

Labor & Intrapartum Maternal Monitoring

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5th Year Medical Students

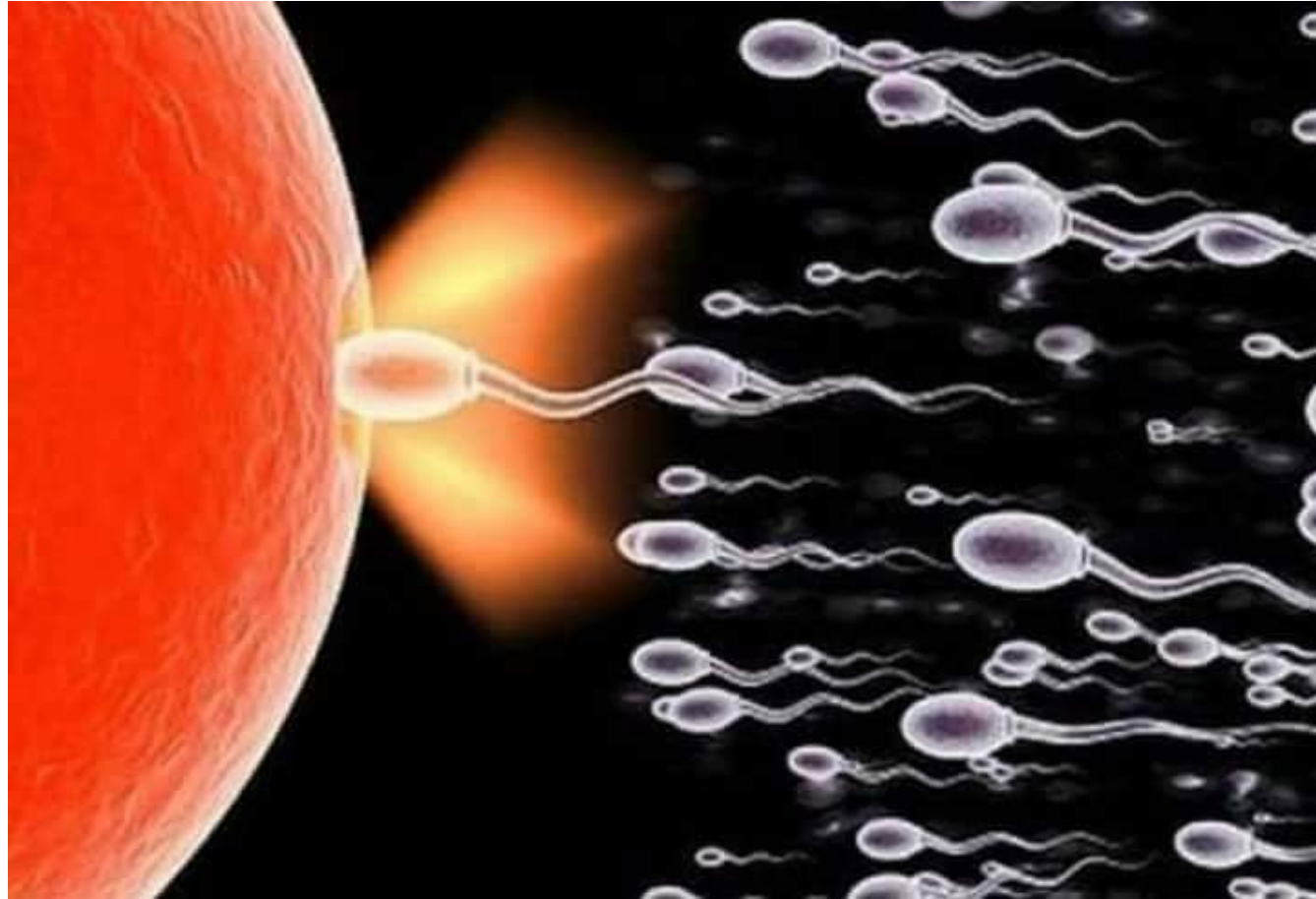
Jordan University

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OBJECTIVES

- 1. Revise the anatomy of female pelvis
- 2. Identify different types of female pelvic cavity
- 3. Define True Labor & False Labor
- 4. Identify mechanism of labor in first and second stage of labor
- 5. Define the four stages of labor
- 6. Describe the management of each stage of labor
- 7. Describe the methods used to assess the progress of labor
- 8. Discuss the available methods for Augmentation & Induction of labor and their complications.
- 9. Describe the active management of the third stage of labor
- 10. Interpret labor partogram

The start of the journey



﴿وَلَقَدْ خَلَقْنَا الْإِنْسَانَ مِنْ سُلَالَةٍ مِنْ طِينٍ (12) ثُمَّ جَعَلْنَاهُ نُطْفَةً فِي قَرَارٍ مَكِينٍ (13) ثُمَّ خَلَقْنَا
النُّطْفَةَ عَلَقَةً فَخَلَقْنَا الْعُلُقَةَ مُضْغَةً فَخَلَقْنَا الْمُضْغَةَ عِظَامًا فَكَسَوْنَا الْعِظَامَ لَحْمًا ثُمَّ أَنْشَأْنَاهُ
خَلْقًا آخَرَ فَتَبَارَكَ اللَّهُ أَحْسَنُ الْخَالِقِينَ (14)﴾



Labor

- **True Labor pain** is defined as regular, rhythmic, progressive and painful uterine contractions that cause progressive dilation and effacement (thinning and shortening) of the cervix and subsequent expulsion of the fetus, and are not relieved by rest, hydration, or pain medications.

Braxton-Hicks contractions (False labor pain)

- Braxton Hicks contractions are irregular in duration and intensity, occur infrequently, are unpredictable and non-rhythmic, and are more uncomfortable than painful.
- Unlike true labor contractions, Braxton Hicks contractions do not increase in frequency, duration, or intensity.
- Women often mistake Braxton Hicks contractions for true labor. They often seek care and undergo unnecessary evaluation for these contractions.
- There is no medical treatment for Braxton Hicks contractions.
- Changing position or activity level, take a warm bath, get a massage, read a book, listen to music, or take a nap & drinking water to rehydrate may help.

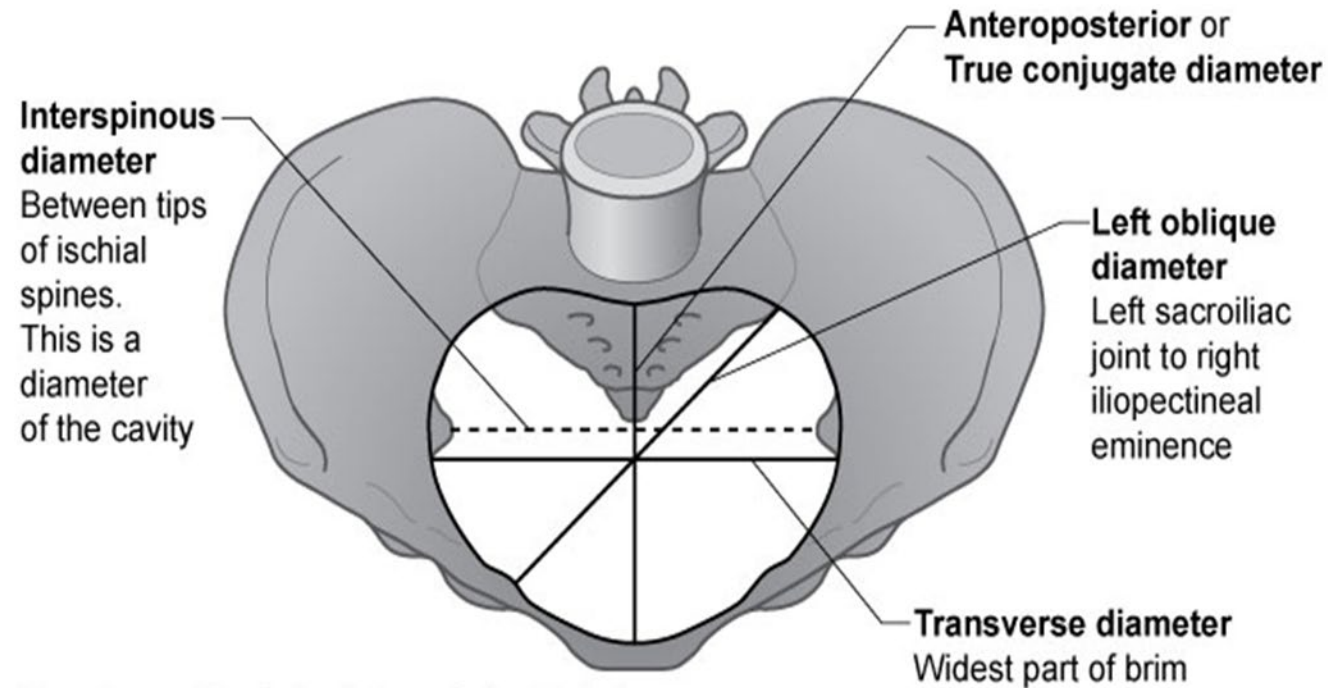
Stages of Labor

- The First stage of Labor
- 1- Latent
- 2-Active (Established)
- The Second stage of labor
- The Third stage of labor
- The Fourth stage of labor

Anatomy of the female pelvis

- ✓ **The Female Bony Pelvis**
 - The Pelvic inlet(The Brim)
 - The Midpelvis (The Midcavity)
 - The Pelvic outlet
- ✓ **The Pelvic Floor**
- ✓ **The Perineum**

The Female Bony Pelvis

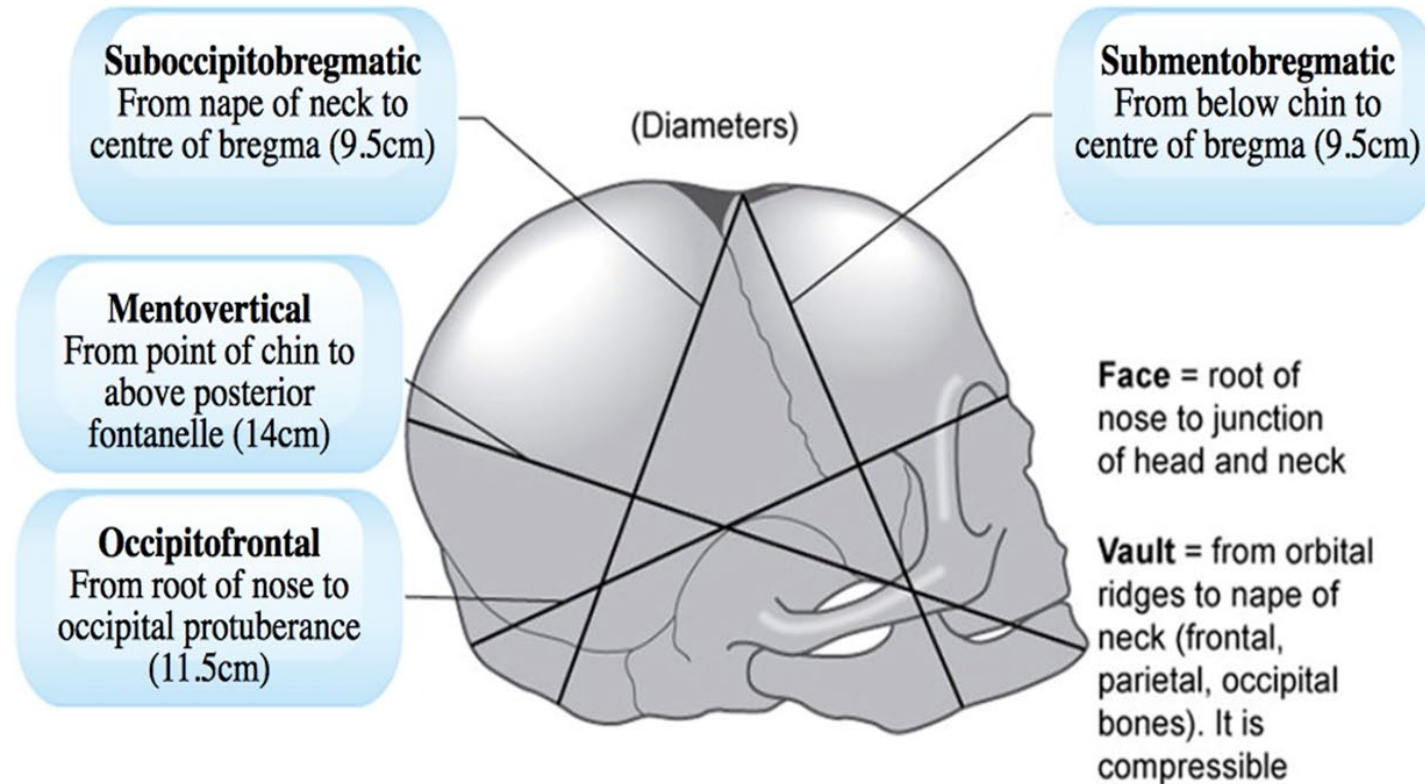


The plane of the brim is bounded anteriorly by the pubis, laterally by the iliopectineal lines, posteriorly by the alae and promontory of the sacrum

Shapes of the pelvis

- The gynaecoid pelvis is the most common shape & most favorable for labor.
- The android pelvis is said to predispose to failure of rotation and deep transverse arrest.
- The anthropoid shape encourages an occipito-posterior (OP) position.
- The platypelloid pelvis is also associated with an increased risk of obstructed labor due to failure of the head to engage, rotate or descend.

Anatomy of the fetal skulls



Normal labor

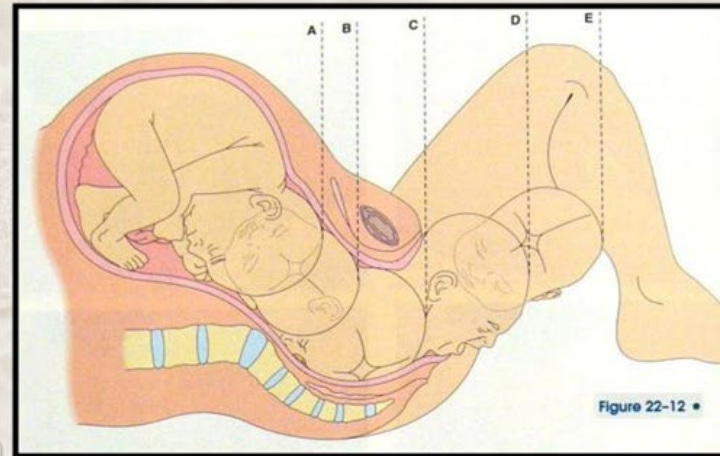
- The fetal head enters the pelvic inlet in a transverse position, rotates in the midpelvis and delivers in an AP position (OA, OP)
- The transverse is the widest diameter at the inlet, but at the outlet it is the AP diameter, and the fetal head must rotate from a transverse to an AP position as it passes through the pelvis.
- Typically, this happens in the midpelvis where the transverse and AP diameters are similar.

Cardinal Movements

The cardinal movements that occur during the mechanism of labor describe the movement of the fetus through the birth canal

Cardinal Movements

- Engagement
- Descent
- Flexion
- Internal Rotation
- Extension
- Restitution
- External Rotation
- **Expulsion (BIRTH!)**



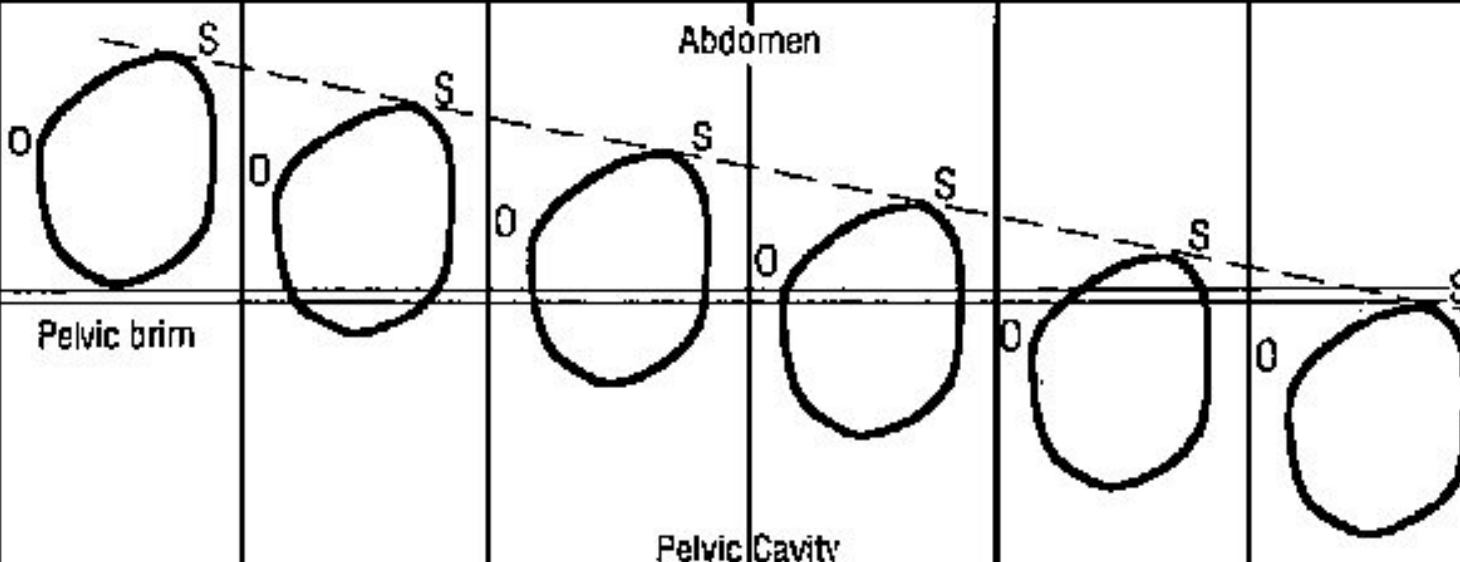
Engagement

- Engagement is said to have occurred when the widest part of the presenting part has passed successfully through the inlet.
- Engagement has occurred in the vast majority of nulliparous women prior to labor, usually by 37 weeks' gestation, but not so for the majority of multiparous women.

Engagement

- The number of fifths of the fetal head palpable abdominally is used to describe whether engagement has taken place.
- If more than two-fifths of the fetal head is palpable abdominally, the head is not yet engaged.
- 2/5 up Engaged

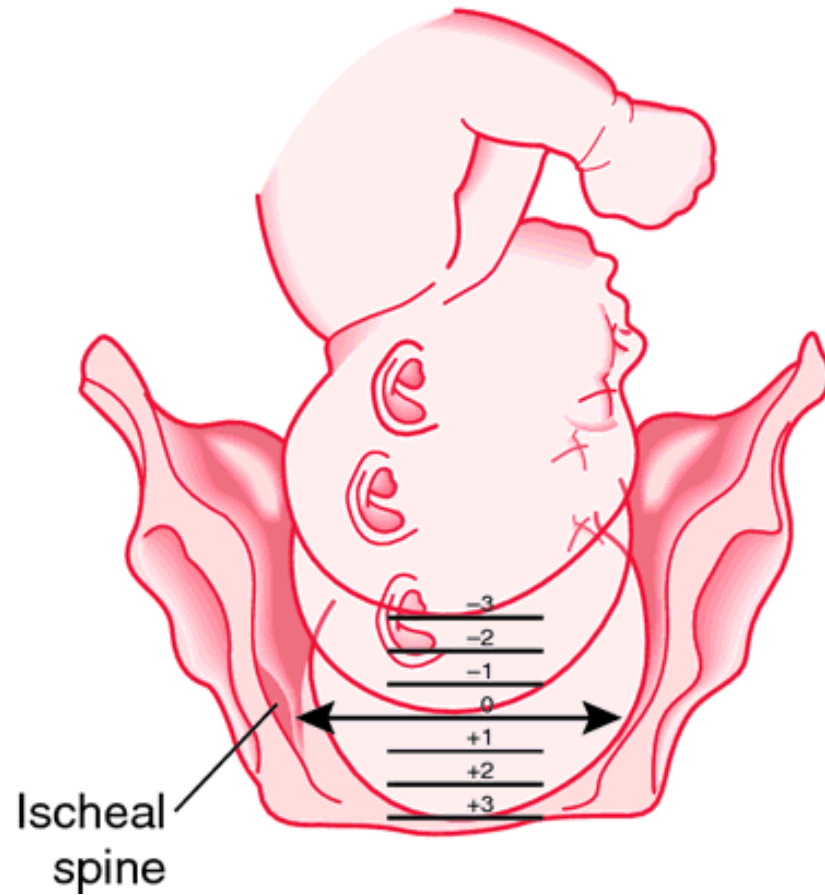
Rule of 5

<i>5/5</i>	<i>4/5</i>	<i>3/5</i>	<i>2/5</i>	<i>1/5</i>	<i>0/5</i>
					
Completely above	Sinciput High Occiput Easily felt	Sinciput Easily felt Occiput Felt	Sinciput Felt Occiput Just felt	Sinciput Felt Occiput Not felt	None of head palpable

Engagement

- “0 Station” is an important landmark for engagement, when the presenting part is at the level of the ischial spine.

Engagement/ 0 Station



The ischial spines

- **The ischial spines are palpable vaginally and are used as important landmarks for two purposes:**
- 1- To assess the descent of the presenting part on vaginal examination (e.g. station zero is at the level of the ischial spines, -1 is 1 cm above the spines and $+1$ is 1 cm below the spines).
- 2- To provide a local anesthetic pudendal nerve block.
- The pudendal nerve passes behind and below the ischial spine on each side.

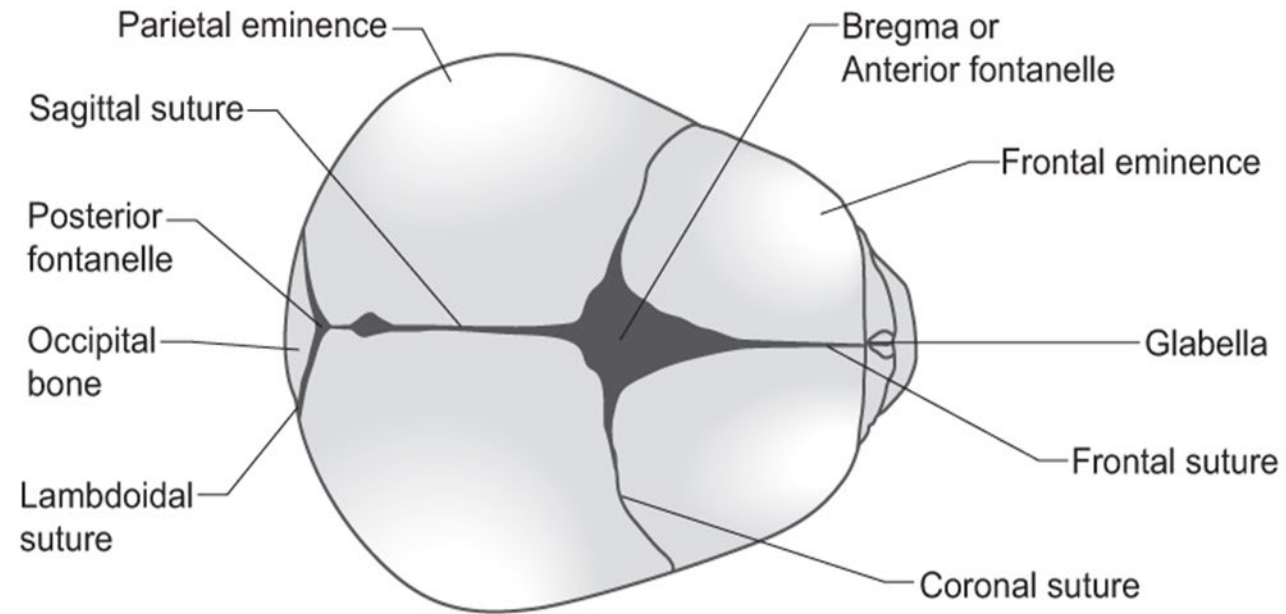
Fetal Lie

- Fetal lie refers to the relationship between the longitudinal axis of the baby with respect to the longitudinal axis of the mother.
- Longitudinal lie
- Transverse lie
- Oblique lie

Fetal Presentation

- Presentation: that part of the fetus entering the pelvis first, e.g. vertex of head, face, brow, breech, shoulder or compound (hand & vertex).

The vertex



Vertex

- The vertex is the area bounded by the anterior (Bregma) and posterior fontanelle and the parietal eminence.
- In normal labor the vertex of the fetal head is the presenting part and the posterior fontanelle (indicating the occiput) is used to define the position of the fetal head in relation to the pubic symphysis (OA,OT,OP)

Summary of Presenting diameters

Vertex	Suboccipito–bregmatic	9.5 cm
Deflexed OP	Occipito–frontal	11.5 cm
Brow	Mento–vertico	13.0 cm
Face	Submento–bregmatic	9.5 cm

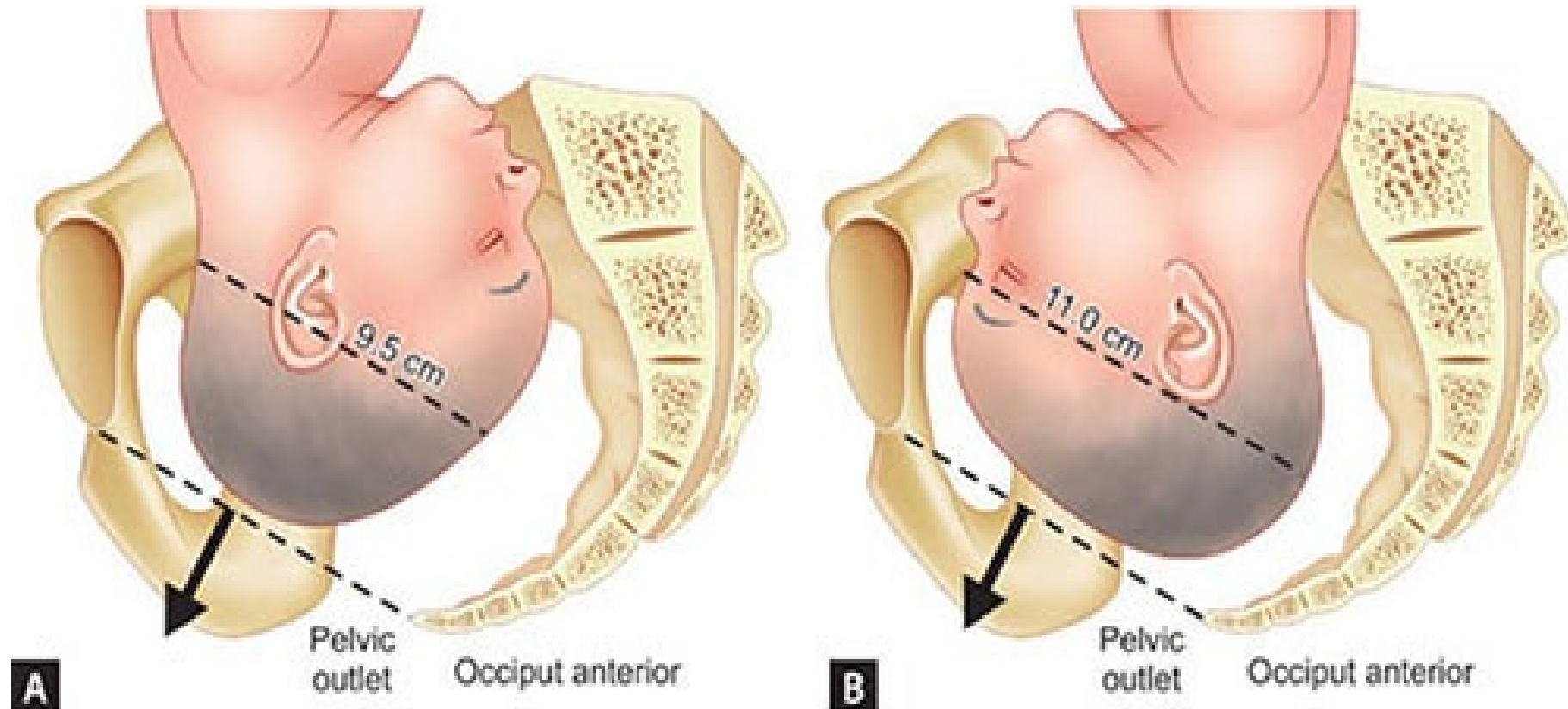
Fetal Position

- Position: orientation of the presenting part in relation to the maternal symphysis pubis, e.g. occipito-anterior, occipito-posterior, occipito-transverse.

Position

- The occipito-anterior (OA) position is the most favorable for a spontaneous vaginal birth.
- The occipito-transverse (OT) position or occipito-posterior (OP) position is a **malposition** and may result in prolonged labor, instrumental delivery or caesarean section.

The Occiput Anterior position is ideal for normal delivery: smallest presenting diameter



Molding

- The parietal bones usually slide over the frontal and occipital bones. Furthermore, the bones themselves are compressible.
- These characteristics of the fetal skull allow a process called ‘molding’ to occur, which reduces the diameters of the fetal head and encourages progress through the bony pelvis, while still protecting the underlying brain.
- Severe molding, or molding early in labor, can be a sign of obstructed labor due to a fetal malposition (failure of the head to rotate) or cephalopelvic disproportion (a mismatch between the size of the fetal head and maternal pelvis).

Original Bishop score

To assess cervical condition

Parameter	0	1	2	3
Dilatation	<1 cm	1–2 cm	2–4 cm	>4 cm
Length	>4 cm	2–4 cm	1–2 cm	<1 cm
Consistency	Firm	Average	Soft	
Position	Posterior	Mid	Anterior	
Station	–3	–2	–1, 0	+1, +2

Simplified Bishop Score

- The most common modification to the Bishop score is a simplified scoring system that just takes into account **dilation, effacement, and station** (each scored 0 to 3 points).
- Range (0-9)
- In this shortened modification, a score of more than 5 is considered favorable

Factors possibly linked to controlling cervical ripening including

- **prostaglandins**
- Estrogens
- Progesterone and antiprogesterones
- Relaxin
- Inflammatory mediators
- Nitric oxide
- Apoptosis

Methods commonly employed to encourage cervical ripening in clinical practice

Pharmacological	Mechanical
Misoprostol - Prostaglandin E1	Foleys Catheter
Dinopostone – Prostaglandin E2	Single / Double Balloon catheter

The First stage of Labor

- ❖ The first stage of labor is divided into two phases:
 - The Latent phase
 - The active phase
- ❖ This describes the time from the diagnosis of labor to full dilatation of the cervix (10 cm).

The Latent Phase of 1st Stage of Labor

- Latent first stage of labor is the presence of irregular contractions which become progressively coordinated, discomfort is minimal, and the cervix effaces and dilates to 4 cm.
- The latent phase is difficult to time precisely, and duration varies, averaging 8 hours in nulliparas and 5 hours in multiparas.
- Duration is considered abnormal if it lasts > 20 hours in nulliparas or > 14 hours in multiparas

Management of ladies in their latent phase of the first stage of labor

- Women who are in the latent phase of labor should be encouraged to mobilize and should be managed away from the labor suite where possible.
- Intervention during this phase is best avoided unless there are identified risk factors.
- Simple analgesics are preferred
- There is no reason to restrict eating and drinking, although lighter foods and clear fluids may be better tolerated.
- Encouragement and reassurance are extremely important.

The active phase of 1st Stage of Labor

- A woman is considered to be in active or established labor when there is regular contractions and progressive dilation **beyond 4 cm (RCOG), 5 cm (WHO), 6 cm (ACOG)**
- Cervical dilatation during the active phase occurs typically at 1 cm/hour or more in a normal labor, but is only considered abnormal if it occurs at less than 1 cm in 2 hour.
- The active phase pf labor is variable in length, usually lasting between 2 and 8 hours, shorter in multiparous women.

Management of Ladies in their active phase of the first stage of labor

- One-to-one midwifery care should be provided.
- Additional emotional support from a birth partner should be encouraged.
- Obstetric and anesthetic care should be available as required.
- Maternal and fetal wellbeing should be monitored.
- Vaginal examinations are performed 4 hourly or as clinically indicated.
- Progress of labor is monitored using a partogram with timely intervention if abnormal.
- Appropriate pain relief should be provided consistent with the woman's wishes.
- Ensure adequate hydration and light diet to prevent ketosis

Methods of Augmentation & Induction of Labor

- Artificial Rupture of Membranes (Amniotomy)
- Oxytocin
- Prostaglandins
- Intracervical Ballon or Foley

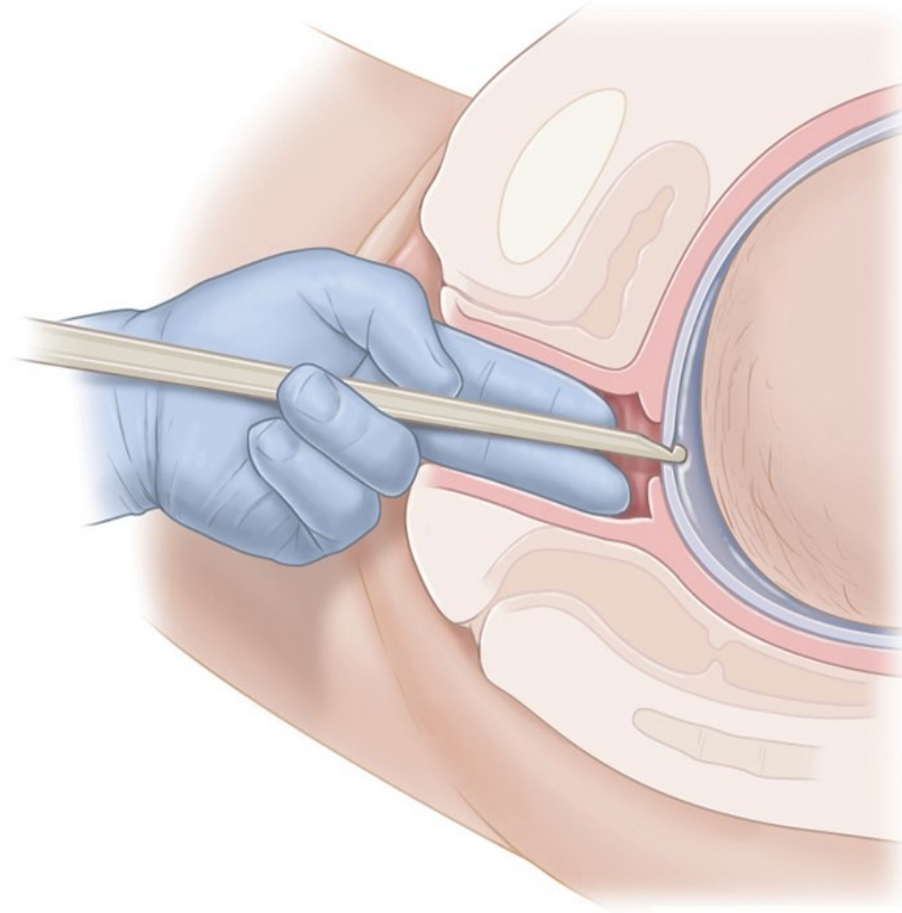
Rupture of the fetal membranes

- Rupture of the fetal membranes is a vital part of normal labor.
- During spontaneous labor at term, the membranes remain intact until after the onset of labor in 90% of women.
- In only 10% of women do they rupture prior to the onset of labour (prelabour or premature rupture of the membranes, PROM).
- If managed conservatively, 70% of mothers will establish in labor spontaneously within 24 hours, and 90% will establish by 48 hours.
- **As the interval between rupture of the fetal membranes at term and birth increases, so may the risk of fetal and maternal infection**

Artificial Rupture of Membranes (Amniotomy)

- ✓ Done in the active phase of the first stage of labor.
- ✓ **Benefits of Amniotomy:**
 - ✓ It is a method of augmentation (Prostaglandin Release, as a result, labor may progress more rapidly)
 - ✓ The status of amniotic fluid is detected (e.g. Meconium-stained liquor)
 - ✓ Amniotomy during this stage may be necessary for specific indications, such as facilitating internal fetal monitoring & fetal scalp PH Blood Sampling (FBS) to confirm fetal well-being.
- ✓ **Contraindications of Amniotomy**
 - ✓ Amniotomy should be avoided in women with HIV infection or hepatitis B or C, so that the fetus not exposed to these organism.
 - ✓ Floating head with or without out polyhydramnios (???)

Artificial Rupture of Membranes (Amniotomy)



Oxytocin

- **Oxytocin** (Oxt or OT) is a neuropeptide hormone normally produced in the hypothalamus and released by the posterior pituitary
- **Oxytocin** is a natural hormone that stimulates uterine contractions in childbirth and lactation after childbirth. It also affects aspects of human behavior and the male and female reproductive systems.
- In the mid-1950s, **synthetic oxytocin** was successfully synthesized by a biochemist named Vincent du Vigneaud; he was later recognized with a Nobel prize for his work.

Oxytocin

- **Uses:**

- ✓ Augmentation of labor
- ✓ Management of post partum hemorrhage

- **Side Effects:** nausea, vomiting, hypotension, hyponatremia, water retention & overstimulation of the uterus.
- Augmentation of labor with an oxytocin infusion will often correct inefficient uterine contractions and may help correct a fetal malposition.
- Augmentation of labor with oxytocin can be dangerous in multiparous, women with a uterine scar, a malpresentation and where there are concerns about fetal wellbeing.

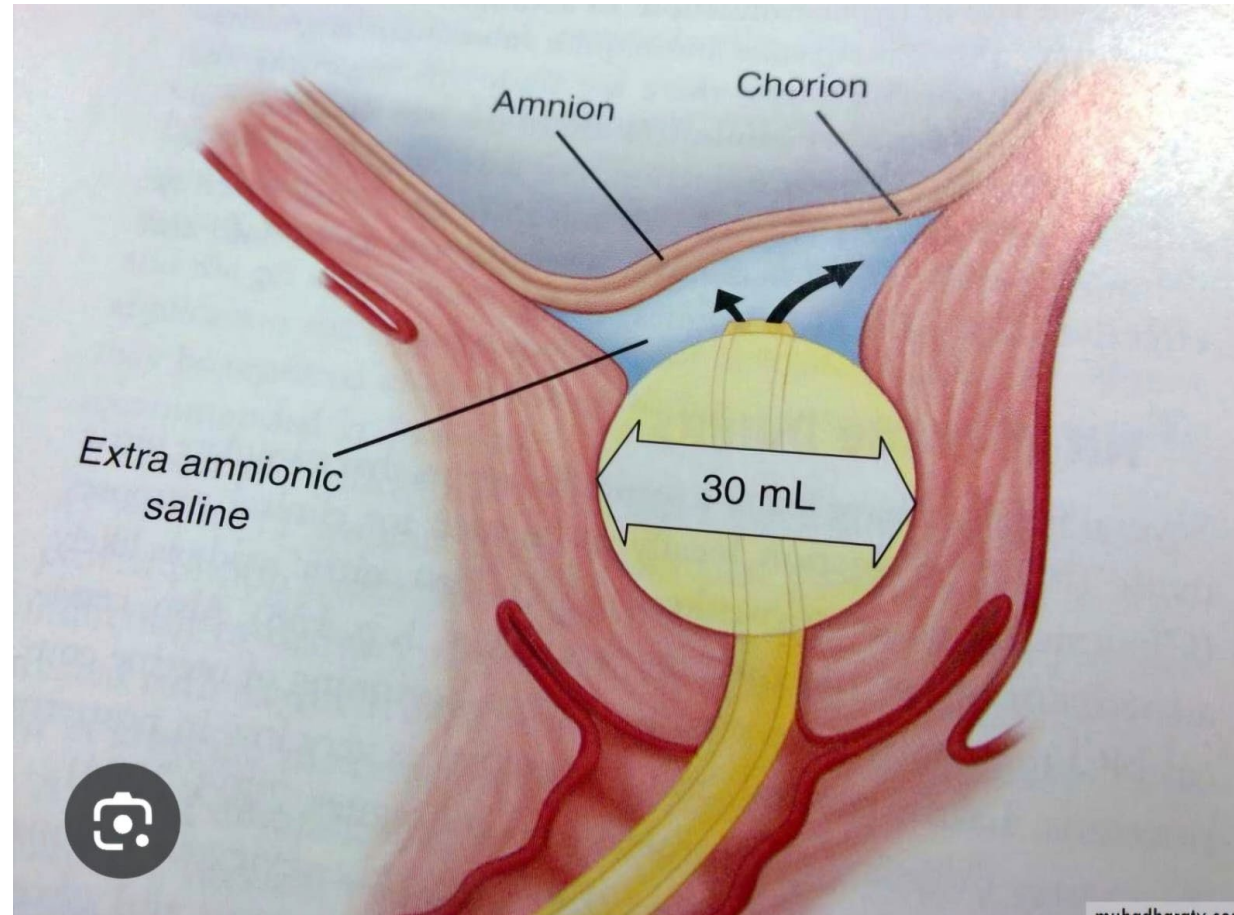
Prostaglandins

- **Prostaglandins:**

1. Prostaglandin E2 (PGE2) (**Brand names:** Cervidil, Prepidil)
2. Prostaglandin E1 (PGE1) (**Brand name:** Misoprostol (Cytotec))

- **Side Effects:** nausea, vomiting, diarrhea, or fever
- **Risk:** Uterine Hyperstimulation which can lead to fetal distress or uterine rupture in rare case

Intracervical Ballon or Foley



Second stage of labor

- **This describes the time from full dilatation of the cervix (10 cm) to delivery of the fetus or fetuses.**

Second stage of labor

- **Duration of the second stage of labor in PG**
 - 2 hrs without epidural anesthesia (RCOG), 3 hrs (ACOG)
 - 3 hrs with epidural anesthesia (RCOG), 4 hrs (ACOG)
- **Duration of the second stage of labor in multiparous**
 - 1 hr without epidural anesthesia (RCOG), 2 hrs (ACOG)
 - 2 hrs with epidural anesthesia (RCOG), 3 hrs (ACOG)

Third Stage of Labor

- The third stage is the interval between delivery of the baby and the complete expulsion of the placenta and membranes.
- This normally takes between 5 and 10 minutes and is considered prolonged after 30 minutes.
- **A third stage lasting more than 30 minutes is defined as abnormal.**
- The risk of postpartum hemorrhage almost *doubles* by the time the duration of third stage reaches twenty minutes.

Signs of Placental Separation in the Third Stage of Labor

- Apparent lengthening of the cord
- A small gush of blood from the placental bed
- Rising of the uterine fundus to above the umbilicus
- Uterine contraction resulting in firm globular feel on palpation

Active management of the third stage

- ✓ Intramuscular injection of 10 IU oxytocin, given as the anterior shoulder of the baby is delivered, or immediately after delivery of the baby.
- ✓ Early clamping and cutting of the umbilical cord.
- ✓ Controlled cord traction.

Methergine (Methylergometrine)

- Methergine is a uterotonic medication
- Used in prevention and treatment of postpartum hemorrhage due to uterine atony.
- Causes sustained uterine contractions (used postpartum only)
- **Forms of Administration:** Oral tab, IM injections, IV (slowly)
- **Side Effects:** Nausea, vomiting, headache, cold extremities, numbness, chest pain, seizures (rare)
- **Contraindications:** Hypertension (Preclampsia), Coronary Artery Disease, Peripheral Vascular Disease & allergy to ergot alkaloids.
- Can cause acute hypertension, stroke, or MI.

Modified approach to active management of the third stage

- **Delayed cord clamping for between 1 and 3 minutes.**
- This approach allows autotransfusion of placental blood to the neonate while maintaining the benefit of a reduced risk of PPH.
- It is of particular importance in preterm birth
- **WHO Recommendations:** Delayed umbilical cord clamping (not earlier than 1 min after birth) is recommended for improved maternal and infant health and nutrition outcomes.

Fourth stage of Labor

- **The fourth stage of labor is the first two hours after birth**, though close monitoring may continue longer in high-risk cases.
- **Monitoring for:**
 - Vital signs (BP, HR, temp)
 - Uterine firmness & Vaginal bleeding
 - Bladder status
 - Pain level and maternal emotional response
- **Keeping skin-to-skin contact with the baby as this is best way to help the baby learn to breastfeed and keep them warm and calm.**
- **During this time, the patient may experience:**
 - Tremors and chills
 - Discomfort from pain, episiotomy, tears, or hemorrhoids
 - Weakness and dizziness, especially while standing up
 - Difficulty in urination

Normal birth

❖ **The World Health Organization (WHO) defines normal birth as follows:**

- The birth is spontaneous in onset and low risk at the start of labor and remains so throughout labor and delivery.
- The infant is born spontaneously in the vertex position between 37 and 42 weeks of pregnancy.
- After birth, mother and infant are in good condition

What are the 3 types of delivery?

- Vaginal delivery.
- Assisted vaginal delivery (Vacuum or Forceps).
- C-section (Cesarean birth)

Admission history to the D/R

- Previous births and size of previous babies. Previous caesarean section.
- Onset, frequency, duration and perception of strength of the contractions.
- Whether membranes have ruptured and, if so, color and amount of amniotic fluid lost.
- Presence of abnormal vaginal discharge or bleeding.
- Recent activity of the fetus (fetal movement).
- Medical or obstetric issues of note (e.g. diabetes, hypertension, fetal growth restriction).
- Any special requirements (e.g. an interpreter or particular emotional/psychological needs).
- Maternal expectations of labor and delivery?

Assessing progress of labor

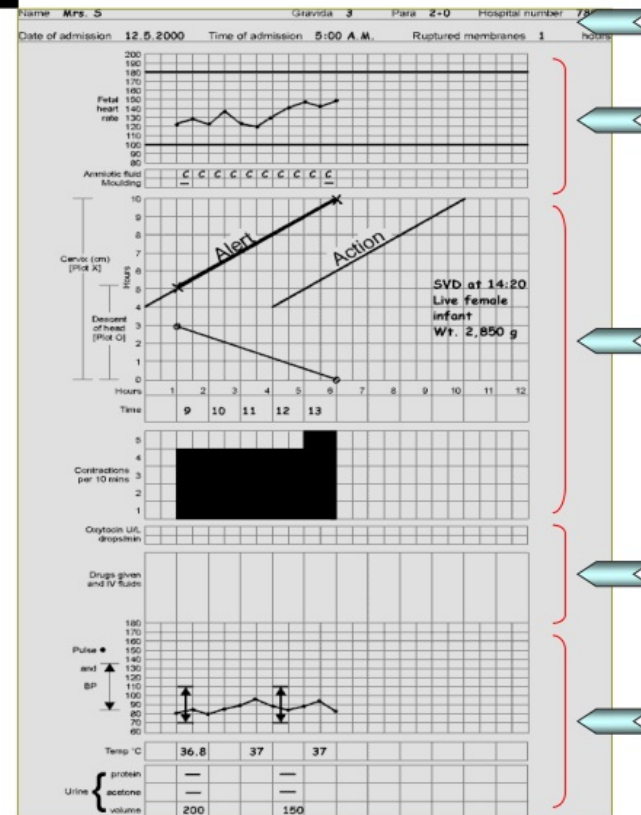
- Contractions
- Cervical dilatation
- Cervical effacement
- Descent of the head

PARTOGRAM

- Partogram is a key tool in detecting an abnormal or prolonged labor.
- It should be done for all women who are in labor, either low risk or high-risk groups.
- Maternal and fetal monitoring are essential to pick up problems early and thus institute timely intervention.
- Documented evidence for medico-legal purpose.
- Educational value for all grades of staff.

Component of Partogram

Component of Partogram



Mother information

Fetal well-being

- Fetal heart rate
- Character of liquor
- Moulding

Labour progress

- Dilatation
- Descent
- Uterine contraction

Medications

- Oxytocin
- Pain relief (e.g. pethidine)

Maternal well-being

- BP, Pulse, Temperature
- Urine – albumin, glucose, acetone
- Urine output

Labor Patterns

- Normal Labor
- Prolonged Latent phase
- Primary Dysfunctional Labor
- Secondary Arrest

Normal labor progression

- Normal labor progression requires consideration of 3 "Ps," representing power, passage, and passenger.
- ✓ Power refers to uterine contractions and maternal expulsive efforts.
- ✓ Passage is the maternal pelvis
- ✓ The passenger is the fetus (size, presentation & position)

Abnormal Labor Indicators

Indication	Nullipara	Multipara
Prolonged latent phase	>20 h	>14 h
Average second stage	50 min	20 min
Prolonged second stage without (with) epidural	>2 h (>3 h)	>1 h (>2 h)
Protracted dilation	< 1.2 cm/h	< 1.5 cm/h
Protracted descent	< 1 cm/h	< 2 cm/h

Causes of abnormal labor patterns (Labor Dystocia)

- **Inefficient uterine contractions**
- **Cephalopelvic disproportion:** (a mismatch between the size of the fetal head and maternal pelvis).
 - Macrocosmic fetus
 - Contracted Pelvis
 - **Malpresentation** (Mentum or Brow)
 - **Malposition** (Asynclitism or extension of the fetal head, occiput posterior or transverse positions)

Three or Five “Ps” of Labor



The 5 “Ps” of Labor:

- Passenger (fetus)
- Powers (uterine contractions)
- Passage (the pelvis & maternal soft parts)
- Position (maternal)
- Psyche (maternal psychological status)

Adverse maternal and fetal outcomes which are associated with labor Dystocia

- Roughly 20% of labors are associated with prolongation, protraction, or an arrest abnormality.
- **Complications of Labor Dystocia:**
- Infection (maternal & fetal), operative birth, low Apgar score at 5 minutes, prolonged hospitalization for both mother and baby, third- and fourth-degree maternal perineal tears, above-average blood loss, and NICU (neonatal intensive care unit) admissions.
- Obstetric fistula (vesicovaginal or rectovaginal) is one of the most distressing late complications of prolonged obstructed labor.

Clinical Signs of Obstructed Labor

- The labor has been prolonged
- The mother is exhausted and anxious
- Signs of dehydration +_ Acidosis
- The mother is tachycardiac, tachypneic with low grade fever
- The urine is concentrated
- The vulva is edematous
- The vagina is dry and hot
- Cervix: is fully or partially dilated, edematous and hanging
- The vertex showed shows excessive molding and large caput
- Bandl's ring may be seen

Bandl's ring

- Bandl's ring (also known as pathological retraction ring)
- A Bandl ring may be associated with protracted or arrested labor.
- A Bandl ring is a constriction between the thicker upper contractile and thinner lower uterine segments.
- It is unclear why this constriction develops during parturition, although prolonged labor and labor dystocia have been suggested as possible causes.

Bandl's ring



RECOMMENDED TEXT BOOKS

- Hacker & Moore's Essentials of Obstetrics and Gynecology
- Obstetrics by Ten Teachers by Philip N. Baker and Louise Kenny
- Williams Obstetrics by Marlene M. Corton

Dr Amal Barakat

Thank You

**The End of Labor & Intrapartum Maternal
Monitoring**