seen in all of the following conditions *except*: **[AI 99]**
a. α- Thalassemia b. Parvovirus-19
c. Rh-incompatibility d. Chromosomal anomaly

12. Hydrops foetalis is seen in following *except*:
a. Rh incompatibility b. Syphilis **[PGI Dec 97]**
c. ABO incompatibility d. CMV

13. Hydrops fetalis is caused by: **[PGI June 08]**
a. Parvovirus infection
b. HZ virus infection
c. Down syndrome
d. Toxoplasma

14. In non immune hydrops which of the following is NOT seen: **[AIIMS 00]**
a. Skin oedema b. Ascites
c. Large placenta d. Cardiomegaly

15. How is fetal blood differentiated from maternal blood: **[AIIMS Nov 2010]**
a. Kleihauer test b. Apt test
c. Bubble test d. Lilly's test

16. Feto maternal transfusion is detected by:
a. Kleihauer test b. Spectrophotometry
c. Benzidine test d. None of the above

17. A 37-year-old primi Rh negative patient is very concerned above her pregnancy at this age. Her pregnancy is 16 weeks and she is HIV negative, hepatitis B surface Ag neg, Rubella nonimmune and has no complain.Her triple test report is normal but still due to her age she insists on getting an amniocentesis done.

Which of the following is the next best step in management: **[New Pattern Question]**
a. Advise against amniocentesis as it will increase the risk of isoimmunisation
b. Follow Rh titres carefully and give Anti D if evidence of isoimmunisation is present.
c. Give Anti D at 28 weeks of pregnancy and after delivery if baby is Rh neg
d. Give Anti D prior to her amniocentesis
e. give rubella vaccine as she is Rubella nonimmune

18. Two weeks later, the results of the patient's prenatal labs come back. Her blood type is A, with an anti D antibody titer of 1:4. What is the most appropriate next step in the management of this patient? **[New Pattern Question]**

a. Schedule an amniocentesis for amniotic fluid bilirubin at 16 weeks
b. Repeat titer in 4 weeks
c. Repeat titer in 28 weeks
d. Schedule PUBS to determine fetal hematocrit at 20 weeks
e. Schedule PUBS as soon as possible to determine fetal blood type

19. All of the following are scenarios in which it would have been appropriate to administer RhoGam to this patient in the past except: **[New Pattern Question]**

a. After a spontaneous first trimester abortion
b. After treatment for ectopic pregnancy
c. Within 3 days of delivering an Rh–ve fetus
d. At the time of amniocentesis
e. At the time of external cephalic version

20. Immediate cord ligation is done in: **[New Pattern Question]**

a. Pre-term babies
b. Rh incompatibility
c. Both a and b
d. None of the above

21. The dose of anti D gamma globulin given after term delivery for a Rh-negative mother and Rh positive baby is: **[New Pattern Question]**

a. 50 microgram
b. 200 microgram
c. 300 microgram
d. 100 microgram
e. All of the above doses are incorrect

22. Dose of anti D for antenatal prophylaxis in Rh-negative nonimmunized females: **[New Pattern Question]**

a. Single dose of 1000 IU at 28 weeks
b. Single dose of 15000 IU at 28 weeks
c. Single dose of 500 IU at 28 weeks
d. Single dose of 1500 IU at 32 weeks

23. Fetal affection by Rh antibody are all *except*: **[New Pattern Question]**

a. Nonimmune hydrops fetalis
b. Icterus gravis neonatorum
c. Congenital anaemia of the newborn
d. Fetal death

EXPLANATIONS & REFERENCES

1. Ans. is a i.e In first pregnancy only IgM antibody is formed

Ref. High Risk Pregnancy - Fernando Arias 3/e, p 359; Turnbull's Obs., p 248, 249

As discussed is the preceeding text – The initial antibodies which are produced are of IgM variety which cannot cross the placenta and by the time IgG antibodies develop, patient has already delivered. Thus first pregnancy is safe.

Another reason is

In sensitised women, anti-D antibodies are produced at such a low level that they are not detected during or after the index pregnancy. Instead, they are identified early in a subsequent pregnancy when rechallenged by another D-positive fetus.

Also Know:

Grandmother's theory: This theory says that rarely the D (Rh)-negative fetus is exposed to maternal D antigen (if she is Rh-positive) and becomes sensitized. When such a female fetus reaches adulthood, she will produce anti D antibodies even before or early in her first pregnancy. This mechanism of isoimmunization is called the **"grandmother theory"** because the fetus in the current pregnancy is jeopardised by antibodies initially produced by its grandmother's erythrocytes.

2. Ans. is a i.e. Advanced maternal age *Ref. Dutta Obs. 7/e, p 332; Textbook of Obs. Sheila Balakrishnan 1/e, p 369*

Conditions predisposing to isoimmunization in Rh –ve female

- Abortion[Q], ectopic pregnancy, molar pregnancy
- Cordocentesis
- Amniocentesis[Q]
- Attempted version[Q]
- Manual removal of placenta
- Chorionic villous sampling[Q],
- ***Trauma***
- ***Antepartum hemorrhage***
- ***Vaginal delivery***
- ***Cesarean section***

Studies show that there is continuous feto-maternal bleed occurring throughout normal pregnancies. During normal pregnancy, fetal red cells cross the placenta in 5% patients during first trimester and in 40-47% patients by the end of third trimester. So it is not advisable to go beyond the expected date of pregnancy in Rh negative females carrying Rh +ve fetus. Hence post dated pregnancy is another risk-factor for isoimmunization.

3. Ans. is c i.e. Anti Lewis *Ref. Fernando Arias 3/e, p 359, 360*

"An antigen frequently found in routine antenatal screening is the Lewis group (Le^a and Le^b).

The Lewis antigens do not cause erythroblastosis fetalis and differ from all of the other red cell antigens in that they are not synthesized in the red cell membrane but are absorbed into it." *—Fernando Arias 2/e, p 116*

Also Know:

Rare antigenic groups which can cause erythroblastosis fetalis (besides Rh)

... Fernando Arias 3/e, p 360; COGDT 10/e, p 283

- Kell (K)
- Duffy (Fy)
- Kidd (Jk)
- MNSs
- MSSs
- Diego P
- Lutheran
- Xg

Extra edge:

- **Besides lewis antigens, I antigen also does not cause erythroblastosis fetails**
- Du antigen—it is a "weak D positive" antigen. Women confirmed to be Du positive are considered as D antigen positive i.e. Rh positive and do not need an immunoglobin. If a D negative woman delivers Du positive infant, she should be given D immunoglobulin *—William 23/e, p 625*

4. Ans. is a i.e. Serial USG can diagnose hydrops early *Ref. Dutta Obs. 7/e, p 333*

Lets have a look at each option separately.

Erythroblastosis fetalis / Rh incompatibility leads to immune hydrops which can be diagnosed by serial USG as cardinal signs of hydrops fetalis viz scalp edema, ascites, pleural and pericardial effusion can all be detected on USG (therefore ***Option "a"*** is correct).

Prognosis depends on both parity and ABO incompatibility:

Parity - As discussed in answer 1 the risk of Rh incompatibility is negligible in the first baby and increases as the parity of mother increases, therefore ***option "c"*** is incorrect.

ABO incompatibility:

- If ABO is present along with Rh incompatibility it protects against Rh isoimmunization.
- ABO blood group compatibility of mother and fetus - ABO incompatibility protects against Rh isoimmunisation. **When ABO incompatible fetal red cells enter the mother's bloodstream, they quickly combine with the naturally occurring anti A and anti B agglutinins and are neutralised by sequestration in the liver. On the other hand, ABO compatible fetal red cells will persist in the mother's circulation and thus stimulate the immune response.**

Antibodies titre:

- Antibody titre can be measured by automated tests.
- A titre of < 4 IU/ml is considered as safe.
- Titre of > 4 IU/ml or 1: 8 denotes isoimmunization.
- Titre of > 10 IU/ml (in some countries > 15 IU/mL) denotes severe hemolysis – it is also called as the 'critical titre'
- Time for performing indirect coombs test.
  In primigravida – at 12 weeks or at booking visit and if it is negative (i.e. mother is not immunised), it is repeated at 28th.
  In multigravida – at 12 weeks or at booking visit and then at monthly interval after 28 weeks.

5. Ans. is b i.e. Intrauterine transfusion *Ref. Dutta Obs. 7/e, p 337; Fernando Arias 3/e, p 366, 367*

Management of Rh negative females depends on whether the female is immunized/ nonimmunized.

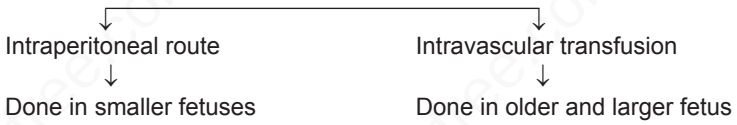
The question which says- what should be done in case of the patient with 28 weeks pregnancy if Δ OD lies at the top of Zone 3.

Zone	Management
a. Zone 1 (i.e. fetus is mildly affected)	• Repeat amniocentesis at 4 weeks and delivery at term 38 - 40 weeks
b. Zone 2 (i.e. fetus is moderately affected) In the lower zone 2-anticipated Hb level is 11-13.9 mg/dl, in the upper zone 2 it is 8-10.9g/dl	• Repeat amniocentesis at 1 - 2 weeks
c. Zone 3 (i.e. fetus is severely affected) anticipated Hb = < 8 g/dl	• Intrauterine transfusion if preterm or delivery at 34 weeks if fetus is salvageable

At 28 weeks intrauterine transfusion should be done.

Extra edge:

- Fetal blood transfusion should be done when Hb is at least 2g/dl below the mean or hematocrit < 30% below the mean for normal fetus at that gestational age
- Intrauterine transfer can be done by –



- Fresh O negative blood should be given.
- In many centres – peak systolic velocity (PSV) of fetal middle cerebral artery (MCA) has replaced amniocentesis for detection of fetal anemia. The anemic fetus shunts blood prefrentially to brain to maintain adequate oxygenation. The peak MCA systolic velocity increases because of increased cardiac output and decreased blood viscosity. If MCA peak systolic velocity is more than 1.5 MOM the fetus is likely to be anemic.

6. Ans. is c i.e. Intrauterine transfusion at 28 weeks *Ref. Dutta Obs. 7/e, p 344; Sheila Balakrishnan, p 369*

Rh anti D immunoglobulin (IgG) is given to unimmunized Rh negative mothers with Rh positive fetus to prevent active immunization and formation of antibodies against fetal RBC's. The Anti D binds to antigen sites on the fetal red cells so that these cells do not mount an immune response, provided the baby is Rh negative and direct coombs test done on baby is negative. If mother's IUT is positive or fetus has positive direct coombs test, it means mother is already immunised. In such cases their is no point in giving anti D.

Indications for Anti D immunoprophylaxis:

First trimester	Later pregnancy
Miscarriage	Miscarriage
Ectopic (medically or surgically managed)	Amniocentesis
Hydatidiform mole	Fetal blood sampling
Threatened abortion	Antepartum hemorrhage
Medical or surgical MTP	External cephalic version
Chorionic villus sampling	Routine antepartum prophylaxis
	Delivery
	Intrauterine fetal death
	Manual removal of placenta

Note: As far as intrauterine fetal transfusion is concerned. It is done as a therapy in case Rh iso immunization has occured prior to 34 weeks so, administration of anti-D at this stage will not help.

Dose:

- Ideally amount of Anti D should be calculated according to the volume of fetomaternal bleed by doing a Kleihauer test.
- Generally:
  - Gestational age < 12 weeks – dose is 50μg
  - Beyond 12 weeks – dose is 300μg

Antepartum prophylaxis: *At 28 weeks gestation in a Rh negative patient:* Indirect coombs test is done and if antibodies are not detected i.e. patient is unimmunised, Anti D 300 μg is given as antepartum prophylaxis.

- 300 μg of Anti D will neutralize about 30 ml of feto maternal bleed (i.e. approximately 15 ml of fetal cell).

7. Ans. is a, b, c, and d i.e. Vaginal bleeding; ECV; Mid trimester abortion; and After amniocentesis
Ref. Dutta Obs. 7/e, p 344 "key points"; Shiela Balakrishnan, p 369

As explained in the previous question: Anti D prophylaxis should be given after all types of abortions (threatened, medical, MTP) molar pregnancy, ectopic pregnancy, delivery (+manual removal of placenta), procedures performed antenatally *(Amniocentesis, Chorionic villous sampling, External cephalic version)* and in cases of antepartum hemorrhage *(Vaginal bleeding in this case)*.

8. Ans. is a, b and d i.e. Given to a newborn within 72 hours of birth. Required when baby is Rh +ve & Mother Rh–ve; and Can be given up to 1 month of age of baby *Ref. Dutta Obs. 7/e, p 334; COGDT 10/e, p 284*

Postpartum prophylaxis

- If baby is Rh positive and mother Rh negative, 300 μg of Anti D immunoglobulin (IgG) is given to the mother and not infant (provided maternal antibody screening is negative) therefore Option 'b' is correct and Option 'a' is incorrect.
- Postpartum prophylaxis is best given within 72 hours after delivery but it can be given till 28 days after delivery Option 'd' is correct.

"Although Rh IgG generally should be given within 72 hours after delivery, it has shown to be effective in preventing isoimmunization if given upto 28 days after delivery" *—COGDT 10/e, p 284*

Anti D immunoglobulin is not helpful in case of ABO incompatibility.

Also Know:

Role of postpartum prophylaxis:

- Anti D immunoglobulin given postpartum binds to antigen sites on the fetal red cells so that these cells cannot mount an immune response and thus prevent future sensitisation and next pregnancy.
- If after delivery, fetus has a positive direct Coombs test, it means that the mother is already immunized. In such cases, there is no point in giving anti D.

9. Ans. is c i.e. Oligohydramnios *Ref. Dutta Obs. 7/e, p 333, William Obs. 23/e, p 627*

Rh incompatibility has adverse effect on the baby mainly, but mother may also be affected.
In Rh negative mothers there is increased incidence of:

- Preeclampsia[Q] - due to hydropic placenta in case of hydrops.
- Polyhydramnios[Q]
- Preterm labour
- Big size baby and its hazards
- Hypofibrinogenemia (due to prolonged retention of dead fetus in utero).
- Postpartum hemorrhage due to big placenta and coagulopathy.
- Maternal mirror syndrome - Characterised by generalised oedema (similar to fetus), proteinuria and pruritis due to cholestasis. These features are omnious and indicate imminent fetal death in utero.

Antepartum hemorrhage is not a direct complication of Rh-incompatibility but may be the result of hypofibrinogenemia.

10. Ans. is a and c i.e. Anemia and hydrops fetalis. *Ref. Dutta Obs. 7/e, p 333-334*

As given in the question Mother is Rh -ve and indirect Coombs test is positive i.e. baby is suffering from Rh-incompatibility.[Q]

"In all cases of Rh –ve women irrespective of blood grouping and parity, ***albumin antibody is detected by indirect Coomb's test****"* *… Dutta Obs. 6/e, p 335*

- Clinical manifestation of Rh-incompatibility on the fetus can range from mild anemia to full blown hydrops fetalis.
- As discussed earlier polyhydramnios and not oligohydramnios is seen in Rh-negative pregnancy. (i.e. option e is incorrect.
- Option b: Abormal umbilical artery waveform is incorrect, it should have been middle cerebral artery waveform.

11. Ans. is c i.e. Rh incompatibility *Ref. Dutta Obs. 7/e, p 497*

12. Ans. is c i.e. ABO incompatibility *Ref. Dutta Obs. 7/e, p 497*

13. Ans. is a, b, c and d Parvovirus infection; HZ virus infection; Down syndrome and Toxoplasma
Ref. Dutta Obs. 7/e, p 497; Williams Obs. 22/e, p 674, 23/e, p 626, 27; Fernando Arias 3/e, p 96

Hydrops fetalis: It is the most severe clinical manifestation of fetus in Rh incompatibility.

- It is characterised by excess fluid in 2 or more body areas such as the thorax, abdomen or skin. It is often associated with hydramnios and a hydropic thickened placenta.
- This condition is characterised on ultrasound by generalised skin oedema (skin thickness > 5 mm), ascites, pleural effusion and large placenta (placental thickness > 4 cm). The fetus may be in Buddha position and there may be a halo around the head.
- The main pathology in all cases is severe anemia, hypoproteinemia, increased capillary permeability and cardiac failure.
- Hydrops is of 2 varieties:

Immune hydrops	Nonimmune hydrops
• It is due to Rh isoimmunisation	• It is accumulation of extracellular fluid in tissues and serous cavities without evidence of circulating antibodies against RBC antigens.
• It accounts for 1/3rd cases of hydrops fetalis	• It is due to conditions other than Rh isoimmunisation
	• It accounts for 2/3 cases of hydrops fetalis

Non immune hydrops: Hydrops occurring due to a cause other than Rh incompatibility is called Nonimmune Hydrops

- It can be caused by a number of conditions (there is an exhaustive list given on p 627 Williams 23/e, Just go through it).

Category	Condition	Category	Condition
Cardiovascular	Tachyarrhthmia Congenital heart block Anatomical defects (ASD/VSD, TOF, hypoplastic left heart, pulmonary valve insufficiency, Ebstein subaortic stenosis, and single ventricle)	Urinary	Urethral stenosis or atresia Posterior neck obstruction Prune belly
Chromosomal	Trisomies, Turner syndrome, and triploidy	Gastrointestinal	Midgut volvulus Jejunal atresia Malrotation of intestines Maconium peritonitis Duplication of intestinal treact
Malformation syndromes	Thanatophoric dwarfism Arthrogryposis multiplex congenital Osteogenesis imperfecta Achondroplasia	Medications	Antepartum indomethacin (taken to stop preterm labor, causing fetal ductus closure and secondary noimmune hydrops fetalis)
Hematological	α-Thalassemia=MC cause of NIHF Arteriovenous shunts (vascular tumors) Kasabach-Merritt syndrome	Infections	Syphilis Parvovirus TORCH Leptospirosis
Twin pregnancy	Twin-twin transfusion syndrome Acardiac twin syndrome		
Respiratory	Diaphragmatic hernia Cystic adenomatous malformation Pulmonary hypoplasia	Miscellaneous	Tuberous sclerosis Cystic hygroma Sacrococcygeal teratoma Congenital neuroblastoma Amniotic band syndrome Congenital lymphedema

- Recurrent hydrops is caused by inborn errors of metabolism like Gaucher disease, GM1 gangliosidosis and sialidosis.

14. Ans. is d i.e. Cardiomegaly *Ref. Williams 23/e, p 626*

"Hydrops is characterized by excess fluid in two or more body areas such as thorax, abdomen or skin. It is often associated with hydraminos and a hydropic thickened placenta".

It is characterised by:

- Increased skin thickness (> 5 mm)^{Q} / skin oedema (first sign seen on USG).
- Placental enlargement
- Pleural effusion
- Ascites
- The fetus is in Buddha position with a halo around the head.

15. Ans. is b i.e. Apt test

...Williams Obs. 23/e, p 617, 618, Dutta Obs. 22/e, p 247, 248; Bedside Obs. Gynae Richa Saxena p 69

In the given options:

Option a – Kleihauer test and

Option b – Apt test (also called as singers alkali denaturation test) are used for detecting the presence of fetal blood in maternal blood.

Both are based on the principle that fetal blood with HbF is resistant to acid and alkali, whereas maternal blood with HbA is sensitive to acid and alkali.

Test	Reagent	Used for diagnosis of
Apt test (Singer alkali denaturation test)	KOH	Vasa previa
Kleihauer Betke test	Citric acid phosphate buffer	Fetomaternal Hemorrhage in Rh-negative pregnancies

Now: Remember:

- The test which differentiates fetal blood from maternal blood: Apt test.
- The test which differentiates fetal RBC from maternal RBC–Kleihauer-Betke test.

16. Ans. is a i.e. Kleihauer test *Ref. Dutta Obs. 7/e, p 334, Sheila Balakrishnan Textbook of Obs 1/e, p 368*

Kleihauer-Betke test

- It is performed on maternal blood to assess the amount of fetomaternal bleed. In order to calculate the dose of Anti-D prophyllaxis required.
- Principle: HbF is more resistant to acid elution than HbA.Q
- The maternal blood is subjected to an acid solution (citric acid phosphate buffer).Q
- Acid will elute the adult hemoglobins but not the fetal haemoglobin from the red cells. Hence, the fetal red cells appear stained dark red, unlike the light coloured maternal red cells or ghost cells.Q
- The number of fetal red cells in 50 low power fields is assessed.
- If there are 80 fetal red cells in 50 low power fields, it represents a fetomaternal bleed of 4 ml of fetal blood.
- 100 µg of anti-D will neutralise 4 ml of fetomaternal bleed.
- If the volume of fetomaternal hemorrhage is > 30 ml of whole blood, the dose of Rh immunoglobulin is calculated as 10 µg for every 1 ml of fetal whole blood.

Also Know

- Indirect Coombs test – detects antibodies in maternal serum.
- Direct Coombs test – detects antibodies in fetus/neonate.

Extra edge:

- Kleihauer-Betke test: can detect as little as 0.2 ml of fetal blood diluted in 5L of maternal blood.
- It is not useful and should not be used to assess the need for anti D administration.
- Presence of reticulocytes and adult red cells containing fetal Hb may cause false positive test.

17. Ans. is d i.e. Give Anti D prior to her amniocentesis

Points worth noting are:

- Primi patient with Rh negative blood group
- She is 37 years old-elderly primi (>30 years) and has risk of Down syndrome (>35 years)
- She is concerned about the risk of having a down syndrome baby at this age and so insists on having amniocentesis done.
  - **Option a:** Advise against amniocentesis as it will increase the risk of isoimmunisation –although the risk of isoimmunisation will definitely be increased but still I will not advise her against amniocentesis seeing her age and her concern.
  - **Option b:** Follow Rh titres carefully and give Anti D if evidence of isoimmunisation is present. Come on in the theory I have explained that Anti d should be given only if evidence of isoimmunisationt is absent. If isoimmunisation is present it means antibodies are already formed, hence no need for giving Anti D. Thus this statement is absolutely wrong.
  - **Option c:** Give Anti D at 28 weeks of pregnancy and after delivery if baby is Rh negative. If baby is Rh negative, no need to give Anti D.
  - **Option d: Give Anti D prior to her amniocentesis:** This is the most logical step which should be done in this case.
  - **Option e: Give rubella vaccine as she is Rubella non immune:** Now I don't need to explain that Rubella vaccine is contraindicated during pregnancy.

18. Ans. is b i.e. Repeat titre in 4 weeks

In the same patient–blood grouping shows A negative, with an anti D antibody titer of 1:4- the most appropriate next step in the management –Since this patient is a primi patient and her antibody titre is 1:4 so we should follow it by doing a repeat titre after every 4 weeks.

If this pregnancy would not have been her first affected pregnancy, then amniocentesis i.e. option a would have been the correct response.

19. Ans. is (c) i.e Within 3 days of delivering a Rh negative fetus

20. Ans. is c i.e. Both a and b *Ref. Dutta Obs. 7/e, p 339, 458; Sheila Balakrishnan, p 148*

Also Know:

In case of Rh isoimmunisation:

No prophylactic ergometrine should be given:

- Cord should be kept long (2-3cms) to enable exchange transfusion if required.
- Cord blood sample should be taken from the placental end for:
  - ABO and Rh grouping[Q]
  - Direct Coombs test[Q]
  - Measurement of serum bilirubin[Q]
  - Hemoglobin estimation[Q]
  - Blood smear for presence of immature RBCs.

Early cord clamping is advised/practised in case of:

1. Preterm or growth restricted fetus[Q] (due to the risk of hypervolemia).
2. In Rh isoimmunisation (to minimise even minute amount of antibody to cross to the fetus from the mother).
3. Birth asphyxia.
4. HIV positive mother.
5. Infants of diabetic mother

21. Ans. is c i.e. 300 microgram *Ref. Dutta Obs. 7/e, p 334*

22. Ans. is b i.e. Single dose of 1500 IU at 28 weeks

Postpartum prophylaxis in Rh negative women

Rh anti-D IgG is administered intramuscularly to the mother following child birth or abortion.

Timing:

- It should be adminsiterd within 72 hrs or preferably earlier following delivery or abortion.
- Should be given only if the baby born is Rh +ve and Direct Coombs Test done on baby's blood is negative
- In case 72 hrs is over, it can be given upto 28 days after delivery to avoid sensitization.

Dose:

- 300 microgram following delviery.
- 50 microgram following induced abortion, spontaneous abortion, ectopic pregnancy or CVS in 1st trimester.
- In case of pregnancy > 12 weeks full dose of 300 mcg should be given

Calculation of dose:

- 10 microgram Anti-D is required for every 1ml of fetal whole blood in maternal circulation.
- Volume of fetal blood entering maternal circulation is estimated by Kleihauer-Betke test
- In this test acid - elution is used to note the number of fetal RBCs per 50 low power field.
- If there are 80 fetal RBCs in 50 LPF in maternal peripheral blood film it represents transplacental hemorrhage to the extent of 4ml of fetal blood.

Site of Injection

Anti D–immunoglobulin is best given intramuscularly into the deltoid muscle as injections into the gluteal region often reach the subcutaneous tissues and absorption may be delayed.

Antepartum prophyllaxis in Rh negative mother

- It is given at 28 weeks in all Rh negative pregnant females with indirect Coombs test negative. Dose = 300 mg = 1500 I/U (single injection).

23. Ans. is a i.e. Nonimmune hydrops fetalis *Ref: Dutta Obs 7/e p333*

Immune hydrops fetalis and not nonimmune hydrops fetalis is a complication of Rh negative pregnancy.

20 Liver, Kidney and GI Diseases in Pregnancy

QUESTIONS

1. **A pregnant woman developed idiopathic cholestatic jaundice. The following condition is not associated:**
   a. Intense itching **[AI 02]**
   b. SGOT, SGPT less than 60 IU
   c. Serum bilirubin > 5 mg/dl
   d. Markedly increased levels of alkaline phosphatise

2. **Best diagnostic test for cholestasis of pregnancy:**
   a. Serum bilirubin **[AI 11]**
   b. Bile acid
   c. Serum alkaline phosphatase
   d. Serum transaminase

3. **Regarding idiopathic cholestasis of pregnancy correct is: [PGI June 02]**
   a. Deep jaundice is present
   b. Pruritus is the first symptom
   c. Maximum incidence during III trimester
   d. Increased liver transaminase
   e. Hepatic necrosis present

4. **Cholestasis of pregnancy is characterized by: [PGI June 03]**
   a. Commonly occur in 1st trimester of pregnancy
   b. Increased maternal mortality
   c. Increased perinatal mortality
   d. Recurrence in subsequent pregnancy
   e. Generalised pruritis

5. **True statement regarding cholestasis in pregnancy:**
   a. Recurs in subsequent pregnancy **[PGI May 10]**
   b. Ursodeoxycholic acid relieves pruritus
   c. Mild jaundice occurs in majority of patients
   d. Pruritus may precede laboratory findings
   e. Serum alkaline phosphatase is most sensitive indicaton

6. **Suganti Devi is 30 weeks pregnant with idiopathic cholestasis, is likely to present with following features *except*: [AIIMS Nov 00]**
   a. Serum bilirubin of 2 mg/dL
   b. Serum alkaline phosphatase of 30 KAV
   c. SGPT of 200 units
   d. Prolongation of prothrombin time

7. **Intrahepatic cholestasis treatment in pregnancy is:**
   a. Cholestyramine b. Ursodiol **[AI 10]**
   c. Steroids d. Antihistamines

8. **At what gestational age should be pregnancy with cholestasis of pregnancy be terminated.**
   a. 39 weeks b. 36 weeks **[AIIMS May 10]**
   c. 38 weeks d. 40 weeks

9. **True about fatty liver of pregnancy: [PGI June 01]**
   a. Common in third trimester
   b. Microvesicular fatty changes
   c. Lysosomal injury is the cause
   d. Alcohol is the main cause
   e. Recurrence is very common

10. **A 36-year-old G1P0 at 35 weeks gestations presents with several days H/O generalised malaise, anorexia, nausea emesis and abd. discomfort. She has loss of apetite and loss of several pounds wt in 1 week. Fetal movements are good. There is no headache, visual changes, no vaginal bleeding, no regular uterine contractions or rupture of membranes. She is on prenatal vitamins. No other medical problem. On exaeration she is mild jaundiced and little confused. Her temp is 100 degree F, PR-70, BP-100/62, no significant edema, appears dehydrated. FHR is 160 and is nonreactive but with good variability. Her WBC- 25000, Hct- 42.0, platelets- 51000, SGOT/SGPT-**

287/350, GLUCOSE-43, Creatinine- 2.0, fibrinogen-135, PT/PTT- 16/50, S. Ammonia level- 90 μ mol/L. Urine is 3+ proteins with large amount of ketones. What is the recommened treatment for this patient?

a. Immediate delivery
b. Cholecystectomy
c. Intravenous diphenhydramine
d. $MgSO_4$ therapy
e. Bed rest and supportive measures since this condition is self limiting

11. A 9-month-old pregnant lady presents with jaundice and distension, pedal edema after delivering normal baby. Her clinical condition deteriorates with increasing abdominal distension and severe ascites. Her bilirubin is 5 mg/dL, S. alkaline phosphatase was 450 u/L and ALT (345 lu). There is tender hepatomegaly 6 cm below costal margin and ascetic fluid show protein less than 2 mg% diagnosis is:

a. Acute fatty liver of pregnancy
b. HELLP syndrome
c. Acute fulminant, liver failure
d. Budd-Chiari syndrome

12 . Highest transmission of hepatitis B from mother to fetus occurs, if the mother is infected during:

a. Ist trimester b. IInd trimester **[AI 07]**
c. IIIrd trimester d. At the time of implantation

13. A mother is HBsAg positive and anti HBeAg positive. Risk of transmission of hepatitis. B in child is:

a. 20% b. 50% **[AIIMS June 99]**
c. 0 d. 90%

14. A pregnant lady is diagnosed to be HBsAg positive. Which of the following is the best way to prevent infection to the child? [AIIMS May 01]

a. Hepatitis vaccine to the child
b. Full course of hepatitis B vaccine and immunoglobulin to the child
c. Hepatitis B immunoglobulin to the mother
d. Hepatitis B immunization to mother

15. Which of the following statements concerning hepatitis infection in pregnancy is true? [AIIMS Nov 01]

a. Hepatitis B core antigen status is the most sensitive indicator of positive vertical transmission of disease
b. Hepatitis B is the most common form of hepatitis after blood transfusion
c. The proper treatment of infants born to infected mothers includes the administration of hepatitis B immune globulin as well as vaccine
d. Patients who develop chronic active hepatitis should undergo MTP

16. Which of the following types of viral hepatitis infection in pregnancy, the maternal mortality is the highest? [AIIMS May 06]

a. Hepatitis A b. Hepatitis B
c. Hepatitis C d. Hepatitis E

17. Differential diagnosis of Hyperemesis gravidarum:

a. Gastritis **[PGI Dec 03]**
b. UTI
c. Toxaemia of pregnancy
d. Reflux oesophagitis

18. When pregnancy is terminated in hyperemesis Gravidarum? [TN 87]

a. Increased acetone in urine
b. Decrease in renal output
c. Vomiting is more than 3 months
d. All of the above

19. A 26-year-old woman in the first trimester of pregnancy has been admitted with retching and repeated vomiting with large hematemesis. Her pulse rate is 126/minute and blood pressure is 80 mm Hg systolic. The most likely diagnosis is: [UPSC 95]

a. Mallory-Weiss syndrome
b. Bleeding from oesophageal varices
c. Peptic ulcer
d. Hiatus hernia

20. In a female with appendicitis in pregnancy treatment of choice is: [PGI Dec 06]

a. Surgery at earliest
b. Abortion with appendectomy
c. Surgery after delivery
d. Continue pregnancy with medical Rx

21. True statement regarding ulcerative colitis in pregnancy is: [AIIMS Dec 97]

a. Severity increases in 3rd trimester
b. Severity increases in 2nd trimester
c. Disease become quiescent
d. Disease remains as such

22. A woman presents with amenorrhea of 6 weeks duration and lump in the right iliac fossa. Investigation of choice is: [AI 01]

a. USG abdomen b. Laparoscopy
c. CT scan d. Shielded X-ray

23. Which of the following is normally present in urine of a pregnant woman in 3rd trimester:

a. Glucose b. Fructose **[AIIMS Nov 10]**
c. Galactose d. Lactose

24. Effect of PIH on GFR is:

a. GFR Increase
b. Decreases GFR
c. GFR remains the same
d. GFR can increase or decrease

25. All of the following conditions are risk factor for urinary tract infections in pregnancy *except*: [AI 04]

a. Diabetes b. Hypertension
c. Sickle cell anemia d. Vesicoureteral reflux

26. Following antibiotics are safe to treat UTI in pregnancy: **[PGI Dec 08]**

a. Aminoglycosides b. Penicillin
c. Cotrmoxazole d. Ciprofloxacin
e. Cephalosporins

27. Asymptomatic UTI in pregnancy, true is: **[PGI Dec 08]**

a. Most are usually asymptomatic in pregnancy
b. If untreated, progresses to pyelonephritis
c. Early and prompt treatment prevents abnormalities in fetus
d. Increase chance of premature infant
e. Increase risk of chronic renal lesion

28. With regards to acute pyelonephritis in pregnancy all of the following are true *except*: **[Manipal 06]**

a. Left kidney is involved in 50% of patients
b. Most common isolate is *E. coli*
c. More common in later ½ of pregnancy
d. Responds to aminoglycosides

29. Retention of urine in a pregnant woman with retroverted uterus is most commonly seen at:

a. 8-10 weeks b. 12-16 weeks **[AI 99]**
c. 20-24 weeks d. 28-32 weeks

30. A lady with 10-12 weeks pregnancy develops acute retention of urine. The likely cause is:

a. Retroverted uterus **[AIIMS Nov 99]**
b. Urinary tract infection
c. Prolapse uterus
d. Fibroid

31. A 30-year-old lady develops retention of urine in the 2nd trimester. The most probable cause is:

a. Fibroid uterus **[AIIMS June 99]**
b. Bladder neck obstruction due to ovarian cyst
c. Obstruction of uterus
d. Retroverted uterus

32. Following renal disorder is associated with worst pregnancy outcome: **[AIIMS May 03]**

a. Systemic lupus erythromatosus
b. IgA nephropathy
c. Autosomal dominant polycystic kidney disease
d. Scleroderma

33. In pregnancy, the most common cause of transient-diabetes insipidus is: **[AIIMS May 01]**

a. Severe preeclampsia
b. Hydramnios
c. Multiple pregnancy
d. IUGR

34. A 25-year-old primigravida with 20 weeks of pregnancy has a first episode of a symptomatic bacteriuria. The risk of having pyelonephritis is: **[New Pattern Question]**

a. No risk with first episode
b. 5%
c. 15%
d. 25%

35. Regarding antibiotic of choice for urinary tract infection (UTI) during pregnancy at third trimester:

a. Cephalosporin **[New Pattern Question]**
b. Quinolones
c. Aminoglycosides
d. Tetracyclines

36. Regarding asymptomatic bacteriuria during pregnancy all are correct *except*: **[New Pattern Question]**

a. Bacterial count is over 10^5/ml
b. Overall incidence is 5-10%
c. It should be treated with appropriate antimicrobial agent
d. Risk of progression to symptomatic state, if left untreated is rare

EXPLANATIONS & REFERENCES

1. **Ans. is c i.e. Serum bilirubin > 5 mg/dL**

2. **Ans. is b i.e. Bile acid**

3. **Ans. is b, c and d i.e. Pruritus is the first symptom, Maximum incidence during III trimester, Increased liver transaminase**

4. **Ans. is c, d and e i.e. Increased perinatal mortality, Recurrence in subsequent pregnancy, Generalised pruritis**

5. **Ans. is a, b, c and d i.e. Recures in subsequent pregnancy, Ursodeoxycholic acid relieves pruritus, Mild jaundice occurs in majority of patients, Pruritus may precede laboratory findings**

Ref. Dutta Obs. 6/e, p 291; Robbin's 7/e, p 921; Williams Obs. 23/e, p 1063, 1064; Mgt of High Risk Pregnancy – SS Trivedi, Manju Puri, p 355, 356

Cholestatic jaundice of pregnancy/cholestatic hepatosis/icetrus gravidarum/recurrent jaundice of pregnancy:

- Idiopathic cholestasis of pregnancy is the 2nd most common cause of jaundice in pregnancy (first one being viral hepatitis).
- It is characterized by accumulation of bile acids in the liver with subsequent accumulation in the plasma causing pruritus and jaundice due to estrogen excess.

Clinical features:

- Manifestations appear in the last trimester (beyond 30 weeks) and only occasionally in the late 2nd trimester.
- **The cardinal clinical finding/1st symptom to appear is severe generalized pruritis with a predilection for the palms and soles[Q].**
- Pruritis precedes laboratory findings by a mean of 3 weeks and sometimes by months[Q].
- Jaundice is slight[Q] **(Bilirubin levels rarely exceed 5 mg)** and seen in 10% patients.
- Cholestasis it tends to recur in subsequent pregnancies[Q] (recurrence rate = 50%), or with estrogen containing contraceptives ∴ **OCP's are contraindicated in females with h/o cholestasis during pregnancy.**

Investigation:

- **Rise in S. bile acids is the earliest/the most consistent change/Best marker for cholestasis.** There is a 10-100 fold increase in s. cholic acid followed by s. chenodoxycholic acid.
- Serum bilirubin levels are increased (rarely more than 5 mg%)[Q] and increase is always in direct bilirubin.
- Serum alkaline phosphatase is raised.[Q]
- SGOT/SGPT levels are normal to moderately elevated (seldomexceed 250 U/L).[Q]
- Liver biopsy, which is rarely done shows no necrosis, no inflammation but shows feature of intrahepatic cholestasis.
- Dyslipedemia is present.

Prognosis:

- There is no increased incidence of maternal mortality.
- Symptoms disappear within two weeks postpartum. Jaundice usually disappears within weeks following delivery. Pruritis as a rule persists longer than jaundice.
- Increase chances of PPH and cesarean section.
- There is increased incidence of prematurity, low birth weight babies, sudden IUD and meconium aspiration in fetus.

Now coming to the Question No. 1

A pregnant female with idiopathic cholestatic jaundice – is associated with

Option a – intense itching → True

Option b – SGDT, SGPT < 60 IU → True

Option c – S bilirubin >5 mg/dL → Incorrect

In Idiopathic cholestasis of pregnancy bilirubin levels are rarely more than 5 mg as supported by –

"Bilirubin levels rarely exceed 5 mg%" *—Williams 22/e, p 1126*

"Hyperbilirubinemia, results from retention of conjugated pigments; but total plasma concentration rarely exceeds 4-5 mg/dL". *—Williams 23/e, p 1064*

"Hyperbilirubinemia occurs in 20% of women and is almost exclusively direct reacting Bilirubin levels are usually between 2-5 mg/dL." *—Mgt of High Risk Pregnancy—S S Trivedi, Manju Puri Jaypee Publication p 356*

Option d – Markedly increased levels of alkaline phosphatase → Incorrect.

In cholestasis of pregnancy alkaline phosphatase may be mildly elevated and is not markedly elevated

Both option c and d are incorrect but, if I have to choose one option I would mark option 'c' as my answer – based on the fact that alkaline phosphatase as such does not carry much significance in the diagnosis of cholestasis (whether it is mildly/markedly elevated).

"Alkaline phosphatase increases above the normal elevation but is not much helpful in diagnosis."

Mgt of High Risk Pregnancy – S S Trivedi Manjupuri Jaypee Publication p 356

Extra edge: Pruritis of cholestasis during pregnancy and physiological pruritis gravidarum in pregnancy can be differentiated by – levels of serum – Glutathione S. transferase (GST) – It rises in cholestasis, atleast 9 weeks before bile acid.

6. Ans. is d i.e. Prolongation of prothrombin time

Ref. Dutta Obs. 6/e, p 291; Robbin's 7/e, p 921; Williams Obs. 23/e, p 1063, 1064

Let's see each option separately.

Option "a" Serum bilirubin of 2 mg/dL.

Bilirubin level rarely exceed 5 mg%.

Bilirubin levels are usually between 2-5 mg/dL i.e. Option "a" is correct.

Option "b" Serum alkaline phosphatase of 30 KAU.

"Alkaline phosphatase may be mildly elevated." *—Robbins 7/e, p 921*

i.e. alkaline phosphatase levels may be normal also. Hence, option b is correct.

Option "c" SGPT of 200 units.

"Serum transaminases levels are normal to moderately elevated but seldom exceed 250 IU/L."

—Williams Obs. 23/e, p 1064

i.e. Serum transaminases (SGPT) may be 200 units.

Option "d" Prolongation of prothrombin time

"Prothrombin time is usually normal unless there is malabsorption."

Mgt of High Risk pregnancy – SS Trivedi, Manju Puri, p 356

Prothrombin is coagulant factor II. Its formation in liver is dependant on fat soluble vitamin K. Absorption of vitamin K occurs with bile acid. In cholestasis absorption of bile acid (vitamin K) is not affected, rather there is accumulation of bile acids, so levels of vitamin K and clotting factors dependant on vitamin K are also normal. The prothrombin time therefore, remains normal in cholestasis.

Only when ursodeoxycholic acid or cholestyramine are being given to patients of cholestasis. Prothrombin time needs to be monitored because these drugs decrease the absorption of bile acids and can therefore cause prolongation of prothrombin time.

7. Ans. is b Ursodiol

8. Ans. is c i.e. 38 weeks

Ref. COGDT 10/e, p 382; Williams Obs 24/e, p 1085, Mgt of High Risk pregnancy—S S Trivedi Manju Puri, p 357.

Management of Intrahepatic Cholestasis – Medical Management

The most troublesome feature of intrahepatic cholestasis is pruiritis (and pruritis is due to bile acid in blood):

- Pruritis can be managed temporarily with antihistaminics and topical emollients
- Ursodeoxychotic acid (10-15 mg/kg/d in 2 divided doses) relieves pruritis decreasing ↓ing the concentration of bileacid in blood and it also improves biochemical abnormalities.

"ACOG (2006) has concluded that ursodeoxycholic acid both allevates pruritis and improves fetal outcomes, although evidence for the latter is not compelling." *—Williams Obs 24/e, p 1085*

As far as cholestyramine is concerned.

Contd…

Contd…

"Cholestyramine is no longer routinely used because of poor compliance" —*COGDT 10/e, p 382*

"Cholestyramine may be effective in 50-70% of women. This compound also causes further decreased absorption of fat soluble vitamins, which may lead to vitamin K deficiency, fetal coagulopathy may develop and there are reports of intracranial hemorrhage and still births." —*Williams Obs 24/e, p 1085*

Corticosteroids:

"Cholestyramine is no longer routinely used because of poor compliance" —*COGDT 10/e, p 382*

"Dexamethasone in a dose of 12 mg/d for 1 week, improves biochemical abnormalities but does not improve pruritis however it is less effective as compared to USCA."

—*Management of High Risk Pregnancy, S S Trivedi Manju Puri, 1/e, p 357*

Corticosteroids:

Antihistaminics relieve pruritis and have no effect on biochemical abnormally temporarily, (hence they are not DOC (only provide symptomatic relief).

Obstetric management—*Mgt of High Risk Pregnancy—S S Trivedi Manju Puri, p 358*

In patients of intrahepatic cholestasis of pregnancy – there is increased perinatal mortality. Hence fetal surveillance is done with biweekly NST. Conventional antepartum testing, does not predict fetal mortality as there is sudden death in choletasis due to acute hypoxia, hence delivery is recommended at 37-38 weeks. In those patients with jaundice (S bilirubin >1.8 mg%) termination of pregnancy should be done at 36 weeks.

9. Ans. is a and b Common in third trimester and Microvesicular fatty changes

Ref. Williams Obs 23/e, p 1065, 1066; COGDT 10/e, p 382

Acute fatty liver of pregnancy/Acute yellow atrophy of the liver:

- It is a rare condition occurring in third trimester (mean gestational age of 37.5 weeks)[Q]
- It is the the M/C cause of acute liver failure during pregnancy.

Aetiology:

- It is associated with disorders of fatty acid transport and oxidation-deficiency of LCHAD enzyme, i.e. long chair hydroxyl aceyl coenz A dehydrogenase
- Risk is increased in case of:
  - First pregnancy, male fetuses, preeclampsia, maternal obesity and multiple pregnancy.

Histology: Pathology

- Liver is yellow, soft and greasy:
  - Swollen hepatocytes with central nuclei and cytoplasm filled with microvesicular fat[Q]
  - Periportal sparing
  - Minimal hepatocellular

} Collectively called as Acute yellow atrophy

Clinical features:

- Patients present in the third trimester (generally at 37 weeks) with nonspecific symptoms like nausea, vomiting, anorexia, vague abdominal discomfort and malaise.
- In many women, persistent vomiting is the main symptom.
- AFP should also be suspected in any woman who presents with new onset nausea and malaise in third trimester.
- This is followed by jaundice (progressive in nature) after about one week.
- In 50% cases-features of preeclampsia viz-hypertension, proteinuria and oedema are present.
- In almost all severe cases, there is profound endothelial cell activation with capillary leakage causing hemoconcentration, hepatorenal syndrome, ascites, and sometimes pulmonary edema. Fetal death is more common in cases with severe hemoconcentration. Stillbirth possibly follows diminished uteroplacental perfusion, but is also related to more severe disease and acidosis. There is maternal leukocytosis and thrombocytopenia.
- The syndrome typically continues to worsen after diagnosis. Hypoglycemia is common, and obvious hepatic encephalopathy, severe coagulopathy, and some degree of renal failure develop in approximately half of women.

Investigations:

- Liver function tests are abnormal:
  - Rise in serum bilirubin but less than 10 mg/dL
  - Increase in SGOT and SGPT (< 1000 IU/L)
  - Increase in alkaline phosphatase (moderately)

Contd…

Contd…

- Prothrombin time may be increased
- Clotting time prolonged.

- In severe cases, there may be disseminated coagulation failure.

Renal function test:
- ↑ S. creatinine (present in all patients)
- ↑ S. uric acid
- ↑ S. ammonia levels

Others:
- ↓ level of glucose (hypoglycaemia)
- ↓ platelet count
- ↓ fibrinogen levels (< 100 mg)

Management:
- Rapid delivery is essential
- Mode of delivery – Induction of labor followed by vaginal delivery
- Since the patient has coagulopathy, hence cesarean section is avoided, but still in practice cesarean is very common.

Complication
- Maternal mortality 10-75%
- Hepatic dysfunction resolves automatically in the postpartum period.
  There are two associated complications which can develop during this period:
  1. Transient diabetes insipidus
  2. Acute pancreatitis

Fetal prognosis:
- Fetal prognosis is poor.
- If the fetuses survive, they may later on develop a Reye like syndrome of hepatic encephalopathy and severe hypoglycemia due to the defect in beta fatty acid oxidation.

10. Ans is a i.e immediate delivery *Ref. Williams 23/e, p 1067*

A 35-year-old pregnant patient having:

- Nausea, vomiting
- Jaundice
- Hypoglycemia
- ↑ ammonia levels
- ↓ platelet levels
- Raised SGOT, SGPT

leave no doubt that she is a case of acute fatty liver of pregnancy

This is not HELLP syndrome as her B/P is normal and not raised.

In AFP: Termination of pregnancy is the first step as spontaneous resolution usually follows delivery.

Read the management of AFP as giver by Williams 23/e, p 1067.

"The key to a good outcome is intensive supportive case and good obstetrical management. Spontaneous resolution usually follows delivery. In some cases, the fetus may be already dead when the diagnosis is made, and the route of delivery is less problematic. Many viable fetuses tolerate labor poorly. Because significant procrastination in effecting delivery may increase maternal and fetal risks, we prefer a trial of labor induction with close fetal surveillance. Although some recommend cesarean delivery to hasten hepatic healing, this increases maternal risk when there is a severe coagulopathy. Transfusions with whole blood or packed red cells, along with fresh-frozen plasma, cryoprecipitate, and platelets, are usually necessary if surgery is performed or if obstetrical lacerations complicate vaginal delivery."

11. Ans. is d i.e. Budd-Chiari syndrome *Ref. Harrison 16/e, p 1862*

The most common causes of acute severe liver injury in a young pregnant women are:
- Viral hepatitis (HAV, HBV)
- Eclampsia, preeclampsia (HELLP syndrome)
- Acute fatty liver of pregnancy
- Budd-Chiari syndrome.

Let us discuss each option separately

Preeclampsia and eclampsia/HELLP syndrome:

- It is the most common cause of abnormal liver function test in women.
- Amniotransferases are modestly elevated.
- But in these cases delivery of the fetus is followed by rapid normalization of the hepatic abnormalities.
- Moreover the question does not mention any history of PIH, hemolysis and thrombocytopenia (HELLP syndrome).

Acute fatty liver of pregnancy:

- Acute fatty liver develops in the third trimester.
- Jaundice develops a few days after the onset. The serum bilirubin is rarely above 10 mg/dL.
- Alkaline phosphate is markedly elevated.
- Aminotransferases are moderately elevated.
- A markedly raised serum ammonia is the most diagnostic finding in establishing the diagnosis of acute fatty liver of pregnancy and symptoms rapidly abate with parturition in most patients.

Fulminant hepatic failure:

- The patient presents with features of severe acute hepatitis leading to the development of hepatic encephalopathy within 8 weeks of onset.
- The bilirubin increases to 20-30 mg/dL.
- The aminotransferase levels are very high (>1000)
- Alkaline phosphatase moderately elevated.
- Delivery is usually the best treatment.

Budd-Chiari syndrome:

- It is a disorder characterized by thrombotic occlusion of the hepatitis veins.
- It is a rare complication of pregnancy.
- Most of the cases presents within few weeks of delivery but in several cases onset occurs during pregnancy.
- Clinical triad of Budd-Chiari syndrome includes sudden onset of abdominal pain, hepatomegaly and ascites (ascites with high protein content is almost always present) near term or shortly after delivery.
- Tender hepatomegaly is one of the hallmark of Budd-Chiari syndrome.
- Aminotransferases are mildly elevated.
- Jaundice is seen in only half of the cases.

12. Ans. is c i.e. IIIrd trimester

Viral hepatitis is the commonest cause of jaundice in pregnancy in the tropics.

Hepatitis A (HAV):

- Infection is spread by faecal-oral route.
- Diagnosis is confirmed by detection of IgM antibody to hepatitis A (anti HAV Igm).
- Disease is usually self limited and fulminant hepatitis is rare.
- Perinatal transmission is rare, chronic carrier state does not exist.
- The virus is not teratogenic.
- Pregnant woman *exposed to HAV infection* should receive immunoglobulin 0.02 ml/kg within 2 weeks of exposure. She should also have hepatitis A vaccine single dose 0.06 ml IM. It is safe in pregnancy.

Hepatitis B virus (HBV):

- The virus is *transmitted by parenteral route, sexual contact, vertical transmission and also through breast milk*.
- The risk of transmission to fetus ranges from 10% in first trimester to as high as 90% in third trimester and it is specially high (90%) from those mothers who are *seropositive to hepatitis B surface antigen (HBsAg) and 'e'-antigen (HBeAg).*
- *Neonatal transmission* mainly occurs at or around the time of birth through mixing of maternal blood and genital secretions. Approximately 25% of the carrier neonate will die from cirrhosis or hepatic carcinoma, between late childhood to early adulthood.
- HBV is not teratogenic.

13. Ans. is a i.e. 20% *Ref. Fernando Arias 3/e, p 158; Harrison 17/e, p 194, Dutta Obs. 7/e, p 292*

Before answering these questions lets first discuss hepatitis in brief.

Maternal infection: The acute infection is manifested by flu like illness as malaise, anorexia, nausea and vomiting. In majority, it remains asymptomatic. Jaundice is rare and fever is uncommon.

Clinical course (HBV): Nearly 90–95% of patients clear the infection and have full recovery.

1% develop fulminant hepatitis resulting massive hepatic necrosis.

10-15% become chronic and 10% of these chronic cases suffer from chronic active hepatitis, cirrhosis and hepatocellular carcinoma.

Diagnosis is confirmed by serological detection of HBsAg, HBeAg (denote high infectivity) and antibody to hepatitis B core antigen (HBcAg) and HBV DNA titer (10^7–10^{11}).

Screening: All pregnant women should be screened for HBV infection at first antenatal visit and it should be repeated during the third trimester for 'high risk' groups (intravenous drug abusers, sexual promiscuity, hemophilics, patients on hemodialysis or having multiple sex partners).

Hepatitis C (HCV):

It is recognized as the major cause of non-A, non-B hepatitis worldwide and is the leading cause of transfusion associated hepatitis. Transmission is mainly blood borne and to a lesser extent by faecal-oral route.

It is responsible for chronic active hepatitis and hepatic failure.

Perinatal transmission (10–40%) is high when coinfected with HIV and HBV.

Detection is by antibody to HCV by EIA, which develops usually late in the infection.

Confirmation is done by recombinant immunoblot assay (RIBA-3).

Chronic carrier state is present. Breastfeeding is not contraindicated.

Hepatitis D (HDV):

It is seen in patients infected with HBV either as a co-infection or super infection. Perinatal transmission is known.

Hepatitis E (HEV): Hepatitis E is the most important cause of non-A, non-B hepatitis in developing countries like India. **C**hronic carrier state is present.

Perinatal transmission is uncommon.

Maternal mortality is very high (15–20%).

Remember: Fulminant hepatitis is more common in hepatitis E, less common in hepatitis C and rare in hepatitis A. Maternal mortality is very high in fulminant type.

Medical termination of pregnancy does not alter the prognosis of the patient.

Now coming to the questions:

Ans 12-Highest transmission of hepatitis B from mother to fetus occurs, if the mother is infected during: IIIrd trimester

Ans 13- is 20% as given in the following books.

The risk of perinatal transmission of HBV depends upon the presence of HBeAg or Anti-HBe antibody.

"The likelihood of perinatal transmission of HBV correlates with the presence of HBeAg. 90% of HBeAg positive mother, but only 10-15% of anti-HBe positive mothers transmit HBV infection to their offspring." *Harrison 17/e, p 1940*

According to Fernando Arias 3/e, p 158:

"The higher risk for vertical transmission of HBV is attributed to chronic carriers with positive HBeAg.

These patients are highly infective and as many as 90% of their newborns will be infected. Mothers with positive anti-HBe antibody have a 25% probability of transmitting the infection. If both HBeAg and anti-HBe are not present there is a 10% probability of neonatal infection."

14. Ans. is b i.e. Full course of hepatitis B vaccine and immunoglobulin to the child

Ref. Dutta Obs. 7/e, p 292; Fernando Arias 3/e, p 158

The best way to prevent infection in a child born to HBsAg positive mother is to give both active and passive immunization.

Infants born to HBsAg positive mothers should be given hepatitis immunoglobulin (0.5 m 1/m) within 12 hours after birth. Along with this the first dose of hepatitis B recombinant vaccine is given.

This is followed by hepatitis B vaccine at 1 and 6 months.

Hepatitis B is not a contraindication for breastfeeding.

15. Ans. is c i.e. The proper treatment of infants born to infected mothers includes the administration of hepatitis B Ig as well as vaccine which should be given within 12 hours of delivery

Ref. Dutta Obs. 7/e, p 292; Fernando Arias 3/e, p 158

Persons at increased risk of hepatitis B infection include homosexuals, abusers of intravenous drugs, healthcare personnel, and people who have received blood or blood products.

However, because of intensive screening of blood for type B hepatitis, hepatitis C has become the major form of hepatitis after blood transfusion. (i.e. option b. incorrect).

The most sensitive indicator of positive vertical transmission of disease is HBe antigen. (i.e. option a. incorrect).

The proper treatment of infants born to infected mothers include administration of hepatitis B immune globulin as well as vaccine.

Chronic acute hepatitis does not necessarily warrant therapeutic abortion (i.e. option d. incorrect). Fertility is decreased, but pregnancy may proceed on a normal course as long as steroid therapy is continued. Prematurity and fetal loss are increased, but there is no increase in malformations.

16. Ans. is d i.e. Hepatitis E

Ref. Dutta Obs. 7/e, p 292; Robbin's 6/e, p 862

- Maximum risk of maternal mortality is with hepatitis E.
- Maximum risk of hepatic encephalopathy is with hepatitis E.
- Maximum risk of perinatal transmission is with hepatitis B.
- All pregnant females should be screened for HBV infection in their first antenatal visit and repeated in the last trimester.
- Screening of HBV is done by determination of HBsAg.
- Maximum transmission of HBB infection occurs at the time of delivery[Q]. Hence MTP is not recommended in case of first trimester. There is no evidence that cesarean section lowers the risk of vertical transmission.
- Breastfeeding is not contraindicated in case of hepatitis.

17. Ans. is a, b and d i.e. Gastritis; UTI; and Reflux of oesophagitis

Ref. Dutta Obs. 7/e, p 155, 157; Current Diagnosis and Treatment of Gastroenterology 2/e, p 180, 181

- Nausea and vomiting of pregnancy commonly termed *'morning sickness'* is a normal phenomenon in pregnancy, occurring in about 70% of all pregnancies.
- In most women, it is limited to the first trimester or till 16 weeks of pregnancy, but a few may continue to have symptoms throughout pregnancy.
- Hyperemesis gravidarum is the other end of the spectrum characterised by severe nausea and intractable vomiting sufficient to interfere with nutrition causing weight loss, dehydration, ketosis, alkalosis and hypocalcemia.
- **Risk Factors:**
  - Maternal age > 35 years
  - Nulliparity
  - Cigarette smoking
  - Fetal loss
  - Unplanned pregnancy
  - Hyperthyroidism
  - High body weight
  - H mole
  - Twin pregnancy
  - Positive family history
- **Clinical features are due to:**
  - Dehydration
  - Starvation
  - Ketoacidosis

Management: Mild to moderate nausea and vomiting of pregnancy – usually needs no treatment except reassurance and frequent small meals. Vitamin B_6 alone or with doxylamine is safe and can be considered.

Extra Edge: *—Williams Obs. 23/e, p 1051*

- Vitamin deficiencies associated with hyperemesis gravidarum:
  - Thiamine deficiency leading to Wernicke encephalopathy.
  - Vitamin K deficiency.

- Level of various minerals in hyperemesis gravidarum:
  - Plasma zinc levels increased.
  - Plasma copper levels decreased.
  - Plasma magnesium levels unchanged.

18. Ans. is b i.e. Decrease in renal output

Ref. Dutta Obs. 7/e, p 157; Current Diagnosis and Treatment of Gastroenterology 2/e, p 180, 181

Indications for therapeutic termination in hyperemesis gravidarum:

- Steady deterioration, in spite of therapy
- Rising pulse rate of 100/min or more
- Temperature constantly above 38°C (100.4°F)
- Gradually increasing oliguria and proteinuria[Q]
- Appearance of jaundice[Q]
- Appearance of neurological complications.

19. Ans. is a i.e. Mallory-Weiss syndrome *Ref. Williams 24/e, p 1074*

Upper gastrointestinal bleeding:

"Occasionally, persistent vomiting may be accompanied by worrisome upper gastrointestinal bleeding. The obvious concern is that there is a bleeding peptic ulceration, however, most of these women have minute linear mucosal tears near the gastroesophageal junction. Women with these co called Mallory-Weiss tears usually respond promptly to conservative measures." *—Ref. Williams 23/e, p 1053*

With persistent retching the less common but more serious oesophageal rupture– **'Boerhaave syndrome'** may develop.

20. Ans. is a i.e. Surgery at earliest *Ref. Williams Obs. 24/e, p 1074*

Diagnosis of appendicitis during pregnancy is difficult as symptoms of appendicitis viz nausea, vomiting anorexia are normally present in pregnancy.

But once the diagnosis is made immediate surgery should be done.

"If appendicitis is suspected, treatment is prompt surgical exploration. Even though diagnostic errors sometimes leads to removal of a normal appendix, it is better to operate than to postpone intervention until generalized peritonitis has developed."

Route:

Before 20 weeks – Laparoscopy

After 20 weeks – Laparotomy (Incision should be made at McBurney's point)

Earlier it was believed CO_2 pneumoperitoneum created during laparoscopy can cause fetal acidosis and hypoperfusion, but now it is not so considered.

21. Ans. is a or b i.e. Severity increases in 3rd trimester; or Severity increases in 2nd trimester

Ref. Williams Obs. 23/e, p 1056

Ulcerative colitis and pregnancy:

"In a meta-analysis of 755 pregnancies, Fonager and Colleagues (1998) reported that ulcerative colitis quiescent at conception worsened during pregnancy in about a third of cases. In woman with active disease at the time of conception, 45% worsened, 25% remained unchanged, and only 25% improved. These observations were similar to those previously described in an extensive review by Miller."

Also Know:

Inflammatory bowel disease and pregnancy: Both forms of chronic inflammatory bowel disease are relatively common in woman of childbearing age. Donaldson concluded the following:

- Pregnancy does not increase the likelihood of an attack of inflammatory bowel disease. If the disease is quiescent in early pregnancy, then flares are uncommon, but if they develop, they may be severe (do not get confused, this statement is a generalised statement for IBD whereas the above statement is specific for ulcerative colitis).
- Active disease at conception increases the likelihood of poor pregnancy outcome.
- Diagnostic evaluations should not be postponed, if their results are likely to affect management.
- Many of the usual treatment regimens may be continued during pregnancy, and if indicated, surgery should be performed.

Effect of ulcerative colitis on pregnancy: In mild or quiescent UC and CD, fetal outcome is nearly normal Spontaneous abortions, stillbirths, and developmental defects are increased with increased disease activity, not medications.

—Harrison 16/e, p 1788

From the above text it is clear that severity of ulcerative colities increases during pregnancy. But sorry friends, no where it is mentioned, whether severity increases in second or third trimester. If anyone of you guys get to know the correct answer, do tell us.

22. Ans. is a i.e. USG abdomen

The answer is quite obvious and I do not think you need any reference for this one.
X-ray and CT scan should be avoided during pregnancy due to risk of radiation exposure.

23. Ans. is a i.e. Glucose *Ref. Williams 23/e, p 124, Dutta Obs. 7/e, p 281*

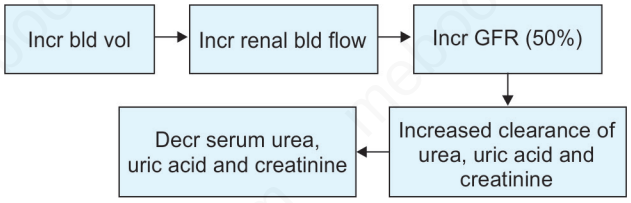
- Glycosouria during pregnancy is normally seen in 5-50% cases
- Reason = Increase in GFR + impaired tubular reabsorptive capacity for filtered glucose
- Mostly seen in mid pregnancy
- For detecting glycosuria s**econd fasting morning sample** is collected
- Fasting glycosuria, if present is omnious
- If glycosuria is seen on one occasion before 20 weeks or on 2 on more occasions thereafter or if glycosuria is present in a pregnant female who has a positive family H/O diabetes or has previously given birth to a macrosomic baby
- Glucose tolerance test should be done.

Management – Glycosuria does not require any treatment and it disappears after delivery.
Also Remember

Q's asked on urine sample collection:
Q1. For urine pregnancy test → Best sample is – first voided morning urine sample.
Q2. For detecting glycosuria – Best sample is second voided morning urine sample.
Q3. For detecting urine infection – Best samples is – midstream clear catch urine sample.
Q4. For detecting proteinuria in PIH. Best sample – do not use 1st voided urine as it may be concentrated and may give a false high reading.
Hence after 1st urine, any urine sample can be used.
Q5. In a patient with urinary fistula – urine sample can be collected by Foley's catheterization.

24. Ans. is b i.e. GFR decreases *Ref. Dutta Obs. 7/e, p 222, Williams Obs. 23/e, p 719*

In normal pregnancy – changes which occur in renal system are-:



In case of PIH-as blood pressure increases, renal blood flow decreases (because pressure and volume are inversely related) so GFR decreases in pregnancy and serum uric acid, urea and creatinine are increased in severe preeclampsia.

Also remember: *Characteristic lesion in PIH is seen in the kidney, i.e. Glomeruloendotheliosis.*
One of the earliest lab manifestations of preeclampsia is hyperuricemia.

25. Ans. is b i.e. Hypertension *Ref. Sheila Balakrishnan 1/e, Paras Publication, p 320; Robbins 7/e, p 997*

Urinary tract infections in pregnancy:
These are the commonest bacterial infections seen in pregnancy.
Risk factors of UTI in pregnant as well as nonpregnant state:

- Urinary tract obstructions as in:
  - Tumors
  - Calculi
- Neurogenic bladder dysfunction as seen in case of:
  - Diabetes
  - Spinal cord injury
- Vesicoureteric reflux as in:
  - Incompetence of vesicoureteral valve
  - Congenital absence of intravesical part of ureter
  - Intrarenal reflux
  - Sickle cell disease and analgesics – which cause papillary necrosis predisposing to UTI

- Best urine sample – Midstream clean catch sample
- Most common cause of clinical pyelonephritis – ascending infection
- MC organism causing UTI and pyelonephritis – E. coli 90% cases.

26. Ans. is b & e i.e. Pencillin and cephalosporin *Ref. Dutta 7/e, p 297; CMDT 07 p 800, 801; COGDT 10/e, p 375*

Principles for management of UTI during pregnancy:

- Single dose therapy is preferred
- The antimicrobial agent should be appropriate to the mother and fetus, any one of the following drugs could be prescribed:
  - Ampicillin
  - Nitrofurantoin – DOC for prophylaxis of recurrent UTI in pregnancy
  - Cephalexin Cephalosporin
  - Amoxicillin clavulanic acid combination.
- Sulfonamides should not be given in the third trimester because they may interfere with bilirubin binding and thus impose a risk of neonatal hyperbilirubinemia and kernicterus.
- Fluoroquinolones are also contraindicated because of their potential teratogenic effects on fetal cartilage and bone.
- Tetracyclines, cotrimoxazole and ciprofloxacin are: contraindicated during pregnancy.

Note: Before starting any antibiotic a midstream clean catch urine sample should be collected for culture.

Cranberry fruit juice is known to prevent recurrences of UTI. It prevents the adhesions of the pilins of E. coli to uroepithelium.

27. Ans. is a, b, d and e i.e. Most are usually asymptomatic in pregnancy, if untreated, progresses to pyelonephritis, Increase chance of premature infant and increase risk of chronic renal lesion.

Ref. Williams Obs. 23/e, p 1035, 1036, COGD T, 10/e, p 374r

Asymptomatic Bacteriuria:

- This refers to persistent, actively multipliying bacteria within the urinary ract in an asymptomatic woman.
- It is diagnosed when bacterial count of the same species is over 10^5/ml in mid stream clean catch specimen of urine on 2 occasions without symptoms of urinary infection
- Counts < 10^4/ml indicate contamination of urine from the urethra or external genitalia
- M/C offending organism = *E. coli* (90% cases)
- Incidence is similar in both non-pregnant and pregnant women, i.e. 1 to 10%
- **Risk factors for developing asymptomatic bacteriuria**
  - Low social economic status
  - Multiparity
  - ↑Age
  - Faulty sexual practices
  - Maternal diabetes
  - Sickle cell trait[Q]

Remember: Asymptomatic bacteriuria is twice as common in pregnant women with sickle cell trait and 3 times as common in pregnant women with diabetes or with renal transplant as in normal pregnant women:

- ACOG recommends screening for bacteria at the first prenatal visit.
- Screening can be done by dip slide technique (Leukocyte esterase- nitrate dipstick) in places where prevalence is <2% and where prevalence is high (5-8%)—urine culture should be done for screening.
- **Prognosis**: Asymptomatic bacteriuria can lead to
  - UTI in 40% cases
  - If untreated – acute pyelonephritis in 25% patients
  - In treated cases incidence of pyelonephritis is 10%
  - Premature labour
  - Preeclampsia
  - Anaemia
  - Risk of developing chronic renal lesions in later life (cystitis and pyelonephritis).
  - Fetal loss
  - IUGR
  - Prematurity

Note: Recurrent asymptomatic bacteriuria is associated with high incidence of urinary tract abnormality of the patient which may be congenital or acquired.

As such asymptomatic bacteriuria do not lead to congenital abnormalities in fetus. Hence, option c is incorrect.

The answer is further supported by following lines from Williams which does not mention congenital malformation as one of the fetal effects of asymptomatic bacteriuria.

"In some, but not all studies, covert bacteria has been associated with preterm or LBW infants. It is even more controversial whether eradication of bacteriuria decreases these complications." *—Williams 23/e, p 1035*

Contd…

Contd…

Management: Drugs used for its treatment are:
- Amoxicillin
- Ampicilin
- Cephalosphorin
- Nitrofurantoin
- Trimethoprim-sulphamethoxasole combination
- In resistant cases, nitrofurantoin is the drug of choice
- Regardless of the treatment recurrence rate is 30%.

28. Ans. is a i.e Left kidney is involved in 50% of patients *Ref. Fernando Arias 3/e, p 491; Dutta Obs. 7/e, 298*

Pyelonephritis in Pregnancy:

Etiology:
- Incidence in pregnancy is 1-3%
- More common in primigravida and young females
- Usually occurs in the second trimester after 16 weeks (>50%) but may occur in 1st and 3rd as well
- Generally bilateral, if unilateral it is more common on right side (in more than half of the cases)
- Most common organism responsible *E. coli* (70%), *Klebsiella* (10%).

Complications

Maternal	Fetal
• Renal dysfunction • Septicemia/Septic shock • DIC • ARDS • Endotoxin induced haemolysis and anaemia	• Preterm delivery/PROM • IUGR • IUD

Note: Bacteremia is seen in 15-20% cases

Management

Aggressive treatment with IV fluids and IV ampicillin/cefazolin. Other drugs which can be used are gentamicin alone or along with amoxicillin or piperacillin tazobactam, combination, IV antibotics are given for 10 days followed by oral drug for 7-10 days.

Antimicrobial suppression therapy is continued till the end of pregnancy to prevent recurrence (30-40%). Nitrofurantoin 100 mg daily at bed time is effective.

29. Ans. is b i.e. 12–16 weeks *Ref. Dutta Obs. 7/e, p 311; Jeffcoates 7/e, p 299*

Retroverted uterus is present in early weeks of pregnancy (in 15% cases).

Outcome of retroverted uterus in pregnancy:

Mostly spontaneous rectification occurs by 10–12 weeks.

In rare cases fundus fails to clear the promontory of sacrum and becomes impacted in pelvis at 12-14 weeks and blocks the opening of internal urethral sphincter leading to acute retention of urine (at 12-14 weeks) Management is immediate catheterization.

30. Ans. is a i.e. Retroverted uterus *Ref. Dutta Obs. 7/e, p 311, 312, Jeffcotes Gynae Combination 7/e, p 493*

Well friends amongst the options given UTI and prolapse of uterus- cause increased frequency of urination and not retention.

So we are left with 2 options – fibroid and irritability uterus.

Intrauterine fibroid commonly causes bladder irritability due to its weight leading to diurnal frequency.

Retroverted uterus: It is common during pregnancy and can lead to retention between 12 and 16 weeks. It is the best answer.

31. Ans. is d i.e. Retroverted uterus *Ref. Dutta Obs. 7/e, p 311, 312*

In the question.

- Both fibroid and retroverted uterus can cause acute retention of urine during early pregnancy.
- But retroverted uterus will be the more correct option as:
  - It is common during pregnancy
  - Most common time of occurrence of urinary retention is second trimester – 12 to 16 weeks.

Also Know : Other causes of retention of urine in pregnancy:

Early pregnancy
- Due to diminished bladder tone
- Impacted pelvic tumor

During puerperium
- Retroverted uterus

32. Ans. is d i.e. Scleroderma *Ref. Williams Obs. 21/e, p 212; Fernando Arias 3/e, p 500, 501*

Prognostic indicators in renal disease and pregnancy:

- Most reliable prognostic indicator of the outcome of pregnancy is the presence of hypertension[Q]. The fetal prognosis for women with chronic renal disease is favorable as long as they do not develop superimposed preeclampsia.
- Second to hypertension, the most valuable prognostic index for patients with chronic renal disease during pregnancy is the degree of renal function impairment:
  - In patients with normal or only midly impaired renal function, pregnancy does not accelerate renal damage
  - In patients with moderate renal insufficiency (serum creatinine of 1.4 mg/dL or greater before pregnancy or creatinine clearance <30 ml/min. there is a decline in renal function during pregnancy).
- Another important prognostic sign is the presence or absence of proteinuria. As a general rule, if the patient has 2+ or more protein in qualitative tests or 3 g or more in 24 hours urine collections at the beginning of pregnancy, the tendency will be toward increased protein losses and development of nephritic syndrome during pregnancy.
- The **histologic characteristics** of the renal lesion also have prognostic value.

Renal Disease	Effects
IgA nephropathy	Good prognosis
Systemic lupus erythematosus	Expect more problems than most glomerular diseases, but prognosis is most favourable, if disease is in remission for at least 6 months before conception.
Periarteritis nodosa and scleroderma	Associated with maternal deaths. Reactivation of quiescent scleroderma can occur during pregnancy and postpartum therapeutic abortion should be considered Fetal prognosis is poor.
Diffuse glomerulonephritis, membrano proliferative glomerulonephritis focal glomerulo sclerosis	Poor outcome

33. Ans. is a i.e. Severe preeclampsia *Ref. COGDT 10/e, p 395; CMDT 07, p 1132*

Diabetes insipidus can be caused by:

Deficiency of antiduretic hormone	Resistance of ADH action
↓	↓
Central diabetes insipidus	Nephrogenic diabetes insipidus.

- A transient form of DI occurs during pregnancy due to:
  - Excessive placental production of vasopressinase
  - Decreased hepatic clearance due to abnormal liver function there in case of:
    a. Preeclampsia
    b. Fatty liver
    c. Hepatitis.
- Approximately 60% of women with previously known DI worsen, 20% improve and 20% do not change during pregnancy.
- Worsening is attributed to excessive placental vasopressinase production.
- Some females with DI who develop placental insufficiency show DI improvement, which is attributed to decreased vasopressinase production by the damaged placenta.

Symptoms:
- Polyuria (4-15 liters/day)
- Intense thirst particularly for ice cold fluids.

Diagnosis: is confirmed by water deprivation test.

Treatment: of choice intranasal L-deamino 8D arginine vasopressin (DDAVP) which is a synthetic analogue of ADH and is resistant to vasopressinase.

34. Ans. is d i.e. 25% *Ref. Dutta Obs. 7/e, p 299*

Twenty-five percent of these women are likely to develop acute pyelonephritis, usually in third trimester, if left untreated.

35. Ans. is a i.e. Cephalosporin *Ref. Williams Obs. 23/e, p 1033, 1036*

- UTI is the most common bacterial infections during pregnancy. Although asymptomatic bacteruria is the most common presentation, symptomatic infection includes cystitis, or pyelonephritis.
- Organisms that cause urinary infections are those from the normal perineal flora.

Drugs use for management of UTI
- As single dose or 3 days course:
  - Amoxicillin
  - Ampicillin
  - Cephalosporin
  - Nitrofurantoin
  - Trimethoprim-sulfamethoxazole.
- In treatment failure:
  - Nitrofurantoin 100 mg four times daily for 21 days.
- For suppression for bacterial persistence or recurrence:
  - Nitrofurantoin 100 mg at bedtime for remainder of pregnancy.

36. Ans. is d i.e. Risk of progression to nephritis, if left untreated is rare *Ref. Dutta Obs. 7/e, p 299*

As discussed earlier:
- Asymptomatic bacteriuria is when bacterial count of same species is over 10^5/ml (i.e. option a is correct).
- Overall incidence during pregnancy ranges between 2-10% (i.e. option b is correct).
- If left untreated, 25% of the women with asymptomatic bacteriuria develop acute pyelonephritis, hence it should be promptly treated (so option c is correct and option d is incorrect).

21

Infections in Pregnancy

FETAL AND NEWBORN IMMUNOLOGY

- The active immunological capacity of the fetus and neonate is compromised compared with that of older children and adults.
- Fetal cell-mediated and humoral immunity begin to develop by 9 to 15 weeks' gestation.
- The primary fetal response to infection is immunoglobulin M (IgM). Passive immunity is provided by IgG transferred across the placenta.
- By 16 weeks, this transfer begins to increase rapidly, and by 26 weeks, fetal concentrations are equivalent to those of the mother.
- After birth, breastfeeding is protective against some infections, although this protection begins to decline at 2 months of age. Current World Health Organization (2013) recommendations are to exclusively breastfeed for the first 6 months of life with partial breastfeeding until 2 years of age.
- Vertical transmission refers to passage from the mother to her fetus of an infectious agent through the placenta, during labor or delivery, or by breastfeeding.

Table 21.1: Specific causes of some fetal and neonatal infections

Intrauterine	Intrapartum	Neonatal
• **Transplacental** - Viruses: varicella zoster, coxsackie, human parvovirus B19, rubella, cytomegalovirus, HIV - Bacteria: Listeria, syphilis, borrelia Protozoa: toxoplasmosis, malaria • **Ascending infection** - Bacteria: group B *streptococcus*, coliforms - Viruses: HSV	• **Maternal exposure** - Bacteria: gonorrhea, chlamydia, group B *streptococcus*, tuberculosis, mycoplasmas - Viruses: HSV, HPV, HIV, hepatitis B, hepatitis C • **External contamination** - Bacteria: *Staphylococcus*, coliforms - Viruses: HSV, varicella zoster	**Human transmission:** *Staphylococcus*, HSV **Respirators and catheters:** *Staphylococcus*, coliforms

HIV = Human immunodeficiency virus; HPV = Human papillomavirus; HSV = Herpes simplex virus.

CHICKENPOX (VARICELLA ZOSTER)

- Chickenpox is caused by varicella zoster virus.
- Varicella virus is usually transmitted by the respiratory route.
- It can also be transmitted from pregnant women to their fetuses by the hematogenous transplancental route.
- Incubation period is 11 days
- Most common cause of maternal mortality in chickenpox is pneumonia.
- One of the risk factors for VZV pneumonia is smoking.
- Maternal varicella infection is usually diagnosed clinically. NAAT is also very sensitive.
- DOC for the treatment of pregnant female with chickenpox is Acyclovir.

- Pregnant females who are exposed to patients of chickenpox should be given varicella immunoglobulin within 96 hours of exposure as prophyllaxis.

Remember

VZ vaccine is not recommended for pregnant women and should not be given to women who may become pregnant during the month following each vaccine dose.

Varicella Infection in Pregnancy

- If varicella infection occurs in a pregnant female during first half of pregnancy (m/c time of transmission—13 to 20 weeks), it results in **congenital varicella syndrome** in the fetus.
- Congenital varicella syndrome is characterized by chorioretinitis, micro-ophthalmia, cerebral cortical atrophy, IUGR, hydronephrosis and skin or bone defects.
- Congenital varicella syndrome is an indication for doing MTP.
- Congenital defect rarely occurs if varicella infection occurs after 20 weeks.
- The terminology 'varicella embryopathy' is not used these days.
- **Neonatal varicella** is characterized by pneumonitis, hepatitis and DIC.
- The severity of neonatal infection is inversely related to the concentration of maternal antibodies present in the newborn circulation. Mother starts producing and transferring antibodies approximately 5 days after the onset of her disease.Thus babies born 5 days or more from the beginning of maternal disease will be protected. —*Fernando Arias 3/e, p 156*
- Perinatal varicella exposure just before or during delivery poses a serious threat to newborns and so Varicella Ig should be given to all neonates of born to mothers who have clinical evidence of varicella 5 days before and upto 2 days after delivery.
- The use of VZIG decreases the chances of neonatal varicella and also modifies the clinical course but it does not always prevent severe or fatal varicella. Expectant treatment with close observation, followed by prompt initiation of antiviral therapy on suspicion of neonatal varicella is recommended.
- Antiviral treatment (acyclovir) is given to neonates only if they develop neonatal varicella syndrome.
- Vaccine is not secreted in breast milk. So postpartum vaccination should not be delayed because of breastfeeding.

INFLUENZA IN PREGNANCY

- Influenza viruses (RNA) are enveloped.
- Hemagglutinin (H) and neuraminidase (N) are present on the surface. Influenza strains are named according to their genus, species and H and N subtypes.
- The course of pregnancy remains unaffected unless the infection is severe.
- **Effects on pregnancy due to H1-N1 infection:** miscarriage, preterm labor, PROM, pneumonia, ARDS, renal failure, DIC and death. Severity of illness is high in pregnancy.
- There is no evidence of its teratogenic effect even if it is contracted in the first trimester. However, outbreak of Asian influenza showed increased incidence of congenital malformation (anencephaly) when the infection occurred in the first trimester.
- **Influenza (inactivated) vaccine is safe in pregnancy and also with breastfeeding.**
- **Diagnosis:** Rapid influenza diagnostic tests (RIDTs) are immunoassays, used for detection of viral RNA by RT-PCR.
- **Management:** Treatment is supportive care.
- During influenza season, all pregnant women should be given the inactivated vaccine (IM).

MEASLES

- The virus (RNA) is not teratogenic.
- However, high fever may lead to miscarriage, IUGR, microcephaly, oligohydramnios, stillbirth or premature delivery.
- Non-immunized women coming in contact with measles may be protected by intramuscular injection of immune serum globulin (5 mL) within 6 days of exposure.
- Mortality is high when complications like pneumonia and encephalitis develop.
- Diagnosis is made by assay of IgM and detection of viral RNA (RT-PCR).
- **Management** is supportive care. Antibiotics are given to prevent secondary bacterial infections.

- Ribavirin may be given for viral pneumonia.
- **Active vaccination (live attenuated) should not be given in pregnancy.**

RUBELLA (GERMAN MEASLES)

1. Rubella is caused by an RNA virus.
2. Transmission is by droplet infection.
3. It is the most severe congenital infection.[Q]
4. Maternal rubella infection is manifested by rash, malaise, fever, lymphadenopathy and polyarthritis
5. If a pregnant woman is infected with rubella, there is a high risk of fetal affection due to transplacental transmission.
6. Fetal transmission of Rubella can occur upto 20 weeks.
7. Congenital Rubella syndrome:

Gestational age	Risk of transmission
1-12 weeks	80–85%
12-16 weeks	50%
16-20 weeks	25%

8. The risk of fetal transmission of rubella is negligible of infection occurs after the second trimester.
9. With late second trimester and third trimester infection, malformations are uncommon, but mental retardation and hearing loss can occur.[Q]
10.

Congenital Rubella Syndrome

- It affects all the organs.
- Most common manifestation is mental retardation. Other manifestations are:
  - Sensorineural deafness
  - Eye effects: Cataract, Glaucoma
  - Congenital heart disease: PDA (Patent Ductus Arteriosus) and pulmonary artery stenosis
  - CNS defects like microcephaly, developmental delay and mental retardation
  - Thrombocytopenia
  - Hepatosplenomegaly

Extended Rubella Syndrome

It is delayed disease comprising of progressive panencephalitis, hearing loss and type 1 diabetes developing in the second or third decade of life in the neonate with rubella.

11. Infants with congenital rubella syndrome may shed the virus for months and remain infective to other infants and adults and, hence, may require isolation.

Perinatal Effects: Miscarriage, intrauterine or neonatal death. Stillbirth and congenital rubella syndrome.

Diagnosis

- **Maternal diagnosis**
  - If there is suspicion of exposure to rubella, both maternal IgG and maternal IgM are done within seven to ten days of exposure. Avidity test is done to know whether infection is of recent ov late onset. Low avidity indicates recent infection & high avidity indicates past infection.
- **Fetal diagnosis:** Test for confirming fetal infection is PCR.
  - Prenatal diagnosis of rubella virus infection using PCR can be done from chorionic villi, fetal blood and amniotic samples.

Management

If a pregnant woman gets primary infection in the first and early second trimester, MTP is the best management.

Prevention

- Vaccines available to prevent rubella—MMR vaccine and Rubella vaccine.
- The rubella vaccine should be offered to all women of childbearing age.

- It can also be given at adolescence.
- Vaccination should not be given to pregnant women and pregnancy is best avoided for one month after the vaccination.

Note: The American Academy of Pediatrics has changed its recommendation from three months to one month now.

- If inadvertently the vaccine was given to a pregnant woman, then no need to terminate pregnancy as congenital rubella syndrome has never been described after vaccination. *... Williams Obs. 23/e, p 1215,Avas 4/e pg60*

CYTOMEGALOVIRUS [CMV]

- It is the commonest cause of fetal and perinatal infection,[Q] but is asymptomatic in 90% of affected newborns.
- Material Infection is usually asymptomatic, the mother is generally unaware of being infected with CMV. A small portion of patients may experience mononucleases like symptoms like malaise, fever, generalized lymphadenopathy and hepatosplenomegaly.
- Routine screening for CMV during pregnancy is not recommended.
  - Being a herpes virus, latent infection and reactivation can occur especially in pregnancy.
  - Fetal infection can occur when mother is affected primarily or if reactivation of infection occurs in pregnancy and so previous infection does not prevent congenital infection. CMV infection 3 months before conception carries a risk of 9% transmission.
  - Neonate infection can occur at the time of delivery or during breastfeeding.
  - Pregnancy does not increase the risk or severity of maternal CMV infection.
  - Primary maternal CMV infection is trasmitted to fetus in 40% cases whereas recurrent or reactivated maternal infection infects fetus in 0.5-1% cases.

Manifestation of congenital CMV infection: CMV is the M/C infective cause of congenital brain abnormalities.

- Stillbirth
- Microcephaly
- Choroidoretinitis
- Deafness
- Hemolytic anemia
- IUGR
- Hepatosplenomegaly
- Icterus
- Mental retardation
- Intracranial calcifications (Distributed around periventricular zone, to be distinguished from toxoplasma in which calcification is scattered throughout the brain)
- Thrombocytopenia with petechiae and purpura
- Pneumonitis

  Note: CMV never leads to heart defects in the fetus.

  Late onset sequelae: Hearing loss, neurological deficit, chorioretinitis, psychomotor retardation or-and learning disabilities.

Note: CMV is the main cause of SNHL during childhood.

Diagnosis

1. Maternal

- Routine screening of all the pregnant women for CMV is not cost-effective.
- Test: Detection of CMV– IgM antibody.
- **Best Test: Avidity test**—Avidity refers to the strength with which an antibody bends to antigen. In recent infection avidity is low and in past or chronic infection avidity is high.
- Women with positive anti CMV IgM antibodies and low avidity are ones how are at increased risk of transmitting infection to fetus.

2. Fetal

- CMV PCR of amniotic fluid is considered **as the gold standard for diagnosis** of fetal infections. Sensitivity of this test is highest when it is performed at least 6 weeks after maternal infection or after 20 weeks gestation.

Management

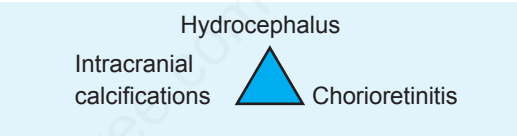
- The management of pregnant women with primary or recurrent CMV is symptomatic treatment.
- Passive to immunization with CMV-specific hyperimmune globulin lowers the risk of congenital CMV infection when given to pregnant women with primary disease.
- Till date there is no vaccine available for CMV.
- If fetus is found to be affected the pregnant female has two options—either she can continue her pregnancy because most of the infected fetuses (90%) develop normally or she can go for MTP.

TOXOPLASMOSIS

- Caused by T. *gondii* which is an obligate intracellular protozoan parasite.
- Cat is the definitive host.[Q]
- Maternal infection is acquired by eating under cooked meat.
- Primary infection causes immunity which is life-long and usually prevents reinfection, i.e. if a female has toxoplasma IgG antibody before pregnancy, there is no risk for a congenitally infected fetus.

Congenital Transmission

- The risk of transmission increases with the period of gestation, i.e. maximum chances of infection are during 3rd trimester.
- Severity of infection decreases with gestational age, i.e. most severe infection occurs when toxoplasma is transmitted in the first trimester.
- In acute maternal toxoplasma infection patients are usually asymptomatic (in 80–90% cases).
- Some patients may present with posterior cervical lymphadenopathy (lymph nodes are nontender, discrete and firm), fever, fatigue, lassitude and maculopapular rash.
- DOC for Toxoplasma during pregnancy is spiramycin (1g every 8 hours).
- Spiramycin reduces the risk of congenital infection during pregnancy.
- If fetal infection is confirmed 3 weeks of spiramycin is alternated with 3 weeks of pyrimethamine sulfonamide combination, and continued till delivery. This is because spiramycin can prevent fetal infection but cannot treat the infection if it is present.
- Triad of congenital toxoplasmosis



- Routine maternal screening for Toxoplasma is not done.
- If maternal infection is confirmed, by serology and avidity testing, to confirm fetal infection following tests are done.
  a. Gold standard: Isolation of toxoplasma in the amniotic fluid by PCR.
  b. Ultrasonography to detect fetal anomalies. If the fetus is infected and hydrocephalus is resent, counseling for termination is to be done.
- Presence of IgM antibody in the neonate indicates congenital infection.
- Treatment with pyrimethamine should be continued in these babies till 1 year of age.

HIV IN PREGNANCY

- **Least Teratogenic Infection: HIV**
- Most common time of vertical transmission:
  - Peripartum period
  - During delivery

- Perinatal transmission—15–40%.
- Risk depends on following factors—maternal viral load, CD4 count (inversely related), vitamin A deficiency and chorioamnionitis.
- Screening adopted for HIV is universal.
- Screening method—Opt out screening (i.e. patient can opt out from the test).
- HIV testing is the first step towards PPTCT (Prevention of parent to child transmission) aimed at reducing the vertical transmission of HIV infection.
- Screening test—ELISA—A positive or indeterminate test should be followed by a Western blot for confirmation.
- Salient points of WHO's latest Nov. 2009 guidelines which were revised from previous (2006) guidelines:
  - All pregnant women should be offered. ART treatment regardless of CD4 + unit or viral load to reduce MTCT. Earlier ART was given when CD4 count < 500
  - For infants of mothers with HIV who are taking therapeutic ART for their own health, the duration of prophylactic ART has been increased irrespective of whether the infant is breastfeeding or not. For breastfeeding infants, it is recommended that daily nevirapine is instituted from birth until 6 weeks of age. For nonbreastfeeding infants, daily AZT or NVP from birth until 6 weeks of age is recommended.
  - It is recommended that antepartum ARV prophylaxis should be started in all women from as early as 14 weeks' gestation (if she is not already on ARV) or as soon as possible when women present late in pregnancy, in labor or at delivery.

HAART Timings

Ref. Williams 23/e, p 1251

Condition	Begin HRT
If a female is already on HAART and becomes pregnant	Continue HAART—even in 1st trimester
If a female is not on HAART and does not require ART for her own health benefit but for MTCT prevention i.e. CD4 > 500	Begin HAART after 1st trimester- (at 14 weeks)
If CD 4 count ≤ 500 – start ART as soon as possible	Treat for HIV but Zidovudine is avoided. Give Interferon alpha to female after delivery and to baby give HBIG and hepatitis B vaccine within 12 hours of birth
If pregnant female is HIV and Hepatitis B positive	

- Ideal ART for pregnant female is:-

Triple Drug Therapy:

One drug from each of the following categories need to be selected:

Nucleoside and Nucleotide reverse transcriptase Inhibitor	Nonnucleoside reverse transcriptase inhibitor	Protease Inhibitor
• Zidovudine • Lamivudine • Tenofovir • Abacavir • Starvidine • Zalcitabine	• Nevirapine • Efavirenz	• Ritonavir • Lopinvair • Indinavir • Saquinavir

- Avoid nevirapine in women with CD 4 count> 250 cell/mm^3
- Start 1/V zidovudine in labor (irrespective of whether the female was on ART or not) if HIV RNA levels >400 copies/ml or unknown near delivery. Dose = 2 mg/ml infused over 1 hour f/b 1 mg/ml/hr until delivery.
- Vit A supplementation is given to all pregnant HIV + ve females.
- If HAART is given throughout pregnancy and zidovudine is given at labor it reduces MTCT (Mother to Child transmission) to 2%.
- Elective cesarean section at 38 weeks should be done if viral load is > 1000 copies/mL.
- After rupture of membranes the advantage of reducing Mother to child transmission by LSCS is lost; hence emphasis is laid on elective cesarean at 38 weeks.
- **Drug supplied by NACO:** Free of cost—NEVIRAPINE (both for mother and baby)

- **If vaginal delivery is being done:** Artificial Rupture of Membranes/Forceps/Vacuum//Fetal Scalp Electrodes are contraindicated.
- First born twin has more risk of infection than second of twin.
- **After delivery:** Breastfeeding is not C/I in developing countries. Decision regarding the type of feed, i.e. breastfeed or replacement feed, should be made during antenatal period itself depending upon whether replacement feed is Acceptable, Feasible, Affordable, Sustainable and Safe (AFASS): As mixed feed is associated with increased rate of HIV transmission as compared to breastfeed alone, it is suggested the weaning must be complete and abrupt after six months of breastfeed or earlier if replacement feed is AFASS.
- DOC for preventing PPH in HIV + ve females: Oxytocin
- Methylergometrine should not be used.

Neonatal Management

- All the babies should be treated with antiretrovirals from birth (Zidovudine syrup 2 mg/kg 4 times a day).
- Accurate diagnosis of infant HIV can only be done by PCR and DNA analysis.
- A negative HIV antibody test at 18 months confirms that the child is not infected.
- Live Oral Polio vaccine and BCG vaccine should not be given.
- Varicella and MMR are recommended for children in immune categories 1 and 2 but neither varicella nor MMR vaccine should be given to severely immunocompromised children.

KEY CONCEPT

Infections in Pregnancy

- Most common—CMV
- Most teratogenic—Rubella
- M/C Time for rubella transmission to fetus—1st trimester (maxmimum—1 to 4 weeks),absent transmission—beyond 20 weeks.
- In Rubella—M/C single defect which occurs is—Sensorineural hearing loss.
- Heart defects seen in Rubella—Patent ductus arteriosus and Pulmonary artery stenosis.
- After rubella vaccine, pregnancy is contraindicated for 1 month.
- CMV—Transmission can occur in any trimester.
- Most severe infection occurs if transmission occurs in 2nd trimester.
- CMV transmission can occur during vaginal delivery and breastfeeding also.
- Primary infection—leads to 40% transmission.
- Recurrent infection—leads to 0.2%-2% transmission.
- **CMV Never Leads to Heart Defects in Fetus.**
- M/C time for toxoplasma infection—3rd trimester
- Fetus is affected maximum/most severely if fetal infection occurs in 1st trimester.
- Triad of toxoplasm infection-intracerebral calcification, chorioretinitis and hydrocephalus.
- Treatment—Spiramycin (prevents fetal transmission but it cannot treat fetal infection if it is present).
- Spiramycin + pyrimethamine and sufonamide combination is given to treat fetal infection and prevent further transmission.

Drug of Choice

Infection	DOC in Pregnancy
Bacterial vaginosis	Metronidazole to patient only 1st trimester—clindamycin
Pneumocystis carinii	Sulphamethozole-trimethoprim
Typhoid	Third gen cephalosporins/azithromycin
Syphilis <1 year >1year	Benzathine penicillin 2.4 million U.i.m. sigle dose Benzathine penicillin 2.4 million U. i.m. weekly x 3 doses
Gonorrhea	Inj. Ceftriaxone 125 mg i.m. single dose or Tab cefixime 400 mg single dose or Inj. Spectinomycin 2 g i.m. single dose
Chlamydia	Azithromycin single dose or Amoxicillin 500 mg TDS × 7 days, 2nd choice—Erythromycin
Group B streptococci	Penicillin, 2nd best—Ampicillin. In patients who are penicillin-resistant—Cefazolin is the
Malaria—Prophylaxis	Chloroquine
Treatment	Chloroquine. For radical cure premaquene is advised after delivery
Appendicitis	In resistant cases (mostly d/t P. falciparum)—Quinine + clindamycin or mefloquine Immediate appendicectomy
Red degeneration	Conservative management (no termination of pregnancy and no myomectomy)

QUESTIONS

TORCH INFECTIONS

1. **Congenital infection in fetus with minimal teratogenic risk is:** **[AI 08]**
   a. HIV b. Rubella
   c. Varicella d. CMV

2. **Most common cause of intrauterine infection:**
   a. Rubella b. Toxoplasma **[AI 03]**
   c. Hepatitis d. Cytomegalovirus

3. **Congenital anomalies are most severe in:** **[AI 99]**
   a. Rubella infection b. Mumps
   c. CMV d. Toxoplasma

4. **Not implicated in congenital transmission is:**
   a. Hepatitis A **[UP 96]**
   b. Toxoplasmosis
   c. Herpes
   d. Syphilis *Ref. Dutta Obs. 7/e, p 289*

5. **Which of the following perinatal infections has the highest risk of fetal infection in the first trimester:**
   a. Hepatitis B virus **[AI 04]**
   b. Syphilis
   c. Toxoplasmosis
   d. Rubella

6. **Highest rate of transmission of toxoplasmosis during pregnancy is seen in:** **[AI 99]**
   a. Ist trimester b. IInd trimester
   c. IIIrd trimester d. Puerperium

7. **A pregnant lady had no complaints but mild cervical lymphadenopathy in first trimester. She was prescribed spiramycin but she was non-compliant. Baby was born with hydrocephalous and intracerebral calcification. Which of these is likely cause?** **[AIIMS May 2010]**
   a. Toxoplasmosis b. CMV
   c. Cryptococcus d. Rubella

8. **Pregnant women in 1st trimester is given spiramycin that she does not stick to. Baby born with hydrocephalus infection was by:** **[AI 09]**
   a. HSV b. Treponema pallidum
   c. Toxoplasma d. CMV

9. **A lady G2P1 with 10 wks pregnancy with one live child has ocular toxoplasmosis. The risk of present baby to get infected is:** **[AIIMS Nov 99]**
   a. 50% b. 25%
   c. 100% d. Nil

10. **During pregnancy baby can be affected in utero in all *except*:** **[AIIMS Nov 99]**
    a. Candida b. Syphilis
    c. Toxoplasmosis d. Polio

11. **Which of the following abnormalities is commonly seen in a fetus with congenital CMV infection:** **[AIIMS June 99]**
    a. Colitis b. Myocarditis
    c. Blood dyscrasias d. Pulmonary cyst

12. **Risk of transmittig LMV to fetus will be maximum in case mother has:** **[New Pattern Question]**
    a. Positive IgM antibodies; Low avidity
    b. Positive IgM antibodies; High avidity
    c. Positive IgG antibodies; Low avidity
    d. Positive IgM antibodies; High avidity

13. **The drug of choice in treatment of typhoid fever in pregnancy is:** **[AIIMS Nov 05]**
    a. Ampicillin b. Chloramphenicol
    c. Ciprofloxacin d. Ceftriaxone

14. **A female presents with leaking and meconum stained liquior at 32 weaks. She is infected with:** **[AI 10]**
    a. CMV b. Listeria
    c. True Toxoplasma d. Herpes

15. **Regarding listerosis in pregnancy:** **[AI 12]**
    a. Mode of transmission of infection is sexual
    b. Is associated with meningoencephalitis of the newborn
    c. May present with skin rash at birth
    d. In labour liquor is meconium stained

CHICKENPOX

16. **A pregnant lady develops chickenpox. During which part of her pregnancy will it lead to highest chance of neonatal infection:** **[AIIMS May 02]**
    a. Last 5 days b. 12-16 weeks
    c. 8-12 weeks d. 16-20 weeks

17. **A pregnant lady acquires chickenpox 3 days prior to delivey. She delivers by normal vaginal route which of the following statements is true?** **[AIIMS Nov 08, AIIMS May 2011]**
    a. Both mother and baby are safe
    b. Give antiviral treatment to mother before delivery
    c. Give antiviral treatment to baby
    d. Baby will develop neonatal varicella syndrome

18. **A 26-year-old woman is 38 weeks pregnant and presents to the labour room in active labour. She had fever for past 2 days. Last night she broke out in any itchy rash that has spread over her arms and torso. She is a teacher by profession and 2 weeks earlier one of the children in her class was diagnosed with chickenpox. She didn't have chickenpox as a child.**
    The patient is worried: Which of the following is the best advice to give her: **[New Pattern Question]**
    a. Nothing needs to be done, chickenpox in children is mild and self limiting.

b. The chance of transmitting the virus of the baby is low and so we treat if symptoms develop.
c. Baby must be treated immediately after birth as chickenpox is serious in newborns
d. Varicella virus is teratogenic and baby might have mild birth defects.

19. A 34-year-old primigravida at 11 weeks gestation presents to her obstetrics clinic with chief complain of exposure to a rash. Her husband is HIV+ve and has broken out on a rash in his left buttock which consists of a grouped vesicles on a maculopapular base, 4 days back. She has got her HIV testing done which is negative. Her P/R is 86/min, B/P = 100/60 mm of Hg, resp rate 10/min and temp = 98.7F.FHS is heard via Doppler. [New Pattern Question]

What is the next step in the management:

a. Administer high dose acyclovir to the infant at birth.
b. Administer high dose acyclovir to the patient now.
c. Administer varicella immunoglobulin to the infant at birth.
d. Administer varicella immunoglobulin to the patient.

GROUP B STREPTOCOCCAL INFECTION

20. A 32-year-old G2P1 woman at 34 weeks' gestation presents to the labor and delivery floor with the chief complaint of regular contractions, bloody show, and a gush of fluids. A 2.3 kg (5 lb 1 oz) boy is delivered by spontaneous vaginal delivery without further complication 1 hour after presentation. Twenty-four hours later, the infant has developed irritability, fever, and respiratory distress. He is diagnosed with sepsis secondary to pneumonia. The mother has no complaints other than anxiety regarding the condition of her child. She denies rigors, chills, sweats, nausea, or vomiting. The mother's pulse is 60/min, blood pressure is 125/80 mm Hg, and temperature is 37°C (98.6°F). Physical examination reveals lungs that are clear to auscultation bilaterally, and no murmurs, rubs, or gallops are present on cardiac examination. The suprapubic region is not tender to palpation. Vaginal and cervical examination reveals no significant tears or bleeds.

Which prenatal test would have provided the most useful information in preventing this condition:

a. Cervical Chlamydia culture **[New Pattern Question]**
b. Cervical gonorrhea culture
c. ELISA for HIV
d. Rectovaginal group B streptococcal culture

HERPES SIMPLEX VIRUS

21. Transmission of herpes is maximum in:

a. IInd trimester **[AIIMS Nov 99]**
b. IIIrd trimester
c. During parturition
d. Ist trimester

22. A 37-year-old G2P1 woman at 38 weeks' gestation presents to the obstetrics clinic for a prenatal visit. The patient had difficulty becoming pregnant but was successful after using in vitro fertilization. She has a history of recurrent herpes outbreaks, and her first pregnancy was complicated by failure to progress, which resulted in a cesarean birth. Routine rectovaginal culture at 36 weeks was positive for Group B streptococci. [New Pattern Question]

Which of the following would be an absolute indication for delivering the child by LSCS:

a. Current symptoms of genital pain and tingling
b. H/o previous cesarean section
c. IVF
d. Maternal colonization with group B streptococci

23. A 25-year-old G1P0 female at 25 wks of gestation comes to you for antenatal check up. She has had an uncomplicated pregnancy but has 5 years history of Genital Herpes infection. She is usually asymptomatic and has had 3 flares in the past 5 years. She is concerned about exposing her unborn child to infection-What is the most appropriate counsel to offer to this patient. [New Pattern Question]

a. Administer one dose of acyclovir if she has active genital herpes at the time of delivery.
b. Administer prophylaxis with acyclovir from now and uptil delivery whether she has active herpes or not.
c. Perform elective LSCS even if mother is asymptomatic at the time of delivery.
d. Perform elective LSCS only if mother has active herpes at the time of delivery.

SYPHILIS

24. Premature baby of 34 weeks was delivered. Baby had bullous lesion on the body. X-ray shows periosistis what is the next investigation:

a. VDRL for mother and baby **[AIIMS]**
b. ELISA for HIV
c. PCR for T.B.
d. Hepatitis surface antigen for mother

25. DOC for syphilis in pregnancy: [AIPG 2012]

a. Erythromycin b. Azithromycin
c. Penicillin
d. Cephalosporin/ceftriaxone

HIV IN PREGNANCY

26. During pregnancy HIV transmission occurs mostly during: [AIIMS Nov 06]

a. Ist trimester b. 2nd trimester
c. 3rd trimester d. During labour

27. Most common cause of HIV infection in infant is:

a. Perinatal transmission **[PGI June 97]**
b. Breast milk
c. Transplacement
d. Umbilical cord sepsis

28. Risk of vertical transmission of HIV without intervention and without breastfeeding is: **[AIIMS Nov 2013]**

a. 15 to 30% b. 5 to 10%
c. 10 to 15% d. 2 to 5%

29. A 19-year-old G2P1 woman at 9 weeks' gestation presents to the obstetrics and gynaecology clinic for her second prenatal visit. She reports no complaints other than occasional nausea. She had her first child by spontaneous vaginal delivery without complications. She is taking no medications and denies ethanol, tobacco, or current drug use. While she does admit to a history of intravenous drug abuse, she denies using them since the birth of her first child. Over the past several months she has had multiple sexual partners and does not use contraception. On physical examination she is in no acute distress. Lungs are clear to auscultation bilaterally. Her heart has a regular rate and rhythm, with no murmurs, rubs, or gallops. She is informed that she will need the routine prenatal tests, including an HIV test. The physician informs her of the risks and benefits of the HIV test: **[New Pattern Question]**

What else should the physician inform the patient before performing the test:

a. Despite the potential for fetal infection, she may opt out from the test
b. Early retroviral therapy will absolutely decrease the chances of transmitting infection to the baby.
c. CDC recommends screening only for patients with high risk factors
d. Risk of the test includes potential for fetal loss.

30. Which drug is given to prevent HIV transmission from mother to child: **[AIIMS Nov 06, Nov 2011]**

a. Nevirapine b. Lamivudine
c. Stavudine d. Abacavir

31. Drugs Supplied by NACO for prevention of mother to child transmission: **[PGI Dec 08]**

a. Nevirapine
b. Zidovudine
c. Nevirapine + Zidovudine
d. Nevirapine + Zidovudine + 3tc

32. For an HIV +ve pregnant woman true is:

a. CS elective will decrease transmission to baby
b. If she hasn't received prophylaxis, leave her alone for vaginal delivery
c. Vaginal delivery will decrease risk for baby
d. Start ART and continue throughout pregnancy ART is safe for gestation
e. Baby doesn't need drugs **[PGI Dec 09]**

33. Transmission of HIV from mother to child is prevented by all the following except: **[AIIMS Nov 08, May 2013]**

a. Oral zidovudine to mother at 3rd trimester along with oral zidovudine to infant for 6 weeks
b. Vitamin A prophylaxis to mother
c. Vaginal delivery
d. Stopping breastfeed

34. HIV positive primi near term, advice given is: **[PGI Dec 08]**

a. Treatment should be started before labour
b. Avoid mixing of blood intrapartam
c. Vaginal delivery preferred
d. Ceserean section would be decrease transmission of HIV to baby

35. All can be used to lower mother to child HIV spread except: **[AI 10]**

a. Elective CS
b. Omitting ergometrine
c. ART
d. Intrapartum nevirapine.

36. Regarding transmission of HIV to infant from infected HIV mother, which statement is/are true:

a. Start zidovudine during labour. **[PGI May 2010]**
b. 25% chance of vertical transmission
c. Avoid breastfeeding
d. Vaccinate infant with OPV and MMR
e. Cesarean section cause less transmission

37. Infections transmitted to the baby at delivery:

a. Toxoplasmosis **[New Pattern Question]**
b. Gonococcus
c. Herpes simplex type II
d. Hepatitis-B

38. Large placenta is seen in all of the following except: **[New Pattern Question]**

a. IUGR b. Syphilis
c. CMV d. Rubella

39. Cesarean section is preferred in: **[New Pattern Question]**

a. Toxoplasmosis b. Herpes
c. CMV d. Varicella zoster virus

40. DOC for intermittent preventive therapy during pregnancy in malaria is: **[New Pattern Question]**

a. Proguanil
b. Pyrimethamine-dapsone
c. Sulfadoxine-pyrimethamine
d. Quinine

41. DOC for pregnant females travelling to areas endemic to chloroquine resistance P-falciparum **[New Pattern Question]**

a. Primaquine b. Doxycycline
c. Amodiaquine d. Mefloquine

42. Which of the following is a known effect of dengue to fetuses, if mother is affected:

a. Abortion **[New Pattern Question]**
b. Teratogenicity
c. IUGR
d. None of the above

43. DOC for symptomatic amoebiasis during pregnancy:

a. No treatment **[New Pattern Question]**
b. Metronidazole
c. Diloxanide furoate
d. Diiodohydroxyquin

EXPLANATIONS & REFERENCES

1. Ans. is a i.e. HIV *Ref. Dutta Obs. 7/e, p 300*

Teratogenic effects have not been documented with HIV ifnection

Rubella, varicella and CMV infections have all been linked to a variety of congenital malformation in the fetus

Effects of maternal HIV infection in pregnancy	
On mother	**On fetus**
The course of HIV in mother remains unaltered as a result of pregnancy Maternal mortality or morbidity are not increased by HIV Main problems a/w HIV infection during pregnancy are related to preterm birth and IUGR.	No teratogenic effects have been reported. Preterm labor, IUGR

No Teratogenic effect
• HIV
• Measures
• Influenza
• Mumps

Infections causing congenital malformation (teratogenic effect)	
• Rubella	• CMV
• Varicella	• Parvovirus
• Toxoplasmosis	
• Mumps	

2. Ans. is d i.e. Cytomegalovirus *Ref. Williams Obs. 23/e, p 1216, 1217; Harrison 17/e, p 48*

Most common causes of intrauterine infection is cytomegalovirus.

3. Ans. is a i.e. Rubella Infection *Ref. Williams Obs. 23/e, p 1214*

"Rubella is one of the most teratogenic agents known." *... Williams Obs. 23/e, p 1214*

Rubella causes a number of serious defects in fetus. These defects may occur singly or in combination called as *Congenital rubella syndrome.*

4. Ans. is a Hepatitis A *Ref. Dutta Obs. 7/e, p 289*

Hepatitis A is transmitted by feco-oral route. vertical transmission is not seen.

5. Ans. is d i.e. Rubella *Read below*

Remember:

	Transplacental			
Infection	***1st Trimester***	***2nd Trimester***	***3rd Trimester***	***During vaginal delivery***
Toxoplasma	10-15% (severe)	20-25% (< 5% severe)	60-70% (mild/ asymptomatic)	–
Rubella	60% Maxm	12 to 19 weeks < 5% and > 20 weeks— absent		–
CMV	30-40% (10% symptomatic, Severe in 1st and early 2nd trimester)			Rare
HSV	Rare			40-60%
Hepatitis	10%			90%

6. Ans. is c i.e. IIIrd Trimester *Ref. Fernando Arias 3/e, p 161; Williams Obs. 23/e, p 1226*

"The incidence and severity of congenital infection depend on fetal age at the time of maternal infection.The risks for fetal infection increases with duration of pregnancy from 6 % at 13 weeks to 72 % at 36 weeks. Conversely the severity of fetal infection is much greater in early pregnancy and fetuses are much more likely to develop clinical findings of infection."

—Williams Obs. 24/e, p 1255

7. Ans. is a i.e. Toxoplasmosis

8. Ans. is c i.e. Toxoplasma

Williams Obs. 23/e, p 1226, Management of high risk pregnancy, Manju puri, SS trivedi p 462

In the question- patient had mild cervical lymphadenopathy for which she was prescribed spiramycin. But the patient was noncompliant and the baby was born with hydrocephalous and intracranial calcification, which are manifestations of congenital toxoplasmosis.

9. Ans. is d i.e. Nil *Ref. Harrison 17/e, p 1306*

The woman who has already given birth to a child with congenital toxoplasmosis, now has no risk of transmitting it to the present baby because *"women who are seropositive before pregnancy usually are protected against acute infection and do not give birth to congenitally infected neonates".*

Remember:

Timing of Maternal infection	Risk of Transmission
• In previous pregnancy	• No risk in future pregnancy
• > 6 months before conception	• No risk in pregnancy
• < 6 months before conception	• Risk increases as the interval between infection and conception decreases
• In first trimester	• Risk is less (15%), but disease is severe
• Third trimester	• Risk is maximum (60%), but disease is mild

10. Ans. is d i.e. Polio *Ref. Nelson 16/e, p 933*

- In case of polio only feco-oral transmission is known, no placental transmission has been reported yet
- All other disease mentioned may be transmitted to fetus by mother
- I am in doubt about candida, because although congenital candidiasis can occur, the mode of transmission is not transplacental but ascending infection from external genitals of mother or during parturition.
- But as far as the answer is concerned it is undoubtedly "POLIO".

Also Know: We all know the Acronym TORCH for infection affecting the fetus or newborn. With certain additions, so that all infections can be included, it can be changed to: *—Shiela Balakrishnan, p 347*

***Mnemonic:* CHAMP'S TORCH**

C – Chickenpox
H – Hepatitis
A – AIDS
M – Malaria
P – Parvovirus
S – Syphilis
T – Toxoplasmosis
O – Others
R – Rubella (most severe)
C – Cytomegalovirus (most common)
H – Herpes virus

11. Ans. is c i.e. Blood dyscrasias *Ref. Dutta Obs. 7/e, p 300; Williams Obs. 23/e, p 1218*

- **Manifestation of congenital CMV infection:**
  - Still birth
  - Microcephaly
  - Choroidoretinitis
  - Deafness
  - Hemolytic anemia (Blood dyscrasias simply stands for any hematological disorder)
  - Pneumonitis
  - Thrombocytopenia with petechiae and purpura
  - IUGR
  - Hepatosplenomegaly
  - Icterus
  - Mental retardation
  - Have intracranial calcifications

  Note: CMV never leads to heart defects in the fetus.

12. Ans. is a i.e Positive IgM antibodies; Low avidity *Ref. Fernando Arias 4/e, p 54*

- If IgM antibodies are present:- It means recent infection.
- Presence of IgG antibodies indicates chronic infection.
- Avidity refers to the ability of the antibody to bend to antigen. As time increases, avidity increases.

Hence:

- Low avidity indicates—Recent infection
- High avidity indicates—Past infection.

So fetal transmission is maximum when IgM antibodies are positive and avidity is low.

13. Ans. is d i.e. Ceftriaxone *Ref. Harrison 17/e, p 958, 959*

Antibiotic therapy for Typhoid fever in Nonpregnant patients

Emperical:

- Ciprofloxacin
- Ceftriaxone/cefotaxime/cefixime

Alternative Drugs:

- Amoxicillin (second line)
- Azithromycin (in MDR patients)

Quinolones are contraindicated in pregnancy, therefore Ceftriaxone is the drug of choice for Typhoid in pregnancy.

14. Ans. is b i.e. Listeria *Ref: Williams Obs. 23/e, p 1224*

"Discolored brownish or meconium stained amniotic fluid is common with fetal infection, even with preterm gestation"

Hence, the correct answer is Listeria, rest of the infections do not lead to preterm labour with meconium stained liquor.

Listeriosis

- Causative organism- listeria monocytogenes (facultative intracellular gram positive bacillus)
- Mode of infection- Food-borne infection caused by eating food like raw vegetables, Coleslaw, Apple cider, Melons, Milk, Fresh mexican style cheese, Smoked fish, Processed foods.
- **Clinical features**
  - Can be asymptomatic
  - Can cause febrile illness.
- Maternal complications which can occur due to listeria infection are:
  - Preterm labor,
  - Chorioamnionitis,
  - Menonium stained liquor,
  - Abortions,
  - Placental Macroabscesses
- Maternal infection can lead to fetal infection characterised by:
  - Disseminated granulomatous lesions with microabscess in skin
  - Stillbirth
  - Overall perinatal mortality-50%.
- **Management**
  - Drug of choice is combination of Ampicillin + gentamicin or in case of pencillin allergy – Trimethoprim sulfamethoxazole
  - Maternal treatment may be effective for fetal infection
  - There is no vaccine for listeriosis.

15. Ans. is a i.e. mode of transmission of infection is sexual *Ref. Williams 23/e, p 1224, 1225*

For explanation see previous answer.

16. Ans. is a i.e. Last 5 days

17. Ans. is d i.e. Baby will develop neonatal varicella syndrome

Ref. Fernando Arias 3/e, p 156; Williams Obs. 23/e, p 1211, 1212, CMDT 07, p 799, 800

***Varicella infection in pregnancy*:**

- If varicella infection occurs in a pregnant female during first half of pregnancy (M/C time of transmission-13 to 20 weeks) it results in congenital varicella syndrome in the fetus.
- **Congenital varicella syndrome in** characterized by chorioretinitis, microophthalmia, cerebral cortical atrophy, IUGR, hydronephrosis and skin or bone defects.
- Congenital varicella syndrome is an indication for doing MTP.
- Congenital defects rarely occurs if varicella infection occurs after 20 weeks.
- The terminology varicella embryopathy is not used these days.
- **Neonatal varicella iin** characterized by pneumonitis, hepatitis and DIC.
- The severity of neonatal infection is inversely related to the concentration of maternal antibodies present in the newborn circulation. Mother starts producing and transferring antibodies approximately 5 days after the onset of her disease.Thus, babies born 5 days or more from the beginning of maternal disease will be protected.

—Fernando Arias 3/e, p 156

- **Perinatal varicella** exposure just before or during delivery poses a serious threat to newborns and so Varicella Ig should be given to all neonates of born to mothers who have clinical evidence of varicella 5 days before and upto 2 days after delivery.
- The use of VZIG decreases the chances of neonatal varicella and also modify the clinical course but it does not always prevent severe or fatal varicella. Expectant treatment with close observation, followed by prompt initiation of antiviral therapy on suspicion of neonatal varicella is recommended.
- Antiviral treatment (acyclovir) is given to neonates only if they develop neonatal varicella syndrome.
- Vaccine is not secreted in breast milk, so postpartum vaccination should not be delayed because of breast feeding.

18. Ans. is c i.e Baby must be treated immediately after birth as chickenpox is serious in newborns.

In the question patient is 38 weeks pregnant, is in labour and has chickenpox for past 2 days. As discussed in previous question, chances of transmitting infection to fetus are maximum just before or after delivery.

Thus, option 'c' is correct and options 'a' and 'b' are incorrect.

Perinatal varicella exposure just before or during delivery poses a serious threat to newborns and so Varicella Immunoglobulin (VZIG) should be given to neonates of born to mothers who have clinical evidence of varicella 5 days before and upto 2 days after delivery.

Coming to option 'd' – Birth defects are seen with varicella, only if it occurs before 20 weeks of pregnancy. This female has acquired the infection at 38 weeks, hence no chances of birth defect in the fetus.

19. Ans. is d i.e administer varicella immunoglobulin to the patient.

- DOC for treatment of pregnant mothers infected with chickenpox is i/v acyclovir
- In Q 19 – The pregnant woman is exposed to chickenpox rash, she does not have chickenpox…so obviously we will not treat her or her baby with acyclovir. Now since the female herself does not have chickenpox so why to give VZIG to the infant, rather this female should be given prophylactic VZIG so that she does not acquire chickenpox.

Varicella prophylaxis: Exposed pregnant women who are susceptible should be given Varicella IG within 96 hrs of exposure to prevent or attenuate varicella infection.

20. Ans. is d i.e rectovaginal group B streptococcal culture

Neonatal sepsis

- Group B streptococci, Streptococcus agalactiae is a major cause of neonatal mortality and morbidity.
- Neonates present with respiratory distress, apnea, hypotension i.e. the neonate in the question is having neonatal sepsis due to Group B Streptococci.
- ACOG recommends universal culture screening for rectovaginal Group B streptococi at 35–37 weeks in all pregnant females.
- Samples are taken from lower third of vagina and rectum as colonization of the birth canal occurs secondary to colonization of anorectal region.

In the question – patient had delivered at 34 weeks and so her screening for group B streptococci by rectovaginal culture was not done. In all such cases where patient presents with preterm labour or term labour with unknown GBS status, a shot of pencillin should be given prophylactically to protect them against GBS infection.

Prophylaxis Against GBS

Intrapartum prophylaxis is indicated	Intrapartum prophylaxis not indicated
• **Previous infant with invasive GBS disease**	• Previous pregnancy with positive GBS screening
• **GBS bacteriuria during present pregnancy**	• Planned cesarean delivery performed in absence of labor or membrane rupture (regardless of maternal GBS culture status)
• Positive GBS screening culture during present pregnancy unless LSCS is planned • Unknown GBS status with any of the following – Delivery at <37 weeks – Amniotic member rupture >18 hrs – Intrapartum temp >100.4F	• Negative GBS vaginal and rectal screening culture

Drugs Used in GBS Prophylaxis

Best drug	Penicillin
Second best drug	Ampicillin
Penicillin allergic patients	At low risk for anaphylaxis-cefazolin At high risk-idamycin/erythromycin/vancomycin

Note: Mode of delivery – In pregnant patients with GBS infection
- If treatment is given – vaginal delivery
- If treatment has not been given – cesarean section

21. Ans. is c i.e. During parturition *Ref. Dutta Obs. 7/e, p 301*

- In case of herpes infection transplacental infection is not common, instead the fetus becomes affected by virus shed from the cervix or lower genital tract during vaginal delivery.
- Baby may sometimes be affected in utero from contaminated liquor following rupture of membranes.

Remember: ***(Very Important)***

• Maximum risk of transmission in first trimester	Rubella
• Maximum risk if infection occurs before 20 weeks	Varicella zoster
• Maximum risk if infection occurs after 18 – 20 weeks	Syphilis
• Rate of transmission increases as pregnancy advances (i.e. maximum risk in third trimester)	Toxoplasmosis and Hepatitis
• No relation to gestational age	CMV
• Least risk of transmission during delivery	Toxoplasmosis
• Maximum risk of transmission during delivery	HIV and Herpes
• Cesarean section is indicated in	Active Herpes infection and HIV
• Most common congenital infection	CMV
• Most severe congenital infection	Rubella
• Congenital infection with minimal teratogenic risk	HIV

22. Ans. is a i.e Current symptoms of genital pain and tingling

23. Ans. is d i.e perform elective LSCS only if mother has active herpes at the time of delivery.

Herpes Simplex Virus infection in pregnancy:
- Most common time of Mother To Child transmission is–at the time of delivery
- About 50% women with HSV is first trimister abort while infection in second half can lead to IUGR, preterm labor.
- ACOG does not recommend a routine screening for HSV

Contd…

Contd…

- Viral isolation is the defective means of diagnosis for HSV infection
- Specimens are obtained from any active lesions as well as from cervix and vagina
- PCR can also be done
- DOC during pregnancy-Acyclovir (safe in lactation also) × 7–10 days
- ACOG recommends daily viral therapy at or beyond 36 weeks for women who have recurrences during pregnancy as it decreases the outbreaks at term and so decreased need for cesarean

Cesarean section is indicated for women with active genital lesions or in patients having prodromal symptoms of herpes viz genital pain and tingling (ans 22). Cesarean is not indicated in women with a h/o HSV infection but no active genital tract lesion/prodromal symptoms at the time of delivery.

- If no active breast lesions are present–patient can breastfeed.
- Now with this background about HSV infection, lets have a look at the options given in Q 23.
- Option a: administer one dose of acyclovir if she has active genital herpes at the time of delivery-incorrect as acyclovir should be given for 7–10 days in case of active herpes infection.
- Option b: administer prophylaxis with acyclovir from now and uptil delivery whether she has active herpes or not–again incorrect as we have to give acyclovir for 7–10 days, then stop and restart at 36 weeks of gestation.
- Option c: perform elective LSCS even if mother is asymptomatic at the time of delivery. – again Incorrect
- Option d: perform elective LSCS only if mother has active herpes at the time of delivery. – correct

24. Ans. is a. i.e. VDRL for mother and baby

25. Ans. is c. i.e Penicillin *Ref. Williams 23/e, p 1238*

Syphilis in Pregnancy

Congenital syphilis:

- Transmission of T pallidum across the placenta from a syphilitic woman to her fetus may occur at any gestational age.
- Untreated infection leads to fetal loss in 40% cases, IUD, stillbirth and abortions. (stillbirths being more common than abortions)

Early Congenital Syphilis	Late Congenital Syphilis	Residual Stigmata
• Appears within first 2 years of life, M/C time is 2-10 weeks age	• Appears after 2 years of life. • Subclinical in most of the cases.	• Hutchinsons teeth (Centrally notched widely spaced peg shaped upper central incisor
• Earliest manifestation-rhinitis/ snuffles	• Features- interstitial keratitis • Eighth nerve deafness	• Mulberry molars
• M/C-bone changes- osteochondritis	• Recurrent arthropathy	
• Periostitis	• B/L knee effusion k/a Cluttons joint	
• Mucocutaneous leison	• Asymptomatic neurosyphilis	
• Hepatosplenomegaly	• Gummatous periostitis	
• Lymphadenopathy		

Diagnosis of congenital syphilis innonates:

- Presence of antetrioponemal IgM antibodies in neonates is diagnostic of congenital syphilis (IgG antibodies are not specific for neonatal infection and may be the result of transplacental transmission from a mother who has been adequately treated).
- VDRL and RPR test are used for rapid screening. A VDRL titre in neonates 4 times greater than the maternal titre is consistent with congenital syphillis.

In asymptomatic infants:

- If mother has been treated with penicillin in 1st/2nd trimester- No treatment for infant
- If mother has not been treated/received treatment with penicillin in third trimester – Treat infant with penicillin

Contd…

Contd…

SYPHILIS TREATMENT during pregnancy *Ref. Williams 23/e, p 1238*

- Syphilis therapy during pregnancy is given to eradicate maternal infection and to prevent congenital syphilis.
- Parenteral penicillin G remains the preferred treatment for all stages of syphilis during pregnancy. (Ans 25)
- There are no proven alternative therapies for syphilis during pregnancy Erythromycin may be curative for mother, but because of limited transplacental passage, it does not prevent all congenital disease.

Women with H/O penicillin allergy, first penicillin desensitization should be done and then followed by penicillin injection.

In Question 24-

- Bullous leisons on the body of the infant and presence of periostitis suggests the diagnosis of congenital syphilis. The only option related to syphilis is VDRL. Therefore it is the answer.

26. Ans. is d i.e. during labour

27. Ans. is a Perinatal transmission *Ref. COGDT 10/e, p 692, 693; Dutta Obs. 7/e, p 301, 302; Harrison 17/e, p 1145; Williams Obs. 23/e, p 1248 onwards, Dutta Obs. 7/e, p 301-302*

Maternal transmission of HIV to child i.e. vertical transmission can occur –

- Antepartum (Transplacental)
- Peripartum (exposure to maternal blood and body fluids at delivery)—Maximum risk period
- Postpartum (breastfeeding).

Maximum risk of transmission is in peripartum period followed by labour

"In the absence of any intervention, an estimated 15–30% of mothers with HIV infection will transmit the infection during pregnancy and delivery, and 10–20% will transmit the infection, through breastfeeding. Vertical transmission of HIV-1 occurs mostly during, the intrapartum period (50–70%)." *—COGDT 10/e, p 692*

Note: If the choice is between intrapartum and peripartum period–better option is peripartum as the risk of transmission due to breastfeeding is also included in peripartum period. *—Park 19/e, p 289, 290*

- Vertical transmission rate to neonates is ≈ 14 %-25%

Factors increasing vertical transmission:

- ***Disease factors***
  - Maternal viral load i.e. maternal plasma HIV RNA burden (most important risk factor)
  - Seroconversion in pregnancy or early disease
  - Advanced maternal disease
  - Low CD4 count (i.e. risk of vertical transmission is inversely related to maternal immune status)
  - Vitamin A deficiency
  - Chorioamnionitis
- ***Obstetric factors***
  - Vaginal delivery
  - Prolonged rupture of membranes (> 4 hrs)
  - Preterm delivery
  - Chorioamnionitis
  - Coexistent STD (specially HSV) and syphilitic
  - Low birth weight infection of placenta
  - Antepartum invasive procedures (amniocentesis, CVS etc.)
  - Intrapartum invasive procedures (instrumental delivery, episiotomy, scalp electrodes etc.)

28. Ans. is a i.e. 15 to 30% *Ref. Selected Topics in Obstetrics and Gynaecology-4: For Postgraduate by Daftary & Desai p29*

Timing	Transmission rate
During pregnancy	5 to 10%
During labour and delivery	10 to 15%
During breastfeeding	5 to 20%
Overall without breastfeeding	15 to 25%
Overall with breastfeeding upto 6 months	20 to 35%
Overall with breastfeeding to 18 to 24 months	30 to 45%

29. Ans. is a i.e. Despite the potential for fetal infection, she may opt out from the test. *Ref. Williams Obs. 23/e p 1248*

- The CDC and ACOG (2008) has recommended prenatal screening for HIV using an "optout approach" this means that the woman is notified that HIV testing is included in a comprehensive set of antenatal tests, but that testing may be declined.
- Women are given information regarding HIV but are not required to sign a specific consent.
- Screening is performed using an ELISA test which has a sensitivity of > 99.5%
- A positive test is confirmed with either a western blot or immunofluorence assay (IIFA) both of which have high specificity.
- According to CDC, antibody can be detected in most patients within 1 month of infection and thus antibody serotesting may not exclude early infection.

30. Ans. is a i.e. Nevirapine *Ref. Dutta Obs. 7/e, p 301, 302, Current concept in contraception and women health. p 186, 188; Shiela balakrishnan/text book of Obs p 360; Williams Obs. 23/e, p 1252; Harrison 17/e, p 1145*

- Traditionally the therapy being given to prevent fetomaternal transmission of HIV has been zidovudine.
- But the cost of the therapy makes it out of reach of many patients in the developing countries.
- One important study in Uganda demonstrated that a single dose of nevirapine given to the mother at the onset of labour followed by a single dose to the new born within 72 hours of birth decreased transmission by 50% compared with a regimen of zidovudine to the mother.

The cost of this regimen is much cheaper than that of zidovudine and thus is being used increasingly in developing countries for prevention of mother to child transmission.

According to *Harrison 17/e, p 1145* -

Zidovudine treatment of HIV infected pregnant women from the begining of 2nd trimester through delivery and of infant for 6 weeks following birth dramatically decreased the rate of intrapartum and perinatal transmission of HIV infection from 22.6% in the untreated group to 5%.

It further says - *"Short course prophylactic anti retroviral (ARV) regimens, such as single dose of nevirapine given to the mother at the onset of labour and a single dose of nevirapine to the infant within 72 hrs of birth are of particular relevance to low- to mid income nations because of the low cost and the fact that in these regions perinatal care is often not available and pregnant women are often seen by a health care provider for the first time at or near the time of delivery."*

Note:

- These days when a pregnant female presents with HIV in pregnancy-HAART , i.e combination of three or four drugs from atleast two different classes, is given to all pregnant female with HIV, irrespective of CD4 count or viral load
- If a woman on HAART gets pregnant, her HAART is continued during pregnancy
- HAART reduces the chances of vertical transmission by less than 2%
- Zidovudine is given IV during labor and delivery to woman with HIV RNA viral load more than 400 copies per mL or who have unknown viral load near delivery

31. Ans. is a i.e. nevirapine *Ref. Parks PSM 20/e, p 373*

NACO is National AIDS Control Organization which was launched in India in the year 1987.The Ministry of Health and Family Welfare had setup NACO as a separate wing to implement and closely monitor the various components of the National Aids Control Programme.

NACO has established many integrated counselling and testing centres (ICTCs),where pregnant women are provided counselling and testing facilities.

"Women who are found to be HIV positive are given single dose of prophylactic Nevirapine at the time of labour and new born infant is also given a single dose of Nevirapine within 72 hrs of birth". *—Park 20/e, p 373*

32. Ans is a and d i.e. CS elective will ↓ transmission to baby and Start ART and continue throughout pregnancy as it is safe for gestation

33. Ans. is c i.e. vaginal delivery

34. Ans. is a, b and d i:e Treatment should be started before labour; Avoid mixing of blood intrapartum and Cesarean section would be decrease transmission of HIV

35. Ans. is b i.e. omitting ergometrine

Ref. Harrison 17/e, p 1145; Dutta Obs. 7/e, p 302, 303; Williams 22/e, p 1316, 23/e, p 1252, 1253

For prevention of mother to child transmisstion the following steps are advocated intrapartum.

1. Nevirapine/zidovudine during labor (most recommended)
2. If viral copies is >1000/ml then elective cesarean should be done otherwise vaginal delivery can be attempted.
3. Women with HIV infection should be scheduled for induction of labour or cesarean delivery at 38 weeks of gestation. The reason for this timing of delivery is to avoid rupture of membranes before labour.

Contd…

Contd…

4. Avoid breastfeeding.
5. If vaginal delivery is being done ARM during labour is avoided.
6. The newborn of HIV infected mother is treated with oral zidovudine, 2mg/kg every 6 hrs for the first 6 weeks of life.
7. There is no role of vitamin A supplementation in preventing transmission-but it is seen that vitamin A deficiency has been noted in pregnant females with HIV, so vitamin A supplementation is done.

36. Ans. is a, b, c and e i.e. Start zidovudine during labour, 25% chance of vertical transmission, Avoid breastfeeding, caesarean section cause less transmission. *Ref: Dutta Obs. 7/e, p 301, Nelson 18/e, p 1430, 1431, 1441, Harrison 17/e, p 1146, Williams Obs. 23/e, p 1252, 1253*

According to the latest edition of Williams Obs 23/e, p 1252

An HIV infected woman on no antiretroviral medication who presents in labour Management includes: Start zidovudine i/v

OR

Start zidovudine plus a single dose of nevirapine. If nevirapine is initiated, consider adding lamivudine for 7 days post partum to decrease nevirapine resistance. *—Williams Obs 23/e, p 1251, Table 59-8, p 1252*

So option a is correct

- Elective cesarean is the best mode of delivery as chances of transmission of HIV are less (i.e. option e is correct)
- Breastfeeding should be avoided except in those cases where mother cannot afford formula feeds. (option c is correct).
- Vertical transmission to the neonates is **a**bout 14-25%[Q]. (i.e. option b is correct) Transmission of HIV–2 is less frequent (1-4%) than for HIV-1 (15-40%)

Vaccination of HIV Infected Infant (Nelson)

- Live oral polio vaccine (OPV) and BCG vaccine should not be given (i.e. option d is incorrect).
- Varicella and MMR are recommended for children in immune categories. 1 and 2, but neither varicella nor MMR vaccines should be given to severely immunocompromised children (immune category 3).

37. Ans. is a i.e. Toxoplasmosis *Ref. Fernando Arias 2/e, p 375, Dutta Obs. 7/e, p 297*

Option 'a' **Toxoplasma –** Congenital transmission.

"Most fetal transmission appears to be transplacental and usually occurs before labour as evidenced by cord antibody titre." *—Fernando Arias 2/e, p 375*

Option 'b' **Gonococcus**

"The baby may be affected during labour while passing through the birth canal, resulting in ophthalmia neonatorum." *—Dutta Obs. 7/e, p 294*

Option 'c' **HSV II**

"The fetus become affected by virus shed from the cervix or lower genital tract during vaginal delivery". *—Dutta Obs. 7/e, p 300*

So, cesarean delivery is indicated in primary active genital HSV infection where the membranes are intact or recently ruptured.

Option 'd' **Hepatitis B**

"Neonatal transmission mainly occurs at or around the time of the birth through mixing of maternal blood and genital secretion." *—Dutta Obs. 7/e, p 292*

38. Ans. is a i.e. IUGR *Ref. Dutta Obs. 7/e, p 497; Williams Obs 23/e, p 627; Fernando Arias 3/e, p 95-96 for causes of NIHF*

Large placenta is seen in case of Hydrops fetalis:

Hydrops fetalis

- There are two varieties: of hydrops

Immune hydrops	Nonimmune hydrops fetalis (NIHF)
• It is due to Rh isoimmunisation	• It is due to conditions other than Rh isoimmunisation
• It accounts for 1/3rd cases of hydrops fetalis	• It accounts for 2/3 cases of hydrops fetalis

Nonimmune hydrops:

- It can be caused by a number of conditions (Discussed in detail in chapter 18).

Infections causing NIHF:

- Of all the PRATSCHEC agents (parvovirus, rubella, AIDS, toxoplasma, syphilis, cytomegalovirus, herpes, echovirus, and coxsackievirus), only AIDS has not been reported in association with Non-Immune Hydrops Fetalis. Parvovirus B-19 is the most common viral infection associated with NIFH.

Note: In IUGR: Placenta is small and not big.

39. Ans. is b i.e. Herpes *Ref. Dutta Obs. 7/e, p 301*

Genital hepes is due to HSV 2

Effects of herpes on pregnancy:

- If there is primary infection in last trimester there are chances of premature labor or IUGR.
- Transplacental infection is not usual.
- The fetus becomes affected by virus shed from the cerivx or lower genital tract during vaginal delivery
- The baby may be infected in utero from the contaminated liquor following rupture of membranes.
- Risk of fetal infection is high in primary genital HSV at term due to high virus shedding compared to a recurrent infection.
- Cesarean delivery is indicated in an active primary genital HSV infection where the membranes are intact or recently ruptured and in females with prodromal symptoms of herpes.
- Drug of choice for genital herpes is acyclovir[Q] (when virus culture is positive).
- Breastfeeding is allowed[Q] provided mother avoids contact between her lesions, her hands and the baby.

Whether there is increased risk of abortion it is still not proved.

40. Ans. is c i.e sulfadoxine – pyrimethamine *Ref. Williams 24/e, pg1257, high risk pregnancy fernando arias 4/e, pg 313*

- **Intermittent Preventive Therapy** is a newer modification of prophyllaxis. In chemo prophyllaxis, the drugs have to be given daily or weekly, wherein in IPT the pregnant females are treated for malaria presumptively at fixed times (either twice or thrice) during pregnancy using drugs with long half life.
- The WHO allows for use of IPT during pregnancy. This consists of at least **two treatment doses of sulfadoxine-pyrimethamine in** second and third trimesters.
- DOC for chemoprophylaxis during pregnancy is chloroquine or hydroxyl chloroquine.

41. Ans is d i.e Mefloquine *Ref. Williams 24/e, pg1257*

Malaria	DOC
• Chloroquine sensitive malasias treatment • Chloroquine resistant P. Falciparum treatment • Intermittent Preventive therapy • Chloroquine sensitive malaria- prophyllaxis • Chloroquin resistant P.falciparum – prophylaxis • Antimalarials contraindicated during pregnancy • Insufficient data for use in pregnancy	• Chloroquine followed by primaquine postpartum for radical cure. • Quinine sulphate + Clindamycin or Mefloquine • Sulfadoxine- pyrimethamine • Chloroquine/hydroxy chloroquine • Mefloquine • Primaquine • Doxycycline Proguanil Amodiaquine

42. Ans is d i.e None of the above *Ref. Fernando arias 4/e, pg313-314*

Dengue fever in pregnancy

Material risks:

a. Associated with high material mortality

b. Deraged liver functions may mimic HELLP syndrome.

Fetal Risks:

- No evidence of teratogenicity, abortion or IUGR following dengue infection during pregnancy
- Vertical transmission is present.
- Newborn presents with fever, hepatomegaly and thrombocytopenia. In grave infection newborn may show coagulopathy.

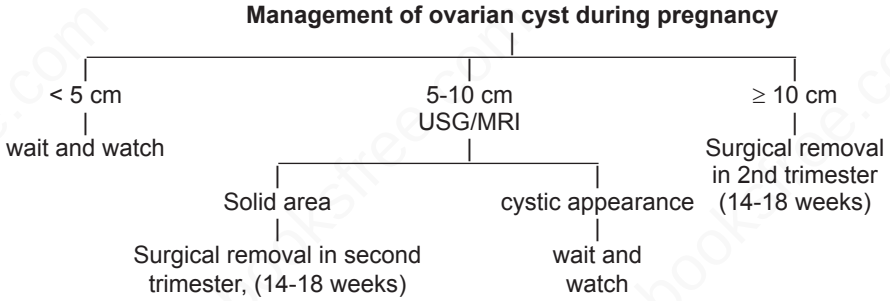
43. Ans is c i.e Dioloxanide furoate *Ref. High risk pregnancy—F. arias 4/e, p 315*

Infections	DOC
• Asymptomatic amebiasis	No treatment
• Symptomatic amebiasis	Diloxanide furoate (500 mg B/D x 10 days)
• Severe infection	Diloxanide + metronidazole.
• Giardiasis	Tinidazole 500 mg BD for 3-5 days.
• Hookworm infection-/ Ascaris	• Avoid any treatment in first trimester • Pyrantel payuvoate /Mebendazole/ Albendazole can be used after 1st trimester

22 Gynaecological Disorders in Pregnancy

OVARIAN TUMOR IN PREGNANCY

Most common ovarian tumor in pregnancy is benign cystic teratoma (dermoid cyst)[Q]
MIC complication of ovarian tumors in pregnancy is torsion (M/C time of torsion-8-10 weeks or early puerperium)
MIC ovarian tumor to undergo torsion in pregnancy **dermoid cyst**.



- In case of complication — remove the tumor irrespective of gestational age.
- During labour, if it leads to obstruction—do cesarean section and simultaneously remove the tumour.
- During puerperium—Remove the tumor as early as possible.
- M/C malignancies of ovary seen in pregnancy.
- Germ cell tumors > sex cord stromal tumors > low malignant potential tumors > epithelial tumors.

RETROVERTED GRAVID UTERUS

The incidence of retroverted uterus is about 10% during first trimester of pregnancy.

Course

- **In majority, of cases, retroverted gravid uterus rectifies spontaneously**. As the uterus grows, the fundus rises spontaneously from the pelvis beyond 12 weeks. Thereafter, the pregnancy continues uneventfully.
- In minority, spontaneous rectification fails to occur between 12 weeks and 16 weeks. The developing uterus gradually fills up the pelvic cavity and **becomes incarcerated**.
  - **In such cases the cervix is pointed upwards and forwards** the uterus continues to grow at the expense of the anterior wall called **anterior sacculation. There is retention of urine**.

Effects on Pregnancy

- Retroverted gravid uterus can lead to Miscarriage;
- If pregnancy continues with anterior sacculation, there is increased chance of
  (a) Malpresentation
  (b) Nonengagement of the head

(c) Preterm delivery and prematurity, and
(d) Rupture of the uterus during labor.

Treatment

Before incarceration: (1) Periodic checkup upto 12 weeks until the uterus becomes an abdominal organ.
After incarceration: (1) Continuous bladder drainage slowly with a Foley's catheter; (2) To put the patient in bed and advise her to lie on her face or in Sims' position; (3) Urine is sent for culture and sensitivity test and urinary antiseptics—ampicillin 500 mg is given 8 hourly daily. With this treatment, the uterus is expected to be corrected spontaneously within 48 hours.

If spontaneous correction fails:

- **Manual correction is done followed by insertion of a Hodge-Smith pessary (to be kept upto 18-20th week).**
- **In diagnosed cases of anterior sacculation** of the uterus, delivery by cesarean section is the method of choice.

CARCINOMA CERVIX IN PREGNANCY

- Cancer cervix is the M/C malignancy encountered during pregnancy (Incidence of invasive cancer cervix is 1 in 2500 pregnancies).
- Pap smear should be performed on all pregnant women at the first antenatal visit.

- Abnormal cytological result: In case of abnormal pap smear report during pregnancy the following guidelines are followed.

Table 22.1: American Society for Colposcopy and Cervical Pathology (ASCCP) guidelines for initial management of epithelial cell abnormalities in pregnancy

Abnormality	Adults	Adolescents[a]
• ASC-US		Repeat cytology 6 weeks postpartum
– HPV positive	Colposcopy 6 weeks postpartum	
– HPV negative	Repeat cytology 6 weeks postpartum	
– HPV unknown	Repeat cytology 6 weeks postpartum	
LSIL	Colposcopy during pregnancy (preferred) May defer until 6 weeks postpartum	Repeat cytology 6 weeks postpartum
• ASC-H • HSIL • SCCA • AGC • AIS	Colposcopy during pregnancy[b]	

Note:
[a]Adolescents = <21 years.
[b]Endocervical curettage and endometrial sampling are contraindicated in pregnancy. adenoCA = adenocarcinoma; AGC = atypical glandular cells; AIS = adenocarcinoma in situ; ASC-H = atypical squamous cells, cannot exclude high-grade squamous intraepithelial lesion; ASC-US = atypical squamous cells of undetermined significance; HPV = human papillomavirus; HSIL = high-grade squamous intraepithelial lesion; LSIL = low-grade squamous intraepithelial lesion; SCCA = squamous cell carcinoma.
Adapted from wright, 2007a; American college of obstetricians and gynecologists, 2013a.

Remember: Conization/cone biopsy should be avoided during pregnancy. If it is strictly indicated it should be performed between 12 to 20 weeks of gestation.Pap smear should be performed on all pregnant women at the first antenatal visit.

Management of CIN during Pregnancy

- CIN 1, 2, 3 are managed after delivery. Patient is allowed to deliver vaginally.
  Major risk during delivery is haemorrhage. Following vaginal delivery, these women should be reevaluated and treated at 6 weeks postpartum.
- Regression of CIN is common during pregnancy and postpartum.
- Adenocarcinoma in situ (AIS) is also managed like CIN i.e. after 6 weeks postpartum.

Management of Invasive Cervical Cancer during Pregnancy

- 70 % cases of cervical cancer diagnosed during pregnancy belong to stage I.
- **Stage 1A1:** vaginal delivery and then simple extrafascial hysterectomy or therapeutic conization after 6 weeks postpartum. If cesarean is being done it can be followed by hysterectomy directly.
- **Stage 1A2:** vaginal delivery and then Wertheim's hysterectomy and pelvic lymph node dissection after 6 weeks or immediately after cesarean section.
- **Stage 1B, IIA:** If detected in first trimester = immediate Wertheim's hysterectomy on pregnant uterus.
- If detected in late second or third trimester: wait (treatment can be delayed up to 4-6 weeks) for fetal lung maturity and then classical caesarean section followed immediately by Wertheim's hysterectomy.
- **Stage IIB-IV** : If detected in first trimester: Immediate radiotherapy (patient will spontaneously abort before 4000 cGY are delivered

  If detected in late second or third trimester wait for fetal maturity, classical caesarean section and then radiotherapy begun postoperatively.

Mode of Delivery

The mode of delivery in cervical cancer is controversial. Vaginal delivery is not contraindicated but there may be significant haemorrhage and recurrence of cervical cancer in episiotomy scar. Hence, classical cesarean is the preferred route of delivery.

QUESTIONS

1. Ovarian cyst in postpartum patient, treatment is:
a. Immediate removal **[AI 07]**
b. Removal after 2 weeks
c. Removal after 6 weeks
d. Removal after 3 months

2. A female having 6 weeks amenorrhea presents with ovarian cyst. The proper management is:
a. Immediate ovariotomy **[AI 00]**
b. Ovariotomy at IInd trimester
c. Ovariotomy 24 hours after delivery
d. Ovariotomy with cesarean

3. A 20-year-young female presented for antenatal checkup. She was in Ist trimester and was diagnosed to have ovarian cyst. Treatment of choice:
a. Surgical removal in IInd trimester
b. Removal after delivery **[AI 01; AIIMS June 99]**
c. Termination of pregnancy and cyst removal
d. Observation

4. Which of the following ovarian tumour is most prone to undergo torsion during pregnancy?
a. Serous cystadenoma **[AI 06]**
b. Mucinous cystadenoma
c. Dermoid cyst
d. Theca lutein cyst

5. Which of the following tumors is not commonly known to increase size during in pregnancy?
a. Glioma **[AI 06]**
b. Pituitary adenoma
c. Meningioma
d. Neurofibroma

6. A pregnant woman with fibroid uterus develops acute pain in abdomen with low grade fever and mild leucocytosis at 28 weeks. The most likely diagnosis is: [AIIMS Nov 03]
a. Preterm labour
b. Torsion of fibroid
c. Red degeneration of fibroid
d. Infection of fibroid

7. A pregnant woman presents with red degeneration of fibroid; Management is: [AI 01]
a. Myomectomy
b. Conservative
c. Hysterectomy
d. Termination of pregnancy

8. Treatment of red degeneration of fibroid in pregnancy: [PGI 03]
a. Analgesics
b. Laparotomy
c. Termination of pregnancy
d. Removal at cesarean section

9. Which one of the following is the best drug of choice for treatment of bacterial vaginosis during pregnancy: [AIIMS May 04]
a. Clindamycin b. Metronidazole
c. Erythromycin d. Rivamycin

10. D/D of acute abdomen in pregnancy are all except:
a. Cystitis **[PGI Nov 2010]**
b. Threatened abortion
c. Cervical incompetence
d. Appendicitis
e. Ruptured ectopic

11. Following is the emergency management of bleeding vulvar varices during pregnancy: [New Pattern Question]
a. Pressure
b. Cautery
c. Simple vulvectomy
d. Observation only

12. Which of the following is not a complication of fibroid in pregnancy? [New Pattern Question]
a. Preterm labour
b. Postpartum hemorrhage
c. Abortion
d. None of the above

13. Procedure of choice in a woman with 12 weeks pregnancy and atypical pap smear is: [New Pattern Question]
a. Cone biopsy
b. MTP with cone biopsy
c. Hysterectomy
d. Colposcopy

14. Which female genital malignancy is most common in pregnancy? [New Pattern Question]
a. Ovarina cancer
b. Vaginal vulvar cancer
c. Endometrial cancer
d. Cervical cancer

EXPLANATIONS & REFERENCES

1. Ans. is a i.e. Immediate removal *Ref. Dutta Obs. 7/e, p 310, Shiela Balakrishnan 1/e, p 265*

As discussed in the text, ovarian tumour in puerperium should be immediately removed.

2. Ans. is b i.e. Ovariotomy at IInd trimester

3. Ans. is a i.e Surgical removal in IInd trimester *Ref. Dutta Obs. 7/e, p 310,Shiela Balakrishnan 1/e, p 265*

- Patient is presenting in the first trimester with ovarian cyst.
- The principle of treatment in case of ovarian tumour is to remove the tumour as soon as the diagnosis is made. But this principle should not be followed in the first trimester.
- Surgery in the first trimester is best avoided, as during surgery a corpus luteal cyst or ovary might be removed which will be detrimental to the pregnancy, which may end up in a miscarriage.
- Therefore, all such cases should be operated (ovariotomy/cystectomy) in the second trimester.
- *Therefore, the best time of elective operation for an ovarian tumor in pregnancy is between 14 to 18 weeks, as the chances of abortion are less and access to the pedicle is easy.*

4. Ans. is c i.e. Dermoid cyst *Ref. Novak 14/e, p 510; Dutta Obs. 6/e, p 310*

"Incidence of dermoid cyst increases two times in pregnancy and it becomes the most commonly diagnosed ovarian tumour during pregnancy." *—Dutta Obs. 7/e, p 310*

"A benign cystic teratoma is the most common neoplasm to undergo torsion." *—Novak 14/e, p 510*

Note: *Benign cystic teratoma is another name for dermoid cyst.*

From the above two lines it is clear that dermoid cyst is the most common ovarian tumour to undergo torsion during pregnancy.

For more details on dermoid cyst and other ovarian tumours kindly see ***"Self Assessment and Review Gynaecology"*** by the same author.

5. Ans. is a i.e. Glioma

Ref. Williams Obs. 23/e, p 1140 for option b and d for option d, 1255; COGDT 10/e, p 398, for option c and d

Let us have a look at each option one by one

Pituitary adenoma (option b): Enlargement of both microadenomas and macroadenomas (≥ 10 mm) is seen during pregnancy, less in case of microadenoma and more in case of macroadenoma. *—Williams 23/e, p 1140*

"Neurofibromas and meningiomas although brain tumors are not specifically related to gestation, meningiomas, angiomas and neurofibromas are thought to grow more rapidly with pregnancy."

—COGDT 10/e, p 398

"Lesions of neurofibromatosis may increase in size and in number as a result of pregnancy."

— Williams 23/e, p 1191

I did not get any text specifically mentioning the relationship between glioma and pregnancy but by exclusion the answer is Glioma.

Remember: Tumours which increase in pregnancy:
- Meningioma
- Angioma
- Neurofibroma
- Pituitary microadenoma

6. Ans. is c i.e. Red degeneration of fibroid *Ref. Shaw 14/e, p 318, 326; Dutta Obs. 6/e, p 314, Fernando Arias 2/e, p 77*

Friends, the answer is quite obvious but let's see how other options can be ruled out.

Option "a" **Preterm labour.**

Points in favour	Points against
• Patient is pregnant • Pain in abdomen at 28 weeks (Preterm labour is where the labour starts before 37th completed weeks. The lower limit is 28 weeks in developing countries and 20 weeks in developed countries	• Preterm labour is diagnosed: – When there are regular uterine contractions (not acute pain), with or without pain at least once in every 10 minutes – Dilatation of cervix is ≥ 2 cm – Effacement of cervix = 80% – Length of cervix as measured by TVS ≤ 2.5 cm and funneling of the internal OS – Pelvic pressure, backache, vaginal discharge or vaginal bleeding. **None of the above criteria are being fulfilled** • Presence of leucocytosis and fever can also go against it as even if there is intraamniotic infection causing preterm labour: – Features like: *fever, leukocytosis, uterine tenderness* and *fetal tachycardia* are absent. Rather, if these features are present it means a final stage of uterine infection has reached. And here, our patient is having fever and leukocytosis without regular uterine contractions but with acute pain in abdomen so, *option "a"* is ruled out .

Option "b" **Torsion of fibroid**

Points in favour	Points against
• Patient has fibroid (though no mention has been made whether it is pedunculated or not, remember torsion is seen in subserous pedunculated myomas)[Q] • Patient is complaining of acute pain in abdomen.	• Orsion is not associated with fever and leucocytosis • It is rare.

Option "d" **Infection of fibroid**

Points in favour	Points against
• Resence of fibroid (*Remember:* Infection is common in submucous fibroids)[Q] • Fever • Leucocytosis.	• Acute pain in abdomen (infection of fibroid will not cause acute pain in abdomen) • Infection of fibroid occurs following abortion or labour (here patient is pregnant but there is no history of abortion or labour) and m/c time for occurence in pregnancy is peurperium • Infection causes blood stained discharge (not seen in this patient).

So, from above discussion infection can be kept in +/– status. If we have no better option we can think about it.

Option "c" **Red degeneration of fibroid**

Red degeneration of fibroid: also called as *Carneous degeneration.*

- **It is seen mostly during mid pregnancy**[Q] (but can occur at other times, as well as in nonpregnant females also)[Q]
- It is an aseptic condition[Q]
- The myoma suddenly becomes acutely painful[Q], enlarged[Q] and tender[Q]
- ***Patient presents with:*** – Acute abdominal pain[Q] – Vomiting[Q]; – Malaise[Q] – Slight fever[Q]
- ***Lab investigations:*** – Moderate leucocytosis[Q] – Raised ESR[Q]

Pathological changes in the tumour:

- Fibroid becomes soft, necrotic or homogenous especially in its centre

- It is stained *Salmon pink*[Q], or red (due to diffusion of blood pigments from the thrombosed vessels)
- It has *fishy odour*[Q] (due to secondary infection with coliform organisms)
- ***Histologically:*** There is evidence of *thrombosis* in some vessels[Q]
- ***Pathogenesis:*** There is *subacute necrosis* of the myoma caused by an interference in blood supply *(aseptic infarction)*.[Q]

Diagnosis is by ultrasound.

Differential diagnosis:

- Appendicitis[Q], Twisted ovarian cyst[Q], Pyelitis[Q] and Accidental hemorrhage[Q]
- So amongst above options — Red degeneration is the correct answer.

Management:

- *Conservative management*[Q]
- Patient is advised rest[Q]
- *Analgesics* are given to relieve the pain[Q]
- The acute symptoms subside in 3-10 days[Q] and pregnancy proceeds uneventfully.

7. Ans. is b i.e. Conservative

8. Ans. is a i.e. Analgesics *Ref. Shaw 14/e, p 326; Dutta Obs. 6/e, p 309; Jeffcoate 7/e, p 502*

Management of Red degeneration of fibroid.

- Patient is managed conservatively[Q]
- Patient is put to bed rest and given analgesics[Q] (to relieve the pain), sedatives[Q] and, if required antibiotics[Q]
- If because of mistaken diagnosis laparotomy is done, abdomen is closed without doing anything
- Myomectomy should never be contemplated during caesarean section as vascularity of fibroid is increased during pregnancy (due to increased estrogen) leading to increased blood loss during cesarean section.[Q]

9. Ans. is b i.e. Metronidazole *Ref. Shaw 14/e, p 118; COGDT 10/e, p 601; Harrison 17/e, p 827*

Bacterial Vaginosis:

- It is an alteration in the normal vaginal flora (so, termed as vaginosis and not vaginitis)
- Polymicrobial in nature
- It is transmitted sexually[Q]
- Infection is favoured by decrease in the number of protective bacteria of vagina (*"Doderlein bacteria"* which release hydrogen peroxide and help in maintaining the acidic pH of vagina[Q])
- Symptoms:
  - 50% are asymptomatic
  - Rest complain of malodorous vaginal discharge with no irritation.[Q]

Diagnosis: By Amsels criteria.

- Vaginal secretions are grey – white and thinly coat the vaginal walls[Q]
- pH > 4.5 (≈ 5 – 5.5) (i.e. increased vaginal pH)[Q]
- Whiff's test/Amine test is positive, i.e. addition of 10% KOH to vaginal secretions produces *Fishy odour*[Q]
- Presence of *'clue cells'* (> 20% of epithelial cells).[Q]

CLUE CELLS: are epithelial cells with granular cytoplasm.

Microscopic examination shows:

- Clue cells[Q]
- ↑ Number of gardenella vaginalis[Q]
- ↓ Number of lactobacilli[Q]
- ↓ Leucocytes (conspicuously absent).[Q]

Treatment:

- DOC Metronidazole 500 mg twice daily for 7 days[Q]
- Treatment of male sexual partner does not improve therapeutic response and is not recommended.[Q]

- **In pregnancy:**
  - TOC is oral metronidazole after 1st trimester[Q]
  - Alternatively, clindamycin can be given
  - Topical application of metronidazole gel should be avoided during pregnancy.[Q]

10. Ans. is a. d and e i.e. Cystitis, Appendicitis and Ruptured Ectopic

Ref. Dutta Obs. 7/e, p 305, Textbook of Obs. Sheila Balakrishnan, p 397

Causes of Acute Abdomen in Pregnancy:

Obstetrical		Non Obstetrical		
Early	**Late**	**Medical**	**Surgical**	**Gynaecological**
• Abortion • Ruptured ectopic pregnancy	• Abruptio placenta • Preterm labour • Polyhydramnios • Repture uterus • Severe pre-eclampsia and HELLP syndrome • Severe preeclampsia and liver rupture	• Pyelonephritis • Cystitis • Pancreatitis • Pyelitis	• Ac appendicitis • Ac cholecystitis • Intestinal or gastric perforation • Intestinal obstruction • Volvulus • Renal or uretric • calculi	• Torsion of ovariancyst • Red degeration of fiibroid • Retentio of urine due to retro verted gravid uterus

From above table it is clear:

Cystitis (Option 'a'), appendicitis (Option d) and ruptured ectopic (Option e) can lead to acute abdomen in pregnancy. Although abortions can also cause acute abdomen, but then it is incomplete or inevitable abortions which are painful.

In case of threatened abortion

> **"The patient presents with amenorrhea followed by vaginal bleeding which is usually painless, but may be associated by mild abdominal pain backache."** *—Shiela Balakrishann 1/e, p 175*

Threatened Abortion

"Bleeding is usually painless but there may be mild backache or dull pain in lower abdomen." *—Dutta Obs 7/e, p 161*

This rules out threatened abortion.

Now coming to cervical incompetence – (option 'c')
In cervical incompetence patient typically presents with painless cervical dilatation and escape of liquor amnii followed by painless expulsion of products of conception.
Thus, it is also ruled out.

11. Ans. is d i.e. Observation only *Ref. Dutta Obs. 6/e, p 103; Williams Obs. 23/e, p 210–211*

Varicosities (lower leg, vulva, rectum) may appear for the first time or aggravate during pregnancy usually in later months.

- It is due to obstruction in the venous return by the pregnant uterus
- Specific treatment is better to be avoided
- Varicosities usually disappear following delivery
- Valvular varicosities may be aided by application of a foam rubber pad suspended across the vulva by a belt used with a perineal pad
- Rarely large varicosities may rupture leading to profuse hemorrhage.

12. Ans. is d i.e. None of the above *Ref. Dutta Obs. 6/e, p 309; Jeffcoates 7/e, p 493, 494*

Effects of Fibroid on Pregnancy

Infertility: It is either the cause or the effect of the fibroid:

- Leiomyomas are a sole cause of infertility in less than 3% of cases.[Q]
- It causes infertility by:

a. Hindering the ascent of the spermatozoa by distorting the uterus and tubes
b. By disturbances in ovulation and
c. By interfering with implantation of the fertilized ovum

- Pregnancy rate following myomectomy is 40%.[Q]

During Pregnancy:

- ***Abortion[Q], Placental abruption[Q] and Premature labour[Q]*** Occurs when fibroid interferes with enlargement of uterus, initiates abnormal uterine contractions or prevents efficient placentation.
- ***Malposition[Q] and Malpresentation[Q] of Fetus:*** *Occur* as fibroid can prevent engagement of head.
- ***Obstructed labour:*** It can be caused by cervical[Q] and broad ligament tumours[Q] which are fixed in the pelvis and by pedunculated subserous leiomyomas which become trapped in the pouch of Douglas.

During Labour:

- If fibroid is situated above the presenting part: uneventful vaginal delivery.
- If fibroid is situated below the presenting part: trial for vaginal delivery should be given. Thus chances of cesarean section are increased.[Q]
- ***Postpartum Hemorrhage[Q]/Delayed Involution[Q]*** can occur if placenta is implanted[Q] over the leiomyoma.

Also Know:

Effects of Pregnancy on Tumour:

- Red degeneration[Q]
- Increased growth of tumour[Q]
- Torsion of pedunculated subserous fibroid[Q]
- Infection during the puerperium.[Q]

13. Ans. is d i.e. Colposcopy

Ref. Dutta Obs. 6/e, p 307; Novak 14/e, p 1437 – 1438; Management of High Risk Pregnancy, SS trivedi, Manju Puri 1/e, p 504–505

As discussed in the preceding text, all abnormal pap smears during pregnancy, should be followed by colposcopy

14. Ans. is d i.e. Cervical cancer *Ref. Williams Obs. 24/e, p 1221*

- *Combined together, genital tract cancers are the most common malignancies encountered during pregnancy.*
- *Most common genital malignancy during pregnancy is cervical cancer.*
  Proportion of malignancies during pregnancy is shown in Figure 22.1. *—Williams Obs. 24/e*

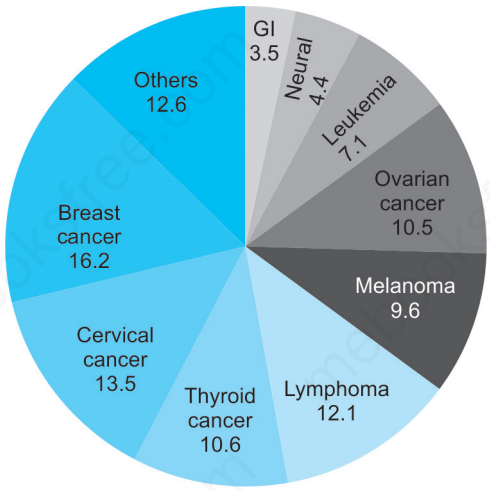


Fig. 22.1: Proportion of malignancies during pregnancy

23 Tuberculosis, Epilepsy and Asthma in Pregnancy

QUESTIONS

1. At what period does the tuberculosis flare up most commonly in a pregnant patient? **[AI 06]**

a. First trimester b. Second trimester
c. Third trimester d. Puerperium

2 A 6 week pregnant lady is diagnosed with sputum positive TB. Best management is: **[AIIMS May 09/AI 11]**

a. Wait for 2nd trimester to start ATT
b. Start category IATT in first trimester
c. Start category II ATT in first trimester
d. Start category III ATT in second trimester

3. Antitubercular drug contraindicated in pregnancy: **[PGI June 05, Dec 01; AI 03]**

a. Streptomycin b. Refampicin
c. INH d. Ethambutol
e. Pyrazinamide

4. A 23-year-old G1P0 woman at 10 weeks' gestation presents to the obstetrics clinic for her initial evaluation. She says she has been hospitalized several times for asthma exacerbations but has never required intubation or admission to an intensive care unit. She is controlled on daily inhaled corticosteroids and albuterol with adequate relief of her symptoms. She is concerned about taking these medications now that she is pregnant. Which of the following is true regarding asthma medications in pregnancy? **[New Pattern Question]**

a. B_2 agonist are contraindicated during pregnancy
b. Both B_2 agonist and inhaled corticosteroids are both contraindicated in pregnancy
c. Both B_2 agonist and inhaled corticosteroids are safe in pregnancy
d. B_2 agonist and inhaled corticosteroids are both safe in pregnancy but during 2nd and 3rd trimester only
e. Inhaled corticosteroids are contraindicated in pregnancy

5. Changes in the respiratory system in pregnancy:

a. Vital capacity is increased **[New Pattern Question]**
b. Subcostal angle remains unchanged
c. Tidal volume remains unaltered
d. Residual volume is decreased

6. For fetal lung maturation, all the corticosteroids can be used *except*: **[New Pattern Question]**

a. Betamethasone
b. Dexamethasone
c. Hydrocortisone
d. Methylprednisolone

7. Which of the following statements is incorrect in relation to pregnant women with epilepsy? **[AI 05]**

a. The rate of congenital malformation is increased in the offspring of women with epilepsy
b. Seizure frequency increases in approximately 70% of women
c. Breast feeding is safe with most anticonvulsants
d. Folic acid supplementation may reduce the risk of neural tube defect

8 Which vitamin deficiency is most commonly seen in a pregnant mother who is on phenytoin therapy for epilepsy? **[AI 06]**

a. Vitamin B_6
b. Vitamin B_{12}
c. Vitamin A
d. Folic acid

9. True statement regarding use of antiepileptic drugs in pregnancy: [PGI Nov 10]

a. Valproate is associated with NTD
b. Multiple drug should be given
c. Carbamazepine is used as monotherapy
d. Phyenytoin c1an produce foetal hydantoin syndrome

10. A 26-year-old primigravida with juvenile myoclonic epilepsy comes to you at 4 months with concern regarding continuing sodium-valproate treatment. Your advice is: [AIIMS Nov 11]

a. Add lamotrigine to sodium valproate
b. Taper sodium valproate and add lamotrigine
c. Switch on to carbamazepine
d. Continue sodium valproate with regular monitoring of serum levels

11. True statements regarding epilepsy in pregnancy is: [New Pattern Question]

a. Seizure frequency decreases in majority
b. Monotherapy is preferred to polydrug therapy
c. No increase in incidence of epilepsy in offspring
d. Breastfeeding is contraindicated

EXPLANATIONS & REFERENCES

1. Ans. is d i.e. Puerperium

Ref. Sheila Balakrishnan 1/e, p 386; Medical Disorders in Pregnancy and Update FOGSI, p 107

Tuberculosis in Pregnancy

Effect of pregnancy on TB	Effect of TB on pregnancy
• If TB is under treatment, pregnancy does not worsen it • Increased chances of relapse in peurperum and TB flares up during puerperium	– ↓ fertility – ↑ abortion – ↑ IUD – ↑ Preterm delivery – ↑ IUGR – ↑ Low birth weight } in severe cases

Remember: TB is not an indication for termination of pregnancy.

Mode of infection for fetus:
- Hematogenous route (through umbilical vein)
- Ingestion of infected ammotic fluid during delivery
- Post partum infection.

2. Ans. is b i.e. Start category IATT in first trimester

Ref. Textbook of Obs. Sheila Balakrishnan 1/e, p 387, Indian Journal of Tuberculosis

- TB during pregnancy, requires prompt treatment
- ATT can be given at any period in pregnancy, including the first trimester:
- **First line drug used are:**
  - INH, Rifampicin, ethambutol and pyrazinamide
  - Streptomycin is contraindicated during pregnancy[Q]
  - The 2 drugs which should be used throughout are – INH and Rifampicin
  - If a third drug is to be used it is usually ethambutol
  - Pyridoxine 50 mg is given along with chemotherapy.

Drug Regimen
Initial 3 drugs for 3 months followed by 2 drugs for 6 months
OR
Initial 4 drugs for 2 months followed by 2 drugs for 4 months

- Breast feeding is not contraindication if the woman is on treatment[Q] but contraindicated if active lesions are present
- Baby should be given INH prophylaxis for 3 months. If montoux test is negative after 3 months, prophylaxis is stopped and BCG vaccination given.

3. Ans. is a i.e. Streptomycin *Ref. Harrison 17/e, p 1018; Williams Obs. 23/e, p 1005, 22/e, p 1065*

We all know streptomycin is contraindicated during pregnancy; earlier their were some doubts regarding the safety profile of pyrazinamide- but now it is obsolutely clear that it can be given safely in pregnancy.

"The regimen of choice for pregnant women is 9 months of treatment with isoniazid and rifampicin, supplemented by ethambutol for the first 2 months. When required pyrazinamide may be given, although there are no data concerning its safety in pregnancy. Streptomycin is contraindicated because it is known to cause 8th cranial nerve damage in the fetus." —*Harrison 16/e, p 962*

"The 6 months regimen with pyrazinamide can probably be used safely during pregnancy and is recommended by the WHO and the international union against tuberculosis and lung disease." —*Williams Obs. 22/e, p 1065*

"Recommended initial treatment for pregnant patients is a three- drug regimen with isoniazid, rifampicin, and ethambutol. If the organism is susceptible the regimen is given for a total of 9 months. According to Bothamley (2001), all of these

drugs are safe during pregnancy. Pyrazinamides added, if necessary. Indeed, the World Health Organization recommends initial therapy with the four-drug regimen for 6 months, as prescribed for nonpregnant adults."

So from above text it can be concluded that pyrazinamide is not contraindicated during pregnancy.

Antituberculosis drugs contraindicated in pregnancy:
K = Kanamycin
F = Fluoroquinolones
C = Capreomycin
A = Amikacin
S = Streptomycin
Mnemonic = KFC Always surprising

4. Ans. is c i.e Both B_2 agonist and inhaled corticosteroids are safe in pregnancy

Asthma in Pregnancy – Important Points:
- Asthma is the most common chronic condition in pregnancy and affects 3–12% of gestations.
- **Effects of pregnancy on asthma:** The course of the disease is very much unpredictable. In about 20%, the condition improves, in 30%, it deteriorates and in 50%, it remains unchanged.
- It is more likely to deteriorate in women with severe asthma.
- Exacerbations are most frequent between 24 to 36 weeks gestation and are most commonly precipitated by viral respiratory infections and non compliance with inhaled corticosteroid regimens.
- Because asthma exacerbation can be severe, they should be treated aggressively in pregnancy.
- **Effects of asthma on pregnancy:** Preterm labor PROM, preeclampsia, LBW baby and slight increase in abruptio placenta.
- Severity of asthma correlates with FEV1 and PEFR (peak expiratory flow rate) FEV1 ideally is > 80% of the predicted value and PEFR FEV1 less than 1L or less than 20% of predicted value, correlates with severe disease.

Management of Asthma in Pregnancy:
- Mild asthma: Inhaled beta agonist (albuterol preferred because of more human data on safety in pregnancy).
- Mild persistent: Low dose inhaled corticosteroids (Budesonide preferred).
- Moderate: Low dose inhaled corticosteroids and long acting b agonist (Salmetrol preferred).
- Severe: High dose inhaled corticosteroid and long acting beta agonist and oral steroids if needed.

- PGF-2 alpha is absolutely C/I in patients of Asthma
- So, if in an asthmatic patient PPH occurs drug of choice is PGE1
- In asthmatic patients DOC for cervical ripening-PGE2 (PGE2 is not contraindicated in asthmatics).

5. Ans. is d i.e. Residual volume is decreased *Ref. Dutta Obs. 7/e, p 55*

Changes in respiratory system during pregnancy:
- With the enlargement of the uterus, specially in the later months, there is elevation of the diaphragm by 4 cm.
- Total lung capacity is reduced by 5% due to this elevation.
- Breathing becomes diaphragmatic. Total pulmonary resistance is reduced due to progesterone effect.
- The subcostal angle increases from 68° to 103°, the transverse diameter of the chest expands by 2 cm and the chest circumference increases by 5–7 cm.
- A state of hyperventilation occurs during pregnancy leading to increase in tidal volume and therefore respiratory minute volume by 40%.

Increase	Decrease	Unchanged
Tidal volume	Residual volume	Respiratory
Minute ventilation	Total lung capacity	Vital capacity
Airway	Functional residual capacity	Maximum breathing capacity
conductance	Expiratory reserve volume	Inspiratory capacity
		Inspiratory reserve volume

6. Ans. is d i.e. Methylprednisolone

DOC for fetal lung maturation is betamethasone. Methylprodnisolone is not effective because of poor placental transfer.

7. Ans. is b i.e. Seizure frequency increases in approximately 70% of women

Ref. Dutta Obs. 7/e, p 291; Harrison 17/e, p 2512; Sheila Balakrishnana 1/e, p 393, 394

Epilepsy in pregnancy:

- Epilepsy is the most common neurological disorder encountered in pregnancy.
- The most common cause for epilepsy in pregnant women is idiopathic.
- Seizure frequencies is unchanged in 50% increased in 30% and decreased in 20% of pregnant females
- Risk of congenital anomalies is about 4% and there is 5–10% risk of epilepsy in the child if parents are affected.
- All anticonvulsant drugs are associated with congenital anomalies as a interfere with folic acid metabolism
- **The malformations include:** Cleft lip and/or palate, mental retardation, cardiac abnormalities, limb defects and hypoplasia of the terminal phalanges. Sodium valproate is associated with neural tube defects. There is chance of neonatal hemorrhage and is related to anticonvulsant induced vitamin K dependent coagulopathy.
- In epilepsy during pregnancy:
  - Mono drug therapy is preferred
  - Lowest possible dose of the chosen drug is given
  - Therapeutic drug monitoring is done.
- All women on anticonvulsants should take folic acid: 4 mg/day for 12 weeks in the preconception period and throughout pregnancy.
- Prenatal screening: Maternal Serum Alphafetoprotein (MSAFP) at 16 weeks + level II USG (To detect neural tube defects)
- Vitamin K 10 mg/day orally from 36 weeks onward to prevent hemorrhagic disease of newborn.

Postpartum Management:

- The newborn is given vitamin K (1 mg IM)
- Breast feeding is not contraindicated as the dose excreted in breast milk is very small.
- There is no contraindication to Breast feeding. *—Dutta Obs 7/e, p 291*
- Antiepileptic medications are excerted into breast milk to a variable degree. Given the overall benefits of breast feeding and the lack of evidence of long term harm to the infant, by being exposed to antiepileptic drugs, mothers with antiepileptic drugs can be encouraged to breast feed. *—Harrison 16/e p 2372*
- **Contraception:**

ACOG has recommended oral contraceptives containing 50 mg of estrogen in women with epilepsy and taking anticonvulsants. *—Williams Obs. 23/e, p 1167*

8. Ans. is d i.e. Folic acid *Ref. KDT 7/e, p 414; Katzung g/e, p 383; Goodman Giliman 11/e, p 510*

- Hypotension and arrythmias occur only on iv injection.
- Vitamin deficiencies associated with phenytoin: — Folic acid (most common)
  - Vitamin D
  - Vitamin K

These vitamin deficiencies occur in all patients an phenytoin therapy and have nothing do with pregnancy. Hence all patients on phenytoin are advised to take folic acid supplementation.

9. Ans. is a, c and d i.e. Valproate is associated with NTD, Carbamazepine is used as monotherapy and Phenytoin can produce foetal hydantoin syndrome *Ref. Willams 24/e, p 1190*

Drug and associated abnormalities

Drug (Brand name)	Abnormalities Described
Valproate (Depakote)	Neural-tube defect, clefts, cardiac anomalies; associated developmental delay
Phenytoin (Dilantin)	Fetal hydantoin syndrome-craniofacial anomalies, fingernail hypoplasia, growth deficieny, developmental delay, cardiac anomalies, clefts
Carbamazepine; oxcarbazeoine (Tegretol;Trileptal)	Fetal hydantoin syndrome, as above; spina bifida
phenobarbital	Clefts, cardiac anomalies, urinary tract malformations
Lamotrigine (Lamictal)	Increased risk for clefts (registry data)
Topiramate	Clefts
Levetiracetam (Keppra)	Theoretical— skeletal abnormalities; impaired growth in animals

10. Ans. is d i.e. Continue sodium valproate with regular monitoring of serum levels

Ref. Williams Obs 23/e, p 1166, 1167, Textbook of Obs by Sheila Balakrishnan, p 394, Harrison 18/e, p 3266

As per ACOG and RCOG guidelines, there is no particular drug of choice for epilepsy in pregnancy

Valproate increases chances of birth defects much more than phenytoin, carbamazepine or phenobarbitone and hence if valproate is being used, it should be substituted by a lesser teratogenic drug.

Now in this question:

A 26-year-old primigravida with juvenile myoclonic epilepsy who has been using valproic acid comes to you at fourth month of pregnancy for advice.

Logically speaking if patient has myoclonic epilepsy in non pregnant states-DOC is valproic acid —Harrsion 18/e, p 3266 or lamotrigine, so her physician must have prescribed valproic acid to her. Ideally valproic acid should not be used during pregnancy as it is associated with a high risk of congenital malformations in the fetus. So if this patient would have come in the first trimester, I would have substituted it with some other antiepileptic drug like lamotrigine.

Note: *"Carbamazepine, oxcarbazeine and phenytoin can worsen certain types of generalised seizures including myoclonic, tonic and atonic seizures."* *—Harrison 18/e, p 3266*

– But since this patient is coming at 4th month, I will continue using valproic acid as the period of maximum teratogenicity is over. In addition I will do a lever II USG scan to rule out congenital anomalies and give folic acid supplementation 4 mg/day – therapeutic dose, to be continued throughout pregnancy.

Remember

Folic Acid

Prophylactic dose	Therapeutic dose
– 400 μg/day	– 4-5 mg/day
– Given to all pregnant females who donot have any previous history of NTD's or are not on valproate	– Given to those pregnant females who have previous H/o NTD or are on valproate
– Ideally – it should be given 3 months before conception and continued for 3 months after conception, but atleast should be started 1 month before conception	– Given 3 months before conception and continued throughout pregnancy

- Dose of folic acid in tablets distributed free of cost by Government of India = 500 μg
- **Vitamin K 10 mg/day is given orally from 36 weeks onward to prevent hemorrhagic disease of new born.**

11. Ans. is b i.e. Monotherapy is preferred to polydrug therapy *—Dutta Obs 7/e, p 291*

As disussed earlier, seizure frequency remains unchanged in majority during pregnancy.

"Frequency of convulsions is unchanged in majority (50%) and is increased in some." *—Dutta 7/e, p 291*

"The risk of developing epilepsy to the offspring of an epileptic mother is 10%." *—Dutta 7/e, p 291*

so option is c is incorrect.

"There is no contraindication for breastfeeding." *—Dutta 7/e, p 291*

so option d is incorrect.

We have read time and again that monotherapy is preferred in preganant epileptic patient.

24 Drugs in Pregnancy and High Risk Pregnancy

QUESTIONS

1. **Antimalarial(s) to be avoided in pregnancy:** **[PGI June 01]**
   a. Chloroquine
   b. Quinine
   c. Primaquine
   d. Antifolates
   e. Tetracyclines
2. **Consequence of maternal use of cocaine is:** **[AI 01]**
   a. Hydrops
   b. Sacral agenesis
   c. Cerebral infarction
   d. Hypertrichosis
3. **A pregnant mother is treated with oral anticoagulant. The likely congenital malformation that may result in the fetus is:** **[AI 98]**
   a. Long bones limb defect
   b. Cranial malformation
   c. Cardiovascular malformation
   d. Chondrodysplasia punctata
4. **Which does not cross placenta?** **[AIIMS Feb 97]**
   a. Heparin
   b. Morphine
   c. Naloxone
   d. Warfarin
5. **When heparin is given in pregnancy, which of the following is to be added?** **[AI 08]**
   a. Iron folic acid
   b. Copper
   c. Calcium
   d. Zinc
6. **A child born with multiple congenital defect including cleft palate, neural tube defect, atrial septal defect and microcephaly which of the following drug is used by mother during pregnancy?**
   a. Erythromycin **[AIIMS June 00]**
   b. Isotretinoin
   c. Ibuprofen
   d. Metronidazole
7. **Vasopressor of choice in pregnancy is:**
   a. Ephedrine **[AIIMS Nov 08]**
   b. Phenylephrine
   c. Methoxamine
   d. Mephentermine
8. **The following drug can be given safe in pregnancy:**
   a. Propylthiouracil **[AI 09]**
   b. MTX
   c. Warfarin
   d. Tetracycline
9. **Which of the following drug is category B (adequate studies in pregnant woman have failed to demonstrate a fetal risk)?** **[AIIMS Nov 14]**
   a. Brimonidine
   b. Pilocarpine
   c. Latanoprost
   d. Dorzolamide
10. **The use of the following drug during pregnancy can lead to Mobius syndrome:** **[AI 12]**
    a. Warfarin
    b. Phenytoin
    c. Mifepristone
    d. Misoprostol
11. **Which can be used in pregnancy?**
    a. ACE inhibitors
    b. Aldosterone
    c. AT receptor antagonist
    d. Propylthiouracil

12. Comprehensive emergency obstetric care does not include: **[AIIMS May 07]**
a. Manual removal of placenta
b. Hysterectomy
c. Blood transfusion
d. Cesarean section

13. MMR is expressed in: **[PGI June 05]**
a. Per 1000 live birth
b. Per 10000 live birth
c. Per 1 lac live birth
d. Per 10 lac live birth

14. A syndrome of multiple congenital anomalies including microcephaly, cardiac anomalies and growth retardation has been described in children of women who are heavy users of: **[New Pattern Question]**
a. Amphetamines
b. Barbiturates
c. Heroin
d. Methadone
e. Ethylalcohol

15. Smoking in pregnancy causes: **[New Pattern Question]**
a. IUGR b. PIH
c. APH d. PPH

16. High risk pregnancy includes all *except*: **[New Pattern Question]**
a. Twins b. 2.5 years old primi
c. Hydramnios d. Previous LSCS

17. Obesity in pregnancy causes all of the following complication *except*: **[New Pattern Question]**
a. Abnormal uterine action
b. Fetal neural tube defect
c. Precipitate labour
d. Venous thrombosis

18. All of the following are direct causes of maternal mortality *except*: **[New Pattern Question]**
a. APH b. PPH
c. Heart disease d. Eclampsia

19. Maternal near miss refers to: **[New Pattern Question]**
a. Teenager becoming pregnant
b. Contraceptive failure in a teenager
c. A woman presenting with life threatening condition but has survived
d. A woman presenting with life threatening condition who has died

20. Basic emergency obstetric services includes all, *except*: **[New Pattern Question]**
a. Parenteral oxytocics
b. Antibiotics and anticonvulsants
c. Manual extractions of the placenta
d. Blood transfusions

21. Fundal height is more than period of gestation in all *except*: **[New Pattern Question]**
a. Hydramnios b. IUD
c. Twin pregnancy d. Hydatidiform mole
e. Uterine myoma

22. Large for date baby may be due to: **[New Pattern Question]**
a. Beckwith syndrome
b. Diabetic mother
c. Genetic predisposition
d. All of the above

23. Following are more common in multipara woman than primipara *except*: **[DNB 01]**
a. Anemia b. Placenta previa
c. PIH d. None of the above

EXPLANATIONS & REFERENCES

1. Ans. is c and e i.e. Primaquine and Tetracyclines

Ref. Dutta Obs. 7/e, 296, 297; Harrison 17/e, p 1289, 1291, 1293

- Malaria is life threatening in pregnancy, therefore benefits of treatment outweigh the potential risk of antimalarials.
- The commonly used antimalarials are not contraindicated in pregnancy.
- Chloroquine is the drug of choice for treatment and prophylaxis (even in pregnancy) of all varieties of malaria.

—Harrison 17/e, p 1293, Williams Obs. 24/e, p 1257

- According to Williams 24/e cloroquine should be used throughout pregnancy and primaquine should be used during postpartum period for malaria in pregnant moment.
- In cloroquine resistant P. vivax malaria-mefloquine is the DOC.
- In cloroquine resistant P. falciparum malaria-mefloquine or quinine is the drug of choice.

Chemoprophylaxis:

- Pregnant women in endemic areas are candidates for chemoprophylaxis.
- It is also recommended for travel to endemic areas.
- *Chloroquine is the drug of choice for prophylaxis* in pregnancy.
- Mefloquine is the only drug adviced for pregnant women who travel to areas with drug resistant malaria. This drug is generally considered safe in 2nd and 3rd trimester of pregnancy and the limited data on 1st trimester exposure are reassuring. *—Harrison 17/e, p 1293*
- ***"Proguanil is considered safe for antimalarial prophylaxis in pregnancy."*** *—Harrison 17/e, p 1293*

Antimalarials contraindicated in pregnancy:

- ***"Tetracycline and doxycycline cannot be given to pregnant women".*** *—Harrison 17/e, p 1291, 1289*
- ***"Primaquine should not be given to pregnant women and neonates.*** *—Harrison 17/e, p 1293*
- ***"Primaquine and doxycycline are contraindicated in pregnancy".*** *—Williams 24/e, p 1257*

2. Ans. is c i.e. Cerebral infarction *Ref. Sheila Balakrishnan, p 696; Williams Obs. 22/e, p 364, 23/e, p 326, 327*

Cocaine addiction can cause – *miscarriage, intrauterine fetal death, PROM, preterm labour* and *IUGR.*

It can lead to the following Malformations in the fetus:

- Microcephaly, cutis aplasia, porencephaly, subependymal and periventricular cysts, ileal atresia, cardiac anomalies, visceral infarcts, limb reduction defects and genitourinary malformations.
- It produces cerebral infarction and periventricular leukomalacia in the fetus.
- The risk of malformations in the embryo/fetus is highest after the first trimester.

3. Ans. is d i.e. Chondrodysplasia punctata *Ref. Dutta Obs. 7/e, p 511*

Warfarin is an anticoagulant drug.

Action : Interferes with the synthesis of the vitamin K dependent factors like II, VII, IX and X.

Side effects:

- Hemorrhage
- ***It leads to:*** – Contradi's syndrome : skeletal and facial anomalies in the fetus
  – Chondrodysplasia punctata in the fetus.
- Miscarriage, IUGR and stillbirths accentuates neonatal hypothrombinemia.

4. Ans. is a i.e. Heparin *Ref. Dutta Obs. 7/e, p 511*

Heparin does not cross placenta and is safe during pregnancy.

It is the drug of choice for the management and prophylaxis of venous thromboembolism during pregnancy.

5. Ans. is c i.e. Calcium *Ref. KDT 6/e, p 598, 599; Harrison 17/e, p 2400*

Heparin can lead to osteoporosis. or hypocalcemia so, calcium supplementation is advisable with the use of heparin.

Also Know :

Durgs which may lead to hypocalcemia and hence calcium supplementation is necessary:

- Corticosteroids
- Anticonvulsants
- Excessive alcohol
- Increase dose of thyroxine
- GnRH
- Lithium
- Cyclosporine
- Cytotoxic drugs
- Aromatase inhibitor
- Aluminium
- Heparin

6. Ans. is b i.e. Isotretinoin *Ref. KDT 5/e, p 801; Sheila Balkrishnan, p 684*

Friends, *Remember* CNS anomaly (NTD) + CVS anomaly + facial defects are seen with the use of isotretinoin.

Drug	Teratogenicity
Alcohol	**Fetal alcohol syndrome (dose related)** Pre and postnatal growth restriction. Facial abnormalities like shortened palpebral fissure, low set ears, smooth philtrum, thinned upper lip and midfacial hypoplasia. CNS defects like microcephaly, mental retardation and behavioural disorders.
Warfarin	**Fetal warfarin syndrome**[Q] Chondrodysplasia punctata[Q], epiphyseal stippling, nasal hypoplasia, optic atrophy and microcephaly.
Phenytoin	**Fetal hydantoin syndrome**[Q] Hypertelorism, broad nasal bridge, low set ears, hypoplastic nails and digits.
Sodium valproate	**Fetal valproate syndrome**[Q] Brachycephaly with a high forehead, hypertelorism, small nose and mouth, shallow orbits, overlapping long fingers and toes and hyperconvex nails.
Diethyl stilboestrol	**Neural tube defects**[Q] Vaginal and cervical adenosis, clear cell adenocarcinoma, uterine anomalies, cryptorchidism and testicular hypoplasia.
Isotretinoin	Cleft palate, neural tube defect, microcephaly, deafness, blindness, cardiac defects like atrial septal defect and great vessel defects.[Q]
ACE inhibitors	Renal tubular dysgenesis, anuria and oligohydramnios.
Androgens and danazol	Masculinisation of a female fetus.
Antineoplastic agents	IUGR, craniosynostosis, micrognathia, severe limb abnormalities.
Tetracyclines	Discolouration of deciduous teeth.
Cocaine	Microcephaly, limb reduction defects and genitourinary malformations due to cerebral infarction.

Maximum sensitivity to teratogens is seen between 3-8 weeks.

7. Ans. is a i.e. Ephedrine *Ref. COGDT 10/e, p 459*

Vasopressor of choice in pregnancy is ephedrine.

Vasopressors	
Which stimulate α adrenergic receptor. ↓ ↓ uterine tone and ↓ uteroplacental flow ↓ Fetal hypoxia so are not preferred. e.g.: Phenylephrine Methoxamine Mephentermine	Which stimulate α + β aderenergic receptors ↓ β_2 mediated vasodilation ↓ Less chances of fetal hypoxia ↓ Therefore they are the vasopressors of choice in pregnant females e.g.: Ephedrine

8. Ans. is a i.e. Propylthiouracil *Ref. Dutta Obs. 7/e, p 288' KDT 6/e, p 250*

Propylthiouracil is used for medical management of hyperthyroidism during pregnancy. As far as other 3 options are concerned.

"**Tetracycline and doxycycline cannot be given to pregnant women or to children <8 years of age.**"

—Harrison 17/e, p 1291

Tetracyclines shouldnot be used in pregnant women and children <8 years because of the risk of dental discolouration/damage and inhibition of growth. *—Dutta Obs. 7/e, p 513, KDT 6/e, p 714*

"Anticancer drugs are contraindicated during pregnancy". *—Dutta Obs, 7/e, p 512*

(Methothexate)

"Warfarin can lead to contradis syndrome (skeletal and facial anomalies), optic atrophy, microcephaly and chondrodysplasia punctata." *—Dutta Obs, 7/e, p 510*

Extra edge:

Food and drug administration (FDA) charted out categories for drugs, taking into account the possible fetal adverse effects:

Category A	Drugs which have no fetal risks as demonstrated by well-controlled studies in humans, e.g. *penicillin, ampicillin.*
Category B	Drugs which have shown no risk in animal studies but human, studies do not exist, or also if any adverse effects have been seen in animal studies with no such effect in well-controlled human trials, e.g., paracetamol, ranitidine.
Category C	Drugs for which there are no studies either animal or human, or drugs in which there are adverse fetal effects in animal studies but no such data exists in human trials, e.g. chloroquine, *acyclovir, zidovudine*.
Category D	Drugs which have proven risks but their use is essential and the benefits outweigh the risks, e.g. *phenytoin, warfarin, propylthiouracil.*
Category X	Drugs which are clearly teratogenic and the - risks outweigh the benefits and hence should be avoided.

9. Ans. is a i.e. Brimonidine *Ref. Internet search*

Drug	Category	Adverse-effects
Beta-blockers	**Category C** (for oral beta-blockers) No specific categorization for topical beta-blockers	• Timolol can cross the placental barrier, thus resulting in fetal bradycardia and cardiac arrhythmia. • Furthermore, beta-blockers can be secreted into breast milk and may cause similar effects in newborn infants.
Alpha-2 Agonists	Category B	• Brimonidine poses substantial risk to the newborn, having been reported to cause central nervous system depression and apnea.

Contd…

Contd…

Drug	Category	Adverse-effects
		• The drug penetrates the blood-brain barrier, and can cross the placenta and possibly excrete into breast milk, posing a real risk of apnea or hypotension in infants. • Thus, even if brimonidine is used during pregnancy, it should be discontinued before labor and during breastfeeding to prevent potential fetal apnea in the infant.
Prostagladin analogues	Category C	• Associated with a high incidence of miscarriage in animal studies. • Oral or vaginal use of misoprostol in pregnancy is associated with an increased risk of Moebius syndrome and terminal transverse limb defects. • Prostaglandius can also stimulate uterine contractions producing premature labor.
Topical carbonic Anhydrase inhibitors Brinzolamide, Dorzolamide	Category C	• There were malformations of the vertebral bodies in rabbits exposed to dorzolamide during pregnancy, suggesting that brinzolamide may be a better alternative. • It is uncertain, if these medications are excreated in human milk.
Oral carbonic Anyhydrase inhibitors Acetazolamide	Category C	• Systemic high dose carbonic anhydrase inhibitors in rats can result in forelimb anomalies. • Acetazolamide may also result in potential metabolic complications to the newborn or breast-feeding child.
Drugs for Glaucoma		
Group	Drugs	Mechanism of Action	Adverse-effects
Miotics: • Direct acting • ACHE inhibitor	Pilocarpine Physostigmine	Trabecular outflow	• Blurred vision (induced myopia) • Headache, brow pain • Cataract formation • Iris cysts • Corneal hypoesthesia
Beta-blockers: • Nonselective (beta-1 and beta-2) • Selective (beta-2)	Timolol, Levobunolol Carteolol Betaxolol	Aqueous formation	• Allergic blepharoconjunctivitis • Transient stinging • Acquired nasolacrimal duct obstruction
Carbonic anhydrase inhibitors	Dorzolamide Brinzolamide	Aqueous formation	• Ocular allergy • Corneal edema • Bitter taste
Alpha-2 agonists	Apraclonidine Brimonidine	Aqueous formation	• Lid retraction • Dry mouth • Anterior uveitis • Drowsiness
Alpha-1 agonists	Dipivefrine Adrenaline	Trabecular and uveoscleral outflow	• Ocular allergy • Conjunctival hyperemia
Prostaglandin F2-alpha	Latanoprost Bimatoprost	Uveoscleral outflow	• Iris pigmentation • Growth of eyelashes • Macular edema

10. Ans. is d i.e. Misoprostol *Ref. Katzung Pharmacology 11/e, p 1029*

- **Möbius syndrome** is an extremely rare congenital neurological disorder which is characterized by facial paralysis and the inability to move the eyes from side to side.
- Most people with Möbius syndrome are born with complete facial paralysis and cannot close their eyes or form facial expression.

- They have normal intelligence.
- Möbius syndrome results from the underdevelopment of the VI and VIIcranial nerves.
- Causes: The causes of Möbius syndrome are poorly understood. Möbius syndrome is thought to result from a vascular disruption (temporary loss of bloodflow) in the brain during prenatal development. There could be many reasons for the vascular disruption leading to Möbius syndrome. The use of the drugs misoprostol or thalidomide or cocaine by women during pregnancy can lead to mobius syndrome.

11. Ans. is d i.e.Propylthiouracil *Ref. KDT 6/e, p 251,484,488,Dutta Obs 7/e, p 288*

Propylthiouracil is used for hyperthyroidism during pregnancy.

ACE inhibitors and Losartan should be avoided during pregnancy.

ACE inhibitors can cause fetal renal tubular dysplasia when used in second and third trimester leading to oligohydramnios, fetal limb contractures, craniofacial deformities and hypoplastic lung development.

12. Ans. is b i.e. Hysterectomy (emergency obstetrics for doctors and midwives, course handbook, Milman School of Public Health)

Setting standards of emergency obstetrics and newborn care:

Basic emergency obstetric and newborn care provided in health centres, large or small include the facilities for:

- Administration of antibiotics, oxytocics and anticonvulsants.
- Manual removal of the placenta.
- Removal of retained products following miscarriage or abortion.
- Assisted vaginal delivery preferably with vacuum extractor.

Comprehensive emergency obstetric and newborn care, typically delivered in district hospital, includes all basic functions above, plus cesarean section, safe blood transfusion and care to sick and low birth weight newborns including resuscitation.

It is recommended that for every 5,00,000 people there should be 4 facilities offering comprehensive essential obstetric care.

13. Ans. is c i.e. Per 1 lac live birth *Ref. Park 22/e, p 517*

The maternal mortality rate should be expressed as a rate per 1000 live births.

Maternal Mortality Rate:

$$\frac{\text{Total number of female deaths due to complications of pregnancy, children or within 42 days of delivery from "puerperal causes" in an area during a given year}}{\text{Total number of live births in the same area and year}} \times 100$$

In developed countries MMR has declined significantly so multiplying factor 100,000 instead of 1000 to avoid fractions in calculating MMR.

Also Know

- Maternal mortality rate in India (2000 census) = 212 per 1 lac live birth.
- Most common cause of maternal mortality in India = Hemorrhage (38%) > sepsis (11%) > abortion (8%) > obstructed labour (5%) > hypertension (5%).
- Late maternal death is death of woman from direct or indirect obstetric causes more than 42 days but less than one year after termination of pregnancy.

14. Ans. is e i.e. Ethylalcohol *Ref. Williams Obs. 23/e*

Maternal abuse-and abnormalities associated with it.

Smoking leads most commonly to IUGR:

- There are increased chances of preterm delivery, placenta previa, abruptio and Abortion.
- It leads to congenital heart defects, gastrochisis and small intestine atresia, cleft lip and palate in the fetus along with IUGR and low birth weight baby.

Maternal alcohol abuse-leads to *Ref. Williams Obs. 23/e, p 317*

Fetal Alcohol Syndrome diagnostic criteria- all required

i. Dysmorphic facial features:
   a. Small palpebral fissures
   b. Thin vermilion border
   c. Smooth philtrum

ii. Prenatal/and or postnatal growth impairment
iii. CNS abnormalities:
   a. Structural: Head size < 10 percentile, significant brain abnormality on imaging
   b. Neurological
   c. Functional global cognitive or intellectual deficits, functional deficits in atleast three domains.

Alcohol Related Birth Defects:

i. **Cardiac:** atrial or ventricular septal defect, aberrant great vessels, conotruncal heart defects.
ii. **Skeletal:** radioulnar synostosis, vertebral segmentation defects, joint contractures, scoliosis.
iii. **Renal:** aplastic or hypoplastic kidneys, dysplastic kidneys, horse shoe shaped kidney, ureteral dilatation.
iv. **Eyes:** Striabismus, ptosis, retinal vascular abnormalities, optic nerve hypoplasia.

Ears: Conductive or neuriosensory hearing loss.
Minor: Hypoplastic nails, clinodactyly, pectus carinatum or excavatum, camptodactyly, **hockey stick** palmar crease, **railroad track** ears.
Maternal opiate abuse: After birth children generally appear normal or have small head size,have tremors, irritabilty, sneezing, and vomiting:

- Symptoms lastfor <10 days
- Abnormal respiratory function during sleep can lead to sudden death.

15. Ans. is a and c i.e. IUGR; and APH *Ref. Dutta Obs. 7/e, p 100, 255; Williams Obs. 23/e, p 180, 181*

Smoking increase the risk of :

- Preterm labour
- Fetal growth restriction
- Low birth weight
- Attention deficit/Hyperkinetic disorder typically identified by school age
- Behavioural learning problems
- Besides the above fetal problems it increase the risk of pregnancy complications related to vascular damage, such as placental insufficiency and placental abruption.

Note:

- Carbon monoxide and nicotine are responsible for the adverse fetal effects.
- Both active and passive smoking are associated with these risks.
- Cessation of smoking increases birth weight of fetus.

- Smoking does not affect maternal weight during pregnancy
- Smoking is protective against PIH.

16. Ans. is b i.e. 25-year-old primi *Ref. Dutta Obs. 7/e, p 632*

High risk pregnancy is defined as one which is complicated by factor or factors that adversely affects the pregnancy outcome – maternal/perinatal or both.

The high risk cases are:

During pregnancy:

- Elderly primi (> 30 years) or age < 16 years
- Elderly grand multipara
- Threatened abortion and APH
- Preeclampsia and eclampsia (i.e. PIH)
- Previous stillbirth, IUD, manual removal of placenta, PPH
- H/O of previous cesarean section and instrumental delivery
- Pregnancy associated with medical diseases.
- Short stature primi < 140 cm
- Pregnancies after prolonged infertility
- Malpresentation
- Anemia
- Twins and hydramnios
- Prolonged pregnancy
- Rh negative pregnancy

During labour

- PROM
- Hand, feet or cord prolapse
- PPH
- Prolonged labour
- Placenta retained more than half an hour
- Puerperal fever and sepsis.

Note: short stature worldwide is Ht < 150 cm and in Indian context it is Ht < 145 cm

17. Ans. is c i.e. Precipitate labour *Ref. Dutta Obs. 7/e, p 344; Williams Obs. 23/e, p 951, 952*

Obesity in Pregnancy

Body weight > 90 kg or BMI > 30 kg/m^2 is considered obese.

(BMI = 20-24 is normal) > 25 kg/m^2 Overweight

Obesity is associated with increased incidence of:

During pregnancy:
- Dyspnoea on exertion
- Hypertension (essential and PIH)
- Diabetes
- Anomalies is increased
- Difficulty in diagnosis of presentation and in hearing the FHS.

During labour:
- Abnormal uterine contractions
- Prolonged labour (and not precipitate labour)
- Shoulder dystocia
- Operative interference/anesthetic complications.

In puerperium:
- Venous thrombosis
- Lactation failure.

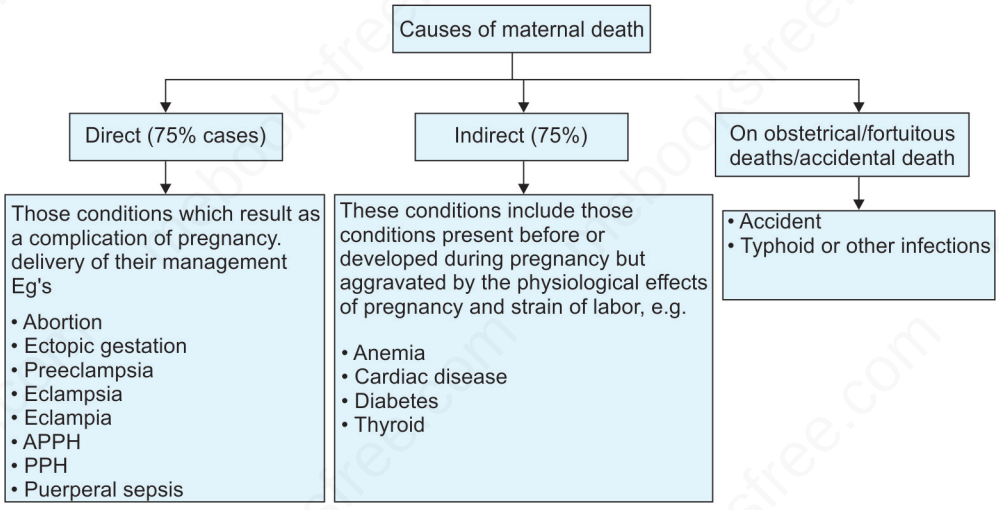
Note: Obese pregnant females should be considered under 'High Risk group'

Risk to the fetus in case of maternal obesity:
- ↑incidence of first trimester abortions
- ↑Incidence of fetal anomalies – especially neural tubal defects
- Macrosomia which in turn leads to ↑chances of shoulder dystocia, birth injury and ↑incidence of low apgar
- Scores and perinatal death (Ref High risk pregnancy Manju puri SS. Trivedi, p 493)
- ↑Still birth rate
- In adult life – such fetuses have increased chances of obesity and heart diseases.

18. Ans. is c i.e. Heart disease *Ref. Dutta Obs. 7/e, p 602*

Maternal Death – Death of a woman while pregnant or within 42 days of termination of pregnancy irrespective of the duration and site of pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accident or incidental causes is called as maternal death.

Maternal Mortality Ratio (MMR)	Maternal Mortality Rate
No of maternal deaths per 100,000 live births In India: MMR is 212 per 100,000 live births **Note:** The MMR is expressed in per lac live births^Q	No of maternal deaths divided by the number of women in reproductive age (15-49). It is expressed per 100,000 women of reproductive age per year India it is 120 as compared to 0.5 in us



So heart disease is an indirect cause of maternal death and not a direct cause.

19. Ans. is c i.e. A woman presenting with life-threatening conditions but has survived

Ref. Master Pass in Obs/Gynae Konar, p 341

A woman presenting with any life-threatening condition and survived, is considered as a Maternal Near Miss case.

Maternal Near Miss is a retrospective event. From the definition point of view, woman can only be recognized as a maternal near miss, when she survives the server complications in pregnancy, labour or postpartum six weeks.

20. Ans. is d i.e. Blood transfusions *Ref. Internet search*

Basic emergency obstetric services include	Comprehensive emergency obstetric services include
• Parenteral oxytocics	• Basic services
• Antibiotics and anticonvulsants	• Casarean sections
• Assisted deliveries	• Blood transfusions
• Manual extraction of the placenta	• Neonatal resuscitation facility
• Removal of retained products	

21. Ans. is b i.e. IUD *Ref. Dutta Obs. 7/e, p 78*

Condition where the Height of Uterus is more than the Period of Amenorrhea:
- Mistaken dates
- Twins
- Polyhydramnios
- Big baby
- Pelvic tumours - Ovarian/fibroid
- H mole
- Concealed accidental hemorrhage.

Conditions where the Height of Uterus is less than the Period of Amenorrhea:
- Mistaken dates
- Scanty liquor
- Fetal growth restriction
- Intrauterine fetal death.

22. Ans. is d i.e. All of the above *Ref. Harrison 17/e, p 413 for option a; Wiliams 23/e, p 854*

Beckwith syndrome: It is characterized by macrosomia, macroglossia and omphalocele. Cytogenetic location is 11q15 and is associated with Wilm's tumour of kidney. *—Harrison 17/e, p 413*

Diabetic mother: Maternal diabetes is an important risk factor for development of fetal macrosomia.

Other risk factors which favour the risk likelihood of large fetus are: *—Williams 23/e, p 854*
- Large size of parents specially the mother who is obese *(Option "c")*
- Multiparity
- Prolonged gestation
- Increased maternal age
- Male fetus
- Previous infant weighing more than 4 kg
- Race/ethnicity.

23. Ans. is c i.e. PIH *Ref. Dutta Obs. 7/e, p 262*

Disorders most common in Multiparae during Pregnancy:
- Anemia
- Twins (5th gravida onwards)
- Rh isoimmunization
- Abortion
- Placenta previa
- Prematurity
- H mole
- Abruptio placentae
- Precipitate labour

During Labour:
- Cord prolapse
- Rupture uterus
- Operative interference
- Cephalopelvic disproportion
- Post partum hemorrhage
- Obstructed labour
- Shock

Disorders most common in Nullipara:
- Hyperemesis gravidarum
- PIH
- Pyelonephritis in pregnancy

SECTION 3

Abnormal Labor

25 Preterm Labor, PROM and Postdated Pregnancy

QUESTIONS

1. **All of the following are risk factors for preterm labor *except*:** **[LEP]**
   a. Previous history of preterm birth
   b. Multiple pregnancy
   c. Previous LLETZ
   d. Marfan's syndrome
   e. Punch biopsy of cervix

2. **Risk of preterm delivery is increased if cervical length is:** **[AI 05]**
   a. 2.5 cm b. 3.0 cm
   c. 3.5 cm d. 4.0 cm

3. **Cut-off value of cervical length at 24 weeks of gestation for prediction of preterm delivery is:** **[AI 03]**
   a. 0.5 cm b. 1.5 cm
   c. 2.5 cm d. 3.5 cm

4. **On TVS which of the following shape of cervix indicates preterm labour:** **[AI 07]**
   a. T b. Y
   c. U d. O

5. **All are used in preterm labour to decrease uterine contractility except?** **[AIIMS Dec 97]**
   a. Methylalcohol
   b. Ritodrine
   c. Magnesium sulphate
   d. Dexamethasone

6. **Which of the following drugs may be used to arrest premature labour?** **[AI 99]**
   a. Aspirin
   b. α-Methyl dopa
   c. Magnesium sulphate
   d. Diazoxide

7. **All are tocolytics *except*:** **[AI 08]**
   a. Ritodrine b. Salbutamol
   c. Isoxsuprine d. Misoprostol

8. **In primi, in preterm labour, all of the following can be used as Tocolytic *except*:** **[PGI Dec 08]**
   a. Ritodrine b. $MgSO_4$
   c. Dexamethasone d. Propranolol

9. **Drug used for preventing preterm labor:** **[LEP]**
   a. Estrogen b. Progesterone
   c. Nifedipine d. Ritrodrine

10. **A pregnant mother at 32 weeks gestation presents in preterm labour. Therapy with antenatal steroids to induce lung maturity in the fetus may be given in all of the following conditions *except*:** **[AI 04]**
    a. Prolonged rupture of membranes for more than 24 hours
    b. Pregnancy induced hypertension
    c. Diabetes mellitus
    d. Chorioamnionitis

11. **A 32-year-old female with a history of 2 mid-trimester abortions, comes now with 32 weeks of pregnancy and labour pains with Os dilated 2 cm. All are done, *except*:** **[AI 00]**
    a. Immediate circlage b. Betamethasone
    c. Antibiotics d. Tocolytics

12. **G3 with previous second trimester abortion presents with 22 week of gestation, abdominal pain, USG shows funneling of internal os. What is the ideal management?** **[AIIMS Nov 07]**
    a. Dinoprost and bed rest
    b. Misoprost and bed rest
    c. Fothergills stitch
    d. McDonald stitch

13. **A woman at 32 weeks of pregnancy, presents with labour pains. On examination, her cervix is dilated and uterine contractions are felt. The management is:** **[AI 00]**
    a. Isoxsuprine hydrochloride
    b. Dilatation and evacuation

c. Termination of pregnancy
d. Wait and watch

14. All of the following are known side effects with the use of tocolytic therapy *except*: [AIIMS May 03]
a. Tachycardia b. Hypotension
c. Hyperglycemia d. Fever

15. Adverse effect of tocolytic agonist in pregnancy:
a. HTN b. ↓ glucose
c. ↓ K^+ d. Arrythmia
e. Pulmonary edema

16. The drug that inhibits uterine contractility and cause pulmonary edema is: [AIIMS May 01]
a. Ritodrine b. Nifedipine
c. Indomethacin d. Atosiban

17. Drug given to reduce uterine contractions during preterm labour with least side effects:
a. Ritodrine **[AIIMS Nov 07]**
b. Nifidipine
c. Magnessium sulphate
d. Progesterone

18. Best tocolytic in a cardiac patient is: [New Pattern Question]
a. Atosbian b. Isoxsuprine
c. Nifedipine d. $MgSO_4$

19. All of the following are contraindications to tocolysis *except*: [New Pattern Question]
a. Chorioamnionitis b. Fetal distress
c. Anencephaly d. Placenta previa

20. AG_2P_1 to female has a history of previous preterm birth at 32 weeks. The percentage chances of preterm birth in this pregnancy are: [New Pattern Question]
a. 5% b. 10%
c. 15% d. 25%

21. A G_2P_1 female at 35 weeks experiences uterine contractions. No fetal distress is seen and membranes are not ruptured. Which of the following is to be done? [New Pattern Question]
a. 12 mg betamethasone injection
b. Vaginal swab culture
c. Tocolytic therapy
d. Cervical cerclage

22. Rupture of membrane is said to be premature when it occurs at? [AI 97]
a. 38 weeks of pregnancy
b. 32 weeks of pregnancy
c. Prior to Ist stage of labour
d. II stage of labour

23. A lady presented with features of threatened abortion at 32 weeks of pregnancy. Which of the following statements with regard to antibiotic usage is not correct? [AIIMS May 2010]
a. Antibiotic prophylaxis even with unruptured membranes
b. Metronidazole, if asymptomatic but significant bacterial vaginosis
c. Antibiotics if asymptomatic but significant bacteremia
d. Antibiotics for preterm premature rupture of membranes

24. All are true about premature rupture of membrane (PROM) *except*: [PGI May 2010]
a. Amnioinfusion is done
b. Amoxiclav antiobiotic should be given
c. Aseptic cervical examination
d. Steroid is used
e. Preterm labour

25. Blood will interfere with the nitrazine test for detecting ruptured membranes because: [New Pattern Question]
a. It is acid
b. It is alkaline
c. It contains increased amounts of sodium chloride
d. It contains decreased amounts of sodium chloride
e. It reacts with the normal flora of vaginal bacteria to give an acid reaction

26. A 35-year-old G2P1L1 presents to antenatal clinic at 35 weeks of pregnancy with C/O, leaking pervagina. Sample of pooled liquid turned red litmus paper blue and ferning was present.The temperature of the patient is 102-F and her pulse is 104. What is the next step in management?
a. Administer betamethasone
b. Administer tocolytics
c. Administer antibiotics
d. Place a cervical cerclage

27. Delayed labour occurs in: [PGI Dec 01]
a. Early use of epidural anesthesia with analgesia
b. Early use of analgesia
c. Unripened cervix
d. Preeclampsia
e. Use of sedative early in course of labour

28. A woman comes with postdated pregnancy at 42 weeks. The initial evaluation would be:
a. Induction of labour **[AIIMS May 01]**
b. Review of previous menstrual history
c. Cesarean section
d. USG

29. Post-term labour is seen in: [New Pattern Question]
a. Hydramnios b. PID
c. Anencephaly d. Multiple pregnancy

30. In post-term pregnancy, there is increased risk of all *except*: [New Pattern Question]
a. Postpartum hemorrhage
b. Meconium aspiration syndrome
c. Intracranial hemorrhage
d. Placental insufficiency leading to fetal hypoxia

31. Saffron coloured meconium is seen in: [New Pattern Question]
a. Postmaturity b. TB
c. Breech d. Normal in appearance

32. All are risk factors for preterm delivery *except*: [New Pattern Question]
a. Absence of fetal fibronectin at < 37 weeks
b. Previous history of preterm baby
c. Asymptomatic cervical dilatation
d. Chylamydial infection of genital tract

EXPLANATIONS & REFERENCES

1. Ans. is e i.e. Punch biopsy of cervix *Ref. Fernando Arias 4/e, p 136, 137*

Risk factors for preterm labor:
1. H/O previous preterm labor
2. In utero exposure to DES
3. Cervical surgery like cone biopsy, LLETZ, Laser ablation and trachelectomy.

Note: Punch biopsy, Laser vaporisation and cryotherapy have not been associated with preterm birth.

4. Obstetrical trauma to cervix during labor or delivery including spontaneous labor, forceps and vacuum delivery and cesarean section.
5. Uterine overdistension as in multifetal pregnancy, polyhydramnios.
6. Multiple dilation and evacuation
7. Infections like bacterial vaginosis, asymptomatic
8. Connective tissue disorders—Ehlers-Danlos syndrome, Marfan's syndrome
9. Preterm premature rupture of membranes
10. Uterine anomalies – unicornuate uterus.

Note: M/C cause of preterm labor – idiopathic followed by infection.

2. Ans. is c i.e. 2.5 cm *Ref. Dutta Obs. 7/e, p 314; Fernando Arias 3/e, p 229, 230*

3. Ans. is c i.e. 2.5 cm.

Preterm labour (PTL): Preterm labour is defined as labour (regular, painful frequent uterine contractions causing progressive effacement and dilatation of cervix) occurring before 37 completed weeks of gestation.

"Risk of preterm birth increases markedly when the cervix is less than 2.5 cms. This measurement has been widely accepted as the threshold to define the risk of premature birth. The possibility of preterm delivery when the cervix is < 25 mm is 17.8%. This risk is significantly greater than the normal risk, and hence these women require additional diagnostic tests and special care." *—Fernando Arias 3/e, p 229, 230*

Also know:

- *Most common cause of preterm labour is idiopathic followed by infection like urinary tract infection, vaginal infections etc*
- Most common organisms responsible for preterm labour:
  Ureoplasma urealyticum and Gardenerella vaginum causing bacterial vaginosis.
- **Diagnosis of Preterm labour is by:** *—Dutta 7/e, p 314*
  - Regular uterine contractions with or without pain (at least 4 in every 20 min or 8 in 60 min).
  - Dilatation (> 2 cm) and effacement (80%) of cervix.
  - ***Length of cervix (measured by TVS) < 2.5 cm and funneling of internal os.***
  - Pelvic pressure, backache and or vaginal discharge or bleeding.

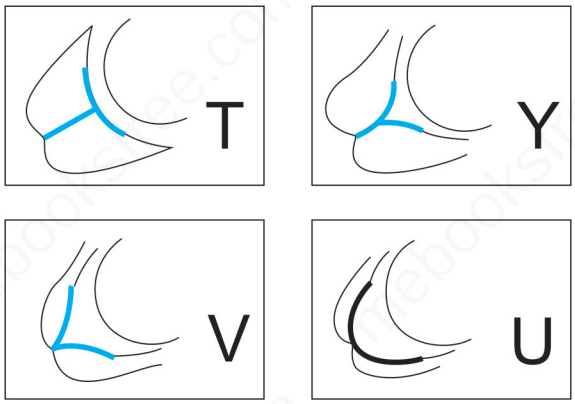
Thus for detecting preterm labor -TVS should be done and cervical length measured.Besides this fetal fibronectin if present in vaginal /cervical secretions before 37 weeks indicates preterm labor.

Fetal fibronectin:
- It is a fetal glycoprotein.
- Normally it is found in the cervico vaginal discharge before 22 weeks and again after rupture of membranes.
- If detected in cervicovaginal secretions prior to rupture of membranes, it indicates disruption of the maternal-fetal interface and may be predictive of impending preterm labour.
- It is measured by ELISA and a value equal to or exceeding 50 ng/ml is considered positive and predictive of preterm delivery.
- When the test is negative it reassures that delivery will not occur within next 14 days.

Remember: *Fetal fibronectin equal to or more than 50 ng/ml and cervical length < 2.5 cm on TVS are the best predictors especially in a woman with a prior history of preterm birth.*

4. Ans. is c i.e. U *Ref. USG in Obs. and Gynae. Callens 4/e, p 581, 582; Donald School Textbook of USG in Obs., p 342; Fernando Aris 3/e, p 265*

Shape of cervix	Seen in
T shaped	Normal
Y shaped	Suspicious of preterm labor
U shaped	Funneling of os-seen in incompetent os, preterm labor



Extra Edge:

Ultrasound of cervix during pregnancy *—USG in Obs. and Gynae. Callens 4/e, p 581*

- Cervical (endocervical) length is the distance between the internal os and external os.
- There are three ways to measure cervical length by sonography: transabdominal, transvaginal, and translabial (transperineal).
- Transvaginal sonography is the best method for cervical measurement.

5. Ans. is d i.e. Dexamethasone

6. Ans. is c and d but c > d i.e. Magnesium sulphate and Diazoxide

7. Ans. is d i.e. Misoprostol

8. Ans. is a and b i.e. Ritodrine and $MgSO_4$.

Ref. Fernando Arias 3/e, p 227; COGDT 10/e, p 275; Dutta Obs. 7/e, p 508

***Tocolytics** are drugs to arrest preterm labor.*
In case of preterm labor main problem is lungs of the fetus are not mature so the main treatment is antenatal steroid injection to the mother ,but steroids require a minimum waiting period of 24 hours to act, so in the meanwhile tocolytics are given to arrest uterine contractions.

Commonly used tocolytics are:

Mnemonic—
PCOD Mein NO Bleeding
P = **P**rostaglandin synthetase inhibitors (indomethacin, sulindac)
C = **C**alcium channel blocker (nifedipine)
O = **O**xytocin antagonist, i.e. atosiban
D = **D**iazoxide *—Fernando Arias 3/e, p 227*
Mein = **M**agnesium sulfate
NO = **N**itric **o**xide donor (glyceryltrinitrate)
Bleeding = **B**etamimetics (ritodrine, terbutaline, salbutamol and isoxsuprine HCl)

Drugs with tocolytic effect but poor efficacy:

—KDT 6/e, p 319

- Ethyl alcohol[Q]
- Nitrites[Q]
- Atropine[Q]
- Phenothiazine[Q]
- General anaesthetics[Q]

Note: Dexamethasone is used for fetal lung maturation in case of preterm labour but has no role as a tocolytic.

Progesterone: *Williams 23/e, p 816, Fernando Arias 2/e, p 87*

- Progesterone is not a tocolytic, it cannot stop pretern labor once contractions begin.
- It is used for prevention of miscarriages. and prevention of preterm labour.
- Progesterone is used only in those females who have risk factors for preterm labor but not in those in whom preterm labor has already begun.

Diazoxide: *—Fernando Arias 3/e, p 227*

- It is a thiazide diuretic used to arrest preterm labour.
- Hypotension, tachycardia, hyperglycemia and decreased utero placental flow are some important maternal side effects.
- Hyperglycemia and fetal distress due to decreased utero placental flow are fetal side effects.
- *Diazoxide has more fetal adverse effect than Magnesium sulphate, so, $MgSO_4$ is a better tocolytic if we have to choose one answer out of these two.*

9. Ans. is b i.e. Progesterone *Ref. Fernando Arias 4/e, p 138*

Drug used for preventing preterm labor is progesterone.

Also know:

- Progesterone is not a tocolytic
- Therapeutic cervical circlage can also be used for preventing preterm labor in pregnant females with gestational age <32 weeks and short cervix.
- $MgSO_4$, 4 g i/v loading dose followed by maintenance dose of 1g/hr for 24 hours, reduces the risk of cerebral palsy in preerm infants. Thus, $MgSO_4$ should be given to all females having preterm labor between 24-32 weeks.

10. Ans. is d i.e. Chorioamnionitis

Ref. Meherban Singh 5/e, p 227; Fernando Arias 3/e, p 220; Sheila Balakrishnan p 230

"Corticosteroids can be given even in presence of maternal hypertension or diabetes mellitus, but should preferably be avoided if PROM is associated with definitive evidence of chorioamnionitis" *—Meherban Singh 5/e, p 227*

"Steroid treatment is contraindicated in presence of overt infection." *—Fernando Arias 3/e, p 220*

Steroid therapy in preterm labour:

- Steroids are recommended for all women in preterm labour before 32 weeks with or without membrane ruptures in whom there is no evidence of chorioamnionitis. According to ACOG, single dose steroid injection is recommended between 24 to 32 weeks. There is no concensus regarding treatment between 32-34 weeks. Corticosteroid therapy is not recommended before 24 weeks.

Advantage:

- Steroids reduce the rate of respiratory distress syndrome, intraventricular hemorrhage and necrotising enterocolitis in the newborn.
- The effect of treatment is maximal between 24 hours of the first dose and uptil 7 days.
- Earlier it was recommended to give repeated doses weekly till the patient delivers but this practice is associated with significant fetal and neonatal side effects like cerebral palsy and should be abandoned.
- Betamethasone is the steroid of choice as it also prevents periventricular leukomalacia although dexamethasone can also be used.
- Dose: (1) Betamethasone = 2 doses of 12 mg, 24 hours apart, (2) Dexamethosane: 4 doses of 6 mg, 12 hours apart.

11. Ans. is c i.e. Antibiotics *Ref. Williams Obs. 24/e, p 850, 851*

In the question, patient is presenting with history of 2 midtrimester abortions and gestational age is 32 weeks with labor pains and dilatation of cervix 2 cm

The membranes are not ruptured, hence management includes:

- **Betamethasone:** To accelerate lung maturation of the fetus.
- **Tocolysis:** Tocolytics are not given with the aim to arrest preterm labor for a long time, but to prolong the labor for 48 hours.

This servers the following purposes:
- The corticosteroids get time to act.
- Allows time for transport of the woman to better obstetrical centre.

Beta-adrenergic agonists, calcium-channel blockers, or indomethacin are the recommended tocolytic agents for such short-term use–up to 48 hours. American college of obstetrics and gynecology recommends that women with preterm contractions without cervical change, especially those with cervical dilation of less than 2 cm, generally should not be treated with tocolytics.

In general, if tocolytics are given, they should be administered concomitantly with corticosteroids. The gestational age range for their use in debatable. However, because corticosteroids are not generally used after 33 weeks and because the perinatal outcomes in preterm neonates are generally good after this time, most practitioners do not recommend use of tocolytics at or after 33 weeks.

In this patient G: Age is 32 weeks and cervix is 2 cm dilated so the use of tocolytics is justified

- **Rescue cerclage *(Williams 24/e, p 857)*:** There is support for the concept that cervical incompetence and preterm labor lie on a spectrum leading to preterm delivery. If cervical incompetence is recognized with threatened preterm labor, then emergency cerclage can be attempted.

Cervical cerclage is done in 3 conditions:
1. Cervical incompetence
2. Prophylactically in women identified on USG to have short cervix <15 mm
3. Rescue cerclage–as discussed above.

- **Antibiotics: Do not have a role in preterm pregnancy with intact membranes.** In a study (ORACLE 11 trial) antimicrobials were given to patients with preterm labor but without membrane rupture, the results were disappointing. In his review, Goldenberg (2002) also concluded that antimicrobial treatment of women with preterm labor for the sole purpose of preventing delivery is generally not recommended. In a follow-up of the ORACLE II trial, Kenyon and associates (2008 b) reported that fetal exposure to antimicrobials in this clinical setting was associated with an increased cerebral palsy rate at age 7 years compared with that of children without fetal exposure.

Also know management of preterm labour with ruptured membranes

Gestational age	Management
34 weeks or more	Proceed to delivery, usually by induction of labor
	Group B streptococcal prophylaxis is recommended
32 weeks to 33 completed weeks	Expectant management unless fetal pulmonary maturity is documented
	Group B streptococcal prophylaxis is recommended
	Corticosteroids–no consensus, but some experts recommend
	Antimicrobials to prolong latency if no contraindications
24 weeks to 31 completed weeks	Expectant management
	Group B streptococcal prophylaxis is recommended
	Single-course corticosteroid use in recommended
	Tocolytics–no consensus
	Antimicrobials to prolong latency if no contraindications
Before 24 weeks[a]	Patient counseling
	Expectant management or induction of labor
	Group B streptococcal prophylaxis is not recommended
	Corticosteroids are not recommended
	Antimicrobials–there are incomplete data on use in prolonging latency

12. Ans. is d i.e. McDonald stitich *Ref. Dutta Obs. 7/e, p 171*

Patient presenting at 22 weeks with:

- Funnelling of cervix on ultrasound examination and history of second trimester abortions indicating cervical incompetence as the cause of preterm labor. In this case Mc Donald stitch will be the ideal treatment as it will prevent preterm labor.

13. Ans. is a i.e. Isoxsuprine hydrochloride *Ref. Dutta Obs. 7/e, p 316-508; Fernando Arias 3/e, p 223, 224, 227, 228*

Now, in this case note - patient is presenting at 32 weeks (i.e., third trimester) with cervix dilated and uterine contractions are felt, which indicate it is a case of early preterm labour and should be managed by giving tocolytics i.e. isoxsuprine hydrochloride.

The tocolytic will delay labor by 48 hours, in the mean while we will give corticosteroids, so that the lung of the fetus matures.

14. Ans. is d i.e. Fever *Ref. Dutta Obs. 7/e, p 508]*

15. Ans is c, d and e i.e. ↓ K^+; Arrythmia and Pulmonary edema. *Ref. Fernando Arias 3/e, p 224-227; COGDT 10/e, p 276, Dutta Obs 7/e, p 508.*

Friends I am listing down the side effect of various tocolytics, just go through them. Amongst them, most important are side effects of betamimetics.

Commonly used tocolytics

Drugs	Maternal side effects	Fetal side effects
i. Betamimetics – Ritodrine – Salbutamol – Terbutaline – Isoxsuprine HCl	Tachycardia[Q], hypotension[Q], pulmonary oedema[Q], myocardial ischemia, hyperglycemia[Q] hypokalemia, cardiac arrythmias	Tachycardia, hyperglycemia hyoglycemia, ileus, increased risk for intraven- tircular hemorrhage
ii. Indomethacin/Sulindac	GI side effects, coagulation disturbances thrombocytopenia, hepatitis, renal failure elevated BP only in hypertensive patients	Renal dysfunction, oligohy- draminos, hypertension, pre-mature pulmonary closure of ductus arteriosus in utero[Q] Increased risk of IVH and necrotising enterocolitis
iii. Glyceryl trinitrate patch	Headache[Q]	
iv. Magnesium sulphate	Diplopia, Respiratory depression[Q], **pulmonary edema[Q]**, cardiac arrest, hypothermia, Neuromuscular toxicity[Q], tetany (i.e. contraindicated in myasthenia gravis and renal failure)	Lethargy, hypotonia, respira-tory depression, Intraventricular haemorrhage
v. Atosiban (Oxytocin antagonist)	Nausea, vomiting, arthralgia	
vi. Nifedipine (Calcium channel blocker)	Headache	None

Remember– Most of the tocolytics lead to tachycardia, hypotension, (and not hypertension except indomethacin and that too only in hypertensive patients), **hyperglycemia** (not hypoglycemia), **hypokalemia**, pulmonary edema, respiratory depression, cardiac arrythmias and cardiac arrest.

16. Ans. is a i.e. Ritodrine *Ref. Fernando Arias 3/e, p 225; COGDT 10/e, p 276*

- Pulmonary edema is a serious complication of beta-adrenergic therapy (ritodrine) and $MgSO_4$.
- This complication occurs in patients receiving oral or (more common) intravenous treatment.
- It occurs more frequently in patients who have excessive plasma volume expansion, such as those with twins or those who have received generous amounts of intravenous fluids and in patients with chorioamnionitis.
- Patient presents with respiratory distress, bilateral rales on auscultation of the lungs, pink frothy sputum, and typical X-ray picture.
- Patients receiving IV beta-adrenergic drugs should be monitored continuously with pulse oxymeter to anticipate the development of pulmonary edema.

17. Ans. is b i.e. Nifedipine *Ref. Fernando Arias 3/e, p 224*

Well friends - I know most of you will raise your eyebrows on this question. But read for yourself what high risk pregnancy – Fernando Arias 3/e, p 224 has to say-

Nifedipine

"Randomized trials have demonstrated that nifedipine is a better tocolytic agent than ritodrine and terbutaline. Nifedipine is the best first line tocolytic agent available at this time.

Headaches are the main maternal side efect but overall the drug is well tolerated and has no apparent fetal effects." *—Fernando Arias 3/e, p 224*

"*When tocolysis is indicated for women in preterm labor, calcium channel blockers are preferred to other tocolytic agents compared mainly with betamimetics.*" *—Mgt of High Risk Pregnancy, SS Trivedi , Manju Puri*

So undoubtedly **nifedipine is the answer of choice as well as the tocolytic of choice.**

IInd choice tocolytics are - Beta adrenergic drugs. *—Fernando Arias 3/e, p 224*

As far as progesterones are concerned, though they are not associated with any significant side effect but tthey are not used as tocolytics.

They are used mainly for threatened abortion and for preventing preterm labor in patients who have risk factors for preterm labor.

18. Ans. is a i.e. Atosiban *Ref. Textbook of Obs.tetrics, Shiela Balakrishnan 1/e, p 231*

Role of Tocolytics in Heart Disease

- Most of the tocolytics are contraindicated in heart disease:
- Safest tocolytic is atosiban (oxytocin antagonist)
- Beta agonist is contraindicated in cardiac arrthymias, valvular disease and cardiac ischemia because of their sympathomimetic side effects such as tachycardia, palpitation and hypotension.
- Nifedipine is contraindicated in conduction defect, left ventricular failure due to side effects as tachycardia, hypotension, etc.

Tocolytics of choice	
• Overall tocolytic of choice	• Nifedipine
• Safest tocolytic agent	• Atosiban
• Most efficacious tocolytic agent	• Nifedipine
• Tocolytic preferred in heart disease	• Atosiban > $MgSO_4$

19. Ans. is d i.e. Placenta preiria contrandications to toclysis *Ref. Dutta Obs. 7/e, p 319*

Contraindications to tocolysis

- Chorioamnionitis
- Preeclampsia/eclampsia
- Advanced labor
- Fetal distress
- Abruption
- IUFD
- Congenital anomalies not compatible with life
- Pregnancy >34 weeks

As far as placenta previa is concerned tocolysis is not contraindicated

Management of patient with placenta previa and preterm labour:

- Tocolytic agent: *"Uterine contractions are common in patients with placenta previa. Since uterine contractions have the potential to, disrupt the placental attachment and aggravate the bleeding, most obstetricians favor the use of tocolytic agents in the expectant management of patient with placenta previa"*.... High risk pregnancy F ernando arias
- **Most commonly used tocolytics in case of placenta previa.**
  - Nifedipine
  - Magnesium sulphate
- **Tocolytics which are not used**
  - Terbutaline and Ritodrine: They cause tachycardia and make the assessment of patient's pulse rate unreliable.
  - Indomethacin: It causes inhibition of platelet cyclo oxygenase system and prolongs the bleeding time.

20. Ans is c i.e. 15% *Ref. Williams Obs 24/e, p 841*

Recurrent spontaneous preterm births according to prior outcome

Birth outcome	Second birth (< 34 weeks) (%)
First birth ≥ 35 weeks	5
First birth ≤ 34 weeks	16
First and second birth ≤ 34 weeks	41

21. Ans. is b i.e. Vaginal swab culture *Ref. Fernando Arias 3/e, p 240; Sheila Balakrishnan, p 233*

The patient is having uterine contractions at 35 weeks of pregnancy.

At 35 weeks:

- There is no role of Betamethasone (corticosteroid)."Current evidence supports the administration of a single course of antenatal corticosteroids between 24-34 weeks to enhance fetal lung maturation". *Ref. Arias 4/e, p 139*
- **Tocolytic therapy:** It is given for short-time use so that corticosteroids can act. Since at 35 weeks, there is no role of corticosteroid, So therefore, no role of Tocolytic.
- Cervical cerclage – no role at 35 weeks. Done before 32 weeks.
- Vaginal/rectal swab culture should be sent to detect group B streptococcus.

22. Ans. is c i.e. Prior to Ist stage of labour *Ref. Fernando Arias 3/e, p 240; Sheila Balakrishnan, p 233*

Premature rupture of membranes (PROM) is defined as spontaneous rupture of membranes before the onset of labour. Preterm premature rupture of membranes (PPROM) is defined as premature rupture of membranes before 37 completed weeks.

Also Know:

- The most probable cause of PROM is a reduction in membrane tensile strength caused by the effect of bacterial proteases or by repeated stretching caused by uterine contractions.
- Risk factors for PROM:
  - Incresing friabilty/decreased tensile strength of membranes mainly due to infections like bacterial vaginosis.
  - Polyhydrtamnios
  - Multiple pregnancy
    Cervical incompetence
    Previous H/O PROM.
- *The predominant risk for patients with PROM between 32 and 36 weeks is chorioamnionitis. Therefore the dominant tendency in their management should be toward delivery.*
- *The predominant risk for patients with PROM between 28 and 32 weeks is hyaline membrane disease. Administration of glucocorticoids and prolongation of the latent phase are beneficial for these patients if they do not have clinical or subclinical chorioamnionitis.*

23. Ans. is a i.e. Antibiotic prophylaxis even with unruptured membranes

Ref. Danforth'sobs and Gynae, 10/e, p 169, 170, 171,172; Williams Obs. 23/e, p 163; COGDT 10/e, p 281, 278; Fernando Arians 3/e, p 234, 235

In the question, patient is presenting at 32 weeks with features of threatened abortion, means she is having warning symptoms and sings of preterm labour viz:

- Menstrual like camps
- Low dull back ache
- Pelvic pressure
- Increase or change in vaginal discharge
- Fluid leaking from vagina
- Uterine contractions that are 10 or less than 10 minutes apart
- Lower uterine segment thinned out.

In such patients (i.e. patients at risk for preterm labour), management should be:

Diagnostic	Therapeutic
• Ultrasound examination of cervical length • ELISA test for detecting Fetalfibronectin Protein in cervico vaginal secretion	• Bed rest • Avoidance of coital activity· • Progesterone injection (weekly)Or suppository (daily) till 35 weeks of pregnancy

As far as – antibiotics are concerned:

"Antibiotic therapy as a treatment of preterm labour and a means of prolonging pregnancy has been studied and for the most part has shown no benefit in delaying preterm birth". *—COGDT 10/e, p 278*

Thus antibiotics prophyllaxis to prevent preterm birth in pregnant women with intact membranes is not recommended. (**i.e.** option 'a' **is incorrect**)

" Antibiotic prophylaxis is given to prevent preterm birth in pregnant women with preterm premature rupture of membranes (for pregnancies between 24 and 32 weeks) *—Fenando Arias 3/e, p 252*

One of the most important objectives of antibiotic treatment in women with PPROM is the prolongation of the latency period. Prolongation of the latency period is important because fetal lung maturity imporves with advancing gestational age, resulting in fewer days in the ventilator and shorter stay at NICU."

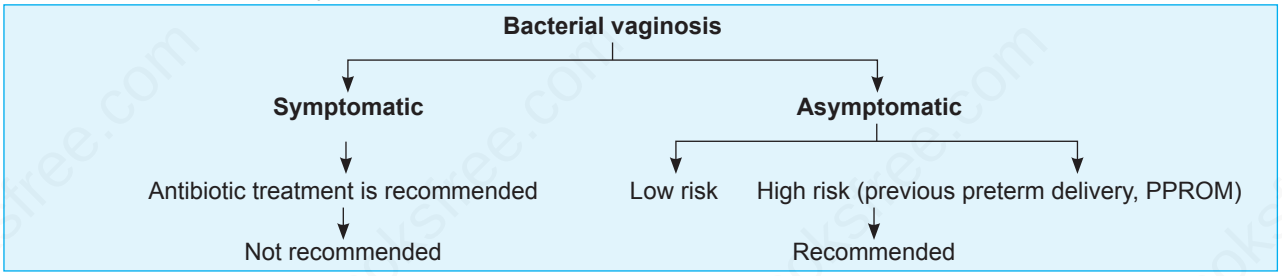
—Fernando Arias 3/e, p 252

Thus option 'd' **i.e.** antibiotics are recommended for preterm premature rupture of membranes is correct.

Now it is obvious – if a female is presenting with significant bacteremia, whether she is symptomatic or asymptomatic, we have to give antibiotics – that means option 'c' is also correct

Coming to option 'b' i.e. Metronidazole should be given for asymptomatic bacterial vaginosis, remains controversial

Williams 23/e. p 814 says – studies have found no evidence to support such use of metronidazole for prevention Some other books like – COGDT say –

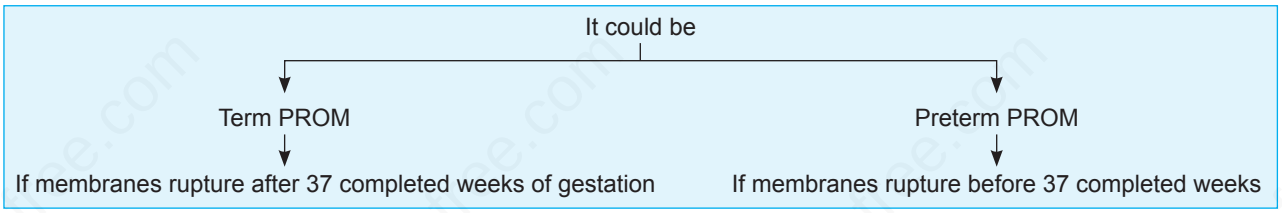


Thus option 'b' can be kept in +/- status

Since option 'a' is absolutely incorrect we are taking it, as the answer of choice.

24. Ans. is a i.e. Amnioinfusion is done. *Ref: Dutta'sobs 7/e, p 317, 318, Williams Obs 23/e, p 163, COGDT 10/e, p 281.*

PROM – is defined as spontaneous rupture of membranes before the onset of labour.



M/C etiology for PROM is infection (Chlamydia-trachomatis, group B streptococci and bacterial vaginosis)

- Patients present with a typical history of sudden gush of clear or pale yellow fluid leaking from vagina. However many women may present with history of intermittent or constant leaking of small amounts of fluid or just sensation of wetness within the vagina.

Diagnosis:

Per speculum examination – First step in the diagnosis of PROM includes **"a sterile per speculum examination** to demonstrate leaking. Pooling of fluid in the posterior fornix or leakage of fluid from the cervical os confirms the diagnosis of PROM.

A per vaginal examination should not be done as it increase the risk of intrauterine infection and preterm labour.

If the condition is still doubtful, following tests are done.

Nitrazine test	***Fern test***	***USG***	***FetalFibronectin Protein***
↓	↓	↓	↓
Principle = pH of aminiotic fluid = 7-7.5 pH of vagianal discharge = 3.5 – 4.5	- Fluid from the posterior vaginal fornix is swabbed on a glass	- incase of PROM - Shows ↓ in amniotic fuild	- It is a glycoprotein present in large amounts in amniotic fluid. It can be detected in 39%
yellow nitrazine paper is introduced in to the vagine	slide and allowed to dry for 10 minutes If on drying	or anhydramnios	of females with PROM by mains of an ELISA test.
if it turns blue ↓ pH is alkaline i.e. amniotic fluid is present (diagnosis of PROM confirmed)	if it remains yellow ↓ pH is acidic fluid is not present	ferm pattern seen ↓ amniotic fluid is present (PROM)	No ferning seen ↓ amniotic fluid is not present

– If the condition occurs before 34 seeks: Steroids are used to enhance fetal lung maturity.

– Antibiotics are given to prevent infection. PROM can lead to preterm labor

25. Ans. is b i.e. It is alkaline *Ref. Fernando Arias 3/e, p 245; COGDT 10/e, p 279*

Nitrazine test for Diagnosis of Premature rupture of Membranes:

Principle:	The vaginal pH is normally 4.5 to 5.5, where as amniotic fluid usually has a pH of 7.0 to 7.5.
Test:	Nitrazine paper is smeared with vaginal secretions.
Result:	Nitrazine paper will turn deep blue if amniotic fluid is present in vagina i.e., membranes have ruptured as pH will become alkaline. The membranes probably are intact if the color of the paper remains yellow or changes to olive-yellow (pH 5.0 to 5.5).
False result:	Antiseptic solution, urine, blood, and vaginal infections alter the vaginal pH and cause false-positive results.

26. Ans. is c i.e Administer antibiotics *Ref. Williams 23/e, p 819, Fernando Arias 3/e, p 197, 198*

The fluid in vagina is amniotic fluid , as it showed in fern pattern on microscopy (presence of sodium chloride in liquor) and the red litmus turned blue (vaginal pH is acidic; amniotic fluid is alkaline).

This patient with premature rupture of membranes (PROM) has a physical examination consistent with an intrauterine infection or chorioamnionitis.

Acute Chorioamniotis is diagnosed Clinically in presence of fever (>100 for 37.8 C) and atleast two of the following:
a. Maternal tachycardia
b. Fetal tachycardia
c. Uterine tenderness
d. Foul smelling amniotic fluid
e. Maternal leucocytosis

When chorioamnionitis is diagnosed, fetal and maternal morbidities increase and delivery is indicated regardless of the fetus's gestational age. In the case described, labor should be induced and antibiotics to be given to avoid neonatal group of strepto coccal infection. Ampicillin is the drug of choice.

There is no role for tocolysis in the setting of chorioamnionitis, since delivery is the goal: There is also no role for the administration of steroids as it is contraindicated in case of chorioamionitis.

Remember: Management of chorioamnionitis at any age is delivery, regardless of the gestational age.

27. Ans. is a, b, c and e i.e. Early use of epidural anesthesia with analgesia; Early use of analgesia; Unripened cervix; and Use of sedative early in course of labour *Ref. Dutta Obs. 7/e, p 401*

Delayed/prolonged labour:

"Labour is said to be prolonged when the combined duration of the first and second stage is more than the arbitrary time limit of 18 hours or when the cervical dilatation rate is less than 1 cm/hr and descent of the presenting part is < 1 cm/hr for a period of 4 hours (WHO-1994)."

Causes of Prolonged labour:

First stage	Second stage
• Fault in power: 1. Uterine inertia (common) 2. Incoordinate uterine contraction. 3. Epidural analgesia 4. Constriction ring	• Fault in the power: 1. Uterine inertia 2. Inability to bear down
• Fault in the passage: 1. Contracted pelvis 2. Cervical dystocia, 3. Pelvic tumour 4. Full bladder.	• Fault in the passage 1. Contracted pelvis 2. CPD 3. Pelvic tumour 4. Undue resistance of the pelvic floor or perineum due to spasm or old scarring
• Fault in the passenger: 1. Malposition and malpresentation 2. Congenital anomalies of the fetus (hydrocephalus). 3. Deflexed head	• Fault in the passenger 1. Malposition and malpresentation 2. Congenital anomalies of the fetus (hydrocephalus). 3. Big baby
• Others: Injudicious (early) administration of sedatives and analgesics before the active labour begins.	

28. Ans. is b i.e. Review of previous menstrual history *Ref. Dutta Obs. 7/e, p 319*

A pregnancy continuing beyond two weeks of the expected date of delivery (> 42 weeks or >294 days) is called postmaturity or post-term pregnancy. Pregnancy between 41-42 weeks is called prolonged pregnancy.

Most common cause of post term pregnancy is wrong dates so, a careful review of menstrual history is important in all such cases –

"If the patient is sure about her date with previous history of regular cycles, it is a fairly reliable diagnostic aid in the calculation of the period of gestation. But in cases of mistaken maturity or pregnancy occurring during lactational amenorrhoea or soon following withdrawal of the pill', confusion arises. In such cases, the previous well documented antenatal records of first visit in first trimester if available, are useful guides."

—Dutta Obs. 6/e, p 319

Once the menstrual history is confirmed, investigations like USG and amniocentesis are done:

i. To confirm fetal maturity

ii. To detect any evidence of placental insufficiency

29. Ans. is c i.e. Anencephaly *Ref. Dutta Obs. 7/e, p 320*

Causes of Post-term pregnancy:

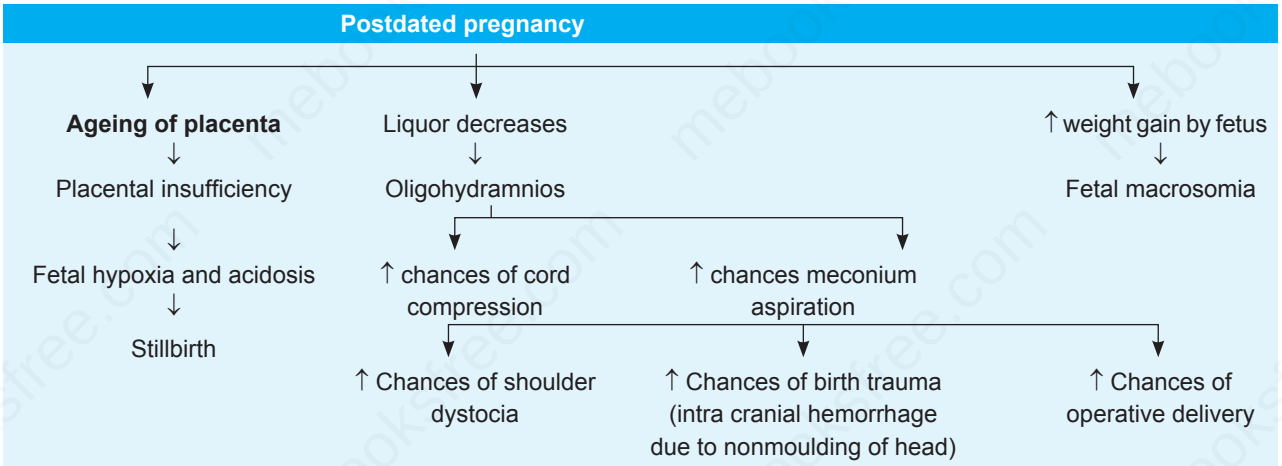
- Wrong dates: due to inaccurate LMP (most common).
- Biologic variability (Hereditary) may be seen in the family.
- Maternal factors: Primipara/elderly multipara/H/o previous prolonged pregnancy, sedentary habit.
- Fetal factors: Congenital anomalies: Anencephaly – (Abnormal fetal HPA axis), adrenal hypoplasia (Diminished fetal cortisol response).
- Placental factors: Sulphatase deficiency (Low oestrogen).

30. Ans. is a i.e. Postpartum hemorrhage *Ref. Dutta Obs. 7/e, p 320*

Post dated/post term/post maturity are pregnancies which have completed 42 weeks or 294 days as calculated from the first day of the LMP, assuring dates are correct.

In post dated pregnancy perinatal mortality and morbidity is much increased.

Fetal complications in Postdated pregnancy–



Neonatal complications:

- Chemical pneumonitis, atelectasis and pulmonary hypertension due to meconium aspiration.
- Hypoxia and respiratory failure.
- **Hypoglycemia and Polycythemia.**

Extra Edge:

Grade 0	Grade I	Grade II	Grade III
• Homogenous placenta	• Echogenic densities appear randomly dispersed in the organ, sparing its basal plate	• Echogenic densities appear in basal plate, comma-like densities	• Large echofree shadows appear in substance of placenta

Contd...

Contd...

• No echogenic densities	• Chorionic plate acquires subtle undulations	• Indentation of chorionic plate	• Marked indentation of chorionic plate giving appearance of ledon. The central portion becomes echofree.
• Smooth chorionic plate	• Nifedipine		

31. Ans. is a i.e. Postmaturity *Ref. Dutta Obs. 7/e, p 38*

Colour of Amniotic fluid

- Pregnancy – Colourless
- Near term – Pale straw coloured due to presence of exfoliated lanugo hairs and epidermal cells from the fetal skin.
- Abnormal colour
  - *Green* - meconium stained (fetal distress in conditions other than breech or transverse position).
  - *Golden yellow* - Rh-incompatibility.
  - *Greenish yellow (saffron)* - postmaturity.
  - *Dark coloured* - in concealed hemorrhage.
  - *Dark brown (tobacco juice)* - in case of IUD.

32. Ans. is a i.e. Absence of fetal fibronection at < 37 weeks *Ref. Fernando Arias 4/e*

Risk factors for preterm labour: have been discussed in Ans. 1

Fetal fibronectin

- It is a fetal glycoprotein found in the cervicovaginal discharge before 22 weeks and again after rupture of membranes.
- Levels of fibronectin > 50 mg/ml indicates preterm delivery (not absence of fibronectin).

26 Obstructed Labor and Intrauterine Death (IUD)

QUESTIONS

1. **Indicators of impending uterine rupture during labour include all of the following *except*:** **[AI 06]**
   a. Fetal distress
   b. Hematuria
   c. Fresh bleeding per vaginum
   d. Passage of meconium

2. **All are seen with scar dehiscence, *except*:**
   a. Maternal bradycardia **[AIIMS Nov 01]**
   b. Fetal bradycardia
   c. Vaginal bleeding
   d. Hematuria

3. **Blood in urine in a patient in labour is diagnostic of:**
   a. Impending scar rupture **[AIIMS May 08]**
   b. Urethral injury
   c. Obstructed labour
   d. Cystitis

4. **Hematuria during labour in previous LSCS is sign of:** **[AIIMS Nov 09]**
   a. Impending rupture of scar
   b. Urethral trauma
   c. Prolong labour
   d. Sepsis

5. **A woman comes with obstructed labour and is grossly dehydrated. Investigations reveal fetal demise. What will be the management?** **[AIIMS Nov 08]**
   a. Craniotomy b. Decapitation
   c. Cesarean section d. Forceps extraction

6. **30-year-old female comes with obstructed labour and is febrile ad dehydrated with IUFD and cephalic presentation. Which is the best way to manage?** **[AIIMS May 11]**
   a. Craniotomy b. Decapitation
   c. Cesarean section d. Forceps extraction

7. **The following statements are related to the management of obstructed labour *except*:** **[New Pattern Question]**
   a. There is no place of wait and watch policy
   b. Dehydration and ketoacidosis should be promptly corrected
   c. Oxytocin has got a definite place in the management
   d. Uterus should be explored as a routine following delivery

8. **Bandl's ring is also called as:** **[PGI June 98]**
   a. Constriction ring
   b. Schroeder's ring
   c. Retraction ring
   d. Cervical dystocia

9. **All are true about constriction ring *except*:** **[New Pattern Question]**
   a. Also called Schroeder's ring
   b. Can be caused by injudicious oxytocin use
   c. Ring can be palpated per abdomen
   d. Inhalation of amylnitrate relaxes the ring

10. **About constriction ring all are correct *except*:** **[New Pattern Question]**
    a. The ring is always felt on abdominal examination
    b. Usually situated around the neck of the fetus in cephalic presentation
    c. There is no progress of labour
    d. The ring is felt during caesarean section or forceps delivery or during manual removal of placenta

11. **Uterine rupture is least common with:** **[New Pattern Question]**
    a. LSCS
    b. Classical section
    c. Inverted T-shaped incision
    d. T-shaped incision

    Note: Most common cause of uterine rupture is separation of a previous cesarean hysterotomy scar.

12. In classical caesarean section more chances of rupture of uterus is in: **[New Pattern Question]**
a. Upper uterine segment
b. Lower uterine segment
c. Uterocervical junction
d. Posterior uterine segment

13. The following statements are related to rupture uterus *except*: **[New Pattern Question]**
a. Lower segment scar rarely ruptures during pregnancy
b. In incomplete rupture the peritoneal coat remains intact
c. Classical caesarean scar often rupture during late pregnancy
d. Risk of lower segment scar rupture is high compared to classical scar rupture

14. All are done in management of shoulder dystocia *except*: **[AIIMS Nov 08, AI 10]**
a. Fundal pressure
b. Mc Roberts manoeuvre
c. Suprapubic pressure
d. Woods manoeuvre

15. Shoulder dystocia result in the following *except*:
a. Sternomastoid swelling **[PGI Dec 97]**
b. Erb's palsy
c. Klumpke's paralysis
d. None of the above

16. Sudden hyperflexion of thigh over abdomen (McRoberts manoeuvre) with of the following nerve is commonly involved? **[AIIMS Nov 08]**
a. Common peroneal nerve
b. Obturator nerve
c. Lumbosacral trunk
d. Lateral cutaneous nerve of thigh

17. A 27-year-old G1P0 woman at 39 weeks' gestation presents to the labor and delivery suite and progresses through the stages of labor normally. During delivery of the infant, the head initially progresses beyond the perineum and then retracts. Gentle traction does not facilitate delivery of the infant. Which of these options is the first step in the management?
a. Abduct mothers thigh and apply suprapubic pressure
b. Apply fundal pressure
c. Flex mothers thigh against her abdomen
d. Push infants head back into the uterus and do cesarean section
e. Do a symphiosotomy

18. All are true regarding dystocia *except*: **[New Pattern Question]**
a. Dystocia is difficult labor
b. It is the M/C indication for primary cesarean delivery
c. ACOG recommends the cervix should be atleast 2 cm dilated for diagnosis of dystocia
d. Dystocia can be due to abnormality in power, passage and passenger

19. A primigravida with full term pregnancy in labor for 1 day is brought to casualty after dia handing. On examination she is dehydrated, slightly pale, bulse 100/min, BP120/80 mm Hg. abdominal examination reveals a fundal height of 36 weeks, cephalic presentation, foetal heart absent, mild uterine contractions present. On P/V examination, cervix is fully dialted, head is at +1 station, caput with moulding present, pelvis adequate. Dirty, infected discharge is present. What would be the best management option after initial work-up?
a. Cesarean section **[New Pattern Question]**
b. Oxytocin drip
c. Ventouse delivery
d. Craniotomy and vaginal delivery

20. The correct match of abnormal uterine action is: **[New Pattern Question]**

A. Constriction ring	1. Cervix fails to dilate even with normal uterine contraction
B. Spastic lower segment	2. Increased basal tone above 20 mm of Hg
C. Bandl's ring	3. Uterine rupture is unlikely
D. Cervical dystocia	4. Always situated at the junction of upper and lower uterine segment.

a. A = 2 B = 3 C = 4 D = 1
b. A = 4 B = 1 C = 3 D = 2
c. A = 3 B = 2 C = 4 D = 1
d. A = 4 B = 2 C = 3 D = 1

21. Hypertonic dysfunctional labour is generally characterised by: **[New Pattern Question]**
a. Rapid cervical dilatation
b. Less pain in labour
c. Responds favourably to oxytocin stimulation
d. Needs adequate pain relief

22. The features of uterine contraction in spastic lower segment are all *except*: **[New Pattern Question]**
a. Presence of fundal dominance
b. There may be reversed polarity
c. Inadequate relaxation in between contractions
d. Basal tonus is usually raised above the critical level of 20 mm Hg

23. A multipara with previous LSCS comes at 38 weeks pregnancy in shock. Differential diagnosis includes:
a. Placenta previa **[PGI June 06]**
b. Abruptio placenta
c. Rupture uterus

24. True about intrauterine fetal death (IUD):
a. Gas bubbles in great vessels **[PGI Dec 03]**
b. Halo's sign +ve
c. Overlapping of skull bone
d. Decreased amniotic fluid volume

25. USG sign of fetal death: **[PGI June 01]**
a. 'Halo' sign of head
b. Heart beat absent
c. Spalding sign
d. Hegar's sign

26. Spalding's sign is seen in: **[PGI June 99; Dec 98]**
a. Still born b. Live born
c. Premature d. Dead born

27. In a pregnant woman of 28 weeks gestation IUD is earliest demonstrated on X-ray by:
a. Increased flexion **[PGI Dec 98]**
b. Overlapping of cranial bone
c. Spalding's sign
d. Gas in vessels

28. Cause of death in breech delivery: **[PGI Dec 97]**
a. Intracranial hemorrhage
b. Aspiration
c. Atlanto axial dislocation
d. Asphyxia

29. In intrauterine death with transverse lie, the following are treatment options *except*: **[PGI June 99]**
a. Decapitation b. Evisceration
c. Craniotomy d. Cesarean section

30. A Patient at 22 weeks gestation is diagnosed as having IUD which occurred at 17 weeks but did not have a miscarriage. This patient is at increased risk for: **[New Pattern Question]**
a. Septic abortion
b. Recurrent abortion
c. Consumptive coagulopathy with hypofibrinogenemia
d. Future infertility
e. Ectopic pregnancy

31. Which is most likely complication of IUD? **[New Pattern Question]**
a. Hypofibrinogenemia
b. Sterility
c. Cervical tear
d. None of the above

32. Intrauterine death at 36 weeks. Treatment is: **[New Pattern Question]**
a. Continue upto term
b. Wait for spontaneous expulsion
c. Syntocinon + ARM
d. Hysterectomy
e. LSCS

33. Early fetal death is death of fetus at: **[New Pattern Question]**
a. 10 weeks
b. < 20 weeks
c. < 28 weeks
d. > 20 weeks

34. A G_2P_{1+0} at 36 weeks of gestation has a H/O prior still birth at 37 weeks. The best time of delivery for the patient this time is: **[New Pattern Question]**
a. Immediately
b. 37 weeks
c. 38 weeks
d. 39 weeks

EXPLANATIONS & REFERENCES

1. **Ans. is d i.e. Passage of meconium** *Ref. Munrokerr's 10/e, p 444,447; Dutta Obs. 7/e, p 328, Operative Obs and Gynae by Randhir Puri, Narendra Malhotra 1/e, p 203, COGDT 10/e, p 340*

2. **Ans. is a i.e. Maternal bradycardia**

Ref. Dutta Obs. 7/e, p 328; Operative Obs and Gynae, Randhir Puri and Narendra Malhotra 1/e, p 202, 203

Uterine rupture typically is classified as either complete (all layers of the uterine wall separated) or incomplete (uterine muscle separated but visceral peritoneum is intact). Incomplete rupture is commonly referred to as **scar dehiscence**.

Scar dehiscence is an intraoperative finding always.

The greatest risk factor for either complete or incomplete uterine rupture is prior cesarean delivery.

Following uterine rupture the most common electronic fetal monitoring finding is sudden, severe heart rate decelerations that may evolve into late decelerations, bradycardia, and undetectable fetal heart action.

In some cases in which the fetal presenting part has entered the pelvis with labor, loss of station may be detected by pelvic examination. If the fetus is partly or totally extruded from the site of uterine rupture, abdominal palpitation or vaginal examination may be helpful to identify the presenting part, which will have moved away from the pelvic inlet.

A firm contracted uterus may at times be felt alongside the fetus.

With rupture and expulsion of the fetus into the peritoneal cavity, the chances for intact fetal survival are dismal, and reported morality rates range from 50% to 75%.

Clinical features of Ruptured Uterus:

Impending Sear Rupture (Scar Dehiscence)	Ruptured Uterus
Unexplained maternal tachycardia	Weak thready fast material pulse
Hypotension	Shock
Fetal bradycardia	Absent fetal heart rate
Uterine scar tenderness	
Bleeding pv	
Hematuria	

Now coming to the question:

In Q1 – indicators of impending uterine rupture:

Option a – Fetal distress (correct)
Option b – Hematuria (correct)
Option c – Fresh bleeding per vaginum (correct)
Option d – Passage of meconium (+/-)

In case of impending rupture when fetal distress occurs, it may be followed by passage of meconium but meconium passage occurs/is a sign of fetal distress and not impending rupture. Moreover these days, meconium passage is not even taken as a sign of fetal distress since fetus can pass meconium without fetal distress, e.g. postdatism.

Hence the **correct option is d, i.e. passage of meconium.**

In Q2 – All are seen with scar dehiscence, *except*:

Option a – Maternal bradycardia
Option b – Fetal bradycardia
Option c – Vaginal bleeding
Option d – Hematuria

Remember – the following line of COGDT

"*there are no reliable signs of impending uterine rupture that occur before labour, although the sudden appearance of gross Hematuria is suggestive*." —*COGDT 10/e, p 340*

So we are left with 2 options – maternal bradycardia and fetal bradycardia.

"*Prolonged late and variable decelerations and bradycardia seen on FHR monitoring are the M/C and often the only manifestation of uterine rupture.* —*Williams Obs. 23/e, p 573*

"*The most common sign of uterine rupture is a non reassuring fetal heart rate pattern with variable deceleration evolving into late decelerations, bradycardia and undetectable fetal heart rate pattern".*

—*John Hopkins Manual of Obs. and Gynae 4/e, p 86*

Thus when impending rupture proceeds to complete rupture, fetal bradycardia occurs, so I am ruling out maternal bradycardia which never occurs.

Remember:
- M/C sign of impending rupture: Fetal brady cardia
- Most consistent sign of impending rupture: Fetal brady cardia

3. Ans. is c i.e. Obstructed labour *Ref. Dutta Obs. 7/e, p 404*

"In obstructed labour the bladder becomes an abdominal organ due to compression of urethra between the presenting part and symphysis pubis, the patient fails to empty the bladder. The transverse depression at the junction of the superior border of the bladder and the distended lower segment is often confused with the Bandles ring. The bladder wall gets traumatised which may lead to blood stained urine, a common finding in obstructed labour."

Also know:

Though hematuria can also indicate impending uterine rupture but for that obviously the patient should have a previous scar, atleast the question should say that patient has had a previous LSCS or something.

*Labour is said to be **obstructed** when despite good uterine contractions, there is arrest of progress due to mechanical factors causing obstruction to delivery.*

Causes:

Maternal:
- Contracted pelvis/CPD.
- Pelvic tumours like fibroids or ovarian tumours.
- Cervical dystocia due to previous scarring.

Fetal:
- Malposition (persistent occipito-posterior or deep transverse arrest).
- Malpresentations (neglected shoulder, brow or persistent mentoposterior).
- Macrosomia.
- Fetal anomalies (hydrocephalus, fetal ascites and abdominal tumours, conjoined twins).

Clinical features:
- ***General examination:*** The mother is exhausted, dehydrated, tachycardia, tachypnea and acidotic breathing present.
- Hematuria i.e., blood is present in urine.
- ***Abdominal examination.***
- Tonically contracted upper segment.
- Lower segment stretched.
- Bandl's ring running obliquely over the uterus and rising up.
- The upper and lower segments will be sharply demarcated.
- Evidence of fetal distress/Fetal heart sounds are usually absent.
- Vaginal examination:
  - Vagina is usually hot and dry and there may be offensive discharge.[Q]
  - Cervix is fully dilated and may be felt hanging loose.
  - Membranes are absent[Q].
  - Presenting part is usually jammed in pelvis. There may be hand prolapse in a neglected shoulder presentation. In cephalic presentations, there will be a large caput and irreducible moulding. So the lower pole may appear to be quite low even when the major part of the head is above the pelvic inlet and palpable per abdomen.

4. Ans. is a i.e. Impending rupture of scar *Ref. COGDT 10/e, p 340*

Now friends - here in the question it is asked specifically that hematuria is seen in a patient with previous LSCS during labour - which indicates **impending rupture of scar**.

"There are no reliable signs of impending uterine rupture that occurs before labor, although the sudden appearance of gross hematuria is suggestive." *COGDT 10/e, p 340*

Here in this questions obstructed labor is not given in the options, but even if it was given, I would have still opted for impending scar rupture as the question is specifically asking, in a case of previous LSCS.

5. Ans. is c i.e. Cesarean section *Ref. Textbook of Obstetrics Sheila Balakrishnan 1/e, p 474*

6. Ans. is c i.e. Cesarean section *Ref. Dutta 7/e, p 404, Textbook of Obs. Sheila Balakrishnan, p 479*

Always remember—two main principles in the management of obstructed labor are:

- Never wait and watch
- Never use oxytocin.

In case of obstructed labor there is a problem with either the passage or the passenger bur the uterus contracts adequately, so if we increase uterine contractions by giving oxytocin it will lead to uterine rupture.

***Note*: Oxytocin should be used in cases of prolonged labor where there are hypotonic uterine contractions. In obstructed labor.**

Management of obstructed labor:

- Management of dehydration—by giving i:v fluids
- Antibiotics are given to prevent infection
- Most important step is to relieve obstruction by either instrumental delivery or by doing LSCS. LSCS may even have to be done, if the baby is dead to relieve the obstruction otherwise uterine rupture can occur.

Management of a case of obstructed labour.

If fetus is alive	If fetus is dead	
↓	↓	
Immediate cesarean section	Earlier when obstetricians were skilled at performing destructive procedures and cesarean section was not considered safe	Modern days
	↓	↓
	Destructive procedures	Cesarean section

Note:

- At cesarean section, it is essential to exclude rupture uterus.
- Continuous bladder drainage must be done for atleast 10 days to prevent formation of a vesicovaginal fistula due to pressure necrosis.

- In the past destructive procedures were being done like craniotomy, but they are obsolete now and should not be performed rather friends they are never performed so even you should not answer them.

7. Ans. is c i.e. Oxytocin has got a definite place in the management *Ref. Dutta Obs 7/e, p 59*

Principles for management of obstructed labor:

- **To relieve** the obstruction at the earliest by a safe delivery procedure (there is no place for wait and watch)
- **To combat** dehydration and ketoacidosis
- **To control sepsis.**

Remember:

- Before proceeding for definitive operative treatment, rupture of the uterus must be excluded.
- Oxytocin should never be used in management of obstructed labor.

8. Ans. is c i.e. Retraction ring *Ref. Dutta Obs. 7/e, p 362*

9. Ans. is c i.e. Ring can be palpated per abdomen

10. Ans. is a i.e. The ring is always felt on abdominal examination

Bandl's ring is also called as Pathological retraction ring.

- It is formed in cases of obstructed labour[Q].

Physiology: *In case of obstructed labour, the upper segment of the uterus contracts and retracts vigorously, in an attempt to overcome the obstruction while the lower segment dilates.*
With each contraction there is myometrial shortening, so that the actively contracting upper segment becomes progressively thicker and shorter. The passive lower segment is progressively stretched and becomes thinner.
The junction between the two segments stands out prominently as a pathological retraction ring or Bandl's ring.
Situation: *It runs obliquely and is always situated at the junction of upper and lower segment.*

On abdominal examination:

- Uterus is tense and tender
- Fetal parts are not easily felt
- Ring is felt as a groove placed obliquely
- FHS is absent
- Round ligaments are palpable.

On vaginal examination: *Ring cannot be felt vaginally.*

Constriction ring/Schroeder's ring: *Constriction ring is a form of incoordinate uterine action where there is localized spastic contraction of a ring of circular muscle fibres of the uterus.*
It is formed due to injudicious use of oxytocin and premature rupture of membranes.

Difference between constriction ring and retraction ring:

	Constriction ring	Retraction ring/Bandl ring
Nature	It is a manifestation of localised incoordinate uterine contraction	It is an end result of tonic uterine contractions and retractions
Cause	Undue irritability of the uterus	Following obstructed labour
Situation	Usually at the junction of upper and lower segment but may occur in other places. Once formed the position does not alter	Always situated at the junction of upper and lower segment The position progressively moves upward
Uterus	Upper segment contracts and retracts with relaxation in between; lower segment remains thick and loose	Upper segment is tonically contracted with no relaxation. The wall becomes thicker; lower segment becomes distended and thinned out
Maternal condition	Almost unaffected unless the labour is prolonged	Features of maternal exhaustion, and sepsis appear
Abdominal examination	a. Uterus feels normal and non tender b. Fetal parts are easily felt c. **Ring is not felt** d. Round ligament is not felt e. FHS is usually present	a. Uterus is tense and tender b. Fetal parts not easily felt c. **Ring is felt** as a groove place obliquely d. Taut and tender round ligaments are felt e. FHS is usually absent
Vaginal examination	a. The lower segment is not pressed by the presenting part b. **Ring is felt** usually above the head c. Features of obstructed labour are absent	a. Lower segment is very much pressed by the presenting part b. **Ring cannot be felt vaginally** c. Features of obstructed labour are present
End result	a. Maternal exhaustion is a late feature	a. Maternal exhaustion and sepsis appear

Note: Construction ring is usually revealed during cesarean section in 1st stage, during forceps application in 2nd stage and during manual removal of placenta in 3rd stage.

Mgt: Delivery by cesarean section. Ring usually passes off by deepening the anesthesia.

11. Ans. is a i.e. LSCS *Ref. Williams Obs. 22/e, p 611, 24/e, p 613 Table 31.3*

Estimated incidences of rupture of uterus with different types of incisions in case of cesarean section are:

Prior incision	Estimated rupture rate (%)
Classical	**2–9**
T-shapped	**4–9**
Low-vertical[a]	**1–7**
One low-transverse	**0.2–1.8**
Prior pre-term cesarean	"increased"
Prior uterine rupture	
• Lower segment	2–6
• Upper uterus	9–32

[a]See text for definition.

Date from the American Collage of Obstetricians and Gynecologists, 2013a; Cahill, 2010b; Chauhan, 2002; Landon, 2006; Macones, 2005; Martin, 1997; Miller, 1994; Sciscione, 2008; Society for Maternal-Fetal Medicine, 2012; Tahseen, 2010.

Also know:

In 1/3rd cases rupture of classical cesarean section scar occurs before labour (Spontaneous rupture during pregnancy).

12. Ans. is a i.e. Upper uterine segment *Ref. Dutta Obs. 7/e, p 429*

Types of rupture	Most common site involved
1. Spontaneous rupture during pregnancy	• Upper segment
2. Rupture during labour due to non obstructive cause (as seen in grand multipara)	• Fundal area (complete rupture)
3. Rupture during labour due to obstruction	• Anterior lower segment transversely is the MC site • It can extend upwards along the lateral uterine wall
4. Rupture of the scar:	
- In classical cesarean section	• Upper segment
- In LSCS	• Lower segment

13. Ans. is d i.e. Risk of lower segment scar rupture is high compared to classical scar rupture *Ref. Dutta Obs. 7/e, p 427*

Rupture Uterus

Disruption in the continuity of the all uterine layers (endometrium, myometrium and serosa) any time beyond 28 weeks of pregnancy is called rupture of the uterus.

The causes of rupture of the uterus are broadly divided into:

- Spontaneous
- Scar rupture
- Iatrogenic

SPONTANEOUS

During pregnancy*: *It is rare for an apparently uninjured uterus to give way during pregnancy.

The causes are: *(1) Previous damage to the uterine walls following dilatation and curettage operation or manual removal of placenta (2) Grand multiparae (due to weak uterine walls) (3) Congenital malformation of the uterus (bicornuate variety) (4) In Couvelaire uterus.*

Spontaneous rupture during pregnancy is usually complete, involves the upper segment *and usually occurs in later months of pregnancy.*

***During labor*:** *Spontaneous rupture which occurs predominantly in an otherwise intact uterus during labor. It is due to:*

- **Obstructive rupture**—This is the end result of an obstructed labor. The rupture involves the lower segment and usually extends through one lateral side of the uterus to the upper segment.
- **Non-obstructive rupture**—Grand multiparae are usually affected and rupture usually occurs in early labor. The rupture usually involves the fundal area and is complete.

SCAR RUPTURE: The incidence of lower segment scar rupture is about 1–2%, while that following classical one is 5–10 times higher. Uterine scar, following operation on the nonpregnant uterus *such as myomectomy or metroplasty hardly rupture.* **Uterine scar following hysterotomy** *behaves like that of a classical scar.*

***During pregnancy*:** *Classical cesarean or hysterotomy scar is likely to give way during later months of pregnancy. Lower segment scar rarely ruptures during pregnancy.*

***During labor**: The classical or hysterotomy scar is more vulnerable to rupture during labor. Although rare, lower segment scar predominantly ruptures during labor.*

IATROGENIC OR TRAUMATIC

***During pregnancy*:**
- Injudicious administration of oxytocin
- Use of prostaglandins for induction of abortion or labor
- Forcible external version specially under general anesthesia.

***During labor*:**
- Internal podalic version—specially following obstructed labor
- Destructive operation
- Manual removal of placenta
- Application of forceps or breech extraction through incompletely dilated cervix
- Injudicious administration of oxytocin for augmentation of labor.

Also know

Scar dehiscence:
- Disruption of part of scar and not the entire length
- Fetal membranes remain intact and
- Bleeding is almost nil or minimal.

Scar rupture:
- Disruption of the entire length of the scar
- Complete separation of all the uterine layers including serosa
- Rupture of the membranes with
- Varying amount of bleeding from the margins or from its extension
- Uterine cavity and peritoneal cavity become continuous.

14. Ans. is a i.e. Fundal pressure

Reproduced from Operative Obs. and Gynae, Randhirpuri, Narendra Malhotra, p 203. *Ref. Dutta Obs. 7/e, p 406*

Shoulder Dystocia:

The term shoulder dystocia is used to define a wide range of difficulties encountered in the delivery of the shoulders (A head to body delivery time exceeding 60 secs defines shoulder dystocia).

Risk factors: Shoulder dystocia can occur in all those conditions where fetus is too big or in case of mismanaged labour.

D-Maternal diabetes[Q]
O-Maternal obesity and fetal obesity, i.e macrosomia
P-Post-term pregnancy
A-Anencephaly[Q], Fetal ascites[Q]

Management of shoulder dystocia:

Shoulder dystocia should be managed as quickly as possible as interval of time from delivery of head to delivery of body is of great importance as far as survival of baby is concerned. Management follows a sequence of steps together called as Shoulder Dystocia Drill.

First line measures:
- Immediately after recognition of shoulder dystocia extra help should be called, in the form of midwifery assistance, an obstetrician, a paediatric resuscitation team and an anaesthetist.
- Maternal pushing should be discouraged, as this may lead to further impaction of the shoulder, thereby exacerbating the situation.
- Liberal episiotomy should be given to provide more space posteriorly.
- *Fundal pressure should not be employed.* As it is associated with an unacceptably high neonatal complication rate and may result in uterine rupture.
- *Moderate suprapubic pressure can be applied* by the assistant.
- *McRoberts' manoeuvre* is the single most effective intervention and should the first maneouvre to be performed. The McRobert's manoeuvre is flexion and abduction of the maternal hips, positioning the maternal thighs on her abdomen.

Second line measures: They should be done only, if first line measures fail:
- *Wood's manoeuvre:* It is progressively rotating the posterior shoulder by 180°. So that the impacted anterior shoulder is released.

Third line measures—They should be done only, if second line measures fail:
- Cleidotomy: Fracturing the clavicle bone of the fetus
- Symphiostomy: Dividing the pubic symphysis of the mother
- Zavanelli manoeuvre: Replacing the head of the baby back into the pelvis followed by cesarean section.

Note: Some other manouevers earlier used were **Hibbard and Rubin method.**

15. Ans. is d i.e. None of the above *Ref. Williams Obs. 22/e, p 513, 514; 23/e, p 486, 487; Dutta Obs. 7/e, p 406*

Complications seen in case of shoulder dystocia are:

Maternal	Fetal
• Intrapartun chorioamnionitis and pastpartum infections (if labour has been prolonged) • Lacerations of birth canal • Rupture uterus and formation of the pathological retraction ring • PPH (atonic and traumatic) • Genital fistula formation • Urinary and anal inconference • Genital organ prolapse at later stages	• Fetal death due to asphyxia • Meconium aspiration syndrome • Erb's palsy due to injury to the spinal nerves C5, C6 and sometimes C7 resulting in a hanging upper arm. The arm is adducted and internally rotated at the shoulder and pronated at the elbow (Option "b" correct) • Klumpke's paralysis is due to injury to C8, T1 and resulting in claw hand deformity. (Option "c" correct) • Fractures of the clavicle or humerus can also occur • Sternocleidomastoid hematoma (Option "a" correct)

Remember: Most common complication of shoulder dystocia is brachial plexis injury.

16. Ans. is d i.e. Lateral cutaneous nerve of thigh *Ref. Dutta Obs. 7/e*

- McRoberts' manoeuvre consists of forcible abduction of patients legs by sharply flexing them on the abdomen.
- It is the single most effective manoeuvre and should be the first manoeuvre to be performed in case of shoulder dystocia.
- McRobert's manoeuvre results in straightening of the sacrum relative to the lumbar vertebra along with rotation of symphysis pubis towards the maternal head and it decreases the angle of pelvic inclination.
- Sometimes, over zealous use of McRobert's manoeuvre may result in separation of the maternal pubic symphysis and injury to *lateral cutaneous nerve of thigh.*

Also Know - Postpartum Neuropathies *—Williams 24/e, p 677*

- Prolonged second stage of labour can injure the Common Fibular Nerve caused by inappropriate leg positioning in the stirrups *—Williams 23/e, p 487*
- M/C nerve injury seen in postpartum females = Lateral femoral cutaneous nerve followed by femoral nerve.
- Risk factors for neuropathy:
  - Nulliparity
  - Prolonged second stage of labor
  - Pushing for a long duration in the semi fowler position.
- Nerve injuries seen with cesarean delivery include iliohypogastric and ilioinguinal nerves.

17. Ans. is c i.e Flex mothers thigh against her abdomen

This patient has shoulder dystocia as head initially progresses beyond the perineum and then retracts which is called as Turtle sign.

Turtle sign positive: Head delivers but retracts against symphisis pubis.

Shoulder Dystocia Drill

1st Line of Management	2nd Line	3rd Line
• Stop giving fundal pressure • Can give supra-pressure • Best/most effective pubic pressure manouvre-Mc Roberts manouvre (flexion and abduction of thigh)	• Woods Corkscrew manouvre	• Cleidotomy (# clavicle of baby) • Symphiosotomy (divide pubic symphysis of mother) • Zavaneilli manouvre (push head backand do cesarean)

Going with the drill, we should first try 1st line steps and then others, this rules out option (d), i.e push infants head back into the uterus and do cesarean section and (e) i.e do a symphiosotomy.

- Fundal pressure should never be applied in case of shoulder dystocia ruling out option (b).
- This automatically leaves us with 2 options (a) abduct mothers thigh and apply suprapubic pressure and (c) i.e Flex mothers thigh against her abdomen.
- Now this is common sense that while doing Mc Roberts manouvre we will first flex the patients legs, and then abduct them and not vice versa..., so the immediate next step is flex her thighs, i.e option (c).

18. Ans. is c i.e. ACOG recommends the cervix should be atleast 2 cm dilated for diagnosis of dystocia

Ref. Williams 23/e, p 464, 465

- **Dystocia literally means *difficult labor* and is characterized by abnormally slow labor progress.**
- It arises from four distinct abnormalities that may exist singly or in combination:
  - **Abnormalities of the expulsive forces.** Uterine contractions maybe insufficiently strong or inappropriately coordinated to efface and dilate the cervix–uterine dysfunction. Also, there may be inadequate voluntary maternal muscle effort during second-stage labor.
  - **Abnormalities of presentation, position, or development of the fetus.**
  - **Abnormalities of the maternal bony pelvis**–that is, pelvic contraction.
  - **Abnormalities of soft tissues of the reproductive tract** that form an obstacle to fetal descent.

Common clinical findings in women with ineffective labor

Inadequate cervical dilation or fetal descent:
- Protracted labor–slow progress
- Arrested labor–no progress
- Inadequate expulsive effort–ineffective pushing.
- **Fetopelvic disproportion:**
- Excessive fetal size
- Inadequate pelvic capacity

Malpresentation or position of the fetus
- **Ruptured membranes without labor.**

- Dystocia is the most common current indication for primary cesarean delivery.
- American College of Obstetricians and Gynaecology recommend (1995a) that the cervix be dilated to 4 cm or more before dystocia is diagnosed, thus, the diagnosis often is made before active labor, and therefore before an adequate trial of labor which leads to unnecessary cesarean section.

19. Ans. is a i.e. Cesarean section *Ref. Read below*

Well friends lets first analyse the condition of patient and then think about its management:
- Patient is primigravida
- On examination:
  - Dehydration is present
  - P/R is 100/min, i.e. tachycardia present.

PIA
- Fundal height-36 weeks
- Presentation-cephalic
- FHS-Absent
- Mild uterine contractions are present.

P/V
- Cervix-fully dilated
- Station = + 1
- Caput present
- Moulding present
- Dirty infected discharge is present.

Most importantly–Pelvis is adequate.

This patient is undoubtedly a case of obstructed labour. As we all know in nulliparous females in case of obstructed labour—a state of uterine exhaustion is reached manifested as weakened uterine conditions.
- In such cases, if oxytocin drip is given it may lead to rupture of uterus as lower segment is thinned out (i.e. ***option 'b'*** ruled out).
- Craniotomy and other destructive procedures are not carried out in modern obstetrics (i.e., ***option 'd'*** ruled out).

Mgt: of obstructed labor cesarean section.

20. Ans. is c i.e. A = 3, B = 2, C = 4, D = 1 *Ref. Dutta Obs. 7/e, p 358-360*

21. Ans. is d i.e. Needs adequate pain relief *Ref. Dutta Obs. 7/e, p 359, 360*

Types of Uterine Dysfunction

There are two types of uterine dysfunction:

- *In the more common* **hypotonic uterine dysfunction,** *there is o basal hypertonus and uterine cotractions have a normal gradient pattern (synchronous), but the slight rise in pressure during a contraction is insufficient to dilate the cervix.*
- *In the other,* **hypertonic uterine dysfuctio or incoordinate uterine dysfunction,** *either the basal tone is elevated appreciably or the pressure gradient is distorted. Gradient distortion may result from contraction of the mid-segment of the uterus with more force than the fundus or from complete asynchronism of the impulses originating in each cornu, or from a combination of these two.*

Pain is present before, during and after contractions. This results in fetal hypoxia in labor. **Placental abruption** is often associated with high baseline tone (> 25 mm Hg). **On CTG the FHR shows reduced variability and late decelerations.**

Effect on the fetus: **Fetal distress** appears early due to placental insufficiency caused by inadequate relaxation of the uterus.

Management: There is no place of oxytocin augmentation with this abnormality. Cesarean section is done in majority of cases. Adequate pain relief or sedation is helpful.

22. Ans. is a i.e. Presence of fundal dominance *Ref. Dutta Obs 7/e, p 360*

Spastic lower segment: It is a variant of hypertonic state:

- Fundal dominance is lacking and often there is reversed polarity
- The pacemakers do not work in rhythm
- The lower segment contractions are stronger
- Inadequate relaxation in between contractions
- Basal tone is raised above the critical level of 20 mm Hg.

Effect on the fetus: **Fetal distress** appears early due to placental insufficiency caused by inadequate relaxation of the uterus.

Management: There is no place of oxytocin augmentation with this abnormality. Cesarean section is done in majority of cases. Adequate pain relief or sedation is helfpul.

23. Ans. is a, b and c i.e. Placenta previa; Abruptio placenta; and Rupture uterus *Ref. Dutta Obs. 7/e, p 618*

Shock in Obstetrics:

Causes of shock during pregnancy

Hypovolemic shock	Septic shock	Cardiogenic shock	Neurogenic shock
Hemorrhagic shock • Ectopic pregnancy • Post abortal hemorrhage • Placenta previa • Abruptio placenta • PPH • Rupture of uterus • Obstetric surgery **Fluid loss shock** • Excessive vomiting • Excessive diarrhoea • Diuresis • Too rapid removal of fluid • Supine hypotension syndrome due to IVC compression by gravid uterus • Shock associated with DIC	• Septic abortion • Chorioamnionitis • Pyelonephritis • Endometritis (Rare)	• Cardiac arrest • Myocardial infarction • Cardiac tamponade • Pulmonary embolism	• Spinal anaesthesia • Aspiration of gastro-intestinal contents during general anaes-thesia especially in cesarean section (Mendelson's syndrome)

24. Ans. is a, c and d i.e. Gas bubbles in great vessels; Overlapping of skull bone; and Decreased amniotic fluid volume *Ref. Dutta Obs. 7/e, p 324*

25. Ans. is b and c i.e. Heart beat absent; and Spalding sign

Ref. Dutta Obs. 7/e, p 324; Sheila Balakrishnan, p 249; Reddy 26/e, p 378, 379

- Intrauterine fetal death is death of the fetus in utero after the period of viability *(after 22 weeks) or when fetus weighs more than 500 gm.*

IUD can be diagnosed clinically by:

- The size of the uterus less than the period of gestation.
- Liquor decreased.
- FHS absent.
- Fetal movements abscent.
- Egg-shell crackling feel of the fetal head *(late feature).*

Ultrasound: Earliest diagnosis is possible by USG.

Diagnostic features:

- Absence of fetal cardiac activity on ultrasound scan (diagnostic).
- Decreased liquor amnii.
- ***Spalding's sign i.e.,*** overlapping of fetal skull bones due to shrinkage of cerebrum after fetal death. (see color plate given at the end for spalding sign).

Radiology:

- ***Roberts sign:*** Presence of gas in the fetal large vessels(earliest sign-seen 12 hours after fetal death).
- ***Ball sign:*** Crumpled up spine of the fetus or hyperflexion of the spine.
- ***Spalding's sign:*** Overlapping of fetal skull bones seen due to shrinkage of cerebrum after death of fetus. Crowding of the ribs shadow with loss of normal parallelism.

Note: Spalding sign is seen both on USG and radiology.

26. Ans. is d i.e. Dead born *Ref. Dutta Obs. 7/e, p 324; Sheila Balakrishnan, p 249; Reddy 26/e, p 378, 379*

Spalding sign: It is the irregular overlapping of the cranial bones on one another, due to liquefaction of the brain matter and softening of the ligamentous structures supporting the vault.

- ***Appears 7 days after death.***
- Is evident on both ultrasound and radiology?
- Similar features may be found in extrauterine pregnancy with live fetus.

27. Ans. is d i.e. Gas in vessels *Ref. Dutta Obs. 7/e, p 324; Sheila Balakrishnan, p 249; Reddy 26/e, p 378, 379*

Sign	Interval after death
Roberts sign (gas in great vessels of fetus)	12 hours
Spalding sign, i.e. overlapping of skull bones of fetus	1 week
Ball sign *(hyperflexion/hyperextension of spine)*	3-4 weeks

28. Ans. is a i.e. Intracranial hemorrhage *Ref. Manual of Obs. by Holland and Brews 16/e, p 190*

- Intracranial hemorrhage is the most common cause of fetal loss in breech and occurs due to tear of tentorium cerebelli and falx cerebri.
- It is caused by traumatic delivery of the after coming head of breech or too rapid delivery of the soft head of a premature baby.

29. Ans. is c i.e. Craniotomy *Ref. Dutta Obs. 7/e, p 397*

Management in case of dead baby with transverse lie – Cesarean section, is much safer in the hands of those who are not conversant with destructive operations. ***If the obstetrician is conversant with destructive operation,*** **decapitation** or **evisceration is to be done.** *—Dutta Obs. 6/e, p 397*

- Destructive operations were done in the past in case of obstructed labour, when the fetus was dead or dying or grossly malformed.

- Today they are undertaken extremely rarely.

Generally speaking, there is no place for destructive operations in modern day obstetrics.

Type	Indication	Procedure
Craniotomy	• Delivery of a dead fetus with cephalic presentation (vertex, brow or face) • Delivery of the arrested after coming head in breech • Interlocking head of twins	• Fetal skull is perforated, contents are evacuated and fetus delivered • *Perforation site:* – Vertex-parietal bone – Brow-frontal bone – Face-orbit or roof of the mouth – After coming head in breech-occipital bone.
Craniocentesis	• Hydrocephalus	• Per abdomen reduction of hydrocephalic head using a large bore needle
Decapitation	• ***Neglected shoulder presentation*** (If the neck is easily accessible) • Interlocking head of twins	• Fetal head is separated from the body, then the decapitated head and trunk are extracted through the vagina
Cleidotomy	• In case of shoulder dystocia when all measures have failed	• One or both clavicles are divided
Spondylotomy	• ***Neglected shoulder presentation***	• Vertebral column is divided
Embryotomy or Evisceration	• ***Neglected shoulder presentation*** (If the neck is not easily accessible	• Fetal abdomen is perforated and its contents are debulked

30. Ans. is c i.e Consumptive coagulopathy with hypofibrinogenemia *Ref. Dutta Obs. 7/e, p 325*

Dead fetus, if retained for more then 4 to 5 weeks, release thromboplastin which leads to DIC (consumptive coagulopathy). In the question, the fetus has been dead and has been retained for five weeks so there are increased chances of DIC.

Obstetrical conditions leading to DIC

a. Septic abortion
b. IUD
c. Abruptio placentae
d. Amniotic fluid embolism
e. Severe preeclampsia, eclampsia. HELLP syndrome.

31. Ans. is a i.e. Hypofibrinogenemia *Ref. Dutta Obs. 7/e, p 325*

Complications of IUD

- Psychological upset.
- Uterine Infections.
- *Blood coagulation disorder: If the fetus is retained for more than 4 weeks (as occurs in 10–20%) there is a possibility that thromboplastin from the dead fetus enters maternal circulation and leads to disseminated intravascular coagulopathy (DIC).*
- *During labor:* Uterine inertia, retained placenta and PPH.

Hypofibrinogenimia occurs due to gradual absorption of thromboplastin, liberated from the dead placenta and decidua, into the maternal circulation.

Remember:

- Critical level of fibrinogen is = 100 mg/ml.
- Hypofibrinogemia/defibrination is observed predominantly in:
  - Retained dead fetus
  - Rh-incompatibility.

32. Ans. is b i.e. Wait for spontaneous expulsion *Ref. Dutta Obs. 7/e, p 325*

In 80% cases of IUD, spontaneous expulsion occurs in 2 weeks. If spontaneous expulsion fails to occur within 2 weeks, intervention should be done.

Indications for interference:

a. *Psychological upset of the patient.*
b. *Manifestations of uterine infections.*
c. *Falling fibrinogen level (fibrinogen estimation should be done every week in case of IUD).*
d. *Tendency of prolongation of pregnancy beyond 2 weeks.*

But this type of expectant management, i.e. awaiting for spontaneous expulsion is now no longer done.

- Nowadays, the usual practice is to induce labour as soon as fetal death is diagnosed, because most women have a natural disinclination to carry a dead fetus within them.
- Labour can be induced by oxytocin drip or PGE_2 gel can be used to ripen the cervix (but this is not given in option).
- ARM is not done; due to the risk of infection (i.e., ***option 'b'*** ruled out).
- Cesarean section is avoided as far as possible in a dead fetus.
- Cesarean section with a dead fetus may some times be necessary in case of previous cesarean section, placenta previa and transverse lie (i.e., ***option 'e'*** ruled out).

So still amongst the given options best is, Wait for spontaneous expulsion.

33. Ans. is b i.e. < 20 weeks *Ref. Williams 24/e, p 661*

The definition given in Ans. 24 is the one given in Dutta.

Willams 24/e p 661 says. ***"According to CDC and WHO—Fetal death means death prior to complete expulsion or extraction from the mother of a product of human conception irrespective of the duration of pregnancy and which is not an induced termination of pregnancy. The death is indicated by the fact that after such expulsion or extraction, the fetus does not breathe or show any other evidence of life such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles".***

Fetal mortality is divided into three periods: **Early**, or < 20 completed weeks; **intermediate**, 20–27 weeks; and **late**, 28 weeks or more. The fetal death rate after 28 weeks has declined since 1990, whereas deaths from 20 to 27 weeks are largely unchanged.

34. Ans. is d i.e. 39 weeks *Ref. Williams 24/e, p 666*

In patients with history of previous still birth—delivery at 39 weeks is recommended by induction or by cesarean delivery (for those with contraindication to induction), irrespective of the gestational age at which previous still birth occured.

Note: In all these patients antepartum fetal surveillance should begin at 32 weeks.

27

Malpresentations

QUESTIONS

1. **The commonest cause of breech presentation is:** **[AIIMS May 03, AI 97]**
   a. Prematurity b. Hydrocephalus
   c. Placenta praevia d. Polyhydramnios

2. **All of the following are associated with breech presentation at normal full term pregnancy, *except*:** **[AI 02]**
   a. Placenta accretea
   b. Fetal malformation
   c. Uterine anomaly
   d. Cornual implantation of placenta

3. **Causes of breech presentation are:** **[PGI June 03]**
   a. Hydrocephalus b. Oligohydramnios
   c. Pelvic contracture d. Placenta praevia

4. **Best method to deliver arms in breech:**
   a. Lovset's method b. Smellie veit **[PGI June 98]**
   c. Pinard's d. Any of the above

5. **The after coming head of breech chin to pubes is delivered by:** **[PGI Dec 98]**
   a. Maricelli technique
   b. Burns-Marshal method
   c. Lovest's method
   d. Manual rotation and extraction by Piper's forceps

6. **Techniques of delivery of after coming head in breech presentation:** **[PGI June 07]**
   a. Burns-Marshall method
   b. Forceps delivery
   c. Modified Mauriceau-Smellie-Veit technique
   d. Lovset's maneuver

7. **After coming head of breech will have difficulty in delivery in all of the following conditions *except*:** **[AIIMS Nov 06, Nov 03, Nov 11]**
   a. Hydrocephalus b. Placenta previa
   c. Incomplete dilation of cervix
   d. Extension of head

8. **Cause of death in breech delivery:** **[PGI 97]**
   a. Intracranial hemorrhage
   b. Aspiration
   c. Atlantoaxial dislocation
   d. Asphyxia

9. **True about Frank Breech:** **[PGI Dec 02]**
   a. Thigh extended, leg extended
   b. Thigh flexed, knee extended
   c. Both are flexed
   d. Budha's attitude
   e. Common in primi

10. **Breech presentation with hydrocephalus is managed by:** **[PGI June 02]**
    a. Cesarean section
    b. Transabdominal decompression
    c. PV decompression
    d. Craniotomy of aftercoming head

11. **In deep transverse arrest the delivery of baby is conducted by:** **[PGI Dec 99]**
    a. Cesarean section
    b. Vacuum extraction
    c. Keilland forcep
    d. Manual rotation and forcep delivery

12. **38 weeks primi in early labour with transverse presentation, TOC is:** **[PGI Dec 98]**
    a. Allow for cervical dilatation
    b. Internal podalic version
    c. LSCS
    d. Forceps

13. **A 30 years old multigravida presented with transverse lie with hand prolapse in IInd stage of labour with dead fetus. The treatment is:** **[PGI June 03]**
    a. Chemical cesarean section
    b. LSCS

c. Craniotomy
d. Decapitation
e. Cleidotomy

14. M/C type of breech presentation:
a. Frank breech b. Complete breech
c. Footling d. Knee

15. The commonest cause of occipitoposterior position of fetal head during labour is: [AIIMS May 03]
a. Maternal obesity b. Deflexion of fetal head
c. Multiparity d. Android pelvis

16. When in labor, a diagnosis of occipitoposterior presentation is made. The most appropriate management would be: [AIIMS May 08/Nov 09]
a. Emergency CS
b. Wait and watch for progress of labor
c. Early rupture of membranes
d. Start oxytoicn drip

17. Causes of face presentation: [PGI Dec 03]
a. Anencephaly b. Prematurity
c. Hydramnios d. Contracted pelvis
e. Placenta praevia

18. Which favor face presentation? [PGI Dec 09]
a. Anencephaly b. Contracted pelvis
c. Placenta praevia d. Thyroid swelling
e. Bicornuate uterus

19. On per vaginal examination, anterior fontanelle and supraobital ridge is felt in the second stage of labour. The presentation is: [AIIMS May 02]
a. Brow presentation b. Deflexed head
c. Flexed head d. Face presentation

20. Diameter of engagement in face presentation/ diameter in face presentation:
a. Mentovertical **[PGI June 02, Dec 00, MP 08]**
b. Submentovertical
c. Suboccipitobregmatic
d. Submentobregmatic
e. Suboccipitovertical

21. In brow presentation, presenting diameter (s) is/are:
a. Submentovertical b. Occipitofrontal **[PGI June 03]**
c. Mentovertical d. Suboccipitobregmatic
e. Suboccipitofrontal

22. A multigravida with previous 2 normal deliveries presents with unstable lie of the fetus at 34 weeks gestation. What could be the most probable cause? [AIIMS Nov 12]
a. Placenta previa b. Oligohydramnios
c. Uterine anomaly d. Pelvic tumour

23. A 30 year old G1P1001 patient comes to see you in office at 37 weeks gestational age for her routine OB visit. Her 1st pregnancy resulted in a vaginal delivery of a 9-lb, 8-oz baby boy after 30 minutes of pushing. On doing Leopold maneuvers during this office visit, you determine that the fetus is breech. Vaginal exam demonstrate that the cervix is 50% effaced and 1–2 cm dilated. The presenting breech is high out of pelvis. The estimated fetal weight. is about 7 lb. you send the patient. for a USG, which confirms a fetus with a frank breech prestation. There is a normal amount of amniotic fluid present, and the head is well-flexed. As the patient's obstetrician, you offer all the following possible mgmt plans *except*: [New Pattern Question]
a. Allow the patient to undergo a vaginal breech delivery whenever she goes into labor
b. Send the patient to labor and delivery immidiately for an emergent CS
c. Schedule a CS at or after 39 weeks gestation age
d. Schedule an ext cephalic version in next few days

24. Incidence of cord prolapse is least in: [New Pattern Question]
a. Frank breech b. Footling presentation
c. Transverse lie d. Brow presentation

25. In an after coming head the following bone is perforated during decapitation: [New Pattern Question]
a. Occiput b. Parietal
c. Palate d. Frontal

26. The most common form of fetal traumatic injury incurred during breach extraction is: [New Pattern Question]
a. Rupture of the liver
b. Rupture of the spleen
c. Intraadrenal hemorrhage
d. Intracranial hemorrhage

27. In a case of direct occipitoposterior position (face to pubis delivery) most commonly encountered problem is: [New Pattern Question]
a. Intracranial injury
b. Cephalhematoma
c. Paraurethral tears
d. Complete perineal tears

28. Deep transverse arrest is seen in all *except*: [New Pattern Question]
a. Android pelvis b. Epidural analgesia
c. Transverse lie d. Uterine inertia

29. In transverse lie, the presentation is: [New Pattern Question]
a. Vertex b. Breech
c. Brow d. Shoulder

30. 30 years old primipara in labour with transverse lie. Treatment of choice is: [New Pattern Question]
a. Internal cephalic version
b. Emergency cesarean section
c. Wait and watch
d. External cephalic version

31. The complications of shoulder presentations are all of the following *except*: [New Pattern Question]
a. Fetal death
b. Uterine rupture
c. Obstructed labour
d. Shoulder dystocia

32. In case of unstable lie of fetus, the placenta is usually: **[New Pattern Question]**

a. Cornual b. Lateral wall
c. Fundus d. Lower segment

33. The following statements are related to occipitoposterior *except*: **[New Pattern Question]**

a. Malrotation of occiput may cause occipitosacral arrest
b. 10% cases are associated with anthropoid or android pelvis
c. Incomplete forward rotation of occiput may cause deep transverse arrest
d. Nonrotation of occiput may cause are associated

34. The following are related to face presentation *except*: **[New Pattern Question]**

a. The commonest position is LMA
b. Engaging diameter is submentobregmatic
c. The diameter distending the vulval outlet is mentovertical
d. During moulding, there is elongation of occipitofrontal diameter

35. In which fetal presentation vaginal delivery can be expected? **[New Pattern Question]**

a. Face presentation when the chin lies direct to the sacrum
b. Brow presentation
c. Shoulder presentation
d. Face presentation when the chin lies under the symphysis pubis

36. For the deep transverse arrest all are correct *except*: **[New Pattern Question]**

a. Head is deep into the pelvic cavity
b. Sagittal suture lies in the bispinous diameter
c. There is no progress at least for 1 hour following full dilatation of the cervix
d. Delivery should be done by immediate caesarean section

37. Which of the following is correctly matched in breech delivery? **[New Pattern Question]**

A. Lovsets manoeuver	1. Aftercoming head of breech
B. Burn Marshall method	2. Shoulder delivery
C. Prague method	3. OP position head
D. Groin traction	4. Delivery of breech

a. A = 3 B = 1 C = 4 D = 2
b. A = 2, B = 1, C = 3 D = 4
c. A = 2 B = 1 C = 4 D = 3
d. A = 3 B = 1 C = 2 D = 4

38. Procedure to be performed in case of arrest of after coming head due to contracted pelvis in breech: **[New Pattern Question]**

a. Craniotomy b. Decapitation
c. Zavanelli maneuver d. Cleidotomy

39. ECV is absolutely contraindicated in all *except*: **[New Pattern Question]**

a. Previous LSCS scar
b. Severe preeclampsia
c. Placenta previa
d. Septate uterus

40. $AG_2 P_1L_1$ female with previous H/O LSCs presents. at 36 weeks of gestation with breech presentation. Next step in management: **[New Pattern Question]**

a. ECV at 37 weeks
b. Planned cesarean at 38 weeks
c. Immediate cesarean
d. Induction of labor

EXPLANATIONS & REFERENCES

1. **Ans. is a i.e. Prematurity** *Ref. Dutta Obs. 7/e, p 375*
2. **Ans. is a i.e. Placenta accreta** *Ref. Dutta Obs. 7/e, p 375*
3. **Ans. is a, c and d i.e. Hydrocephalus; Pelvic contracture; and Placenta praevia** *Ref. Dutta Obs. 7/e, p 375*

At 28 weeks of pregnancy, approximately 20% of women have breech presentation. The fetus undergoes spontaneous version usually between 30th and 34th week. This corrects the breech position such that, at term ***only 3% of pregnant women*** *have breech presentation.*

Any maternal or fetal condition, which prevents this spontaneous version will result in a persistent breech presentation.

Causes of Breech presentation

Most common cause-prematurity.

Incidence of breech at term 3%.

Other Causes: ***Factors preventing spontaneous version—***

Mnemonic:		ASD Between oesophagus and trachea
Atrial	–	Anomalies of uterus (septate/bicornuate)
		Anomalies of fetus (trisomy 13, 18, 21)
Septal	–	Short cord
Defect	–	Intrauterine death
Between	–	Breech with extended legs
Oesophagus	–	Oligohydraminos
Trachea	–	**T**wins
Favourable adaptation:	–	Hydrocephalus
	–	Placenta praevia
	–	Cornufundal attachment of the placenta[Q]
	–	Contracted pelvis
Undue mobility of the fetus:	–	Hydramnios[Q]
	–	Multiparae[Q] with lax abdominal wall

Also Know:

Recurrent breech: *When breech recurs in 3 or more consecutive pregnancies, it is called habitual or recurrent* breech.

Causes:

- Congenital malformation of uterus (septate or bicornuate).
- Repeated cornufundal attachment of the placenta.

4. **Ans. is a i.e. Lovset's method** *Ref. Dutta Obs. 7/e, p 387*

Friends amongst malpresentations: Breech is the most frequently asked—***"Many question are asked on Breech. So, I am summarising all the important points you need to know about breech."***

Breech

- Most common cause prematurity.
- *Most common type of breech:* Frank breech/Extended breech.
- *Incidence:* – 20% at 28 weeks
  – 5% at 34 weeks
  – **3% at term.**
- Commonest position – Left sacroanterior (LSA).
- Engaging diameter of breech – Bitrochanteric (10 cm).
- Engaging diameter of shoulder – Bisacromial (12 cm).
- Engaging diameter of head – suboccipitofrontal (10 cm).

- Head is born by flexion.Q
- **Diagnosis by vaginal examination:**

Flexed Breech *(MC in multipara)*	Extended Breech *(MC in primigravida)*	Footling presentation
Ischial tuberosities, anus, sacrum, buttocks and feet are palpated	*Buttocks with genitalia are the presenting part, feet not felt*	• Feet are the presenting part • Maximum chances of cord prolapse

Overall M/C variety is frank (extended breech) and is most favourable for vaginal delivery.

Algorithm for Management of Breech

Assess maternal and fetal well being

External cephalic version

- Done after 35 completed weeks
- Ideal time 36th week
- **Contraindications to ECV:**
  - Placenta previa APH
  - **Pre-eclampsia, hypertension**
  - Multiple pregnancy
  - Obesity
  - Bad obstetric history
  - Elderly primigravida
  - Ruptured membranes
  - Oligohydramnios
  - Contracted pelvis
  - Congenital abnormalities of uterus
  - Significant fetal anomalies/dead fetus
  - IUGR

Elective cesarean section (> 38 weeks)

Indications

Absolute indications

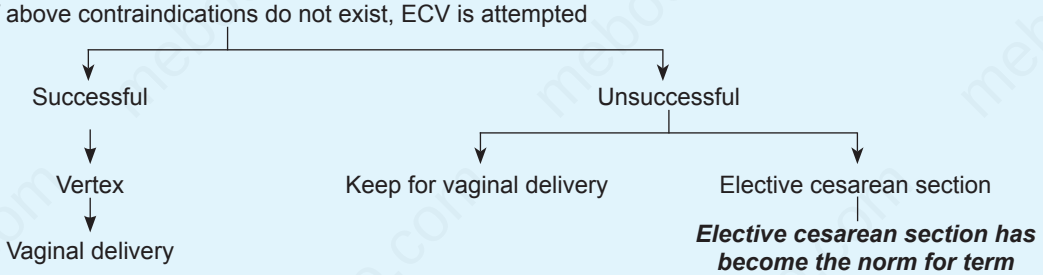
1. Footling breech
2. Stargazer baby (hyperextended head in breech)
3. Preterm

Relative indications

1. Primigravida with breech
2. Macrosomia
3. Previous LSCS with breech
4. Twins with first baby in breech

Note: In star gazer breech, i.e. breech with neckhyper-extended, vaginal delivery may result in injury to the cervical spine.

- If above contraindications do not exist, ECV is attempted



Elective cesarean section has become the norm for term breech presentation in many centres (Arias 4/e, p 377)

Assisted Breech Delivery:

- In breech delivery assistance may be required for:
  - i. Delivery of head – Burns-Marshall methodQ
    - Mauriceau-smellie-veit methodQ
    - **Piper's forcepsQ or Neville-Barnes forceps**
  - ii. Extended legs – Pinard's maneouvreQ (**Remember:** P for popliteal fossa and P for Pinard's manouvre)
  - iii. Extended arm – Lovset's maneouvreQ

Sometimes the head rotates posteriorly so, that the face is behind the pubis. Delivery in this position is difficult and *'Prague manoeuvre'* may be tried.

Also Know:

- Best time for episiotomy in breech – Climbing of perineum.
- Best time for episiotomy in vertex – Crowning of head.

5. Ans. is d i.e. Manual rotation and extraction by Piper's forceps

Ref. Dutta Obs. 7/e, p 388; Shiela Balakrishnan, p 455; Williams Obs. 22/e, p 578, 579, 23/e, p 537, 538

- Sometimes in breech presentation, the after coming head rotates posteriorly so that the face is behind the pubis, this condition is difficult to deliver and is called ***Chin to pubis rotation.***
- In this situation manual rotation of fetal head and trunk is done as in malar flexion and shoulder traction and then head is delivered with forceps. In case of premature baby, the delivery of head may be completed as face-to-pubis by reversed malar flexion and shoulder traction (**Prague manouvere**) or by forceps.

6. Ans. is a, b and c i.e. Burn-Marshall method; Forceps delivery; and Modified Mauriceau-Smellie-Veit technique

Ref. Dutta Obs. 7/e, p 383, 384

Methods of delivery of after coming head of breech:

- Burns marshall technique
- Mouriceau smellie met technique
- Piper's forcep or Neville Barnes forceps

Note: Lovset's manoeuvre is used for delivery of extended arms in breech.

7. Ans. is b i.e. Placenta previa *Ref. Williams Obs. 22/e, p 579, 23/e, p 538; Dutta Obs. 7/e, p 387*

Entrapment of the after coming head occurs in case of:

- *Incompletely dilated cervix*
- Hydrocephalus
- *Extended head*/deflexed head
- Contracted pelvis

Management:

- If entrapment occurs due to incompletely dialated cervix—***'Duhrssen's incisions'*** are placed over the cervix avoiding the 3 and 9'o clock position.
- ***Intravenous nitroglycerine*** can be used to relax the cervix.
- Replacement of the fetus higher in to the vagina and uterus, followed by cesarean delivery ***(Zavanelli maneouvre).***

Also know:

Impacted Breech:

- Inspite of good uterine contractions and complete dilatation of the cervix, the breech fails to descend.
- This occurs only in extended breech and is usually due to disproportion.
- Impaction can occur at the inlet, cavity or outlet.
- *If within 30 min of full cervical dilatation the breech does not descend and distend the perineum, cesarean section is done regardless of the level of impaction.*

8. Ans. is a, c and d i.e. Intracranial hemorrhage; Atlantoaxial dislocation; and Asphyxia

Ref. Dutta Obs. 7/e, p 379

- The risk of fetal mortality and morbidity are greatly increased in the vaginal breech delivery.
- Fetal mortality is least in frank breech and maximum in footling presentation *(as the chances of cord prolapse are more).*
- Gynaecoid and anthropoid pelves are favourable for the after coming head.
- The fetal risk in multipara is no less than that of primigravida because of increased chances of cord prolapse associated with flexed breech which occurs in multipara.

The main causes of increased perinatal mortality and morbidity in breech are:

- Prematurity
- Increased incidence of congenital anomalies.
- **Birth asphyxia:**
  - Due to cord prolapse or cord compression.
  - Due to prolonged delivery and delay in the after coming head.
- **Birth trauma due to rough handling during delivery and failure to use the femoropelvic grip:**
  - ***Intracranial hemorrhage*** due to uncontrolled delivery of the head and rupture of the veins of Galen or tentorial or falx tears. Skull fractures can also occur.
  - Fracture dislocation of cervical vertebra, *atlantoaxial dislocation* and occipital diastasis.
  - Cervical and brachial plexuses injuries, including Erb's palsy.

- Complete transection of spinal cord.
- Sternocleidomastoid hematoma and later torticollis.
- Rupture liver and spleen.
- Fracture of femur, clavicle or humerus.
- Damage to the fetal adrenals.
- Traumatised pharynx due to the obstetrician's finger.

9. Ans. is b and e i.e. Thigh flexed, knee extended and Common in primi *Ref. Dutta Obs. 7/e, p 374, 375*

Breech presentation

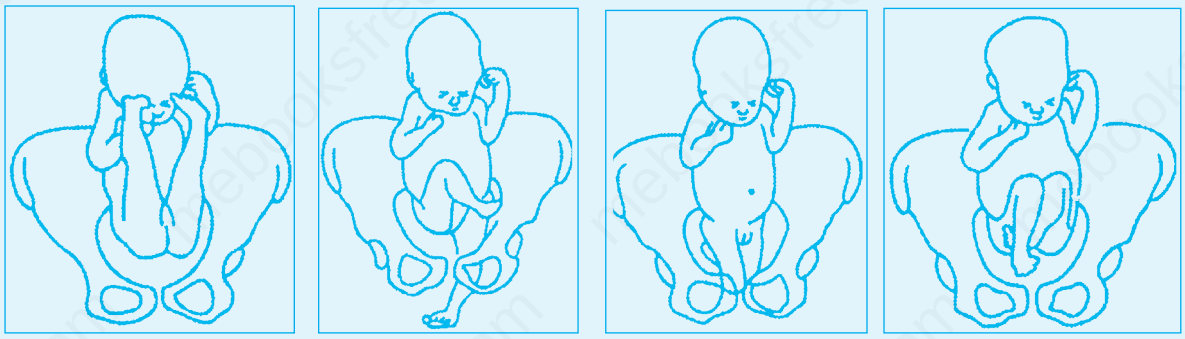
Incomplete breech

Breech with extended legs (Frank breech)
- *Thighs are flexed on trunk and legs are extended at the knee joint*[Q]
- *Presenting part consists of two buttocks and external genitalia*
- *Common in primi*[Q]

Footling presentation
- *Both thighs and legs are partially extended*

Knee presentation
Thighs are extended but knees are flexed

Complete/flexed breech
- *Full flexion attitude is maintained, the legs are flexed, knees and thighs flexed at hips*
- *Presenting part consists of two buttocks, ext. genitalia and feet*
- *Commonly seen in multipara*



10. Ans. is a, b, c and d i.e. Cesarean section, Transabdominal decompression, PV decompression and Craniotomy of after coming head *Ref. Dutta Obs. 7/e, p 586; Williams Obs. 22/e, p 518, 23/e, p 480; Sheila Balakrishnana, p 470*

Management options in case of breech presentation with hydrocephalus.

Cephalocentesis: In this, excessive fluid is removed thereby reducing the fetal head size, allowing vaginal delivery.
—Williams Obs. 22/e, p 518, 23/e, p 480

It can be done:

- ***Perabdomen:*** A wide bore needle is inserted via the maternal abdomen into the fetal head after emptying the bladder. The transabdominal approach is used successfully in both cephalic and breech presentation.
- ***Pervaginal:*** With cephalic presentation, as soon as the cervix is dilated upto 3–4 cm, ventricles are tapped trans vaginally with a wide bore needle. With breech presentation labour is allowed to progress upto delivery of trunk and shoulders. The needle is inserted transvaginally just below the anterior vaginal wall and into the aftercoming head through the widened suture line.

Cesarean Section: *Williams Obs. 23/e, p 481* recommends all hydrocephalic fetuses should be delivered abdominally, whereas the use of cephalocentesis should be limited to fetuses with severe associated abnormalities.

Craniotomy: is recommended, if the obstetrician is well, versed with the technique and is applicable for the forecoming (vertex) and the after coming head (breech) in case of hydrocephalus if fetus is dead.

Note: In a hydrocephalic fetus if BPD is < 10 cm or, if head circumference is < 36 cm, vaginal delivery may be permitted.
—Williams 23/e, p 480

11. Ans. is a, b, c and d i.e. Cesarean section; Vacuum extraction; Keilland forcep; and Manual rotation and forcep delivery *Ref. Dutta Obs. 7/e, p 372; Williams 23/e, p 480*

In case of occipto posterior position, if partial anterior rotation occurs the head is arrested with the sagittal suture in the transverse diameter at the level of the ischial spines, after full dilatation of the cervix in spite of good uterine contractions. This condition is called as *Deep Transverse Arrest*. It occurs more commonly in android pelvis.

Management of deep transverse arrest:

Ventouse	*Ideal in all cases*
Manual rotation and forceps application	*If the obstetrician is well-versed with this technique manual rotation followed by forceps application can be done*
Forceps rotation and delivery	*Under general anaesthesia Keilland's forceps are used for rotation and delivery in deep transverse arrest.*
Cesarean section	*If the pelvis is android or there is CPD, cesarean section should be done. In modern obstetrics, traumatic vaginal delivery causing intracranial hemorrhage is to be avoided at all costs and so there is increasing use of cesarean section for deep transverse arrest.*
Craniotomy	*If the baby is dead.*

Note: In most centres nowadays, either cesarean section or vacum extraction is performed, due to lack of experience in forceps rotation and manual rotation. It is extremely important to remember that, if vacum or forceps fails, no attempt should be made to persist with vaginal delivery. The procedure should be abandoned and immediate cesarean section undertaken. In late and neglected cases, if the fetus is dead, craniotomy is an option in experienced hands. However, now days most obstetricians would prefer to perform cesarean section in cases of obstructed labour, even when the fetus is dead.

12. Ans. is c i.e. LSCS *Ref. Dutta Obs. 7/e, p 397*

When a patient with transverse lie is seen in labour, it is managed as follows according to *—Dutta Obs. 6/e, p 397*

Early labor:

- ECV – provided there is good amount of liquor amnii and there is no contraindication. ECV should be tried in all cases.
- LSCS – is the preferred method of delivery, if version fails or is contraindicated.

Late labor:

- Baby alive – If the baby is mature and fetal condition is good, it is preferable to do LSCS in all cases.
- Baby dead – LSCS even in such cases, is much safer in the hands of those who are not conversant with destructive operation. If the obstetrician is conversant with destructive operation, decapitation or evisceration is to be done. Following destructive operation, the uterine cavity is to be explored to exclude rupture of uterus. Internal version should not be done.

According to *—Williams Obs. 22/e, p 510, 23/e, p 478*

- Onset of active labor in a woman with a transverse lie is an indication for cesarean delivery.
- Once labor is well-established, attempts at conversion to a longitudnal lie by abdominal manipulation are likely to be unsuccessful.
- Before labor or early in labor, with the membranes intact, attempts at external version are worth trying in absence of other complications that indicate cesarean section.

In the given question 38 weeks primi is presenting in early labour, so external cephalic version could have been tried, but it is not given in the option, so our answer is LSCS.

Note: While doing LSCS—a transverse incision into the uterus may lead to difficult fetal extraction. Therefore a vertical incision is typically indicated.

13. Ans. is b and d i.e. LSCS; and Decapitation *Ref. Dutta Obs. 7/e, p 397, 585-587, Munrokerr 100/e, p 134, 135*

Patient is presenting with tansverse lie with hand prolapse, i.e. baby is dead so it should be managed as dead baby with transverse lie.

Management in case of dead baby with transverse lie – Cesarean section even in such cases, is much safer in the hands of those who are not conversant with destructive operations. ***If the obstetrician is conversant with destructive operation,*** decapitation or evisceration is to be done. *—Dutta Obs. 7/e, p 397*

During labour with fetus dead — in transverse lie ***"In these circumstances decapitation with the Blond Hiedler saw is the most appropriate treatment, if the skill exists to carry this out. In regions where there is less experience with such procedures, or where the mother may not accept this management, cesarean section may be preferable."***
—Murnokerr 100/e, p 134, 135

Note: If this question is asked in AI/AIIMS where a single option is to be marked — go for option b, i.e. LSCS, because in present day obstetrics there is no role of destructive procedures.

14. Ans is a. i.e. Frank breech *Ref. Fernando Arias 4/e, p 375*

Varieties of breech:
- Complete (20%)
- Incomplete:
  - Frank breech (70%)
  - Footting breech
  - Knee breech

15. Ans. is d i.e. Android pelvis *Ref. Dutta Obs 7/e, p 365*

In vertex presentation when the occiput is placed posteriorly over the sacroiliac joint or directly over the sacrum. It is called as occiptoposterior position.

Causes of Occipitoposterior Position:

Most common cause of occipitoposterior position is anthropoid and android pelvis:

Cause	Reason
• Shape of the pelvic inlet – Anthropoid pelvis – Android pelvis	• In anthropoid pelvis, the AP diameter of the brim exceeds the transverse diameter. This pelvis is usually of high assimilation type with an extravertebra in the sacrum. Therefore, inclination of the pelvis is increased and this favours occipitoposterior. • In android pelvis the inlet is wedge shaped and so the bulky occiput cannot find space in the narrow forepelvis. This predisposes to occipitoposterior.
• High pelvic inclination	• Same as for anthropoid pelvis.
• Primary brachycephaly	• Cause marked deflexion of the head.
• Attachment of placenta on anterior wall of uterus	• Cause marked deflexion of the head.
• Abnormal uterine contraction	• leads to deflexion and persistent occipito posterior position.

Remember:
- M/C cause of OP position — Android pelvis/ Deflexed head.
- All malpresentations are common in multiparous females except occipitoposterior which is common in nulliparous (Primigravida) females.

- At the onset of labor — 15–20% cases are occipitoposterior
- At the end of labor—5% cases are occipitoposterior
- M/C position in OP = is Paght occipitoposterior position.

16. Ans. is b i.e. Wait and watch for progress of labour
Ref. Dutta Obs. 7/e, p 373 chart; Operative Obs and Gynae by Randhir Puri and Narendra Malhotra 1/e, p 173; Williams Obs 23/e, p 479

Occipitoposterior positions

"In practice about 5-10% of women admitted in labor with cephalic presentations present with occipitoposterior presentations. Given time and patience, many of these will rotate and get corrected to occipitoanterior position and deliver normally". *—Operative Obs and Gynae 1/e, p 173, Randhir Puri and Narendra Malhotra*

This explains that a careful wait and watch policy should be adopted for occipito posterior position.

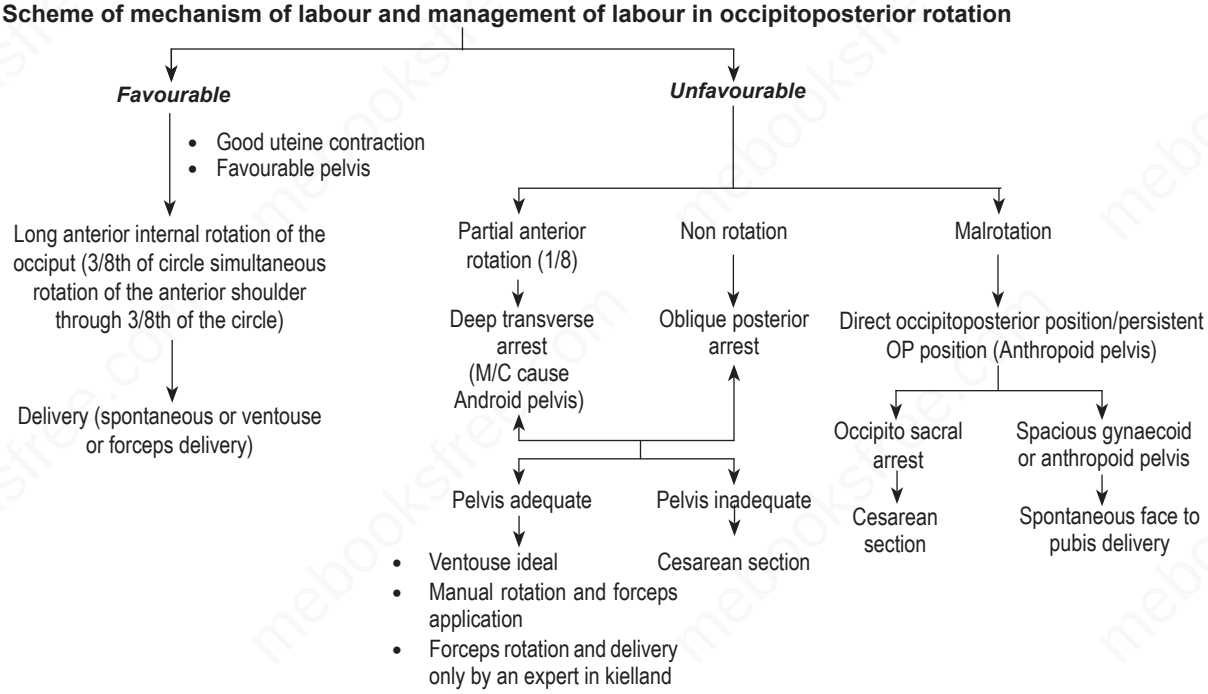
Course of Labour in Occipitoposterior Position:

- In 90% cases – if uterine contractions are good and pelvis is favourable, occiput rotates through 3/8th of a circle and baby is born as occipitoanterior.
- So, when diagnosis of occipitoposterior presentation is made—labour is allowed to proceed in a manner similar to normal labour, in anticipation of normal vaginal delivery.

Indications of cesarean section in occipitoposterior position:

- Arrest of labour (failure of rotation)
- Incordinate uterine action
- Fetal distress
- Other obstetrical complications warranting cesarean.

Scheme of mechanism of labour and management of labour in occipitoposterior rotation



Note: Management of DTA, oblique posterior arrest and occipitosacral arrest in modern day obstetrics is cesarean section.

17. **Ans. is a, b and d i.e. Anencephaly, Prematurity; and Contracted pelvis** *Ref. Dutta Obs. 7/e, p 388*

18. **Ans is a, b and d i.e. Anencephaly, Contracted pelvis and Thyroid** *Ref. Dutta Obs. 7/e, p 388*

I know it is difficult to mug up the causes of different malpresentations. To help you out I am telling you an easy way to remember the causes of face presentation.

Causes of Face presentation:

A. Causes similar in face and breech presentation:

D - I**U**D
A - Anencephaly — M/C cause of face presentation.
M - Multiparity, **P - Prematurity** — Risk factors for all malpresentations.

B. Causes related to neck:

- **T**umour of neck (congenital branchocele, congenital goitre).
- **T**wist of the cord round the neck.
- Increased **t**one of extensor group of neck muscles.

C. Other causes:
- Lateral obliquity of uterus.
- Platypelloid pelvis.

Remember:
- Most common congenital anomaly associated with face presentation is Anencephaly.[Q]
- M/C cause of face presentation— Anencephaly.
- M/C pelvis associated with face presentation — Platypelloid pelvis.

19. Ans. is a i.e. Brow presentation *Ref. Dutta Obs. 7/e, p 392*

Palpation on per vaginal examination	Presentation
• Occiput and posterior fontanelle (Anterior fontanelle not felt easily)	*Vertex (Occipitoanterior position)*
• Both fontanelle felt easily	*Vertex (Occipitoposterior position)*
• Anterior fontanelle (bregma) is felt at one end and root of nose (nasion) and orbital ridges at the other end of an oblique or transverse diameter	*Brow*
• Mouth with hard alveolar margins with nose, malar eminence, superior orbital ridges and mentum	*Face*

Also Know:

On palpation, difference between face and breech presentations:

Face	Breech
• Mouth and malar eminences form a triangle	• Ischial tuberosities and anus are in a line
• Alveolar margins hard	• Anal margins soft
• Sucking effect of mouth	• Grip of anal sphincter
• No meconium staining	• Meconium staining on finger

20. Ans. is b and d i.e. Submentovertical; and Submentobregmatic *Ref. Dutta Obs. 7/e, p 389*

Presentation	Engaging Diameter
• Occipito posterior	• Suboccipito frontal (deflexed head) • Occipito frontal (further deflexed head)
• Face	• Submentovertical (partially extended head) • Submentobregmatic (in fully extended head)
• Brow	• Mentovertical
• Breech – Of breech – Of shoulder – Of head	 – Bitrochanteric – Bisacromial – Suboccipitofrontal

21. Ans. is c i.e. Mentovertical *Ref. Dutta Obs. 7/e, p 392*

Brow Presentation:
- Causes of brow presentation are same as for face presentation.
- Most common cause – Flat pelvis/Platypelloid pelvis.

- Engaging diameter – Mentovertical (14 cm).
- There is no mechanism of labour.
- Diagnosed on P/V by palpating supraorbital ridges and anterior fontanelle.
- Delivery is by cesarean section.

22. Ans. is a i.e Placenta previa *Ref. Dutta Obs. 7/e, p 397*

- The presenting female is multipara with previous 2 normal deliveries and unstable lie.
- Lie refers to the relationship between the longitudinal axis of the foetus to that of the mother which may be longitudinal transverse or oblique.
- Unstable lie refers to the frequent changing of fetal lie and presentation even beyand 36th week of pregnancy.

Contributing factors:

- Grand multipara (M/C cause)
- **Placenta previa**
- Polyhydramnios
- Pelvic inlet contracture and/or fetal macrosomia
- Pelvic tumors

(Grand multipara, Placenta previa, Polyhydramnios, Pelvic inlet contracture and/or fetal macrosomia, Pelvic tumors) — Prevent engagements

- Uterine abnormalities (e.g. bicornuate uterus or uterine fibroids)
- Fetal anomaly (e.g. tumours of the neck or sacrum, hydrocephaly, abdominal distension).

Coming to the question- patient is a multigravida with previous 2 normal deliveries:

- As history of normal delivery is present, it rules out uterine anomaly.
- There are no signs and symptoms suggestive of pelvic tumor.
- Oligohydroamnios does not cause unstable lie, it is caused by plyhydroamnios.
- Thus in this patent most probable cause of unstable lie is placents previa.

Management of unstable lie:

- Hospital admission from 37 weeks onwards.
- Elective caesarean section is done in majority of the cases specially in the presence of complicating factors like pre-eclampsia, placenta praevia, contracted pelvis, etc.
- Stabilising induction of labour: External cephalic version is done (if not contraindicated) after 37 weeks → oxytocin infusion is started to initiate effective uterine contractions. This is followed by low rupture of the menbranes (amniotomy). Labour is monitored for successful vaginal delivery. This procedure may be sone even after the spontaneous onset of labour.

Note: M/C cause of fetal death in unstable lie is cord prolapse.

23. Ans. is b. i.e. Send the patient to labor and delivery immediately for an emergent CS

Now here patient has come for routine antenatal visit, during which it was discovered that the fetus is breech.

Points worth noting are:

- Gestational age is 37 weeks.
- On vaginal examination the cervix is 50% effaced and 1-2 cm dilated.
- The presenting breech is high out of pelvis, i.e it is not engaged and version can be attempted.
- The estimated fetal weight is about 7 lb (i.e. it is not much that vaginal breech delivery cannot be attempted).
- USG confirms fetus is in frank breech position, there is a normal amount of amniotic fluid present, and the head is well-flexed (all factors favoring version and vaginal breech delivery).
- Since patient is 37 weeks pregnant and presenting part is high out of the pelvis, amount of amniotic fluid is adequate so we can attempt external cephalic version and yes since version carries a risk of fetal distress and cesarean section. I will give the patient a chance to discuss with her family members and come back to me in a few days, if she wishes for external cephalic version (i.e. option d is correct).

Another option in this case would be to allow the patient to undergo a vaginal breech delivery whenever she goes into labor, i.e, option is correct.

Now both version and vaginal breech delivery carry a risk to the fetus, so if patient refuses to take any risk I will advise her to go for an elective cesarean section at or after 39 weeks, but there is no need/indication for an emergency cesarean section immediatelly and hence option b is the answer.

24. Ans. is a i.e. Frank breech *Ref. Dutta Obs. 7/e, p 398*

Cord Prolapse: Cord prolapse is the condition where the umbilical cord lies below the presenting part after rupture of membranes.

In cord presentation, the membranes are intact.

In occult cord prolapse the cord is by the side of the presenting part, but not felt by the examining fingers.

In breech: Highest risk of cord prolapse—footling breech

Least risk of cord prolapse — frank breech

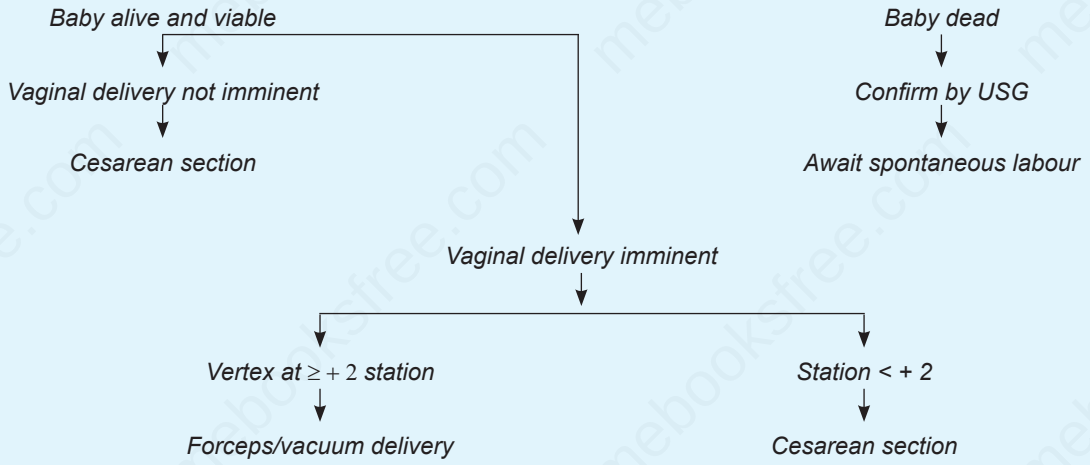
Overall: Highest risk of cord prolapse—transverse lie

Least risk of cord prolapse — vertex — occipitoanterior

Extra Edge:

In case of cord prolapse, on CTG variable deceleration is seen.[Q]

Management of Cord Prolapse



25. Ans. is a i.e. Occiput *Ref. Dutta Obs. 7/e, p 586*

Craniotomy: It consists of perforating the fetal skull, evacuating the contents and then delivering rest of the fetal parts.

Indication:

- Delivery of a dead fetus in obstructed labour with a cephalic presentation (vertex, brow or face).
- Delivery of the arrested after coming head in vaginal breech delivery.

Presenting Part	Perforation Site
Vertex	One or other parietal bone
Brow	Frontal bone
Face	Orbit or roof of the mouth
After coming head in breech	Occipital bone

26. Ans. is d i.e. Intracranial hemorrhage *Ref. Manual of Holand and Brews 16/e, p 190*

The most frequent single cause of death in breech presentation is intracranial haemorrhage due to tentorial tears, these tears are the result of sudden excessive pressure on the after coming head and may be aptly described as the snapping of the internal "*grey-ropes*" of the cranium.

27. Ans. is d i.e. Complete perineal tears *Ref. Dutta Obs. 7/e, p 370*

In face to pubis delivery → the most common complication is perineal tear as the occiput is posterior and thus the longer biparietal diameter (9.4 cm) distends the perineum rather than the smaller bitemporal diameter (8 cm). Hence in all such cases liberal episiotomy should be given.

28. Ans. is c i.e. Transverse lie *Ref. Dutta Obs. 7/e, p 373*

Deep transverse arrest is a complication of occipitoposterior position, how can it occur in transverse lie.

Causes of deep transverse arrest:

- Faulty pelvic architecture – Android pelvis
- Depresion of the head
- Weak uterine contractions
- Laxity of pelvic floor muscles:
  - Epidural analgesia causes prolonged 2nd stage of labour.
  - In transverse lie; presenting part is shoulder; so no question of DTA of head.

29. Ans. is d i.e. Shoulder *Ref. Dutta Obs. 7/e, p 394*

Transverse lie—

Important points:

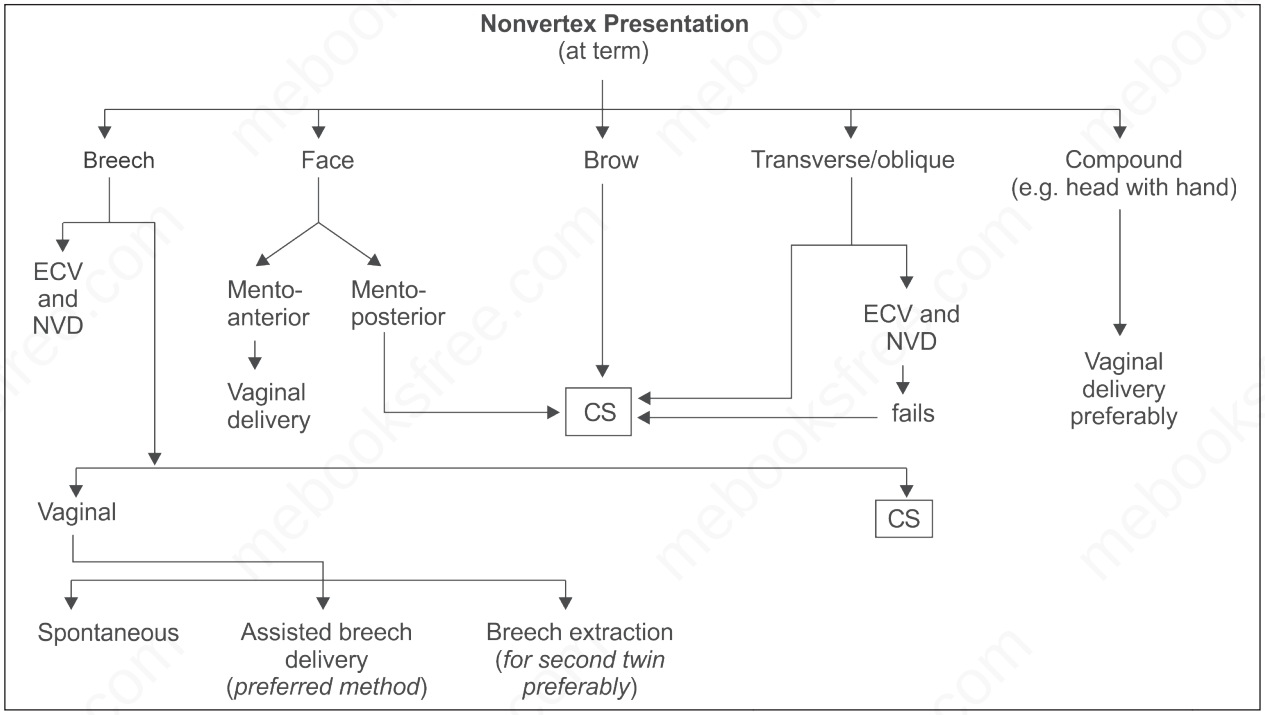
- In transverse lie – presentation is shoulder presentation
- M/C cause of transverse lie is prematurity
- M/C cause of transverse lie in term pregnancy – placenta previa
- There is no mechanism of labor in transverse lie
- M/C cause of cord prolapse is transverse lie
- Hand prolapse occurs in transverse lie
- Management of transverse lie with live baby in labor – caesarean section
- Management of transverse lie with dead baby – caesarean section.
- Options of destructive procedures which can be done in transverse lie:
  1. Decapitation
  2. Evisceration
- Management of neglected shoulder presentation – caesarean section
- Management of transverse lie during pregnancy – external cephalic version
- Management of 1st twins with transverse lie – caesarean section
- Management of 2nd twin with transverse lie – Internal Podalic Version.

30. Ans. is b i.e. Emergency cesarean section *Ref. Dutta Obs. 7/e, p 397; Williams Obs. 22/e, p 510, 23/e, p 478*

- Patients in labour with transverse lie can be managed by external cephalic version followed by surgical rupture of the membrane.
- But it is important to note that the patient is a primigravida with age 30 years, i.e. elderly primi, so ECV is contraindicated.
- This patient requires an emergency cesarean section.

Guidelines for the management of transverse lie

Antenatal	During labour	
↓	↓	
External cephalic version in all cases beyond 35 weeks	*Before/early labour*	*Active/late labour with membranes ruptured and inadequate liquor*
↓	↓	↓
If version fails or is contraindicated	*When liquor is adequate*	*Cesarean section*
↓	↓	
Cesarean section at 38 weeks	*External cephalic version*	
	↓	
	If version fails/contraindicated	
	↓	
	Cesarean section	



31. Ans. is d i.e. Shoulder dystocia *Ref. Dutta Obs. 7/e, p 395*

In neglected shoulder presentation there is a increased fetal loss due to:

- Cord prolapse
- Tonic contraction of uterus/obstructed labour
- Rupture of uterus

Maternal risk is increased due to:

- Dehydration } due to obstructed labour
- Ketoacidosis }
- Septicemia; Rupture uterus; Hemorrhage; Shock and peritonitis

32. Ans. is d i.e. Placenta in lower segment *Ref. Dutta Obs. 7/e, p 397*

Repeat, see Q 22 for explanation.

33. Ans. is b i.e. 10% cases are associated with anthropid or android pelvis *Ref. Dutta Obs. 7/e, p 365*

All the options given in the question are correct except – option b

"In more than 50%, the occipitoposterior position is associated with either on anthropoid or android pelvis"

—Dutta Obs 7/e, p 365

34. Ans. is c i.e. The diameter distending the vulval outlet is mentovertical (14 cm) *Ref. Dutta Obs. 7/e, p 388*

Face presentation:

- **The attitude** of the fetus shows complete flexion of the limbs with extension of the spine. **There is complete extension of the head** so that the occiput is in contact with the back.
- **The denominator** is mentum.
- **The commonest position is left mentoanterior (LMA).**
- Face presentation present during pregnancy (primary) is rare, while that developing after the onset of labor (secondary) is common. It occurs more frequently seen in multiparae (70%), like other malpresentations.
- Most common maternal cause is platypelloid pelvis and most common fetal cause is anencephaly.
- **The diameter of engagement** is the oblique diameter—right in LMA, left in RMA.
- **The engaging diameter of the head** is submento-bregmatic 9.5 cm (3 3/4") in fully extended head or submento-vertical 11.5 cm (4 1/2") in partially extended head.

- **Engagement is delayed** because of long distance between the mentum and biparietal plane (7 cm).
- **The head is born by flexion:** (11.5 cm).
- Vaginal delivery is possible in nentoanterior positions but not in persistent mentoposterior.
- In mentoposterior during early stages of labor the policy of wait and watch should be adopted, in hope of mentoposterior getting converted to mentoanterior spontanelously. Persistent mentoposterior position is an indication for doing cesarean section.

35. Ans. is d i.e. Face presentation when the chin lies under the symphysis pubis *Ref. Dutta Obs. 7/e, p 388, 389*

Vaginal delivery is not possible in:
- Brow presentation
- Shoulder presentation (transverse lie)
- Mentoposterior presentation of face (i.e. when chin lies directed to sacrum)

In mentoanterior, i.e when chin lies under the symphysis pubis – vaginal delivery is possible.

36. Ans. is d i.e. Delivery should be done by immediate cesarean section *Ref. Dutta Obs. 7/e, p 372*

Deep transverse Arrest

The head is deep into the cavity; the sagittal suture is placed in the transverse bispinous diameter and there is no progress in descent of the head even after 1/2 to 1 hour following full dilatation of the cervix.

Causes:
- Faulty pelvic architecture such as prominent ischial spines, flat sacrum and convergent side walls
- Deflexion of the head
- Weak uterine contraction
- Laxity of the pelvic floor muscles.

Diagnosis:
- The head is engaged
- The sagittal suture lies in the transverse bispinous diameter
- Anterior fontanelle is palpable
- Faulty pelvic architecture may be detected.

Management:
- *Vaginal delivery is found not safe* (big baby and or inadequate pelvis): Cesarean section.
- *Vaginal delivery is found safe* (any of the methods may be employed):
  - **Ventouse**—excessive traction force should not be used
  - **Manual rotation and application of forceps**
  - **Forceps rotation and delivery with Kielland** in the hands of an expert.

Note: **Operative vaginal delivery for DTA** should only be performed by a skilled obstetrician. Otherwise cesarean delivery is always preferred these days.

37. Ans. is b i.e. A = 2, B = 1, C = 3, D = 4 *Ref. Dutta Obs. 7/e, p 383, 384*

Maneouver used in assisted breech delivery:

i. Delivery of head	–	Burns Marshall method[Q]
	–	Mauriceau-Smellie-Veit method[Q]
	–	Piper's forceps[Q]
ii. Extended legs	–	Pinard's maneouvre[Q] (**Remember:** P for popliteal fossa and P for Pinard's manouvre)
iii. Extended arm	–	Lovset's maneouvre[Q]

Sometimes the head rotates posteriorly so, that the face is behind the pubis. Delivery in this position is difficult and *'Prague manoeuvre'* may be tried.

38. Ans is c. i.e. Zavanelli maneuver *Ref. Williams, 24/e*

The last rescue for entrapped fetal head is replacement of the fetus higher into the vagina and uterus, followed by caesarean delivery. This is called as Zavanelli maneuver.

39. Ans is a. i.e. Previous LSCS scar *Ref. Fernando Arias 4/e, p 374*

Absolute Contraindications for ECV:

i. Placenta previa
ii. Multiple pregnancies
iii. H/O antepartum haemorrhage
iv. IUGR
v. Severe preeclampsia and hypertension
vi. Rupture of membranes
vii. ECV is performed with caution and without force in patients with lower uterine scar. It is not contraindicated.

40. Ans is a i.e. ECV at 37 weeks *Ref. Fernando Arias, 4/e, p 375*

As discussed earlier ECV is not contraindicated in previous LSCS patients, hence in this patient ECV should be attempted at 37 weeks.

Prerequisites for ECV:

1. ECV should be done at 36-37 weeks
2. Membranes should be intact
3. Liquor should be adequate
4. Can be done in early labor (in latent phase)
5. No contraindications for ECV.

28

Operative Obstetrics

QUESTIONS

VERSIONS

1. **ECV is contraindicated in:** **[AI 07, RJ 08]**
   a. Primi b. Flexed breech
   c. Anemia d. PIH
2. **On external cephalic version, fetal bradycardia occurred. The next course of action is:** **[AP 97]**
   a. Reversion to the original position immediately by external version
   b. Internal podalic version
   c. Cesarean section
   d. Rupture of the membranes
3. **The complication that can occur with internal podalic version for transverse lie:** **[AI 08, AIIMS Nov 07]**
   a. Uterine rupture b. Uterine atony
   c. Cervical laceration d. Vaginal alceration

VENTOUSE/FORCEPS

4. **Ventouse in 2nd stage of labour is contraindicated in:**
   a. Persistent occipitoposterior position **[AI 00]**
   b. Heart disease
   c. Uterine inertia
   d. Preterm labour
5. **Contraindication of vacuum extraction:**
   a. Prematurity **[PGI June 04]**
   b. Brow presentation
   c. Fetal distress
   d. Floating head
   e. Undilated cervix
6. **All are complications of vacuum assisted delivery over forceps delivery *except*:** **[AIIMS Nov 13]**
   a. Cephal hematoma
   b. Subgaleal hematoma
   c. Intracranial hemorhage
   d. Transient lateral rectus palsy
7. **Which statements is true regarding Ventouse (vacuum extractor)?** **[AIIMS May 03]**
   a. Minor scalp abrasions and subgaleal hematomas in new born are more frequent than forceps
   b. Can be applied when foetal head is above the level of ischial spine
   c. Maternal trauma is more frequent than forceps
   d. Can not be used when fetal head is not fully rotated
8. **True about vacuum extraction of fetus:** **[PGI May 2010]**
   a. Can be used in nondilated cervix
   b. Can be used in incompletely dilated cervix
   c. Used in face presentation
   d. Applied 3 cm posterior to anterior fontanel
   e. Applied 3 cm anterior to posterior fontanel
9. **True about instrumental vaginal delivery:** **[AI 02]**
   a. Full cervical dilatation is the only prerequisite
   b. Forceps are used in all cases of breech delivery
   c. Forceps may be used, if ventouse fails
   d. Ventouse can not be used in rotational occipito-transverse/posterior delivery
10. **Outlet forceps, means:** **[PGI Dec 09]**
    a. Head at station "0"
    b. Full cervical dilatation
    c. Rupture of membrane
    d. Rotation > 45
11. **In the criteria for outlet for ceps application all are incorrect *except*:** **[AIIMS Nov 2011]**
    a. Fetus should be in vertex presentation or face with mentoanterior
    b. Sagittal suture should be less than 15 degrees from anterioposterior plane

c. There should be no caput succedaneum
d. Head should be at zerostation

12. Least complication in outlet forceps is: [AIIMS Dec 98]
a. Complete perineal tear
b. Vulval hematoma
c. Extension of episiotomy
d. Cervical tear

13. In heart disease, prophylactic forceps is applied at head station of: [PGI Dec 98]
a. –1 b. +1
c. 0 d. +2
e. Cervical tear

14. Forceps should not be used in: [UP 01]
a. Twin delivery
b. Hydrocephalus
c. Postmaturity
d. After coming head of breech

15. Forceps delivery is done in all *except*: [PGI 89]
a. Mentoposterior
b. Deep transverse arrest
c. After coming head
d. Maternal heart disease

16. With regards to flexion point which is correct? [New Pattern Question]
a. Flexion point is located 3 cm anterior to posterior fontanelle
b. Located 6 cm posterior to anterior fontanelle
c. Both a and b are correct
d. Both a and b are incorrect

17. Traction force required for forceps delivery in primigravida is: [New Pattern Question]
a. 15 kg b. 18 to 20 kg
c. 13 kg d. 25 kg

EPISIOTOMY

18. All of the following are true regarding forceps and vacuum delivery *except*: [AIIMS Nov 12]
a. Vacuum requires more clinical skills than forceps
b. Vaccum is preferred more in HIV patients than forceps
c. Forceps is more associated with fetal facial injury
d. Vacuum has more chance of formation of cephalhaematoma

19. All of the following statements are true for episiotomies *except*: [AI 02]
a. Allows widening of birth canal
b. Can be either mild-line or mediolateral
c. Involvement of anal sphincter is classified 3rd–4th degree perineal tear
d. Mid-line episiotomies bleed less, are easier to repair and heal more quickly

20. Perineal tear should be repaired: [AIIMS May 95]
a. 24 hrs later b. 48 hrs later
c. 36 hrs later d. Immediately

CESAREAN SECTION

21. The following is always an indication of cesarean section, *except*: [AI 02]
a. Abruption placentae
b. Untreated stage of I_b Ca cervix
c. Active primary genital herpes
d. Type IV placenta previa (major previa)

22. An absolute indication for LSCS in case of a heart disease is: [AIIMS Nov 00]
a. Coarctation of aorta
b. Eisenmenger syndrome
c. Ebsteins anomaly
d. Pulmonary stenosis

23. Indication of classical cesarean section:
a. Ca cervix **[PGI Dec 03]**
b. Kyphoscoliosis
c. Previous 2 LSCS
d. HSV infection
e. Contracted pelvis

24. Which of the following is not a contraindication of vaginal delivery after previous caesarean? [AI 08]
a. Previous classical C/S
b. No history of vaginal delivery in the past
c. Breech presentation in previous pregnancy
d. Puerperial infection in previous pregnancy

25. Vaginal birth after caesarean section (VBAC) is contraindicated in: [PGI Nov 12]
a. Previous classical section
b. Suspected CPD
c. NO vaginal birth previously
d. Previous uterine rupture

26. In a woman having a previous history of cesarean section all of the following are indications VBAC, *except*: [AIIMS May 01]
a. Occipito posterior position
b. Fetal distress
c. Breech presentation
d. Mid pelvic contraction

27. Trial of scar is contraindicated in all *except*: [AIIMS Nov 12]
a. History of previous classical cesarean section
b. History of previous CS due to contracted pelvis
c. Previous 3 LSCS
d. Previous history of LSCS (Indication malpresentation)

28. Best level of anaesthesia for LSCS: **[AIIMS Nov 13]**
a. T8
b. T10
c. T6
d. T4

OTHERS

29. Induction of labor by amniotomy can lead to the following complications: **[PGI Nov 07]**
a. Cord prolapse
b. Abruptio placenta
c. Rupture uterus
d. Infection

30. Zavenelli's manoeuver done in: **[PGI Dec 06]**
a. Shoulder dystocia
b. Deep transverse arrest
c. Retained placenta
d. Face presentation

31. You are called to the operating room. The general surgeons have operated on a woman to rule out appendicitis and the signs of an abdominal pregnancy with an 18 week fetus and placenta attached to the omentum. The best course of action in the case is: **[New Pattern Question]**
a. Removal of both fetus and placenta
b. Laparoscopic ligation of umbilical cord
c. Removal of the fetus only
d. Closely follow until viability and then deliver by laparotomy

32. A forceps rotation of 30° from left occiput anterior (LOA) to occiput anterior (OA) with extraction of the fetus from +2 station is described as which type of forceps delivery? **[New Pattern Question]**
a. High forceps
b. Midforceps
c. Low forceps
d. Outlet forceps

33. Indications for cesarean hysterectomy are all *except*: **[New Pattern Question]**
a. Placenta accreta
b. Couvelaire uterus
c. Atonic uterus with uncontrolled PPH
d. Rupture uterus

34. All are the contraindications for vaginal birth after previous caesarean *except*: **[New Pattern Question]**
a. Previous classical uterine incision
b. Previous lower segment transverse caesarean
c. Presence of inverted 'T' shaped uterine incision
d. Where facilities for emergency caesareans are not available

35. A cesarean section was done in the previous pregnancy. All of the following would be indications for elective cesarean section except: **[AIIMS May 14]**
a. Breech
b. Macrosomia
c. Polyhydramnios
d. Post-term

36. The following statements are related to symphysiotomy *except*: **[New Pattern Question]**
a. The operation should be done only when obstruction is anticipated
b. Isolated outlet contraction is the ideal case
c. FHS must be present
d. Ventouse is preferable to forceps for extraction

37. Symphysiotomy is indicated in: **[New Pattern Question]**
a. Contraction of brim
b. Contraction of cavity
c. Contraction of outlet
d. All of these
e. None of the above

EXPLANATIONS & REFERENCES

1. Ans. is d i.e. PIH *Ref. Dutta Obs. 7/e, p 380, Williams Obs 23/e, p 540*

External cephalic version: ECV is the procedure where presentation other than cephalic is converted by external manipulation into a cephalic presentation. It can be carried out in breech presentation or in transverse lie. It is more successful in transverse lie.

Timing:

- It should be done after 35 weeks.
- ***Ideal time is 36-37 weeks***

Contraindications to version:

Friends, you can remember the contraindication to ECV—if you remember, ECV should not be done in conditions:

- Where there is risk to mother
- Where there is risk to fetus
- Where conditions are not suitable.

Risk to mother	Risk to fetus	Conditions not suitable
• APH – Placenta previa/abruptio placentae • Pre eclampsia (hypertension)	• Precious pregnancy as in bad obstetrics history • Elderly primigravida • IUGR	• Multiple pregnancy • Obesity • Ruptured membranes (because liquor has drained) • Oligohydramnios • Contracted pelvis • Congenital abnormalities of uterus • Significant fetal anomalies/dead fetus

2. Ans. is a i.e. Reversion to the original position immediately by external version *Ref. Dutta Obs.7/e, p 583*

External cephalic version:

Is done to bring favourable cephalic pole in the lower pole of uterus.

Indications:

- Breech presentation
- Transverse lie

Procedure:

- The manoeuver is carried out after 35 weeks under the effect of. Terbutaline 0.25 mg s.c. or Isoxsuprine 50–100 μg IV **Ultrasound** examination is done to confirm the diagnosis and adequacy of amniotic fluid volume. A reactive NST should precede the manoeuver[Q]. Then ECV is attempted followed by a repeat NST after the procedure.
- A reactive NST should be obtained after completing the procedure[Q]. There may be undue bradycardia due to head compression which is expected to settle down by 10 minutes. If however, fetal bradycardia persists, the possibility of cord entaglement should be kept in mind and in such cases reversion is done.
- If version is successful the patient is observed for 30 minutes -
  - To allow for the fetal heart rate to settle down to normal.

If even after reversion, fetal distress persists—cesarean should be done.

3. Ans. is a i.e. Uterine rupture *Ref. Dutta Obs. 7/e, p 585, Munrokerr 100/e, p 292*

Internal podalic version (IPV):

- In modern obstetrics, there is no place for this procedure in a singleton pregnancy.
- Internal podalic version is only used for the second twin when it is lying transversely and external version fails[Q].

Prerequisites for IPV:

- The membranes should be intact or very recently ruptured in other words liquor should be adequate.
- The cervix should be fully dilated.
- Fetus must be living.

Anaesthesia: General anaesthesia[Q] (halothane).

Contraindications:

- Obstructed labour[Q]
- Membranes ruptured with all the liquor drained
- Previous cesarean section even if it is LSCS.
- Contracted pelvis.

Complications:

Maternal	Fetal
Placental abruption	Asphyxia
Rupture uterus	Cord prolapse
Increase morbidity	Intracranial haemorrhage

4. Ans. is d i.e. Preterm labour *Ref. Dutta Obs. 7/e, p 580*

5. Ans. is a, b, c, d and e i.e. Prematurity, Brow presentation, Fetal distress, Floating head, Undilated cervix
Ref. Dutta Obs. 7/e, p 580; COGDT 10/e, p 466, 467, Williams Obs 23/e, p 523

Ventouse/Vacuum extraction: Ventouse is an instrument which assists in delivery by creating a vaccum between it and fetal scalp.

Prerequisite:

- Bladder should be empty
- Cervix should be at **least 6 cm dilated (i.e. ventouse can be applied in incompletely dilated cervix)**
- Vertex presentation
- Head should be engaged
- No bony resistance below the head/No evidence of CPD

Indications:

- As an alternative to forceps operation.
- As an alternative to rotational forceps in occipito transverse or posterior position.
- Delay in descent of the head in case of the second baby of twins.
- Deep transverse arrest[Q].
- To cut short the second stage of labour as in heart disease patients.

Contraindications:

***Mnemonic:* PCM not demanded in common public**

P	=	**P**rematurity (< 34 weeks or weight < 2 kg) as chances of scalp avulsion or subperiosteal hemorrhage are more
C	=	Fetal **c**oagulopahty
M	=	Fetal **m**acrosomia (weight ≥ 4 kg)
Not	=	**N**onengaged fetal head
Demanded	=	Fetal **d**istress where urgent delivery is needed
In	=	**I**nfection = HIV
Common	=	**C**PD (Cephalo pelvic disproportion)
Public	=	**P**resentation other than vertex (including face presentation)

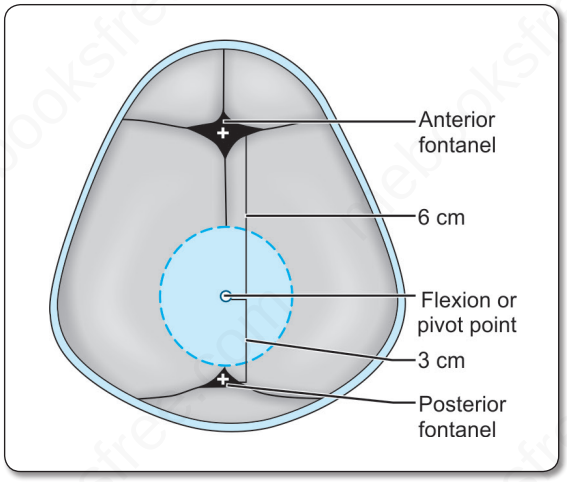
Relative contraindication–Recent scalp blood sampling (Williams Obs 23/e, p 523)

The 2 main advantages of vacuum are:

- It can be applied through incompletely dilated cervix (not undilated cervix)
- Can be used in unrotated or malrotated occipitoposterior position of head, e.g. in deep transverse arrest with adequate pelvis.

Extra Edge:

- Vacuum cup should be applied over the sagittal suture at the median flexion point located 3 cm anterior to the posterior fontanelle.



- Maximum pressure created by vacuum = 0.8 kg/cm^2 (600 mm Hg)
- The direction of pull of vacuum should follow the Curve of Carus, i.e. downwards and backwards, then downwards and finally upwards (similar to forceps).
- Delivery should occur within three pulls over a period of 15 mins.
- If the cup slips, despite of correct application or delivery does not occur after three pulls-cesarean section is indicated.

6. Ans. is None *Ref. Williams Obs. 23/e, p 524*

Complications: of vacuum

Maternal	Fetal
(In ventouse maternal complications are less than with forceps) • Soft tissue injuries to the vagina, cervix and perineum • Annular detachment of the cervix • Traumatic PPH	• MC is retinal hemorrhage *(COGDT 10/e, p 468)* • Scalp injury • **Cephalhematoma** (More common with vacuum) • **Intracranial hemorrhage** • **Subgaleal hemorrhage** (More common with vacuum) • Neonatal jaundice (More common with vacuum) • Asphyxia in difficult vacuum • Shoulder dystocia (More common with vacuum) • Erb paralysis, **6th and 7th nerve palsy.**

Comparison of vaccum extractor with forceps:

Complications seen more with forceps:
• Maternal trauma • Blood loss • Episiotomy rates • 3rd and 4th degree perineal lacerations • Anal sphincter dysfunction

Fetal complications:

More with forceps	More with vaccum
• Intracranial haemorrhage • Facial N palsy • Brachial plexus palsy	• 6 mN palsy • Retinal injury • Cephal hematoma

6th nerve paralysis is a complication of vacuum extraction (Williams 23/e, 524) and fetal complications are more with vacuum than forceps, so ideally the answer to this questions should be none.

7. Ans. is a i.e. Minor scalp abrasions and subgaleal hematomas in new born are more frequent than forceps

Ref. Dutta Obs. 7/e, p 581; Sheila Balakrishnan, p 545; COGDT 10/e, p 468

Vacuum	Forceps
Advantages	**Disadvantages**
No need for anaesthesia	Requires anaesthesia
Less maternal injuries	Maternal injuries may occur
Promotes autorotation, can be used in unrotated or malrotated occipito posterior position of the head	No autorotation, occupies space at the sides
Does not require full cervical dilatation	Requires full dilatation
Can be applied if cervix > 6 cm dilated	
Less traction force needed	More traction force needed
Disadvantages	**Advantages**
Requires maternal effort	No maternal effort needed, therefore suitable in case of maternal heart disease and maternal exhaustion
Takes time in fetal distress	Quick in cases of fetal distress and maternal exhaustion
More cephalhematomas/subgaleal hematoma/jaundice	Less cephalhematomas
Cannot be used in preterm (< 34 weeks)	Can be used in preterm
Cannot be used in other presentations	Can be used in face and breech
Cannot be used in IUD baby as chignon formation will not occur	Can be used in delivery of an IUD baby.

So from the above table it is clear that-

Maternal trauma is less in vacuum than in forceps *(**Option "c"** is incorrect)*

Vacuum promotes autorotation, So can be used in unrotated or malrotated occipitoposterior position of the head **(*Option "d" is incorrect*).**

Remember: The two main advantages of vacuum over forceps are:

i. ***It can be used in unrotated or malrotated occipitoposterior position of the head eg. in deep transverse arrest with adequate pelvis.***
ii. ***It can be applied even through incompletely dilated cervix.***

As far as ***option "b"*** is concerned *—Dennen's Forcep's Deliveries 3/e, p 178*

"Although Malmstrom originally described application of the Ventouse to a scalp prior to full dilatation of the cervix and at any station of the head, the reported subsequent higher incidence of fetal injury has altered the indication"

Currently, use at high stations and with incomplete cervical dilatation is discouraged.

So ventouse should not be applied when fetal head is above the level of ischial spine ***(Option "b" incorrect)***.

COGDT 10/e, p 468 says about subgaleal hematomas:

"Subgaleal hematoma, a more serious complication, occurs in 50 of 10,000 vacuum deliveries.

Subgaleal hematoma is mentioned as a complication of ventouse and not of forceps in all the books *(i.e. **option "a"** is correct)*.

8. Ans. is b and e, i.e. Can be used in incompletely dilated cervix and Applied 3 cm anterior to posterior fontanel.

Ref: Duttaobs 7/e, p 580, 581, Williamsobs 23/e, p 552-524, John Hopkins Manual of Obs. and Gynae 4/e, p 84

Vacuum can be applied if cervix is atleast 6 cm dilated i.e. **option 'b' –'can be used in incompletely dilated cervix'** is correct but **option 'a'- can be used in nondilated cervix'** is incorrect.

Vacuum cannot be applied in presentation other than vertex hence it cannot be applied in face presentation **option 'c' –'used in face presentation'** is incorrect.

Proper cup placement is the most important determinant of success in vacuum extraction.

"The center of the cup should be over the sagittal suture and about 3 cm in front of the posterior fontanel toward the face. Anterior placement on the fetal cranium - near the anterior fontanel rather than over the occiput - will result in cervical spine extension unless the fetus is smal" – *—Williams Obs. 23/e, p 523*

"The suction cup is applied in the midline on the sagittal suture about 1 to 3 cm anterior to the posterior fontannelle (the flexion point) ". *—John Hopkins Manual of Obs and Gynae 4/e, p 84*

i.e option e-applied 3 cm anterior to posterior fontannele is correct.

9. Ans. is b i.e. Forceps are used in all cases of breech delivery *Ref. Dutta Obs. 7/e, p 575; COGDT 10/e. p 468*

Conditions (Criteria) to be fulfilled prior to forceps operation

Fetal and uteroplacental criteria	Maternal criteria
• The fetal head must be engaged • The cervix must be fully dilated • The membranes must be ruptured • The position and station of the fetal head must be known with certainty	• No major cephalopelvic dispropor tion by clinical pelvimetry • Bladder must be emptied • Adequate analgesia

Thus fully dilated cervix is not the only prerequisite *(**Option "a"** is incorrect).*

Option "b" i.e. Forceps are used in all cases of breech delivery

The most commonly used method in breech presentation is the **assisted breech delivery** where Burn Marshal technique is used for the after coming head which does not involve the use of forceps but–

Dutta 6/e, p 384 ***says "Forceps can be used as a routine".***

Sheila Balakrishnan p 454 says ***"Forceps for the after coming head, Piper's forceps or any straight forceps can be used. This is the best method of delivery of the head."***

COGDT 10/e, p 347 ***says "Piper forceps may be used electively or when the Mauriceau-Smellie-Veit maneuver fails to deliver the aftercoming head".***

So forceps can be used routinely in breech deliveries but it is not a common practise *so option 'b' can be kept in +/– status.*

Earlier we have studied that ventouse is used in unrotated/malrotated occipitotransverse/posterior deliveries *(option 'd' incorrect).*

As far as ***option 'c'*** is concerned i.e. Forceps may be used if ventouse fails.

COGDT 10/e, p 468 says ***"Under no circumstances should the operator switch from vacuum to forceps or vice versa. An excellent study examining neonatal injury clearly demonstrated that the greatest incidence of neonatal injury occurred in babies in whom both vacuum and forceps were used."***

So amongst all the options given option 'b' is partially correct. We are taking it is the answer of choice here.

10. Ans. is b and c i.e. Full cervical dilatation, Rupture of membrane

11. Ans. is a i.e. Fetus should be vertex presentation or face with mentoanterior

Ref: Dutta Obs. 7/e, p 573,575, Williams 23/e, p 513

Outlet forceps are a variety of low forceps, so the basic criteria to be fulfilled before any forceps application should be fulfilled here also.

Criteria to be fulfilled before forceps application.

F = **F**avourable head position and station
O = **O**pen OS (fully dilated)
R = **R**uptured membranes
C = **C**ontractions present and consent taken
E = **E**ngaged head, empty bladder
P = No major C**P**D/pelvis should not be contracted

Classification of forceps delivery according to station and rotation

Type of Procedure	Criteria	Forceps used
A High forceps	• Vertex not engaged • No longer used	Kielland forceps
B Mid forceps	• Head is engaged but presenting part/station is above +2	Andersons or simpsons forceps
C Low forceps	• Station is more than +2 but has not yet reached the pelvic floor rotation can be more or less than 45°	
D Outlet forceps	• Station is more than +2 and fetal skull has reached the level of pelvic floor (i.e. station ≥ + 3) • Scalp is visible at the introitus without separating the labia • Fetal head is at or on the perineum • Sagittal suture is indirect AP diameter or • Right or left occipito anterior or posterior position • Rotation is < 45°	Wrigley's forceps

Note:
- The most important point of reference in the use of forceps is the station of biparietal diameter.
- These days forceps are not applied at station < + 2.
- When correctly applied, the long axis of the blades should correspond to occipitomental diameter

Presentations in which forceps

Can be applied	Cannot be applied
Vertex Deep transverse arrest After coming head of breech Face-mento anterior presentation Brow presentation Face-mento posterior presentation	(only after manual rotation) (Forceps used- Pipers forceps) (Note-Forceps cannot be applied only in those conditions in which cesarean section has to be done) Transverse lie

Coming to Q10.

Option a-Head at 0 station -Incorrect as in outlet forcep head is at the perineum

Option b-Full cervical dilatation-correct

Option c-Membrane should be ruptured-correct

Option d-rotation >45 degrees-incorrect as rotation should be less than 45 degrees

Coming to Q11.

Option a: Fetus should be in vertex or mentoanterior position is correct

Option b: Sagittal suture should be less than 15° from anteroposterior plane is incorrect

Forceps can be applied till maximum 45° rotation

Option c: There should be no caput succedaneum- Again incorrect as presence of caput succedaneum is not a contraindication for forceps application

Option d: Head should be at zerostation also incorrect as outlet forceps is applied when head reaches the perineum

12. Ans. is d i.e. Cervical tear *Ref. COGDT 10/e, p 463; Sheila Balakrishnan, p 463; Dutta Obs.7/e, p 579*

Complication of forceps delivery: *—Dutta Obs.7/e, p 578*

Maternal	Fetal
Immediate • Injury –Vaginal laceration or sulcus tear, extension of episiotomy to involve the vaginal vault, complete perineal tear, cervical tear • Nerve injury–Femoral (L2, 3, 4), Lumbosacral trunk (L4,5) • Postpartum hemorrhage may be–(i) traumatic or (ii) atonic, or (iii) both • Anaesthetic complications following local or general anaesthesia • Puerperal sepsis and ↑ maternal morbidity	• Immediate • Facial bruising • Facial palsy • Intracranial hemorrhage (rupture of the great vein of Galen) – Cephal hematoma • Skull fracture – Cervical spine injury (rotational forceps) • Asphyxia

Contd…

Maternal	Fetal
Remote	**Remote**
• Painful perineal scars, dyspareunia, low backache, genital prolapse, stress urinary incontinence and sphincter dysfunction	• Cerebral or spastic palsy due to residual cerebral injury (rare)

In case of outlet forceps all the given complications may occur but cervical tear is unlikely, as outlet forceps is applied at the level of introitus and does not reach the cervix.

13. Ans. is d i.e. +2 *Ref. COGDT 10/e, p 463; Sheila Balakrishnan, p 463*

- In heart disease forceps are applied prophylactically to cut down the second stage of labour and usually low or outlet forceps applied.
  - ***Low forceps:*** Applied when leading point of fetal scalp is at station + 2 and not on pelvic floor.
  - ***Outlet forceps:*** Applied when fetal skull has reached pelvic floor and scalp is visible at the introitus even without separating the labia, i.e. station ≥ + 3

Note: "O" station means the level of ischial spine.

Also Know: *From Operative Obs and Gynae by Randhir Puri 1/e, p 178*

Prophylactic forceps (to shorten the second stage of labour) is used in:
- Medical diseases like cardiac disease and pre-eclampsia.
- Low brith weight infants (No obvious advantage) *—Williams Obs. 22/e, p 550*
- After coming head in breech.

14. Ans. is b i.e. Hydrocephalus *Ref. Dutta Obs. 7/e, p 575*

As discussed previously—

One of the criteria to be fulfilled before applying forceps is—there should be no major cephalopelvic disproportion (CPD) by clinical pelvimetry and hydrocephalus is an important cause of CPD. *—Dutta Obs. 7/e, p 352*

15. Ans. is a i.e. Mentoposterior *Ref. Dutta Obs. 7/e, p 391, 372*

Option 'a'

Mentoposterior: Before going on to mentoposterior, lets see mentoanterior.

Mentoanterior *—Dutta Obs. 7/e, p 390*

In mentoanterior face presentation there is place for spontaneous vaginal delivery and liberal episiotomy is all that is required. In case of delay, forceps delivery is done.

In mentoposterior: 20 to 30% cases rotate anteriorly through 3/8 of circle and deliver as mento anterior, there fore trial of labour may be given in hope of anterior rotation of chin, followed by spontaneous/forceps delivery. In the rest 70-80%, incomplete anterior rotation/ non rotation occurs.

In these persistent mentoposterior: cesarean section is the only management. Therefore in mentoposterior per se forceps is not applied, only when it rotates anteriorly and becomes mentoanterior, forceps are applied.

Option 'b'

Deep transverse arrest

Management options in case of deep transverse arrest are: *—Dutta Obs. 7/e, p 372*

Ventouse: Ideal for all cases

Cesarean section: If the pelvis is android or there is CPD, cesarean section should be done. In modern obstetrics, traumatic vaginal delivery causing intracranial hemorrhage is to be avoided at all costs and so there is increasing use of cesarean section for deep transverse arrest.

Other options are:
- Manual rotation followed by outlet forceps application.
- Forceps rotation and delivery using Keilland forceps.
- Craniotomy if the baby is dead.

As far as ***options 'c'*** and ***'d'*** are concerned: *In after coming head of breech, and in heart disease forceps are routinely applied.*

Also Know: Many questions are asked on vaccum/forceps application in various types of presentations.

Remember: The following in Brief:

Forceps can be applied in:
- Vertex presentation
- Breech presentation (after coming head of breech)
- Occipitoposterior position
- Transverse arrest (keilland forceps used for rotation)
- Mentoanterior position.

Forceps cannot be applied in:
- Mentoposterior
- Brow presentation
- Transverse lie.

Forceps used for correcting asynclitism of head: Keilland forceps.
Mid cavity forceps: Keillands forceps
Forceps used in after coming head of breech: Pipers forceps.
Outlet forceps: Wrigley's forceps
Long curved forceps: Das forceps
Ventouse is applied in:
- Vertex presentation:
  - *Occipito anterior position*
  - *Occipito transverse/posterior position*
  - *Deep transverse arrest*

Ventouse is contraindicated:
- Face presentations (Mento anterior and posterior)
- Breech presentation
- Brow presentation

16. Ans. is c i.e. Both a and b are correct *Ref. Dutta Obs. 8/e, p 662*

Vaccum cup should be applied at flexion point which is situated—at 3 cm anterior to posterior fontanelle or 6 cm posterior to anterior fontanelle. See figure in Ans. 5.

17. Ans. is b i.e. 18 to 20 kg *Ref. Dutta Obs. 8/e, p 654*

Traction force required by forceps is:
Primigravida = 18–20 kg
Multigravida = 13 kg
Vaccum = Initial pressure is 0.2 kg/cm^2 induced over 2 minutes. The pressure is gradually increased at the rate of 0.1 kg/cm^2 to a maximum of 0.8 kg/cm^2 (600 mm of Hg).

18. Ans is a i.e. Vacuum requires more skills than forceps *Ref Dutta Obs. 7/e, p 579, 581*
- Forceps require more skills than vacuum.
- Ventouse-It is comfortable and has lower rates of maternal trauma and genital tract lacerations.
  - Reduced maternal pelvic floor injuries.
  - Perineal injuries are less.

Due to these reasons, vacuum is preferred more than forceps in HIV patients to decrease the mother to child transmission.

19. Ans. is a i.e. Allows widening of birth canal *Ref. Dutta Obs. 7/e, p 568, 569; Dewhurst 6/e, p 307*

Episiotomy: is defined as a surgical incision made over the perineum and vulva during delivery to increase the diameter of the vulval outlet (and not the whole of birth canal) during child-birth and to prevent perineal tears. Thus episiotomy is a surgically given perineal tear of second degree.

Types of Episiotomy:
- Median
- Mediolateral
- Lateral
- 'J' shaped

Mediolateral and median episiotomy are the most common types.
Commonly a right mediolateral episiotomy is performed, angled at 45^0 from the vulvar rim.

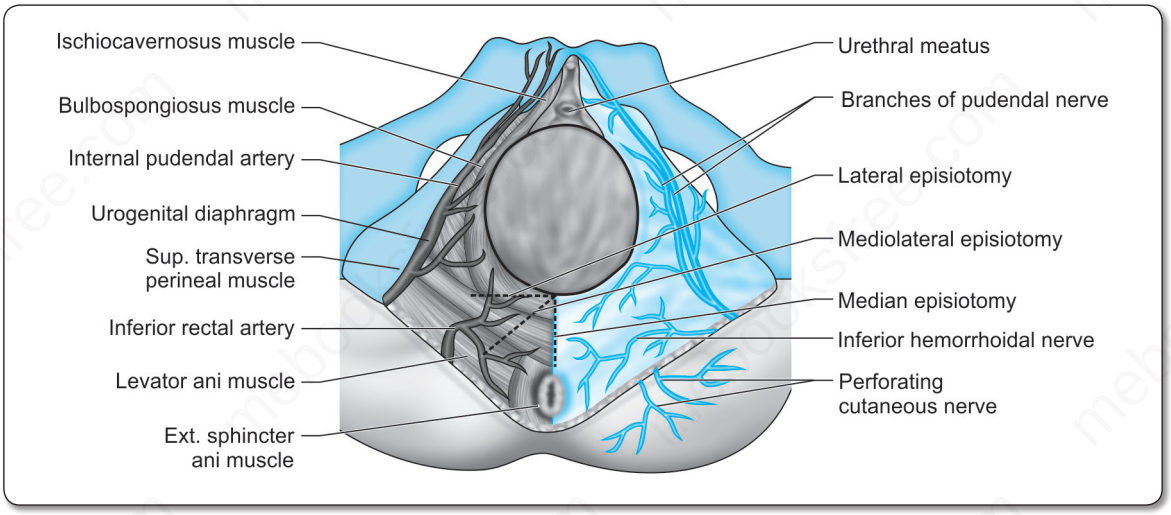
Comparison between Midline (median) and Mediolateral episiotomy.

Median	Mediolateral
• Muscles are not cut	• Muscles are cut
• Blood loss is less	• Blood loss is more
• Repair is easy	• Repair is difficult
• Healing is superior	• Healing is less superior
• Dyspareunia is rare	• Dyspareunia is more
• Extension, if occurs, may involve rectum	• Relative safety from rectal involvement from extension
• Incision cannot be extended	• Incision can be extended

Note: Sphincter involvement is classified as 3 degree.

Extra Edge: Structures cut in Mediolateral episiotomy *(Very Important)*

- Posterior vaginal wall
- Superficial and deep transverse perineal muscles, bulbospongiosus and part of levator ani
- Fascia covering those muscles
- Transverse perineal branches of pudendal vessels and nerves
- Subcutaneous tissue and skin.



20. Ans. is d i.e. Immediately *Ref. Dutta Obs. 7/e, p 422, 423*

Perineal Tears:

1º	Is a laceration of the vaginal mucosa and the perineal skin, but not the underlying fascia and muscle.
2º	Involves the vaginal mucosa, perineal skin, and the fascia and muscles of the perineal body.
3º	Involves the vaginal mucosa, skin and perineal body and the anal sphincter is also disrupted.
4º	In addition, the rectal mucosa is also torn.

Management of Perineal tears:

Recent tear should be repaired immediately following the delivery of the placenta.[Q]

In cases of delay beyond 24 hours, the complete tear, should be repaired after 3 months.[Q]

Repair of first and second degree tears: is similar to repair of episiotomy.

Repair of third and fourth degree tears: There repair is of prime importance as uncorrected tears may lead to faecal incontinence.

The rectal mucosa is first repaired followed by the disrupted ends of the anal sphincter (both the internal and external sphincter). Then the remaining repair is carried out as in any other second degree perineal tear.

Also Know: In case wound breakdown occurs, secondary repair should be deferred for up to at least 8 weeks after correcting infection.

21. Ans. is a i.e. Abruptio placenta *Ref. Dutta Obs. 7/e, p 308, 301, 250; COGDT 10/e, p 334*

Cesarean Section is not indicated in all cases of abruptio placentae.

"An attempt at vaginal delivery is indicated if the degree of separation appears to be limited and if continuous FHR tracing is reassuring. When the placental separation is extensive but the fetus is dead or of dubious viability, vaginal delivery is indicated". *—COGDT 10/e, p 334*

- In carcinoma cervix, classical cesarean section should be done, vaginal delivery should not be allowed because of cervical dystocia and injuries. *—Dutta Obs. 7/e, p 308*
- Cesarean section is indicated in an active primary genital HSV infection where the membranes are intact or recently ruptured. *—Dutta Obs. 7/e, p 300*
- In severe degree of placenta previa (Type II posterior, Type III or Type IV), cesarean section is indicated for maternal interest even if the baby is dead. *—Dutta Obs. 7/e, p 252*

Also Know: *—COGDT 10/e, p 469, 470*

Indications of cesarean section	
Absolute	**Relative**
• Central placenta previa • Contracted pelvis • Adherent placenta • Previous 2 or more LSCS • Classical cesarean section • Advanced carcinoma cervix • Transverse lie/mentoposterior/brow presentation • Active genital herpes infection in mother • Monoamnionic monochorionic twin • Footling/knee/stargazer breech • HIV with viral load > 1000 • Macrosomia with weight > 5 kg In nondiabetic and in diabetic ≥ 4.5 kg	• CPD • Fetal distress • Previous LSCS • IUGR • Bad obstetric history • Primi with breech • Elderly primi • Pre-clampsia/eclampsia

Previous cesarean section – earlier it was believed that once a cesarean means always a cesarean. But this dictum does not hold good now. Vaginal birth after cesarean (VBAC) is being practised now a days.

22. Ans. is a i.e. Coarctation of Aorta *Ref. Dutta Obs. 7/e, p 278*

- *Heart disease during pregnancy, in itself is not an indication for cesarean section.*
- Cesarean section in heart disease is done in specific cases as discussed in chapter 16.

"In coarctation of aorta, elective cesarean section is indicated to prevent rupture of the aorta or mycotic cerebral aneurysm." *Ref. Dutta Obs. 7/e, p 278*

23. Ans. is a and e i.e. Ca cervix; and Contracted pelvis *Ref. Dutta Obs. 7/e, p 590, 591; Williams Obs. 22/e, p 597, 598, 23/e, p 555*

Classical cesarean:

- In classical cesarean section the uterine incision is made on the anterior uterine wall in the upper segment above the reflection of the uterovesical fold of peritoneum.
- The chances of rupture of uterus are high with classical cesarean section therefore it is rarely used now a days.
- It is done only in cases where the lower segment is not approachable.

Indications of classical Cesarean-section

Lower segment approach Is difficult due to	Lower segment approach risky	Postmortem section
• Dense adhesions (previous operation) • Severe contracted pelvis (osteomalacic or rachitic)	• Big fibroid in lower segment • Ca Cervix • Repair of difficult and high V V F • Severe degree of placenta previa with engorged vessels in lower segment	Contemplating to have a live baby

Also Know:

Classical cesarean section:

- It is associated with maximum incidence of rupture uterus[Q] (4–9%)[Q].
- **Rupture can occur during pregnancy[Q] even prior to onset of labour.**
- Site of rupture – upper segment.

Lower segment transverse incision also called as Munro-Kerr incision:

- It is the most common type of cesarean section practised.

Lower segment vertical incision:

Indications:

- Constriction ring
- Lower segment not formed as in **transverse lie**[Q] and prematurity.

Disadvantages:

- Extension downwards can involve the cervix, the vagina and even the bladder.

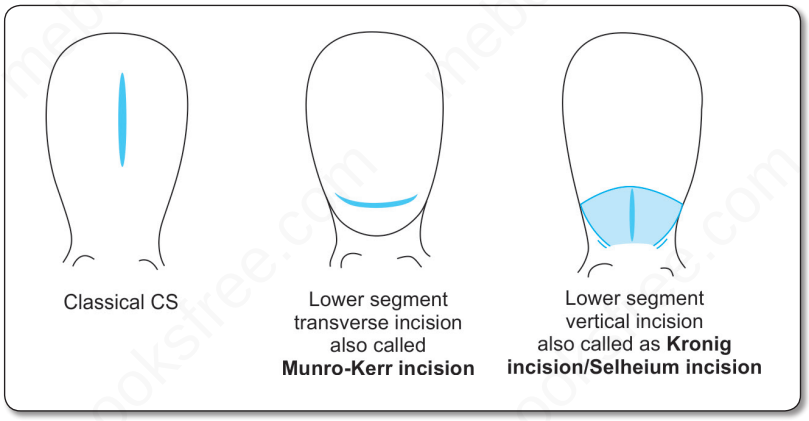
Advantages of a Lower segment section over Classical cesarean section:

Healing of the lower segment incision is better as it is located in the lower segment which is quiescent. Hence tensile strength is more and so the chance of scar rupture in the next pregnancy is minimal.

Incidence of rupture-

Prior Uterine Incision	Estimated Rupture (%)
Classical	4–9
T-shaped	4–9
Low vertical	1–7
Low transverse	0.2–1.5

- In women with uterine malformations who have undergone cesarean delivery, the risk for uterine rupture in a subsequent pregnancy may be as high as with a classical incision.



24. Ans. is c. i.e. Breech presentation in previous pregnancy *Ref. Williams Obs. 22/e, p 610-613, 23/e, p 567-571; Mudaliar 9/e, p 449*

25. Ans. is a, b and d i.e. Previous classical section, Suspected CPD and Previous uterine rupture

Vaginal birth after cesarean section-VBAC: Or Trial of Scar

Earlier previous cesarean section was considered as an absolute contraindications for vaginal delivery. *—Dutta Obs. 6/e, p 355*

But now this statement is considered as an exaggeration. *—Williams Obs. 22/e, p 608, 23/e, p 565*

Vaginal delivery can be tried in post LSCS cases in institutions equipped to respond to emergencies (i.e., rupture uterus) with physicians immediately available to provide emergency care.

Contd...

Contd...

Recommendations of American college of obstetricians and Gynecologists (ACOG) for vaginal birth after cesarean delivery (VBAC) selection criteria. *—Williams Obs. 22/e, p 610, 23/e, p 567, Table 26.2*

- One prior low - transverse cesarean delivery.
- Clinically adequate pelvis. (No CPD)
- No other uterine scars of previous rutpure.
- Physician immediately available throughout active labor who is capable of monitoring labor and performing emergency cesarean delivery.
- Availability of anesthesia and personel for emergency cesarean delivery.

Contraindications:

- *Prior classical or T or J-shaped uterine incision* or extensive transfundal uterine surgery (e.g. myomectomy).
- Previous 2 or more LSCS
- Previous history of uterine rutpure
- Contracted pelvis or CPD
- Medical or obstetrical complications that preclude vaginal birth (e.g. placenta previa), malpresentations
- Inability to perform emergency CS due to factors related to the facility, surgeon, anesthesia, or nursing staff.

Thus it is clear previous classical cesarean and suspected CPD are contraindication for VBAC.

Absence of any vaginal delivery in the past.

- Previous history of vaginal delivery either before or following a cesarean birth significantly improves the prognosis of a subsequent successful VBAC.
- It also lowers the risk of subsequent uterine rupture. Indeed it is the most favourable prognostic factor.
- ACOG has recently recommended that for women with prior two low transverse cesarean deliveres, only those with a prior vaginal delivery should be considered for VBAC. Therefore absence of any vaginal delivery in the past can be considered as unfavourable for VBAC.

"Previous vaginal birth, particularly previous VBAC is the single best predictor for successful VBAC and is associated with approximately 87-90% planned VBAC sucess rate."

—Management of High-risk Pregnancy by SS Trivedi, Manju Puri, p 235

"A history of two or more Csections without any successful vaginal delivery may preclude offering VBAC as well". *John Hopkins Manual of Obs anfd Gynae 4/e, p 86*

Thus no vaginal delivery in the past is also a relative Contra indication for VBAC.

This leaves us with two options i.e. puerperal infection and breech presentation (in Q 21).

- **Puerperal infection in previous pregnancy** may interfere with healing and predisposes to a weak scar. Previous uterine infection is listed as one of the causes of uterine scarring and is considered a risk factor for uterine rupture during trial of labor for VBAC. It is thus a relative contraindication for VBAC (ACOG bulletin).
- **As far as breech presentation** in the previous pregnancy is concerned. The success rate for a trial of scar depends to some extent on the indication for the previous cesarean delivery. Generally, about 60–80% of trial after prior cesarean birth result in vaginal delivery, with success being maximum if previous cesarean section was because of breech presentation.

The ideal interdelivery interval after cesarean should be 18 months. But minimum it should be 6 months.

Some factors that influence a successful trial of labor in a Woman with prior cesarean delivery

Williams 24/e, Table 31.1

Low-Risk	Favors success	Increase failure rate	High-Risk[a]
Transverse incision prior vaginal delivery appropriate counseling sufficient personnel and equipment	Teaching hospital white race spontaneous labor prior fetal malpresentation 1 or 2 prior transverse incision Nonrecurrent indication current preterm pregnancy	Single mother Increased matenal age Macrosomic fetus Obesity Breech Multifetal pregnancy Preeclampsia EGA > 40 weeks Low-vertical incision Unknown incision	Classical or T incision Prior rupture Patient refusal Transfundal surgery Obsterical contraindication, e.g. previa Inadequate facilities

Contd...

Contd...

Low-Risk	Favors success	Increase failure rate	High-Risk[a]
		Labor induction Medical disease Multiple prior cesarean deliveries Education < 12 years Short interdelivery interval Liability concerns	

[a]Most consider these absolute contraindications.
EGA = estimated gestational age.

26. Ans. is d i.e. Mid pelvic contraction

Ref. Williams Obs. 22/e, p 610-613, 23/e, p 567, Bedside Obs/Gynae by Richa Saxena 1/e, p 122

As discussed in previous question –VBAC (trial of scar) should be attempted only in patients with clinically adequate pelvis, hence if previous cesarean was done for midpelvic contraction we would not attempt VBAC.

Remember: VBAC and trial of scar are synonyms of each other but VBAC and trial of labor have two different meanings (*see* Chapter 7 for more details on trial of labor)

27. Ans. is d i.e. Previous history of LSCS (Indication malpresentation) *Ref. Williams 24/e, p 611*

As discussed

- If there is history of previous LSCS due to contracted pelvis next pregnancy, LSCS has to be done. VBAC cannot be tried.
- If there is history of previous classical cesarean section- again VBAC is contraindicated.
- History of previous 3LSCS also means VBAC is contraindicated. But if there is history of previous LSCS done because of fetal distress or malpresentation, next time VBAC can be tried.

28. Ans. is d i.e. T4 *Ref. Dutta Obs. 7/e, p 519*

Spinal anesthesia:

Spinal anesthesia is done by injection of local anesthetic agent into the subarachnoid space. It has less procedure time and high success rate. Spinal anesthesia can be employed to alleviate the pain of delivery and during the third stage of labor. For normal delivery or for outlet forceps with episiotomy, ventouse delivery, block should extend from T10 (umbilicus) to S1. For cesarean delivery level of sensory block should be up to T4 dermatome. Hyperbaric bupivacaine (10-12 mg) or lignocaine (50-70 mg) is used

Side effects of spinal Anesthesia

- Hypotension due to blocking of sympathetic fibres leading to vasodilation and low cardiac output
- Respiratory depression may occur
- Failed block, chemical meningitis, epidural abscess
- Total spinal — due to excessive dose or improper positioning
- Postspinal headache – due to low or high CSF pressure and leakage of CSF
- Meningitis due to faulty asepsis
- Toxic reaction of local anesthetic drugs
- Paralysis and nerve injury
- Nausea and vomiting are not uncommon
- Urinary retention, (bladder dysfunction).

29. Ans. is a and d i.e. Cord prolapse; and Infection *Ref. Dutta Obs. 7/e, p 525; Williams Obs. 23/e, p 508*

Amniotomy or Artificial rutpure of membranes can lead to:	ARM is contraindicated in
• Cord prolapse/cord compression[Q] • Amnionitis[Q] (i.e., infeciton) • Accidental injury to placenta, cervix or fetal parts[Q] • Liquor amnii embolism[Q]	• IUD • polyhydraminos • Maternal AIDS • Maternal genital herpes infection.

30. Ans. is a i.e. Shoulder dystocia *Ref. Dutta Obs. 7/e, p 406*

Manoeuvres done in case of:

Shoulder dystocia	Breech extraction	Normal delivery
• Mc Roberts manoeuvre (most commonly performed/first performed manoeuvre) • Wood's manoeuvre • Zavanelli manoeuvre.	• Burns Marshall technique (for after coming head of Breech). • Modified Mauriceau Smellie-Veit technique (Malar flexion and shoulder traction). • Lovset's manoeuvre (for extended arms). • Pinard's manoeuvre (for frank breech extraction).	• Retzer manoeuvre

31. Ans. is c i.e. Removal of fetus only *Ref. Dutta Obs. 7/e, p 188; Williams Obs. 23/e, p 250, 251*

Abdominal pregnancy

- Management includes urgent laparotomy irrespective of period of gestation.
- The ideal surgery is to remove the entire sac, fetus, placenta and membrane. This can be done if placenta is attached to a removable organ like uterus or broad ligament.
- If placenta is attached to some vital organs, it is better to take out the fetus and leave behind the placenta and the sac after tying and cutting the cord with its placental attachment.
- Absorption of placenta occurs by aseptic autolysis.
- If placenta is left, its involution is monitored by serum hCG and USG.

Dangers related to leaving placenta attached:

- Infection and abscess
- Adhesions
- Intestinal obstruction
- Wound dehiscence

32. Ans. is c i.e. Low forceps *Ref. Dutta Obs. 7/e, p 573, Table 362*

Presence of fetal head at +2 station indicates low forceps delivery.

High forceps = Head not engaged
Mid cavity forceps = Head engaged, presenting part above +2 station
Low forceps = Head at +2 or below it but not yet reached pelvic flow
Outtet = Head at or on perineum

33. Ans. is b i.e. Couvelaire uterus *Ref. Dutta Obs. 7/e, p 598 Williams 24/e, p 599*

Cesarean hysterectomy refers to an operation where cesarean section is followed by removal of the uterus. **Peripartum hysterectomy** is the surgical removal of the uterus either at the time of cesarean delivery or in the immediate postpartum period (even following vaginal delivery).

Some indications for peripartum hysterectomy

- Uterine atony
- Abnormal placentation
  - Bleeding
  - Accrete syndromes
- Uterine extension
- Uterine rupture
- Cervical laceration
- Postpartum uterine infection
- Leiomyoma
- Invasive cervical cancer
- Ovarian neoplasia

M/C cause of cesarean/peripartum hysterectomy is PPH.

Remember: Couvelaire uterus (as seen after abruptio placenta) is not an indications for hysterectomy.

34. Ans. is b i.e. Previous lower segment transverse caesarean *Ref. Dutta Obs. 7/e, p 330*

Previous 2 LSCs and not a single one is a C/I for VBAC

35. Ans. is c i.e. Polyhdramnios *Ref. Williams 24/e, p 611*

Some factors that influence a successful trial of labor in a woman with prior cesarean delivery

Low-Risk	Favors success	Increase failure rate	High-Risk[a]
Transverse incision prior vaginal delivery appropriate counseling sufficient personnel and equipment	Teaching hospital white race spontaneous labor prior fetal malpresentation 1 or 2 prior transverse incision Nonrecurrent indication current preterm pregnancy	Single mother Increased matenal age Macrosomic fetus Obesity Breech Multifetal pregnancy Preeclampsia EGA > 40 weeks Low-vertical incision Unknown incision Labor induction Medical disease Multiple prior cesarean deliveries Education < 12 years Short interdelivery interval Liability concerns	Classical or T incision Prior rupture Patient refusal Transfundal surgery Obsterical contraindication, e.g. previa Inadequate facilities

[a]Most consider these absolute contraindications.
EGA = estimated gestational age.

36. Ans. is a i.e. The operation should be done only when obstruction is anticipated

37. Ans. is c i.e. Contraction of outlet *Ref. Dutta Obs. 7/e, p598*

- **Symphysiotomy is the operation designed to enlarge the pelvic capacity by dividing the symphysis pubis.**
- It can be done as an alternative to risky cesarean section when there is a likelihood of scar rupture in subsequent labors. Moreover, symphysiotomy produces permanent enlargement of the pelvis, as such future dystocia will be unlikely.
- The operation should be done in established obstruction and not when it is only anticipated.
- The conditions to be fulfilled before doing Symphysiotomy are:
  - The pelvis should not be severely contracted; isolated outlet contraction is ideal
  - Vertex must be presenting
  - The FHS must be present.
- The operation consists of dividing the symphysis pubis strictly in the midline from above downwards until the arcuate ligament is cut.
- The baby is delivered spontaneously with liberal episiotomy or by traction—ventouse (preferable) or forceps.
- **Complications:** Retropubic pain, osteitis pubis, stress urinary incontinence and rarely vesicovaginal fistula.

29

Pharmacotherapeutics

QUESTIONS

1. **In a lady of 32 weeks pregnancy injection dexamethasone is to given to prevent:** **[AI 07]**
   a. Respiratory distress syndrome
   b. Neonatal convulsions
   c. Neonatal jaundice
   d. Cerebral palsy

2. **Use of prostaglandins:** **[PGI Dec 06]**
   a. Missed abortion b. IInd trimester abortion
   c. Ectopic pregnancy d. PPH

3. **Misoprostol has been found to be effective in all of the following *except*:** **[AI 05]**
   a. Missed abortion
   b. Induction of labour
   c. Menorrhagia
   d. Prevention of postpartum hemorrhage (PPH)

4. **True about misoprostol:** **[PGI Dec 09]**
   a. PGE2
   b. 1st trimester abortion
   c. Used in PPH
   d. Rectally given
   e. Needs refrigration

5. **PG F-2d contrandicated is in:** **[PGI June 98]**
   a. Bronchial asthma
   b. DM
   c. Twins
   d. HT

6. **Oxytocin is preferred over ergometrine in:** **[PGI Dec 97]**
   a. Induction of labour b. Prevention of PPH
   c. Both of the above d. None of the above

7. **Ergometrine is contraindicated in:** **[AIIMS Feb 97]**
   a. Eclampsia
   b. Abortion
   c. Induction of labour
   d. Postpartum hemorrhage

8. **The nerve roots blocked in pudendal nerve block is:** **[AI 93]**
   a. L1,2,3 b. L2,3
   c. S2,3,4 d. S4

9. **Half-life biological of oxytocin:** **[New Pattern Question]**
   a. 2–3 min b. 3–4 min
   c. 5–6 min d. 7–8 min

EXPLANATIONS & REFERENCES

1. Ans. is a i.e. Respiratory distress syndrome *Ref. Williams Obs. 23/e, p 821; Dutta Obs. 7/e, p 316*

- Administration of dexamethasone before delivery:
  - Reduces the incidence and severity of intraventricular hemorrhage[Q]
  - Accelerates fetal lung maturation in preterm labour and prevents hyaline membrane disease.[Q]
- It should be given atleast 24 hours before delivery.
- Its effect lasts for 7 days therefore earlier it was said that repeat injections of betamethasone should be given weekly. Recent trials have shown that repeated injection lead to an increase in incidence of cerebral palsy therefore repeated injections are not given.
- Steroid of choice for lung maturity is Betamethasone.
- Dose = 2 doses of 12 mg of steroid (i.e., 3 ampules) are given i/m - 24 hours apart.

Adverse effects of Dexamethasone:

On Mother			On Fetus
• Pulmonary edema	]		• Early onset neonatal sepsis
• Infection	}	Short-term side effect	• Chorioamnionitis
• More difficult glucose control in diabetic women	]		• Neonatal death
No long-term maternal adverse effect.			

2. Ans. is a, b, c and d i.e. Missed abortion; IInd trimester abortion; Ectopic pregnancy; and PPH

Ref. Dutta Obs. 7/e, p 504

Uses of prostaglandins:

- **Induction of IInd trimester abortion (MTP and missed abortion).**
- Termination of molar pregnancy.
- **Medical management of tubal ectopic pregnancy.**
- Cervical ripening prior to induction of abortion or labour.
- Induction of labour.
- Augmentation of labour.
- **Management of atonic PPH.**

Besides the obstetrical actions of prostaglandins, PGE1 inhibits gastric secretions and is used for treatment of peptic ulcers.

3. Ans. is c i.e. Menorrhagia

4. Ans. is b, c and d i.e. 1st trimester abortion; Used in PPH and Rectally given

Ref. Dutta Obs. 7/e, p 504, 505; Sheila Balakrishnan, p 688, Shaw 14/e, p 222

- Misoprostol is PGE_1 analogue.
- It is cheap, stable at room temperature[Q], long shelf life, easily administered (oral or vaginal or rectal)[Q] and has less side effects.
- Induction delivery interval is short. It is not yet approved for use in pregnancy by FDA.
- **Uses of misoprostol:**
  - i. Cervical ripening prior to labour induction (but not FDA approved).
  - ii. Cervical ripening in first trimester and missed abortion.
  - iii. Second trimester MTP.
  - iv. Management of PPH (upto 1000 mg rectally).
- **Side effects** are Tachysystole, meconium passage and possible uterine rupture.
- It is **contraindicated** in women with previous caesarean birth.

As far as option 'b' of Q 6 is concerned "misoprostol can be used in 1st trimester abortion". *—Shaw 14/e, p 222*

5. Ans. is a i.e. Bronchial asthma *Ref. COGDT 10/e, p 210*

PG F-2d is never used in asthmatic patients.

"Postpartum hemorrhage is treated with oxytocin or PGE_2. Prostaglandin F-2α or ergotamine derivatives are contraindicated because they may cause significant bronchospasm." *Williams 24/e, p 1015*

Remember: In asthmatic patients PGE_2 is not contraindicated and can be used for cervical ripening and induction.

6. Ans. is a i.e. Induction of labour *Ref. Dutta Obs. 7/e, p 503*

Comparison of ergot derivatives and Oxytocin

Feature	Ergot derivatives	Oxytocin
Mode of action	• Act directly on myometrium producing tetanic contraction with complete loss of polarity • Causes spasm of both upper and lower segments	• Acts on the physiological uterine contractile system. Law of polarity is maintained[Q]
	• Cannot be used on uterus with fetus within, as it will lead to severe fetal hypoxia and uterine rupture.	• Causes contraction and relaxation of the upper segment while the lower segment gets stretched to expel the fetus therefore mainly used for induction of labour[Q]
Onset of action	• Comparatively slower	• Fast in action
Duration	• Long sustained	• Short lived
Clinical uses	• Main use is in prevention and treatment of PPH: – Active management of third stage of labour – Atonic PPH – Postabortal hemorrhage	• Main action is induction of labour • To accelerate uterine action during labour • To stop postpartum or postabortal hemorrhage along with ergometrine

7. Ans. is a i.e. Eclampsia *Ref. Dutta Obs. 7/e, p 503*

Contraindications for the use of Ergometrine are:

Suspected pleural pregnancy	If given after the delivery of first baby, the second baby will be compromised
Organic cardiac disease	Can cause overloading of right heart and precipitate heart failure
Severe preeclampsia and eclampsia	Sudden rise in BP
Rhnegative mother	Increased chances of fetomaternal transfusion

8. Ans. is c i.e. S2, 3, 4 *Ref. Dutta Obs. 7/e, p 518*

Pudendal nerve block:

- *Pudendal nerve arises from:* S2, S3, S4 and therefore pudendal nerve block - will block S2, S3, S4, nerve roots.
- It is used for perineal analgesia and relaxation.
- **Anaesthesia** used is 20 ml of 1% lignocaine.
- **Route:** Transvaginal and perineal route.
- **Site:** Pudendal nerve is blocked just above the tip of ischial spine.
- **Indications:**
  - Prior to application of forceps or vacuum
  - To suture vaginal lacerations
  - In Assisted breech delivery.

9. Ans. is b i.e. 3–4 minutes *Ref. Dutta Obs. 7/e, p 498*

Oxytocin

- It is a nonapeptide (Peptide of nine amino acids).
- Released by posterior pituitary and synthesized in the supra optic and paraventricular nucleus of hypothalamus.
- **Half life 3–4 minutes.**
- ***Duration of action –*** 20 minutes.
- ***Mechanism of action –*** Acts through calcium mediated channels to initiate myometrial contractions.

SECTION 4

Fetus

30. Fetal Growth Disorders
31. Fetal Malformations

30

Fetal Growth Disorders

FETAL GROWTH

- Fetal growth is characterized by sequential patterns of tissue and organ growth, differentiation, and maturation.
- Fetal growth has been divided into three phases. The initial phase of hyperplasia occurs in the first 16 weeks and is characterized by a rapid increase in cell number. The second phase, which extends up to 32 weeks' gestation, includes both cellular hyperplasia and hypertrophy. After 32 weeks, fetal growth is by cellular hypertrophy, and it is during this phase that most fetal fat and glycogen are accumulated. The corresponding fetal-growth rates during these three phases are 5 g/day at 15 weeks' gestation, 15 to 20 g/day at 24 weeks, and 30 to 35 g/day at 34 weeks.
- Insulin and insulin-like growth factors, particularly insulin-like growth factor-I (IGF-1), have an important role in regulation of fetal growth and weight gain.
- Other hormones implicated in fetal growth are hormones derived from adipose tissue. These hormones are known broadly as adipokines and include leptin, the protein product of the *obesity gene*. Fetal leptin concentrations increase during gestation, and they correlate with birth weight.
- Fetal growth is also dependent on an adequate supply of nutrients. Both excessive and diminished maternal glucose availability affect fetal growth. Reducing maternal glucose levels may result in a lower birth weight. Excessive glycemia produces macrosomia.

Gestational Age and Birth Weight

Previously, the birth weight of ≤ 2500 g was taken as the index of prematurity without taking any consideration of the gestational period or any other factors. But infants born at term or post-term may weigh ≤ 2500 g and occasionally a baby of diabetic mother may weigh much more than 2500 g even before 37 weeks. Therefore, survival outcome of an infant depends both on the gestational age as well as on the birth weight. Gestational age and birth weight are related by the following terms:

a. **Small for Gestational Age (SGA):** Birth weight less than 10th percentile for gestational age.
b. **Appropriate for Gestational Age (AGA):** Birth weight lies between the 10th and 90th percentiles for gestational age.
c. **Large for Gestational Age (LGA):** Infant's birth weight above the 90th percentile for gestational age.

- **Low birth weight (LBW) infant is defined as one whose birth weight is less than 2500 g irrespective of the gestational age**. *Very-low birth weight (VLBW)* infants weigh 1500 g or less and *extremely-low birth weight (ELBW)* infants weigh 1000 g or less (WHO).
- **Preterm**—Preterm Birth (PTB) is defined as one when birth occurs before completion of 37 menstrual weeks of gestation regardless of birth weight. The growth potential may be normal and appropriate for the gestational period (10th to 90th percentile).
- **Small for gestational age (SGA)**—About 70% of infants with a birth weight below the 10th percentile are found normally grown. **They are constitutionally small and not at any increased risk for adverse outcome**. They present at the end of the normal spectrum for growth. The remaining 30% are truly growth restricted.

Types of SGA Fetus

Based on clinical evaluation and ultrasound examination:

Type I	• Fetuses that are small and healthy • They have normal ponderal index, normal subcutaneous fat and usually have uneventful neonatal course.
Type II	• Fetuses where growth is restricted by pathological process (true IUGR) • These are further divided into symmetrical IUGR (20%) and asymmetrical IUGR (80%).

IUGR

Intrauterine growth restriction is said to be present in those babies whose birth weight is below the tenth percentile of the average for the gestational age. Growth restriction can occur in preterm, term or post-term babies.

Depending upon the relative size of their head, abdomen and femur, the fetuses are subdivided into: (a) Symmetrical or Type I (b) Asymmetrical or Type II.

***Symmetrical (20%)*:** The fetus is affected from the noxious effect very early in the phase of cellular hyperplasia. The total cell number is less. This form of growth retardation is most often caused by structural or chromosomal abnormalities or congenital infection (TORCH). **The pathological process is intrinsic to the fetus and involves all the organs including the head** (Table 30.1).

***Asymmetrical (80%)*:** The fetus is affected in later months during the phase of cellular hypertrophy. The total cell number remains the same but size is smaller than normal. The pathological processes that too often result in asymmetric growth retardation are maternal diseases extrinsic to the fetus. These diseases alter the fetal size by reducing uteroplacental blood flow or by restricting the oxygen and nutrient transfer or by reducing the placental size.

Comparison of Symmetric and Asymmetric IUGR

Symmetric IUGR (20%)	Asymmetric IUGR (80%)
• Symmetrically small	• Head is larger than abdomen
• Head/abdomen and femur/abdomen ratios normal	• Elevated head/abdomen and femur/abdomen ratios
• Normal ponderal index associated with genetic disease, infection	• Low ponderal index due to mainly placental vascular insufficiency
• Total number of cells—decreased	• Total number of cells—same
• Cells size—normal	• Cells size—decreased
• **Poor** prognosis	• Good prognosis

Causes of IUGR

Maternal	Fetal	Placental	Unknown (~ 40%)
• Constitutional[Q]: Small mothers	• Structural anomalies – Cardiovascular – Renal – Osteogenesis imperfecta	• Causes leading to poor uterine blood flow to the placental site for long time, i.e. placental insufficiency (MC) – Placenta praevia[Q] – Abruption[Q] – Infarction – Placental hemangiomas – Chronic villitis – Hemorrhagic endocasculitis	
• Poor maternal nutrition[Q]: During pregnancy	• Chromosomal abnormalities – Trisomy 13, 18, 21[Q] – Turner syndrome[Q]		

Contd…

Contd…

Maternal	Fetal	Placental	Unknown (~ 40%)
• Social deprivation[Q]	• Infections (fetal infection) – Rubella, CMV, Herpes simplex virus, Varicella virus, and HIV – Malaria		
• Maternal diseases – Chronic hypertension/PIH[Q] – Thrombophilia[Q], hemoglobinopathy – Heart disease[Q] Class III and IV – Chronic renal disease – Collagen vascular disease – Diabetes with vascular lesion – Sickle cell anemia	• Multiple pregnancy		
• ***Toxins***: Alcohol, Smoking[Q], Heroin, Morphine, Cocaine			
• ***Drugs***: Chemotherapeutic agents, Warfarin and Phenytoin			

Diagnosis

Diagnosis of IUGR by Clinical Method

- ***Maternal weight gain:*** *Maternal weight gain is an insensitive index of fetal growth.* The association between poor maternal weight gain and small babies has been demonstrated in one study but most of the studies have found that this association has questionable clinical value and that the weight gain is normal in a significant number of mothers who deliver small babies.
- ***Uterine fundal height:*** Measurement of the uterine fundal height is the most common method used to clinically estimate fetal growth. Fundal height is measured in centimeters from the upper border of the pubic symphysis to the top of the fundus of the uterus.
- ***Symphysiofundal height (SFH):*** Measurement in centimeters closely correlates with gestational age after 24 weeks. A lag of 4 cm or more suggests growth restriction. It is a fairly sensitive parameter (30-80%). Serial measurement is important.

Biochemical markers have also been used to assist the diagnosis. Erythropoietin level in cord blood is high in IUGR fetuses.

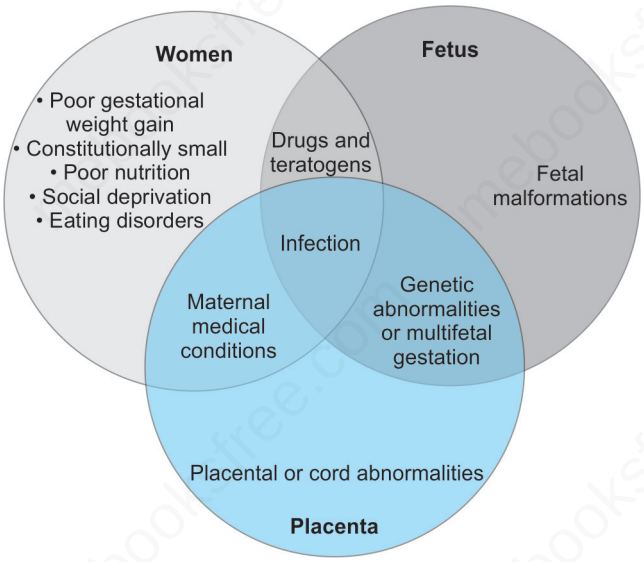


Fig. 30.1: Risk factors and causes of impaired fetal growth centering on the mother, her fetus and the placenta

Diagnosis of IUGR by Ultrasound Examination

Parameter	Feature
Biparietal diameter	Serial measurement of BPD can diagnose IUGR but has low sensitivity and low specificity as the head is one of the last organs affected by fetal malnutrition. Also, late in pregnancy, the fetal head begins to undergo a moulding process as it dips into the pelvis, making it difficult to obtain adequate measurements.

Contd…

Contd…

Parameter	Feature
Abdominal circumference	Abdominal circumference (AC) is the single most sensitive parameter to detect IUGR. Serial measurements of AC and estimations of fetal weight are more diagnostic to fetal growth restriction. It has a negative predictive value of 99%, i.e. normal AC rules out the possibility that the baby is small.
Estimated fetal weight	Fetal weight estimates are usually within 5–10% of the true fetal weight. It is valuable in the diagnosis of small fetuses but does not differentiate between IUGR babies and babies who are small and healthy.
Head to abdomen ratio (HC/AC)	The ratio compares the most preserved organ in the malnourished fetus, i.e. the brain, with the most compromised organ, the liver. The AC should be measured at the level of the bifurcation of the hepatic vein in the center of the fetal liver. The fetal head circumference should be measured at the level of thalami. An advantage of using the head circumference instead of the BPD is that the effect of head moulding is minimised. Fetal malnutrition should be suspected when the HC/AC ratio is abnormally high. In asymmetric IUGR, HC is ↑, HC/AC >> 1. In symmetric IUGR, both HC and AC are decreased. So HC/AC remains normal.
Femur to abdomen ratio	Normally the femur to abdomen ratio remains constant after 20 weeks. Normal value 22 ± 2 High femur to abdomen ratio suggests fetal growth restriction.
Fetal ponderal index $PI = \frac{\text{Estimated fetal wt.}}{(FL)^3}$	The degree of fetal wasting is judged by fetal PI. PI is independent of gestational age and has constant value throughout the second part of pregnancy. Normal PI = 8.325 ± 2.5 Fetal PI ≤ 7 should be considered abnormal, which strongly suggests fetal malnutrition.
Oligohydramnios	It is a late manifestation of fetal malnutrition.
Doppler velocimetry Most Important	Abnormal umbilical artery Doppler velocimetry findings—characterized by absent or reversed end-diastolic flow—have been uniquely linked with fetal-growth restriction. It has also been correlated with hypoxia, acidosis and fetal death. Umbilical artery Doppler velocimetry is considered standard in the evaluation and management of the growth-restricted fetus. American College of Obstetricians and Gynecologists (2013a) notes that umbilical artery Doppler velocimetry has been shown to improve clinical outcomes.

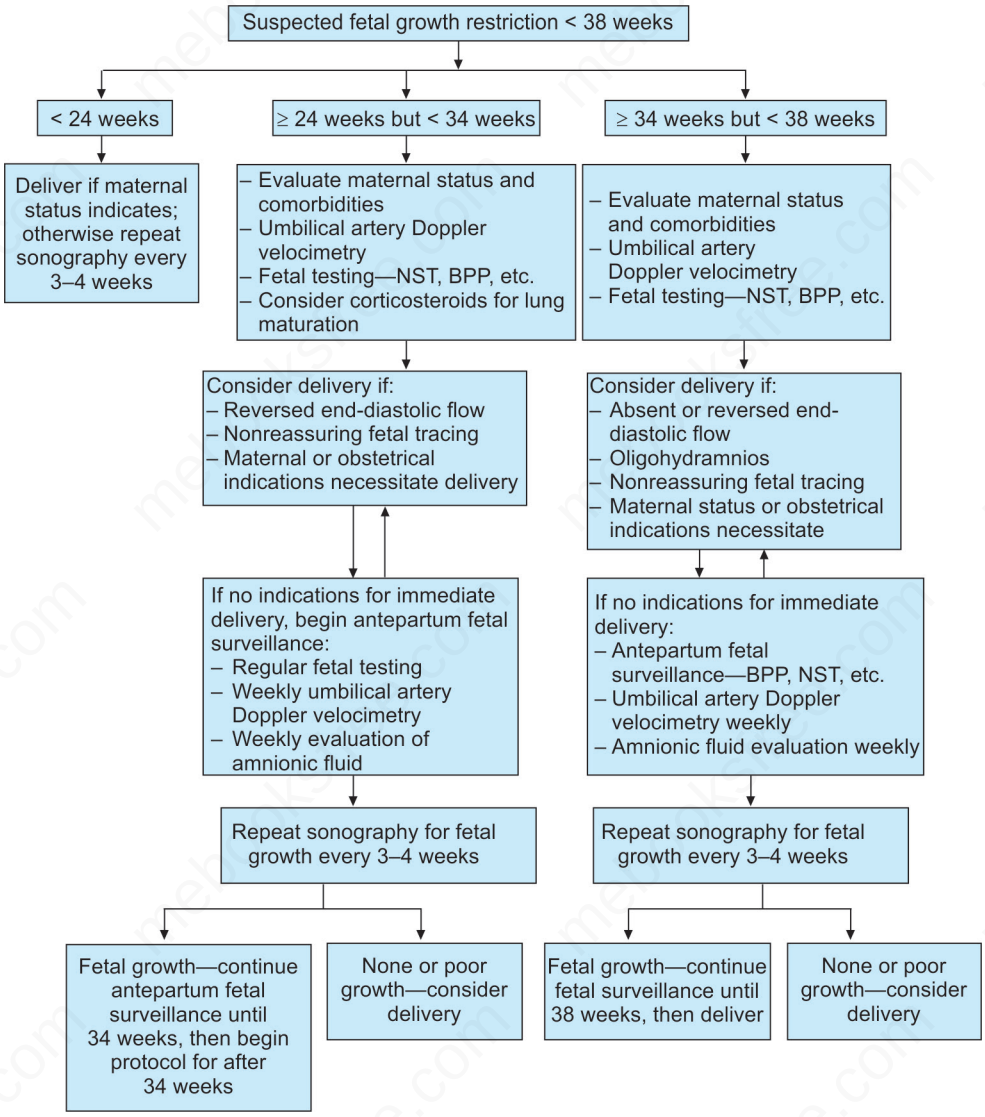
Complications

Fetal: (a) Antenatal—Chronic fetal distress, fetal death
(b) Intranatal—Hypoxia and acidosis
(c) After birth.

***Immediate*:** (1) Asphyxia, bronchopulmonary dysplasia and RDS. (2) Hypoglycemia due to shortage of glycogen reserve in the liver. (3) Meconium aspiration syndrome (4) Microcoagulation leading to DIC. (5) Hypothermia. (6) Pulmonary hemorrhage. (7) Polycythemia, anemia, thrombocytopenia. (8) Hyperviscosity-thrombosis. (9) Necrotizing enterocolitis due to reduced intestinal blood flow. (10) Intraventricular hemorrhage (IVH). (11) Electrolyte abnormalities: hypocalcemia, hyperphosphatemia, hypokalemia due to impaired renal function. (12) Multiorgan failure. (13) Increased perinatal morbidity and mortality.

***Late*:** Asymmetrical IUGR babies tend to catch up growth in early infancy. The fetuses are likely to have: (1) retarded neurological and intellectual development in infancy. The worst prognosis is for IUGR caused by congenital infection, congenital abnormalities and chromosomal defects. **Other long-term complications** are: (2) Increased risk of metabolic syndrome in adult life: obesity, hypertension, diabetes and coronary heart disease (CHD). (3) LBW infants have an altered orexigenic mechanism that causes increased appetite and reduced satiety. (4) Reduced number of nephrons—causes renal vascular hypertension.

Management



MACROSOMIA

The recommended definition is fetal (neonatal) weight exceeding two standard deviations or above 90th centile for the appropriate normal population.

According to ACOG, birth weight of ≥ 4500 g is called macrosomia.

In the Indian context, birth weight of ≥ 4000 g is called macrosomia.

Risk factors associated with macrosomia are:

- Maternal diabetes
- Multiparity
- Increased maternal age
- Race and ethnicity (Hispanic ethnicity is a/w increased risk)
- Maternal obesity (If maternal BMI is > 30 kg/m^2, it is associated with increased risk)
- Prolonged gestation
- Male fetus
- Previous infant weight more than 4000 g

Grades of Macrosomia

Grade I – 4000–4499 g
Grade II – 4500–4999 g
Grade III – ≥ 5000 g

- A major concern in the delivery of macrosomic infants is shoulder dystocia and permanent brachial plexus injury (seen in < 10% of all shoulder dystocia cases).
- There are increased chances of operative delivery with macrosomia.
- Some clinicians proposed labor induction when fetal macrosomia is diagnosed in nondiabetic women but it is not supported by ACOG.
- Planned LSCS may be done in diabetic women with an estimated fetal weight exceeding 4500 g and in nondiabetics, if expected fetal weight is > 5000. *—Williams Obs, 23/e*

QUESTIONS

1. IUGR is defined when: **[AI 97]**
a. Birth weight is below the tenth percentile of the average of gestational age
b. Birth weight is below the 20 percentile of the average of gestational age
c. Birth weight is below the 30 percentile of the average of gestational age
d. Weight of baby is less than 1000 gm

2. All are the causes of intrauterine growth retardation *except*: **[AI 05]**
a. Anemia
b. Pregnancy induced hypertension
c. Maternal heart disease
d. Gestational diabetes

3. IUGR is seen in: **[PGI Dec 02]**
a. Rubella b. Syphilis
c. CMV d. Chickenpox
e. HPV

4. IUGR is characterized by all *except*: **[PGI June 01]**
a. Polycythemia
b. Meconium aspiration syndrome
c. HMD
d. Hypocalcemia

5. True statement about symmetrical IUGR with respect to asymmetrical IUGR: **[PGI May 2013]**
a. Worse prognosis
b. Neurological defects
c. Head larger than abdomen
d. Less common
e. Total number of cell is normal

6. IUGR can be detected by USG: **[PGI Dec 05]**
a. ↓ Fetal weight
b. ↓ BPD
c. ↑ HC/AC
d. ↓ Head circumference
e. ↑ Amniotic fluid volume

7. Best parameter for ultrasound evaluation of IUGR is: **[AIIMS June 97]**
a. Placental membrane
b. Length of femur
c. Abdominal circumference
d. BPD

8. A lady of 150 cm height with Hb of 11gm%, BP of 160/110 mm Hg and 12 kg gain during her pregnancy delivered an IUGR baby, the causes in this cases are: **[PGI Dec 03]**
a. Maternal infection
b. Short stature
c. HTN
d. ↑ Weight gain
e. ↓ Hb%

9. Birth weight of a baby can be increased by:
a. Cessation of smoking **[AIIMS May 07]**
b. Aspirin
c. Ca^{++} and vitamin D supplement
d. Bed rest

10. Difference between prematurity and IUGR is that premature baby has: **[PGI June 08]**
a. Sole creases all over feet
b. Breast nodule 2 mm
c. Ear cartilage well formed - good clastic recoil
d. Skin glistening, thin
e. Poor muscle tone

11. A large baby is born with which complication in pregnancy: **[AI 07]**
a. Gestational diabetes
b. Gestational hypertension
c. Cardiac disease
d. Anaemia

12. Caudal regression syndrome is seen in babies of mother having: **[AI 07]**
a. Gestational diabetes
b. PIH
c. Cardiac disease
d. Anaemia

13. Hypoglycemia in newborn is seen in:
a. IUGR **[PGI Dec 01]**
b. Mother with hypothyroidism
c. Rh incompatibility
d. Macrosomia
e. Hyperthyroidism

14. Intrauterine fetal distress is indicated by:
a. Acceleration of 15/min **[PGI June 04]**
b. Deceleration of 30/min
c. Variable deceleration 5-25/min
d. Fetal HR<80/min
e. Fetal HR 160-180/min

15. A pregnant lady with persistent late, variable deceleration with cervical dilatation of 6 cm shifted to OT for surgery. Which of the following is not done in M/n: **[AIIMS May 01]**
a. Supine position b. O_2 inhalation
c. IV fluid d. Subcutaneous terbutaline

16. Most common cause of post neonatal mortality is:
a. Genetic cause **[AIIMS Dec 98]**
b. Maternal health during pregnancy

c. Environmental causes
d. Conditions effecting in early neonatal period

17. Cephalhematoma: [AI 02]
a. Is caused by oedema of the subcutaneous layers of the scalp
b. Should be treated by aspiration
c. Most commonly lies over the occipital bone
d. Does not vary in tension with crying

18. Which is not done in case of IUGR ?
a. Nonstress test **[New Pattern Question]**
b. Oxytocin challenge test
c. Ultrasound abdomen
d. Amniocentesis

19. The characteristics of caput succedaneum include all of the following *except*: [New Pattern Question]
a. Crosses midline
b. Crosses the suture line
c. It does not disappear within 2-3 days
d. It is a diffuse edematous swelling of the soft tissues of the scalp

20. Hematoma of the sternomastoid muscle detected in a 16 days old infant requires: [New Pattern Question]
a. Immediate surgical evacuation
b. Surgical intervention within 2 weeks
c. Prophylactic antibiotic therapy
d. No immediate therapy

21. Meconium is excreted by a newborn till…days:
a. 2 b. 3 **[New Pattern Question]**
c. 6 d. 4

22. The number of fontanelles present in a newborn child is: [New Pattern Question]
a. 1 b. 2
c. 4 d. 6

23. Consider the following in a newborn: [New Pattern Question]
1. Heart rate of 110
2. Slow and irregular respiratory effort
3. Flaccid muscle tone
4. No reflex irritability
5. Blue colour

What is the Apgar score in this case?
a. 1 b. 3
c. 5 d. 7

24. A 25-year-old woman had premature rupture of membranes and delivered a male child became lethargic and apneic on the 1st day and went into shock. The mother had a previous history of abortion 1 year back. On culture, her vaginal swab growth of a hemolytic colonies on blood agar was found. On staining these were found to be gram positive cocci. Which of the following is the most likely etiological agent: [New Pattern Question]
a. Streptococcus pyogenes
b. Streptococcus agalactiae
c. Peptostreptococci
d. Enterococcus faecalis

25. The commonest cause of perinatal death in India: [New Pattern Question]
a. Prematurity
b. Asphyxia
c. Intracranial haemorrhage
d. Congenital malformation

26. Regarding IUGR [New Pattern Question]
a. Abdominal circumference (AC) is the least sensitive parameter for detection of IUGR
b. In asymmetric IUGR head circumference/abdominal circumference (HC/AC) is reduced
c. Serial biparietal diameter (BPD) is the only important measurement in IUGR
d. AC indirectly reflects fetal liver size and glycogen storage

27. All are the risk factors associated with macrosomia *except*: [AI 05]
a. Maternal obesity
b. Prolonged pregnancy
c. Previous large infant
d. Short stature

28. Macrosomia is/are associated with: [PGI Nov 09]
a. Gestational diabetes mellitus
b. Maternal obesity c. Hypothyroidism
d. Hyperbilirubinemia e. Fetal goitre

EXPLANATIONS & REFERENCES

1. **Ans. is a i.e. Birth weight is below the tenth percentile of the average of gestational age** *Ref. Dutta Obs. 7/e, p 461*

   Intrauterine growth restriction is said to be present in those babies whose birth weight is below the tenth percentile of the average for the gestational age.

2. **Ans. is d i.e. Gestational diabetes** *Ref. Dutta Obs. 7/e, p 287,463, 464, Fernando Arias 3/e, p 11 for a,115 for d,106 for b*

   As far as, Pregnancy induced hypertension and maternal heart disease are concerned, there is no doubt that both these conditions cause IUGR.

   For 'Anemia' *Dutta Obs. 6/e, p 463* says : ***Anemia causes IUGR.***

   Williams Obs. 23/e, p 848 says : "***In most cases, maternal anemia does not causes fetal growth restriction, Exception include sickle cell disease."***

   Fernando Arias 3/e, p 111 says : ***"Sickle cell anemia causes fetal growth retardation."***

   "Awathi et al (2001) reported an incidence of IUGR of 37% among Indian women suffering from moderately severe anemia."

   So sickle cell anemia and moderately severe anemia with Hb < 8 g/dL causes IUGR.

   As far as diabetes is considered : "***Growth restriction is less commonly observed and is associated with maternal vasculopathies".*** *—Dutta Obs. 7/e, p 287*

   Fernando Arias 3/e, p 106 says : Diabetes with vascular disease is a cause of IUGR.

   It is further supported by following lines from Fernando Arias 3/e, p 115.

   "Insulin dependant diabeties with microvascular disease are at high risk for having IUGR fetuses."

   "Diabetic Vasuculopathy and excessively tight control of diabetes mellitus in pregnancy has been linked to intrauterine growth restriction"

   Mgt of High Risk Pregnancy, SS Trivedi and Manju Puri p 328, 329

   But here friends all texts refer to overt diabetes complicated with vasculopathies leading to IUGR, gestational diabetes is diabetes which is first recognised during preganacy and it doesnot lead to vasculopathies so no IUGR.Rather gestational diabetes leads to macrosomia.

3. **Ans. is a,b, c and d i.e. Rubella; Syphilis; CMV; and Chickenpox**

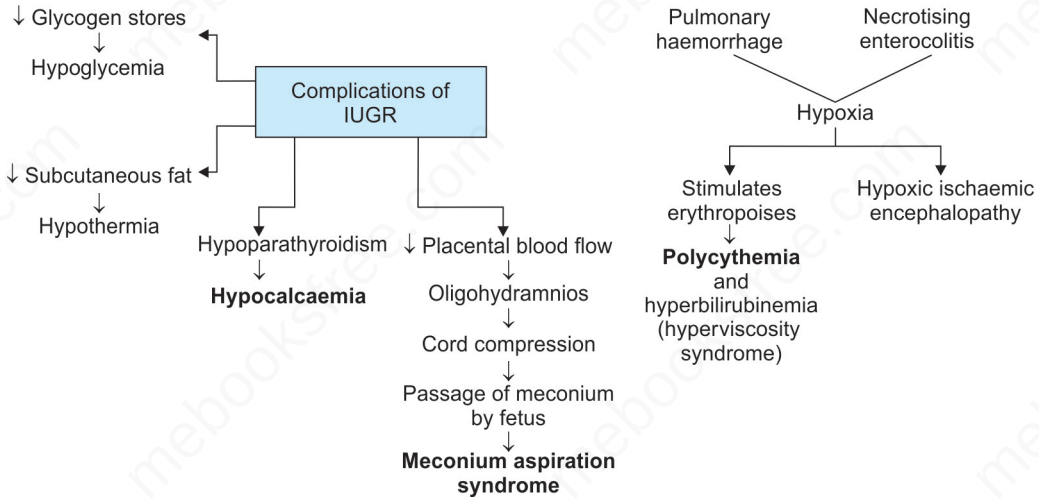
   Ref. Dutta Obs. 7/e, p 462; COGDT 10/e, p 290, Mgt of High Risk Pregnancy, SS Trivedi and Manju Puri, p 178, *Bedside Obs and Gynae Richa, Saxena, p 184*

   Congenital infections leading to IUGR: *—COGDT 10/e, p 289, 290*

   Viral: CMV, Rubella, Herpes, Varicella zoster, Influenza, Poliovirus, HIV *—Fernando Arias 3/e, p 110*
   Protozoan: Toxoplasma, Malaria, Trypanosoma
   Bacterial: Listeria monocytogenes, Tuberculosis and Syphilis

4. Ans. is c i.e. HMD *Ref. COGDT 10/e, p 293; Dutta Obs. 7/e, p 464.*

Fetal complications of IUGR



Long-term complications of IUGR:

- Low IQ, learning and behaviour problems
- Major neurologic handicaps (seizure disorders, cerebral palsy, mental retardation)
- Adult diseases—these children are supposed to be at increased risk of developing disorders like obesity, diabetes mellitus, cardiovascular disease.

Now let's see what *Ghai 6/e, p 166* says about **Hyaline membrane disease (RDS).**

In RDS the basic abnormality is surfactant deficiency.

"RDS almost always occurs in preterm babies often less than 34 weeks of gestation. It is the commonest cause of respiratory distress in a preterm neonate".

- The overall incidence is 10-15% but can be as high as 80% in neonates < 28 weeks.

COGDT 10/e, p 293 says : ***"Hypoxia in IUGR fetus is the result of increasing fetal requirement during pregnancy and not due to hyaline membrane disease (i.e. surfactant deficiency)."***

According to Fernando Arias, 3/e p 112.....RDS/HMD is seen in preterm fetal growth restricted infants. The RDS is not because of IUGR but due to prematurity, so I am ruling it out because **the question is not asking about Preterm IUGR**

5. Ans. is a and d i.e. Worse prognosis and Less common *Ref. Dutta Obs. 7/e p 462*

Intrauterine growth restriction is said to be present in those babies whose birth weight is below the tenth percentile of the average for the gestational age. Growth restriction can occur in preterm, term or post-term babies.

Depending upon the relative size of their head, abdomen and femur, the fetuses are subdivided into:

- Symmetrical or Type I
- Asymmetrical or Type II

Symmetrical (20%):

The fetus is affected from the noxious effect very early in the phase of cellular hyperplasia. The total cell number is less. This form of growth retardation is most often caused by structural or chromosomal abnormalities or congenital infection (TORCH). The pathological process is intrinsic to the fetus and involves all the organs including the head.

Asymmetrical (80%):

The fetus is affected in later months during the phase of cellular hypertrophy. The total cell number remains the same but size is smaller than normal. The pathological processes that too often result in asymmetric growth retardation are maternal diseases extrinsic to the fetus. These diseases alter the fetal size by reducing uteroplacental blood flow or by restricting the oxygen and nutrient transfer or by reducing the placental size.

Features of symmetrical and asymmetrical IUGR fetuses	
Symmetrical (20%)	**Asymmetrical (80%)**
Uniformly small	**Head larger than abdomen**
Ponderal index (Birth weight/Crown-heel length^3)—normal	Low
HC: AC and	
FL: AC ratios—normal	Elevated
Etiology: Genetic disease or infection—(Intrinsic to fetus)	Chronic placental insufficiency—(Extrinsic to fetus)
Total cell number—less	Normal
Cell size—normal	Smaller
Neonatal course—complicated with **poor prognosis**	Usually uncomplicated having good prognosis

6. Ans. is a, b, c and d i.e. ↓ fetal weight; ↓ BPD (less growth of BPD); ↑ HC/AC; and ↓ Head circumference

Ref. Dutta Obs. 7/e, p 463; Fernando Arias 2/e, p 307-309

For detail see preceding text.

7. Ans. is c i.e. Abdominal circumference *Ref. Dutta Obs. 7/e, p 463; Fernando Arias 3/e, p 308*

"Abdominal circumfernece (AC) is the single most sensitive parameter to detect IUGR. Serial measurements of AC and estimations of fetal weight are more diagnostic to fetal growth restriction." *—Dutta 7/e, p 463*

"The biometric parameters, AC is most affected by fetal growth" *—Williams 24/e, p 199*

8. Ans. is c i.e. HTN (hypertension) *Ref. Dutta Obs. 7/e, p 97, p 260, 51*

Friends, It is a tricky question which needs only common sense. Answer is hidden in the question itself. So, lets read the question once again and rule out each option one by one.

The lady in our question is of 150 cm height (~ 5 feet).

"While an arbitrary measurement of 5 ft. is considered as short stature in western countries, it is 4' 7" in India considered the low average height." *—Dutta Obs. 6/e, p 98*

So, the lady is not constitutionally small. ***i.e. options 'b' is ruled out.***

Her Hb is 11 gm%.

"According to the standards laid down by WHO, anemia in pregnancy is present when the haemoglobin concentration in the peripheral blood is 11gm% or less". *—Dutta Obs. 6/e, p 262*

So, according to the WHO standard 11gm% is borderline for anemia.

Also-as discussed in answer 2 anemia leads to IUGR when it is moderately severe i.e. Hb<8 gm% or if it is sickle cell anemia (Fernando arias, 3/e, p 41)

So, ***option 'e'*** is ruled out.

Her BP is 160/110 mm Hg

Hypertension: is an absolute rise of BP of at least 140/90 mm Hg, if the previous BP is not known. So, there is no doubt that the patient is hypertensive.

Prolonged hypertension leads to placental insufficiency which ultimately results in IUGR.

*So, **option 'c'** is correct.*

Her weight gain is 12 kg.

"Ideally weight gain should depend on prepregnancy body mass index (BMI) level. Weight gain for a woman with normal BMI (20-26) is 11 to 16 kg". *—Dutta Obs. 6/e, p 51*

So, the weight gain comes under normal range, ***option 'd'*** ruled out.

Though maternal infection during pregnancy also causes IUGR, here in our question no such history has been mentioned.

So, ***option 'a'*** is also ruled out. Hence the answer of this question is, **IUGR is due to hypertension.**

9. Ans. is a i.e. Cessation of smoking *Ref. COGDT 10/e, p 293; Williams Obs. 22/e, p 354,23/e, p 329*

"Smoking is the single most preventable cause of IUGR in infants born in the united states—women who quit smoking at 7 months gestation have newborns with higher mean birthweights than do women who smoke throughout the pregnancy. Women who quit smoking before 16 weeks of gestation are not at any increased risk for an IUGR infant." *—COGDT 10/e, p 293*

The answer is further supported by *Williams 24/e, p 882*

"In prevention of fetal growth restriction – smoking cessation is critical" *—Williams 24/e, p 882*

10. Ans. is b, d and e i.e. Breast nodule 2 mm; Skin glistening, thin; and Poor muscle tone

Ref. Dutta Obs. 7/e, p 457, 462, 447; Meharban Singh's Clinical Method 3/e, p 243

Prematurity
- Definition: Baby born before 37 completed week of gestation are preterm/premature baby.
- Incidence: 20-25%

Difference between Prematurity and IUGR.

Prematurity	IUGR
• Definition: Baby born before 37 completed weeks of gestation	• Babies whose birth weight is below 10th percentile of the average for gestational age
• Incidence: 20-25%	• 2-8%
• Weight and height: 2500 gm or less & length is usually less then 44 cm and length is unaffected	• Weight deficit at birth is about 600 gm below the minimum in percentile standard
• Head and abdomen: are relatively large	• Scaphoid abdomen
• Head circumference (HC): disproportionately exceeds that of the chest {Normally HC is greater than the circumference at birth, the difference is about 1.5 cm}	• Head circumference is relatively large than the body in asymmetric variety
• Pinnae of ears are soft and flat. Poor recoil	• Pinna of ear has cartilaginous ridges
• Eyes: kept closed	• Eyes are open
• **Skin: thin, red shiny, covered by plentiful lanugo and vernix caseosa[Q].**	• Dry and wrinkled, skin thin meconium stained vernix caseosa and thin umbilical cord
• **Muscle tone is poor[Q]**	• Reflexes are normal including Moro's reflex, baby alert active and normal cry
• Plantar creases are not visible before 34 weeks	• Plantar crease are well-defined
• Nails are not grown right upto the finger tips	• Nails grown
• Breast nodule < 5 mm and nipple small or absent	

11. Ans. is a i.e. Gestational diabetes *Ref. Dutta Obs. 7/e, p 284; Williams Obs. 23/e, p 854*

Large baby is called as ***macrosomia*** *which is defined as fetal (neonatal) weight exceeding two standard deviations or above 90th centile for the appropriate normal population.*

According to ACOG: birth weight of ≥ 4500 gm is called as macrosomia.

In Indian context birth weight of ≥ 4000 gm is called as macrosomia.

Macrosomia is seen in:
- Maternal diabetes
- Maternal obesity
- Multiparity
- Prolonged gestation
- Increased maternal age

Other risk factors for macrosomia are : Previous infant weight > 4 kg; male fetus; and race ethinicity.

12. Ans. is a i.e. Gestational diabetes *Ref. Dutta Obs. 7/e, p 284; Fernando Arias 3/e, p 454*

Gestational diabetes is associated with increased risk of congenital malformation in the newborn.

The malformation most specific for gestational diabetes is caudal regression syndrome.

"The lesion classically associated with diabetic embryopathy, the caudal regression syndrome, is rare, with an incidence of 1.3 per 1000 diabetic pregnancies." *—Fernando Arias 3/e, p 454*

13. Ans. is a and d i.e. IUGR and Macrosomia

Ref. Dutta Obs. 7/e, p 285; Williams Obs. 23/e, p 1131, 1132; Ghai 6/e, p 177, 487; KDT 5/e, p 227

Hypoglycemia is defined as blood glucose of less than 40 mg/dL, irrespective of the gestational age.

Causes of hypoglycemia

Let us see each option one by one.

Option 'a' **IUGR**

"Hypoglycemia is due to shortage of glycogen reserve in the liver as a result of chronic hypoxia"

—Dutta Obs. 6/e, p 465

Option 'b' **Mother with hypothyroidism**

Maternal hypothyroidism can cause hypoglycemia if it leads to fetal hypothyroidism also but "Maternal TSH receptor bloking antibodies can cross the placenta and cause fetal thyroid dysfunction.They however have little or no effect on fetal thyroid function even though they too cross the placenta.".

—Williams 23/e, p 1131, 1132

So according to latest editon of Williams, maternal hypothyroidism does not lead to fetal hypothyroidism, thus it does not cause fetal hypoglycemia.

Option 'c' **Rh incompatibility**

There is no definite correlation between Rhincompatibility and hypoglycemia.

Option 'd' **Macrosomia**

Macrosomia usually is due to maternal diabetes which inturn results in fetal hyperinsulinemia due to beta cell hyperplasia, which further results in neonatal hypoglycemia. *—Dutta Obs. 6/e, p 287*

Option 'e' **Hyperthyroidism :** Hyperthyroidism is a diabetes like state with increased insulin resistance.

Increased thyroid hormone		
↑ Glycogenolysis ↓ Hyperglycemia	↑ Gluconeogenesis ↓ Hyperglycemia	↑ BMR ↓ Hypoglycemia

Though utilization of sugar by tissues is increased (mainly secondary to increased BMR), glycogenolysis and gluconeogenesis in liver more than compensates for it and result in hyperglycemia. *—KDT 5/e, p 227*

Also Know:

Causes of hypoglycemia in neonates *—Ghai 6/e, p 177*

Common

- Inadequate substrates, especially, if feeding is delayed or is suboptimal: small for dates and preterm babies.
- Relative hyperinsulinism in infants of diabetic mothers.
- Secondary to polycythemia.
- Secondary to stressful conditions such as hypothermia, sepsis, asphyxia and respiratory distress.

Rare

- Hyperinsulin states: Beta cell hyperplasia (nesidioblastosis), adenoma of beta cells.
- Deficiency of hormones such as glucagon, GH, epinephrine, adrenal and ACTH.
- Metabolic disease such as glycogen storage disease, fructose intolerance, ketotic hypoglycemia, maple syrup urine disease, etc.

14. Ans. is b, c, d and e i.e. Deceleration of 30/min; Variable deceleration 5-25/min; Fetal HR < 80/min; and Fetal HR 160-180/min *Ref. Williams Obs. 22/e, p 461; 23/e, p 429-431, Dutta Obs. 7/e, p 612*

Fetal distress is an ill-defined term, used to express intrauterine fetal jeopardy, as a result of intrauterine fetal hypoxia.

Indicators of Fetal Distress:

Clinical	Biochemical
• Prolonged tachycardia (> 160 bpm) • Prolonged bradycardia (< 110 bpm for atleast 5 minutes) • Absence of acceleration • Reduced fetal heart rate variability • Severe variable and late deceleration	• Fetal scalp blood pH < 7.2

Also Know:

Meconium in Amniotic fluid

Earlier meconium in amniotic fluid was considered as a potential warning of fetal asphyxia.

But now it is considered that the high incidence of meconium observed in the amniotic fluid during labour often represents fetal passage of gastrointestinal contents in conjunction with normal physiological process. Although normal, such meconium becomes an environmental hazard when fetal acidemia supervenes.

15. Ans. is a i.e. Supine position *Ref. Dutta Obs. 7/e, p 614*

"Deceleration is defined as a decrease in fetal heart rate below the base line of 15 beats per minute or more."

Variable deceleration is seen in case of cord-compression/prolapse.

In case of cord-compression/prolapse patient should not be allowed to rest in supine position as it will lead to more pressure on the cord. In cord prolapse the patient is allowed to rest in exaggerated elevated Sims position with a pillow under the hip.

Management of Non-reassuring fetal status (Fetal Distress)

- Lateral positioning avoids compression of vena cava and aorta by the gravid uterus. This increases cardiac output and uteroplacental perfusion.
- Oxygen is administered to the mother with mask to improve fetal SaO_2.
- Correction of dehydration by IV fluids (crystalloids) improves intravascular volume and uterine perfusion.
- Correction of maternal hypotension (following epidural analgesia) with immediate infusion of 1 litre of Crystalloid (Ringer's solution).
- Stoppage of oxytocin to improve fetal oxygenation. Fetal hypoxia may be due to strong and sustained uterine contractions. With reassuring FHR and in absence of fetal acidemia, oxytocin may be restarted.
- Tocolytic (Injection terbutaline 0.25 mg S.C.) is given when uterus is hypertonic and there is nonreassuring FHR.
- Amnioinfusion is the process to increase the intrauterine fluid volume with warm normal saline (500 ml). Indications are:
  - Oligohydramnios and cord compression
  - To dilute or to wash out meconium
  - To improve variable or prolonged decelerations.

Advantages : Reduces cord compression, meconium aspiration, and improves Apgar score.

16. Ans. is c i.e. Environmental causes *Ref. Park 19/e, p 452*

Deaths occurring from 28 days of life to under one year are called postneonatal death.

$$\textbf{The postneonatal mortality rate} = \frac{\text{Number of deaths of children between 28 days and one year of age in a given year}}{\text{Total live births in the same year}} \times 1000$$

Park 19/e, p 452 says:

"Whereas neonatal mortality is dominated by endogenous factors, postneonatal mortality is dominated by exogenous factors (e.g. environmental and social factors)."

- Main causes in developing countries:
  - Diarrhoea
  - Respiratory tract infection
  - Malnutrition.
- Main causes in developed countries:
  - Congenital anomalies.

Extra Edge:

Some important definitions:

- ***Perinatal period*** extends from the 28th week of gestation up to the 7th day of life.
- ***Extended perinatal period*** is the period from the 22nd week up to the 7th day of life.
- ***Neonatal period*** extends from birth up to 28 days of life. The early neonatal period refers to the first 7 days and the late neonatal period from 7 days to 28 days.
- Stillbirth: A stillbirth is the birth of a newborn after 28th completed week (weighing 1000 gm or more) when the baby does not breathe or show any sign of life after delivery. Such deaths include antepartum deaths (macerated) and intrapartum deaths (fresh stillbirths). Stillbirths rate is the number of such deaths per 1000 total births (live and still births).

- **Perinatal mortality rate (PNMR):** Perinatal mortality is defined as deaths among, fetuses weighing 1000 gm or more at birth (28 weeks gestation) who die before or during delivery or within the first 7 days of delivery. The perinatal mortality rate is expressed in terms of such deaths per 1000 total births. Perinatal deaths are thus the sum of stillbirths plus early neonatal deaths.

Causes: Infection > Birth asphyxia and trauma > Preterm birth and/or LBW > Congenital malformation.

- Neonatal mortality rate (NMR): It is the death of the baby within 28 days after birth. Neonatal mortality rate is the number of such deaths per 1000 live births. Majority of the deaths occur within 48 hours of birth.

Most common cause of Neonatal mortality is Prematurity.

17. Ans. is d i.e. Does not vary in tension with crying *Ref. Dutta Obs. 7/e, p 483*

Cephalhaematoma:
- Collection of blood in between the pericranium and the flat bone of the skull due to rupture of a small emissary vein from the skull. It may be associated with fracture of the skull bone.
- Usually unilateral.
- Lies over a parietal bone.
- Caused generally by forceps delivery but may also be met with following a normal labour.
- Ventouse application does not increase the incidence of cephalhaematoma.
- It is never present at birth but gradually develops after 12-24 hours of birth and disappears by 6-8 weeks[Q].
- It is circumscribed, soft, fluctuant, and incompressible.
- The swelling is limited by the suture lines of the skull[Q] as the pericranium is fixed to the margins of the bone.
- No active treatment is necessary.
- Prognosis is good.

Meningocele always lies over a suture line or fontanelle and there is impulse on crying.

18. Ans. is d i.e. Amniocentesis *Ref. Fernando Arias 2/e, p 313, 314; COGDT 10/e, p 294*

Bedside Obs and gynae by Richa Saxena p 192

Antepartum Surveillance of IUGR Fetus

Majority of the fetal deaths in IUGR occur after 36 weeks. Therefore, correct diagnosis and timely intervention is vital.

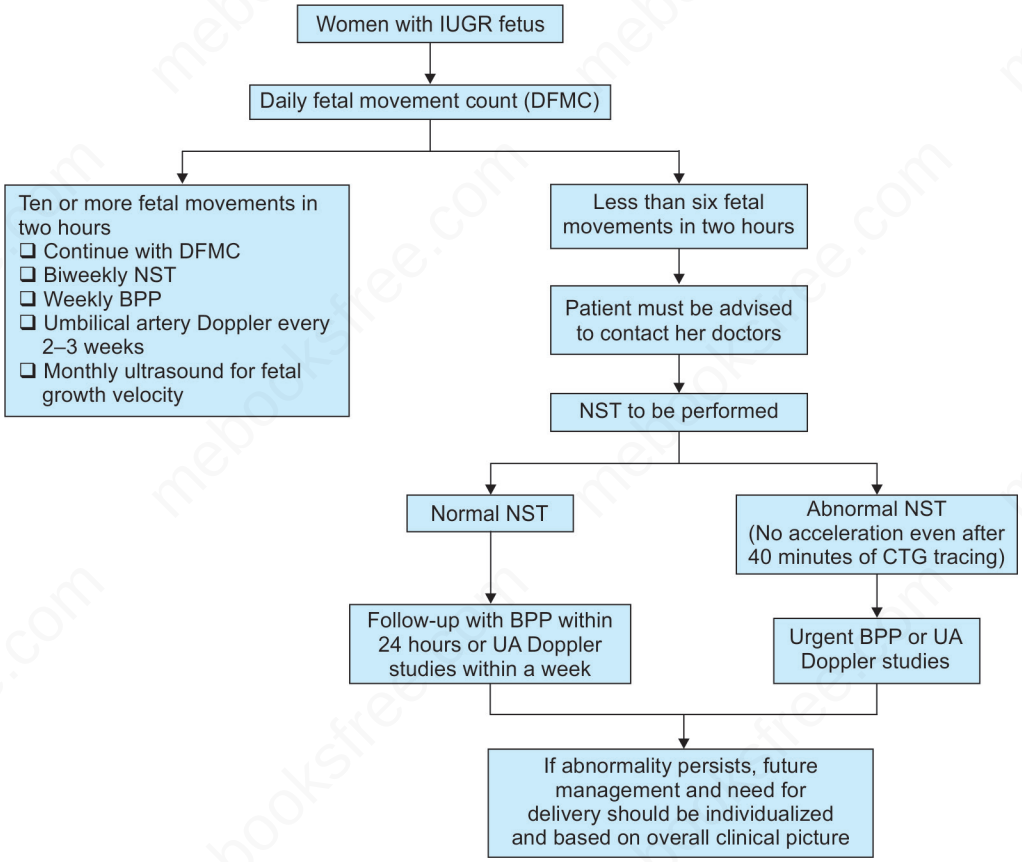
There is no best method for monitoring a fetus with suspected IUGR.

Following investigation should be done in case of IUGR.

Test	Timing
Fetal movement count	Daily
Amniotic fluid volume	Weekly
Nonstress test	Twice weekly
Biophysical profile	Weekly if NST is abnormal
Oxytocin challenge test	Every fortnightly, if biophysical profile is less than 8
Umbilical artery Doppler	Every 2-3 weeks

Test	Significance
Amniocentesis	***"In selected cases, amniocentesis may be indicated for determination of fetal pulmonary maturity with an uncertain date of conception, for assessment of fetal karyotype, or for diagnosis of fetal infection."*** ***—COGDT 10/e, p 294***
Cordocentesis	***"Fetal blood sampling has a limited role in the evaluation of IUGR fetuses. Also, umbilical cord sampling is dangerous in the IUGR fetus, and these babies frequently develop prolonged, severe bradycardia during this procedure, requiring emergency cesarean delivery."*** ***—Fernando Arias 2/e, p 314***

So, from the above text it can be concluded that NST, CST and USG are done routinely in case of IUGR whereas amniocentesis is required in selected cases.



19. Ans. is c i.e. It does not disappear within 2-3 days *Ref. Dutta Obs. 7/e, p 86, 87*

Caput succedaneum

- This is a localised swelling of the scalp due to effusion of serum above the periosteum.

Pathology:

- There is obstruction of venous and lymphatic return due to pressure by the cervix.

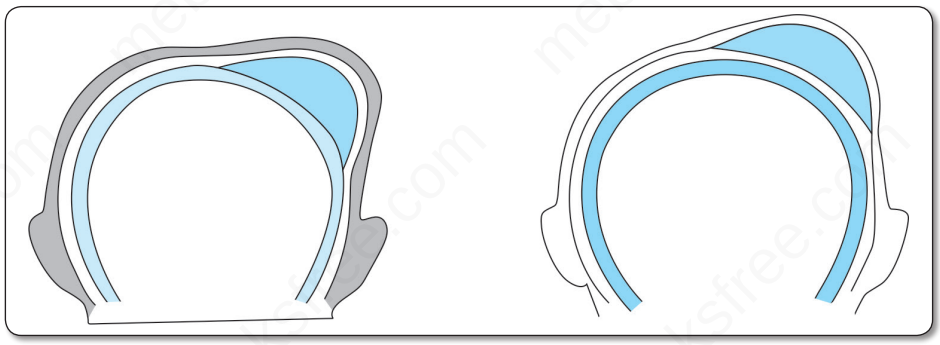
↓

- Stagnation of fluid

↓

Edema over scalp

- **Site:** of the caput depends upon the position of the head.
- It is present at birth and disappears by about 24-36 hours.
- The size indicates the amount of pressure on the head.



Cephalhematoma	Caput succedaneum
Sharply circumscribed	Diffuse
Soft but does not pit on pressure	Soft and pits on pressure
Under the periosteum	Above the periosteum
Does not cross suture lines	Lies over and crosses suture lines/midline
Fixed in one place	Movable over dependant part
May be associated with fracture	Not associated with fracture
Appears some time after birth, grows larger and disappears only after weeks or months	Largest at birth, immediately starts to regress and disappears in a few hours

20. Ans. is d i.e. No immediate therapy *Ref. Dutta Obs. 7/e, p 486*

Sternomastoid tumour/Hematoma

- Presents at about 7-10 days after birth
- Situated at the junction of upper and middle third of the muscle
- Etiology: rupture of sternocleidomastoid muscle fibres and blood vessels, due to:
  - hematoma and cicatricial contracture
  - Difficult breech delivery
  - Attempted delivery after shoulder dystocia
  - Excessive lateral flexion of neck following normal delivery.
- Clinical features: Transient torticollis
- Treatment:
  - No treatment required, disappears spontaneously by 6 months of age
  - Gentle movements and stretching of muscle done after feeds is useful
  - Do not massage.

21. Ans. is b i.e. 3 days *Ref. Dutta Obs. 7/e, p 446; Williams Obs. 23/e, p 600*

"Meconium is normally passed 3-4 times a day for 2-3 days." *—Dutta Obs. 6/e, p 448*

"For the first 2-3 days after birth, the contents of colon are composed of soft, brownish green meconium."
—Williams Obs. 22/e, p 643

Also Know:

- A delay in initial passage of meconium for > 12 hours after birth requires observation.
- In breast-fed infants – stools are soft, golden yellow in colour, sour smelling and acid in reaction.
- In bottle fed infants – the stools are hard, pale, foul smelling and alkaline in reaction.

22. Ans. is d i.e. 6 *Ref. Dutta Obs. 7/e, p 84*

6 fontanelles are present in fetal skull:

- Anterior fontanelle (bregma) – 1
- Posterior fontanelle (lambda) – 1
- Anterolateral fontanelle – 1
- Posteriolateral fontanelle – 1

23. Ans.i s b i.e. 3 *Ref. Dutta Obs. 7/e, p 470*

Signs	0	1	2
• Respiratory effort	Absent	Slow, irregular	Good, crying
• Heart rate	Absent	Slow (< 100)	> 100
• Muscle tone	Flaccid	Flexion of extremities	Active body movement
• Reflex irritability	No response	Grimace	Cry
• Colour	Blue, pale	Body pink, extremities blue	Complete pink

Total score	=	10
No depression	=	7-10
Mild depression	=	4-6
Severe depression	=	0-3
In this case :		
Heart rate	=	110 means score of 2
Respiratory effort	=	slow and irregular means a score of 1
Muscle flaccid	=	score 0
Blue color	=	score 0
Reflex irratibility none	=	0
Total score in this case	=	3

24. Ans. is b i.e. Streptococcus agalactiae *Ref. Nelson 17/e, p 627, Williams Obs, 23/e, p 1220*

Streptococcal (agalactiae) infection is characterised by:

- Asymptomatic bacteremia to septic shock (as is the case here).
- Early onset disease may present at birth, and generally within 6 hours of birth (patient is presenting here on the first day).
- In utero infection may result in fetal asphyxia, coma or shock.
- In 10% of infants with early onset disease, meningitis occurs.
- Diagnosis is made by isolation and identification of organism from sterile site.
- The demonstration of gram positive organism in pairs or chain in buffy coat or other sterile fluid indicates infection.
- Drug of Choice: Penicillin G/Ampicillin

If patient is allergic to penicillin → cefazolin is recommended.

25. Ans. is b i.e. Asphyxia *Ref. Park 22/e, p 522*

The WHO's definition, more appropriate in nations with well-established vital records of stillbirths is as follows:

$$\text{PMR} = \frac{\text{Late foetal deaths (28 weeks gestation and more) + early neonatal deaths (first week) is one year}}{\text{Live births + late foetal deaths (28 weeks gestation and more) in the same year}} \times 100$$

The WHO'S definition, more appropriate in nations with less well-established vital records, is:

$$\text{Perinatal mortality rate} = \frac{\text{Late foetal deaths (28 weeks of gestation) + postnatal deaths (first week) in a year}}{\text{Live births in a year}} \times 1000$$

Causes of perinatal mortality ***—Park 22/e, p 522***

About two-thirds of all perinatal deaths occur among infant with less than 2500 g birth weight. The causes involve one or more complications in the mother during pregnancy or about, in the placenta or in the foetus or neonate.

Main causes

The main causes of death are intrauterine and birth asphyxia, low birth weight, birth, and intrauterine or neonatal infection.

Important causes of perinatal mortality *Ref. Dutta Obs 7/e, p 607*

Causes	Percent
Infections (Sepsis, Meningitis, Pneumonia, Neonatal tetanus, Congenital syphilis)	33
Birth asphyxia and trauma hypothermia	28
Preterm birth and/or low birth weight	24
Congenital malformations and others	15

26. Ans. is d i.e. AC indirectly reflects fetal liver size and glycogen storage *Ref. Dutta Obs 7/e, p 462, 463*

'*AC is the single most sensitive parameter to detect IUGR*' *—Dutta Obs 7/e, p 462*

'*Serial measurements of AC (not BPD) and estimation of fetal weight are more diagnostic to fetal growth restriction*' *—Dutta Obs 7/e, p 462*

Head circumference (HC) and abdominal circumference (AC) ratios: In a normally growing fetus the HC/AC ratio exceeds 1.0 before 32 weeks. It is approximately 1.0 at 32 to 34 weeks. After 34 weeks, it falls below **1.0. If the fetus is affected by asymmetric IUGR, the HC remains larger. The HC/AC is then elevated.** In symmetric IUGR, both the HC and AC are reduced. The HC/AC ratio remains normal. Using HC/AC ratio, 85% of IUGR fetuses are detected.

***Pathophysiology*:** Basic pathology in small for gestational age is due to reduced *availability* of nutrients in the mother or its reduced *transfer* by the placenta to the fetus. It may also be due to reduced *ultilization* by the fetus. Brain cell size (asymmetric–SGA) as well as cell numbers (symmetric-SGA) are reduced. **Liver glycogen content is reduced. AC indirectly reflects the decreased fetal liver size and glycogen content.**

27. **Ans. is d i.e. Short stature**

28. **Ans. is a and b i.e. Gestational diabetes mellitus and Maternal obesity** *Ref. Williams Obs. 22/e, p 905, 23/e, p 854*

Macrosomia is the term used to describe a large fetus.

The recommended definition is fetal (neonatal) weight exceeding two standard deviations or above 90th centile for the appropriate normal population.

According to ACOG: birth weight of ≥ 4500 gm is called as macrosomia.

In Indian context birth weight of ≥ 4000 gm is called as macrosomia.

Risk factors associated with macrosomia are:

- Maternal diabetes
- Maternal obesity (If maternal BMI is > 30 kg/m^2, it is a/w increased risk)
- Multiparity
- Prolonged gestation
- Increased maternal age
- Male fetus
- Race and ethinicity (hipanic ethnicity is a/w increased risk)
- Previous infant weight more than 4000 g

31

Fetal Malformations

NEURAL TUBE DEFECTS

These result from incomplete closure of the neural tube by the embryonic age of 26 to 28 days. They are the second most common class of malformations after cardiac anomalies.

- Neural tube defects can be prevented with folic acid supplementation.
- **Anencephaly** is characterized by absence of the cranium and telencephalic structures, with the skullbase and orbits covered only by angiomatous stroma. **Acrania** is absence of the cranium, with protrusion of disorganized brain tissue. Both are generally grouped together, and anencephaly is considered to be the final stage of acrania.
- **Cephalocele** is the herniation of menings through a cranial defect, typically located in the midline occipital region. When brain tissue herniates through the skull defect, the anomaly is termed an **encephalocele.** Associated hydrocephalus and microcephaly are common.
- Cephalocele is an important feature of the autosomal recessive **Meckel-Gruber syndrome**, which includes cystic renal dysplasia and polydactyly.
- **Spina bifida** is a defect in the vertebrae, typically the dorsal arch, with exposure of the meninges and spinal cord. The birth prevalence is approximately 1 per 2000. Most cases are *open spina bifida*—the defect includes the skin and soft tissues. Herniation of a meningeal sac containing neural elements is termed a myelomeningocele. When only a meningeal sac is present, the defect is a **meningocele**.

Risk Factors for Neural Tube Defect

Genetic cause	Environmental Exposures	Geographical–Ethnicity, Diet and Other Factors
• Family history–multifactorial inheritance • Syndromes with autosomal recessive inheritance–Meckel-Gruber, Roberts, Joubert, Jarcho-Levin, HARDE (hydrocephalus-agyria-retinal dysplasia-encephalocele) • Aneuploidy–trisomy 13 and 18, triploidy	• Diabetes–hyperglycemia • Hyperthermia–hot tub or sauna, fever (controversial) • Medications–valproic acid, carbamazepine, coumadin, thalidomide, efavirenz	United Kingdom, India, China, Egypt, Mexico, Southern Appalachian United States

Recurrence

The recurrence risk of NTDs is:

- If H/O one affected child = 5%.
- If H/O two affected children = 13%.

Prevention

- Most women at increased risk for NTDs benefit from 4 mg folic acid (Therapeutic dose of folic acid) taken daily before conception and through the first trimester. This is particularly important, if a woman has one or more prior affected children or if either the pregnant woman or her partner has such a defect. Folic acid supplementation may not decrease the risk for NTDs in those with valproic acid exposure, or defects associated with a genetic syndrome (American College of Obstetricians and Gynecologists, 2013b).
- It is recommended that all pregnant women at low risk take 400 μg of folic (Prophylactic dose of folic acid) and orally every day begining from one month before conception and throughout the first trimester, to reduce the NTD risk by as much as 80 percent. This is called as **prophylactic dose of folic acid**.
- If there is H/O previous NTD: The dose of folic acid to be given is 4–5 mg **(Therapeutic dose)**.

Diagnosis

Screening for NTDs

Maternal serum alpha fetoprotein levels:

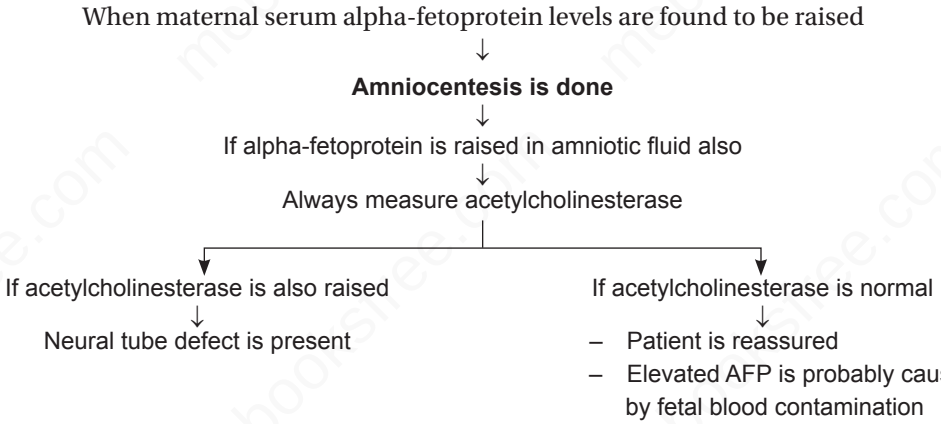
- AFP is a glycoprotein synthesized by fetal yolk sac and later by fetal GI tract and liver (A detailed discussion of AFP is done in Chapter 32).
- In females carrying fetus with NTDs–the AFP concentration at 16–18 weeks exceeds 2.5 multiple of meridian (MOM) (In twin gestation ≥ 3.50 MOM).
- So MSAFP is used as a screening test for NTD.
- Test is done between 15–20 weeks of pregnancy.

Confirmatory Diagnosis

Confirmatory diagnosis for NTDs can either be made by:

i. **Targeted sonography:** Many centres are now using targeted sonography to confirm the diagnosis of NTDs after maternal serum alpha proteins levels are found to be raised.

ii. **Amniocentesis** was considered as the "gold standard" for the diagnosis of open NTDs but now in many centres it has been replaced by or used in conjunction with specialized sonography.



The overall sensitivity of amniocentesis is approximately 98 percent for open NTDs, with a false-positive rate of 0.4 percent. Other fetal abnormalities associated with elevated amnionic fluid AFP levels and positive assay for acetylcholinesterase include ventral wall defects, esophageal atresia, fetal teratoma, cloacal exstrophy, and skin abnormalities such as epidermolysis bullosa.

ANENCEPHALY

- It is characterised by absence of the cranial vault and cerebral hemispheres.[Q]
- It is the most common type of neural tube defect.[Q]
- Caused by failure of closure of Rostral Neuropore at an early embryonic stage.

Pathological Features

- Forebrain and midbrain are absent.
- Cerebellum and Hindbrain are less involved or completely spared.
- Base of skull and facial bones are not affected.
- Pituitary gland is either absent or hypoplastic.Q
- As a result: Adrenal gland is diminished in size.Q

Such fetuses have *bulging eyes, short neck* and a *large tongue.*

Complications

Caused by Anencephaly during Pregnancy:

- ***Polyhydramnios:*** seen in 35% cases.Q
  Causes:
  - Diminished fetal swallowingQ
  - Secretion of CSF directly into the amniotic cavityQ
  - Excessive micturition.Q
- ***Preterm labour:*** due to associated polyhydramnios.
- ***Malpresentation:*** face presentation (most common)Q and breech presentation.
- **Rather most common fetal anomaly responsible for face presentation is anencephaly.**
- Tendency for postmaturity.Q
  Cause: Insufficient production of cortisol from fetal adrenals leading to diminished oestriol.

Complications during Labour

- ***Shoulder dystocia***Q**:** Most common complication of anencephaly during labour.
- Obstructed labour.Q
- Risk of recurrence is 5% after one affected child and 13% after two affected children.Q

Diagnosis

- ***By ultrasound:*** Demonstration of
  a. Absence of cranial vault and
  b. Angiomatous brain tissue
  c. Mickey mouse sign—seen in first trimester

  Time ≥14 weeks and accuracy—100%
  It can be diagnosed earliest by 10 weeks on ultrasound.Q
- **Elevated levels of maternal serum alpha-fetoproteins.**Q
- ***By amniocentesis:*** Purpose of amniocentesis is to measure concentration of alpha-fetoprotein (AFP) and acetylcholinesterase in amniotic fluid.
  Amniotic fluid acetylcholinesterase has better diagnostic value than amniotic fluid AFP.Q
  Most specific marker for diagnosis of anencephaly—acetylcholinesterase.

Management

Termination of pregnancy irrespective of gestational age.

SPINA BIFIDA

Spina bifida can be reliably diagnosed with second trimester sonography.

Ultrasonographic signs indicating spina bifida: *—Williams Obs. 22/e, p 394, 23/e, p 354, 355*

- Small biparietal diameter.
- Ventriculomegaly.
- Frontal bone scalloping (the so called **lemon sign**).Q
- Elongation and downward displacement of the cerebellum (the so called **banana sign**).Q
- Effacement or obliteration of the cisterna magna.

QUESTIONS

1. **All of the following are true about anencephaly *except*:** **[AIIMS June 00]**
   a. Facial presentation
   b. Increased alpha-fetoprotein
   c. Enlarged adrenal gland
   d. Polyhydramnios

2. **The best marker for neural tube defect is:**
   a. Acetylglucosonidase **[AIIMS June 99]**
   b. Acetylcholinesterase
   c. Alpha-fetoprotein
   d. Chorionic gonadotrophin

3. **Which one of the following biochemical parameters is the most sensitive to detect open spina bifida?** **[AI 05]**
   a. Maternal serum alpha-fetoprotein
   b. Amniotic fluid alpha-fetoprotein
   c. Amniotic fluid acetylcholinesterase
   d. Amniotic fluid glucohexaminase

4. **Open neural tube defects are best detected by increase in which of the following?** **[AI 11]**
   a. Acetylcholinesterase
   b. Pseudocholinesterase
   c. AFP
   d. hCG

5. **Accurate diagnosis of anencephaly in ultrasound is seen at week:** **[PGI June 97]**
   a. 6 weeks of gestation
   b. 8 weeks of gestation
   c. 10 weeks of gestation
   d. 14 weeks of gestation

6. **A woman has had 2 previous anencephalic babies, risk of having a third one is:** **[AI 01]**
   a. 0% b. 10%
   c. 25% d. 50%

7. **Hydrocephalus is best detected antenately by:** **[AIIMS June 00]**
   a. X-ray abdomen
   b. Amniocentesis
   c. Clinical examination
   d. Ultrasonography

8. **Preconceptional intake of which of the following results in decrease in incidence of neural tube defect?** **[AIIMS May 08]**
   a. Vitamin A b. Folate
   c. Vitamin E d. Vitamin C

9. **All are true about aneuploidy *except*:** **[AIIMS May 09]**
   a. 30% of trisomy 21 fetus die in utero
   b. 80% of trisomy 18 fetus die in uero
   c. Occurrence of aneuploidy has no relation with the progression of mother's age
   d. The recurrence risk for nondisjunctional aneuploidy is 1% higher

10. **Anencephaly is best diagnosed using:** **[New Pattern Question]**
    a. Maternal serum alpha-fetoprotein
    b. Amniotic fluid alpha-fetoprotein
    c. USG
    d. X-ray

11. **The following are related to anencephaly *except*:** **[New Pattern Question]**
    a. It is commonly associated with prematurity
    b. Often associated with oligohydramnios
    c. Increased association with female baby
    d. Obstructed labour may occur

12. **Tear drop sign is seen in:** **[New Pattern Question]**
    a. Spina bifida
    b. Anencephaly
    c. Agenesis of corpus callosum
    d. Cystic hygroma

13. **Lemon sign is seen in:** **[New Pattern Question]**
    a. Spina bifida
    b. Anencephaly
    c. Agenesis of corpus callosum
    d. Cystic hygroma

14. **Gastroschisis is associated with all *except*:** **[New Pattern Question]**
    a. Younger maternal age
    b. Maternal obesity
    c. Smoking
    d. Use of recreational drugs

EXPLANATIONS & REFERENCES

1. **Ans. is c i.e. Enlarged adrenal gland** *Ref. Fernando Arias 3/e, p 64; Dutta Obs. 7/e, p 408, 409*

   Read the text for explanation.

2. **Ans. is b i.e. Acetylcholinesterase** *Ref. Dutta Obs. 7/e, p 106*

3. **Ans is c i.e. Amniotic fluid acetylcholinesterase**

4. **Ans is a i.e. Acetylcholinesterase** *Ref. Dutta Obs. 7/e, p 106*

   "Acetylcholinesterase is elevated in most cases of open neural tube defects. It has got better diagnostic value than AFP".

   Extra Edge:

   In order to distinguish between open neural tube defect and open ventral wall defects
   - Ratio of Acetylcholinesterase to pseudocholinesterase (nonspecific cholinesterase) is measured.

   If $\frac{(AcHE)}{(PcHE)} < 0.10 \rightarrow$ ventral wall defect

   Remember: *Amniotic fluid alpha-fetoprotein/acetylcholinesterase determination is a diagnostic test; in contrast to maternal serum alpha-fetoprotein determination, which is a screening test.*

5. **Ans. is d i.e 14 weeks of gestation** *Ref. Williams Obs. 22/e, p 394, 23/e p 354; Fernando Arias 3/e, p 64.*

   Friend, there are two aspects which should be considered while answering such a question.
   - Best time for diagnosis
   - Earliest time of detection.

   In case of anencephaly:

   "The diagnosis may be suspected in the first trimester during examination with endovaginal probe but it is usually not certain until after 14 weeks." *—Fernando Arias 3/e, p 64*

   "Anencephaly can theoretically be diagnosed as early as 8 weeks; however it can be missed in the first trimester. In the second trimester, if an adequate ultrasound examination can be performed, anencephaly is diagnosed with virtually 100% accuracy." *—Williams Obs. 21/e, p 1120*

   "It can be diagnosed in the late first trimester and with adequate visualization, virtually all cases may be diagnosed in the second trimester". *—Williams Obs. 23/e, p 354*

   Anencephaly -

   "Although fetal head can be positively identified by vaginal sonography as early as the 7th week of gestation, the diagnosis may be difficult in the first trimester. The diagnosis is easy in the midtrimester."

   —Callen, Ultrasound in Obs. & Gynae 4/e, p 284

   So friends reading all the texts:

   Best time for diagnosis of anencephaly is ≥ 14 weeks.[Q]
   Earliest time at which anencephaly can be diagnosed is 10 weeks.[Q]

KEY CONCEPT

- Maternal screening for anencephaly by measuring maternal serum AFP is done between 15–20 weeks. *—Williams Obs. 23/e, p 289*
- Most sensitive marker for neural tube defects is Acetylcholinesterase.[Q]
- First and most common investigation for NTD is ultrasonography.
- Best Ix = Targeted USG.
- By endovaginal and transabdominal ultrasound, possibility of fetal anencephaly can be ruled out as early as 8 weeks.[Q]
- *To rule out spina bifida:* a level II USG scan should be done at 16 weeks.

6. Ans. is b i.e. 10% *Ref. Fernando Arias 2/e, p 327*

The risk of recurrence of anencephaly:
If one child is affected 5%
If two children are affected 13%

Note: Anencephaly has a lethal prognosis and therefore it is the universally accepted indication for termination of pregnancy even during the third trimester.

7. Ans. is d i.e. Ultrasonography *Ref. Williams Obs. 22/e, p 316, 517, 23/e, p 290; Fernando Arias 2/e, p 331*

Hydrocephalus is a condition in which there is an abnormal increase in cerebrospinal fluid within the ventricular and subarachnoid spaces of brain.

"The prenatal diagnosis of hydrocephalus is usually made by demonstration of a dilated ventricular system in an ultrasound examination." *—Fernando Arias 2/e, p 331*

- Earliest and most accurate sonographic sign of hydrocephalus – Enlarged lateral ventricles.[Q]
- The lateral ventricle is measured at the level of atrium.
- Normal transverse diameter of atrium is 7 mm ± 1 mm (It remains constant during the second and third trimester).
- When diameter of atrium is >10 mm, it is called as *Ventriculomegaly/Hydrocephalus.*

Other signs of hydrocephalus on USG:

- Dangling choroid plexuses.
- Thinning out of cerebral cortex.

Extra Edge:

- Friends, the terms ventriculomegaly and hydrocephalus are often used interchangeably but have slightly different meanings.
  - ***Ventriculomegaly:*** The condition in which lateral ventricles of the brain are filled with excessive fluid and enlarge such that their diameter is ≥ 10 mm.
  - ***Hydrocephalus:*** There is ventriculomegaly along with an increase in the head circumference.
- Normal fetal head circumference at term ranges between 32 and 38 cm.
- With hydrocephalus, the circumference exceeds 50 cm. *—Williams Obs. 22/e, p 517, 23/e, p 480*
- Ventriculomegaly can also be caused by[Q]:
  - Spina bifida[Q], agenesis of corpus callosum
  - Chromosomal abnormalities[Q]
  - Congenital infections like cytomegalovirus, toxoplasmosis, syphilis and influenza.[Q]

Hence once diagnosed on USG–Karyotyping and TORCH test should be done to know the etiology.

8. Ans. is b i.e. Folate *Ref. Dutta Obs. 7/e, p 409; COGDT 10/e, p 197*

"Folic acid has been shown to effectively reduce the risk of neural tube defects (NTDs). A daily 4 mg dose is recommended for patients who have had a previous pregnancy affected by neural tube defects. It should be started atleast 1 month (ideally 3 months) prior to pregnancy and continued through the first 6–12 weeks of pregnancy." *—COGDT 10/e, p 197*

Remember:

- *Therapeutic dose* of folic acid (to be given in females with previous history of baby with NTD) - 4 mg.
- *Prophylactic dose* of folic acid = 0.4 mg i.e. 400 μg
- *Duration:* It should be started 1 month before conception and continued till 3 months of pregnancy.

Note: Women with insulin dependant diabetes mellitus and those with seizure disorders treated by valproic acid[Q] and carbamazepine are also at greater risk for NTD's and should be given therapeutic dose of folic acid i.e 4 mg.

9. Ans. is c i.e. Occurrence of aneuploidy has no relation with the progression of mother's age
Ref. Robbin's 7/e, p 172-174, Fernando Arias 3/e, p 34 for option d

Aneuploidy

- Each human cell consists of 23 pair of chromosomes i.e., the normal chromosome number is 46
- Aneuploidy is a deviation from the normal number of 46 chromosome. Which could be be 47 or 45 chromosomes or it can be defined as state of having chromosome number that is not multiple of 23.

Nondisjunction

- Nondisjunction is failure of paired homologus chromosomes to separate during the first meiotic division that leads to the production of gametes (ova and spermatozoa).
- Thus, some gametes receive two and other receive none of the involved pair. After the second meiotic division the resulting gametes will have 24 and 22 chromosomes respectively. Such gametes are aneuploid.

Anaphase lag

- In anaphase lag, one homologus chromosome in meiosis or one chromatid in mitosis lags behind and is left out of the cell nucleus. This results in one normal cell and one cell with monosomy.

Survival of Aneuploidy

- Monosomy or trisomy involving the sex chromosome are compatible with life and are usually associated with variable degree of phenotypic abnormalities.
- Monosomy involving an autosome generally represents loss of too much genetic information to permit live births or even embryogenesis.
- With the exception of trisomy 21 all others will produce severely handicapped infants who almost invariably die at an early age.

Estimated abortion rate in early pregnancy

Chromosome abnormality	Abortion rate
Trisomy 13	71%
Trisomy 18	74%
Trisomy 21	24%
Monosomy X0	54%

Risk of aneuploidy with maternal age

- About 1 in every 500 live born babies has some chromosomal abnormality. The rate of aneuploidy in embryos is much higher with increasing maternal age. The rate of aneuploidy in embryo becomes > 80% in women greater than 40 years of age and in live births it is 1–20%.

Recurrence Risk of Down syndrome

Trisomy 21

"When a pregnant woman has a history of a previous child with down syndrome, it is important to know the type of chromosomal defect found in the affected child because the risk of recurrence in a future pregnancy will be different depending on the type of defect. The recurrence risk for nondisjunctional T21 is 0.75% higher than the maternal and gestational age related risk. For example, if the background risk for a woman 25-year-old at 16 weeks of gestation is 1 in 933 (0.10%). If she has history of T21 in previous pregnancy, her risk will be 0.10 + 0.75% = 0.85%, i.e.1 in 117."

—High Risk Pregnancy Fernando Arias 3/e, p 34

This means option 'd' is correct

Extra edge

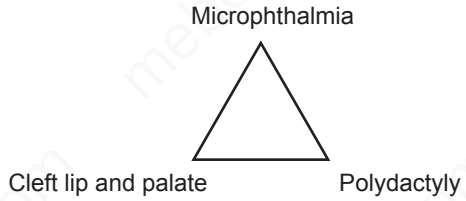
- Trisomy 18/Edward syndrome and trisomy 13/Patau syndrome are both lethal conditions.
- They are mostly due to nondisjunction during meiosis and the frequency of these conditions increases with maternal age and decreases with gestational age.

Trisomy 18/Edward syndrome

- ***Phenotypic abnormalities***
  - Fawn like, low set ears
  - Small BPD of skull
  - Micrognathia
  - Clenched hands, i.e. third or 4th finger overrides others
  - Rocker bottom foot
- ***Systemic abnormalities***
  - Profound mental retardation
  - Cardiac defects – VSD/coarcation of aorta
  - Renal malformation (horse shoe shaped kidney)
  - Esophageal atresia/omphalocele
- The risk of recurrence of T18 is 0.75% higher than the maternal and age related risk for T18 (similar to Down syndrome).
- Screening for trisomy 18 is done by serology (Triple test/Quadruple test) and by USG (by measuring nuchal translucency, single umbilical artery and choroid plexus cyst).

Trisomy 13/Patau syndrome

Characterized by a triad of



Diagnosis:

- T13 can be suspected by ultrasonographic findings in the second trimester.
- Serological screening is not useful.

Recurrence rate for T13 is 1 in 100.

10. Ans. is c i.e. USG *Ref. Williams Obs. 22/e, p 321, 322, 23/e, p 291*

"In the early days of AFP screening, an elevated maternal serum AFP level prompted amniocentesis to determine the amniotic fluid AFP level. If the AFP level was elevated, then an assay for acetylcholinesterase was done. These tests were considered diagnostic for fetal NTD. Today however nearly 100% of NTDs are identified by ultrasonography used alone."

Diagnosis of Anencephaly/NTD in brief:

- Best screening test for NTD: Maternal serum alpha protein (between 14 and 22 weeks, best at 16 weeks).
- Best marker for NTD/Open spina bifida/ Anencephaly is Acetylcholinesterase.
- **Best investigation for Anencephaly—ultrasound.**
- Best time for diagnosis of Anencephaly is ≥ 14 weeks by USG[Q]
- Earliest diagnosis of Anencephaly by 10 weeks[Q].
- Best investigation for hydrocephalus is Ultrasound.[Q]

11. Ans. is b i.e. Often associated with oligohydramnios *Ref. Dutta Obs. 7/e, p 408*

Anencephaly is associated with polyhydramnios and not oligohydramnios. Rest all options are correct.

12. Ans. is c i.e. Agenesis of corpus callosum *Ref. Fernando Arias 4/e, p 16, Figures 2-4*

Lateral ventricles in agenesis of corpus callosum on USG show **a tear drop shape.** As corpus callosum develops only after 12 weeks, this is second trimester diagnosis. Recently MRI is also proving helpful in its diagnosis.

13. Ans. is a i.e. Spina bifida *Ref. Fernando Arias 4/e, p 15*

Classical signs of spina bifida on USG are:

(i) Lemon sign – frontal bone scalloping

(ii) Banana sign – downward displacement of the cerebellum.

14. Ans. is b i.e. Maternal obesity *Ref. Fernando Arias 4/e, p 20*

Gastroschisis refers to full thickness abdominal wall defect with evisceration of the intestines due to ischemic insult to the developing anterior abdominal wall.

Risk factors:

- Young age of mother < 20 years
- **Low BMI**
- Smoking
- Use of recreational drugs
- Increase in frequency of genitourinary infections.

Note: Gastroschisis is not associated with an increased risk of aneuploidy.

- Complications – IUGR, oligohydramnios (presence of either indicates poor prognosis)
- Survival rate = 90%
- Mortality is due to short Gut syndrome.

SECTION 5

Diagnosis in Obstetrics

32

Diagnosis in Obstetrics

QUESTIONS

PRENATAL DIAGNOSIS

1. **Appropriate material for antenatal diagnosis of genetic disorders includes all of the following *except*:** **[AIIMS May 06]**
   a. Fetal blood b. Amniotic fluid
   c. Chorionic villi d. Maternal urine
2. **Karyotyping of fetus can be done through all of the following invasive methods *except*:** **[AIIMS Nov 11]**
   a. Amniocentesis
   b. Cordocentesis
   c. Chorionic villous sampling
   d. Fetal skin biopsy
3. **Prenatal diagnosis at 16 weeks of pregnancy can be performed using all of the following, *except*:** **[AI 06]**
   a. Amniotic fluid b. Maternal blood
   c. Chorionic villi d. Fetal blood

ALPHA FETO PROTEIN

4. **In which of the following conditions would maternal serum alpha-fetoprotein values be the highest?**
   a. Down's syndrome **[AIIMS Nov 05]**
   b. Omphalocele
   c. Gastroschisis
   d. Spina bifida occulta
5. **Screening by using maternal serum alpha fetoproteins helps to detect all of the following *except*:** **[AI 04]**
   a. Neural tube defects
   b. Duodenal atresia
   c. Talipes equinovarus
   d. Omphalocele
6. **Increased AFP level is seen in:** **[AIIMS Nov 07]**
   a. Down syndrome
   b. Molar pregnancy
   c. Overestimated gestational age
   d. Congenital nephrotic syndrome
7. **Alpha-fetoprotien concentration in serum is elevated in:** **[PGI Dec 08]**
   a. Hepatoma
   b. Hepatoblastoma
   c. Endodermal sinus tumor
   d. Cirrhosis
   e. Chromosomal trisomy
8. **AFP is raised in all *except*:** **[PGI Dec 99]**
   a. Polycystic kidney
   b. Trisomy
   c. IUD
   d. Oesophageal atresia
9. **Maximum level of alpha fetoprotein is seen in:**
   a. Fetal serum **[AIIMS June 98]**
   b. Placenta
   c. Amniotic fluid
   d. Maternal serum
10. **About AFP true are all *except*:** **[PGI June 08]**
    a. MSAFP detected 16-18 weeks of gestation
    b. Diabetic patients have increased AFP level
    c. MsAFP is unrelated to period of gestation
    d. Highest fetal level is seen around 13 weeks of gestation
    e. Increased in down syndrome
11. **Regarding alpha fetoprotein true statement is:**
    a. Major source in fetal life is yolk sac **[AIIMS May 08]**
    b. Commonly incrased in wilms tumour
    c. Maximum level at 20th week
    d. Half-life 5-7 days

12. ↓ed maternal serum α-FP is seen in:
a. Multiple pregnancy **[PGI June 03; Dec 97]**
b. Trisomy 21
c. Open neural tube defect
d. IUD

hCG

13. ↓ hCG level seen in: **[PGI 04]**
a. Down syndrome
b. DM
c. Multiple pregnancy
d. Ectopic pregnancy
e. Oesophageal atresia

14. Raised beta-hCG levels are seen in: **[PGI June 01]**
a. DM b. Preeclampsia
c. Ectopic pregnancy d. Rh-incompatibility
e. Down syndrome

15. Monitoring of β-hCG is useful in management of:
a. H. mole **[PGI Dec 08]**
b. Choriocarcinoma
c. Ectopic pregnancy
d. Endodermal sinus tumor

AMNIOCENTESIS AND CVS

16. Amniotic fluid contains acetyl cholinesterase enzyme. What is the diagnosis?
a. Open spina bifida **[AIIMS May 07, Nov 06]**
b. Gastroschisis
c. Omphalocele
d. Osteogenesis imperfecta

17. Which of the following tests on maternal serum is most useful in distinguishing between open neural tube defects and ventral wall defects in a fetus?
a. Carcinoembryogenic antigen **[AI 04]**
b. Sphingomyelin
c. Alpha-fetoprotein
d. Pseudocholinesterase

18. The best time to do chorionic villous sampling is:
a. Between 6-8 weeks **[AIIMS May 05]**
b. Between 7-9 weeks
c. Between 9-11 weeks
d. Between 11-13 weeks

19. Transabdominal CVS can be done in:
a. 7-9 weeks **[AIIMS May 09]**
b. 11-13 weeks
c. 9-11 weeks
d. 13-15 weeks done before 10 weeks

20. Chorionic villous sampling done before 10 weeks may result in: **[AIIMS May 02, Dec 97]**
a. Fetal loss
b. Fetomaternal hemorrhage
c. Oromandibular limb defects
d. Sufficient material not obtained

21. DNA analysis of chorionic villus/amniocentesis is not likely to detect: **[AI 01]**
a. Taysach's disease
b. Hemophilia A
c. Sickle cell disease
d. Duchenne muscular dystrophy

22. Chorionic villous sampling is done in all *except*:
a. Phenylketonuria **[AIIMS Dec 97, AI 08]**
b. Down's syndrome
c. Neural tube defect
d. Thalassemia/sickle cell anemia

23. True about chorionic villi biopsy: **[PGI June 08]**
a. Strongly associated with faciomandibular defects
b. Done in 10-12 weeks
c. Rh immunoglobulin prophylaxis is not necessary
d. Done to diagnose genetic disorders

24. Hazard of chorionic villous biopsy is: **[New Pattern Question]**
a. Limb abnormality b. Spina bifida
c. Down's syndrome d. Abortion

25. About amniocentesis true is following *except*:
a. It carries risk of miscarriage **[PGI June 00]**
b. Always done as a blind procedure
c. Done between 10-18 weeks
d. Chromosomal abnormality can be detected

26. Amniocentesis done at: **[PGI Dec 09]**
a. 14-18 weeks b. 16-20 weeks
c. 20-24 weeks d. 24-28 weeks
e. >34 weeks

27. Which of the following is not an indication of amniocentesis for chromosomal detection? **[New Pattern Question]**
a. Gestation diabetes mellitus
b. Previous Down's child
c. Maternal age more than 35
d. Parents with chromosomal anomaly

FETAL IMAGING

28. At what level of β-hCG is it that normal pregnancy can be earliest detected by TVS (transvaginal USG)?
a. 500 IU/ml b. 1000 IU/ml **[PGI Dec 06]**
c. 1500 IU/ml d. 2000 IU/ml
e. 2500 IU/ml

29. Early date for detection of fetal heart: **[PGI June 06]**
a. 6.0-6.5 weeks b. 6.5-7 weeks
c. 7.1-7.5 weeks d. 8 weeks

30. What is the finding seen earliest in USG? **[PGI Dec 05]**
a. Yolk sac b. Fetal heart
c. Chorion d. Placenta
e. Embryo

31. Best confirmation for pregnancy at six weeks? **[AIIMS Nov 13]**
a. USG for cardiac activity
b. Doppler
c. Estimation of serum beta-hCG in urine
d. Bimanual palpation

32. Pseudogestational sac seen in ultrasonography of: **[PGI Dec 05]**
a. Missed abortion b. Ectopic gestation
c. Complete abortion d. Hematometra

33. Which one of the following congenital malformation of the fetus can be diagnosed in first trimester by ultrasound? **[AI 06]**
a. Anencephaly b. Inencephaly
c. Microcephaly d. Holoprosencephaly

34. During USG, fetal abdominal circumference is measured at the level of: **[New Pattern Question]**
a. Stomach and umbilical vein, perpendicular to spire
b. Kidneys
c. Stomach parallel to spire
d. Liver and spleen

35. Best marker of gestational age in 2nd trimester is:
a. Biparietal diameter **[AI 04]**
b. Head circumference
c. CRL
d. Femur length

36. At 9 weeks, approximate CRL in mm of a fetus would be: **[New Pattern Question]**
a. 8 mm
b. 2.5 mm
c. 9 mm
d. 5 mm

37. Doppler ultrasound in pregnancy detect: **[AI 98]**
a. Cardiovascular malformation
b. Neural tube defect
c. Abdominal masses
d. IUGR

38. Fetal anemia is detected on Doppler of: **[New Pattern Question]**
a. Uterine artery
b. Umbilical artery
c. Middle cerebral artery
d. Any of the above

39. On Doppler the most omnious sign indicating fetal compromise is: **[New Pattern Question]**
a. ↑ pulsatality index in umblical art
b. ↑ S/D blood flow ratio
c. ↑ cerebral arter flow
d. Absent diastolic flow

40. Increased acidosis and hypoxaemia is associated with: **[New Pattern Question]**
a. Normal Doppler wave form
b. Increased fetal diastolic flow in the middle cerebral artery with absent diastolic flow in the aorta
c. Presence of the 'notch' in the uterine artery
d. Absent umbilical artery

41. X-ray pelvimetry is indicated in all of the following conditions *except*: **[AI 98]**
a. Severe CPD
b. Breech presentation in vaginal delivery
c. Outlet obstruction
d. Osteomalacia

ANTENATAL FETAL ASSESSMENT

42. Late deceleration indicates: **[AI 98]**
a. Head compression
b. Cord compression
c. Fetal hypoxia
d. Breech presentation

43. A drop in fetal heart rate that typically last less than 2 minutes and usually associated with umbilical cord compression is called:
a. Early deceleration **[AIIMS May 03]**
b. Late deceleration
c. Variable deceleration
d. Prolonged deceleration

44. Early deceleration denotes: **[PGI June 97]**
a. Head compression
b. Cord compression
c. Placental insufficiency
d. Fetal distress

45. With reference to fetal heart rate, a nonstress test is considered reactive when: **[AIIMS Nov 03]**
a. Two fetal heart rate accelerations are noted in 20 minutes
b. One fetal heart rate acceleration is noted in 20 minutes
c. Two fetal heart rate accelerations are noted in 10 minutes
d. Three fetal heart rate accelerations are noted in 30 minutes

46. 35 weeks pregnant diabetic female with NST non-reactive. What should be done next?
a. Induction of labour **[AIIMS May 11]**
b. CS
c. Do NST after 1hour
d. Proceed to biophysical profile

47. AG_2P, woman at 35 weeks pregnancy complains of decreased fetal movement. Next step in Mgt is: **[New Pattern Question]**
a. Observation
b. Do NST
c. Do CST
d. Do BPS
e. Induction reliably of labor

48. In a nondiabetic high risk pregnancy the ideal time for non stress test monitoring is: [AIIMS May 01]
a. 48 hours
b. 72 hours
c. 96 hours
d. 24 hours

49. All of the following are components of manning score/Biophysical score *except*:
a. Non stress test **[AIIMS May 06, Nov 00; AI 97]**
b. Oxytocin challenge test
c. Fetal body movement
d. Respiratory activity of child

50. Manning score includes/Biophysical score includes: [PGI Dec 09, Dec 01]
a. Fetal movements
b. Respiratory movements
c. Placental localization
d. Uterine artery wave form
e. Fetal heart rate accelerations

51. Oxytocin challenge test for assessing fetal well-being is contraindicated in all *except*: [New Pattern Question]
a. Placenta previa
b. Previous 2 LSCS
c. Breech
d. Premature labour

52. Which is most significant finding in cardiotocography for detection of fetal hypoxia? [New Pattern Question]
a. Late deceleration
b. Variable deceleration
c. Sinusoidal deceleration
d. Early deceleration

53. Sinusoidal heart rate pattern is seen in: [New Pattern Question]
a. Placenta previa
b. Vasa previa
c. Battledore placenta
d. Succenturiate placenta

54. Which of the following explanations is not an explanation for decreased variability of the fetal heart tracing? [New Pattern Question]
a. Fetal "sleep state"
b. Prematurity
c. Barbiturate ingestion
d. Fetal stimulation

55. Consider the following: [New Pattern Question]
1. Reactive NST
2. Absence of deceleration
3. Sinusoidal pattern

Which of the above findings in an antepartum CTG indicate fetal well-being:
a. 1 and 2 only
b. 2 and 3 nly
c. 1 and 3 only
d. 1, 2, 3

56. Following represents fetal hypoxia *except*:
a. Excessive foetal movements **[AI 98, 96]**
b. Meconium in vertex presentation
c. Fetal scalp blood pH > 7.3
d. Heart rate < 100

MIXED BAG

57. Banana and lemon sign is seen in which fetal anomalies? [PGI June 05]
a. Neural tube defect
b. Hydrops fetalis
c. Twins
d. IUD
e. Down syndrome *[Ref. Williams 23/e, p 354, 355]*

58. A 17-year-old comes to an adolescent clinic with complain of nausea and vomiting. She did a home urine pregnancy test which was positive. She does not remember her date of last menstrual period. USG shows a viable pregnancy of 8 weeks gestation. Which of the following statements regarding first trimester ultrasound is correct? [New Pattern Question]
a. A gestational sac can be first seen 2 weeks after LMP
b. The accuracy of determining gestational age using ultrasound begins to decrease after first trimester
c. Yolk sac is the first sign of pregnancy on USG
d. USG can be used to determine the sex of the baby

59. A patient present for her first initial OB visit after performing a home pregnancy test and gives a last menstrual period of about 8 weeks ago. She says she is not entirely sure of her dates, however because she has a long history of irregular menses. Which of the following is the most accurate of way of dating the pregnancy? [New Pattern Question]
a. Determination of uterine size on pelvic examination
b. Quantitave serum hCG levels
c. Crown rump length on abdominal or vaginal examination
d. Determination of progesterone level along with serum hCG level

60. A 28 years female G2P1 presents to antenatal clinic at 24 weeks for routine check up. USG shows a normal for gestational age fetus at 24 weeks of gestation in frank breech position, with no other abnormalities. What is the most appropriate next step in mgt? [New Pattern Question]
a. Glucose challenge test with 50 gm of glucose
b. culture for Neisseria gonorhhea and Chlamydia trachomatis (normally done at initial visit and in certain high risk GRPs at 32-36 weeks along wid GRP B streptococcal screening)
c. ECV
d. immediate LSCS
e. immediate induction and vaginal delivery

61. In pregnancy with increased MSAFP which of the following should be done? [New Pattern Question]

a. Repeat measurement of MSAFP at later date
b. USG
c. Amniocentesis
d. Termination of pregnancy

62. Abnormal tachycardia is defined as: [New Pattern Question]

a. Fetal heart rate $\geq$ 160 bpm
b. Fetal heart rate $\geq$ 180 bpm
c. Fetal heart rate $\geq$ 200 bpm
d. None of the above

63. Abnormal baseline variability in fetus is defined as: [New Pattern Question]

a. Beat to beat variation < 5 mins
b. Beat to beat variation < 5 for 40 mins
c. Beat to beat variation < 5 for 60 mins
d. Beat to beat variation < 5 for 90 mins

64. During 1st stage of labour, FNR should be auscultated in low risk pregnancy after every: [New Pattern Question]

a. 10 mins
b. 15 mins
c. 30 mins
d. 45 mins

EXPLANATIONS & REFERENCES

1. Ans. is d i.e. Maternal urine *Ref. Dutta Obs. 7/e, p 106, 07*

Prenatal genetic diagnosis can be made by:

Method	Sample and study material
Chorion villus sampling	Chorion villi –trophoblastic cells are obtained from:
Chorion villus sampling	i. Amniotic fluid ii. Fibroblasts
Cordocentesis	i. Fetal blood ii. White blood cells of fetus iii. Red blood cells of fetus
Maternal serum alpha feto protein	Maternal blood
Triple test	Maternal blood

2. Ans. None > Fetal skin biopsy *Ref. Williams 23/e, p 299-301*

Currently there are 3 techniques available for obtaining fetal tissue for fetal karyotyping:

i. **Chorionic villi sampling:** Performed at 10-13 weeks. A catheter is passed through the cervix or through the abdominal wall into the uterus under ultrasound guidance, and a sample of chorionic villi surrounding the sac is obtained.

The chorionic villi are formed by trophoblast and hence study material is trophablast.

In a morula the outer layer is trophoblast and inside is inner cell mass, So whatever chromosomal abnormalities are seen in fetus can be detected by CVS.

DNA can be extracted from these cells for molecular analysis. DNA analysis of CVS specimens is helpful for early diagnosis of hemoglobinopathies and all metabolic proplems like gauchers disease, phenyeketonuria can also be detected by CVS.

ii. **Amniocentesis:** It is an invasive procedure performed between 15 to 20 weeks for detecting fetal karyotype.

It is done under ultrasound guidance using a 22 gauge spinal needle. The spinal needle is passed through the mothers lower abdomen into the amniotic cavity inside the uterus and 10-20 ml of amniotic fluid is collected. Ammolic fluid has cells from amnion, fetal skin and lungs which are collected and cultured for fetal karyotyping, biochemical and metabolic analysis.

iii. **Percutaneous umbilical blood sampling (PUBS/Cordocentesis):** The most frequent indication for cordocentesis is rapid karyotyping of the fetus (with PUBS-high quality karyotype can be obtained in 48-72 hours rather than in 10-14 days that is needed for amniotic cell culture).

In PUBS a needle is inserted into the unblical cord under ultrasound guidance and fetal blood is collected from the umblical vein. PUBS is also useful in evaluating fetal metabolism and hematologic abnormalities.

PUBS can be easily done after 24 weeks and by skilled operators as early as 18 weeks of gestation.

As far a **skin biopsy** is concerned obviously it can detect any chromosomal anomaly but is not used for this purpose.

It is done between 17 and 20 weeks to detect serious skin disorders like epidermolysis bullosa, oculocutaneous albinism, etc.

Thus ideally answer to this question should be none but, if one option has to be selected it should be skin biopsy as it is not used for this purpose.

Techniques for prenatal diagnosis

Fetal tissues	Technique	Timing (weeks)	Studies done on tissue	Risk
Amniotic fluid	• Conventional amniocentesis • Early amniocentesis	15-16 11-14	AFP/ACHE/hCG	Abortion, needle puncture injuries, placental abruption chorioamniocentes abruption, pretems labour.
Amniocytes	• Conventional amniocentesis • Early amniocentesis	15-16 11-14	Cell culture for karyotypes, enzyme assay, DNA studies, FISH	
Chorionic villi	• Trans cervical • Transabdominal	10-13 10-13	Biochemical chromosomal DNA	2% fetal loss, limb defects, mosaicism andmaternal bleeding
Fetal blood	• Fetoscopic aspiration • Cordocentesis	18-20 18-20	Coagulation factor Immunoglobulin antibodies estimation; DNA and enzyme study; karyotype, FSH	1% fetal loss, rhesus sensitization, fetal infection, PROM
Fetal liver	• Fetoscopic biopsy • Percutaneous biopsy	18-20	Enzyme assay as in OTC deficiency	—
Fetal skin	• Fetoscopic biopsy • Percutaneous biopsy	17-20	Histopathology	—
Fetal muscle	• Fetoscopic biopsy • Percutaneous biopsy	18-20	Histopathology	—
Maternal serum	Maternal blood	12-14	AFP/UE3 hCG	Nil
Fetal cells in maternal circulation	Flow cytometry, PCR1 monoclonal antibodies	1st trimester	Fish fetal sexing DNA testes	Nil
Preimplantation embryo biopsy	IVF biopsy of blastocysts	4-8 cell stage blastocyst	DNA, PCR enzyme assay	—

3. Ans. is d i.e. Fetal blood *Ref. Dutta Obs. 7/e, p 106, 107*

All options given in the question are correct as all of them are used for prenatal diangosis.

But, read the question very carefully. It specifically says at *"16 weeks of pregnancy"*.

Cordocentesis in is done at 18–20 weeks therefore we cannot include fetal blood in this answer.

4. Ans. is c i.e. Gastroschisis

Ref. Williams Obs. 23/e, p 289, 290; Fernando Arias 3/e, p 83, 84; USG in Obs and Gynae by Callen 4/e, p 28

Friends, many questions are asked on serum alpha fetoprotein, therefore basic knowledge of this protein is quite vital.

Alpha Fetoprotein:

- It is a glycoprotein[Q] synthesized by the fetal yolk sac[Q] in the early weeks of gestation and by the gastrointestinal tract[Q] and liver[Q] later.
- It is the most abundant protein in the fetal serum.
- It circulates in fetal serum and passes into fetal urine and amniotic fluid.
- Concentration of AFP increases steadily in fetal serum till 13 weeks[Q], (3 mg/ml) after which the level rapidly decreases throughout the rest of pregnancy.
- AFP level in fetal serum declines following birth and by one year of age, its concentration is 1 ng/ml which persists throughout life.
- AFP passes from the fetus to amniotic fluid when fetus passes urine.
- It passes into the maternal serum by diffusion across the placental membranes and via placental circulation and is found in steadily increasing quantities in maternal serum after 12 weeks.

These are the usual ways of entry of serum alfa fetoprotein in maternal serum but serum alfa fetoprotein can find its way in maternal serum in other ways too.

Contd…

Contd…

- Open fetal body wall defects uncoverd by integument permit allows additional AFP to leak into the amniotic fluid and thus maternal serum AFP are increased. This is the reason for increase in serum alpha fetoprotein in neural tube defects and ventral wall defects.
- Maternal screening is done between 15-20 weeks (according to *Williams* 23/e, p 289, *Fernando Arias 3/e, p 58).*
- It is measured in nanograms per ml and reported as a multiple of the median (MOM).
- MSAFP of 2.5 MOM is considered as the upper limit of normal (for twin pregnancy it is 3.5 MOM).

Now after having this basic knowledge lets have a look at the question.

In the question alpha fetoprotein will be increased in the following conditions.

- Gastroschisis – Ventral wall defect
- Omphalocele – Ventral wall defect
- Spina bifida occulta – Neural tube defect

In Down's syndrome - AFP levels are decreased.

Spina bifida occulta:

Spina bifida occulta is usually a small, clinically asymptomatic defect, covered by skin, so there are less chances of mixing of fetal serum and maternal serum. Therefore the maternal serum alphafetoprotein level usually does not increase in spina bifida occulta.

"In the fetus with a defect such as anencephaly or spina bifida, AFP enters the amniotic fluid in increased amounts, leading to higher levels in the maternal serum as well. Levels of AFP are elevated in amniotic fluid and maternal serum only when such lesions are "open," i.e., when the neural tissue is exposed or covered by only a thin membrane. When NTDs are skin-covered, AFP does not escape from the fetal circulation, and such defects are generally not detected by maternal serum AFP (MSAFP) screening". *—USG in Obs. and Gyane by Callen 4/e, p 25*

Omphalocele: *—Fernando Arias 3/e, p 84*

It is a midline defect of the anterior abdominal wall characterized by herniation of the abdominal viscera into the base of the umbilical cord.

The protruding organs are typically covered by a thin aminoperitoneal membrane.

Omphalocele has a strong association with high levels of maternal serum alpha-fetoprotein because the ventral wall defect allows mixing of fetal and maternal circulation.

Gastroschisis: *—Fernando Arias 2/e, p 83*

Gastroschisis is a paraumbilical defect of the anterior abdominal wall, through which abdominal viscera herniates. The defect is usually located on the right side of the cord insertion and compromises the full thickness of the abdominal wall.

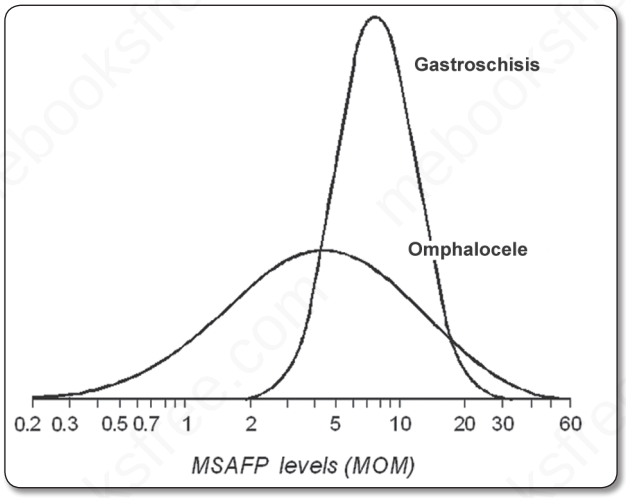
There is no sac or membrane covering the herniated organs.

This defect is associated with high alpha feto protein titre.

Both gastroschisis and omphalocele are ventral wall defects containing abdominal organs and both are associated with high alphafetoprotein level in maternal serum.

But it is likely that alphafetoprotein level will be higher in patients with gastroschisis as there is no sac or membrane which covers the herniated organs in this defect. So there is more possibility of fetoprotein leak into the maternal serum or amniotic fluid in Gastroschisis. The answer is further supported by the following graph from

USG in Obs. and Gynae by Callen 4/e, p 28



Also Know:

Neural tube defects and abdominal wall defects can be differentiated by:

i. USG
ii. Amniotic fluid acetyl cholinesterase levels which are raised in open NTD but low in abdominal wall NTD
iii. Pseudocholinesterase levels which are low in NTD but high in abdominal wall defects.

Gastroschisis and omphalocele can be differentiated by USG.

5. Ans. is c i.e. Talipes equinovarus *Ref. Williams Obs. 24/e, p 287; Fernando Arias 3/e, p 54*

Some condition associated with abnormal maternal serum alpha fetoprotein concentration.

Elevated Levels	Low Levels
• Error in dates • Multifetal pregnancy • Severe oligohydramnios • Neural tube defects • Pilonidal cysts • Esophageal or intestinal obstruction (and atresia) • Liver necrosis • Cystic hygroma • Sacrococcygeal teratoma • Fetal death • Abdominal wall defects: – omphalocele – gastroschisis • Urinary obstruction • Renal anomalies: – polycystic kidney – absent kidneys • Congenital nephrosis • Osteogenesis imperfecta • Congenital skin defects • Cloacal exstrophy • Chorioangioma of placenta • Low birth weight • Placental abruption • Placenta accreta • Preeclampsia • Improper adjustment for low maternal weight • Maternal hepatoma or teratoma	• **G: G**estational trophoblastic diseases • **O²: O**verestimated gestational age, overweight mother • **A:** Spontaneous **a**bortion • **T: T**risomy (21 or 18)

6. Ans. is c i.e. Over estimated gestational age

7. Ans. is a, c and d i.e. Hepatoma, Endodermal sinus tumor, Cirrhosis

8. Ans. is b i.e. Trisomy *Ref. Williams Obs. 23/e, p 291, Shaw 14/e, p 380*

As we have discussed earlier – AFP levels are raised in :

- **Under estimated gestational age**
- **Decreased liqour**
- **Decreased birth weight of infant and decreased maternal weight**
- **IUD**
- **Multifetal pregnancy** (The amount of AFP entering the maternal circulation is proportional to the number of fetuses).
- **Defects which permit more release of AFP into maternal serum**
  - Neural tube defects
  - Abdominal wall defects : – omphalocele
    – gastroschisis
  - Pilonidal cysts
  - Congenital skin defects
- **Maternal causes:**
  - Preeclampsia
  - Maternal hepatoma, teratoma, endodermal sinus tumor —Shaw 14/e, p 380

- **Placental causes:**
  - Chorioangioma of placenta
  - Placenta accreta
  - Abruptio placentae
- **For other casues of increased AFP which are difficult to remember:**

Mnemonic - CLEAN OS
C – Cystic hygroma
L – Liver necrosis
E – Exstrophy of cloaca
A – Atresia of oesophagus/intestine
N – Congenital nephrosis and other disorders of kidney like: polycystic kidney, absent kidney
O – Osteogensis imperfecta
S – Sacrococcygeal teratoma

9. Ans. is a i.e. Fetal serum

Ref. COGDT 10/e, p 185; Manual of Laboratory and Diagnostic Tests by Fransis Fishback 7/e, p 995

- Alpha fetoprotein is the most abundant protein in the fetal serum throughout fetal development.
- It is transferred from fetus to amniotic fluid when fetus passes urine.
- The concentration of AFP in amniotic fluid is approximately 100 folds less than in fetal serum, peaks at 13-14 weeks and then decreases in the second trimester (by 10% per week).
- AFP reaches the maternal serum by diffusion across the amniotic membranes and via the placenta.
- The level of AFP in maternal serum is less than fetal serum as is suggested by:

"***Fetal serum contains AFP in a concentration 150 times that of maternal serum".*** *—COGDT 10/e, p 185*

"Ordinarily high level of fetoprotein are found in developing fetus and low levels exist in maternal serum and amniotic fluid". *—Mannual of Laboratory and Diagnostic Test Fishback 7/e, p 995*

10. Ans. is b, c, and e i.e. Diabetic patients have ↑ AFP level; MsAFP is unrelated to period of gestation; and Increased in down syndrome

Ref. Wiliiams 23/e, p 289-291, ; Dutta Obs. 7/e, p 106; Fernando Arias 3/e, p 454 for option 'b', p 40 for option c

Alpha fetoprotein:

- It is glycoprotein produced by fetal yolk sac and later by liver.
- Highest level of AFP in fetal serum and amniotic fluid is reached around 13 weeks and (3 mg/ml) thereafter it decreases.
- It is detected in maternal serum at 15-20 weeks of gestation (i.e. option a is correct).
- "The maternal serum concentration of AFP increases during pregnancy and reaches a peak between 28 and 32 weeks" *—Fernando Arias 3/e, p 40*

  This means option c is incorrect.
- Level of alpha fetoprotein are decreased in Downs syndrome (i.e. option e is incorrect).
- Normally MSAFP is lower in diabetic women but, if diabetic female carries a fetus with open NTD's alphafetoprotein is increased (i.e. option b is incorrect). *—Fernando Arias 3/e, p 454*

11. Ans. is a i.e. Major source in fetal life is yolk sac *Ref. Wiliams 23/e, p 288; Dutta Obs. 7/e, p* 106

As discussed earlier:

"AFP is synthesized early in gestation by the fetal yolk sac and later by the fetal GITand liver."

—Williams 23/e, p 288

- No where it is given that major source is yolk sac, so this statement ***(option "a")*** is partially correct.
- AFP levles are not increased in wilms tumour (i.e. ***option "b"*** is incorrect).
- Maximum level of AFP in:
  - Fetal serum is at - 13 weeks
  - Amniotic fluid is at 13 weeks
  - Maternal serum is at 28-32 weeks.

—Dutta Obs. 6/e, p 107; Fernando Arias 3/e, p 40

*So, **option 'c'** is incorrect.*

- Half life of AFP is 3.5 days (internet) so, ***option 'd'*** is wrong.

Amongst all the options given - ***Option 'a'*** is the best bet.

12. Ans. is b i.e. Trisomy 21 *Ref. Williams Obs. 23/e, p 291; Fernando Arias 2/e, p 38*

Low levels of MSAFP (< 0.25 MOM) are seen in:

- Chromosomal trisomy
- Gestational trophoblastic diseases
- Blighted ovum
- Increased maternal weight
- Overestimated gestational age.

Note : The list given in the *Williams Obs. 23/e, p 291 — Includes fetal death both in causes of increased and decreased AFP. But Fernando Arias 2/e, p 38 specifically includes — IUD in the causes of increased AFP and Blighted ovum/Abortion in the causes of decreased AFP.*

13. Ans. is d i.e. Ectopic pregnancy *Ref. Williams Obs. 23/e, p 63, 64*

14. Ans. is d and e i.e. Rh-incompatibility; and Down syndrome *Ref. Williams Obs. 23/e, p 64; Dutta Obs. 7/e, p 59*

hCG levels:

Caught you, I know some of you must have instantly answered ***"Down's syndrome"***. But my dear friends read the question very carefully. It says decreased hCG levels and not decreased AFP levels.

hCG levels:

Increased	Decreased
M **M**ultiple fetuses[Q]	a. Ectopic pregnancy[Q]
R **R**h-incompatibility[Q]	b. Impending spontaneous abortion[Q]
D **D**own syndrome[Q]	c. Other trisomies viz. 18, 13
C **C**horiocarcinoma[Q]	
H **H**ydatidiform mole[Q]	***Mnemonic:*** **MR. DCH**

15. Ans. is a, b and **c i.e. H. mole, Choriocarcinoma and Ectopic pregnancy**

Ref. Shaw 14/e, p 231, 235, 380; Dutta Obs. 7/e, p 59

β-hCG levels are helpful in monitoring:

a. H. mole:

" A method of detecting the persistent mole and development of choriocarcinoma is by estimating hCG is the serum urine". *—Shaw 14/e, p 231*

b. Chorio carcinoma:

β-hCG is a specific marker for choriocarcinoma.

The levels of β–hCG are monitored following chemotherapy and complete regression of tumor is indicated when three consecutive weekly radioimmunoassays of hCG in serum are negative. *—Shaw 14/e, p 235*

c. Ectopic pregrancy:

In case of unruptured ectopic pregnancy which is managed medically with methotrexate or by conservative surgery-monitoring is done by estimating β-hCG levels.

"Following conservative surgery or medical treatment ,estimation of β-hCG should be done weekly till the value becomes < 5.0 mIU/ml" *—Dutta Obs 6/e, p 191*

d. Endodermal sinus tumor-

'These tumors are yolk sac tumors and their markers are Alpha fetoprotein and antityrypsinso their levels and not beta-hCG. So hCG levels are not used for monitoring. *—Shaw 14/e, p 380*

16. Ans. is a i.e. Open spina bifida *Ref. Dutta Obs. 7/e, p 106; Fernando Arias 2/e, p 36*

Amniotic fluid Acetylcholineesterase level is elevated in open neural tube defect:

- It has a better diagnostic value than AFP.
- In case of suspected neural tube defect, on Amniocentesis, if amniotic fluid AFP levels are raised but Acetyl-cholinesterase levels are normal, patient should be reassured that elevated AFP levels are probably caused by fetal blood contamination but, if acetyl cholinesterase is also elevated along with AFP it is indicative of NTD.
- It also helps to distinguish between neural tube defect and abdominal wall defects (both of which cause elevated MSAFP):
  - Acetyl cholinesterase is raised in open NTD, but is low in abdominal wall defects.
  - In patients with NTD, the ratio of acetylcholinesterase to butyrlcholinesterase levels is 0.14 or more. In case of abdominal wall defects this ratio is less than 0.14.

17. Ans. is d i.e. Pseudocholinesterase *Ref. Fernando Arias 2/e, p 35, 36; Sheila Balakrishnan, p 603*

In patients with elevated amniotic fluid AFP to differentiate between NTD and abdominal wall defect, **acetylcholinesterase and pseudocholinesterase are measured:**

Marker	Nerual tube defect	Abdominal wall defect
• Acetyl cholinesterase	• High	• Low
• Pseudo cholinesterase (Butyl cholinesterase)	• Low	• High
• Ratio of ACh/pseudocholinesterase	• > 0.14	< 0.14

Also Know: Amniotic fluid levels of 17 hydroxyprogesterone are raised in congenital adrenal hyperplasia.

18. Ans. is d i.e. Between 11–13 weeks

Ref. Harrison 17/e, p 409; Williams Obs. 22/e, p 329, 23/e, p 300, Dutta Obs. 7/e, p 107

"CVS is the second most common procedure for genetic prenatal diagnosis. Because this procedure is routinely performed at about 10 to 12 weeks of gestation, it allows for an earlier detection of abnormalities and a safer pregnancy termination, if desired." *—Harrison 17/e, p 409*

"Biopsy of chorionic villi is generally performed at 10 to 13 weeks." *—Williams 24/e, p 300*

"CVS is usually performed between 11 and 14 weeks."

—Fernando Arias 4/e, p 8

Chorionic Villi Sampling

Study material: Chorionic villi from which trophoblastic cells are used for study.
Times: Between 10–13 weeks.
Indications:
- To detect cytogenetic, biochemical and fetal disorders
- To detect chromosomal anomalies
- Appropriate for first trimester diagnosis of Down syndrome

Note: It is not suitable for detection of neural tube defects.
Routes:
- Transabdominal (done using spinal needle)
- Transcervical (done using specially designed catheter)

Advantages over amniocentesis:
- The main advantage of CVS is that, results are available earlier in pregnancy, which allows earlier and safer methods of pregnancy termination when results are abnormal.

Risks:
- Chances of fetal loss/abortion 1–2% (more than amniocentesis).
- If performed earlier than 9 weeks (typically around 7 weeks), increased chances of oromandibular limb hypogenesis and limb reduction defects.
- It can cause rupture of membranes, leakage of amniotic fluid and infection.
- Rh isoimmunization can occur in Rh-negative females.

Relative CI:
- Vaginal bleeding or spottin
- Active genital tract infection
- Extreme ante or retroflexion of uterus.

19. Ans. is b i.e. 11–13 weeks

Ref. Operative Obs. and Gynae by Randhir Puri and Narendra Malhotra 1/e, p 103, Dutta Obs. 7/e, p 107

The best time to perform CVS is 10-13 weeks.

Now the question is specifically asking about the time at which Transabdominal CVS is performed.

"Trans abdominal and transvaginal chorionic viili sampling- Both routes are comparable when performed between 10 and 12 weeks. If period of gestations is above 12 weeks then only transabdominal – CVS is performed."

—Operative Obs. and Gynae by Randhir Puri and Narendera Malhotra 1/e, p 103

As far as Williams and high risk pregnancy are concerned they donot mention specifically the timing of transabdominal CVS.

Also know:

- The criteria to decide between Transcervical or Transabdominal CVS is **placental localization.**

Fundal placentas and anterior, posterior or lateral placentas located in the upper two third of uterus are better approached by transabdominal CVS.

Anterior, posterior or lateral placentas located in the lower third of uterus can be sampled easily by transcervical CVS.

Note: Approximately 70-80% of all CVS are performed transabdominally.

Transcervical CVS *—Fernando Arias 3/e, p 48, 49*

Advantages: Genetic diagnosis is achieved at an early gestation age

- Comfortable for patient as there is no pain or discomfort
- Technically simple.

Disadvantages: Slightly higher risk of fetal loss (≈ 5%)

- The chromosome composition and enzyme composition of chorionic villi cells may occasionally be different from that of fetal cells
- It is associated with potential risk of ascending infection
- Threatened abortion and vaginal bleeding are frequent.

Transabdominal CVS – Optimum time to perform – 10-12 weeks.

Advantage

1. There is minimal risk of infection
2. It does not cause vaginal bleeding
3. There are no contra indications.

Disadvantages

1. Amount of tissue obtained is less than that with transcervical
2. Patient discomfort is more
3. Difficult to perform, if placenta is posterior and technically more difficult than transcervical

- Remember – If CVS is to be done after 12 weeks, then only transabdominal route should be chosen and never transcervical.

20. Ans. is c i.e. Oromandibular limb defects *Ref. Williams Obs. 21/e, p 990; 22/e, p 330, 23/e, p 300*

"Chorionic villous sampling is usually performed at 10-13 weeks and is associated with several complications but studies suggests that limb reduction and oromandibular limb hypogenesis is more common, if CVS is done before 9 weeks. So, CVS is done after 9 weeks because it is more safe." *—Williams Obs. 21/e, p 990*

"The frequency of oromandibular limb hypogenesis, however was increased after CVS, when the procedure was performed before 9 weeks." *—Williams Obs. 22/e, p 330*

"It was shown that limb reduction defects were associated with CVS performed earlier in gestation—typically around 7 weeks." *—Williams 23/e, p 300*

21. Ans. is a i.e. Tay sachs disease *Ref. Shiela Balakrishnan, p 607*

22. Ans. is c i.e. Neural tube defect *Ref. Operative Obs and Gynae by Randhir Puri, Narendra Malhotra 1/e, p 261, 262; Obs. and Gynae Beckmann 5/e, p 45*

In chorionic villous biopsy, trophoblastic tissue is obtained from the chorionic villi, followed by biochemical or molecular (DNA) analysis of this tissue to diagnose various conditions.

Indications of CVS

1. **DNA analysis for diagnosis of genetic disorder without prior cultrue.**
   a. Single gene disorder like:
      i. Thalassemia major
      ii. Hemophilia
      iii. Duchene muscular dystrophy.
   b. Inherited disorder of metabolism
   c. Determination of paternity

Diagnostic chorionic villous biopsy

Conditions which require molecular or DNA analysis	Conditions which require biochemical analysis
• Hemoglobinopathies (sickle cell disease)	• Tay Sach's disease
• Cystic fibrosis	• Neimen Pick disease

Contd…

Contd…

• Duchenne's or Berkers muscular dystrophy	• Gaucher's disease
• Hemophilia A and B	• Urea cycle defects
• Down syndrome	• Amino acid disorder
• Congenital adrenal hyperplasia	• Congenital adrenal hyperplasia • Phenylketonuria

2. Early Karyotype is required

a. Increased maternal age
b. Previous aneuploidy
c. Parental balanced translocation
d. Fragile X-syndrome

Note: Congenital adrenal hyperplasia can be diagnosed both by biochemical testing and DNA analysis.

New coming to Q 21: *For diagnosis of Tay Sach's disease biochemical analysis of chorionic villous sample is done (not DNA analysis).*

Coming to Q 222: ***"The indications of CVS and amniocentesis are usually the same, however disorders that specifically require analysis of amniotic fluid liquor such as neural tube defects are not amenable to prenatal diagnosis by CVS."*** *—Obs. and Gynae Beckman 5/e, p 45*

Also know: Applications of the Invasive diagnostic procedures:

	CVS (Chronic Blood Sampling)	Amniocentesis	FBS (Fetal Blood Sample)
Chromosomal disorders	Can be detected by all three test Most rapid results are obtained by fetal blood sampling		
Single gene defect	Can be detected by all three test		
Infections (CMV and toxoplasmosis)	Can be detected by all three test		
Rh-isoimmunisation	Does not detect	Detects by: Bilirubin assessment in Rh-disease	Detects by: Rh and platelet isoimmuni
Neural tube defects	—	Detects by measuring AFP Acetyl -choline esterase	—

23. Ans. is a, b and d i.e. Strongly associated with fasciomandibular defects; Done in 10-12 weeks; and Done to diagnose genetic disorders *Ref. Dutta Obs. 7/e, p 107*

Remember after CVS:

- Anti-D immunoglobulin 50 m gm IM should be administered to a Rh-negtive woman.

24. Ans. is d i.e. Abortion *Ref. Williams Obs. 23/e, p 300; Dutta Obs. 7/e, p 107*

It must be quite surprising for some you that why I have not marked ***option "a"*** i.e. Limb abnormality as the answer.

This is because *Williams Obs. 23/e, p 300* says—

"Early reports of an association between CVS and limb reduction defects, oromandibular defects and cavernous hemangiomas have been disproved.

When CVS is performed after 9 weeks, Kuliev and Colleagues (1996) reported the incidence of limb-reduction defects to be 6 per 10,000 - the same as the background incidence.

The frequency of oromandibular limb hypogenesis however was increased after CVS when the procedure was performed before 9 weeks."

Therefore, It can be concluded—*complication caused by CVS, if performed before 9 weeks—oromandibular and limb defects otherwise M/C complication of is CVS—increased chances of fetal loss.*

Therefore, It can be concluded—*complication causes by CVS, if performed before 9 weeks—oromandibular and limb defects otherwise M/C complication of is CVS—increased chances of fetal loss.*

25. Ans. is b i.e. Always done as a blind procedure *Ref. Dutta Obs. 7/e, p 647, 648*

26. Ans is b i.e. 16-20 weeks

27. Ans is a i.e. Diabetes mellitus

Ref. Dutta Obs. 7/e, p 647; Fernando Arias 3/e, p 46, 47; COGDT 10/e, p 107, Williams Obs. 23/e, p 299, 300

Amniocentesis at a Glance:

Amniocentesis is the deliberate puncture of amniotic fluid sac per abdomen used to diagnose fetal aneuploidy and other genetic conditions:

- Amniocentesis can be done anytime between 15-20 weeks.
- Because amniocytes need to be cultured before fetal karyotype can be assessed therefore time needed for karyotyping is 7-10 days.
- **It should be offered to the following class of patients:**
  - Singleton pregnancy and maternal age 35 years or above.
  - Twin pregnancy at age over 31 years of pregnancy.
  - Previous chromosomally abnormal child.
    - Three or more spontaneous abortions.
    - Patient or husband with chromosome anomaly.
    - Family history of chromosome anomaly.
    - Possible female carrier of X-linked disease.
    - Metabolic disease risk (because of previous experience or family history).
    - NTD risk (because of previous experience or family history).
    - Positive second-trimester maternal serum screen. or majer fetal structural defect identified by USG

Indications:

Diagnostic :

- ***Early months (14-16 weeks):***
  Antenatal diagnosis of chromosomal and genetic disorder:
  i. Sex-linked disorders
  ii. Karyotyping
  iii. Inborn errors of metabolism
  iv. Neural tube defects.
- **Later months:**
  - Fetal lung maturity by measuring ratio of Lecithin and sphingomyelin.
  - Degree of fetal hemolysis in Rh-sensitised mother – Spectrophotometric analysis of amniotic fluid and deviation bulge of the optical density at 450 nm is obtained.
  - Meconium staining of liquor is an evidence of fetal distress.
  - Amniography or fetography following instillation of radio-opaque dye in the amniotic fluid cavity.

Therapeutic:

- **First half:**
  - Induction of abortion by instillation of chemicals such as hypertonic saline, urea or prostaglandins.
  - Repeated decompression of the uterus in acute hydramnios.
- **Second half:**
  - Decompression of uterus in unresponsive cases of chronic hydramnios producing distress or to stabilise the lie prior to induction.
  - To give intrauterine fetal transfusion in severe hemolysis following Rh-isoimmunisation.
  - Amnioinfusion in oligohydramnios.

Procedure:

Amniocentesis is performed under sonographic guidance using a 20-22 gauze spinal needle about 4" in length (About 30 ml of fluid is collected in a test tube for diagnostic purposes).

Precautions:

- Prior sonographic localization of placenta is desirable to prevent bloody tap and fetomaternal bleeding. Earlier methylene blue dye was used for the purpose but now it is contraindicated as it has been associated with jejunal atresia and neonatal methhemoglobinemia.
- Prophylactic administration of 100 μg of anti-D immunoglobulin in Rh-negative nonimmunised mother.

Complications of Amniocentesis:

Maternal complications :

- Chorioamnionitis
- Hemorrhage (placental or uterine injury)

Contd…

Contd…

- Premature rupture of the membranes and premature labour
- Maternal isoimmunisation in Rh-negative cases.

Fetal complications:

- Abortion (0.3–0.5%), The loss rate is doubled in twin pregnancy and obese women with BMI ≥ 40 kg/m^2
- Trauma
- Feto-maternal hemorrhage
- Oligohydramnios due to leakage of amniotic fluid which may lead to:
  - Fetal lung hypoplasia
  - Respiratory distress
  - Talipes.

Early Amniocentesis at between 11 to 14 weeks.

Traditionally, genetic amniocentesis is performed at 16 weeks of gestation, and the results of the test become available in the eighteenth week.

- By this time, fetal movements may have already been noticed, making the option of termination of pregnancy, in the case of an abnormal result, distressing for most patents.
- **Early amniocentesis** is done at 11 to 14 weeks but can be performed as early as 10 weeks.
- The amount of fluid withdrawn is ≈ 1 ml/week.
- Early amniocentesis is associated with increased risk of postprocedural pregnancy loss, increased risk of positional foot deformities (talipes equinovarus or club test) and membrane rupture. Another problem seen with early amniocentesis is cell culture failure rate thus necessitating a second procedure. For these reasons ACOG recommends against the use of early amniocentesis.

28. Ans. is b i.e. 1000 IU/ml *Ref. Dutta Obs. 7/e, p 642*

β-hCG level (miu/ml)	Structure visible	TVS/TAS
• 1000-1200	Gestational sac	TVS
• 6000	Gestational Sac	TAS
• 7000	Yolk sac	TAS
• 11000	Embryo	TAS

29. Ans. is a i.e. 6.0-6.5 weeks *Ref. USG in Obs. and Gynae. Callen 4/e, p 119, 120*

"Embryonic investigations suggest that cardiac contractions begin in fetus at 36 days gestational age."[Q]

"For practical purposes, many sonologists consider the identification of cardiac activity in an embryo with a CRL of less than 5 mm as 6 weeks GA. Cardiac activity should be detected routinely when the embryo attains a length of 4 to 5 mm. This corresponds to a GA of 6.0 to 6.5 weeks, at which time the MSD is 13 to 18 mm. Using a transabdominal approach, cardiac activity should be evident by 8 weeks GA, when the MSD is 25 mm."

—Callen 4/e, p 120

Transvaginal USG	At 5-6 weeks of gestational age corresponding to 13-18 mm of MSD.
Transabdominal USG	At 8 weeks of gestational age corresponding to 25 mm of MSD.
MSD: *Mean sac diameter.*	

To obtain uniformity gestational sac size is determined by calculating mean sac diameter (MSD).

30. Ans. is a i.e. Yolk sac *Ref. Dutta Obs. 7/e, p 642*

Fetal structure	Detected by TVS	Detected by TAS
• Gestational sac	4 weeks and 3 days	5 weeks and 5 days
• Yolk sac	5 weeks	7 weeks
• Cardiac activity	5.1 – 6.5 weeks	7-8 weeks
• Embryonic movement	7 weeks	

31. Ans. is a i.e. USG for cardiac activity *Ref. Dutta Obs. 7/e, p 147*

- With transabdominal scanning, the gestational sac is reliably seen in the uterus by 6 weeks, and fetal echoes and cardiac activity by 7 weeks. With transvaginal scanning, these are seen about 1 weeks earlier, thus confirming pregnancy.

- The level of hCG are not the best confirmatory test for pregnancy as hCG in plasma and urine are strikingly increased in women with hydatiform mole.
- Bimanual palpation can only detect uterine enlargement but the cause of uterine enlargement can only be detected by ultrasound.
- Confirmation of cardiac activity by Doppler can be done only at 10 weeks and not 6 weeks.

32. Ans. is b i.e. Ectopic gestation *Ref. USG in Obs. and Gynae by Callen 4/e, p 127*

When ultrasound examination reveals a sac without an embryo or yolk sac, the diagnosis is limited to one of three entities:

- A normal early intrauterine pregnancy (IUP).
- An abnormal intrauterine pregnancy (IUP).
- ***A pseudogestational sac in a patient with an ectopic pregnancy.***

Also Know:

Character	True gestational sac	Pseudogestational sac
• Location within the uterus	Eccentric	Central
• Shape	Round and regular in outline	Irregular
• Double ring sign due to chorion	Present	Absent
• Identification of structures: yolk sac, fetal pole	Present	Absent
• Increase in sac size	1 mm/day	Absent

33. Ans. is a i.e. Anencephaly

Ref. Williams Obs. 21/e, p 1120; USG in Obs. and Gynae by Callen 4/e, p 284, Fernando Arias 3/e, p 64, 66, 69

As discussed in chapter on fetal malformation, anencephaly can be diagnosed as early as 8-10 weeks/first trimester in experienced hards.

Microcephaly: *—USG in Obs and Gynae Callen 4/e, p 298, 299*

- It is decreased head size.
- In these patients both brain mass and total cell number are reduced.
- There is disproportion in size between the skull and face.
- It is difficult to recognize this anomaly by ultrasound – A head circumference below 2 SD from the mean is used as a diagnostic criteria in midtrimester scan.

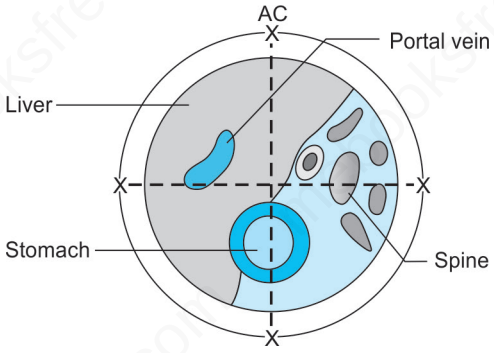
Holoprosencephaly is the presence of a single centrally placed cerebral ventricle and may be associated with midline abnormalities of the face.

With the use of vaginal probe it can be recognised in the beginning of midtrimester.

Also Know: Encephalocele can also be recognised in first trimester and is seen as a bony defect with protrusion of the brain tissue and meninges. Occipital encephaloceles are commonest. A genetic association of encephalocele and polycystic kidney and is called *Meckel-Gruber syndrome*, which is an autosomal recessive disorder.

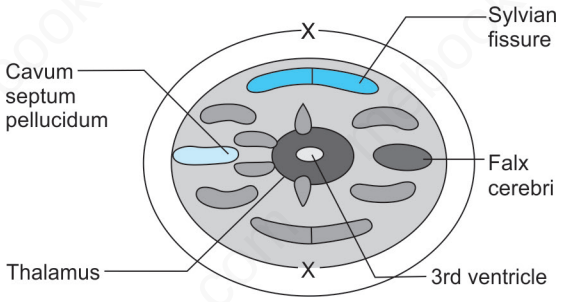
34. Ans. is a i.e Stomach and umblical vein, perpendicular to the spine *Ref. Williams 24/e, p 198*

The abdominal circumference is measured at a transverse plane (i.e plane perpendicular to fetal spine) at the level of stomach and conference of the umblical vein with the portal sinus.



It is an indicator fetal growth, hence is an indicator of IUGR/macrosomia in fetus.

***Note*:** Biparietal diameter:- is measured in transthalamic view at the level of thalamic and cavut septum pellucidum (CSP), from the outer edge of the skull to inner edge of the distal skull.



35. Ans. is a i.e. Biparietal diameter *Ref. Williams Obs. 24/e, p 198; USG in Obs. and Gynae by Callen 4/e, p 208*

"In the second trimester the BPD most accurately reflects the gestational age, with a variation of 7 to 10 day."

—Williams 24/e, p 198

Ultrasonographic 'fetal measurements' commonly used are:

– Crown Rump length – Biparietal diameter
– Head circumference – Abdominal circumference
– Femur length.

- All the parameters given above are: **Primary biometric parameters.**
- Transcerebeller diameter is a **Secondary biometric parameter.**
- Other secondary biometric parameters are: – Binocular distance – Cerebellar distance – Clavicle length – Radius length – Ulnar length – Tibia length – Foot length
- Best parameter for dating of pregnancy - Measurement of CRL in 1st trimester.
- CRL (in mm) + 6.5 = weeks in gestation.
- Most sensitive parameter for assessment of fetal growth is abdominal circumference.
- Best age for assessment of gestation age in second trimester 14-20 weeks.

Prediction of fetal gestational age using ultrasound biometric parameters

—Bedside Obs/Gynae by Richa Saxena, p 191

Period of gestation	Ultrasound parameter to be used
8 weeks to 12 weeks	Crown-rump length measurement
Second trimester	BPD, HC
Third trimester	FL

Note: In brachycephaly or Dolichocephaly – HC is better parameter in 2nd trimester than BPD as HC is unaffected by the shape of fetal head.

36. Ans. is b i.e 2.5 mm *CRL (in mm) + 6.5 = Gestational age in weeks*

Remember:

At 9 weeks, hence CRL would be 9-6.5 = 2.5 mm approximately.

Also know

- CRL (In mm) + 42 = gestational age in days
- MSD (In mm) + 30 = gestational age in days
  MSD = mean sac diameter.

37. Ans. is d i.e. IUGR *Ref. Williams Obs. 23/e, p 344, 345; Sheila Balakrishnan p 618, 620*

Doppler ultrasonography is a noninvasive technique to assess blood flow. It is useful for diagnosis of IUGR.

"The utility of umbilical artery Doppler velocimetry was reviewed by the American College of obstetricians and gynecologists (1999, 2000). It was concluded that no benefit has been demonstrated other than in pregnancies with suspected fetal growth restriction. No benefit has been demonstrated for velocimetry for other conditions, such as post-term pregnancy, diabetes mellitus, systemic lupus erythematosus, or antiphospholipid antibody syndrome. Similarly, velocimetry has not proved of value as a screening test for detecting fetal compromise in the general obstetrical population".

—Williams Obs. 23/e, p 344

38. Ans. is c i.e. Middle cerebral artery *Ref. Williams 23/e, p 362, 363*

Doppler of uterine artery:

- Pre-eclamptic pregnancies demonstrate high impedance in the uteroplacental circulation, represented as a diastolic notch hence Doppler of uterine artery is helpful as a screening test to detect pregnant females who will develop pre-eclampsia.
- If **diastolic notch** persists in uterine artery between 22-24 weeks, it is an predictor of pre-eclampsia.

39. Ans. is d i.e. Absent end diastolic flow *Ref. Williams 23/e, p 645*

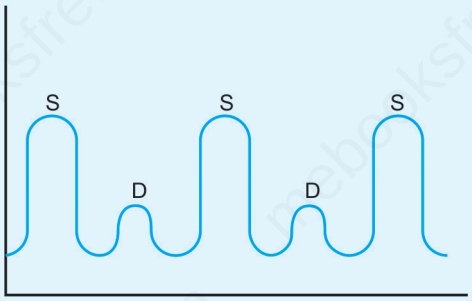
- Doppler ultrasound is used to assess the uterine, placental and fetal arterial and venous system.
- It is especially relevant in IUGR.

Ratios measured by Doppler:

- S/D – Systolic - diastolic ratio or S/D ratio *(most commonly)*
- S-D/S – Resistance index
- S-D/Mean – Pulsatility index

Umbilical artery vessels:

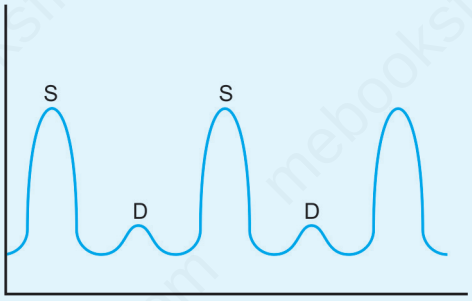
- Blood flow across the umbilical arteries provides a comprehensive overview of the - fetal blood supply and helps in detecting fetal circulatory compromise.
- The systolic component of blood flow reflects the cardiac pump and the diastolic component the distal vascular bed.
- In this case the distal vascular bed is the placental villous tree and hence umbilical artery Doppler is actually a placental and not a fetal Doppler.
- The umbilical artery is characterised by **forward^{Q} low resistance** flow.
- As gestation increases, there is gradual fall in all the resistance indices so the amount of forward diastolic flow increases (*Remember :* Diastolic flow is inversely related to peripheral resistance). systolic/diastolic rates decreases as period of gestation increases.



- **There are three abnormal flow patterns; reduced EDF, absent EDF and finally reversal of flow.**

Reduced EDF: End diastolic flow.

SD ratio decreases: It indicates uteroplacental insufficiency.

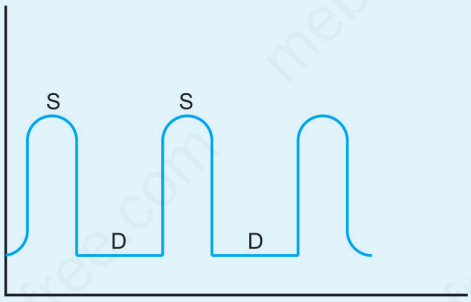


- A normal Doppler is reassuring for at least a week and need only be repeated weekly to detect compromise.
- It the umbilical artery flow is abnormal, then further monitoring is with NST or BPP to decide on the time of delivery.

Contd…

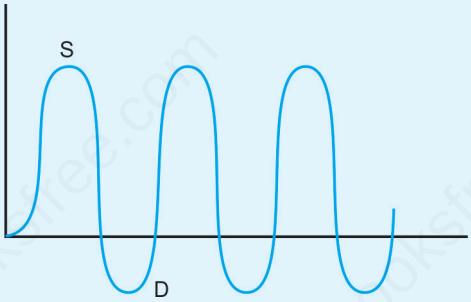
Contd…

Absent end diastolic flow (AEDF):



- These fetuses have a poorer outcome than those with only reduction in EDF, with the majority being delivered by cesarean section.
- The aim should be to deliver before reversal of flow.
- Once reversal occurs the fetus usually dies within 1–2 days.
- It is indication of termination of pregnancy, if pregnancy > 34 weeks by cesarean section.

Reversed end diastolic flow (REDF).



- It is an indication of termination of pregnancy irrespective of gestational age.

Umbilical artery velocimetry provides a useful adjunct in management of high risk pregnancy. They are however not recommended for screening low risk pregnancies.

— Williams Obs. 22/e, p 401

Middle Cerebral Artery (MCA)

- Doppler measurement of middle cerebral artery velocimetry has been studied and employed clinically for detection of fetal anemia.
- With fetal anemia, the peak systolic velocity is increased (≥ 1.5 MOM) due to increased cardiac output and decreased blood viscosity. This has permitted the rhesus group alloimmunization.
- MCA Doppler has also been studied as an adjunct to the evaluation of fetal-growth restriction. It is believed that there is a progression of Doppler findings in severly affected fetuses such that incressed impedance of flow in the umbilical artery may be detected first. This is followed by redistribution of flow to the brain, with decresing resistance that has been termed brain sparing, and eventually by abnormalities in venous flow.

"At this time, MCA Doppler has not been adopted as standard practice in the management of growth restriction, and its utility in the timing of delivery of such fetuses is uncertain."

—Williams Obs 23/e, p 364

Note: The last blood vessel to show changes in IUCR is ductus venosus (terminal event).

40. Ans. is b i.e. Increased fetal diastolic flow in the middle cerebral artery with absent diastolic flow in the aorta

Ref. Williams Obs. 23/e, p 363, 364; Dutta Obs. 7/e, p 645

Doppler Study of Middle Cerebral Vessels:

- Normally the middle cerebral vessels have high resistance flow and are characterised by little diastolic flow.
- In case of IUGR a brain-sparing effect is seen with a reduction in the resistance indices in the middle cerebral vessels (i.e. increased flow) due to the shunting of blood to the brain in IUGR. Whereas in other areas (as aorta in the options) show decreased flow.

- ***"Increased fetal diastolic flow in middle cerebral artery with absent diastolic flow in aorta implies fetal acidemia."*** *—Dutta Obs. 7/e, p 648*

As far as persistence of diastolic notch in uterine artery is concerned, it signifies pregnancies destined to develop preeclampsia.

41. Ans. is a i.e. Severe CPD *Ref. Read below*

The main aim of X-ray pelvimetry is to:

- To confirm the diagnosis of contracted pelvis if it cannot be confirmed clinically
- To rule out CPD.

Severe CPD can be diagnosed clinically and trial of labour is not indicated in this case. It is managed by elective cesarean section therefore, there is no role of X-ray pelvimetry.

For those who feel breech presentation in vaginal delivery should be the answer, read the following lines from

—Callen USG Obs and Gynae 4/e, p 729

"Although pelvimetry is no longer commonly performed, it is beneficial in patient who desire a trial of labour when the fetus is in breech presentation".

42. Ans. is c i.e. Fetal hypoxia

43. Ans is c i.e. Variable deceleration

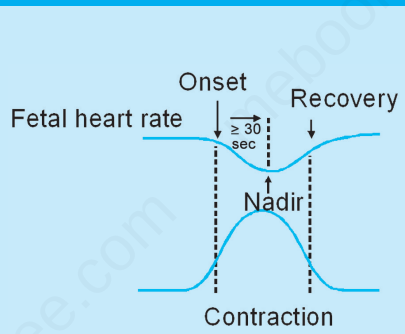
44. Ans is a i.e. Head compression *Ref. Dutta Obs. 7/e, p 612; Williams Obs. 23/e, p 421, 422*

"Deceleration is defined as a decrease in fetal heart rate below the base line by 15 beats per minute or more."

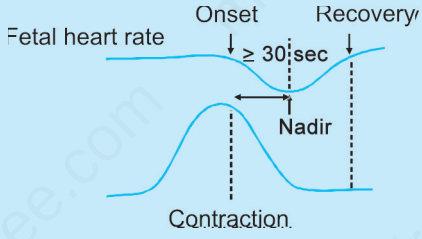
Three basic patterns of deceleration are observed, each of which has a diagnostic significance:

FHR pattern	Feature	Seen in	Diagram
Early deceleration	Deceleration coincidences with a contraction Uniform onset, i.e. gradual takes > 30 sec and recovery Magnitude rarely >40 bpm	Head compression Not associated with fetal hypoxia	A
Late deceleration	Begins at or after the contraction peak and touches baseline only after contraction Uniform onset, i.e. gradual takes > 30 secs and recovery May be of low magnitude 10-20 bpm	Maternal hypotension from epidural analgesia and uterine hyperactivity caused by oxytocin stimulation leading to fetal hypoxia. Maternal disease like hypertension, diabetes and collagen vascular disorder (due to placental insufficiency). Rare cause is severe chronic maternal anemia. *Acute late deceleration are due to placental abruption.*	B
Variable deceleration *Significant variable deceleration*	Variable relationship to contraction Ragged waveform. Abrupt in onset < 30 sec Variable magnitude Deceleration to <70 bpm lasting > 60sec.	Umbilical cord compression They are potentially dangerous to fetus	C

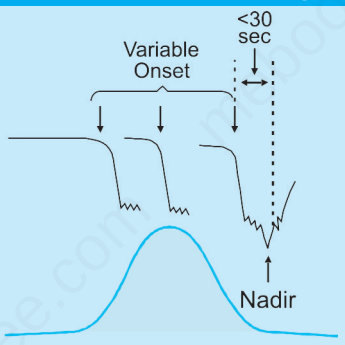
FHR pattern	Feature	Seen in	Diagram



A – Early deceleration



B – Late deceleration



C – Variable deceleration

Also Know:

Baseline fetal heart rate = 120-160 bpm (according to NICE criteria 110-160 bpm)

Bradycardia:

- Rate < 110 bpm
- Due to mild head compression in the second stage of labour
- Congenital heart block
- Indicates serious fetal compromise.

Tachycardia:

- Rate > 160 bpm
- Maternal fever due to *'amnionitis'* is the commonest cause
- Cardiac arrythmias
- Maternal parasympathomimetics (atropine) or sympathomimetics (terbutaline)
- May indicate fetal compromise.

Beat to beat variability:

- A baseline variability of 5-25 bpm is a sign of fetal well-being
- Causes of decreased beat to beat variability:
  - Fetal hypoxia (it is the single most reliable sign of fetal compromise)Q/Fetal acidemiaQ
  - Sleep phaseQ
  - Drugs (Sedatives, Analgesics, $MgSO_4$, Antihypertensives) given to motherQ
  - Maternal acidemia.Q

Sinusoidal heart rate:

- It is a stable baseline FHR with fixed baseline variability without any acceleration
- Seen in cases of severe fetal anemia as in
  - Rh-isoimmunisationQ
  - Ruptured vasa previaQ
  - Twin to twin transfusion.Q

Accelerations:

- Accelerations are increase in FHR by 15 bpm or more lasting for at least 15 sec.
- Accelerations denote an intact neurohormonal and cardiovascular activity and therefore denote a healthy fetus at >32 weeks.

45. Ans. is a i.e. Two fetal heart rate accelerations are noted in 20 minutes

Ref. Dutta Obs. 7/e, p 108, 109; Williams Obs. 23/e, p 338; Fernando Arias 3/e, p 17, 18

Non Stress Test: It is the most commonly used test for antepartum evaluation of the fetal status.

Principle : The test looks for the presence of temporary accelarations of fetal heart rate (FHR) associated with fetal movement. Presence of spontaneous fetal heart rate acceleration associated with fetal movements is an indicator of fetal well being, likewise the absence of fetal reaction suggests the possibility of fetal hypoxia.

Method:

- Place patient in the semi-Fowler's position.
- Apply the tococardiographic equipment to the maternal abdomen, and observe the uterine activity and FHR for 10 minutes. Instruct the patient to push the calibration button of the uterine contraction tracing every time she feels fetal movement.

Interpretation: Reactive/Positive NST – 2 or more accelerations of at least 15 beats per minute, each lasting for at least 15 seconds and occurring within 20 minutes of the beginning of the test.Q

If in 20 minutes test is not reactive, do a 20 minute repeat test to account for fetal sleep cycle before concluding the test nonreactive.Q

Reactive test means that fetus is in no danger for at least 7 days.Q

A non reactive nonstress test should be followed by contraction stress test (CST).Q But these days CST is not done, hence it should be followed by biophysical score (BPS).

Note : Most common condition for nonreactive NST — fetal hypoxia.

Time for performing these test:Q

- Testing should begin by 32 to 34 weeks.
- In pregnancies with severe complications, begin at 26-28 weeks.

Note : In case test is being performed before 32 weeks, accelerations are defined as having 10 bpm or more above baseline for 10 seconds or longer:

- Interval between NST testing
  - Ideally – repeated weekly (a reactive NST means that fetus is not in danger for atleast 7 days)
  - In high risk pregnancies like diabetes mellitus, IUGR and Gestational hypertension! twice weekly
  - In severe preeclampsia remote from term – done daily
- The positive and negative predictive value of a NST is typically less than 50% and more than 90% which means a reactive NST is more reliable in excluding fetal hypoxia than a nonreactive test in predicting fetal compromise.

False normal stress test: Though a normal stress test means that fetus is not in danger for at least 7 days, but NST is inadequate to preclude an acute asphyxial insult.

Causes of death within a week of normal NST:

- Meconium aspiration associated with umbilical cord abnormalities
- IUGR
- Oligohydramnios
- Placental abruption
- Abnormal cord position.

Contraction Stress Test (Oxytocin challenge test)

Principle : Uteroplacental blood flow decreases markedly or ceases during uterine contractions, therefore uterine contraction cause a hypoxic stress which a normal fetus can tolerate without difficulty but a compromised fetus will not be able to tolerate such decrease in oxygen supply and will demonstrate it by deceleration of fetal heart rate following contraction.

Method :

- Place patient in the Semi-Fowler's position.
- Fetal heart rate and uterine contraction are measured simultaneously with an external monitor. If at least 3 spontaneous uterine contractions of more than 14 seconds are not present in 10 minute uterine contractions should be induced with oxytocin.

Interpretation of CST

–Williams Obs. 23/e, p 338

- ***Positive –*** Persistent late deceleration of heart rate following 50% or more of uterine contractions.
- ***Negative –*** No late deceleration or significant variable deceleration.
- ***Hyperstimulation –*** Deceleration of FHR with uterine contractions lasting > 90 seconds or occurring more frequently than every two minutes.

Remember :
- NST is an indicator of fetal health
- CST is an indicator of uteroplacental function.

46. Ans. is d. i.e. Proceed to biophysical profile *Ref. Management of High Risk Pregnancy, Manjupuri, SS Trivedi, p 62*

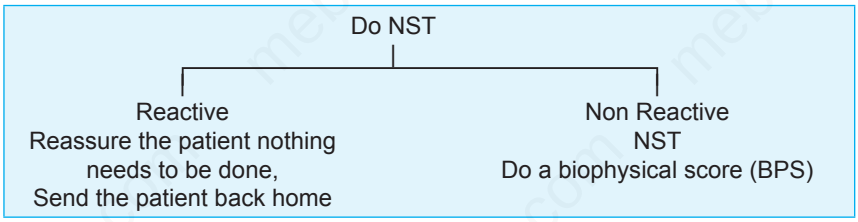
Non Stress Test

Basis of performing the test

With fetal movement	With fetal movement
↓	↓
Fetal heart rate increases (FHR acceleration)	FHR doesnot increase
↓	↓
Indicates healthy fetus	indicates fetal hypoxia
↓	↓
Test is called as Reactive Test	Test is called as Nonreactive
↓	↓
Reactive NST = In a period of 20 minutes, there should be atleast 2 accelerations of ≥ 15 bpm lasting for atleast 15 seconds	To be called as nonreactive, there should be <2 accelerations or no accelerations in a period of 40 minutes (to exclude those cases in which fetus might be sleeping in first 20 minutes)

47. Ans. is b i.e. Do NST

Remember: Whenever a pregnant female complains of decreased fetal movement



- A nonreactive NST earlier was being followed by a CST (contraction stress test) to confirm the diagnosis of hypoxia but CST is associated with risk of initiating labour and hence these days a non reactive NST is being followed by a biophysical score (Manning score).

48. Ans. is b i.e. 72 hours *Ref. Williams Obs. 23/e, p 339*

Intervals between NST testing

"The interval between tests is arbitrarily set at 7 days. According to ACOG, more frequent testing is advocated for women with posterm pregnancy, type I diabetes mellitus, IUGR or gestational hypertension. In these circumstances some investigators recommend twice weekly (i.e. after 72 hours) with additional testing performed for maternal or fetal deterioration regardless of the time elapsed since the last test. Others recommend NST daily. Generally daily NST is recommended with severe preeclampsia remote from term."

This text I have given from *Williams.*

Reading the above text it is evident that, in severe preeclampsia - testing should be done daily.

For the rest of the high risk pregnancies twice weekly testing can be done (i.e. ≈ after 72 hours).

This is my way of looking at things because in clinical practice also we perform NST weekly or twice weekly.

49. Ans. is b i.e. Oxytocin challenge test *Ref. Dutta Obs. 7/e, p 109*

50. Ans is a, b and e i.e. Fetal movements, Respiratory movements, Fetal heart rate accelerations

Ref. Williams 23/e, p 339, 340; Dutta Obs. 7/e, p 109

Manning: proposed a method using 5 fetal **biophysical variables**[Q] to assess the status of fetal well-being antenatally.

These 5 variables together are called as Biophysical Profile (BPP)/Biophysical score

- Fetal **T**one
- Fetal **B**reathing Movements (seen in 30 minutes)
- Fetal gross body **M**ovements (seen in 30 minutes)
- **A**mniotic Fluid Volume
- **N**on stress test

Mnemonic: ***Remember : TBM*** - **(Tuberculosis meningitis) Always Notorious** for these variables.

Fetal Biophysical Profile (BPP)

- **Principle** – Biophysical profile is a screening test for uteroplacental insufficiency.[Q] The fetal biophysical activities are initiated, modulated and regulated by fetal nervous system. The fetal CNS is very much sensitive to diminished oxygenation/ Hypoxia → Metabolic acidosis → CNS depression → Changes in fetal biophysical activity.
- **Indication of BPP scoring** -Nonreactive NST[Q], high risk pregnancy[Q].
- **Test frequency** – Weekly after a normal NST, and twice weekly after an abnormal test.
- The variables are observed for atleast 30 minutes[Q] and assigned a score of 2 each[Q] to normal variables and a score of 0[Q] to abnormal variables.
- Thus the highest score possible for a normal fetus is 10.[Q]
- A score of 8 to 10 is normal, 6 is equivocal and 5 or less is abnormal.

Components and Their scores for the Biophysical profile:

Component	Score 2	Score 0
Nonstress test	> 2 accelerations of > 15 beats/min for > 15 sec in 2-40 min	0 or 1 acceleration in 2-40 minutes
Fetal breathing	> 1 episode of rhythmic breathing lasting > 30 second within 30 minutes	< 30 second of breathing in 30 min
Fetal movement	> 3 discrete body or limb movements within 30 minutes	< 3 discrete movements
Fetal tone	> 1 episode of extension of fetal extremity with return to flexion, or opening or closing of hand within 30 minute	No movements or no extension/ flexion
Amniotic fluid volume	Single vertical pocket > 2 cm	Largest single vertical pocket < 2 cm

Predictive value of All variables is not same :

- Most important variables are NST and Amniotic fluid volume.
- *Intermediatery important:* Fetal breathing movement.
- *Least important:* Fetal tone and fetal body movement.

Remember:

- Vibroacoustic stimulation test (VAST) is a part of modified biophysical profile and not original biophysical profile as proposed by Manning.
- Modified biophysical score combines 2 variables only viz **NST** (specifically VAST a short-term indicator of fetal acid-base status), with **amniotic fluid index** (a long-term indicator of placental function).

In BPS:

- A score of 10/10 or 8/10 with normal Amniotic fluid volume. No fetal compromise
- A score of 6/10 or 8/10 with decreased Amniotic fluid volume is borderline. Mgt should be repeat BPP on same day and delivers ≥ 37 weeks.
- A score of ≤ 4/10 indicates urgent delivery.

51. Ans. is c i.e. Breech *Ref. Dutta Obs. 7/e, p 501*

Contraindications of Contraction Stress Test:

- Compromised fetus.
- Previous history of cesarean section.
- Complications likely to produce preterm labour.
- APH.

52. Ans. is a i.e. Late deceleration *Ref. Williams Obs. 23/e, p 420; COGDT 10/e, p 255, 257*

It is one of those questions where if we keep searching for reference, we get more and more confused whereas the answer lies is front of our eyes and we all know it.

All of you know — contraction stress test

"The contraction stress test (CST) is based on the response of FHR to uterine contractions, with the premise that fetal oxygenation will be worsened. This results in late decelerations in an already suboptimally oxygenated fetus. The test requires 3 contractions in 10 minutes, a positive or abnormal test is when late decelerations occur with more than half of the contractions, suspicious with any late decelerations, and negative with no late decelerations." *—COGDT 10/e, p 255*

So here is our answer, the most significant finding for hypoxia is late deceleration.

Our answer is further supported by *COGDT 10/e, p 257.*

"Late decelerations are smooth falls in the FHR begining after the contractions has started and ending after the contractions has ended. They are associated with fetal hypoxemia and potential for perinatal morbidity and mortality. Variable decelerations are abrupt in decline and return to baseline, vary in timing with the contractions, and usually represents cord compression."

As far as sinusoidal pattern is concerned - *Williams Obs. 23/e, p 420* says ***"Intrapartum sinusoidal fetal heart patterns were not generally associated with fetal compromise".***

53. Ans. is b i.e. Vase previa

Sinusoidal Pattern:

- Stable baseline heart rate of 120 to 160 beats/min with regular oscillations.
- Amplitude of 5 to 15 beats/min (rarely greater).
- Long-term variability frequency of 2 to 5 cycles per minute.
- Fixed or flat short-term variability.
- Oscillation of the sinusoidal waveform above or below a baseline.
- Absence of accelerations.

Causes of Sinusoidal Pattern:

- Serious fetal anemia due to Rh-isoimmunisation/rupture vasa previa / feto maternal hemorrhage / twin to twin transfusion.
- Drugs — Meperidine, morphine, alpha prodine and butorphanol.
- Amnionitis.
- Fetal distress (+/–).
- Umbilical cord occlusion.

54. Ans. is d i.e. Fetal stimulation *Ref. Dutta Obs. 7/e, p 611*

Baseline varibility on CTG is the oscillation of baseline FHR excluding acceleration and deceleration.

A varibility of 5-25 BPM is a sign of fetal well-being.

Decreased varibility is seen in:

- Fetal hypoxia
- Congenital malformation
- Infection
- Sleep apnoea
- Maternal academia
- Drugs given to mother such as sedatives, magnesim sulfphate, antihypertensives

Williams 22/e, p 499: **Drugs given to moter which decrease the baseline varibility are:**

- Narcotics
- Phenothiazines
- General anaesthetics
- Butorphanol
- Barbiturates
- Tranquilizers
- Meperidine
- $MgSO_4$

According to *Wiliams* Increasing gestational age leads to increased baseline varibility, so it can be taken prematurity will have decreased varibility (i.e. ***option 'b'*** can be considered correct).

55. Ans. is a i.e . 1 and 2 only *Ref. Dutta Obs. 7/e, p 110, for 1, 612 for 2 and for 3; Williams 23/e, p 420*

Reactive NST, i.e. acceleration with fetal movements indicates a healthy fetus.

"Absence of deceleration in the NST is reassuring. Absence of accelerations in the NST may be a sign of fetal compromise." *—Fernando Arias 3/e, p 19*

"Sinusoidal pattern is observed with serous fetal anemia, whether from D iso immunization, ruptured vasa previa, fetomaternal haemorrhage or twin to twin transfusion." *—Wiiliams 23/e, p 420*

56. Ans. is c i.e. Fetal Scalp pH > 7.3 *Ref. Dutta Obs. 7/e, p 612, 613, William Obs. 23/e, p 426*

- Normal fetal scalp pH ranges from 7.25 to 7.35.
- Fetal hypoxia is indicated by 'acidosis' or fall in fetal scalp pH to values below normal (Not by increase).
- It is used to corroborate the significance of fetal CTG (Cardiotocography).

Interpretation of Fetal Scalp blood sampling

	pH	Action
Normal	> 7.25	Reassuring
Pre-acidosis	7.20-7.25	Repeat in 30 min
Acidosis	< 7.20	Immediate delivery

Meconium staining: It has always been said meconium indicates fetal distress but it is seen that meconium may also be seen in fetuses which are not acidemic at birth.

"The high incidence of meconium observed in the aminiotic fluid during labor often represents fetal passage of gastrointestinal contents in conjunction with normal physiological process. Although normal such meconium becomes an enviromental hazard when fetal acidemia supervenes.' *—Williams Obs. 23/e, p 432*

Fetal movements : both decreased as well as excessive fetal movements are ominous features.

Fetal heart rate:

"Fetal distress on CTG is characterised by tachycardia or bradycardia, reduced FHR variability, deceleration and absence of acceleration." *—Dutta Obs. 6/e, p 613*

Also Know:

Cut off for oxygen saturation for diagnosing fetal distress is < 30%.

- Oxygen saturation > 30% even in presence of non reassuring FHR tracing indicates normal fetal oxygenation.

57. Ans. is a i.e. Neural tube defect *Ref. Williams Obs. 23/e, p 354, 355*

Signs of Spina bifida on Ultrasound

- Small biparietal diameter.
- Ventriculomegaly.
- Frontal bone scalloping or the so called ***lemon sign***.
- Elongation and downward displacement of the cerebellum-the so called ***banana sign***.
- Effacement or obliteration of the cisterna megna.

58. Ans. is b i.e The accuracy of determining gestational age using ultrasound begins to decrease after first trimester

59. The answer is c i.e. Crown rump length on abdominal or vaginal examination

Coming to Q 58: The question is asking about first trimester USG.

Option a. A gestational sac can be first seen 2 weeks after LMP – incorrect as it is seen at 4 weeks, 5 days after LMP

Option b. The accuracy of determining gestational age using ultrasound begins to decrease after first trimester—correct as the best time to determine gestational age is first trimester and therefore accuracy decreases.

Option c. Yolk sac is the first sign of pregnancy on USG—Incorrect as the first sign of pregnancy on USG is gestational sac, first sign of intrauterine pregnancy is yolk sac.

Option d. USG can be used to determine the sex of the baby yes USG can determine sex of the baby but not in first trimester Sex of the baby can be determined positively on USG at 14 weeks.

60. Ans. is a i.e. Glucose challenge test *Ref. Read below*

Points worthnoting here are:

Patient is presenting to antenatal clinic at 24 weeks for routine check up and a coincidental finding on USG is fetus at 24 weeks of gestation in frank breech position, with no other abnormalities.

- Now friends at 24 weeks, breech should not worry you as most of the times it spontaneously rotates and be comes cephalic at term.Thus options c i.e ECV and d i.e immediate LSCS and e i.e immediate induction and vaginal delivery are ruled out.
- Culture for Neisseria gonorhhea and Chlamydia trachomatis—It is normally done at initial visit and in certain high risk groups at 32-36 weeks along with group B streptococcal screening, so it is also ruled out.
- 24 weeks gestational age is the correct time for screening for gestational diabetes therefore we will do glucose challenge test with 50 gm of glucose.

Friends, mentioning about breech presentation was just given to confuse you, actually examiner wants to know whether you know the correct time for different screening tests or not.

61. Ans. is b i.e. USG *Ref. Fernando Arias 2/e, p 35, 36; 3/e, p 54, Dutta Obs. 7/e, p 106*

MSAFP is a screening test. If it is raised, it should be followed by a diagnostic test, i.e. either USG or amniocentesis as discussed earlier, these days for diagnosis of NTD, USG has replaced amniocentesis, hence answer is USG.

62. Ans. is b i.e. Fetal heart rate ≥ 180 bpm

63. Ans. is d i.e. Beat to beat variability < 5 for 90 minutes

Definition of individual features of fetal heart trace a described by NICE[7]

Table 32.1: Definition of normal, suspicious and pathological FHR traces[4] (NICE guideline 2007)

Definition	Traces
Normal	An FHR trace in which all four features are classified as reassuring.
Suspicious	An FHR trace with one feature classified as non-reassuring and the remaining features classified as reassuring.
Pathological	An FHR trace with two more features classified as non-reassuring or one or more classified as abnormal.

Table 32.2: Category definition (old NICE guideline 2007)[4]

Features	Baseline (bpm)	Variability (bpm)	Deceleration	Acceleration
Reassuring	110-160	≥ 5	None	Present
Non-reassuring	100-109 161-180	< 5 for 40-90 minutes	Typical variable Decelerations with over 50% of contractions, occurring for over 90 minutes Single prolonged deceleration for up to 3 minutes	The absence of accelerations with otherwise normal trace is of uncertain significance
Abnormal	< 100 > 180 Sinusoidal pattern ≥ 10 minutes	<5 for 90 minutes	Either atypical variable decelerations with over 50% of contractions or late decelerations, both for over 30 minutes Single prolonged deceleration for more than 3 minutes	

Table 32.3: Category definition (NICE guideline 2015)

Desciption	Feature baseline (bpm)	Baseline variability (bpm)	Deceleration
Reassuring/Normal	100-160	5 or more	None or early
Non-reassuring	161-180	Less than 5 for 30-90 minutes	Variable decelerations: • Dropping from baseline by 60 bpm or less and taking 60 seconds or less to recover • Present for over 90 minutes • Occurring with over 50% of contractions OR Variable decelerations: • Dropping from baseline by more than 60 bpm or taking over 60 seconds to recover • Present for up to 30 minutes • Occurring with over 50% of contractions OR Late deceleration: • Present for up to 30 minutes • Occurring with over 50% of contractions
Abnormal	Above 180 or below 100	Less than 5 for over 90 minutes	Non- reassuring variable decelerations • Still observed 30 minutes after starting conservative measures • Occurring with over 50% of contractions OR Late decelerations: • Present for over 30 minutes • Do not improve with conservative measures • Occurring with over 50% of contractions OR Bradycardia or a single ·prolonged Deceleration lasting 3 minutes or more

64. Ans. is c i.e. Every 30 minutes

Auscultation of fetal heart sounds is a very good way of intrapartum fetal monitoring fetal heart sounds should be auscultation.

	1st stage	2nd stage
Low risk	every 30 mins	every 15 mins
High risk	every 15 mins	every 5 mins

33

Down Syndrome

INTRODUCTION

- Down syndrome is Trisomy 21.
- Trisomy 21 due to nondisjunction of chromosomes is the etiology of 95% of Down syndrome cases, whereas 3 or 4% is due to a robertsonian translocation.
- The nondisjunction that results in trisomy 21 occurs during meiosis 1 in almost 75% of cases. The remaining events occur during meiosis II.
- Down syndrome is the most common nonlethal trisomy. Its Prevalence is approximately 1 per 1000 pregnancies. At maternal age ≥35 years, incidence is in 350 pregnancies.
- Approximately 30 percent of fetuses with Down syndrome are lost between 12 and 40 weeks, and 20 percent between 16 and 40 weeks.
- Adult women with Down syndrome are fertile, and a third of their offspring will have Down syndrome. Males with Down syndrome are almost always sterile because of markedly decreased spermatogenesis.

CLINICAL FINDINGS

- It is estimated that 25 to 30% of second-trimester fetuses with Down syndrome will have a major malformation that can be identified sonographically.
- Approximately 40% of liveborn infants with Down syndrome are found to have cardiac defects, particularly endocardial cushion defects and ventricular septal defects. Gastrointestinal abnormalities develop in 7% and include duodenal atresia, esophageal atresia, and Hirschsprung disease.
- Typical findings in Down syndrome include brachycephaly; epicanthal folds and upslanting palpebral fissures: Brushfield spots, which are grayish spots on the periphery of the iris; a flat nasal bridge; and hypotonia. Infants often have loose skin at the nape of the neck, short fingers, a single palmar crease, hypoplasia of the middle phalanx of the fifth finger, and a prominent space or "sandal-toe gap" between the first and second toes. Some of these findings are sonographic markers for Down syndrome.
- Health problems more common in children with Down syndrome include hearing loss in 75%, refractive errors in 50%, cataracts in 15%, thyroid disease in 15%, and an increased incidence of leukemia. Degree of mental impairment is usually mild to moderate, with an average intelligence quotient (IQ) score of 35 to 70.
- Recent data suggest that approximately 95% of live born infants with Down syndrome survive the first year. The 10-year survival rate is at least 90% overall and is 99%, if major malformations are absent.

SCREENING TESTS FOR DOWN SYNDROME

Important considerations:

- First-trimester screening at 11 to 14 weeks' gestation, using the fetal nuchal translucency measurement together with serum analytes, has achieved Down syndrome detection rates comparable to those for second-trimester screening in women younger than 35 years (American College of Obstetricians and Gynecologists, 2013c).
- Combinations of first-trimester and second-trimester screening yield Down syndrome detection rates as high as 90 to 95%.

- Maternal serum cell-free fetal DNA testing for trisomy 21, 18 and 13 has become available as a screening test for high-risk pregnancies, with a 98 percent detection rate and a false-positive rate of 0.5 percent (American college).

First Trimester Screening

The most commonly used protocol involves measurement of sonographic nuchal translucency and two maternal serum analytes viz hCG, (either free or intact) and pregnancy associated plasma protein A (PAPP-A).

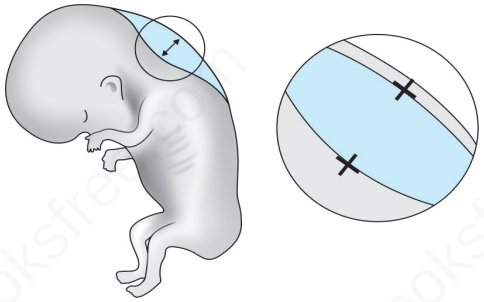
Nuchal Translucency

- Nuchal Translucency (NT) is a sonographic marker of Down syndrome/aneuploidy in 1st trimester.
- It is the maximum thickness of the subcutaneous translucent area between the skin and soft tissue that overlies the fetal spine in sagittal plane.
- It is measured between 11–13 weeks
- Nuchal translucency upto 3 mm = Normal
- If NT > 3 mm → Marker for Down syndrome
- Best Approach for measuring NT – Transvaginal route

Note: Increased nuchal translucency is not a fetal abnormality, but rather a marker or soft sign that confers increased risk of fetal abnormality.

Causes of increased nuchal translucency:

- Down syndrome (Trisomy 21)
- Trisomy 18
- Trisomy 13
- Turner syndrome
- Klinefelter syndrome
- Triploidy
- Congenital heart disease



Note:
NT should be measured when Crown Rump Length is between 45-85 mm
It should be measured in midsagittal plane

Serum Analytes

- Two analytes used for first-trimester aneuploidy screening are human chorionic gonadotropin-either intact of free β-hCG—and pregnancy-associated plasma protein A (PAPP-A).
- In cases of fetal Down syndrome, the first-trimester serum free β-hCG level is higher, approximately 2.0 MoM and the PAPP-A level is lower, approximately 0.5 MoM.
- With trisomy 18 and trisomy 13, levels of both analytes are lower.
- If gestational age is correct, the use of these serum markers—without NT measurement—results in detection rates for fetal Down syndrome up to 67% .
- Aneuploidy detection is significantly greater, if these first-trimester analytes are either: (1) combined with the sonographic NT measurement or (2) combined with second-trimester analytes, which is termed serum integrated screening (p 291).

Note: In twin pregnancies, serum free β-hCG and PAPP-A levels are approximately doubled as compared to singleton values.

βhCG levels in Down syndrome are increased from the end of 1st trimester and throughout the second trimester, making it a useful marker in both 1st and 2nd trimester, whereas 'PAPP-1' levels are decreased only in 1st trimester, later there values start approaching normal, hence it is a useful marker only 1st in trimester.

Combined First Trimester Screening

The most commonly used screening protocol does PAPP at 9 weeks, NT measurement at 11 weeks and serum hCG at 12 weeks and. Using this protocol, 95% Down syndrome detection rates are as high as.

Maternal age does affect the performance of first-trimester aneuploidy screening tests.

Second Trimester Screening

Triple Test

- It is a screening test for Down syndrome
- Done between 16 and 18 weeks of gestation,
- It involves estimation of 3 hormones: hCG, AFP, and unconjugated estriol (UE3).

Interpretation

	hCG	AFP	UE3
Down's syndrome (T21)	↑	↓	↓
Edward syndrome (T18)	↓	↓	↓

To the triple test, if the level of a fourth-marker-dimeric **inhibin** alpha are added, the test is called as **Quad test or quadruple test**. Levels of inhibin A are elevated in Down syndrome.

Note:

- Free estriol is a breakdown product of DHEA-S produced by fetal adrenal gland in placenta.
- Inhibin A is produced by placenta during pregnancy and by corpus luteum in nonpregnant females.

The quadtest is the most commonly used second-trimester serum screening test for aneuploidy

Screening Test	Detection of Down's Syndrome (%)
Double test (βhCG + PAPP) (done in first trimester)	60
Triple test	70
Quadruple test (hCG, AFP, UE3, + Inhibin A)	75
Serial integrated test (hCG, AFP, UE3, Inhibin A, PAPPA)	85

Integrated Screening

Combines results of first- and second-trimester tests. This includes a combined measurement of fetal NT and serum analyte levels at 11 to 14 weeks gestation plus quadruple markers at 15 to 20 weeks.

Cell-Free Fetal DNA Screening

- Using massively parallel sequencing or chromosome selective sequencing to isolate cell-free fetal DNA from maternal plasma, fetal Down syndrome and other autosomal trisomes may be detected as early as 10 weeks' gestation.
- Recent trials of these techniques in high-risk pregnancies have yielded detection rates for trisomies 21, 18, and 13 of approximately 98%.
- This novel technology has recently become clinically available as a screening test, but it is not considered a replacement diagnostic test.

The American College of Obstetricians and Gynecologists (2012 b) currently recommends that the test may be offered to the following groups:

- Women 35 years or older at delivery.
- Those with sonographic findings indicating increased risk for fetal aneuploidy.
- Those with a prior pregnancy complicated by trisomy 21, 18, or 13.
- Patient or partner carries a balanced robertsonian translocation indicating increased risk for fetal trisomy 21 or 13.
- The College does not recommend offering the test to women with low-risk pregnancies or multifetal gestations (American College of Obstetricians and Gynecologists, 2012 b).

Sonographic Marker for Down in 2nd Trimester
Brachycephaly or shortened frontal lobe
Clinodactyly (hypoplasia of the 5th digit middle phalanx)
Hyper echogenic bowel
Echogenic intracardiac focus
Nasal bone absence or hypoplasia
Nuchal fold thickening
Aberrant right subclavian artery
"Sandal gap" between first and second toes
Shortened ear length
Single umbilical artery
Short femur
Short humerus
Mild hydronephrosis ventriculomegaly.

Note: The nuchal skinfold is measured in the transcerebellar view of the fetal head, from the outer edge of the skull to the outer border of the skin. A measurement ≥ 6 mm is typically considered abnormal. This finding is present in approximately 1 per 200 pregnancies and confers a more than tenfold risk for Down syndrome.

Confirmatory Test

The only 100% confirmatory test for Down's syndrome is karyotyping, the sample for which can be obtained by chorionic villus sampling in 1st trimester or amniocentesis in 2nd trimester. Hence, in a patient who has a past history of fetus with Down's syndrome, fetal karyotyping has to be done in the next pregnancy.

Extra edge

Serum β–hCG and PAPP-A levels at 11-13 weeks in pregnancies complicated with trisomies:

βhCG	Median MOM	PAPP-A	Median MOM
Normal karyotype	1.0	Normal karyotype	1.0
Trisomy 21	2.0	Trisomy 21	0.5
Trisomy 18	0.2	Trisomy 18	0.2
Trisomy 13	0.5	Trisomy 13	0.3

Other sonographic markers in 1st trimester of Down syndrome:
1. Absence of nasal bone.
2. Reversed 'a' wave in ductus venosus
3. Tricuspid regurgitation.

Recurrence risk of Down syndrome:

Chromosome Constitution of Affected Child	Risk of Down Syndrome to Offspring in Next-Pregnancy		
1. Nondisjunction-Trisomy 21	Father	Mother	
	N	N	
		Mat age < 30	2-3%
		Mat age > 30	Risk at mothers age + 1%
2. Robertsonian translocation (21/21)	N	C	100%
	C	N	100%
3. Other translocations: 3/21; 14/21; 15/21; 21/22	N	C	12%
	C	N	2-3%
4. Mosaic	N	N	2-3%

QUESTIONS

1. **Kamlesh, a 2-year-old girl, has Down's syndrome. Her karyotype is 21/21 translocation. What is the risk of recurrence in subsequent pregnancies, if the father is a balanced translocation carrier:** **[AI 02; AIIMS June 00]**
   a. 100%
   b. 50%
   c. 25%
   d. 0%

2. **Screening for Down's syndrome should be done in the age group in pregnancy:** **[AIIMS 94]**
   a. 30
   b. 35
   c. All in the reproductive age group
   d. None of the above

3. **All of the following are biochemical markers included for triple test *except:*** **[AIIMS May 05, 03]**
   a. Alfa-fetoprotein (AFP)
   b. Human chorionic gonadotropin (hCG)
   c. Human placental lactogen (HPL)
   d. Unconjugated oestriol

4. **Increased nuchal translucency at 14 weeks is suggestive of:**
   a. Down's syndrome **[AI 07]**
   b. Oesophageal atresia
   c. Trisomy 18
   d. Foregut duplication cyst

5. **The best way of diagnosing Trisomy 21 during second trimester of pregnancy is:** **[AI 06]**
   a. Triple marker estimation
   b. Nuchal skin fold thickness measurement
   c. Chorionic villus sampling
   d. Amniocentesis

6. **Diagnosis of Down syndrome at 11 weeks is best assessed by:** **[AI 98]**
   a. Ultrasonography
   b. Amniocentesis
   c. Chorionic villous biopsy
   d. Doppler ultrasound

7. **Mr. and Mrs. Annadural have a 2-month-old baby suffering with Down's syndrome. Karyotype of Mrs. Annadural shows translocation variety of Down syndrome. Which of the following investigation will you advise to the parents before the next pregnancy?** **[AI 04]**
   a. Triple test
   b. α-fetoprotein
   c. Karyotyping
   d. β-human chorionic gonadotropin hCG

8. **Which of the following is the investigation of choice in a pregnant lady at 18 weeks of pregnancy with past history of delivering a baby with Down's syndrome?** **[AI 04]**
   a. Triple screen test
   b. Amniocentesis
   c. Chorionic villous biopsy
   d. Ultrasonography

9. **A pregnant female, 38-year-old, had a child with Down's syndrome. How do you assess the risk of Down's syndrome in the present pregnancy:**
   a. Material alpha-fetoprotein **[AIIM May 01, June 00]**
   b. Material hCG
   c. USG
   d. Chorionic villous biopsy

10. **A 32-year-old woman is 9 weeks pregnant and has a 10-year-old Down's syndrome child. What test would you recommend for the mother, so that she can know about her chances of getting a Down's syndrome baby is this present pregnancy. How will you assure the mother about the chances of Down's syndrome in the present pregnancy?** **[AIIMS Nov 10]**
    a. Blood test
    b. USG
    c. Chorionic villus sampling
    d. Assure her there is no chance since she is less than 35 years of age

11. **Which of the following is not done for antenatal diagnosis of Down's syndrome?** **[AIIM June 99]**
    a. Amniotic fluid volume estimation
    b. Alpha-fetoprotein estimation
    c. Cordocentesis
    d. Chorionic villous biopsy

12. **Which of the following feature on second-trimester ultrasound is not a marker of Down's syndrome?**
    a. Single umbilical artery **[AI 03]**
    b. Choroid plexus cyst
    c. Diaphragmatic hernia
    d. Duodenal atresia

13. **An HIV positive, 36 years old female on ART councils. Which of the following 1st trimester markers of Downsyndrome would be affected by?** **[New Pattern Question]**
    a. β–hCG
    b. PAPP-A
    c. NT
    d. All of the above

EXPLANATIONS & REFERENCES

1. Ans is a i.e. 100% *Ref. Fernando Arias 3/e, p 34*

Down Syndrome– (Trisomy 21)

- Seen in 11n 800 to 1000 newborns
- M/C Nonlethal trisomy
- Risk of Down syndrome increases with increase in maternal age
- At maternal age of 35 years, the risk of having a baby with Down syndrome is 1:365. to 1:400.

Recurrent Risk of Down's syndrome

Chromosome Constitution				
Affected child	**Father**	**Mother**	**Risk of the Offspring**	
Trisomy 21 (nondisjunction)	N	N	Mother < 30 years in present pregnancy	2 – 3%
			Mother > 30 years; had Down baby before 30 years of age	Risk at mothers age + 1%
			Mother >30 years; had Down baby after 30 years age	Risk at mother's age
Translocations 14/21, 15/21,	N	C		12%
13/21, 21/22	C	N		2–3%
Translocations	N	C		100%
21/21	C	N		100%
Mosaic	N	N		2–3%

C = Carrier; N = normal.

Remember = A funda – In balanced translocation (21/21), the risk of recurrence in subsequent pregnancy is 100% — regardless of the fact whether mother/father is a carrier.

2. Ans is b i.e. 35 years *Ref. Williams Obs. 23/e, p 296, Fernando arias 2/e, p 26*

Maternal age and Risk of Down's syndrome:

Category	Increased risk at Mother's age
In singleton pregnancy	≥ 35 years
In twin pregnancy	≥ 31 years
With previous Down's syndrome	≥ 31 years

3. Ans is c i.e. Human placental lactogen (HPL) *Ref. Dutta Obs 7/e, p 106*

Discussed in preceding text

4. Ans is a i.e. Down's syndrome *Ref. Fernando arias 3/e, p 38, USG in obs & gynae by colleen 4/e, p 41*

In the options we have Down syndrome as well trisomy 18 as, discussed in preceding text, in both these conditions NT is raised still the better option is Down syndrome.

My answer is based on the following lines from USG in Obs. and Gynae by Callen.

"Johnson et al showed that simple nuchal translucency between 10 and 14 weeks were associated with a 60% incidence of abnormal karyotypes-mostly trisomy 21. Unlike the second trimester experience, in which large cystic hygromas were most often associated with Turner syndrome, the 45X karyotype represented a minority of the karyotype abnormalities in the group of fetuses with first trimester nuchal translucency thickening."

Remember:

- Nuchal translucency (NT) is a sonographic marker of Down syndrome/aneuploidy in first trimester whereas nuchal fold thickness (NFT > 5 mm) is the most important sonographic marker of aneuploidy in the second trimester.
- Absent nasal bone is another marker of Down syndrome in 1st trimester. Nasal bone is absent in 68.8% of fetuses with Down syndrome.

5. Ans is d i.e. Amniocentesis

6. Ans is c i.e. Chorionic villous biopsy *Ref. Ghai 6/e, p 604, Fernando arias 3/e, p 44, 45*

As discussed earlier—the best way of diagnosing Down syndrome in present pregnancy is by karyotyping of the fetus. The sample for which can be obtained by chorionic villous biopsy in the first trimester and Amniocentesis in the second trimester.

In a Nut shell remember:

	1st trimester	2nd trimester
Screening test	Nuchal translucency + βhCG + PAPPA, i.e. combined test	Quad test/Triple test
Diagnostic test (karyotyping)	Chronic Villi sampling	Amniocentesis

7. Ans is c i.e. Karyotyping *Ref. Williams 23/e, p 267-269; Fernando Arias 3/e, p 34*

When a pregnant woman has a history of previous child with Down syndrome, it becomes important to know the type of chromosomal constitution, not only in that particular child but also in the parents because the risk of recurrence in future pregnancy depends on all these factors (as shown in Table in Ans. 1).

Karyotyping of Mrs. Annadural has already been done and a translocation variety of Down's detected. Risk of recurrence however does not depend on mother's karyotype alone, but it also depends on the father's karyotype. Father's karyotyping is therefore the test of choice prior to next pregnancy to determine the risk of recurrence.

8. Ans. is b i.e. Amniocentesis

9. Ans. is d i.e. Chorionic villous biopsy *Ref. Fernando Arias 3/e, p 27, Dutta Obs. 7/e, p 108, 494.*

In patients with previous history of Down syndrome –

"The risk of recurrence is greater than the risk of genetic diagnosis and these patients should be advised to seek genetic counselling and to have a genetic diagnosis." — Fernando Arias 3/e, p 27

Therefore amniocentesis /Chorionic villous biopsy should be done.

In Q8 patient is 18 weeks pregnant therefore we will do Amniocentesis.

In Q9 since Amniocentesis is not given in options therefore chorionic villous biopsy is the answer of choice.

Remember:

- Investigation to be done in patients with previous H/o Down syndrome before next pregnancy
  - Karyotype of mother and father both[Q].
- Investigation to be done in patients with previous H/o Down syndrome during next pregnancy
  - Genetic diagnosis (Amniocentesis/Cordocentesis).

10. Ans is c i.e. Chorionic villus sampling *Ref. Fernando Arias 3/e, p 38-40, Williams Obs. 23/e, p 300*

Friends – In Patients with previous H/O Down's syndrome the only confirmatory test, which tells us with 100% reliability of the chances of Down's syndrome in present pregnancy is **"Karyotyping".**

The sample for karyotyping can be obtained in first-trimester by – chorionic villi sampling and in 2nd trimester by amniocentesis.

So obviously we will think of marking option 'c' i.e. chorionic villi sampling as the correct answer but, The Question specifically mentions that patient is 9 weeks pregnant and we all know that if CVS is done before 10 weeks– it can lead to limb reduction defects and oromandibular defects in the fetus ∴Some people argue CVS is not the correct thing to do at this stage.

Read for yourself what Williams has to say on this issue.

"Early reports of an association between CVS and limb. Reduction defects and oromandibular limb hypogenesis caused a great deal of concern (Burton, 1992; Firth, 1991, 1994; Hsieh, 1995, and all their colleagues). Subsequently, it was shown that limb-reduction defects were associated with CVS performed earlier in gestation—typically around 7 weeks" ***—Williams Obs 23/e, p 300***

11. Ans. is a i.e. Amniotic fluid volume estimation *Ref. Fernando Arias 3/e, p 27, Dutta 6/e, p 108, 494.*

12. Ans. is b i.e. Choroid plexus cyst *Ref. Ultrasound of Fetal Synd. by Benacerraf 1/e, p 404, 405, 413; USG in Obs. & Gyane by Callen 4/e, p 44; Williams Obs 23/e, p 295.*

Single umbilical artery and, diaphragmatic hernia are seen in USG of Down syndrome.

"Several investigators have suggested that choroids plexus cysts are also associated with an increased risk of trisomy 21. However, our group demonstrated that the frequency of choroids plexus cysts among fetuses with trisomy 21 was the same as that among fetuses without trisomy 21, suggesting that the presence of choroid plexus cysts should not increase a patient's calculated risk of having a fetus with Down syndrome.
This is in agreement with the work from Gupta and co-worker, who reported a 1 in 880 risk of Down syndrome among fetuses with isolated choroids plexus cysts detected antenatally."

—Ultrasound of Fetal Synd. by Benacerraf1/e, p 404, 505

"The presence of a cyst in the choroids plexus in an axial view through the upper portion of fetal head has been correlated with the increased risk of Trisomy 18" *—Management of High Risk Pregnancy by SS Trivedi, Manju Puri, p 12*

- Choroid plexus cysts are found to be associated with trisomy 18 (occurring in nearly 30% of cases of trisomy 18).
- Choroid plexus cysts are also found in 0.7 to 3.6% of normal second trimester fetuses.

Structural malformation	Aneuploidy risk	Associated with
1. Cystic hygroma	50-70	Turners ,Trisomy 21, 18, 13; Triploidy
2. Holoprosencephaly	30-40	Trisomy 21, 18, 13; Turners.
3. Ventriculomegaly	5-25	Trisomy 21, 18, 13; Turners.
4. Dandy Walker malformation	40%	Trisomy 21, 18, 13; Turners.
5. Omphalocele	30-50	Trisomy 18, 13, 21, Triploidy
6. Duodenal atresia	30	Trisomy 21
7. Choroid plexus cyst	30%	Trisomy 18
8. Diaphragmatic hernia	5-15	Trisomy 18, 13, 21
9. Esophageal atresia	10-15	Trisomy 18, 21
10. Cleft up palate	5-15	Trisomy 18, 13

13. Ans. is a. i.e β-hCG *Ref. Fernando Arias 4/e, p 4*

Women with HIV:

β-hCG levels in women who are HIV positive and are on treatment have been shown to have a lower value than women without HIV and those with HIV not receiving treatment. In contrast- PAPP- A levels and NT are not affected by HIV status.

SECTION 6

Recent Papers

AIIMS November 2015
AIIMS May 2015
PGI May 2015
PGI November 2014

Latest Papers

AIIMS NOVEMBER 2015

1. **The dose of misoprostol in emergent management of PPH:**
   a. 200 mcg b. 400 mcg
   c. 600 mcg d. 800 mcg
2. **Following fetal tocographic finding was seen in a 30-year-old female patient in labor. What does it suggest?**
   a. Early cord compression b. Fetal distress
   c. Head compression d. Fetal anemia
3. **Best time to give Anti-D to a pregnant patient:**
   a. 12 weeks b. 28 weeks
   c. 36 weeks d. After delivery
4. **Modified BPS consists of:**
   a. NST with AFI
   b. NST with fetal breathing
   c. NST with fetal movement
   d. NST with fetal tone
5. **A G3P2, pregnant comes to your clinic at 18 weeks of gestation for genetic counselling. She has a history of two kids born with thalassemia major. Which test would you recommend now?**
   a. Amniocentesis
   b. Chorionic villus sampling
   c. Cordocentesis
   d. Noninvasive prenatal testing
6. **The shortest AP diameter of pelvic inlet:**
   a. True conjugate
   b. Obstetric conjugate
   c. Anatomical conjugate
   d. Boisterous conjugate
7. **A 23-year-old lady taking antiepileptics for a seizure disorder gets married. When should folic acid supplementation advised to the patient?**
   a. Any time as soon as she presents to the clinic irrespective of pregnancy
   b. Three months before becoming pregnant
   c. 1st trimester
   d. As soon as pregnancy is confirmed
8. **Estrogen and progesterone is first two months of pregnancy are produced by:**
   a. Fetal ovaries
   b. Fetal adrenal
   c. Placenta
   d. Corpus luteum
9. **DOC for PIH is:**
   a. Atenolol
   b. Nitroprusside
   c. Enalapril
   d. Alpha methyldopa

EXPLANATIONS

1. **Ans. is d i.e 800 mcg** *Ref. Fernando Arias 4/e, p 394, COGDT 11/e, p 353*
   Misoprostol-PGE is effective in the management of PPH. However it is associated with significant side effects—nausea, vomiting, diarrhea which may limits its use as first line prostaglandin in the developed countries. It can be given sublingually, orally, vaginally and rectally. Dose range from 200 to 1000 mcg.
   The dose recommended by FIGO is 800 mcg (4 tablets of 200 mcg each). Orally which is as effective as 40 U/L oxytocin. This dose can also be given per rectally.
2. **Ans. is b i.e Fetal distress** *Ref. Dutta Obs 8/e p 695*
   As seen in the CTG training, the dip in fetal heart rate is occuring after uterine contraction—it means late deceleration which signifies uteroplacental insufficiency or fetal by hypoxia (distress).

3. **Ans. is b i.e 28 weeks** *Ref. Williams Obs 24/e, p 312*
   Anti-D infection should be given to all Rh-negative pregnant females with indirect wombs test negative at 28 weeks.
   Dose = 300 mcg
   Infection given intramuscularly.
4. **Biophysical/Manning score consists of:** *Ref. Williams Obs 24/e, p 342-344*
   T-Fetal tone
   B-Fetal breathing movement
   Meningitis-Gross body movement
   Always-Amniotic fluid index
   Notorious-Nonstress test
   Among the 5 components- NST and AEI are most important, modified BPS consists of only these 2 components
5. **Ans. is c i.e. Cordocentesis** *Ref. Williams Obstetrics 24/e, p 300, Ghai Essential Pediatrics 8/e, p 341-344*
   As this patient is presenting at 18 weeks, we need a quick method to diagnose thalassemia antenatally because the legal age of abortion is only till 20 weeks. Fetal karyotyping takes 7-10 days when done through CVS or amniocentesis. Cordocentesis is a much quicker method to acheive the same as results are available in 24-48 hours and hence the best answer to this question.
6. **Ans. is b i.e. Obstetric conjugate** *Ref. Williams 23/e, p 32, Dutta Obs 7/e, p 88*
   See Chapter 1 of the book for explanation.
7. **Ans. is b i.e. Three months before becoming pregnant** *Ref. COGDT 11/e, p 537*
   All females on antiepileptic drugs should be informed of the likelihood of fetal anomalies. They should be counselled regarding folic acid supplementation (4 mg/d) starting atleast 3 months preconceptionally to possibly reduce the chance of NTD.
8. **Ans. is d i.e Corpus luteum** *Ref. Read below*
   In the initial few weeks- the main source of estrogen and progesterone is corpus luteum. Placenta takes ever the function of corpus luteum at 8 weeks.
9. **Ans. is d i.e Alpha methyldopa**
   The answer to the question should have been labetalol.
   But since it is not given in options-We will go with alpha methyldopa. Methyldopa is used for chronic hypertension in pregnancy and mild preeclampsia but is not used in severe preeclampsia because of delayed onset of action.

AIIMS MAY 2015

1. **What is the level of proteinuria to diagnose severe pre-eclampsia:**
   a. 20 mg b. 200 mg
   c. 300 mg d. 2000 mg
2. **Drug of choice for hypertension in pregnancy:**
   a. Enalapril
   b. Verapamil
   c. Methyldopa
   d. Frusemide
3. **Antihypertensive not used in pregnancy:**
   a. Enalapril
   b. Nifedipine
   c. Hydralazine
   d. Labetalol
4. **Anticipated preterm delivery. Dose of dexamethasone given to mother is:**
   a. 12 mg 12 hourly 2 doses
   b. 12 mg 24 hourly 4 doses
   c. 6 mg 24 hourly 2 doses
   d. 6 mg 12 hourly 4 doses
5. **Carbetocin dose for PPH is:**
   a. 100 microgram im
   b. 50 microgram iv
   c. 150 microgram iv
   d. 250 mcg
6. **What are the cut off values in 2 hour oral glucose tolerance test for fasting and at 1 hour and 2 hours after meals respectively:**
   a. 92, 182, 155 b. 92, 180, 153
   c. 95, 180, 155 d. 92, 180, 155
7. **A G6+0+0 lady h/o recurrent missed abortions at 14–16 weeks comes to you with a missed abortion at 12 weeks. Which of the following tests is not warranted?**
   a. Lupus anticoagulant
   b. Anticardiolipin antibodies
   c. VDRL of father and mother
   d. Fetal karyotype
8. **A mother comes with history of antenatal fetal death due to neural tube defect in first child. What is the amount of folic acid you will prescribe during preconceptional counselling (in micrograms/day)?**
   a. 4 b. 40
   c. 400 d. 4000
9. **Earliest diagnosis of pregnancy can be established safely by:**
   a. USG for fetal cardiac activity
   b. Fetal cardiac Doppler study
   c. HCG levels
   d. MRI pelvis

EXPLANATIONS

1. **Ans. is d i.e 2000 mg** *Ref. Williams Obs 24/e, p 181*

Earlier level of Proteinuria was used in classification of hypertensive disorders as Preeclampsia and severe preeclampsia but now in the new classification, this criteria has been removed.

New ACOG 2013 Guidelines

Condition	Criteria required
Gestational hypertension	BP > 140/90 mm Hg after 20 weeks in previously normotensive women
Preeclampsia-hypertension with proteinuria	300 mg/24 h, or Protein: creatinine ratio > 0.3 or Dipstick 1 + persistent
Thrombocytopenia Renal insufficiency Liver involvement	Platelets <100,000/ul Creatinine: 1.1 mg/dl. or doubling of baseline Serum transaminase levels twice normal
Cerebral symptoms	Headache, visual disturbances, convulsions
Pulmonary edema	Present

2. **Ans. is c i.e Methyldopa** *Ref. Williams Obs 24/e, p 760, 1005*

DOC for hypertension in pregnancy—is Labetalol out of the given options—Methyldopa is the best answer.

3. **Ans. is a i.e Enalapril** *Ref. Williams Obs 24/e, p 1005*

ACE inhibitors: Enralapril is contraindicated in pregnancy.

4. Ans. is d i.e 6 mg 12 hourly 4 doses *Ref. High Risk Pregnancy 4/e, p 139*

The 2 steroids used for prevention of Respiratory Distress syndrome are:

1. Betamethasone (two doses of 12 mg, given intramuscularly 24 hours apart.
2. Dexamethasone—4 doses of 6 mg given intramuscularly 12 hours apart.
   DOC—Betamethasone
   C/I—Chorioamnionitis
   Time—It should be given in all preterm deliveries before 34 weeks.

5. Ans. is d i.e 250 mcg *Ref. Fernando Areas 4/e, p 394*

Doses of uterotonics for treating PPH:

Uterotonic	Dose in PPH
1. Oxytocin (only drug recommended by WHO for treating PPH)	40 IU in 500 ml of Hartman at rate of 125 ml/hr (10 units/hr)
2. Carboprost—PGF-2α	250 mcg 1/m—to be repeated every 15 minutes eight times (maximum-2 mg)
3. Misoprostol	200—1000 mcg FIGO dose—800 mcg oral (4 tablets of 200 mcg each)

Dose of Uterotonics for preventing PPH:

Uterotonic	Dose for preventing PPH
1. Oxytocin (only drug recommended by WHO for preventing PPH)	5-10 IU Slow 1/h
2. Syntometrine	Oxytocin = 5–10 IU Ergometrine = 0.5 mg 1/m or 1/h
3. Ergometrine alone	0.25 mg or 0.5 mg—or 1/h
4. Methyl ergometrine	0.2 mg
5. Injection PGF-2α	250 mcg—1/m
6. Misoprostol	600 mcg oral

6. Ans. is b i.e 92, 180, 153 *Ref. High Risk Pregnancy; Fernando Areas 4/e, p 213*

These are the latest cutoffs for diagnosis of Gestational diabetes melitus following a 75 g Oral Glucose tolerance test. Any one of the values above threshold level is diagnostic.

Threshold values for diagnosis of gestational diabetes:

	Threshold	
Plasma glucose	mmol/L	mg/dL
Fasting	5.1	92
1-hr	10.0	180
2-hr	8.5	153

7. Ans. is c i.e VDRL of father and mother *Ref. Williams Obs 24/e, p 358*

M/c cause recurrent abortion in 1st trimester = congenital anomalies.
M/c cause of recurrent abortion in 2nd trimester—In competent as other—Antiphospholipid antibody syndrome.
Through VDRL is a simple test mostly performed in initial work up of all cases of multiple abortions, in this case all abortions are by 16th week while in syphilis, usually there is a improvement in the duration of pregnancy (Kassowitz Law).

8. Ans. is d i.e 4000 *Ref. Williams Obs 24/e, p 1104*

- Folate Requirement in normal pregnancy: 4 micrograms
- Folate requirement in pregnancy with previous history of neural tube defects: 4 mg.

9. Ans. is a i.e USG for fetal cardiac activity *Ref. Williams Obs 24/e, p 222*

An intrauterine gestational sac is reliably visualized with transvaginal sonography by five weeks and an embryo with cardiac activity by six weeks. The embryo should be visible transvaginally once the mean sac diameter has reached 20 mm—otherwise the gestation is an embryonic. Cardiac motion is usually visible with transvaginal imaging when the embryo length has reached 5 mm.

Remember:

Appearance of only gestational:

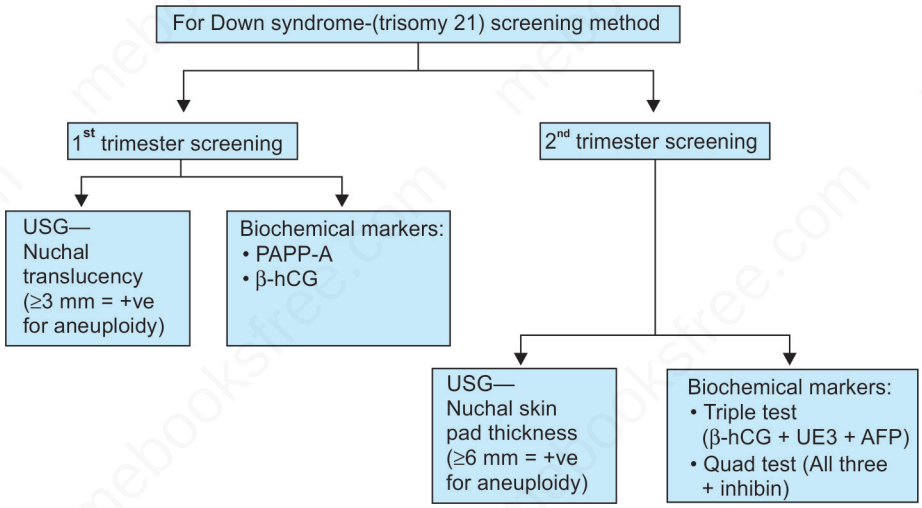
- Sac confirms pregnancy but does not tell whether it is intrauterine or extrauterine
- hCG levels can be raised in other conditions also hence it is not diagnostic of pregnancy.

PGI MAY 2015

1. **Aneuploid in 1st trimester is detected by:**
   a. Nuchal translucency
   b. MSAFP level
   c. PAPP-A
   d. Unconjugated estriol
   e. β-hCG
2. **Feature of false labor:**
   a. Steady intensity of pain
   b. Cervical dilation
   c. Discomfort is in the back and abdomen
   d. Intervals remain long
   e. Discomfort usually is relieved by sedation
3. **Which of the following is true about partial mole?**
   a. Karyotype is 69 XXY or 69 XXX
   b. High malignant potential
   c. β-hCG level is <50,000
   d. Thecan lutein cysts common
   e. Immunostaining ($p57^{KIP2}$) positive
4. **Which of the following is lower segment vertical incision?**
   a. Simon
   b. Selheim
   c. Kronig
   d. Kerr
   e. None of the above
5. **True about placental abruption:**
   a. Pre-eclampsia is a risk factor
   b. Common in multigravida
   c. Common in primigravida
   d. Premature separation of normal implanted placentae
   e. Character of bleeding is bright red blood

EXPLANATIONS

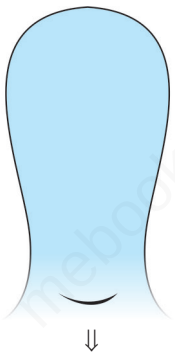
1. **Ans. is a, c and e i.e Nuchal translucency, PAPP-A and β-hCG** *Ref. Williams Obs 24/e*



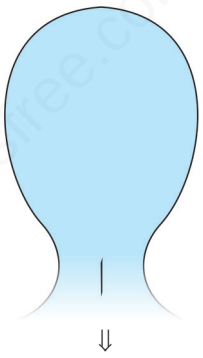
2. **Ans. is a, d and e i.e Steady intensity of pain, Intervals remain long and Discomfort usually is relieved by sedation**
Ref. Dutta 7/e, p 117

False labor pains are either constant or irregular. They do not have regular, rhythmic character seen in True labor pains (i.e. option a is correct).
The interval between contractions or pain progressively decreases in true labor pains whereas it remains long and constant in false labor (i.e. option d is correct).
False labor pain do not lead to cervical dilatation and does not radiate to back (i.e. options b and c are incorrect)
False labor pains are relieved by sedation or enema (i.e. option e is correct).

3. **Ans. is a, c and e i.e. Karyotype is 69 XXY or 69 XXX, β-hCG level is <50,000 and Immunostaining ($p57^{K1P2}$) positive**
Ref. Dutta Obs 7/e, p 191, 198; Williams 24/e, p 397
As discussed in chapter on Trophoblastic diseases—partial moles are triploid their karyotype is 69 XXY or 69 XXX, β-hCG levels are less than 50,000.
4. **Ans. is b and c i.e. Selheim and Kronig (Internet search)**
Lower segment incisions of uterus can be



- Low transverse incision
- Called as Munro Kerr incision
- Rupture rate = 0.2-1.5%
- M/C used incision



- Lower vertical incision
- Called as Kronig incision or Sellheim incision
- Rupture rate—1-7%
- Indications:
  - Construction ring
  - Obese female
  - Macrosomic babies
  - When lower segment is not very well-developed as in transverse lie

Note: Classical caesarean section incision is also called as Sanger incision.

5. **Ans. is a, b, and d i.e Pre-eclampsia is a risk factor, Common in multigravida and Premature separation of normal implanted placentae**
Ref. Dutta, Obs 7/e, p 252, 253
See chapter APH & DIC for explanation.

PGI NOVEMBER 2014

1. **Cause(s) of still birth:**
   a. Prematurity b. Syphilis
   c. Abruptio placentae d. Diabetes
2. **High level of hCG found in:**
   a. Twin b. Down syndrome
   c. Choriocarcinoma d. Ectopic pregnancy
3. **All of the following is true about Abruptio placentae *except*:**
   a. Premature separation of normal attached placentae
   b. Bright red blood
   c. Risk of recurrence is about 15% with previous abruption
   d. More common in multigravida
   e. Pre-eclampsia is a risk factor
4. **True about amniotic fluid:**
   a. Same concentration of plasma throughout pregnancy
   b. Forms from transudation of plasma through fetus skin before 20 weeks of gestation
   c. Fetus swallows amniotic fluid
   d. Protects fetus from injury
   e. Main channel for gaseous exchange
5. **Which of the following is/are criteria for the expectant management in preeclampsia *except*:**
   a. Platelet count <100000
   b. BP > 140/90
   c. Urine output < 400 ml/day
   d. Presistent headache
   e. Visual disturbances
6. **True statement regarding use of ACE inhibitors in pregnancy:**
   a. Cause polyhydramnios
   b. Cause renal agenesis
   c. Cause pulmonary hypoplasia
   d. Use during first 3 month is safe
   e. Safe in last trimester

EXPLANATIONS

1. **Ans. is All** *Ref. Dutta Obs 7/e, p 607; 8/e, p 690*

Stillbirth is birth of a newborn after 28 completed weeks (weighing 1000 g or more) when the baby doesnot breathe or show any sign of life after delivery.

Important causes of stillbirth:

Important causes of stillbirths and main interventions		
Causes	**Percent**	**Proven interventions**
Birth asphyxia and trauma	30	Skilled attendant at birth. Effective management of obstetric complications
Pregnancy complications (placental abruption, preeclampsia, diabetes mellitus)	30	Prepregnancy care, effective management of pregnancy complications
Fetal congenital malformations and chromosomal anomalies	15	Preconceptional genetic counseling, prenatal diagnosis
Infection	5	Effective care during pregnancy and labor. Clean delivery
Cause unknown	20	

'Prematurity is a common cause of stillbirth-Reddy 32/e, p 417.

2. **Ans. is a, b and c i.e. Twin, Down syndrome and Choriocarcinoma** *Ref. Williams 23/e, p 64; Dutta Obs 7/e, p 59*

Increased	Decreased
M **M**ultiple fetuses^{Q}	a. Ectopic pregnancy^{Q}
R **R**h-incompatibility^{Q}	b. Impending spontaneous abortion^{Q}
D **D**own syndrome^{Q}	c. Other trisomies viz. 18, 13
C **C**horiocarcinoma^{Q}	
H **H**ydatidiform mole^{Q}	***Mnemonic:*** **MR. DCH**

3. **Ans. is b i.e. Bright red blood** *Ref. Dutta Obs 8/e, p 294, 295*

The risk of recurrence for a woman with previous abruption varies between 5% and 17% (Dutta Obs 8/e, p 295).
Rest all options, you are aware of.

4. **Ans. is b, c and d i.e. Forms from transudation of plasma through fetus skin before 20 weeks of gestation, Fetus swallows amniotic fluid and Protects fetus from injury** *Ref. Dutta Obs 8/e, p 43-44*

Options b and c have already been explained in chapter 3 of the guide.

Here I am telling you about functions of amniotic fluid.

In pregnancy:

- Acts as a shock absorber
- Maintains an even temperature
- It allows for growth and free movement of fetus

Note: Its nutritive value is negligible.

5. **Ans. is b i.e BP> 140/90** *Ref. Fernando Arias 4/e, p 215, 216*

Expectant Mgt of preeclampsia would be done in mild preeclampsia and severe preeclampsia before 34 weeks.

The main aspects of expectant management are:

Guidelines for the expectant management of severe preeclampsia less than 34 weeks:

- Hospitalization
- Daily weight
- Daily input and output
- Antihypertensive treatment (Aldomet, labetalol, nifedipine)
- Betamethasone (two 12 mg doses 24 hours apart)
- Laboratory every other day or more frequently, if needed AST, ALT, LDH, platelet count, creatinine, bilirubin, 24-hour urinary protein
- Daily fetal movement count
- Weekly to as frequently as daily NST depending upon fetal growth status and liquor
- Umbilical and middle cerebral Doppler twice every week
- Amniotic fluid volume twice every week
- Ultrasound for fetal growth every two weeks.

Patients with severe preeclampsia need meticulous attention. The criteria to interrupt expectant management and move to delivery are:

Criteria to interrupt expectant management and move to delivery—

Maternal:

- Persistent severe headache or visual changes eclampsia
- Shortness of breath, chest tightness with rales and/or SpO_2 <94% at room air; pulmonary edema
- Uncontrolled severe hypertension despite treatment
- Oliguria < 500 ml in 24 hours or serum creatinine >1.5 mg/dl
- Persistent platelet count <100,000/mm^3
- Suspected abruption, progressive labour and/or ruptured membranes

Fetal:

- Severe growth restriction < 5th centile for gestational age
- Reversed or end diastolic flow in umbilical artery Doppler
- Persistent severe oligohydramnios
- Biophysical profile <4 dose
- Fetal death

6. **Ans. is b and c i.e. Cause renal agenesis and Cause pulmonary hypoplasia**

ACE inhibitors in pregnancy:

Oligohydramnios, renal failure, bony malformations, pulmonary hypoplasia and prolonged hypotension have been associated with the use of ACE inhibitors.

Fetal toxicity occurs with ACE inhibitors therapy occurs in 2nd and 3rd trimester but a recent study has shown that its use in first trimester is also unsafe-leading to major congenital malformation.

Annexures

ANNEXURE - 1

Colour of amniotic fluid	Seen in condition
Colorless	Preterm
Straw coloured	Term
Green colour (meconium)	Fetal distress/breech or transverse lie/listeria infection
Golden yellow	Rh-incompatibility
Saffron	Postdated pregnancy
Tobacco juice	IUFD

ANNEXURE - 2

Causes of oligohydramnios:

- Drugs: PG synthetase inhibitor–Indomethacin
- Maternal conditions–High BP (Gestational HT/Preclampsia/Eclampsia)
- Post-term pregnancy
- Premature rupture of membrane (PROM)
- Amnion nodosum
- Chromosomal anomaly–Triploidy
- Renal anomalies: Renal agenesis
- Posterior urethral valve.

ANNEXURE - 3

Causes of polyhydramnios:

- **Fetus produces more urine for example:**
  a. Twin/multifetal pregnancy (number of fetus is more: more of urine)
  b. Maternal hyperglycemia/diabetes
  Maternal hyperglycemia → Fetalhyperglycemia → Fetal polyuria → Increased amniotic fluid
  c. Twin-to-twin transfusion syndrome.
- **Besides producing amniotic fluid fetus also swallows amniotic fluid. The amount of amniotic fluid will increase if; fetal swallowing is impaired as in case of:**
  a. Cleft lip and cleft palate
  b. Esophageal atresia or stenosis
  c. Duodenal atresia or stenosis
  d. Bowel obstructione.
  e. Anencephaly (swallowing is decreased + increased transudation of CSF into amniotic fluid due to absence of cranial vault).
- **Other important causes of polyhydraminos which need to mugged up are:**
  1. ***Placental Causes:***
  a. Chorangioma of placenta and circumvallate placenta.

2. ***Fetal Causes:***
   a. Hydropsfetalis
   b. Rubella, syphilis, toxoplasma infection of fetus
   c. Trisomy (note—Triploidy leads to oligohydraminos)
   d. Sacrococcygealteratoma
   e. Thallasemia of fetus.

ANNEXURE - 4

Types of pelvis and important points on them

Caldwell and Mohoy classification:

Gynaecoid	50%
Anthropoid	25%
Android	20%
Platypelloid	5%

Important points:

KEY CONCEPT

Remember **the following points on pelvi (most of the questions are asked on them):**

- Normal female pelvis – Gynaecoid pelvis[Q].
- Male type pelvis – Android pelvis[Q].
- Most common type of pelvis – Gynaecoid pelvis[Q].
- Least common type pelvis – Platypelloid pelvis[Q].
- The only pelvis with AP diameter more than transverse diameter – Anthropoid pelvis[Q].
- Face to pubes delivery is most common in Anthropoid pelvis[Q].
- Direct occipitoposterior position is most common in Anthropoid pelvis[Q].
- Persistent occipitoposterior position is most common in Android pelvis[Q].
- Deep transverse arrest/ Nonrotation/Dystocia is most common in Android pelvis[Q].
- Broad flat pelvis – Platypelloid pelvis[Q].
- Transverse diameter is much more than AP diameter – Platypelloid pelvis[Q].
- Engagement by exaggerated posterior asynclitism occurs in platypelloid pelvis[Q].
- Super subparietal instead of biparietal diameter engages in platypelloid pelvis[Q].

ANNEXURE - 5

Definitive signs of early pregnancy:

Sign	Feature	Seen in
Jacquemier's/ Chadwick's sign	Dusky hue of the vestibule and anterior vaginal wall due to local vascular congestion	8th week of pregnancy
Osiander's sign	*Increased pulsation felt through the lateral fornices*	*8th week of pregnancy*
Goodell's sign	*Softening of cervix (cervix feels like lip of mouth whereas in non pregnant state it feels like tip of nose)*	*6th week of pregnancy*
Hegar's sign	*On bimanual examination with 2 fingers in anterior fornix and fingers of other hand behind the uterus, the abdominal and vaginal fingers seem to appose below the body of uterus. It occurs because of softening of isthmus[Q]*	*6-10 weeks of pregnancy*
Palmer's sign	*Regular and rhythmic uterine contraction which can be felt on bimanual examination*	*6-8 weeks of pregnancy*

- In the first trimester ***uterus*** enlarges to the size of hens egg at 6th week, cricket ball size at 8th week and size of fetal head by 12th week. It remains an intrapelvic organ.
- **Other signs seen in early pregnancy:**
  - Hartman sign–bleeding present at the time of implantation in few females.

ANNEXURE - 6

Best parameters for estimation of fetal age:

• **1st trimester**	Crown Rump length (CRL)
• **2nd trimester**	Biparietal diameter (BPD)
• **3rd trimester**	Femur length
• **Overall**	Crown Rump length

- **BPD is measured in the trans thalamic view at the level of the thalami and cavum septum pellucidum. From outer table of skull to inner table.**

- Cephalic index = BPD divided by occipito frontal diameter (OFD).
- It head shape is flattened (dolichocephaly) or rounded (brachycephaly), then HC is more reliable than BPD. As BPD is affected by shape of head but not HC.

USG in pregnancy

- Best time to assess gestational age by USG is 9-12 weeks (by crown rump length).Q
- Best indicator of fetal growth – Abdominal circumference.Q
- So the best USG parameter to detect IUGR is Abdominal circumference.Q
- The best USG parameter to detect macrosomia is abdominal circumference.Q
- **AC is measured at the junction of left and right portal vein or liver and cystic duct.Q**
- Mean sac diameter (CMSD) is used to determine gestational age before CRL can be measured.
- MSD = Length + height + width/3.
- Normal MSD (in mm) + 30 = days of pregnancy.
- CRL (in mm) + 42 = gestation in days.
- The embryo should increase its CRL by 1 mm per day.
- Fetal anomaly which can be earliest detected by USG–Anencephaly.
- Lemon and Banan sign are seen in spina bifida on USG.
- The two best ultrasonographic markers of Down syndrome in first trimester:
  a. Absent or hypoplastic nasal bone
  b. Increased nuchal translucency.
- The diameter which in mm when measured between 14 and 24 weeks corresponds to the gestational age in weeks – Inter cerebellar diameter.Q
- If a single ultrasound examination is planned for the purpose of evaluating fetal anatomy, ACOG (2011) recommends it to be performed at 18–20 weeks.

ANNEXURE - 7

Recommended daily allowance in pregnancy and lactation:

Daily dietary allowances for a woman of reproductive age, pregnancy and lactation.

	Nonpregnant	Pregnancy second half	Lactation	Sources
Energy (kcal)	2200 kcal	2500 kcal	2600 kcal	Protein, fat, carbohydrate
Protein (gm)	50 gm	60 gm	65 gm	Meat, fish, poultry, dairy product
Iron (mg)	18 mg	40 mg*	30 mg*	Meat, egg, grains [* to be supplemented]
Calcium (mg)	500 mg	1000 mg	1500 mg	Dairy products
Zinc (mg)	12 mg	15 mg	19 mg	Meat, egg, seafood
Iodine (mg)	150 mg	175 mg	200 mg	Iodized salt, seafood
Vitamin A (IU)	5000 IU	6000 IU	8000 IU	Vegetables, liver, fruits
Vitamin D (IU)	200 IU	400 IU	400 IU	Dairy products
Thiamine (mg)	1.1 mg	1.5 mg		Grains, cereals
Riboflavin (mg)	1.1 mg	1.6 mg		Meat, liver, grains
Nicotinic acid (mg)	15 mg	17 mg	Almost same	Meat, nuts, cereals
Ascorbic acid (mg)	60 mg	70 mg	as in pregnancy	Citrus fruits, tomato
Folic acid (mg)	200 mg	400 mg		Leafy vegetables, liver
Vitamin B_{12} (mg)	2 mg	2.2 mg		Animal proteins

ANNEXURE - 8

Safety of vaccines in pregnancy:

Remember:

A simple "FUNDA" (Proposed by CDC Society, 2002).

- Killed vaccine are safe in pregnancy.
- Live vaccines are best avoided in pregnancy.

Safety of Vaccines in Pregnancy:

Safe	Only in epidemics	To be given in case of travel to highly endemic area or exposed to contacts	Contraindicated
• H -Hepatitis A/B	• Tab-Typhoid • P-Pneumococcus • C-Cholera	• Yellow fever • Japenese encephalitis • Polio (IPV)	• Rubella • Measles • Varicella
• I-Influenza • T-Tetanus • Rabies-Rabies **(mnemonic-HIT Rabies)**	• M-Meningococcus **(Tab PCM)**		• BCG • Mumps • Small pox

ANNEXURE - 9

Important time table of events:

Important events	Following fertilization
'0' hour	Fertilization
4th day	16 cell stage
	Morula enters uterine cavity
5th day	Blastocyst
7th day	Interstitial implantation occurs
21st–22nd day	Placenta fully established/Fetal circulation established and heart formed
8 weeks	Internal gonads formed
10–12 weeks	Swallowing starts
11 weeks	Fetal breathing movements
12 weeks	External genitalia formed
12 weeks	Urine formation occurs
14 weeks	Gender can be identified on USG

ANNEXURE - 10

Few named structures and their location:

Named structure	Seen in
• Nitabuch's layer	It is the zone of fibroid degeneration where trophoblast and decidua meet. Seen in basal plate of placenta
• Hoffbaeur cells	Phagocytic cell seen in connective tissue of chorionic villi of placenta
• Folds of Hobokon	Umblical cord
• Whartons jelly	Connective tissue of umblical cord
• Peg cells	Fallopian tube
• Langhans cells	Cytotrophoblast

ANNEXURE - 11

Recommended weight gain in pregnancy based on BMI in singleton pregnancy:

Weight - for - height		Recommended total weight gain		Weight gain/week
Category	BMI	kg	lb	In lb/week
Underweight	<18.5	12.5-18	28-40	1 (1-1.3)
Normal	18.5-24.9	11.5-14	25-35	1 (0.8-1)
Overweight	25-29.9	7-11.5	15-25	0.6 (0.5-0.7)
Obese	≥30	7	11-20	0.5 (0.4-0.6)

***Note*:** 1 lb = 0.454 kg

Recommended wieght gain is 31-50 lb.

Recommended weight gain in twin pregnancy:

- Normal BMI = 37-54 lb
- Overweight = 31-50 lb
- Obese = 25-42 lb
- 1 lb = 0.454 kg

ANNEXURE - 12

Fetal heart rate traces as described by NICE (2015 guidelines):

Desciption	Feature baseline (bpm)	Baseline variability (bpm)	Deceleration
Reassuring/Normal	100-160	5 or more	None or early
Nonreassuring	161-180	Less than 5 for 30-90 minutes	Variable decelerations: • Dropping from baseline by 60 bpm or less and taking 60 seconds or less to recover • Present for over 90 minutes • Occurring with over 50% of contractions. OR Variable decelerations: • Dropping from baseline by more than 60 bpm or taking over 60 seconds to recover • Present for up to 30 minutes • Occurring with over 50% of contractions. OR Late deceleration: • Present for up to 30 minutes • Occurring with over 50% of contractions.
Abnormal	Above 180 or below 100	Less than 5 for over 90 minutes	Nonreassuring variable decelerations • Still observed 30 minutes after starting conservative measures • Occurring with over 50% of contractions. OR Late decelerations: • Present for over 30 minutes • Do not improve with conservative measures • Occurring with over 50% of contractions. OR Bradycardia or a single prolonged Deceleration lasting 3 minutes or more

ANNEXURE - 13

Management algorithm for PPH—Hemostasis:

Management Algorithm for PPH (Hemostasis) Proposed by Chandraharan and Arulkumaran	
H	Ask for help and hands on uterus
E	Establish aetiology, ensure ABC, ensure availability of blood and ecobolics (drugs that contract the uterus)
M	Massage of uterus
O	Oxytocin infusion/prostaglandins
S	Shift to theatre–aortic pressure or antishock garment
T	Tamponade balloon/uterine packing (consider tranexemic acid 1 gm)
A	Apply compression suture
S	Systemic pelvic devascularization–uterine/internal iliac artery
I	Interventional radiology
S	Subtotal/total hysterectomy

ANNEXURE - 14

Conditions in which alphafetoproteins are increased and decreased:

Elevated levels	Low levels
• Error in dates • Multifetal pregnancy • Severe oligohydramnios • Neural tube defects • Pilonidal cysts • Esophageal or intestinal obstruction (and atresia) • Liver necrosis • Cystic hygroma • Sacrococcygeal teratoma • Fetal death • Abdominal wall defects: – omphalocele – gastroschisis • Urinary obstruction • Renal anomalies: – polycystic kidney – absent kidneys • Congenital nephrosis • Osteogenesis imperfecta • Congenital skin defects • Cloacal exstrophy • Chorioangioma of placenta • Low birth weight • Placental abruption • Placenta accreta • Preeclampsia • Improper adjustment for low maternal weight • Maternal hepatoma or teratoma	• **G: G**estational trophoblastic diseases • **O²: O**verestimated gestational age, overweight mother • **A:** Spontaneous **a**bortion • **T: T**risomy (21 or 18)

ANNEXURE - 15

Conditions in which hCG levels are increased and decreased:

Increased	Decreased
M **M**ultiple fetuses[Q]	a. Ectopic pregnancy[Q]
R **R**h-incompatibility[Q]	b. Impending spontaneous abortion[Q]
D **D**own syndrome[Q]	c. Other trisomies viz. 18, 13
C **C**horiocarcinoma[Q]	
H **H**ydatidiform mole[Q]	***Mnemonic:*** **MR. DCH**

COLOR PLATES

CTG MADE EASY

WHAT IS CARDIOTOCOGRAPHY

Cardiotocography (CTG) is a procedure of graphically (graphy) recording fetal heart activity (cardio) and uterine contraction (toco)—both recorded in the same time scale simultaneously and continuously through uterine quiescence and contraction. Pressure sensitive Tocodynamometer (transducer) of 'guard-ring'/strainguage type.

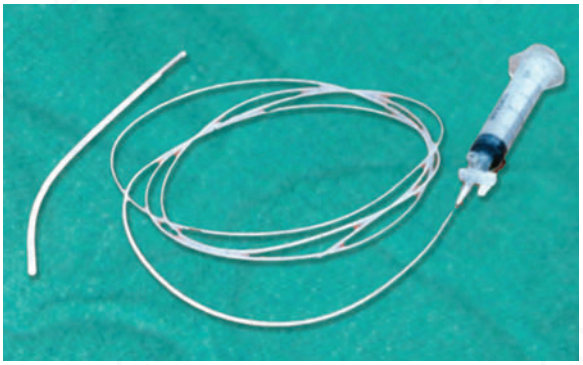


Fig. 1: Transducer

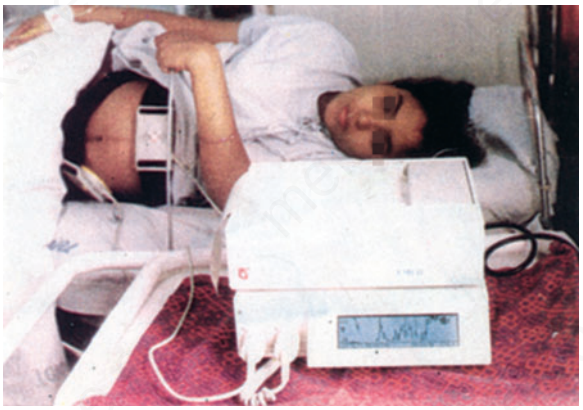


Fig. 2: Cardiotocography in action

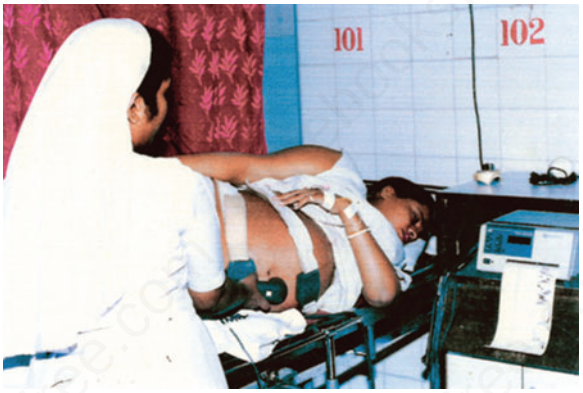


Fig. 3: Vibroacoustic stimulation being given

Applicability

Can be used both for antenatal and intranatal monitoring of uterine contraction.

Mechanism of Working

The transducer senses the forward displacement of the uterus as the uterus contracts and depicts it in the form of tracing.

Practical Procedure of doing External Tocography

Fixing the Transducer

- Patient lies supine.
- The toco belt is arranged around her waist level so that the ends of the belt are on the top of the abdomen for fastening.
- Abdomen is then palpated to delineate the fundus of the uterus.
- The toco transducer plug is then plugged in the appropriate socket (Toco socket) on the CTG machine. The socket is usually, color matched, i.e. the socket and plug are of the same color. This is done in order to avoid confusion with 'cardio' plug and 'cardio' socket as described in previous chapters. On doing this, in some machine, TOCO-EXT sign lights up and the same words are annoted/printed on the chart paper.
- Toco transducer face—It is the side of the transducer that faces mother's abdomen. This surface with central pressure sensitive area is next placed on the fundus and fixed there with the help of the belt. It is best to choose a site where the distance between the transducer and the uterus is least. Difficult in obese patients.

FEATURES TO SEE IN A CTG TRACING

The following seven features are to be critically observed in any CTG tracing:

- Baseline fetal heart rate (FHR)
- Baseline variability of FHR
- Any acceleration of FHR
- Any deceleration
- Incidents associated with acceleration or deceleration if any like—with fetal movement, uterine contraction, etc.
- Uterine contraction, where present—their frequency, duration and amplitude and also the basal uterine tone, i.e. the tone in between contractions. The last two parameters can only be assessed where internal tocometry through placement of intrauterine catheter has been used.
- Precise *time-correlation* of FH changes with the onset, peak and disappearance of uterine contraction.

In addition to above, special analysis is required for cases where stimulation tests have been done like • Acoustic stimulation, • Scalp stimulation, etc.

BASELINE FHR—GENERAL CONSIDERATIONS

CTG Definition of Baseline FHR

Baseline FHR on a CTG tracing is taken as the mean FHR over a period and should be arrived at by observing a tracing of at least 10 minutes duration. It is deduced from continuous FHR record by imagining a line passing horizontally, roughly, through the 'middle' of the wavy line of the FH tracing indicating sort of average rate of FH between the upper and lower limits of it's variability.

Clinical Definition

Clinically baseline FHR is taken as the rate found on ordinary auscultation at any given point of time, and time to time.

Note

Baseline FHR is difficult to record in cases of arrhythmia.

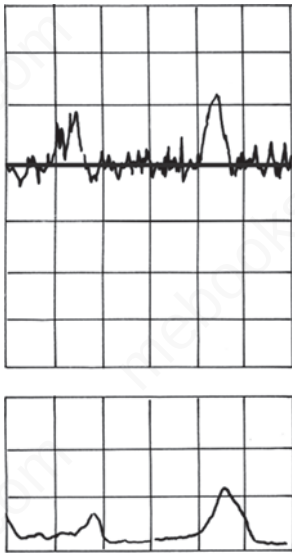


Fig. 4: A horizontal line has been drawn through the middle of the wavy line of FH tracing indicating sort of average rate of FH, i.e. the baseline rate. Notice two typical healthy accelerations of more than 15 BPM and lasting more than 15 seconds. Also notice that these two accelerations have coincided with uterine contraction (see text)

Normal Baseline FHR at Various Periods of Gestation

12–30 Weeks –	140–180 BPM
30–40 Weeks –	120–160 BPM
40+ Weeks –	Lowest upto 110 BPM may be considered as normal (see below)

This reduction in FHR with increasing maturity is brought about by the increasing maturity of the fetal vagal center.

Types of Baseline Abnormality

There are 3 type of abnormalities in baseline FHR.

- Tachycardia
- Bradycardia
- Decreaed baseline variability

TACHYCARDIA

Baseline tachycardia means sustained (not transient) increase in FHR to above 160 bpm. Such label should be put on only after observing the tracing for a minimum period of *10 minutes*.

Causes of Baseline Tachycardia

- Stress
- Hypoxia
- Infection
- Epidural Analgesia
- Pre-term Fetus
- Drug Treatment—Beta adrenergic agents
- Anemia (Maternal and Fetal)
- Maternal Cardiac Failure

Fetal Tachcardia can be

- Mild—160–180 bpm
- Severe—Above 180 bpm
- If the rate exceeds 200 bpm the risk of fetal heart decompensation is very high

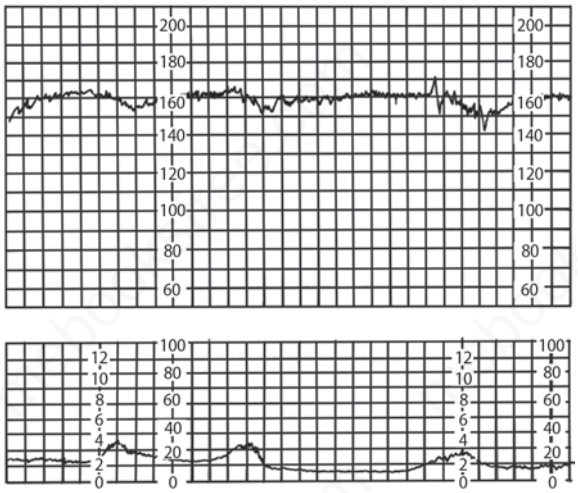


Fig. 5: Showing baseline tachycardia (160 bpm) with almost total loss of variability. Notice also the very shallow type II dips. This is a case of complicated baseline tachycardia and is ominous

BRADYCARDIA

Baseline bradycardia means sustained (not transient) decrease in FHR to below 120 bpm. Just as for baseline tachycardia, such label should be put on only after observing the tracing for *a minimum period of 10 minutes*.

Causes of Baseline Bradycardia

- Hypoxemia
- Tissue Hypoxia
- Local Anesthetic Agent
- Narcotic Drugs
- Mild (Partial) Umbilical Cord Compression
- Postdated Fetus (40 Plus Weeks)
- Head Compression
- Heart Block

BASELINE VARIABILITY OF FHR

Definition

Normally, the baseline FHR is found to vary between 5–15 bpm every 10 to 20 seconds, i.e. at the frequency of 3–6 cycles per minute. This is called baseline variability. However, the minute irregularity that is invariably seen in the CTG trace line, which gives it a somewhat saw-toothed appearance and which represents the real beat-to-beat variation of FHR, is also referred as baseline variability (see short-term variability).

- Less than 5 bpm—Ominous
- Between 5–10 bpm—Normal but needs observation
- Between 10–20 bpm—Healthy fetus
  Variability between 20–25 is also normal but not seen commonly)
- More than 25 bpm—Needs critical observation.

How to Find Out the Magnitude of Baseline Variability

The magnitude of baseline variability is to be found out by drawing a line each along the highest and the lowest projection of FHR trace *during one minute period.*

Best Time to Assess Variability During Labor

In labor, the best time to assess the magnitude of variability is in between contractions so as to avoid confusion with the effect of contraction on FHR.

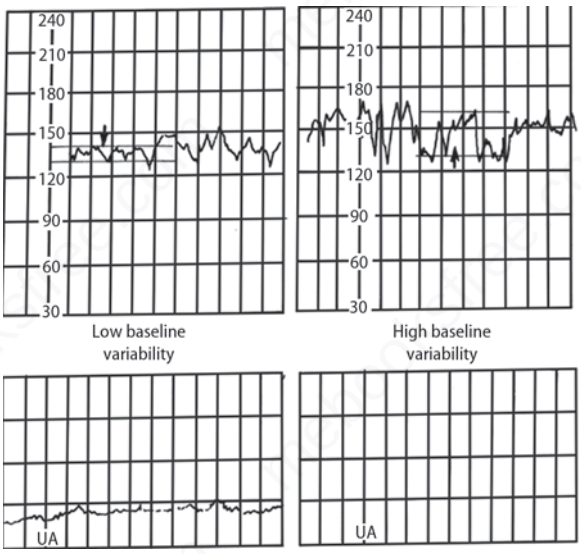


Fig. 6: Showing the method of precisely ascertaining the magnitude of baseline variability. A line each is to be drawn along the highest and the lowest projection of FHR trace

> ***Sinusoidal Pattern***
>
> In this the 'amplitude' and the 'period' of variation remains more or less *constant* giving the trace a smooth regular wavy appearance.

ACCELERATIONS

Definition

From the baseline rate a sudden increase in FHR by more than 15 bpm lasting for more than 15 seconds is considered as acceleration.

Significance of Occurrence of Acceleration

The presence of qualifying acceleration signifies healthy state of the fetus.

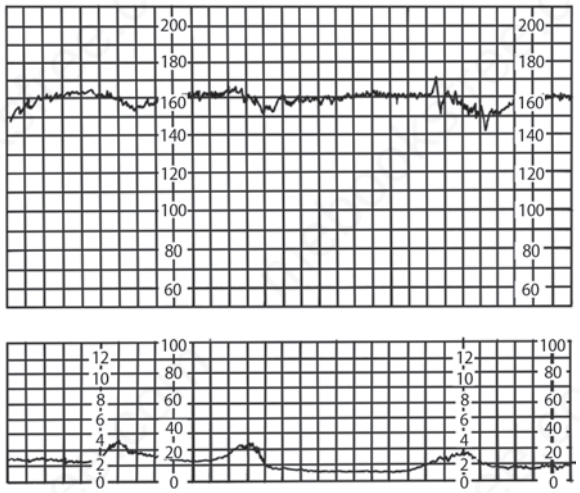


Fig. 7: This shows sinusoidal pattern of FHR tracing. Notice here the 'Amplitude' and 'Period' of variation of FHR is more or less constant giving the trace a smooth regular wavy appearance

DECELERATIONS

Definition

From the baseline rate a sudden decrease in FHR by more than 15 bpm lasting for more than 15 seconds but less than two minutes is considered as deceleration (Ingemarsson, et al. 1993).

Significance

Contrary to what is true about acceleration, in any FHR tracing, deceleration whatever may be its type—should better be absent.

Types

Classically, deceleration has been classified into three types as follows:

- Early deceleration
- Late deceleration
- Variable deceleration

Early Deceleration (Type I DIP)

This is also called 'Synchronous deceleration' because it exactly synchronises with uterine contraction.

Classical Features

- The dip in FHR is 'V' shaped with a 'sharp' lowest point.
- The apex of V coincides with the peak (apex) of uterine contraction.
- Deceleration starts very shortly after the beginning of contraction, hence it is called 'early'.
- Deceleration recovers fully by the end of the contraction.
- Deceleration is short lived.
- Baseline FHR and baseline variability of FHR remain normal in between contraction.

Causes of Early Deceleration

- Head compression

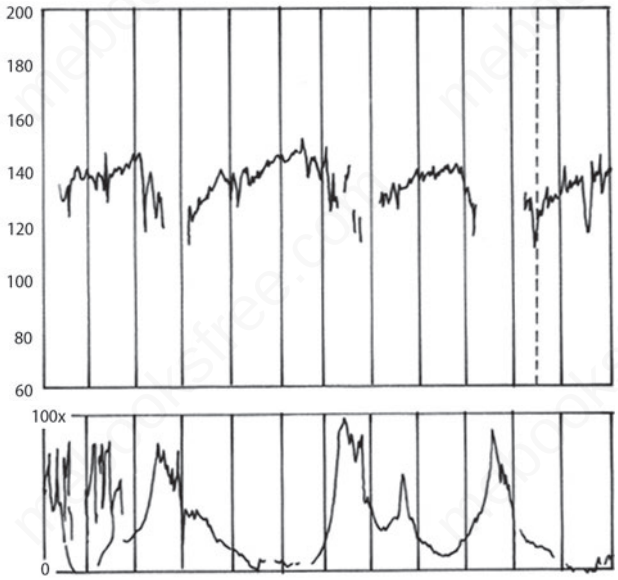


Fig. 8: This is a tracing of typical type I dip or early deceleration. Notice that the deceleration has 'started early' in contraction and recovered before the contraction is over. Also notice that the lowest point of deceleration has exactly coincided with the peak of uterine contraction. The important thing here is—the baseline FHR and baseline variability of FHR is preserved. This patient was fully dilated with head deep in the pelvis. Notice that the third dip was of greater magnitude than fast two dips. This was produced by finger pressure on head during PV during that particular contraction exaggerating the head compression and thereby aggravating the deceleration

Significance of Early Deceleration

Early deceleration, if 'uncomplicated', does not signify hypoxia or acidosis and hence immediate intervention is usually not necessary in these cases. However, it has been suggested that it is possible for coexistent mild hypoxia to potentiate the effect of early deceleration (Steer, 1986) when the pattern would gradually change into late deceleration shape. *Hence, tracing should be continued in these cases right upto delivery*.

Late deceleration (Type II Dip)

Nomenclature

It is that type of 'contraction associated' deceleration of FHR which starts only *'late in contraction'* and does not return to normal baseline until after the contraction is over.

Occurrence of late deceleration on the face of artificially induced uterine contraction forms the basis of Contraction Stress Test (CST), Oxytocin Challenge Test (OCT) and Nipple Stimulation Stress Test (NSST) (see Chapter 15—'Applied Cardiotocography—Antenatal').

According to FIGO (1987)—there must be three or more late decelerations following 'consecutive' contractions for a diagnosis of late deceleration to be made.

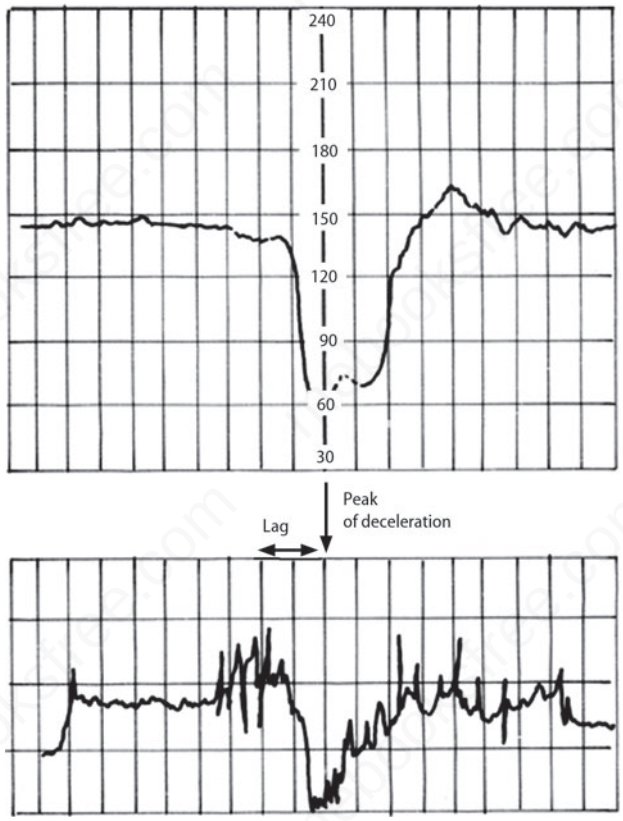


Fig. 9: This is a tracing of typical type II dip or late deceleration. Notice the deceleration has started 'late' in contraction and has outlasted the contraction. The time lag between the peak of deceleration and peak of contraction is evident. Note the compensatory acceleration at the end of deceleration. The other major ominous sign in this tracing is almost total absence of baseline variability

Classical Features

- The dip in FHR trace is somewhat wide-mouthed 'U' shaped with round bottom.
- The lowest point of 'U' does not coincide with the peak of uterine contraction. It comes after a 'time lag' of minimum of 15 seconds.
- Deceleration starts 'late' in contraction and hence it is called late deceleration.
- Deceleration does not recover by the end of the contraction. It outlasts the contraction.
- Deceleration is much more prolonged than early deceleration.

Clinical Causes of Late Deceleration

a. *Preuterine*
   - Maternal Hypotension
     - Supine hypotension
     - Following epidural block
   - Severe Anaemia

b. *Uterine*
   - Uterine Hyperactivity
     - Oxytocin Infusion given for induction or acceleration of labour
     - Prostaglandin induction

c. *Intrauterine*
   - Placental Insufficiency

This may be due to whatever cause, e.g. pregnancy induced hypertension, post dated pregnancy situation, APH, etc. IUGR is a frequent finding in this group.

Variable Deceleration

Nomenclature

Variable deceleration means decelerations which are variable in their relation to uterine contraction which means:

- May come (variably) during any phase of contraction—not typically 'early' or 'late'.
- May or may not come with each and every contraction.

The main cause

Variable deceleration has been thought to reflect a recurrent threat of decreased perfusion of the fetus arising from a ***disturbance in blood flow through the umbilical cord*** due to it's compression of varying degrees.

FORMULA OF 15 FOR CTG INTERPRETATION

For Acceleration

- FHR should rise by at least 15 bpm from baseline
- Acceleration should last at least for 15 seconds
- At least one such acceleration should occur during a 15 minutes period

For Deceleration

- FHR should drop by at least 15 bpm from baseline
- Dip should last for at least 15 seconds
- To call a deceleration "Late deceleration" the "Lag period" between lowest point of bradycardia and the peak of uterine contraction must be of at least 15 seconds duration.

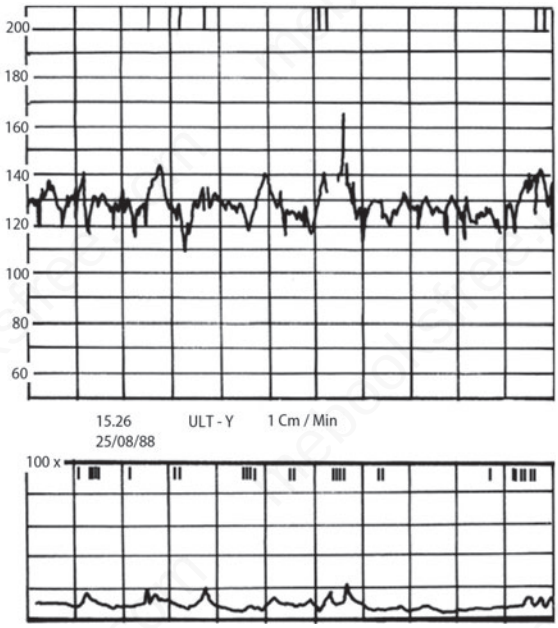


Fig. 10: Reactive non-stress test

A Reactive Non-Stress Test

This is a ten minutes tracing from an uncomplicated case who had a routine NST for fetal monitoring because she was postdated by two days. Four clear qualifying reactivity (accelerations) are seen—of at least 15 bpm magnitude and of at least 15 seconds duration. Baseline FHR is around 130 bpm and baseline variability is between 5–10 bpm. The pointed dark vertical lines of about 1 cm length each at the ery top of the tracing paper denote the number of fetal movement as registered by the mother through the remote event marker (Patient button).

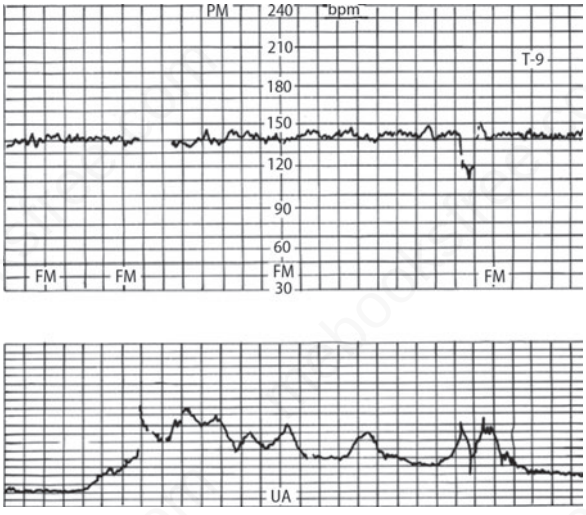


Fig. 11: Non-reactive non-stress test (NST)

A Non-Reactive 'Non-Stress Test' (NST)

This is a 'non-reactive' antenatal CTG tracing showing absence of acceleration of FH with fetal movement over 20 minutes period which is the standard duration for performing NST. Baseline FHR is normal here but the baseline variability is less than 5 bpm which is worrying.

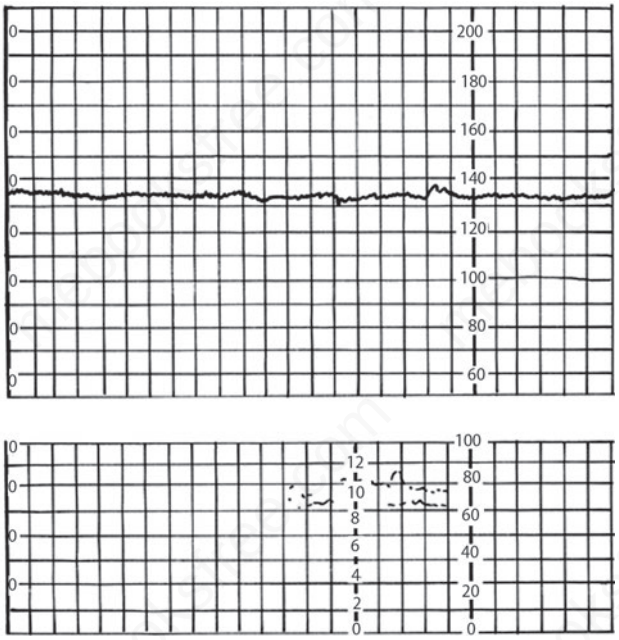


Fig. 12: Flat CTG

Flat CTG

This is a typical tracing of poor baseline variability (i.e. poor beat-to-beat variation) also called 'Flat' tracing. The variability here would be something like 1 or 2-bpm whereas minimum acceptable is 5-bpm-normal range being 10-15 upto 25 bpm. This is an antenatal CTG tracing of a case of gross IUGR with diminished FM at 37th week. The patient had not been on any sedation. The tracing was continued for over 90 minutes but variability did not increase and no fetal movement was registered by mother during the period. Even manual stimulation of fetus by abdominal palpation did not have any effect on FHR. So, a caesarean section was done because such prolonged and grossly diminished variability is often associated with fetal hypoxia and acidosis. A 2.1 kg baby was delivered with Apgar 4 at 1 min. Liquor was very scanty and thick though not meconium stained. Without the use of CTG such fine kind of FHR abnormality cannot be diagnosed since the baseline FHR, which is the only thing that can be appreciated by fetoscope or Doptone, would always have been found to be normal-around 138-bpm (see tracing) on auscultation in such a case.

Sources of Figures 1 to 12: Practical cardiotocography, 3rd edition. Jaypee Brothers. AK Debdas.

IMPORTANT ULTRASOUNDS AND DOPPLER IMAGES

USG SHOWING INCREASED NUCHAL TRANSLUCENCY

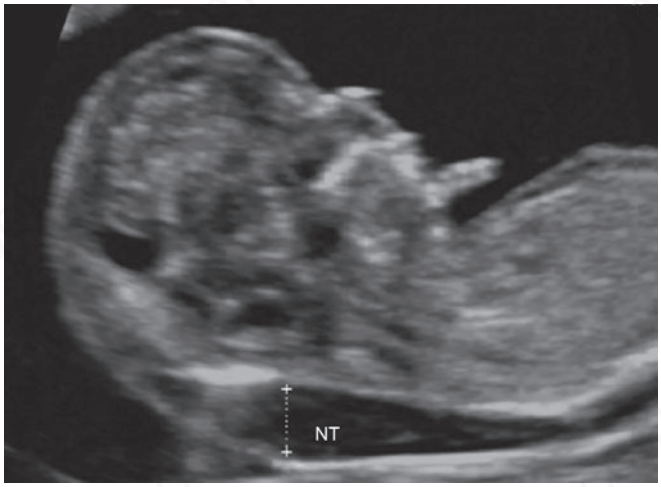


Fig. 1: Increased nuchal translucency (NT)

NUCHAL TRANSLUCENCY AND CHROMOSOMAL DEFECTS

Increased nuchal translucency (≥3 mm) can be associated with a number of anomalies, including:

• Aneuploidy—trisomies (including Down's syndrome) and Turner's syndrome

• Nonaneuploidy structural defects and syndromes—congenital diaphragmatic hernia, congenital heart disease, omphalocele, skeletal dysplasia, fetal infections, etc.

The detection rate of about 75–80% can be obtained by screening of fetuses by NT alone with maternal age for trisomy 21 and other major aneuploidies with a false positive rate of 5%. The detection rate can be improved to 90% by a combination of NT with maternal serum free β-hCG and pregnancy-associated plasma protein A (PAPP-A).

MEASUREMENT OF NUCHAL TRANSLUCENCY

The 'Fetal Medicine Foundation' (London) has laid down the following guidelines for correct measurement of 'Nuchal Translucency:

- The gestational period must be 11–13 weeks and six days. At and after 14 weeks of gestation with fetus is often in a vertical position, which makes it difficult to obtain the appropriate image.
- The fetal crown-rump length should be between 45 and 84 mm.
- The magnification of the image should be such that the fetal head and thorax occupy the whole screen.
- A mid-sagittal view of the face should be obtained. This is defined by the presence of the echogenic tip of the nose and rectangular shape of the palate anteriorly, the translucent diencephalon in the center and the nuchal membrane posteriorly (Fig. 2).

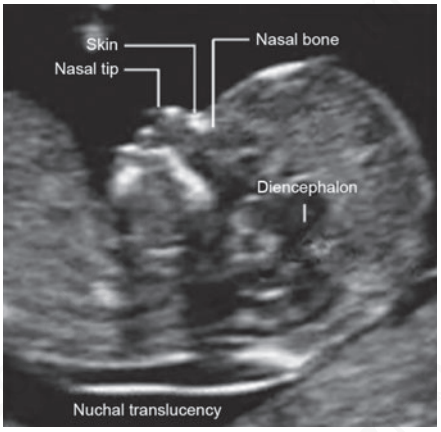


Fig. 2: Nuchal translucency measurement by ultrasound

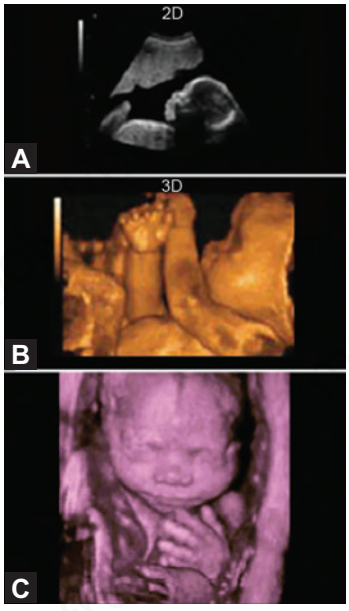
The fetus should be in a neutral position, with the head in line with the spine.

The widest part of translucency must always be measured.

• Measurements should be taken with the inner border of the horizontal line of the calipers placed on the line that defines the nuchal translucency thickness (Fig. 3).

Fig. 3: Correct placement of calipers for measurement of nuchal translucency

3D-USG IN OBSTETRICS



Figs. 4A to C: (A) 2D fetal profile, (B) 3D fetal profile; and (C) 3D image of a fetus

USGs IN TWIN PREGNANCY

USG OF CONJOINED TWIN

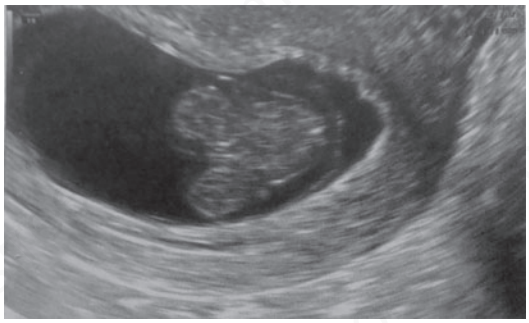


Fig. 5: Conjoined twin pregnancy at 9 weeks' gestation. Note the 2 fetal heads and apparent fusion at the thorax and abdomen. In this image, there is also a single amnion and chorion identified.

***Note*:** The two fetal heads and aparent fusion at thorax and abdomen.

USG OF DICHORIONIC DIAMNIOTIC TWIN

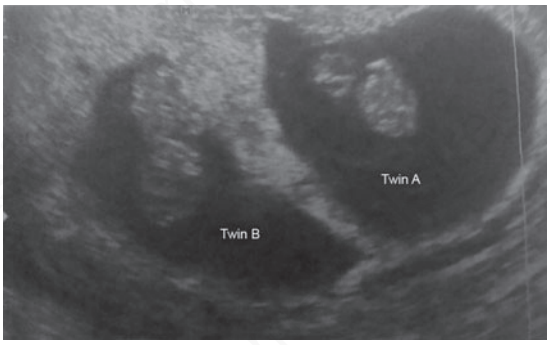


Fig. 6: Dichorionic diamniotic twin gestation at 8 week' gestation. Note the thick dividing membrane and wedge-shaped "lambda sign," the area at the top of the image, which represents the junction of the 2 placenta

***Note*:** The thick dividing membrane and wedge-shaped 'lambda' sign, the area at the top of the image, which represents the function of the 2 placentas.

USG OF CONJOINED TWINS

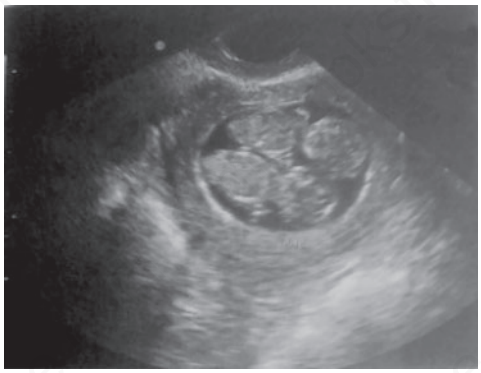
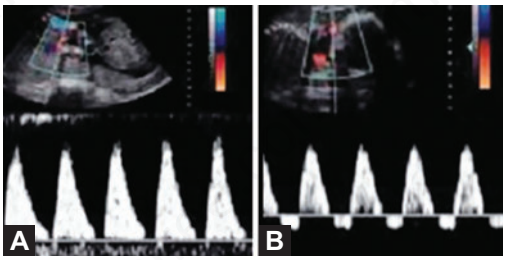


Fig. 7: Monochorionic monoamniotic twin gestation at 10 weeks' gestation.

Note: The lack of a dividing membrane and the close proximity of the fetuses. A single yolk sac was also noted.

DOPPLER ARTERY IMAGES

UMBILICAL ARTERY DOPPLER



Figs. 8A and B: Umbilical artery Doppler: (A) absent end-diastolic flow; (B) Reversed end diastolic flow

IMAGING FOR ADHERENT PLACENTA

CHARACTERISTICS OF PLACENTA ACCRETA ON GREYSCALE USG:

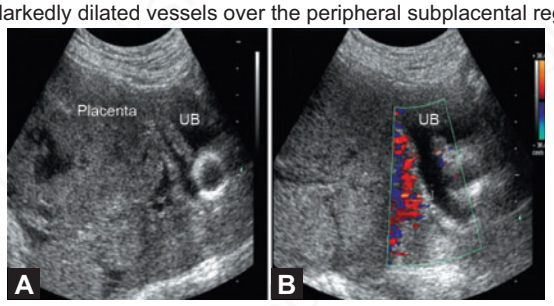
On gray-scale ultrasound imaging, the presence of at least one of the following characteristics is required to indicate placenta accreta: as shown in Figures 8A and B.

- Complete loss of the retroplacental sonolucent zone
- Irregular retroplacental sonolucent zone
- Thinning or disruption of the hyperechoic uterine serosa-bladder interface
- The presence of focal exophytic masses invading the urinary bladder and
- The presence of abnormal placental lacunae.

Likewise, the diagnosis of placenta accreta was regarded as positive when any one of these color Doppler criteria was present.

CHARACTERISTICS OF PLACENTA ACCRETA ON COLORED DOPPLER

- Diffuse or focal lacunar flow pattern.
- Sonolucent vascular lakes with turbulent flow typified by high velocity (peak systolic velocity >15 cm/s) and low resistance waveform.
- Hypervascularity of the uterine–bladder interface with abnormal blood vessels linking the placenta to the bladder, and
- Markedly dilated vessels over the peripheral subplacental region.

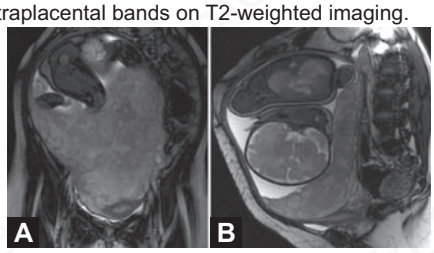


Figs. 9A and B: Cervix bisected to achieve access to the vesicouterine peritoneum. Slight traction on the bladder with Babcock's forceps brings connecting tissue strands into view for excision and the plane for access.

Soure: Shet SS. Access to vesicounterine and rectouterine pouches. In: Sheth SS (Ed). Vaginal hysterectomy, (2nd edn.) New Delhi, India: Jaypee Brothers Medical Publishers (P) Ltd; 2014.pp.31-50

CHARACTERISTICS OF PLACENTA ACCRETA ON MRI

- Uterine bulging.
- Heterogenous signal intensity within the placenta
- Dark intraplacental bands on T2-weighted imaging.



Figs. 10A and B: MRI images: (A) placenta percreta. (B) placenta previa without invasion

USG OF H. MOLE

***Note*:** The snowstorm appearance of H. mole.

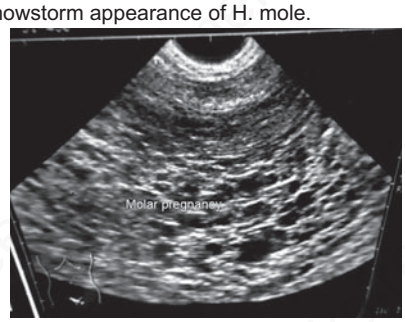


Fig. 11: USG showing snow storm appearance of hydatidiform mole

USG OF IUD

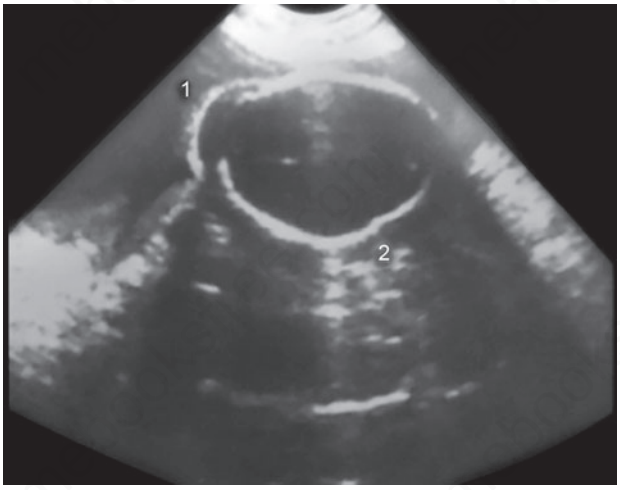
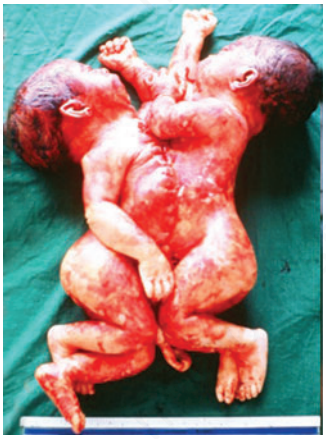


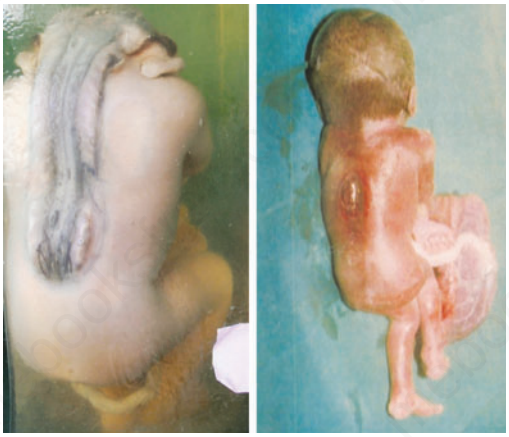
Fig. 12: Spalding sign

***Note*:** The overlapping of bones: Spalding; sign characteristic of IUD.

SPECIMENS IN OBSTETRICS



Specimen 1
Conjoined twins



Specimen 3
Spina Bifida

Specimen 2
Anencephaly

Specimen 4
Hydrocephalus

IMPORTANT FIGURES IN OBSTETRICS

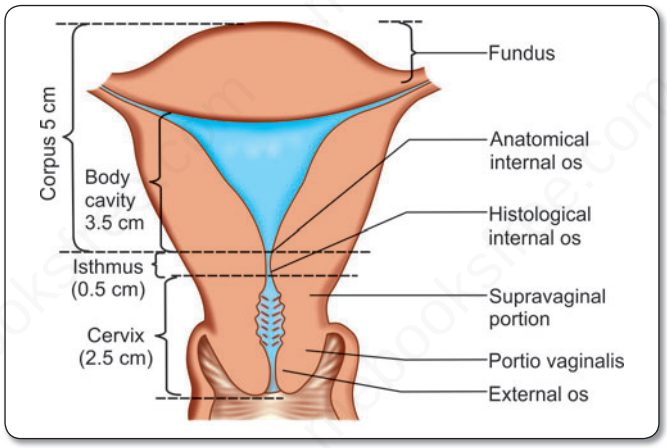


Fig. 1: Coronal section showing different parts of uterus

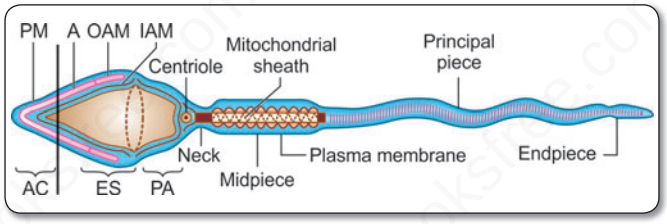


Fig. 2: Structure of a mature spermatozoon: PM = Plasma membrane; A = Acrosome; OAM = Outer acrosomal membrane; IAM = Inner acrosomal membrane; AC = Acrosomal cap; ES = Equatorial segment; PA = Post-acrosomal region

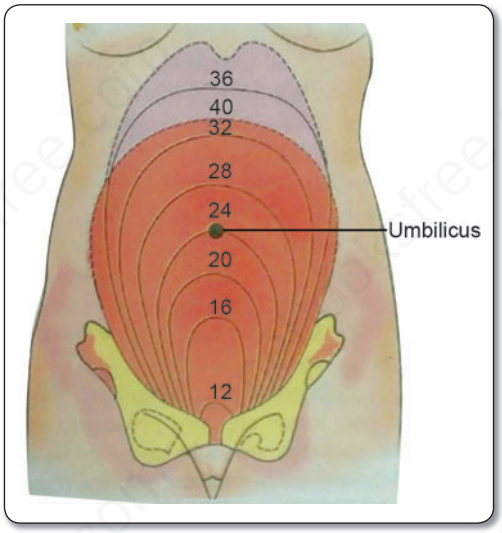
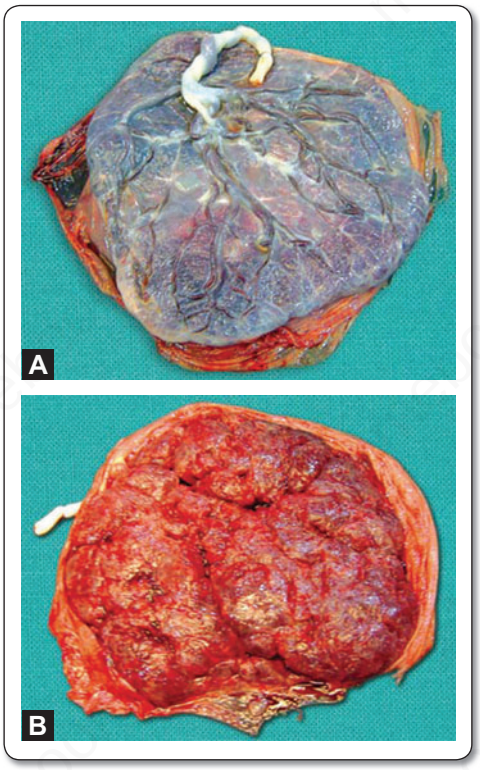


Fig. 3: Fundal height at various gestations (weeks)



Figs. 4A and B: (A) Fetal surface of the placenta showing attachment of the umbilical cord with ramification of the umbilical vessels. (B) Maternal surface of the placenta showing shaggy look with cotyledons limited by fissures

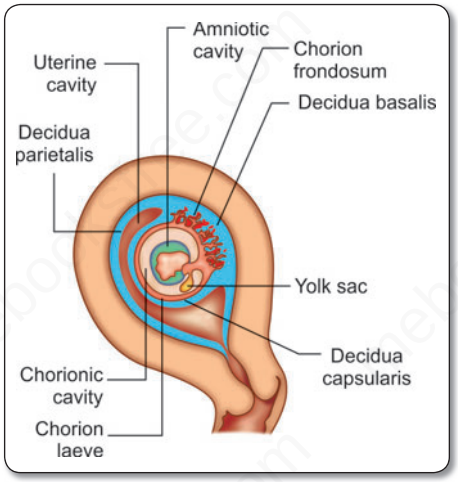
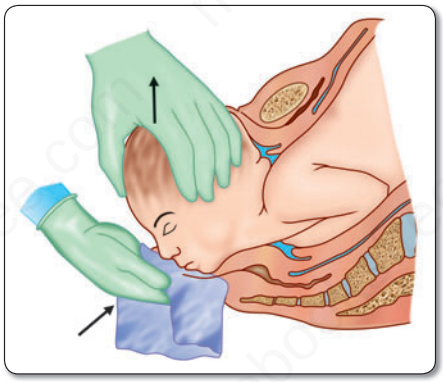


Fig. 5: Relation of the amniotic cavity: End of the 8th week
Note: The types of decidua

MANEUVERS IN OBSTETRICS



Ritgen's maneuver: For normal delivery

Fig. 1: Assisted delivery of the head by extension, exerting and upward pressure to the chin by the right hand placed over the anococcygeal raphe (Ritgen's maneuver)

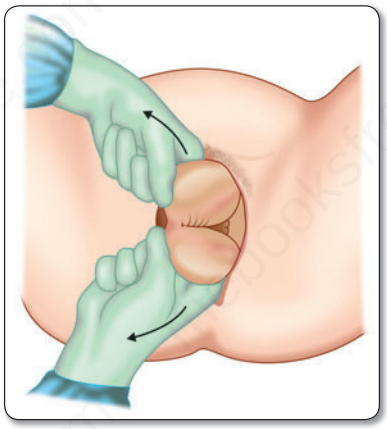
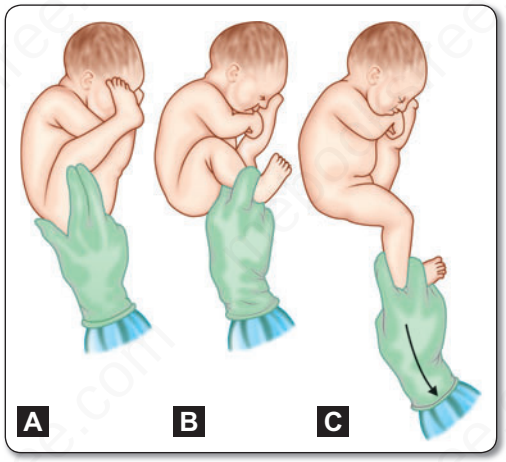


Fig. 2: Both groin traction for assisted breech delivery



Figs. 3A to C: Pinard's manuever—(A) Flexion and abduction of popliteal fossa; (B) To catch hold the ankle; (C) To pull down by movement of abduction

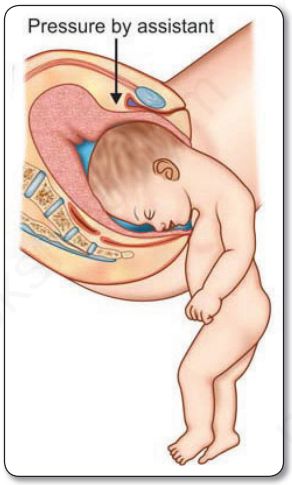


Fig. 4: Delivery of after-coming head by Burns-Marshall method

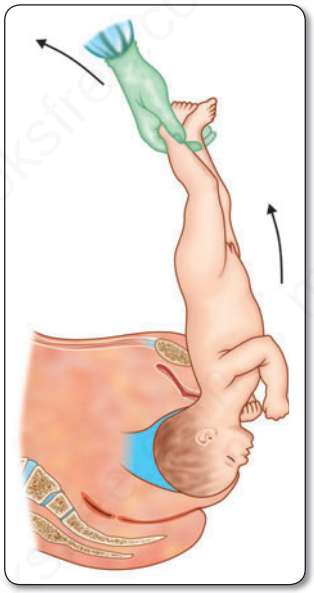
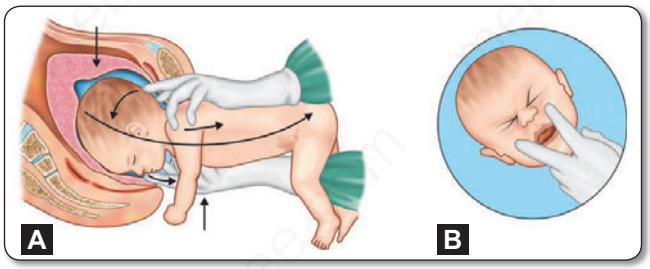
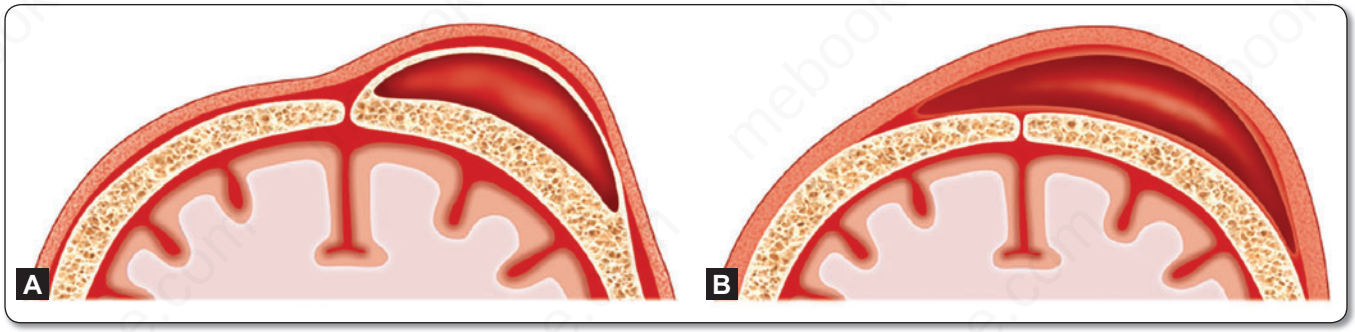


Fig. 5: Continuation of the Burn-Marshall method



Figs. 6A and B: Delivery of the aftercoming head by malar flexion and shoulder traction—(A) Original Mauriceau-Smellie-Veit; (B) Modification (preferred)



Figs. 7A and B: Cephalohematoma versus subgaleal hematoma. (A) Cephalohematomas are limited to suture lines. (B) In subgaleal hematomas, the bleeding crosses suture lines, causing diffuse welling that can indent on plapation

INSTRUMENTS

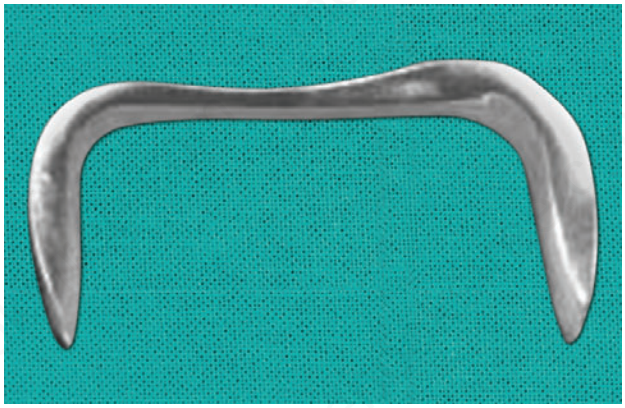


Fig. 1:

Sims posterior vaginal speculum

Material: Stainless steel

Sterilization: Autoclaving and boiling

Uses

- *Gynecologic*
  - Routine gynecological examination to visualize vagina and cervix
  - To collect discharge from posterior fornix
  - Hysterosalpingography (HSG)
  - Gynecological operations.
- *Obstetric*
  - Routine per speculum examination
  - Manual vacuum aspiration (MVA), first trimester medical termination of pregnancy (MTP)
  - Cervical cerclage
  - Diagnose and repair cervical tear.

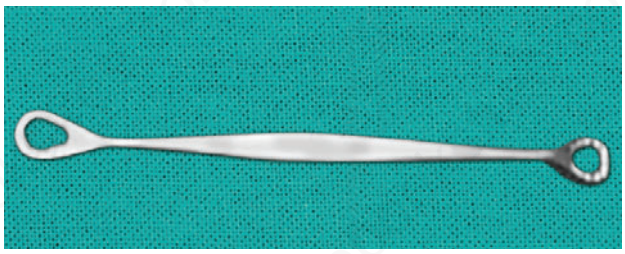


Fig. 2:

Sims anterior vaginal wall retractor

Material: Stainless steel

Sterilization: Autoclaving and boiling

Uses

Along with Sim's speculum, to visualize cervix by retracting anterior vaginal wall.

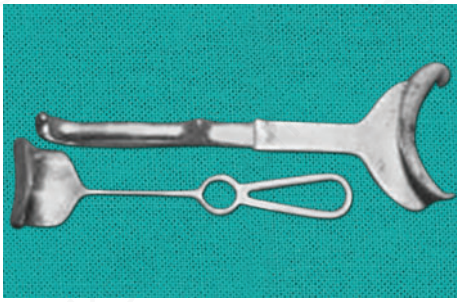


Fig. 3:

Doyen's retractor

Material: Stainless steel

Sterilization: Autoclaving

Uses

- *Gynecologic*
  - Abdominal hysterectomy
  - Wertheim's hysterectomy
  - Tuboplasty
  - Sling operation
  - Purandare's cervicopexy
  - Exploratory laparotomy for ovarian tumors
  - Myomectomy.
- *Obstetric*
  - Cesarean section
  - Cesarean hysterectomy
  - Exploratory laparotomy for ruptured tubal ectopic pregnancy.

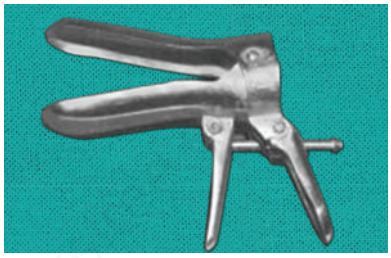


Fig. 4:

Cusco's self-retaining vaginal speculum

Material: Stainless steel

Sterilization: Autoclaving and boiling

Uses

- Routine per speculum examination in gynecology
- Colposcopy
- Endometrial biopsy
- Cervical punch biopsy
- Pap smear
- Insertion and removal of intrauterine contraceptive device (IUCD)
- Intrauterine insemination (IUI).

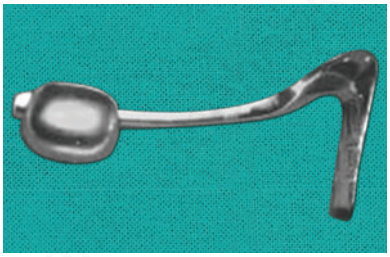


Fig. 5:

Auvard's speculum

Material: Stainless steel

Sterilization: Autoclaving

Uses

- Vaginal hysterectomy
- Anterior colporrhaphy
- Kelly's repair
- Fothergill's/modified Fothergill's repair
- Vesicovaginal fistula repair
- Schauta's hysterectomy.

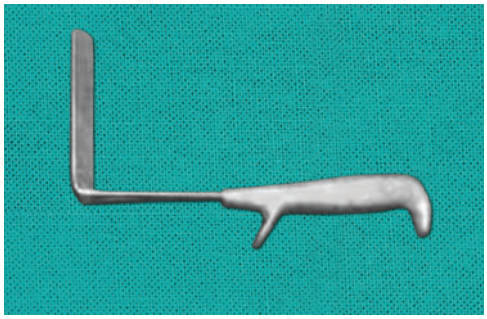


Fig. 6:

Landon bladder retractor

Material: Stainless steel

Sterilization: Autoclaving and boiling

Uses

- To retract the bladder away from cervix and uterus during vaginal hysterectomy. It is introduced into anterior pouch after the uterovesical fold of peritoneum has been opened
- To retract lateral and anterior vaginal walls during any vaginal operation.

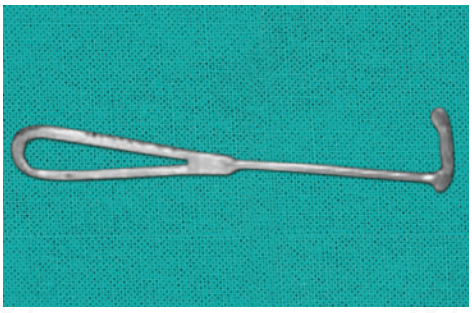


Fig. 7:

Right angle retractor

Material: Stainless steel

Sterilization: Autoclaving and boiling

Uses

- To retract abdominal wall during tubal ligation
- To retract bladder and posterior vaginal wall during hysterectomy
- To retract bladder during abdominal hysterectomy.

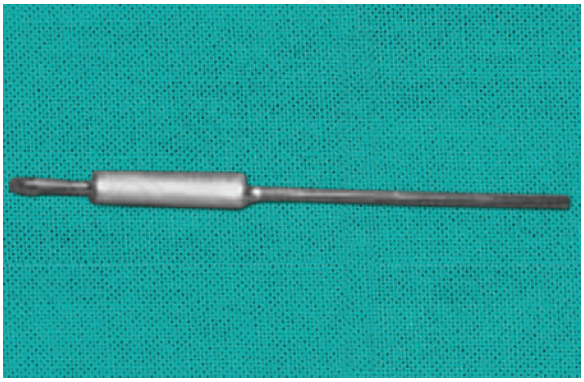


Fig. 8:

Flushing curette

Material: Stainless steel

Sterilization: Autoclaving and boiling

Use

Dilatation and evacuation operation.

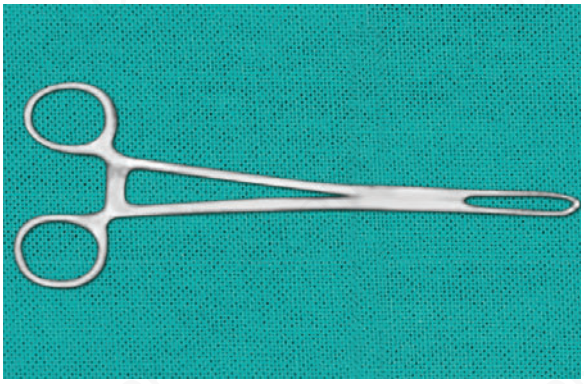


Fig. 9:

Allis tissue-holding forceps

Material: Stainless steel

Sterilization: Autoclaving and boiling

Uses

- *General:* To hold the rectus sheath while opening and closing abdominal wall
- *Gynecologic:* To hold the edges of vagina
  - In anterior colporrhaphy, enterocele repair, colpo-perineorrhaphy

Contd...

Contd...

- In vaginal hysterectomy, abdominal hysterectomy
- Fothergill's repair
- Repair of vesicovaginal/rectovaginal fistula
- To hold the cervix
- Abdominal hysterectomy
- To hold the lips of pediatric cervix
- To hold the uterus
- Vaginal and abdominal hysterectomy, myomectomy, utriculoplasty
- Marchetti test for detection of stress urinary incontinence.

- *Obstetric*
  - In lower segment cesarean section (LSCS) to hold angles of uterine incision
  - For correction of acute inversion of uterus.

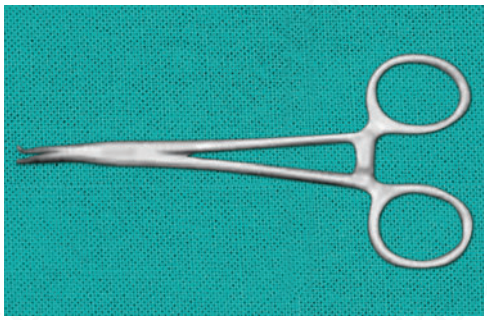


Fig. 10:

Curved artery forceps

Material: Stainless steel

Sterilization: Autoclaving

Uses

- For hemostasis
- Holding structures like peritonium, rectus sheath, vessels, muscles, etc. during any operative procedure
- For suture removal
- Can be used for clamping placenta after delivery of baby.

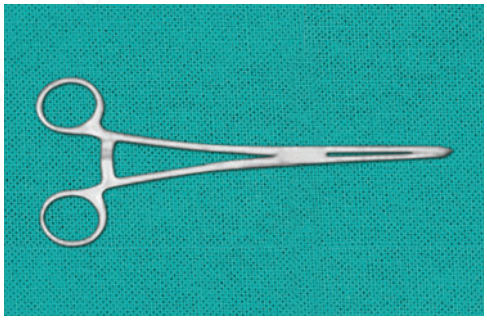


Fig. 11:

Sponge-holding forceps

Material: Stainless steel

Sterilization: Autoclaving and boiling

Uses

- *General*
  - Painting and preparing parts preoperatively
  - Swab out cavities like vagina and pelvic cavity
- *Gynecologic*
  - For applying pressure over deep bleeding points during pelvic surgery
  - To check hemostasis of stumps during vaginal hysterectomy
  - For packing away omentum and intestines out of pelvis in gynecological operations
- *Obstetric*
  - To hold lips of pregnant cervix during tightening of os
  - For diagnosis and repair of cervical tear
  - Swab out blood in uterine cavity.

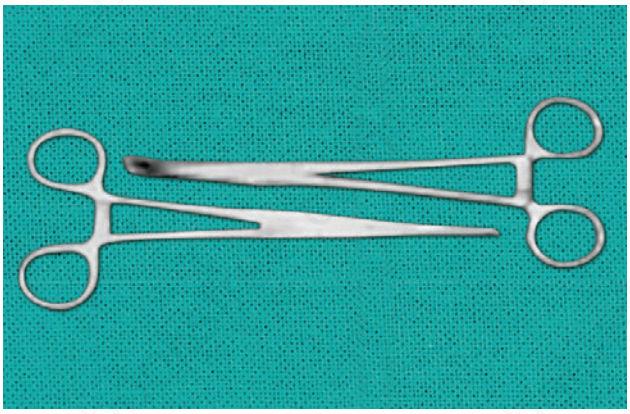


Fig. 12:

Kocher's clamp

Material: Stainless steel

Sterilization: Autoclaving and boiling

The blades may be curved or flat or straight. One blade has a longitudinal ridge which fits in a longitudinal groove on the other blade. It has transverse serrations on its blade.

Uses

Hysterectomy

To clamp the uterosacral ligaments, uterine blood vessels and the cornual structures or the infundibulopelvic ligaments in vaginal hysterectomy.

- Ophorectomy for ovarian cysts or tumors
- Removal of pedunculated leiomyomatous polyps
- Salpingectomy for tubal ectopic gestation
- Cesarean hysterectomy
- Clamping the umbilical cord of the newborn
- Artificial low rupture of membranes

To hold the uterus during abdominal hysterectomy.

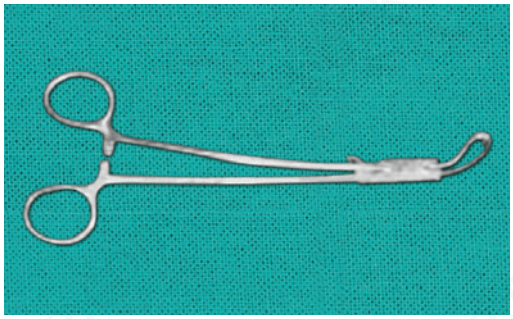


Fig. 13:

Tenaculum

Material: Stainless steel

Sterilization: Autoclaving and boiling

Uses

- To hold the lips of nulliparous cervix
- To hold cervical stump in subtotal hysterectomy.

Special Use

- Hysterosalpingography
- Chromopertubation test
- Rubin's test.

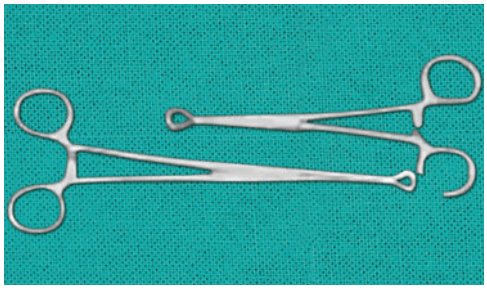


Fig. 14:

Straight Babcock forceps

Material: Stainless steel

Sterilization: Autoclaving and boiling

Uses

To hold tubular structures like:

- Fallopian tubes in tubal sterilization, ruptured tubal ectopic pregnancy
- Round ligaments
- Ureters in Wertheim's hysterectomy
- Vas in vasectomy
- Appendix and cecum in appendicectomy.

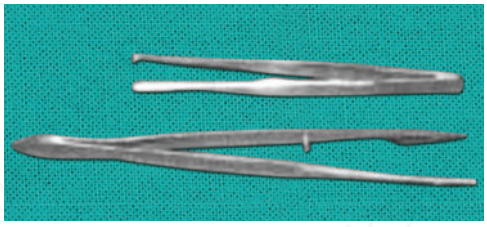


Fig. 15:

Tooth forcep

Material: Stainless steel

Sterilization: Autoclaving and boiling

Uses

- To hold tough structures like:
  - Tendon
  - Fascia
  - Skin
  - Rectus sheath
  - Uterine wall, etc.
- Can be used for hemostasis.

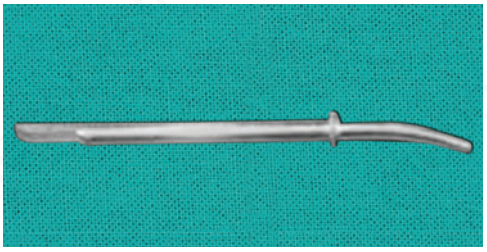


Fig. 16:

Hegar dilator

Material: Stainless steel

Sterilization: Autoclaving and boiling

It is a solid rod-curved near the tip and tapering towards the tip. The curve is shallow and the dilating portion is within terminal 1.5 cm of the dilator.

Uses

For the rapid dilatation in:

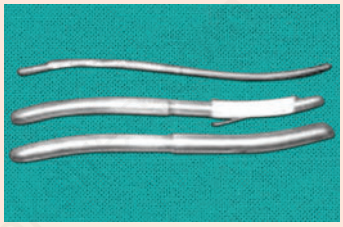
- Prior to endometrial curettage
- Prior to suction aspiration for first trimester MTP
- Prior to suction evacuation of mole
- Removal of endometrial polyp, placental polyp, leiomyomatous polyp
- Hysteroscopy
- Amputation of cervix, Fothergill's operation, following cervical conization
- Cervical stenosis
- Application of intrauterine radiotherapy
- Primary dysmenorrhea
- Diagnosis of incompetent os.

Fenton Dilator

It is similar to Hegar dilator except for two important differences—it is more tapering and hollow inside.

Use

Same as that of Hegar dilator.



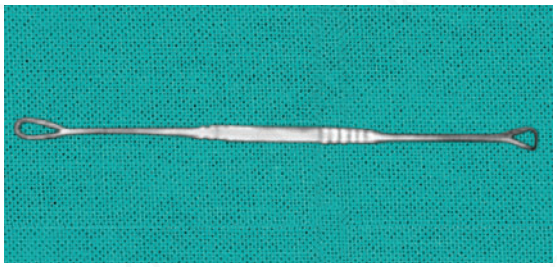


Fig. 17:

Sharp and blunt curette

Uses

- Gynecological uses
  - Diagnostic
    1. Primary or secondary infertility for ovulation detection
    2. Tuberculous endometritis
    3. Abnormal uterine bleeding
    4. Endometrial hyperplasia/endometrial carcinoma
    5. Carcinoma cervix
    6. Secondary amenorrhea
    7. Postmenopausal bleeding
  - Therapeutic
    1. Dysfunctional uterine bleeding (DUB)
- Asherman's syndrome
- To remove embedded intrauterine device (IUD)
- Obstetrical uses:
  - MTP, check curettage
  - Blunt curettage in abortions
  - Secondary persistent pulmonary hypertension (PPH), subinvolution.

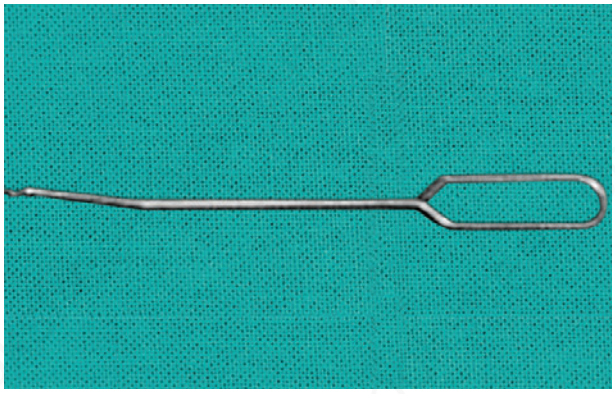


Fig. 18:

IUCD removing hook

Material: Stainless steel

Sterilization: Autoclaving and boiling

Uses

- Removal of an embedded IUD from the uterine cavity
- Removal of tubal prosthesis from the uterine cavity.

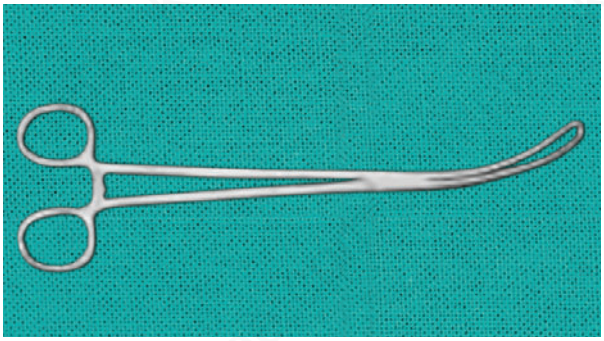


Fig. 19:

Vulsellum

Material: Stainless steel

Sterilization: Autoclaving and boiling

Uses

- To hold anterior lip of cervix in:
  - Endometrial biopsy
  - IUCD insertion
  - Intrauterine insemination
  - Vaginal hysterectomy
  - Cauterization of cervix and cervical biopsy
- To hold posterior lip of cervix in:
  - Colpopuncture for suspected ruptured ectopic pregnancy
  - Culdoscopy
  - Posterior colpotomy.

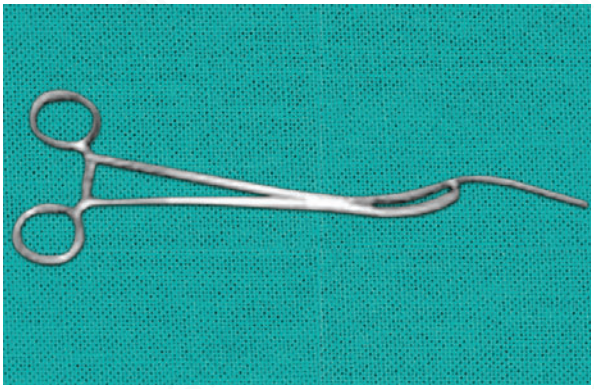


Fig. 20:

Hulka uterine manipulator

Material: Stainless steel

Sterilization: Autoclaving and boiling

Uses

- It is used to elevate and manipulate position of uterus for following:
  - Laparoscopic sterilization
  - Sterilization by mini laparotomy
  - Visualization of pelvic structures by laparoscopy.

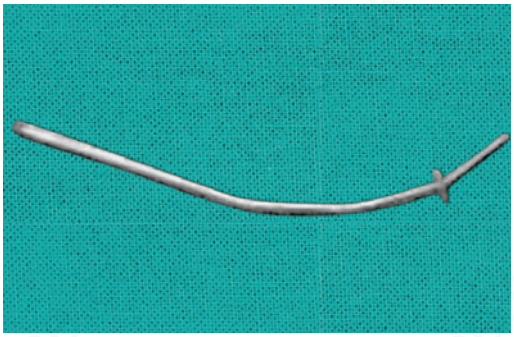


Fig. 21:

Vitoon uterine manipulator

Material: Stainless steel

Sterilization: Autoclaving and boiling

Uses

Same as that of Hulka uterine manipulator.

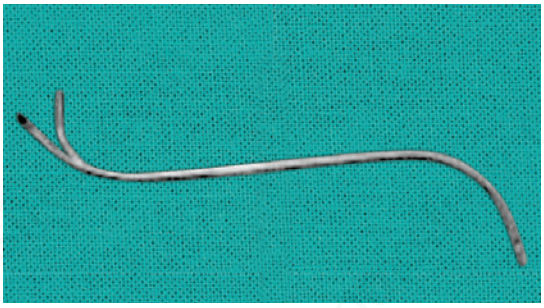


Fig. 22:

Drew-Smythe catheter

Material: Stainless steel

Sterilization: Autoclaving and boiling

It is S-shaped and has a side opening to drain liquor amnii. It has a spring loaded stylet with a blunt tip.

Uses

- High amniotomy
- To drain a hydrocephalic head through a spina bifida, in case of a breech delivered up to the head.

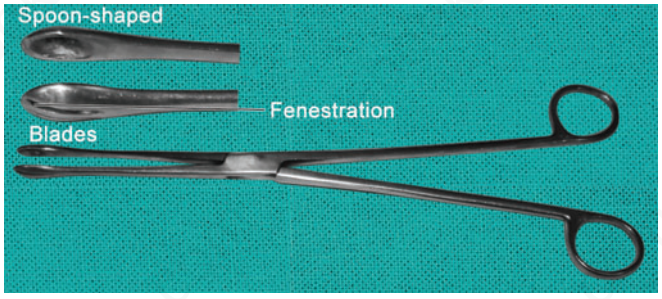


Fig. 23:

Haywood Smiths ovum forceps

Designed by Haywood Smiths.

Parts

Blades

- Blades are spoon-shaped, fenestrated and have blunt ends
- Longitudinal fenestrations can hold good amount of tissue.

Lock

- It is absent.
- Anything held in blades is firmly caught but not nipped and so no crushing.

  Ovum forceps is differentiated from sponge holding forceps by following points:
  - It has no lock
  - It has no serrations

Catch lock is absent so less chances of injury to intra-abdominal structures.

Uses

- Evacuation of products of conception in abortion and vesicular mole.
- Evacuation of products of conception in secondary PPH.

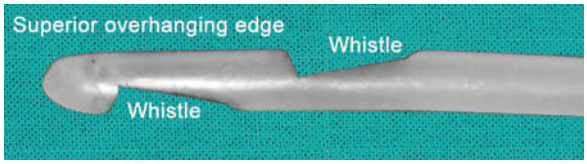


Fig. 24:

Karman cannula

A long tubular structure made of plastic or metal.

- *Types:* Rigid or flexible
- *Sizes:* 4–12 mm
- Parts
  - *Distal end:* Double whistle at the terminal end.
  - *Proximal end:* Fixes into syringe.
  - Superior overhanging edge acts as a curette.

The number of cannula corresponds to diameter of cannula in millimeters. A plastic cannula is preferred because it is less traumatic, transparent and disposable.

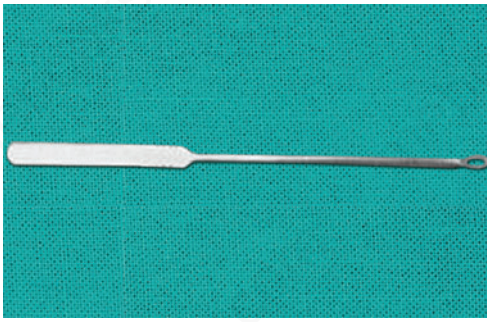


Fig. 25:

Cuzzi placental curette
Material: Stainless steel
Sterilization: Autoclaving and boiling

OBSTETRIC FORCEPS

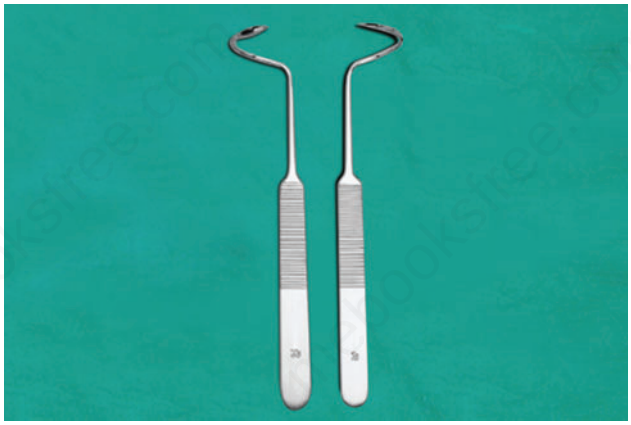


Fig. 26: Shirodkar's cerclage needles

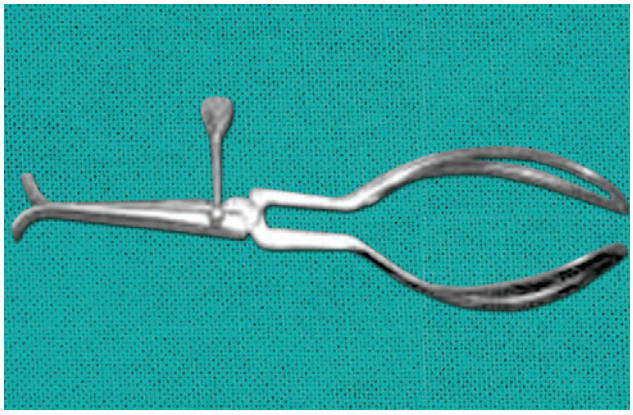


Fig. 27: Long-curved obstetric forceps

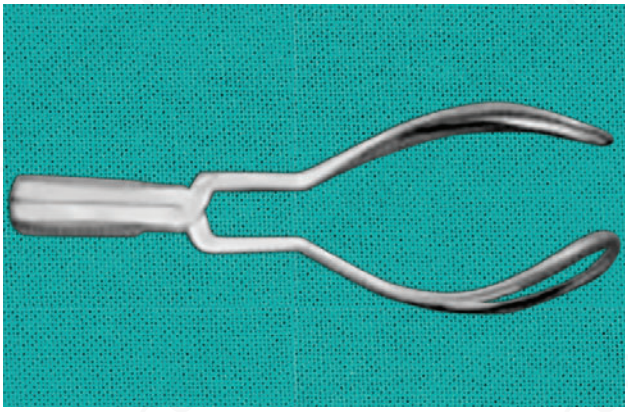


Fig. 28: Wrigley's forceps

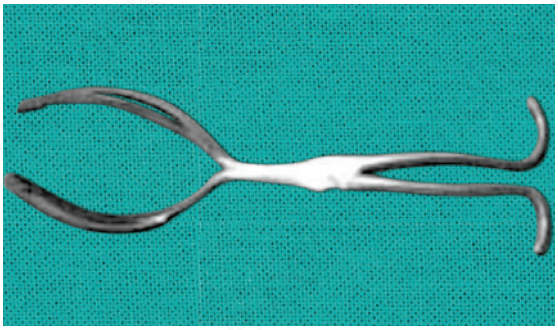


Fig. 29: Kielland's forceps

Measurement: Length 40 cm, straight obstetric forceps without any axis traction device. It has got a sliding lock which facilitates correction of synclitism of the head.

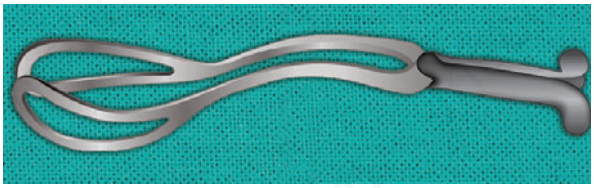


Fig. 30: Piper's forceps

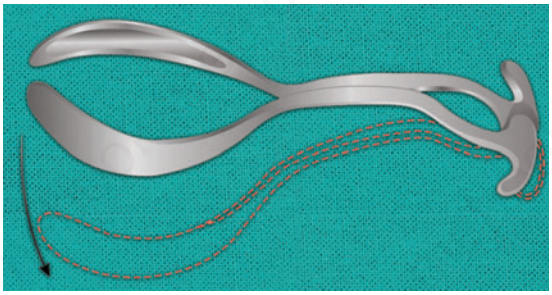


Fig. 31: Laufe's forceps

Fig. 32: Barnes-Neville forceps

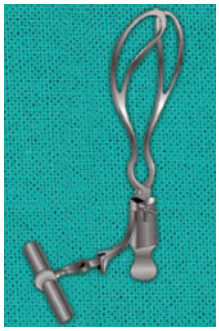
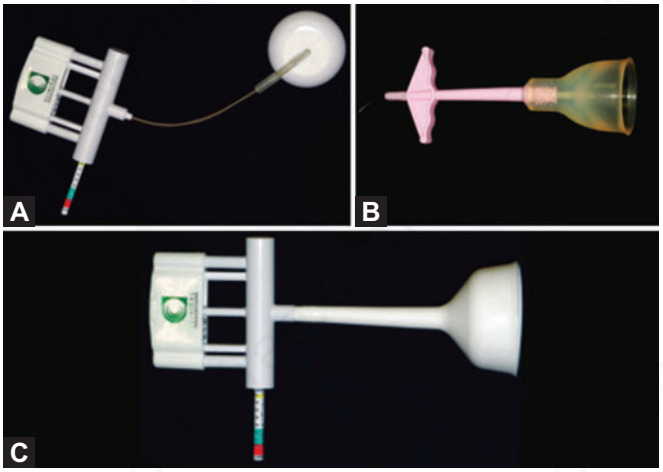


Fig. 33: Haig-Ferguson's forceps

Fig. 34: Rigid metal Malstromme cup



Figs. 35A to C: Examples of newer vacuum devices; the cups can vary in shape and size. (A) The Kiwi Omnicup is a rigid plastic cup that is disc-shaped and modeled after the original Bird posterior cup; it is suited for occipitoposterior deliveries. Newer devices allow (B) for an assistant to hand-pump suction using a separate device or (C) for the user to hand-pump suction with a single handheld device