

# Normal labour

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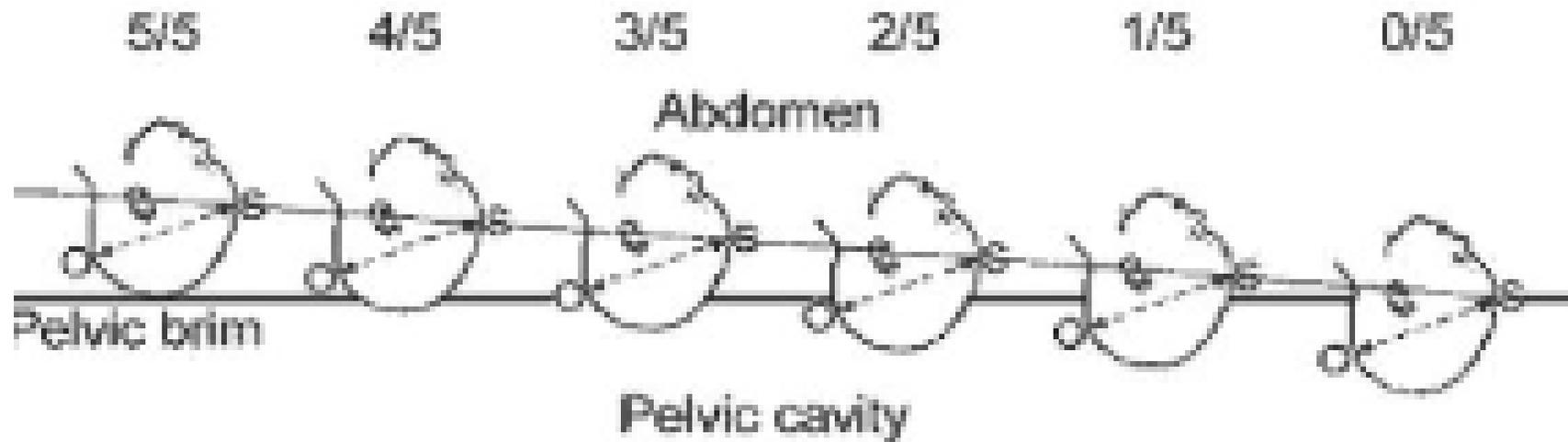


# Agenda

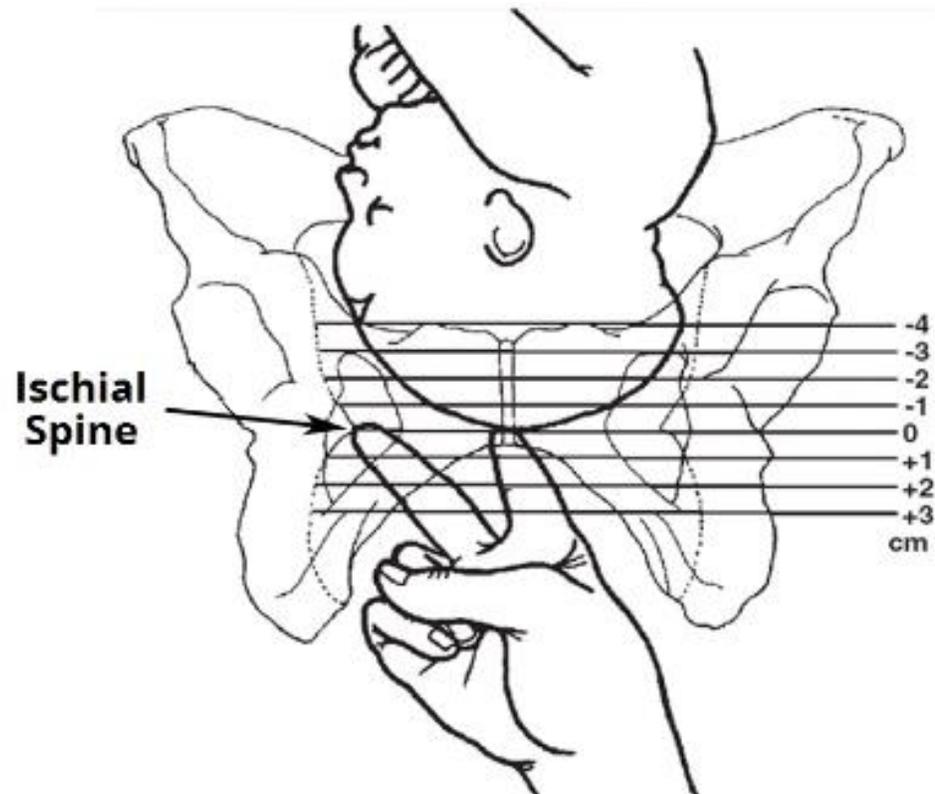
- Definitions
- Fetal skull and pelvic diameters
- Normal labour: definition, mechanisms, stages, and management

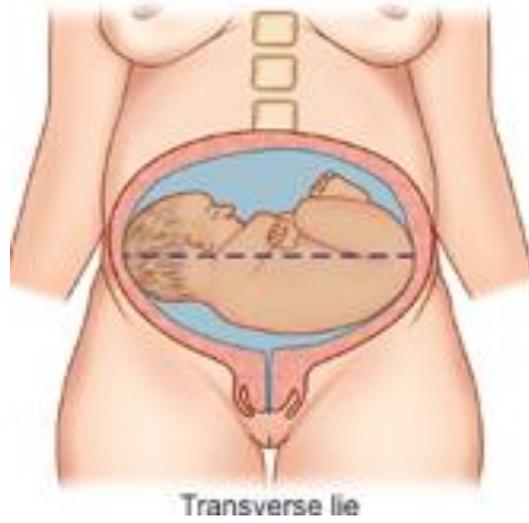
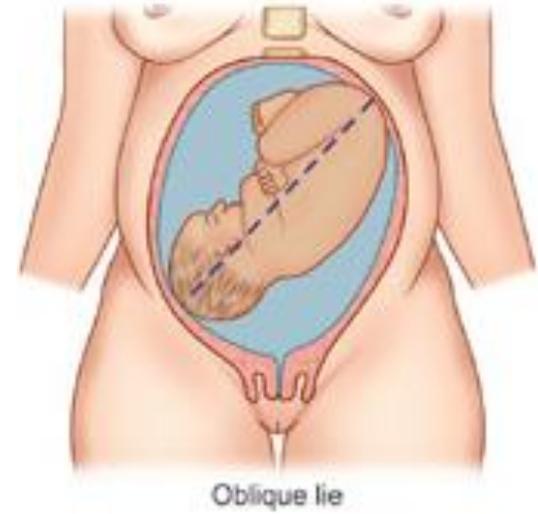
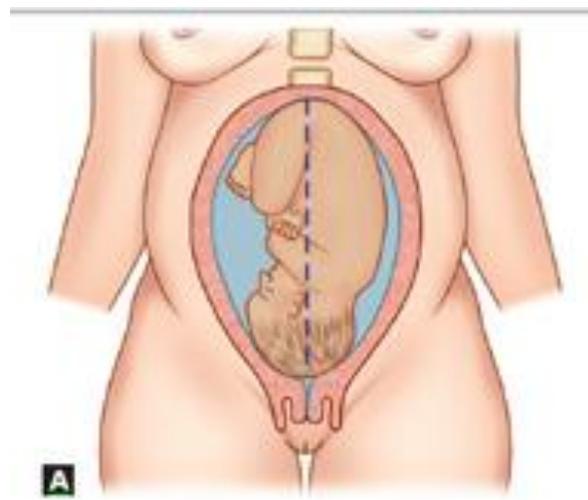
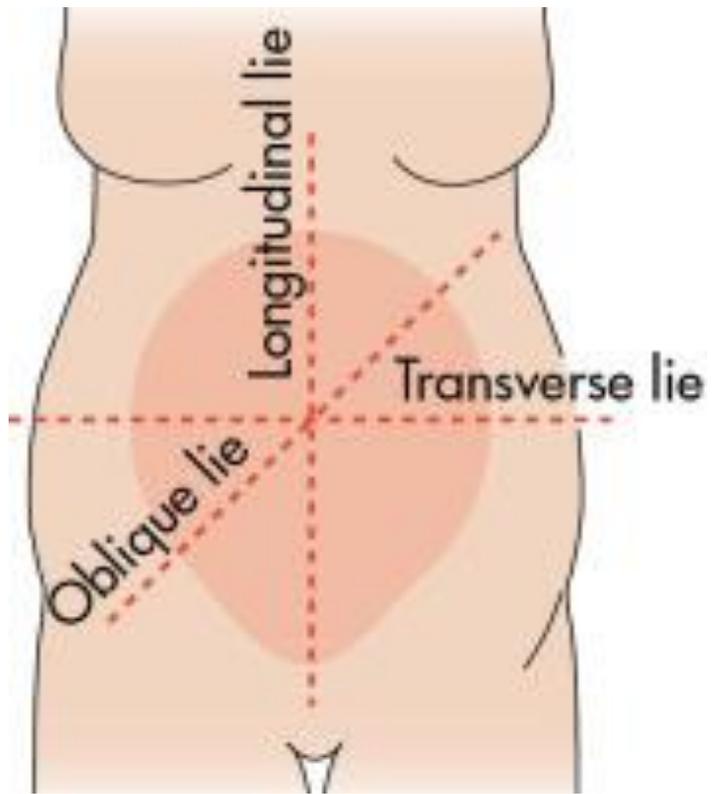
# Definitions

- Engagement: when the widest diameter of the fetal presenting part has passed through the pelvic inlet
  - Assessed abdominally (rule of 1/5th) and vaginally (station)
- Station: the level of the denominator of the presenting part above or below the plane of the ischial spines
- Lie: the relation between the longitudinal axis of the fetus and the longitudinal axis of the mother's uterus (longitudinal, transverse, oblique, unstable)



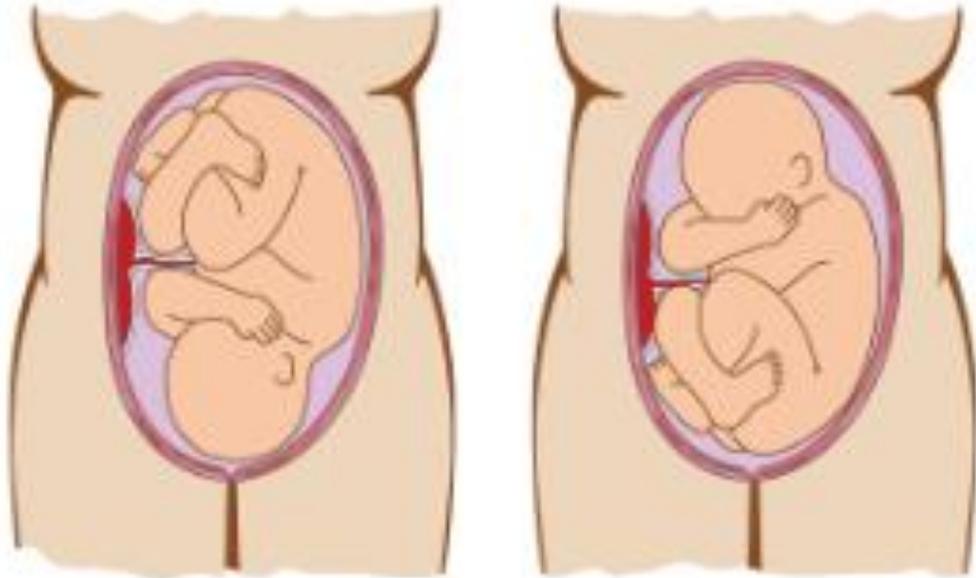
Assessment of engagement and station





Fetal lie

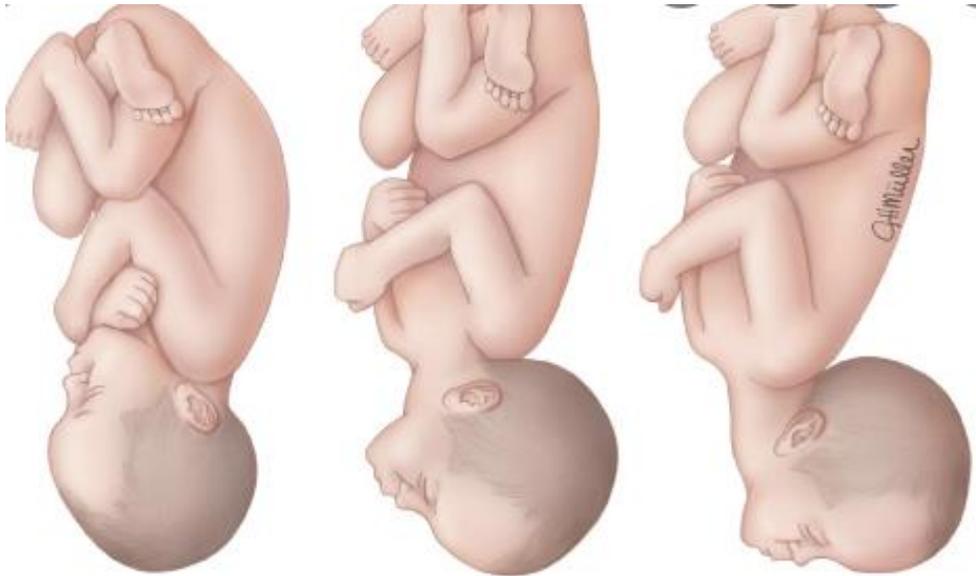
- Presentation: the part of the fetus that occupies the lower segment or pelvis, i.e., head (cephalic) or buttocks (breech)
- Presenting part: the lowest part of the fetus palpable on vaginal examination. For a cephalic presentation, this can be the vertex, the brow or the face, depending on the attitude
- Attitude of the head describes the degree of flexion: vertex, brow or face. (the relation between fetal parts to each others, well-flexed, deflexed, extended ...)



Cephalic

Breech

Presentation



Attitude

**Vertex presentation**



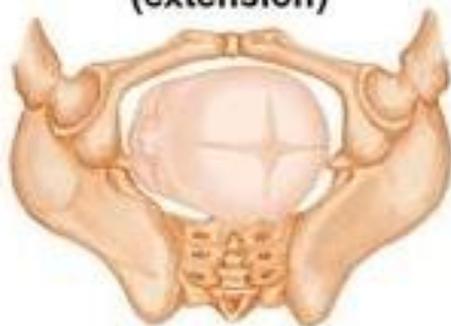
**Complete flexion**



**Brow presentation**



**Poor flexion  
(extension)**



**Face presentation**

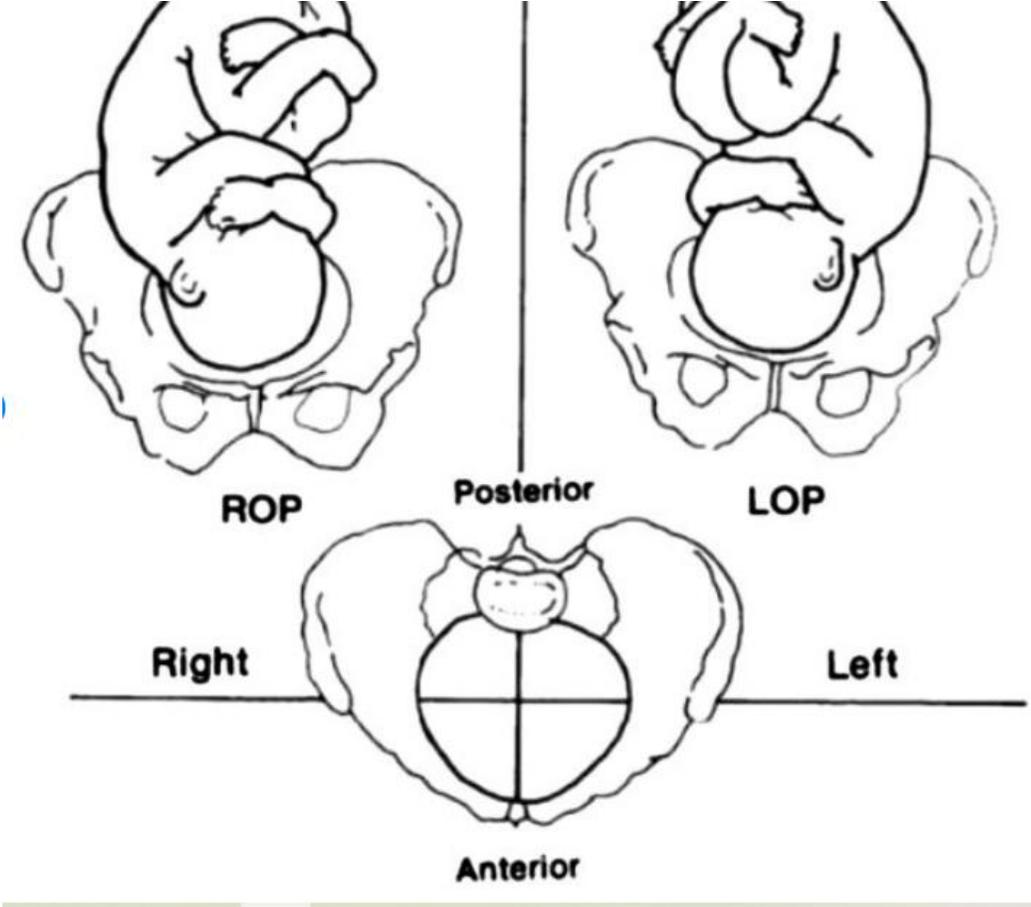
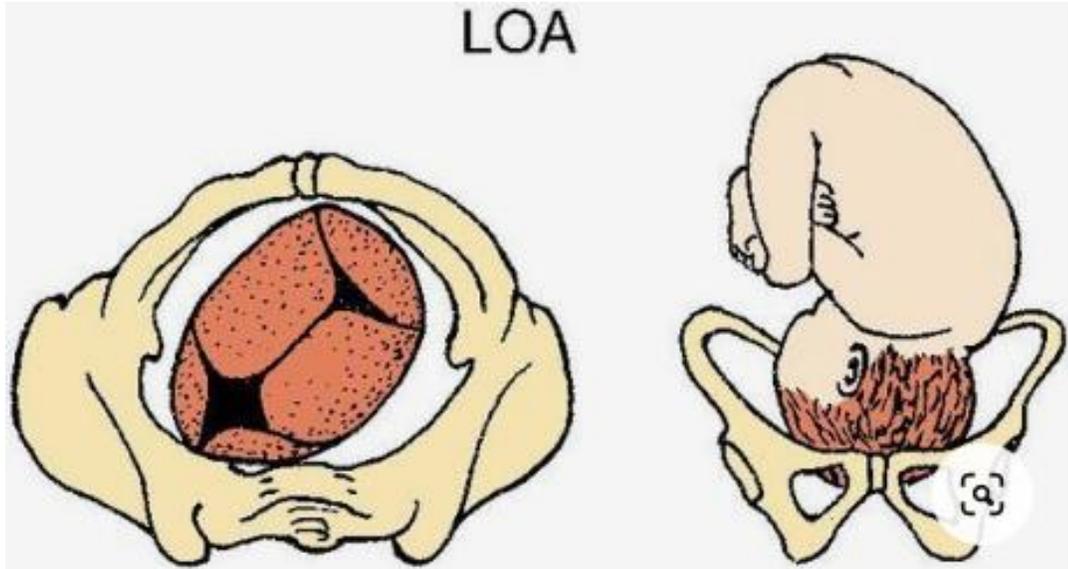


**Full extension**



- Position: the relation between the denominator of the presenting part and the maternal pelvis
  - The denominator: is a bony landmark on the presenting part used to denote the position;
    - In vertex it is the occiput
    - In face it is the mentum (chin)
    - In breech it is the sacrum
    - In brow it is the frontal bone

# Position

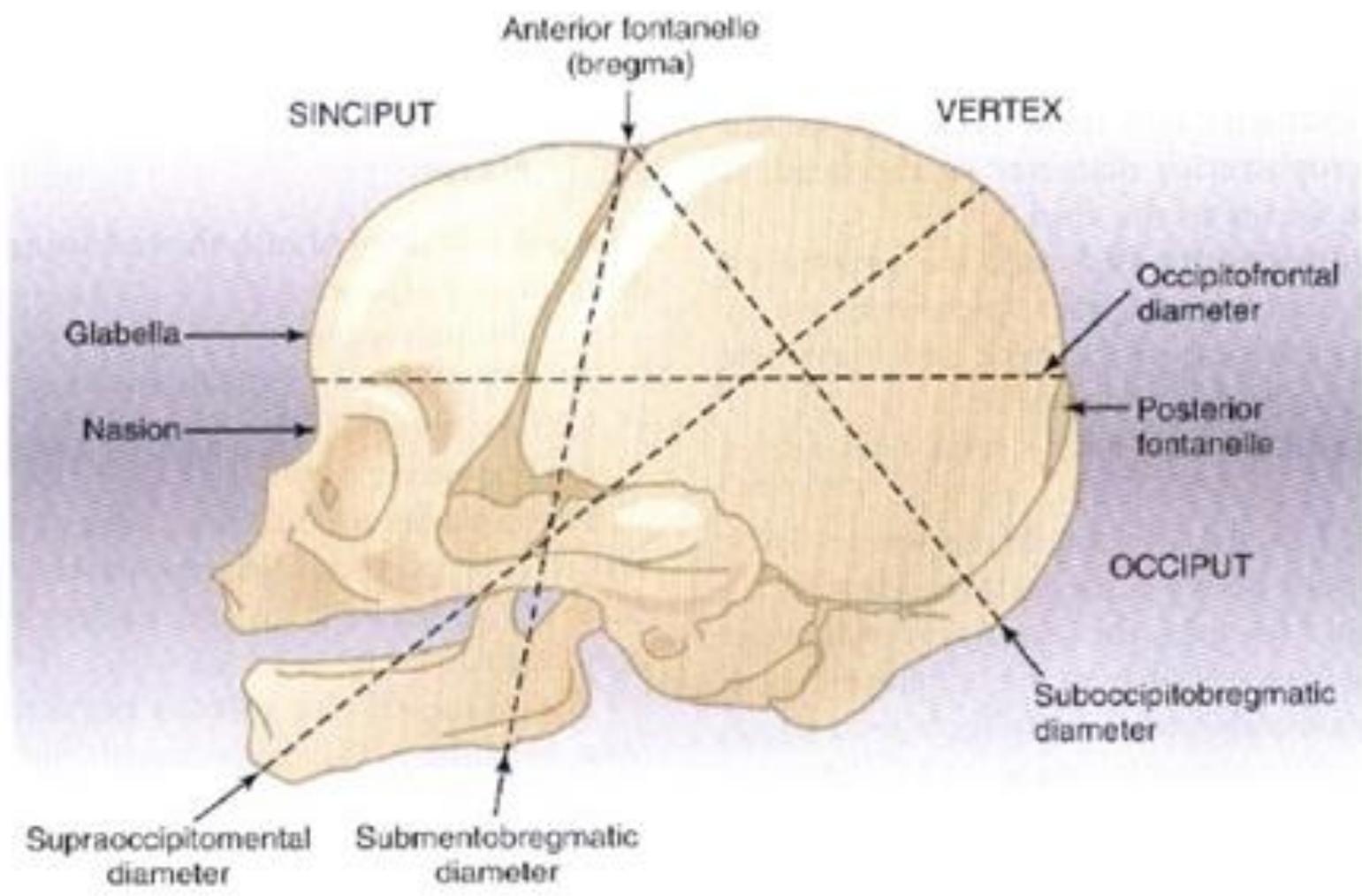


# Fetal skull anatomy and diameters

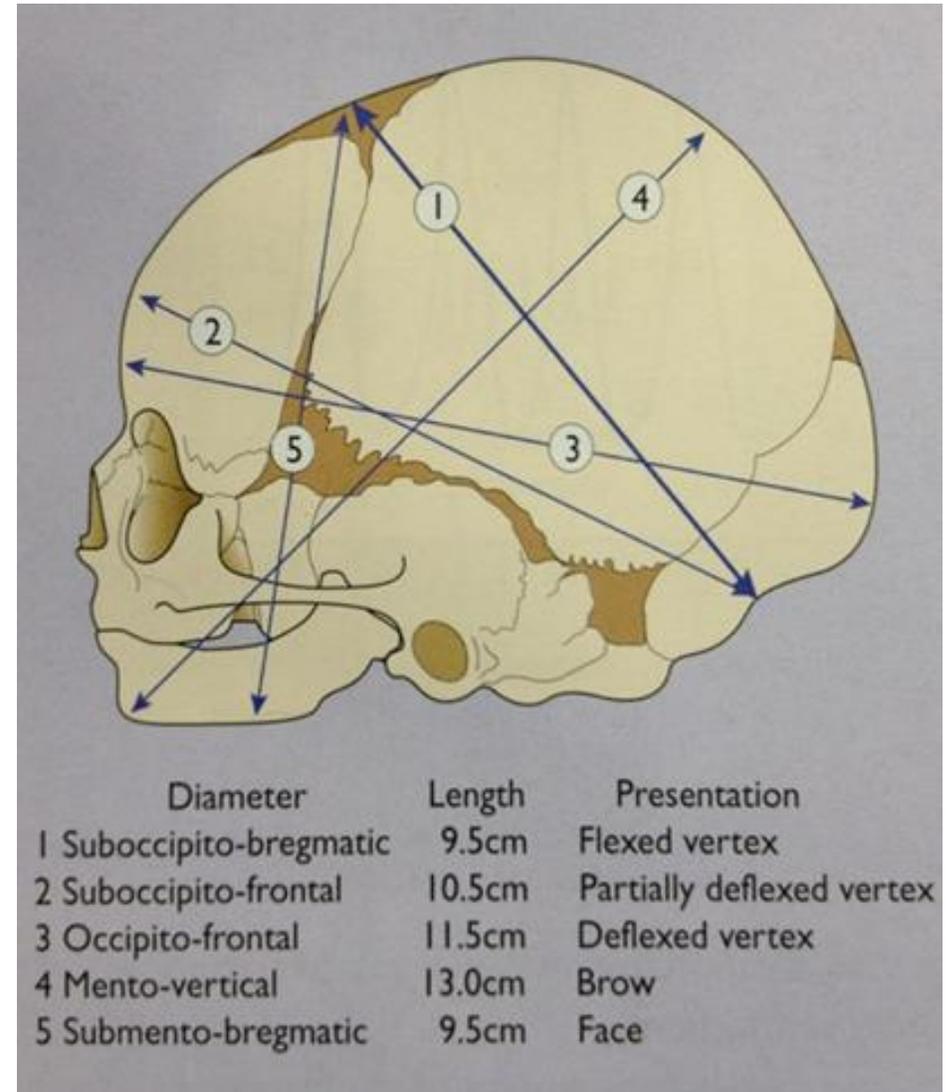
- Largest and least compressible part of the fetus; it is the most important in delivery - regardless of the presentation



- Landmarks:
  - **Anterior fontanelle**
  - **Vertex**: the area between fontanelles, bounded laterally by parietal eminences
  - **Posterior fontanelle**
  - **Occiput**: the area behind and inferior to posterior fontanelle
  - **Sinciput** (brow): the area between anterior fontanelle and glabella
  - **Glabella**: elevated area between orbital ridges
  - **Nasion**: the root of the nose

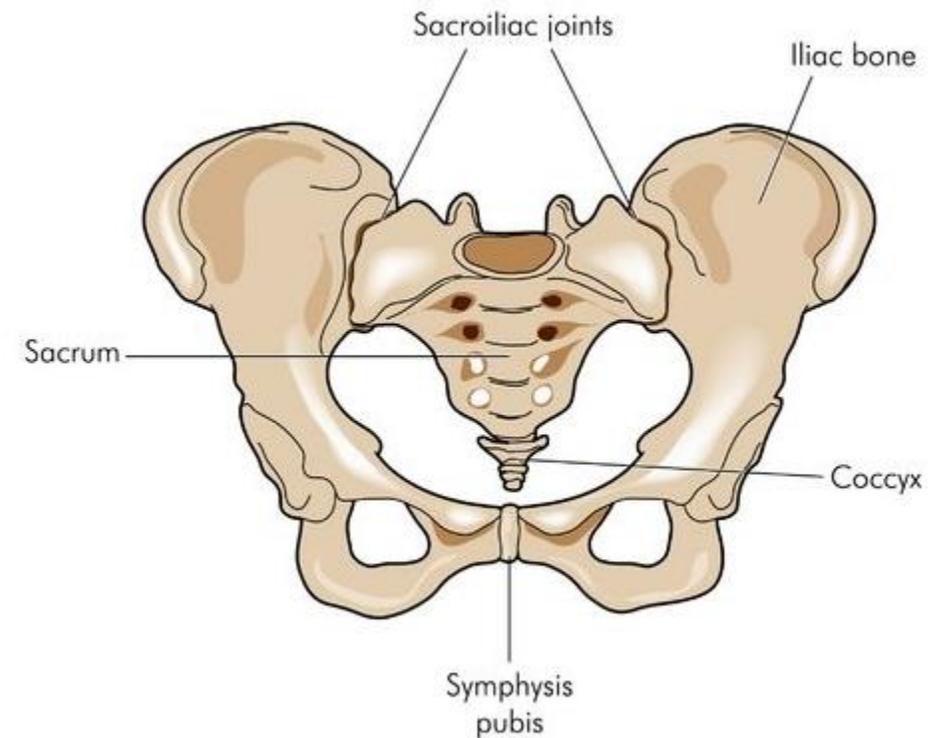


- When the vertex of the fetus presents, and fetal head is well flexed, the **smallest anteroposterior diameter suboccipito-bregmatic** enters the birth canal

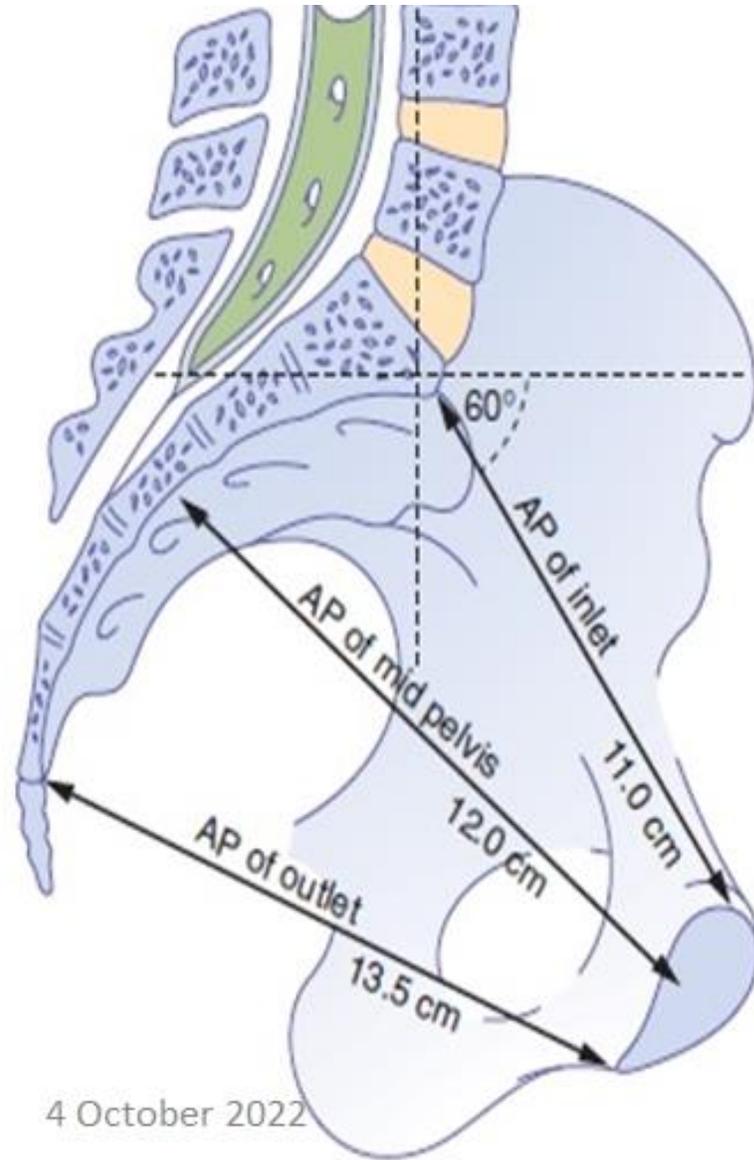


# Maternal pelvis anatomy

- Four bones: 2 innominate, sacrum, and coccyx
- Joints: sacroiliac, symphysis pubis, and sacrococcygeal



- Planes of the pelvis: imaginary flat surfaces that extend across the pelvis at different levels
  - Inlet: transverse diameter is about 13 cm, anteroposterior diameter 11 cm
  - Mid-pelvis: almost round, the transverse and AP diameters are similar. On the lateral wall of the mid-pelvis, ischial spines are palpable vaginally. Used as landmarks to assess the descent of the head on vaginal examination (station)
  - Outlet: the anteroposterior diameter is 13 cm, transverse diameter 11 cm



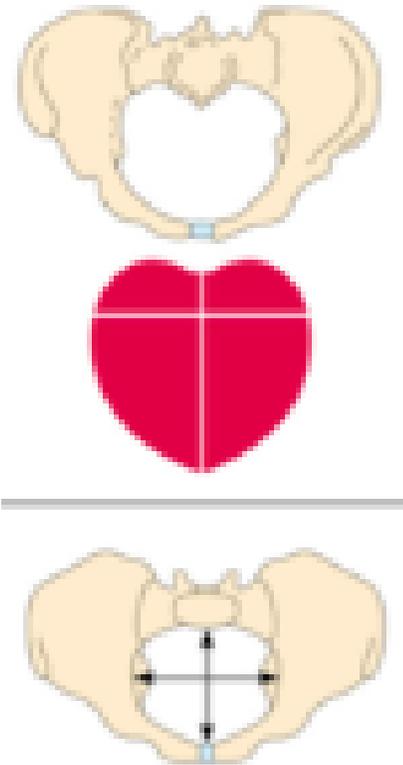
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- Maternal pelvis can be classified according to its shape based on Caldwell-Malloy pelvic types into:
  - Gynecoid
  - Android
  - Anthropoid
  - Platypelloid

- Gynecoid pelvis:

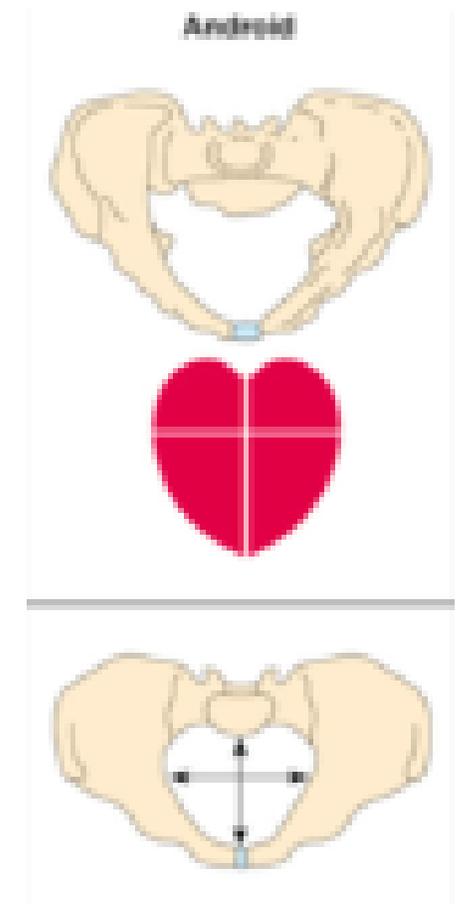
- Classical female pelvis (50%)
- Most favourable for delivery
- Inlet is round oval with largest transverse diameter, straight side walls, well-curved sacrum

Gynecoid



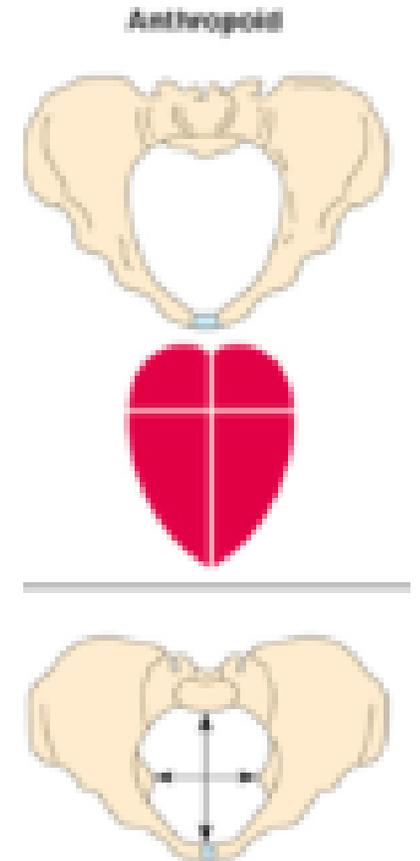
- Android pelvis:

- 30% of women
- Typical male pelvis
- Restricted at all levels, arrest of descent in labour is common



- Anthropoid pelvis:

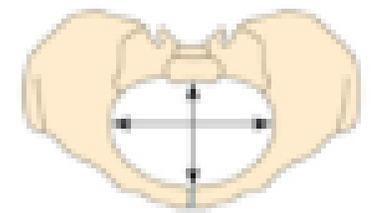
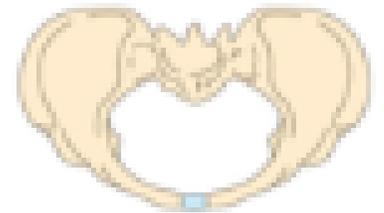
- 20% of women
- Fetal head engages in the anteroposterior diameter of pelvis
- Persistent occipitoposterior Position.



- Platypelloid pelvis:

- 3% of women
- Oval shaped inlet with wide transverse diameter
- Increased risk of obstructed labour

Platypelloid



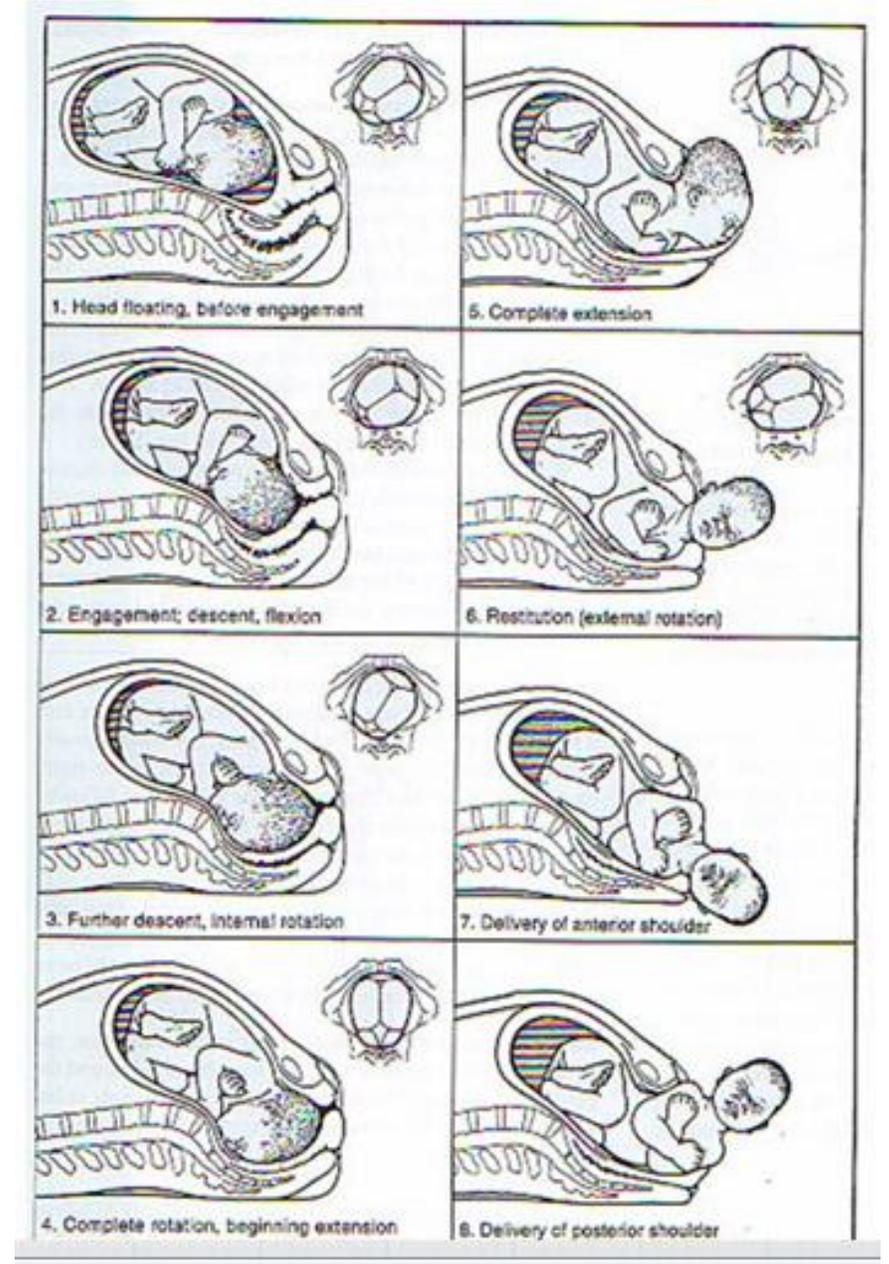
# Labour

- Labour: the process whereby the fetus and the placenta are expelled from the uterus
- Diagnosis: when painful uterine contractions occur, followed by dilatation and effacement of the cervix
  - Cervical dilatation: The cervix begins dilating and stretching beyond the normal dimensions and is measured in centimetres (0-10)
  - Cervical effacement: softening, thinning and shortening of the cervix.

# Normal labour

- To be called a normal labour, it should fulfil the **criteria** of:
  1. Singleton
  2. Between 37-42 weeks gestation
  3. Spontaneous onset
  4. Unassisted vaginal delivery
  5. Vertex presentation
  6. Within reasonable time and without complication to the mother or the fetus

# The Cardinal movements of head in labour



- The **cardinal movements of labour** refer to the changes in position of the fetal head during its descent through the birth canal in vertex presentation:
  1. Descent (lightening) : movement of the fetal head through the pelvis toward the pelvic floor
  2. Engagement : the descent of the widest diameter of the presenting fetal part below the plane of the pelvic inlet
  3. Flexion : a passive movement that permits the smallest diameter of the fetal head (suboccipitobregmatic diameter) to pass through the maternal pelvis

4. Internal rotation : the fetal occiput rotates from its original position (usually transverse) toward the symphysis pubis (occiput anterior) or, less commonly, toward the hollow of the sacrum (occiput posterior).
5. Extension : the fetal head is delivered by extension from the flexed position as it travels beneath the symphysis pubis.
6. External rotation : the fetal head turns to realign with the long axis of the spine, allowing the shoulders to align in the anterior-posterior axis.
7. Expulsion : the anterior shoulder descends to the level of the symphysis pubis

- Initiation of labour:

- Labour is a release from the state of functional quiescence maintained during pregnancy.
- Decreased myometrial responsiveness to progesterone
- Increased responsiveness to estrogen
- Activation of the fetal hypothalamic pituitary axis, results in increased release of cortisol, increasing the synthesis and release of prostaglandins, and formation of myometrial gap junctions and activation of oxytocin receptors

- Irregular, painless, of mild intensity contractions of uterine smooth muscle can occur throughout the third trimester and are often felt as Braxton Hicks contractions, not result in cervical changes
- Preparation for labour:
  - Lightening
  - False labour
  - Cervical effacement

	False Labour	True Labour
How often are contractions?	Irregular Do not get closer	Regular Get closer and stronger with time
Do they change with movement?	Decrease with walking/ rest/ or changing position	Irrelevant to position
Strength	Weak (may be strong then get weaker)	Steadily increase in strength
Pain site	Abdomen or pelvis	Start in the lower back and move to the front to abdomen

- Diagnosis of labour:

- Labour is diagnosed when painful regular contractions lead to effacement and dilatation of the cervix
- This is commonly accompanied by a 'show' ( pink/white mucus plug) from the cervix and/or rupture of the membranes, causing release of liquor
- Effacement: normally tubular cervix is drawn up into the lower segment until it is flat . Due to increased water content and collagen lysis

# Stages of labour

- **First stage:**

Begins with the onset of labour and ends with full cervical dilation (10cm).

The descent, flexion and internal rotation described occur to varying degrees.

Duration:

Nulliparous: average 8 hours, no more than 18

Multiparous: average 5 hours, no more than 12

It is divided into latent and active phases:

- The latent phase begins with regular contractions and ends when there is an increase in the rate of cervical dilation (up to 4 cm)
- The active phase is characterized by an increased rate of cervical dilation and descent of the presenting fetal part (4-10 cm)

- **Second stage:**

The second stage of labour is the interval between full cervical dilation and delivery

Descent, flexion and rotation are completed and followed by extension as the head delivers

- Divided into :
  - Passive phase: describes the time between full dilatation and the onset of involuntary expulsive contractions. (Epidural?)
  - Active second stage: there is a maternal urge to push because the fetal head is low (Voluntary).

- Duration:
  - Nulliparous: maximum of 2 hours (3 allowed if on epidural anaesthesia)
  - Multiparous: maximum of 1 hour (2 allowed if on epidural anaesthesia)

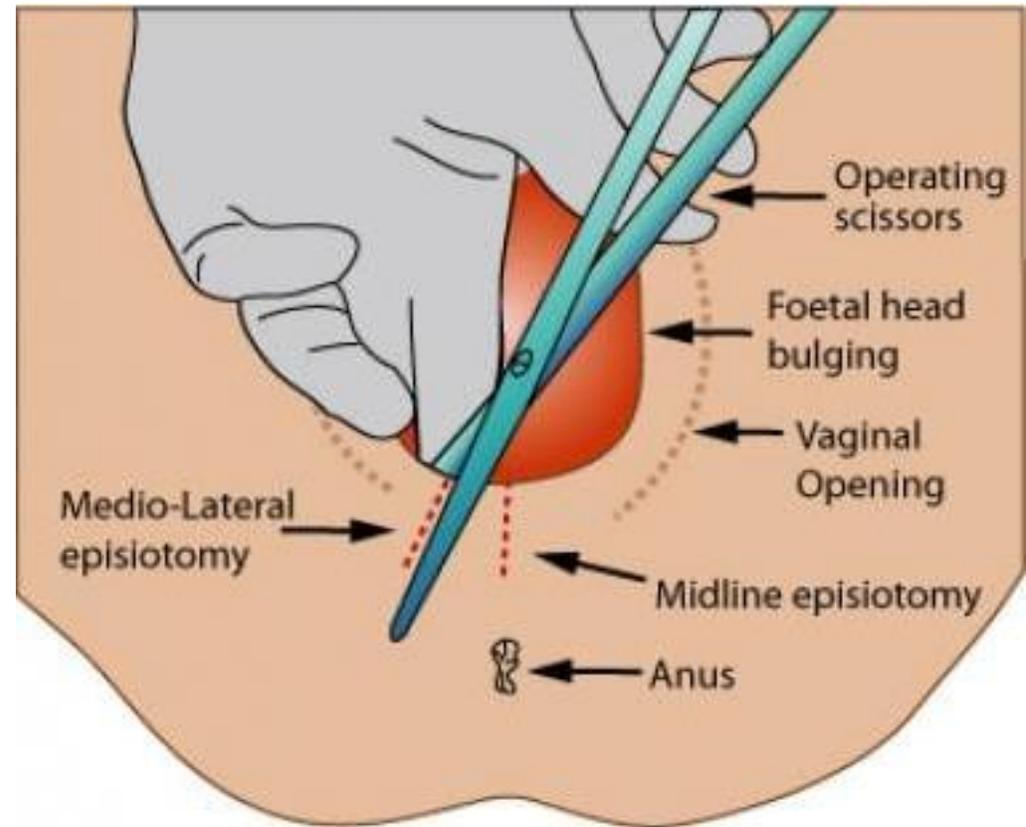
- Crowning:

when the largest diameter of the fetal head is encircled by the vulvar ring



- Episiotomy:

Procedure to make a controlled incision of the perineum for enlargement of the vaginal orifice to facilitate difficult deliveries, preferred in a mediolateral orientation



- **Third stage of labour:**

- From delivery of the fetus till delivery of placenta and membranes
- Usually, < 30 minutes (can be up to 1 hour if no active management applied)
- Normal blood loss up to 500 mL

- Active management vs. physiological?

	Physiological	Active
Uterus	Assess size and tone	Assess size and tone
Uterotonic	Not used	Oxytocin after delivery of anterior shoulder
Cord traction	None	Controlled cord traction (after signs of placental separation)
Cord clamping	Variable	Early

- Signs of placental separation:
  - Fresh show of blood from the vagina
  - The umbilical cord lengthens outside the vagina
  - The fundus rises up
  - The uterus becomes firm and globular

- Perineal trauma detected after delivery:
  1. First degree: injury to perineal skin and/or vaginal mucosa
  2. Second degree: injury involving perineal muscles but NOT anal sphincters
  3. Third degree: injury to perineum involving anal sphincter complex:
    - 3a: <50% of external anal sphincter
    - 3b: > 50% of external anal sphincter
    - 3c: both external and internal anal sphincters torn
  4. Fourth degree: involving anorectal mucosa

- **Fourth stage:**

- From delivery of the placenta to stabilization of the patient's condition; for example, suturing of perineum if needed and resolution of epidural anaesthesia
- Usually at about 1-2 hours, maximum of 6 hours postpartum

# General care for women in labour

- **Physical health in labour observations:**
  - Contraction frequency recorded every 30 minutes.
  - The temperature and blood pressure every 4 hours
  - Pulse every 1 hour and then every 15 minutes in the second stage

- **Mobility and delivery positions:**

- Freedom of movement is encouraged.
- Most women deliver semi-recumbent. Squatting, kneeling or the left-lateral position all probably increase the dimensions of the pelvis.
- The supine position avoided

- **Diet:**

- Hydration: encouraged to drink isotonic drinks or water. Intravenous fluid may be necessary if labour is prolonged
- Stomach and food: eating is appropriate during labour, although only small amounts are usually eaten. Eating is often discouraged if the labour is high risk, and ranitidine is often given to reduce the stomach acidity

- **Urinary tract:**

The woman must be encouraged to micturate frequently in labour; if she has an epidural, catheterization may be needed, routine catheterization is unnecessary

- **Pain relief:**

- Should be provided as soon as the patient asks for it, even if in the latent phase of first stage
- Multiple non-pharmacological methods:
  - Music
  - Breathing techniques
  - Massages
  - Labour in water

- Pharmacological pain relief:
  - Inhalational: Etonox (50% O<sub>2</sub>/ 50% N<sub>2</sub>O)
  - Parenteral: IV/IM opioids (morphine, pethidine)
    - Avoid pethidine: IUFD, epilepsy, sickle cell
  - Regional: offers best pain relief, might be associated with longer 2<sup>nd</sup> stage and increased risk of instrumental delivery

# Management of labour

- History –detailed history upon presentation of patient, review of antenatal notes
- Examination –full general, obstetric and vaginal examination
- Assessment of labour –serial observations and examinations, monitoring of progress (partogram –not routinely), assessment of fetal wellbeing

- History:

- When did the pain start?
- Regular or not?
- Intervals between contractions?
- Vaginal passage of fluid, blood, mucus?
- Fetal movement?
- Any conditions that need special care in labour?

- Examination:

- Vital signs
- General
- Obstetric examination
- Vaginal examination

- Vaginal examination:
  - Assess cervical dilatation
  - Effacement
  - Fetal presenting part
  - Position
  - Station
  - Fluid passage/ bleeding

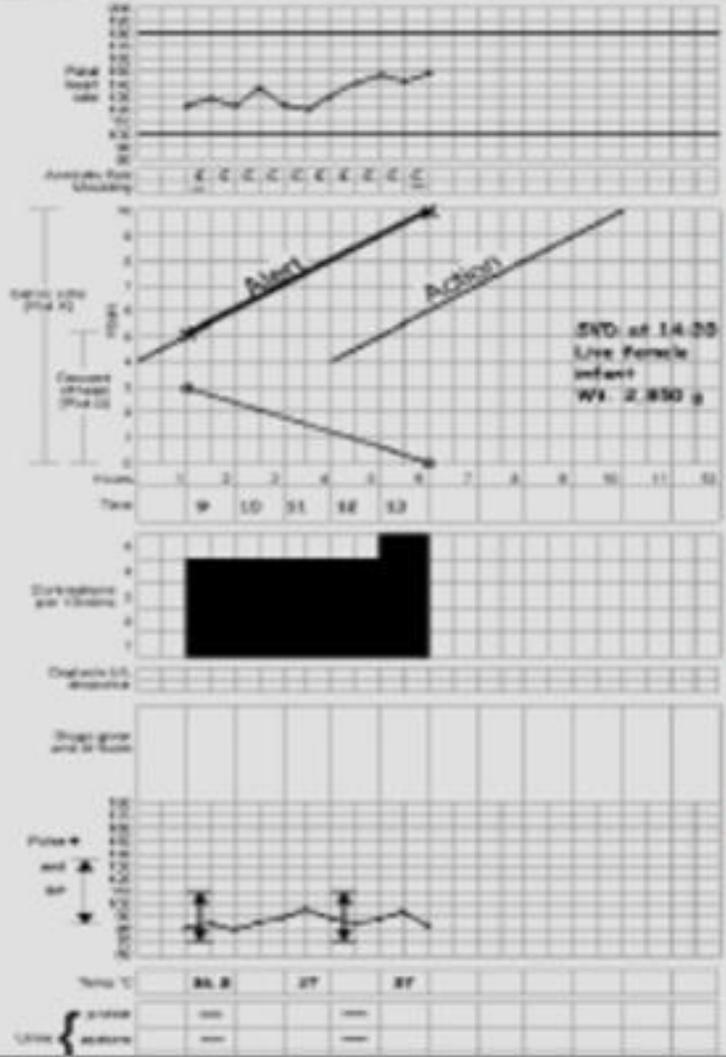
- Monitoring progress –the partogram:
  - Graphic record of labour
  - It allows an instant visual assessment of rate of cervical dilatation and comparison with expected norm so that slow progress can be recognized early; and appropriate actions can be taken.
  - ‘Alert’ and ‘Action’ lines on the partogram indicate slow progress.

# PARTOGRAPH

Name \_\_\_\_\_ Gravida \_\_\_\_\_ Para \_\_\_\_\_ Hospital no. \_\_\_\_\_  
 Date of admission \_\_\_\_\_ Time of admission \_\_\_\_\_ Ruptured membranes \_\_\_\_\_ Hours \_\_\_\_\_



Name: Mrs. B Parity: 3 Page: 3 of 8 Hospital number: 123456  
 Date of admission: 12.12.2006 Time of admission: 9:00 A.M. Patient number: 1



**Mother information**

**Fetal well-being**

- Fetal heart rate
- Character of liquor
- Moulding

**Labour progress**

- Dilatation
- Descent
- Uterine contraction

**Medications**

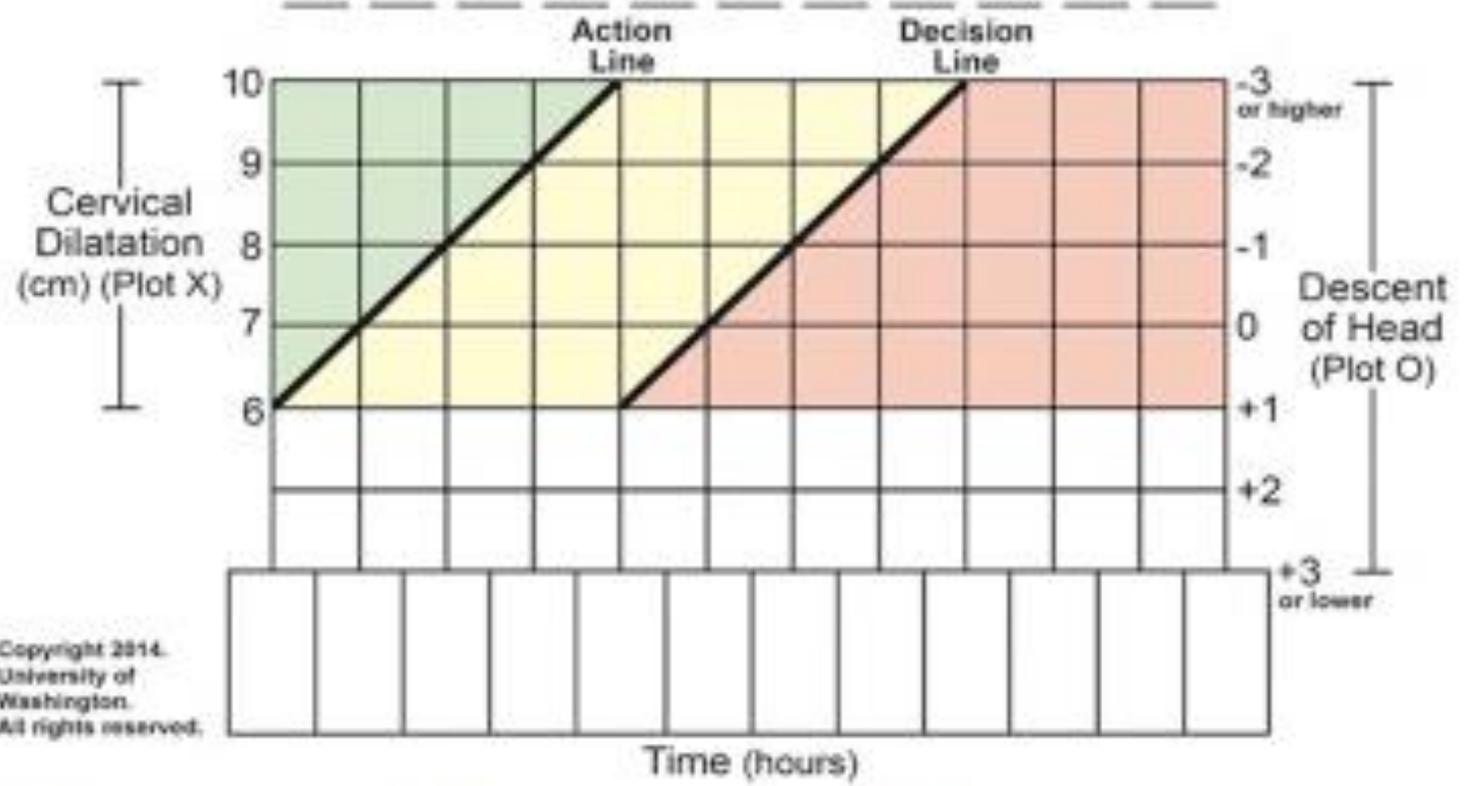
- Oxytocin
- Pain relief (e.g. pethidine)

**Maternal well-being**

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

### Active Phase of Labor for $\geq 37$ Weeks GA

Position: ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○



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- Normal labor:  
Expectant management
- Off median normal labor curve:  
Augment labor management
- >95th percentile for normal labor curve:  
Consider safety of continued labor vs delivery

# Assessment of fetal wellbeing

- Check colour of the liquor, fetal heart rate, and do fetal blood sampling if indicated
- Fetal heart can be assessed using:
  1. Pinard stethoscope
  2. Hand-held doppler
  3. Cardiotocography (CTG)

- Low risk pregnancies:
  - Intermittent fetal heart rate auscultation
  - Every 15 minutes during the first stage, and every 5 minutes in the second.
  - Use Pinard's stethoscope or a hand-held Doppler to check FH for 60 seconds after a contraction

- **CTG –Cardiotocogram**

- Records the FHR on paper and electronically, either from a transducer placed on the abdomen or from a probe in the vagina attached to the fetal scalp. Another transducer synchronously records the uterine contractions



- When to use CTG?

- Abnormal FH on auscultation, 20-minute CTG if normal can go back to intermittent auscultation

- High risk pregnancies: **continuous** electronic fetal monitoring CTG

- Medical disorders

- Vaginal bleeding

- Meconium-stained liquor (the passage of meconium by the fetus in utero during the antenatal period or in labour)

- Previous CS (VBAC)

- CTG interpretation:

- Always take into account the whole clinical picture of the patient when interpreting a CTG trace (medical dx, any vaginal bleeding, liquor colour, ...)

- Check:

- Contractions
    - Baseline FHR
    - Variability
    - Accelerations
    - Decelerations

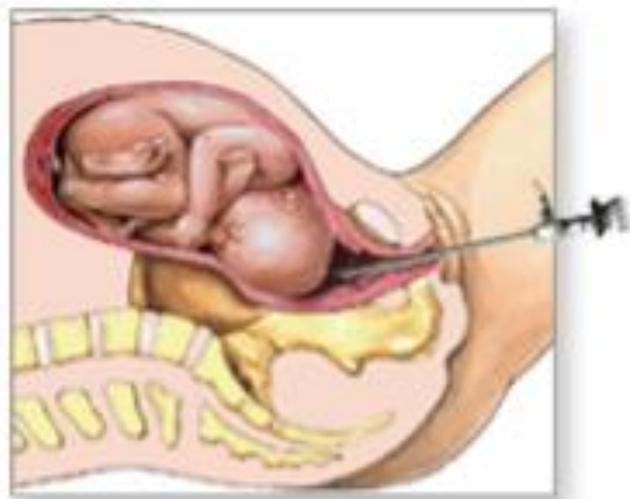
- Contractions:

- Once labour is established, effective uterine contractions are 3-5 contractions/ 10 minutes and each lasts for 45-60 seconds

- Hypertonus: contractions last  $> 60$  seconds
- Tachysystole:  $\geq 6$  contractions/10 minutes

- In suspected fetal compromise:
  1. Correct cause
  2. Fetal blood sampling if persistent distress
  3. Expedite delivery if FBS not available and persistent fetal distress (instrumental delivery if applicable or urgent CS)

1. Improve placental blood supply: correct hypovolemia (IV fluids), correct hypotension (left lateral position to relieve aortocaval compression), and diminish uterine activity (stop oxytocin infusion, or use tocolytics if necessary)
2. Vaginal examination: to exclude cord prolapse or very rapid progress

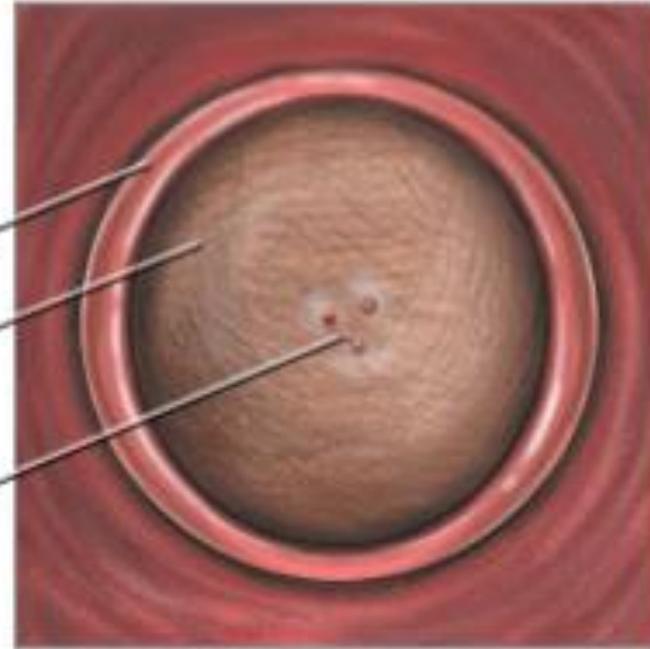


Endoscopic view

Dilated cervix

Fetal scalp

Blood droplets  
collected for  
analysis



Fetal blood testing is performed during labor to test the blood pH of the baby which can determine its well-being during delivery. A small puncture is made in the scalp and fetal blood droplets are collected in a thin glass tube. Testing the scalp pH can help your doctor decide if your fetus is getting enough oxygen during labor. This helps determine if your baby is healthy enough to continue labor, or if a forceps delivery or cesarean delivery might be the best route of birth.

- Fetal blood sampling interpretation:
  - PH > 7.25: observe labour, repeat if any concern arises
  - PH < 7.2: immediate delivery
  - PH 7.2 – 7.24: repeat after 30 minutes

# Thank you!

- References:

1. Hacker & Moore's essentials of obstetrics and gynecology
2. Obstetrics and Gynaecology an evidence-based text for the MRCOG
3. THE JOHNS HOPKINS MANUAL OF GYNECOLOGY AND OBSTETRICS