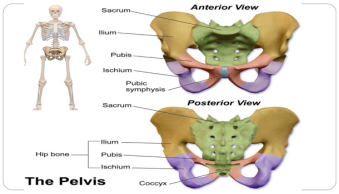
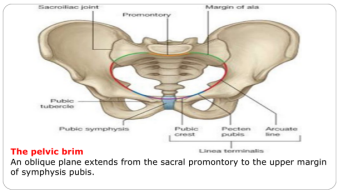
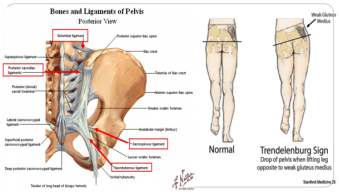
بسم الله الرحمن الرحيم

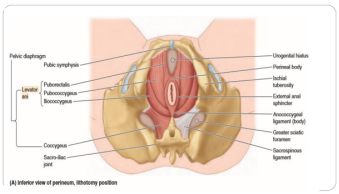
Anatomy of the Pelvis
High-Yield Study Sheet

Built from the uploaded lecture slides







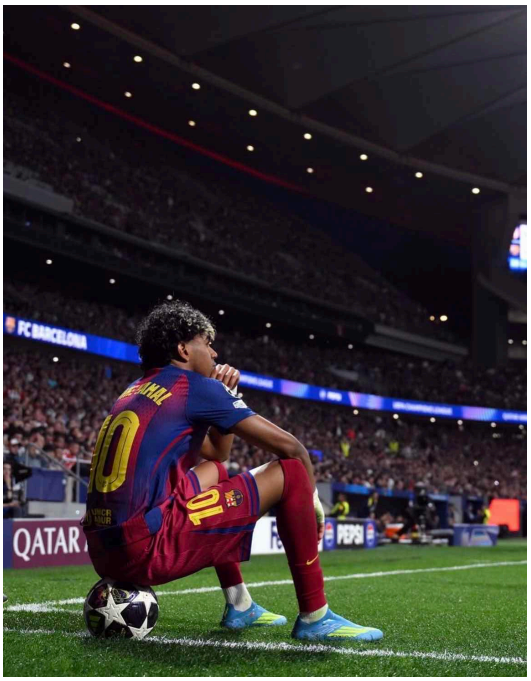


Selected slide visuals from the deck

1. Learning Objectives

- Bony pelvis, its joints and ligaments
- Pelvic diameters
- Muscles of pelvis
- Blood supply of pelvis
- Nerve supply of the pelvis
- Lymph drainage of the pelvis
- Peritoneum of pelvis

Exam focus
• The deck is heavily anatomy + obstetrics oriented.
• Expect direct questions on diameters, pelvic types, conjugates, ligaments, and pelvic floor support.



We gave it our all, but it wasn’t enough. This is just part of the journey: to reach the top, you have to climb, and we know it won’t be easy, nor will they make it easy for us. But giving up is not an option.

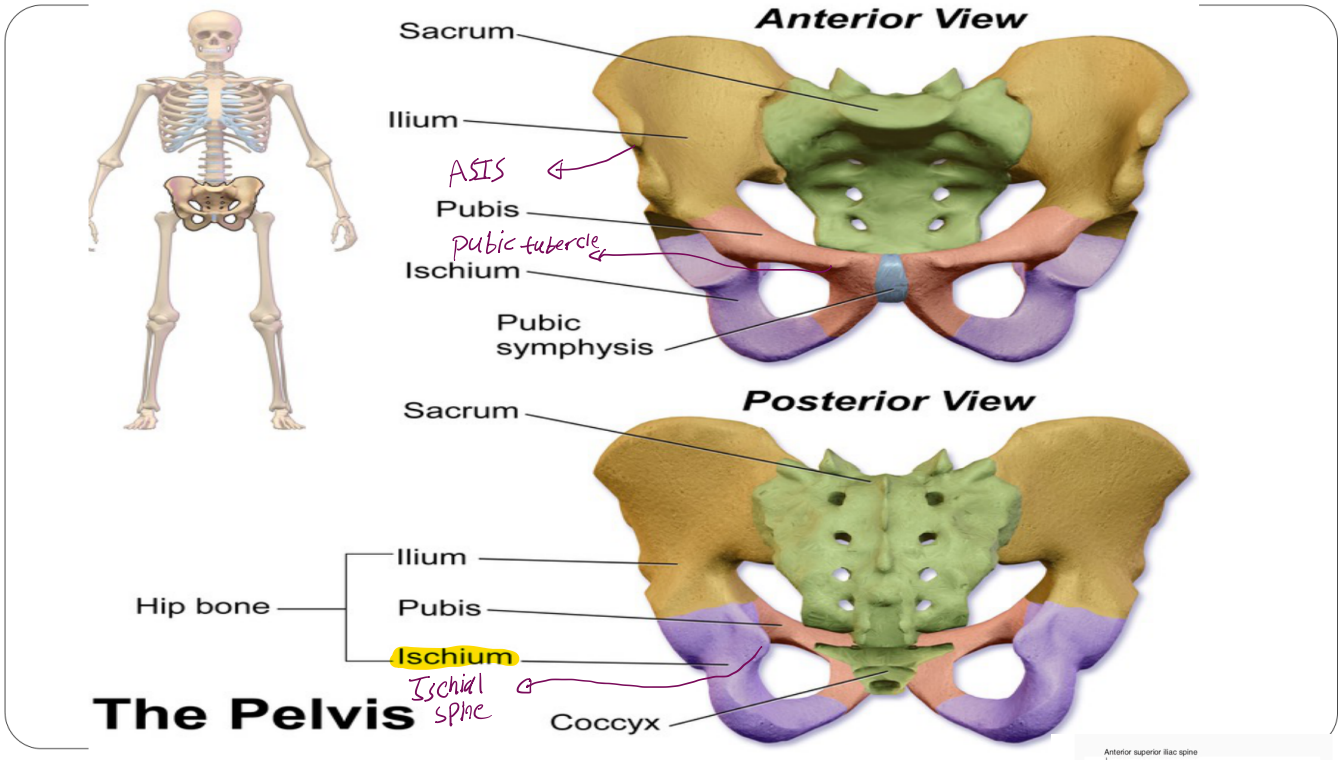
We have more than enough reasons to be hopeful, and we’re going to go for them with everything we’ve got. Every mistake is a lesson, and don’t doubt that we will learn from each one.

We are Barça, and we will be back where we belong. My parents taught me that a man’s word is always kept… and we will bring it back to Barcelona.

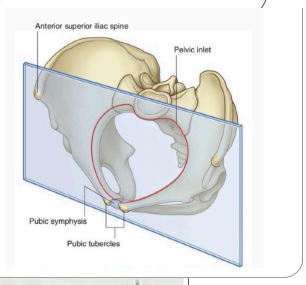
Forever Barça 💙❤️
-Lamine Yamal

2. Bony Pelvis, Joints, Ligaments, and Surface Landmarks

- The bony pelvis is formed by 4 bones: right and left hip bones, sacrum, and coccyx.
- The 4 joints are: 2 sacroiliac joints (plane synovial), symphysis pubis, and sacrococcygeal joint(s) (cartilaginous).
- The pelvis is supported by 4 ligaments: iliolumbar, lumbosacral, sacrotuberous, and sacrospinous.

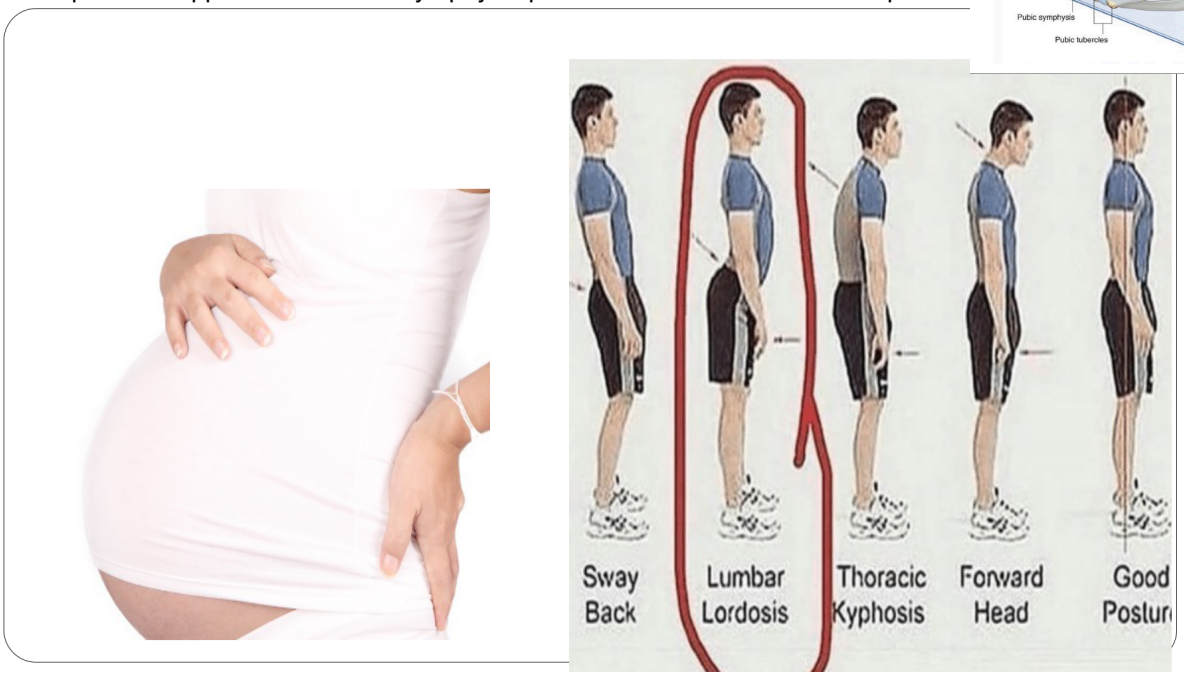


Pelvic bones in anterior and posterior views



Normal position of the pelvis

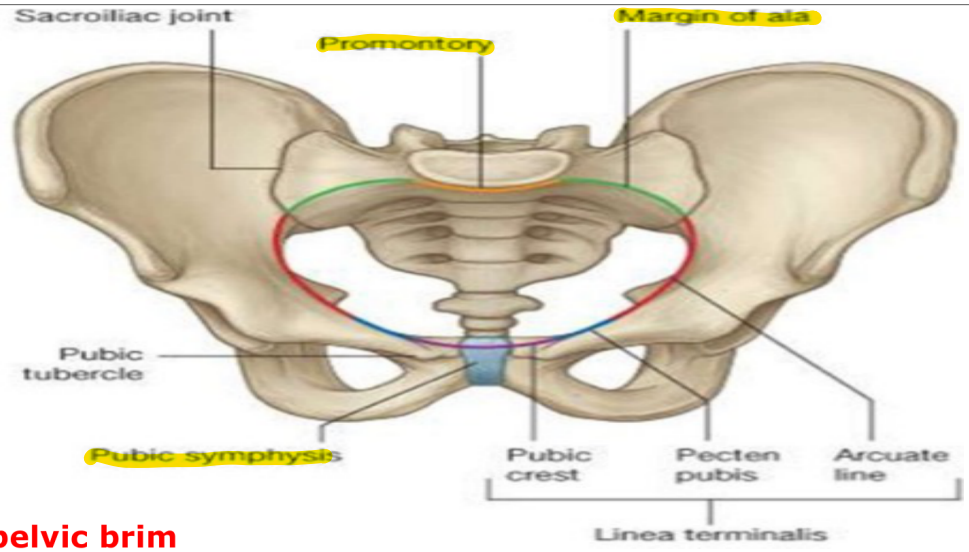
- In erect posture, the ASIS (Anterior Superior Iliac Spine) and pubic tubercles lie in the same vertical plane.
- The ischial spine and upper border of the symphysis pubis lie in the same horizontal plane.



Swayback posture and lumbar lordosis in pregnancy

Pelvic brim

- An oblique plane extending from the sacral promontory to the upper margin of the symphysis pubis.



The pelvic brim

An oblique plane extends from the sacral promontory to the upper margin of symphysis pubis.

Pelvic brim / linea terminalis

Trap

- The pelvic brim divides the greater pelvis from the lesser pelvis.
- Do not confuse the pelvic brim with the pelvic outlet.

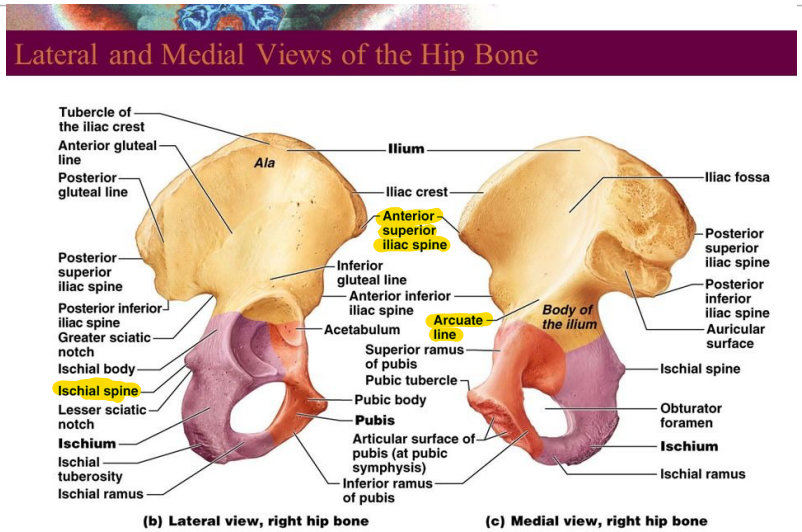
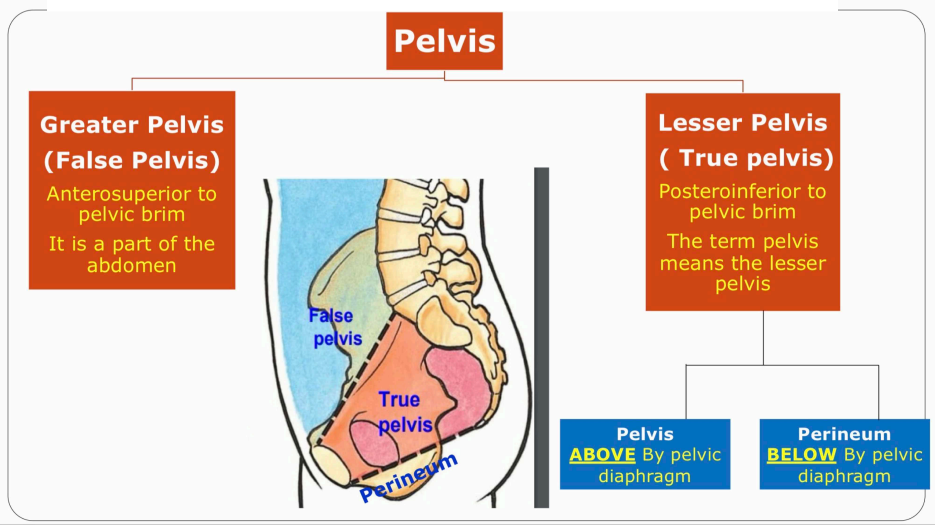


Figure 8.8b, c



3. True Pelvis: Inlet, Outlet, and Cavity

- Greater pelvis (false pelvis): anterosuperior to the pelvic brim; it is part of the abdomen.
- Lesser pelvis (true pelvis): posteroinferior to the pelvic brim; in exam language, 'pelvis' usually means the lesser pelvis.
- Above the pelvic diaphragm is the pelvic cavity; below it is the perineum.

A. Pelvic inlet (pelvic brim)

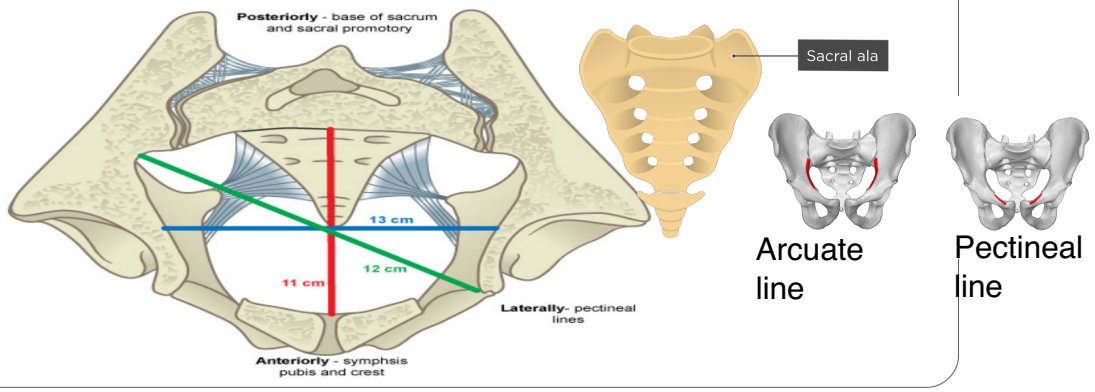
- Shape: male = triangular or heart-shaped; female = transversely oval.
- Formation: anteriorly by symphysis pubis; posteriorly by sacral promontory; laterally by ala of sacrum, arcuate line, pectineal line, and pubic crest.

❑ **Diameters :**

Anteroposterior diameter:
From sacral promontory to upper border of symphysis pubis (4 niches).

Oblique diameter:
From the sacro-iliac joint to the opposite iliopubic eminence (4.5 inches).

Transverse diameter:
Between the 2 arcuate lines (5 inches). **It is the widest diameter.**

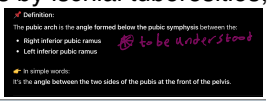


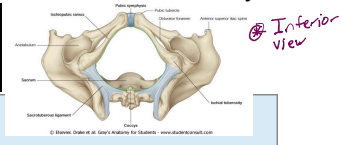
Inlet diameters

Diameter	Measurement	High-yield note
Anteroposterior	4 inches	Promontory to upper border of symphysis pubis
Oblique	4.5 inches	Sacroiliac joint to opposite iliopubic eminence
Transverse	5 inches	Widest diameter of the inlet

B. Pelvic outlet

- Formation: anteriorly by pubic arch; posteriorly by coccyx; lateral angles by ischial tuberosities; anterolateral sides by ischiopubic rami; posterolateral sides by sacrotuberous ligaments.

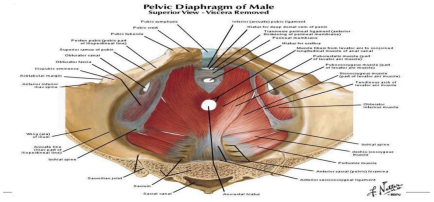




Outlet diameters

Diameter	Measurement	High-yield note
Anteroposterior	5 inches	Coccyx to lower border of symphysis pubis; widest diameter of the outlet
Oblique	4.5 inches	Midpoint of sacrotuberous ligament to junction of pubic and ischial rami of opposite side
Transverse	4 inches	Between the two ischial tuberosities

C. Pelvic cavity



- Anterior wall: short (2 inches); formed by bodies of pubic bones and symphysis pubis.
- Posterior wall: long (6 inches); formed by sacrum and coccyx.
- Lateral walls: pelvic surfaces of pubis, ischium, and ilium.
- The pelvic diaphragm (levator ani + coccygeus) divides the pelvis into the pelvic cavity above and the perineum below.

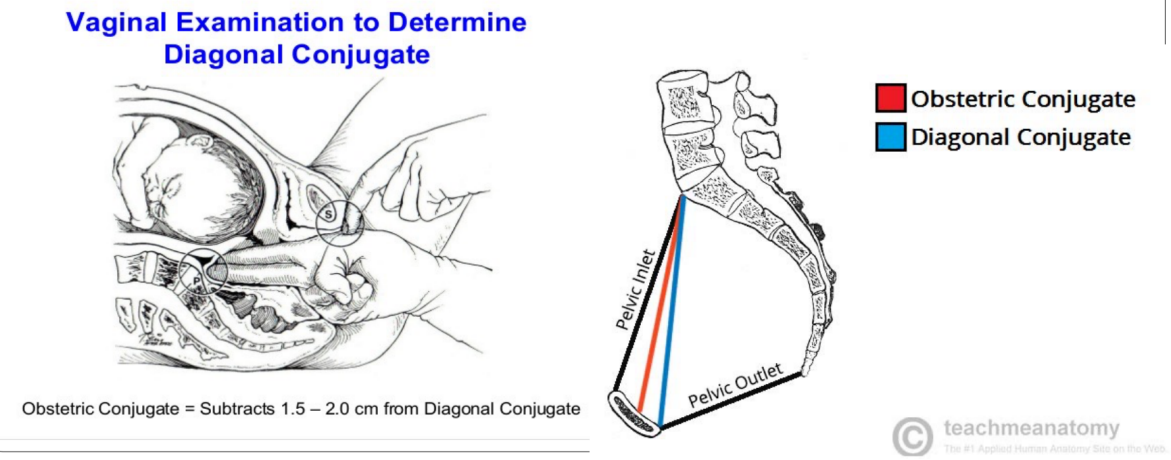
4. Obstetric Measurements, Conjugates, and Labour

Pelvic cavity diameters by level

Level	AP	Oblique	Transverse
Inlet	4	4.5	5
Mid-cavity	4.5	4.5	4.5
Outlet	5	4.5	4

Diagonal conjugate : It is the distance between promontory of sacrum and the lower border of the symphysis pubis. Shorter diagonal conjugate indicates contracted pelvis.

Obstetric conjugate: between promontory of sacrum and most bulging point on the back of symphysis pubis. It is less than Diagonal conjugate by 1.5 to 2 cm



Diagonal conjugate and obstetric conjugate

- Diagonal conjugate: distance from sacral promontory to the lower border of the symphysis pubis; a shorter value suggests a contracted pelvis.
- Obstetric conjugate: distance from the sacral promontory to the most bulging point on the posterior surface of the symphysis pubis.
- The obstetric conjugate is about 1.5 to 2 cm less than the diagonal conjugate.
- The diagonal conjugate is the one that can be estimated on vaginal examination.

In the clinic

Pelvic measurements in obstetrics

Transverse and sagittal measurements of a woman's pelvic inlet and outlet can help in predicting the likelihood of a successful vaginal delivery. These measurements include:

- the sagittal inlet (between the promontory and the top of the pubic symphysis),
- the maximum transverse diameter of the inlet,
- the bispinous outlet (the distance between ischial spines), and
- the sagittal outlet (the distance between the tip of the coccyx and the inferior margin of the pubic symphysis).

These measurements can be obtained using magnetic resonance imaging, which carries no radiation risk for the fetus or mother (Fig. 5.33).

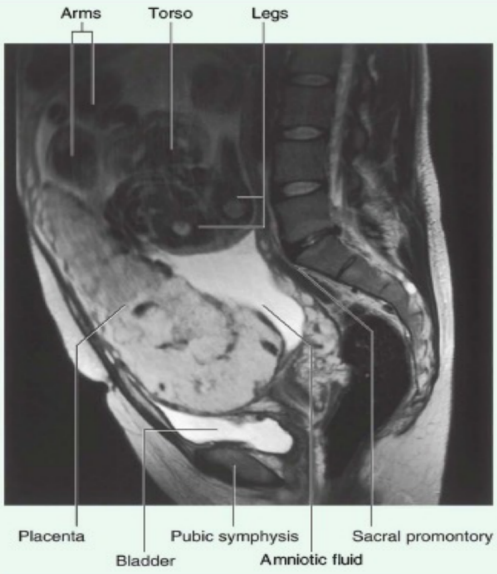


Fig. 5.33 Sagittal T2-weighted magnetic resonance image of the lower abdomen and pelvis of a pregnant woman.

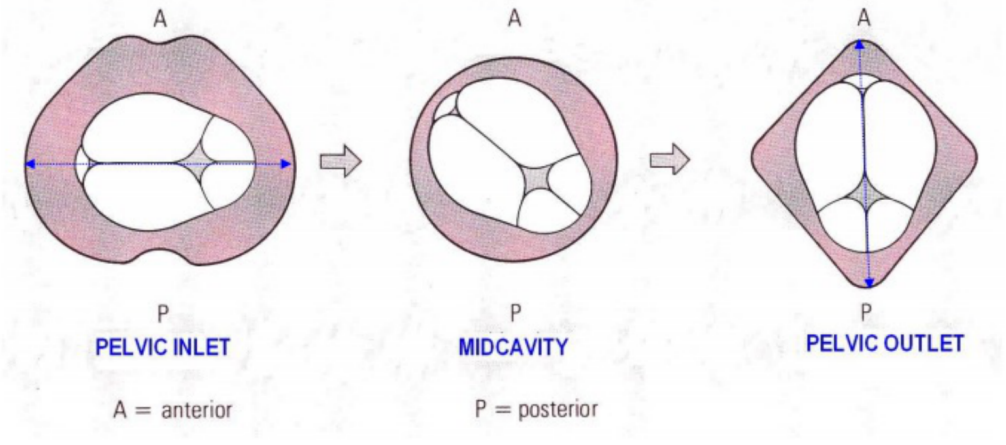
Gray's Anatomy for Students, 3rd edition

MRI-based obstetric pelvic measurements

- Transverse and sagittal pelvic measurements help predict the chance of successful vaginal delivery.
- Measured parameters: sagittal inlet, maximum transverse diameter of the inlet, bispinous outlet, and sagittal outlet.
- MRI can obtain these measurements without radiation risk to mother or fetus.

Rotation of head during labour

- Widest diameter of pelvic canal changes from **transverse diameter** at ***pelvic inlet*** to **Anterior posterior** diameter at ***pelvic outlet***
- To obtain best fit of fetal head, the longest diameter of the fetal head passes through the widest diameter of the pelvis.
- Therefore the head must rotate during labour



Why the fetal head rotates during labour

- At the pelvic inlet, the widest diameter is transverse.
- At the pelvic outlet, the widest diameter is anteroposterior.
- Therefore the fetal head must rotate so its longest diameter passes through the widest pelvic diameter.

Fetal head stations

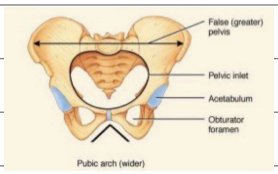
Station	Relation to ischial spines
-2	Above the ischial spines
-1	Above the ischial spines
0	At the ischial spines
+1	Below the ischial spines; head may become visible at the introitus
+2	Below the ischial spines
+3	Further descent

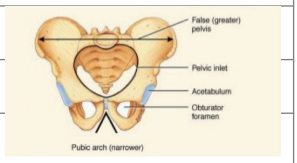
Most tested obstetric idea

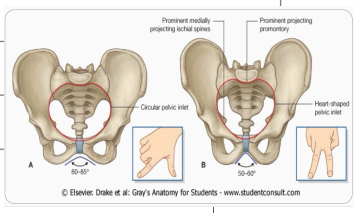
- Inlet = transverse widest diameter.
- Outlet = AP widest diameter.
- Station 0 = at the ischial spines.

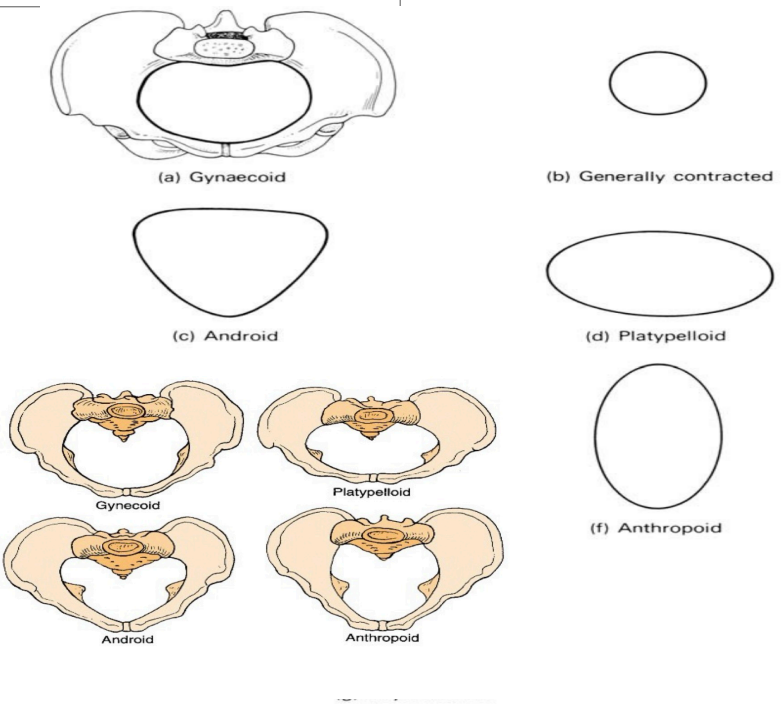
5. Sex Differentiation and Types of Female Pelvis

Feature	Female	Male
Inlet	Wider, transversely oval	Smaller, heart-shaped
Cavity	Wider, shallower	Narrow, deeper
Outlet	Larger	Smaller
Subpubic angle	Wide	Acute
Ischial tuberosities	Everted externally	Turned in
Sacrum	Wider, shorter	Narrower, longer
Side of pubic arch	Everted externally	Not everted









Gynaecoid pelvis:
Normal

Android pelvis:
Like Male ⇝ It has some male features

Anthropoid pelvis:
it simulates the pelvis of apes. It has **Small transverse diameter** and long anteroposterior diameter.

Platypelloid pelvis:
it is a flat pelvis in which the inlet has Larger transverse diameter much than the anteroposterior diameter.

Female pelvic inlet shapes

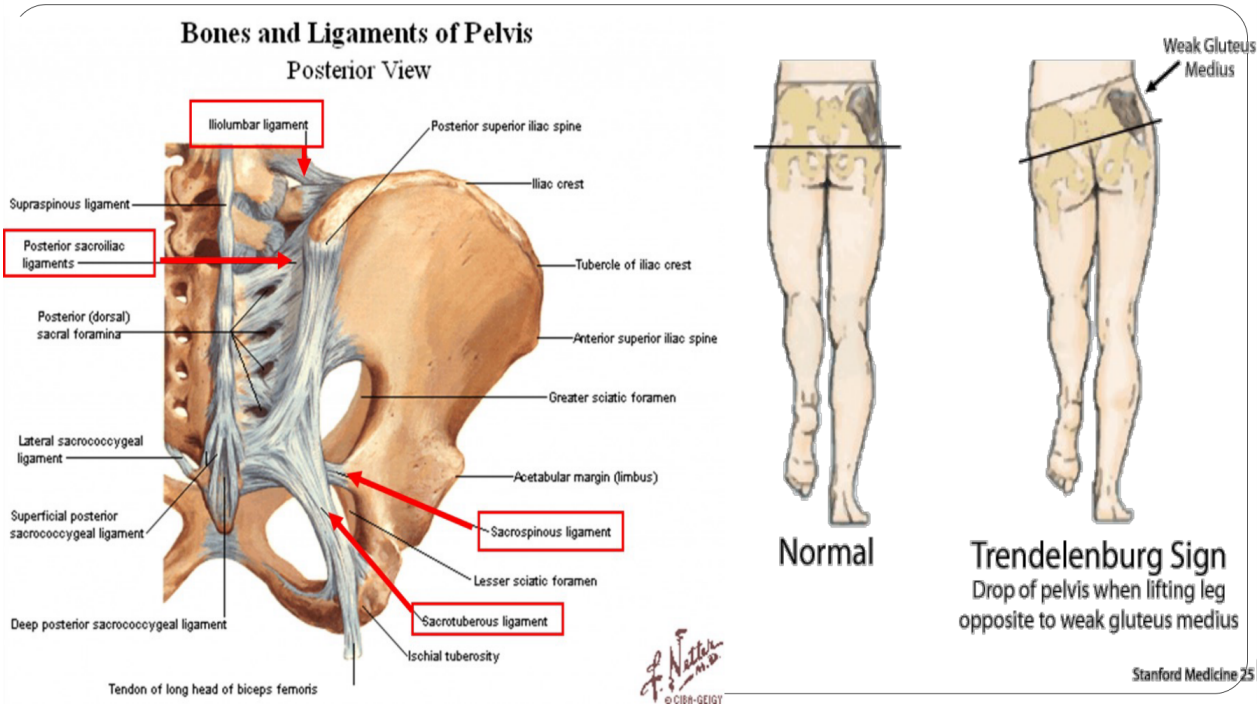
- Gynaecoid pelvis: typical or normal female pelvis.
- Android pelvis: female pelvis with male features.
- Anthropoid pelvis: ape-like; small transverse diameter and long anteroposterior diameter.
- Platypelloid pelvis: flat pelvis with a larger transverse diameter than anteroposterior diameter.
- The figure also shows a generally contracted pelvis, where the inlet is reduced overall.

Trap

- Android = like male.
- Anthropoid = AP long, transverse small.
- Platypelloid = flat and wide transversely.

6. Pelvic Fractures, Coccydynia, and Ligaments

- If the pelvis breaks at only one point, the fracture is usually stable and no displacement occurs.
- If there are two breaks, the fracture is unstable and displacement occurs.
- Coccydynia is usually caused by direct trauma to the coccyx, classically after falling down concrete steps.
- Complications of pelvic fractures: injury to the male urethra and urinary bladder, bleeding from vessel injury, sciatic nerve injury, and rarely rectal damage.
- Fractures involving the greater sciatic notch can injure the sciatic nerve.



Posterior pelvic ligaments

Vertebropelvic ligaments

KNOW THE FUNCTIONS ONLY

- Iliolumbar ligament: tip of L5 transverse process to iliac crest.
- Lumbosacral ligament: inferior aspect of L5 transverse process to lateral part of the ala of sacrum.
- Sacrotuberous ligament: lower part of sacrum and coccyx to ischial tuberosity.
- Sacrospinous ligament: ischial spine to lateral margins of sacrum and coccyx.

Functions of the vertebropelvic ligaments

- Iliolumbar and lumbosacral ligaments prevent anteroinferior displacement of L5 under body weight.
- Sacrotuberous and sacrospinous ligaments convert the greater and lesser sciatic notches into foramina.
- They also prevent upward tilting of the lower part of the sacrum under body weight.

Late pregnancy changes

- Increased sex hormones and relaxin relax pelvic ligaments in the last half of pregnancy.
- This increases mobility at the pelvic joints.
- Relaxation of the sacroiliac joints and pubic symphysis can increase pelvic diameters by about 10 to 15%, mainly transverse diameters, including the interspinous distance.
- The coccyx can move posteriorly to help fetal passage.
- Relaxation of sacroiliac ligaments can increase pelvic rotation and contribute to a swayback posture.

- أنَّ جاهِمةَ جاءَ إلى النَّبيِّ صلَّى اللَّهُ عليهِ وسلَّمَ ، فقالَ: يا رسولَ اللَّهِ ، أردتُ أن أغزوَ وقد جئتُ أستشيرُكَ ؟ فقالَ: هل لَكَ مِن أمٍّ ؟ قالَ: نعَم ، قالَ : فالزَمها فإنَّ الجنَّةَ تحتَ رِجلَيها

خلاصة حكم المحدث : حسن صحيح

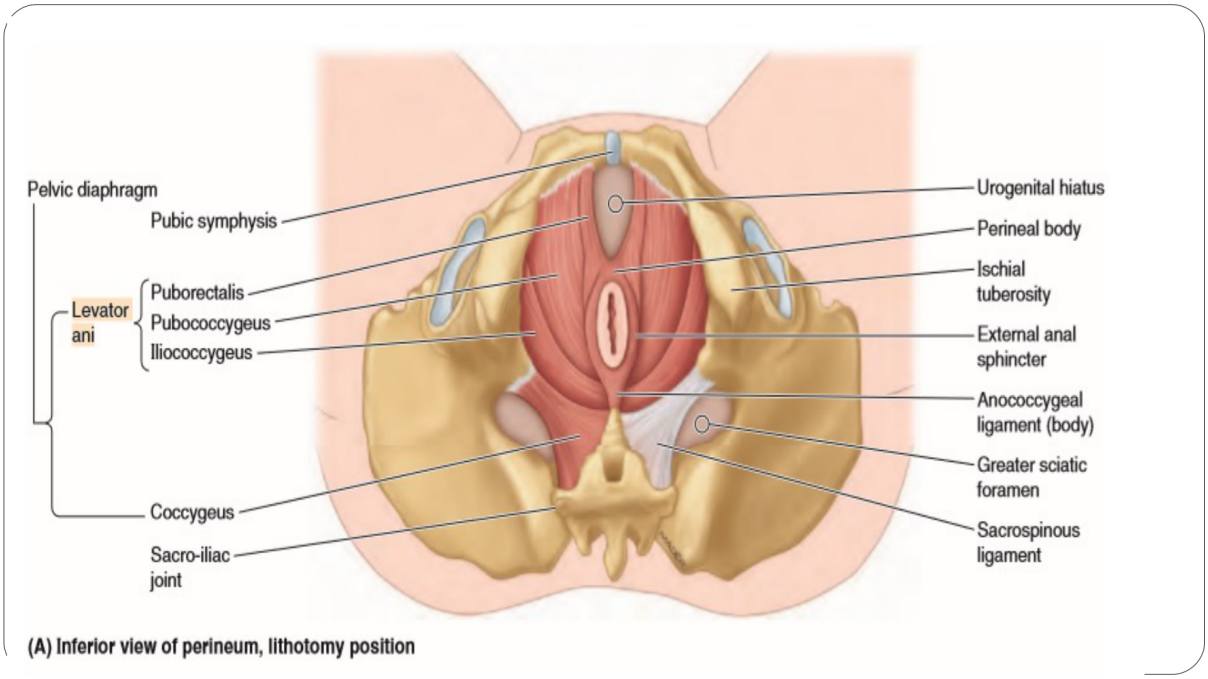
الراوي : معاوية بن جاهمة السلمي | المحدث : الألباني | المصدر : صحيح النسائي الصفحة أو الرقم : 3104

Swayback posture and lumbar lordosis in pregnancy

7. Muscles of the Pelvis and Pelvic Fascia

Group	Muscles
Pelvic wall	Piriformis, obturator internus
Pelvic floor	Levator ani, coccygeus

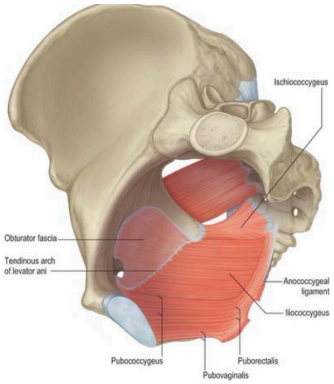
- Levator ani and coccygeus of both sides form the pelvic diaphragm, which forms the pelvic floor.
- The part of the pelvis above levator ani is the pelvic cavity.
- The part of the pelvis below levator ani is the perineum.
- The part of obturator internus above the origin of levator ani is in the side wall of the pelvic cavity.
- The part of obturator internus below the origin of levator ani is in the side wall of the ischiorectal fossa of the perineum.
- The anterior borders of the two levator ani muscles are separated by a gap filled by puboprostatic ligaments in males or pubovesical ligaments in females.



Pelvic diaphragm and the perineum

Pelvic fascia

- Piriformis fascia is part of the parietal pelvic fascia.
- Anterior relation: internal iliac vessels.
- Posterior relation: sacral nerves.
- Obturator fascia covers the pelvic surface of obturator internus and fuses with periosteum at the margins of the muscle except at the obturator groove, where it passes below the obturator nerves and vessels.
- Between the lower border of the pubic body and the ischial spine, the fascia thickens to form the tendinous arch (white line), which gives origin to levator ani.
- Below the level of levator ani, the fascia lies in the lateral wall of the ischiorectal fossa and forms the pudendal canal around the internal pudendal artery and pudendal nerve.



Levator ani & coccygeus

Levator ani

Origin :

- Lower part of back Body of pubis
- White line of Obturator fascia
- Pelvis surface of Ischial spine

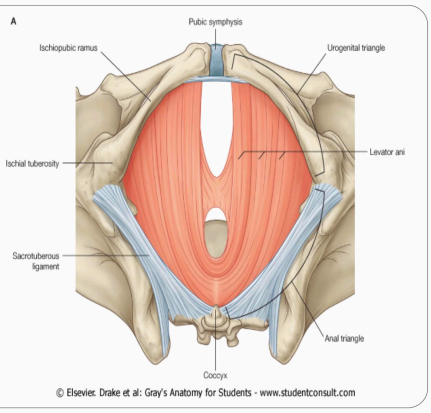
Nerve Supply :

➢ On its pelvic surface :
fourth sacral N. (sacral plexus)

➢ On its perineal surface :
perineal branch (of pudendal N.)

Action :

1-Supports and maintains the pelvic viscera in position.
2-It resist the rise in intra pelvic pressure during the straining
3-Sphincter action on the anorectal junction, and vagina.



Levator Ani Muscle

Pubococcygeus
Arises from body of pubis and anterior 1/2 of the white line

Iliococcygeus
Arises posterior 1/2 of the white line and ischial spine

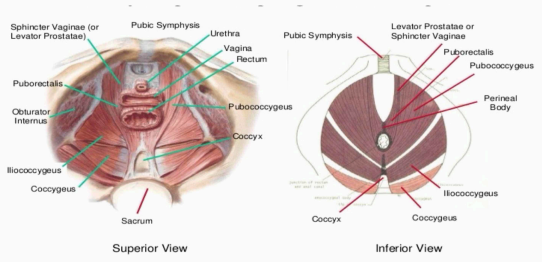
Anterior fibres
form Levator prostate in males and Sphincter vaginae in females

Intermediate fibres
Puborectalis

Poserior fibres
pubococcygeus proper

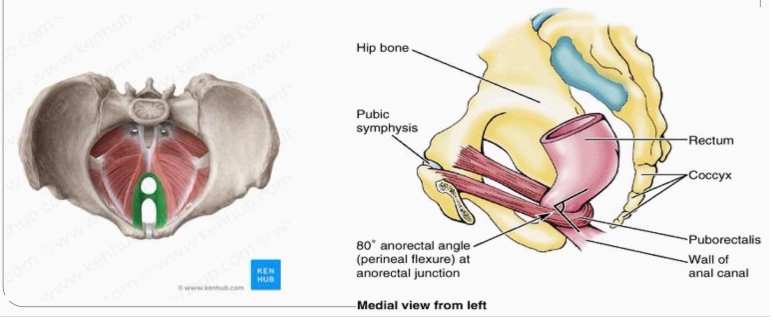
1- Levator prostatae or sphincter vaginae ;

It pass horizontally and backwards around the sides of prostate in male or sides of vagina in female to insert into the **perineal body**
It supports the prostate , constrict the vagina and stabilize the perineal body.
Perineal Body : is a mass of fibrous tissue, in front of the anal canal.
❖**In the male** : it lies between anal canal and bulb of the penis.
❖ **In the female** : it lies between anal canal and lower part of vagina.



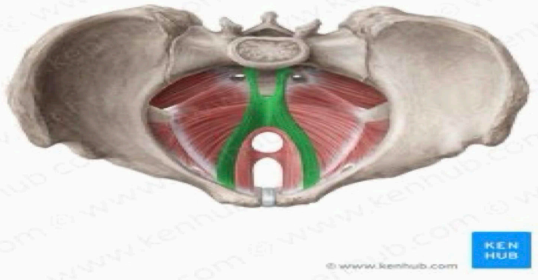
2. The puborectalis

It passes inferomedially to become continuous with the opposite ones behind the anorectal junction, so form a U-shaped sling.
It is inserted into Anococcygeal body



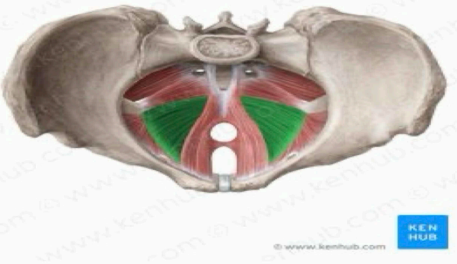
3-Pubococcygeus proper

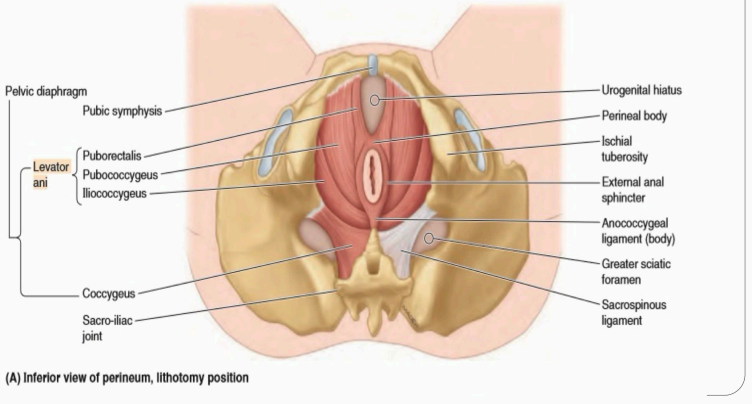
It pass medially to be attached to side of coccyx and anococcygeal Body
Anococcygeal body :A small fibrous mass between the tip of the coccyx and the anal canal.



Iliococcygeus :

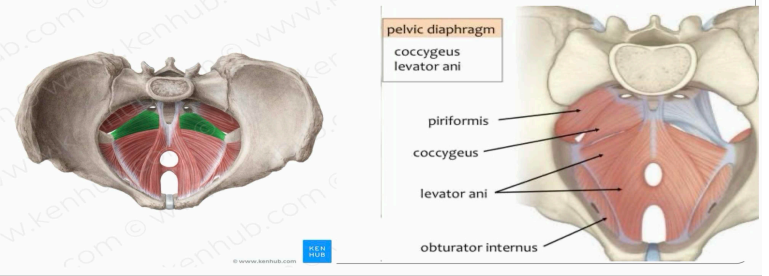
It arises from posterior 1/2 of the white line and ischial spine.
Its fibres pass medially inferior to the pubococcygeus proper and has the same insertion into side of coccyx and the anococcygeal raphe.





Coccygeus Muscle

Origin : Ischial spine
Insertion : lower end of the sacrum and into the coccyx
Nerve supply: A branch of the 4th and 5th sacral nerves
Action: The two muscles assist the levatore ani in supporting the pelvic viscera.



8. Levator Ani and Coccygeus: High-Yield Details

Levator ani

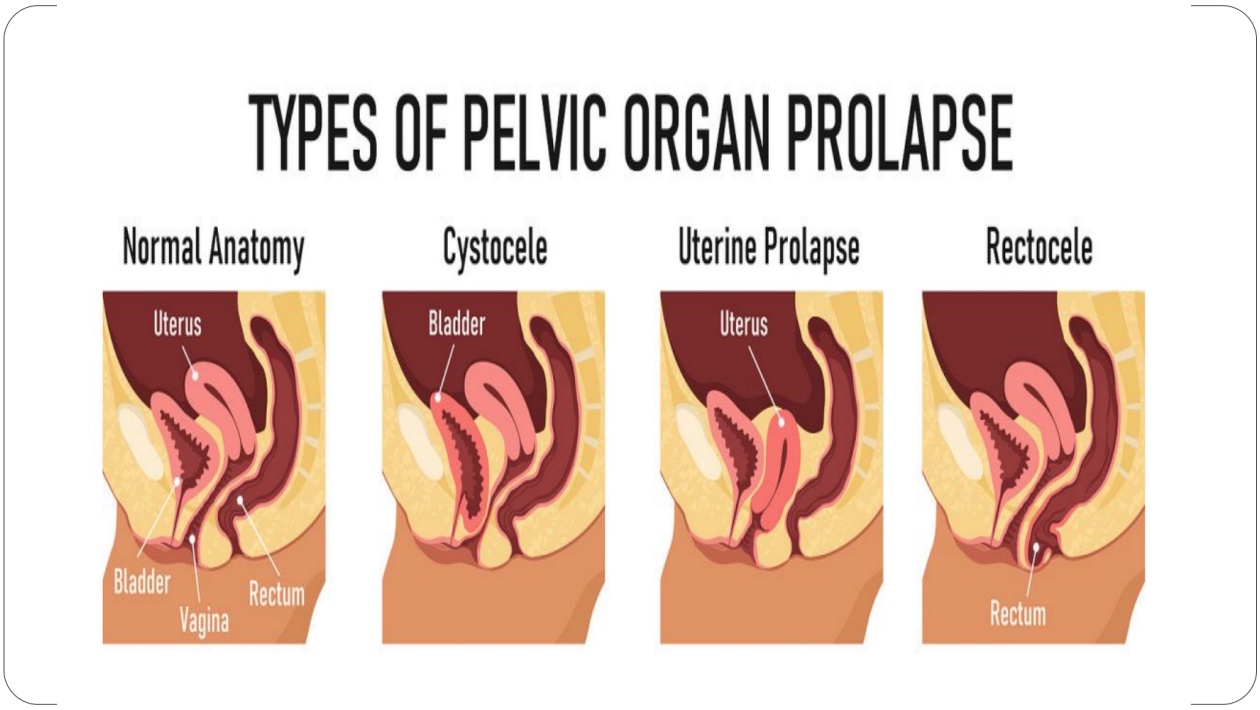
- Origin: lower part of the posterior body of pubis, white line of obturator fascia, and pelvic surface of the ischial spine.
- Nerve supply: pelvic surface from the 4th sacral nerve (sacral plexus); perineal surface from the perineal branch of the pudendal nerve.
- Actions: supports and maintains pelvic viscera, resists rises in intrapelvic pressure during straining, and acts as a sphincter on the anorectal junction and vagina.

Part	Origin / course	Insertion / function
Pubococcygeus	Body of pubis + anterior half of white line	Contributes to support of pelvic viscera
Iliococcygeus	Posterior half of white line + ischial spine	Attaches to side of coccyx and anococcygeal raphe
Puborectalis	Intermediate fibers	U-shaped sling around anorectal junction
Levator prostatae / sphincter vaginae	Anterior fibers	Runs around prostate / vagina and inserts into perineal body
Pubococcygeus proper	Posterior fibers	Attaches to side of coccyx and anococcygeal body

- Levator prostatae or sphincter vaginae passes horizontally and backward around the sides of the prostate or vagina to insert into the perineal body.
- It supports the prostate, constricts the vagina, and stabilizes the perineal body.
- Perineal body = mass of fibrous tissue in front of the anal canal; in males it lies between the anal canal and bulb of the penis; in females between the anal canal and the lower part of the vagina.
- Puborectalis passes inferomedially and continues with the opposite side behind the anorectal junction to form a U-shaped sling; it inserts into the anococcygeal body.
- Pubococcygeus proper attaches medially to the side of the coccyx and the anococcygeal body.
- Anococcygeal body = small fibrous mass between the tip of the coccyx and the anal canal.
- Iliococcygeus arises from the posterior half of the white line and the ischial spine; its fibers pass medially inferior to the pubococcygeus proper and insert into the side of the coccyx and the anococcygeal raphe.
- Coccygeus: origin from the ischial spine; insertion into the lower end of the sacrum and coccyx; nerve supply from branches of the 4th and 5th sacral nerves.
- Coccygeus assists the levator ani in supporting the pelvic viscera.

Alteration in the position of the bladder neck and urethra, leading to **stress incontinence** (patient dribbles urine whenever the intra-abdominal pressure is raised, as in coughing).

Pelvic floor injury can lead to stress incontinence



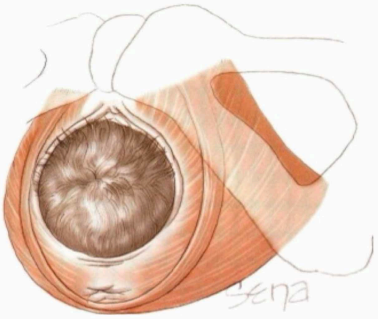
Common pelvic organ prolapse patterns

Functional Significance of the Pelvic Floor in the Female

It helps in head rotation during second stage of labour

Injury to the pelvic floor

- Can happen during a difficult childbirth
- This leads to loss of support for the pelvic viscera leading to
  - Uterine and vaginal prolapse,
  - Herniation of the bladder (cystocele),
  - Alteration in the position of the bladder neck and urethra, leading to **stress incontinence** (patient dribbles urine whenever the intra-abdominal pressure is raised, as in coughing).
  - Prolapse of the rectum may also occur.



Functional significance of the pelvic floor in females

- Helps head rotation during the second stage of labour.
- Difficult childbirth can injure the pelvic floor and lead to loss of support for pelvic viscera.
- Consequences: uterine and vaginal prolapse, cystocele, altered bladder neck and urethral position causing stress incontinence, and possible rectal prolapse.

تناديك رغبة المقابيل من الأرض
وأنت بالمجرة

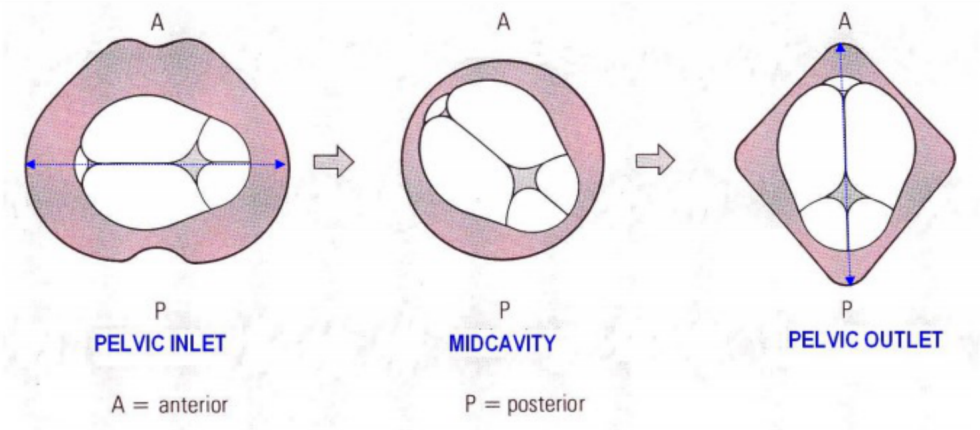
Last-Minute Revision

Memorize these first

- Pelvic brim divides greater (false) pelvis from lesser (true) pelvis.
- Inlet widest diameter = transverse; outlet widest diameter = AP.
- Diagonal conjugate can be examined clinically; obstetric conjugate is 1.5 to 2 cm shorter.
- Female pelvis: wider inlet, wider cavity, larger outlet, wide subpubic angle, everted ischial tuberosities, wider shorter sacrum.
- Sacrotuberous + sacrospinous ligaments convert sciatic notches into foramina.
- Relaxin increases pelvic joint mobility in late pregnancy.
- Pelvic diaphragm = levator ani + coccygeus.
- Puborectalis is the key U-shaped sling at the anorectal junction.
- Pelvic floor injury after childbirth can cause prolapse and stress incontinence.

Rotation of head during labour

- Widest diameter of pelvic canal changes from **transverse diameter** at ***pelvic inlet*** to **Anterior posterior** diameter at ***pelvic outlet***
- To obtain best fit of fetal head, the longest diameter of the fetal head passes through the widest diameter of the pelvis.
- Therefore the head must rotate during labour



One last look: inlet transverse, outlet AP

Built from the uploaded anatomy of the pelvis lecture slides.

اللهم ربِّ لك الحمد حتى ترضى، ولك الحمد ربِّ إذا رضيت، ولك الحمد ربِّ بعد الرضا