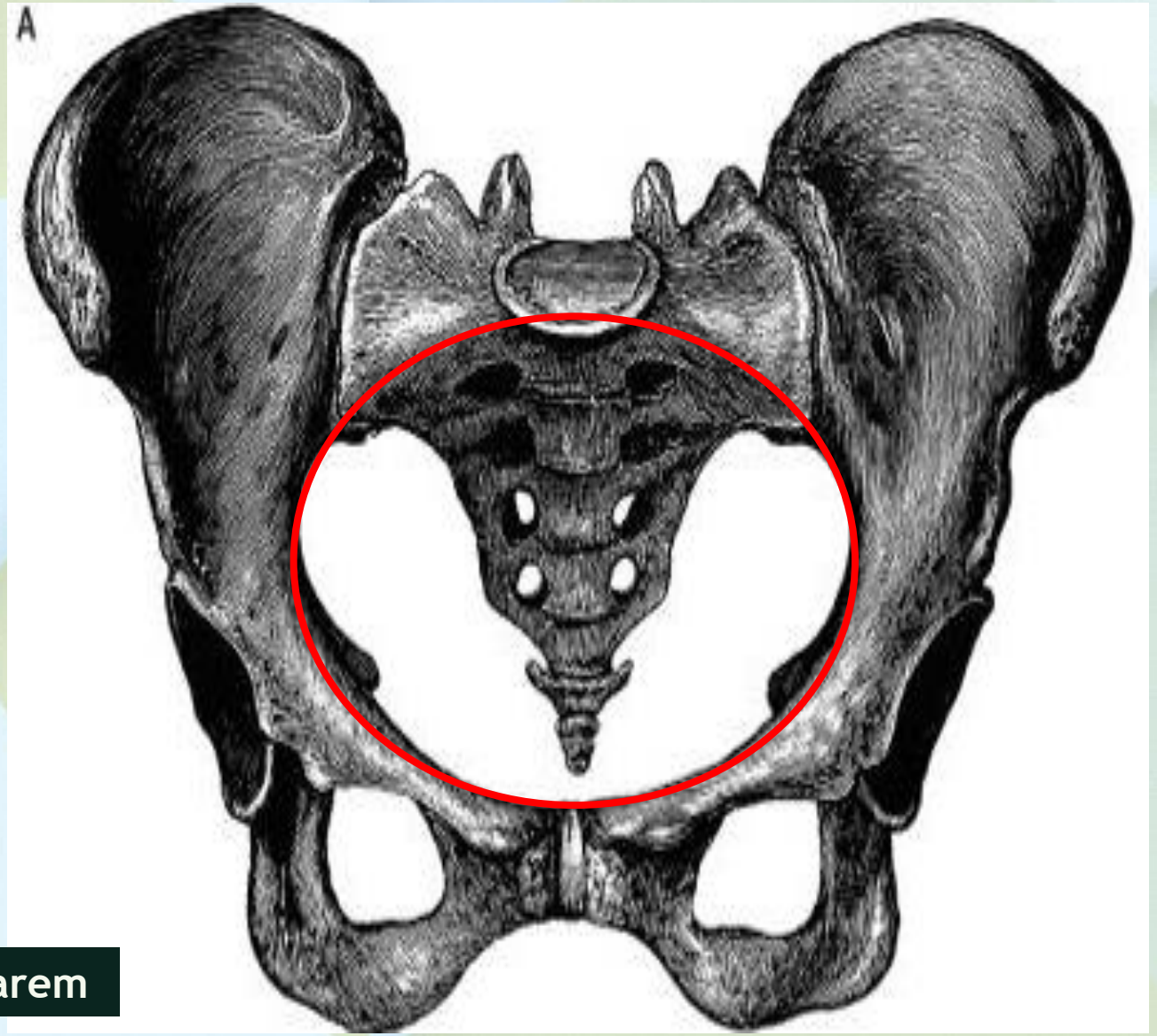
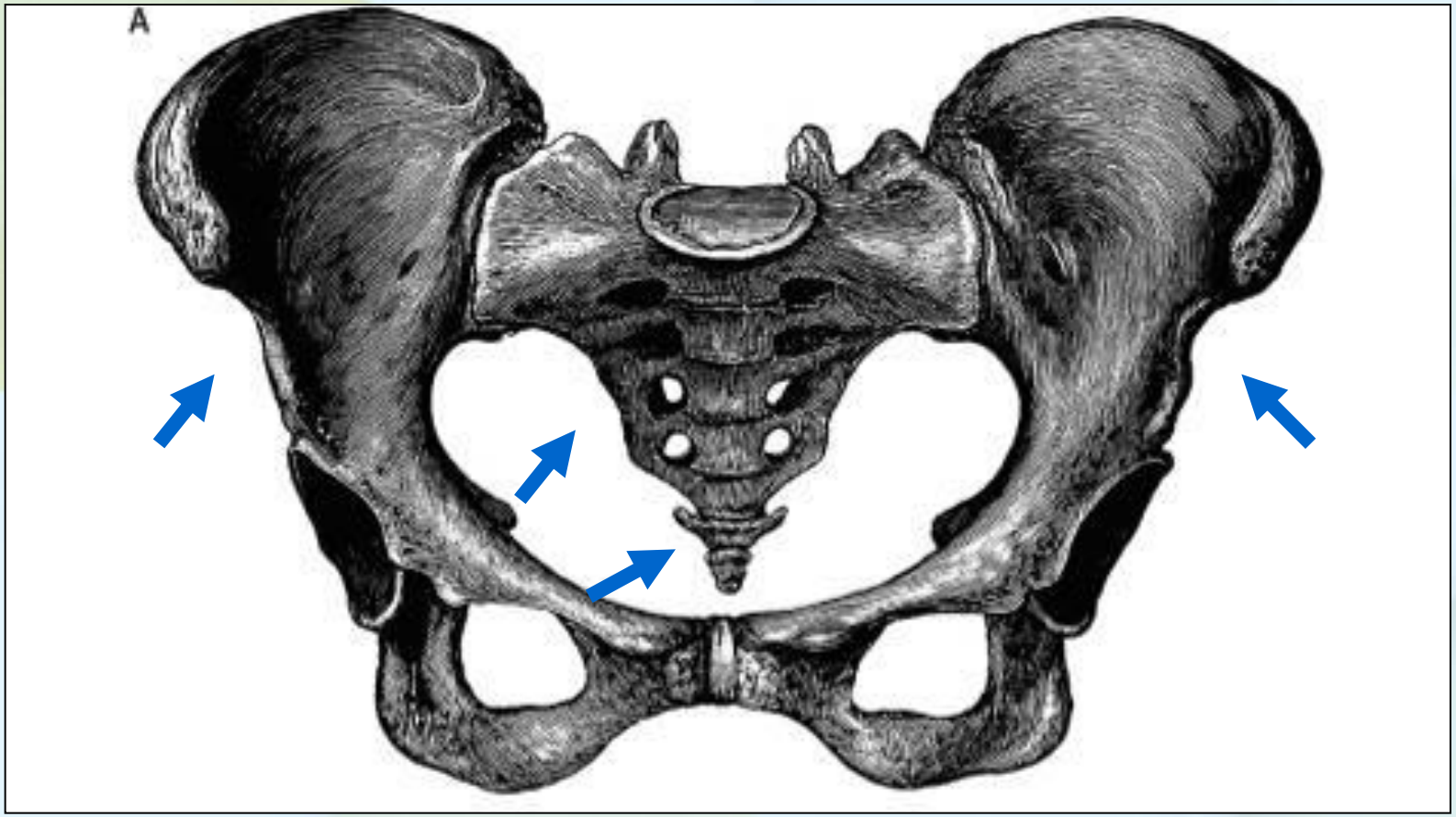
ANATOMY OF THE PELVIS



Prof. Saeed Abuel Makarem

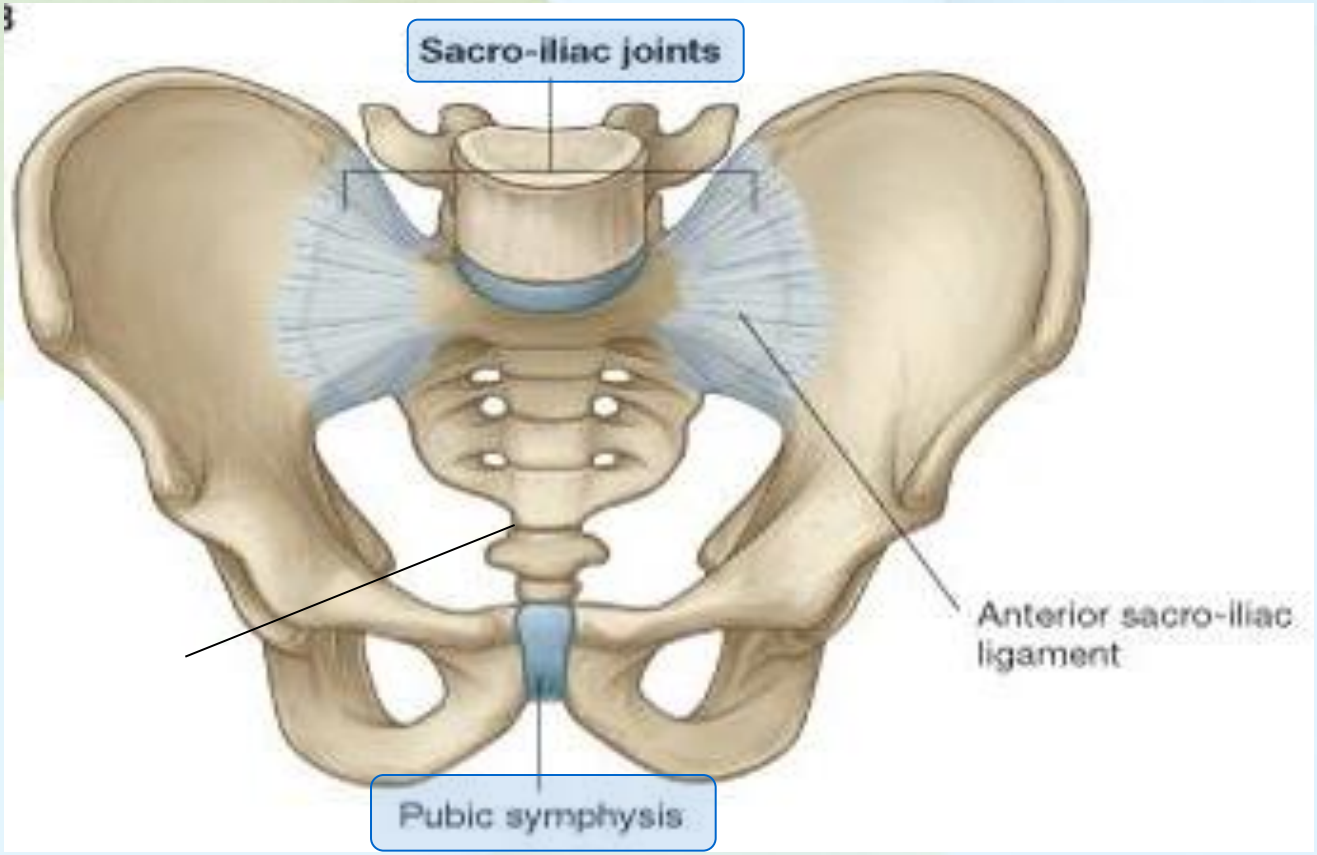
OBJECTIVES

- By the end of the lecture, you should be able to:
- Describe the anatomy of the pelvis regarding (bones, joints & muscles).
- Describe the boundaries and subdivisions of the pelvis.
- Differentiate the different types of the female pelvis.
- Describe the pelvic walls & floor.
- Describe the components & function of the pelvic diaphragm.
- List the blood & nerves & lymphatic of the pelvis.



The bony pelvis is composed of four bones:

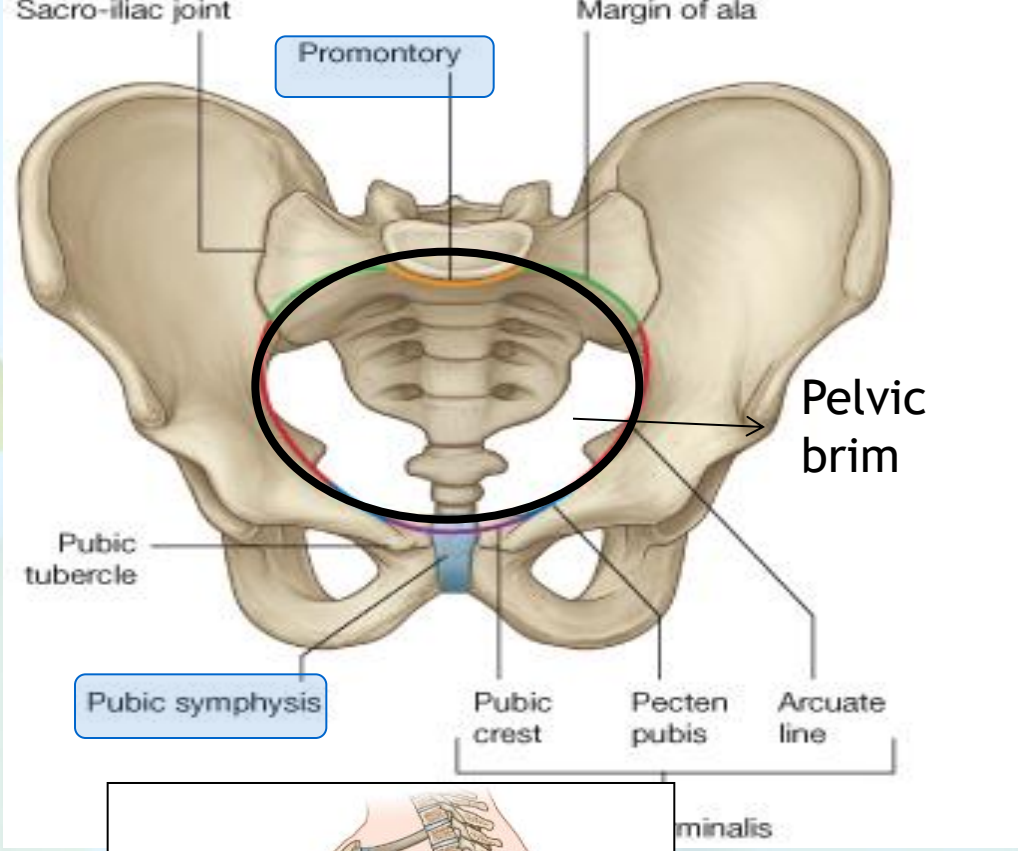
- Two hip bones, which form the anterior and lateral walls.
- Sacrum and coccyx, which form the posterior wall.
- These 4 bones are lined by 4 muscles and connected by 4 joints.
- The bony pelvis with its joints and muscles form a strong **basin-shaped** structure (with multiple foramina), that contains & protects the lower parts of the alimentary & urinary tracts and internal organs of reproduction.



FOUR JOINTS

1- Anteriorly:
Symphysis pubis (2nd cartilaginous joint).
2- Posteriorlateraly: Two Sacroiliac joints. (Synovial joins)
3- Posteriorly: Sacrococcygeal joint (cartilaginous), between sacrum and coccyx.

The pelvis is divided into two parts by the **pelvic brim.** Above the brim is the **False or greater pelvis,** which is part of the abdominal cavity. Below the brim is the **True or lesser pelvis.**

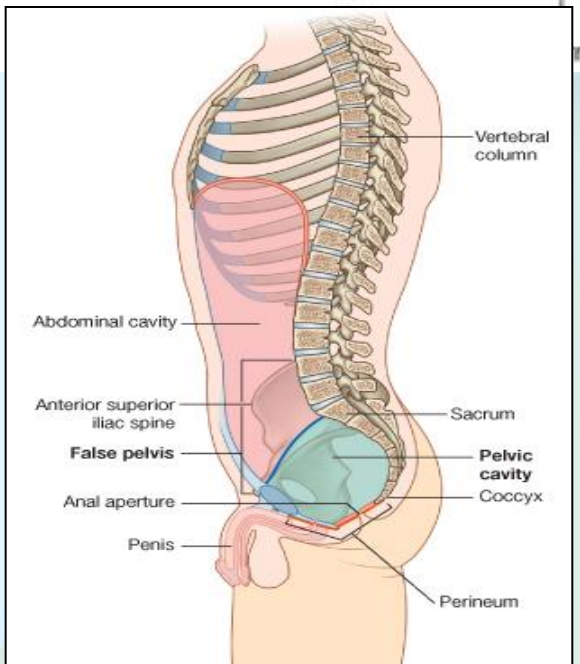


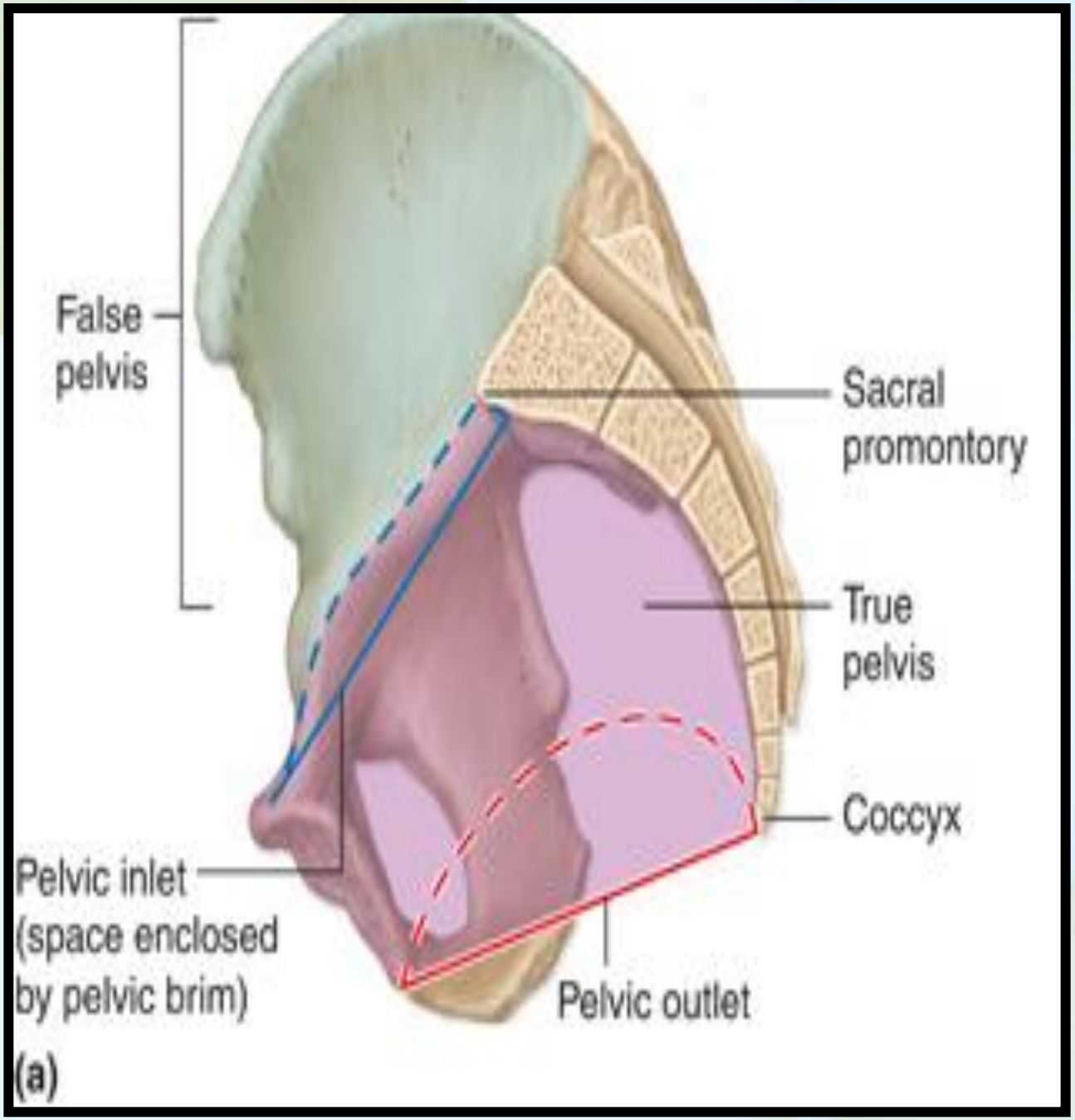
The False pelvis is bounded by:

Posteriorly:
Lumbar vertebrae.

Laterally:
Iliac fossae and the iliacus.

Anteriorly:
Lower part of the anterior abdominal wall.
It supports the abdominal contents.





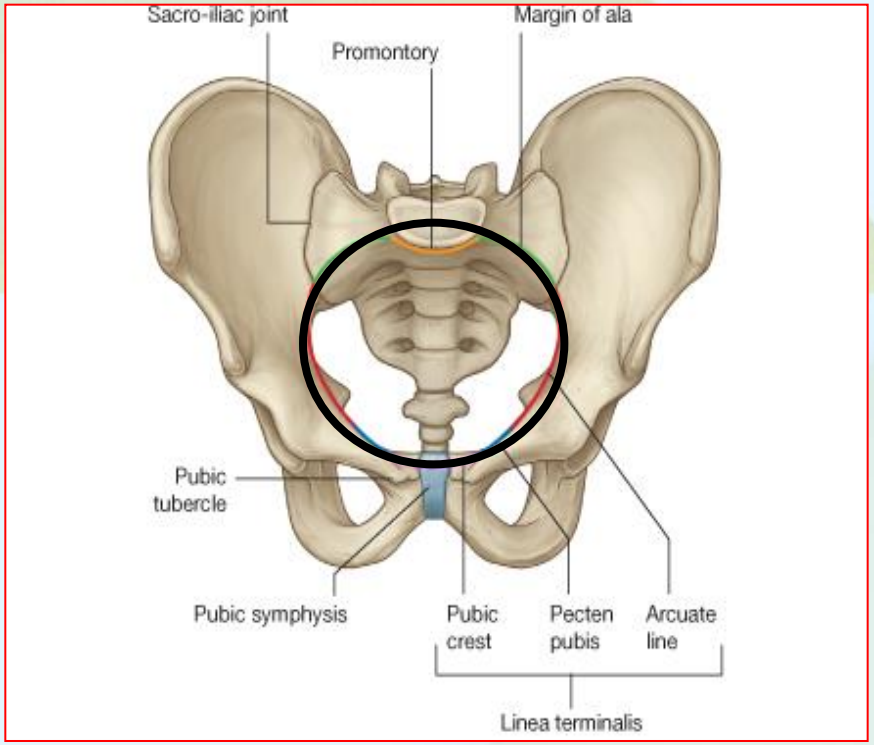
The True pelvis has:

- ***An Inlet.***
- ***An Outlet.***

and a Cavity.

The cavity is a short, curved canal, with a shallow anterior wall and a deeper posterior wall. It lies between the inlet and the outlet.

Boundaries of the PELVIC INLET



Anteriorly:

Symphysis pubis, (upper border).

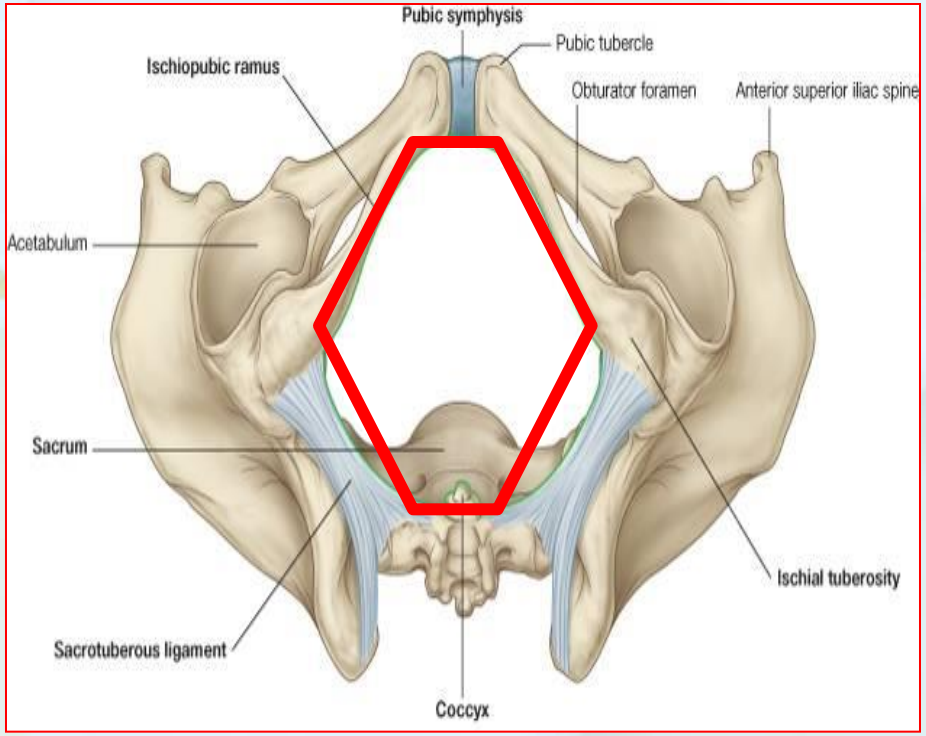
Posteriorly:

Sacral promontory, ala of sacrum.

Laterally: **(on both sides)**

Ileopectineal line (arcuate) lines.

Boundaries of the PELVIC OUTLET



Anteriorly:

Symphysis pubis, (lower border).

Posteriorly:

Tip of Coccyx.

Anterolaterally:

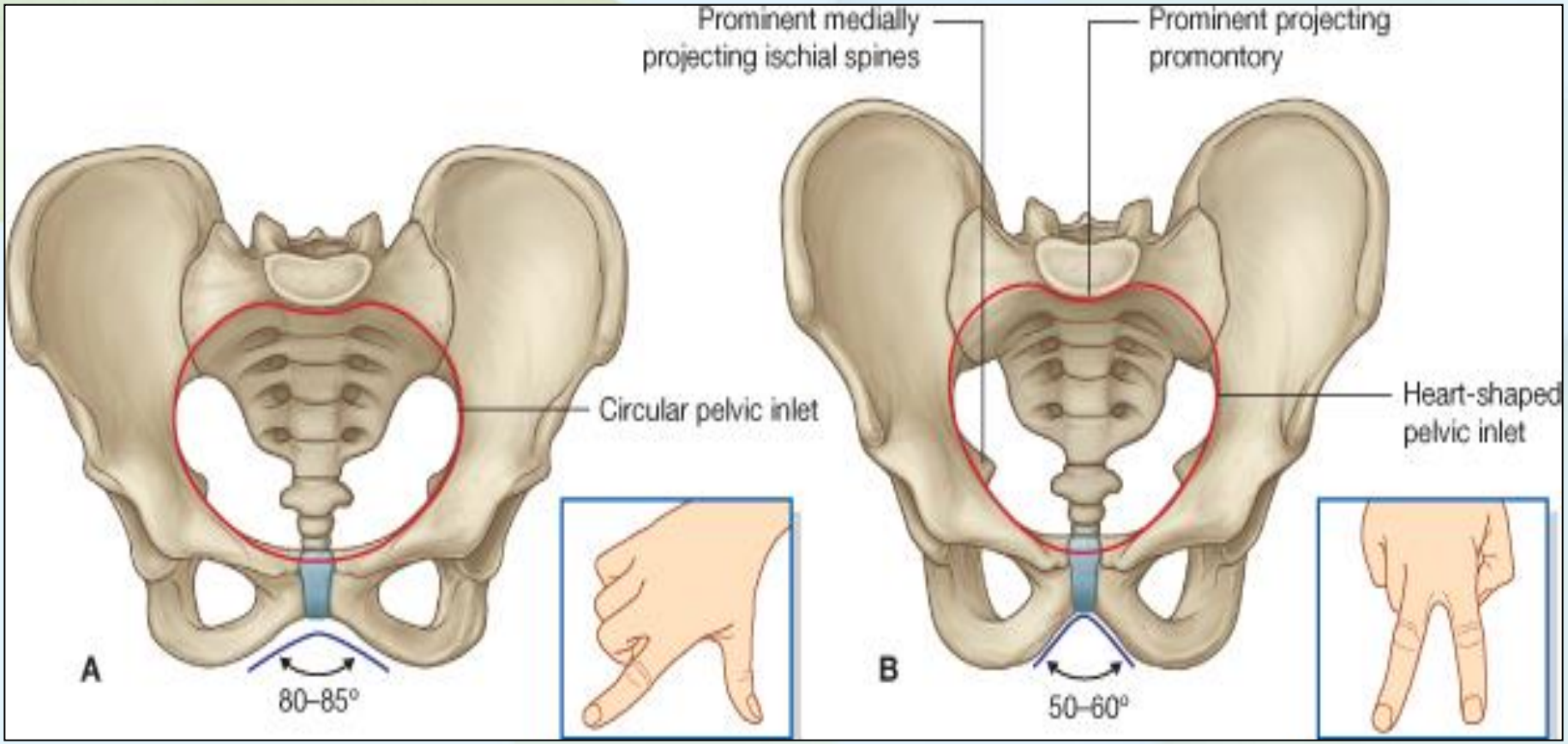
Ischiopubic ramus.

Posterolaterally:

Sacrotuberous ligament.

FEMALE

MALE

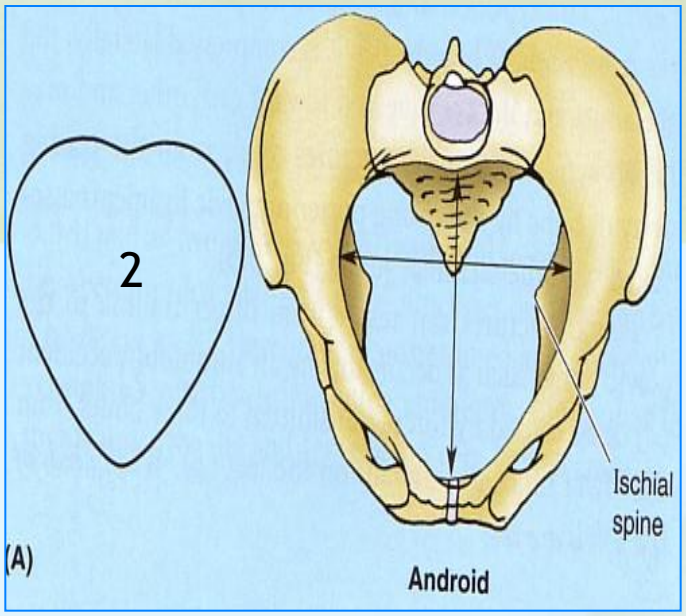


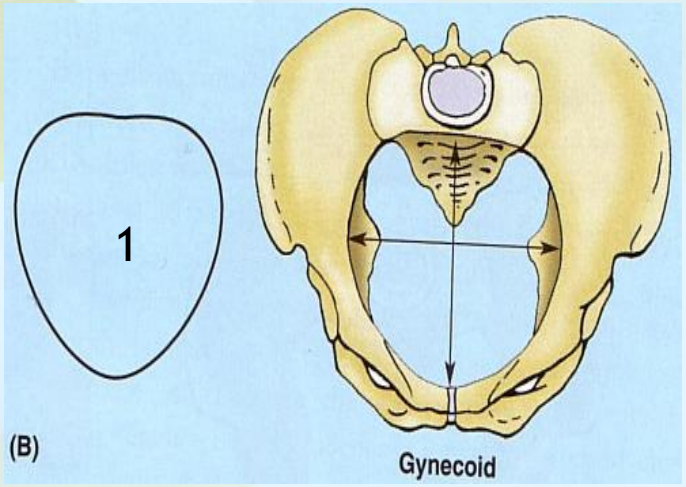
What is the MAIN DIFFERENCES BETWEEN Male and female pelvis?

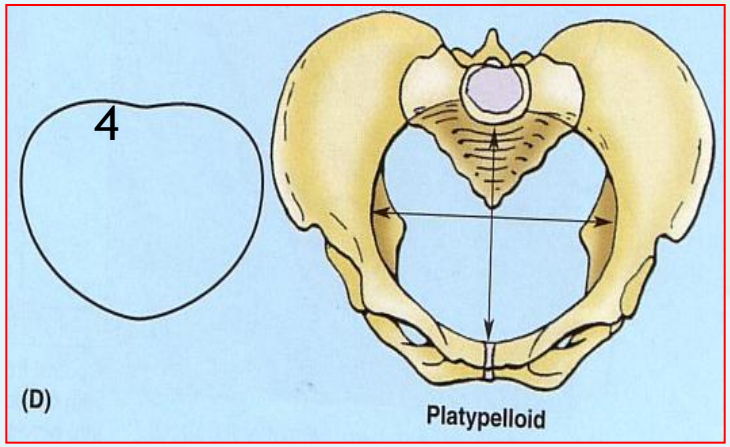
In female the Sacrum is usually wider and shorter.

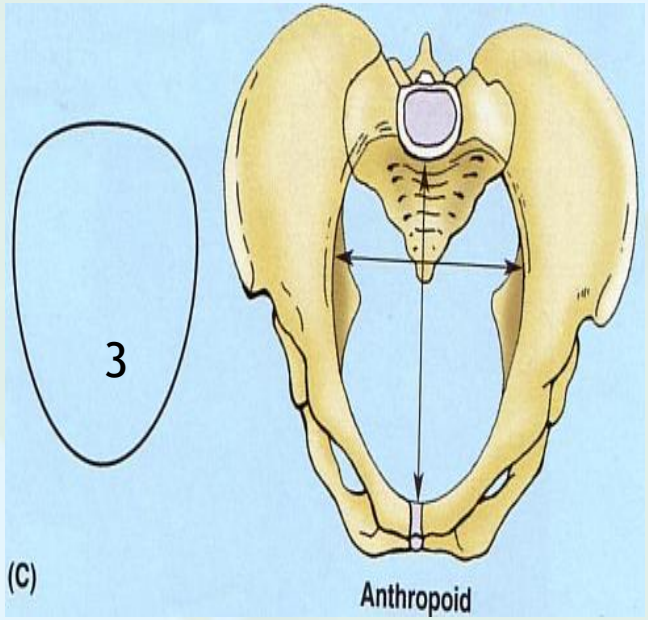
Also, the *Angle of the pubic arch* is wider.

Types of Female Bony Pelvis





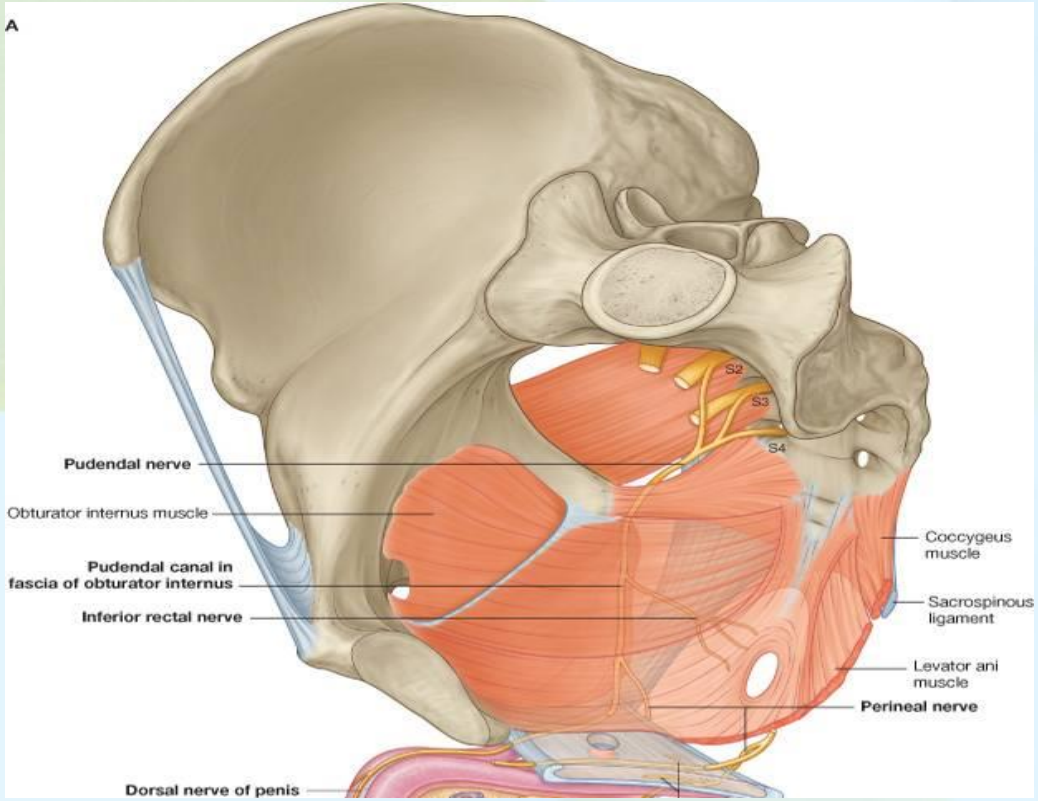




Why information of the shape and dimensions of the female pelvis is of **great importance for obstetrics?**

Because it is the bony canal through which the child head passes during birth.

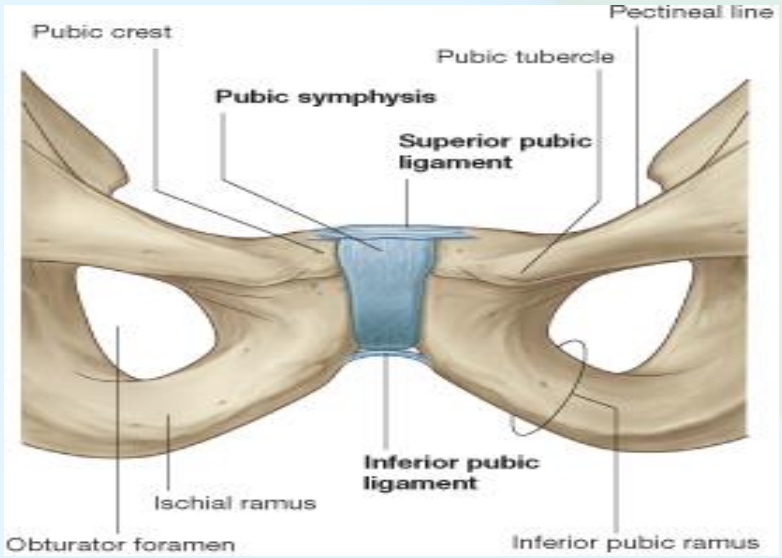
Pelvic walls



The pelvis has 4 walls:

1. Anterior.
2. Posterior.
3. Lateral.
4. Floor or inferior.

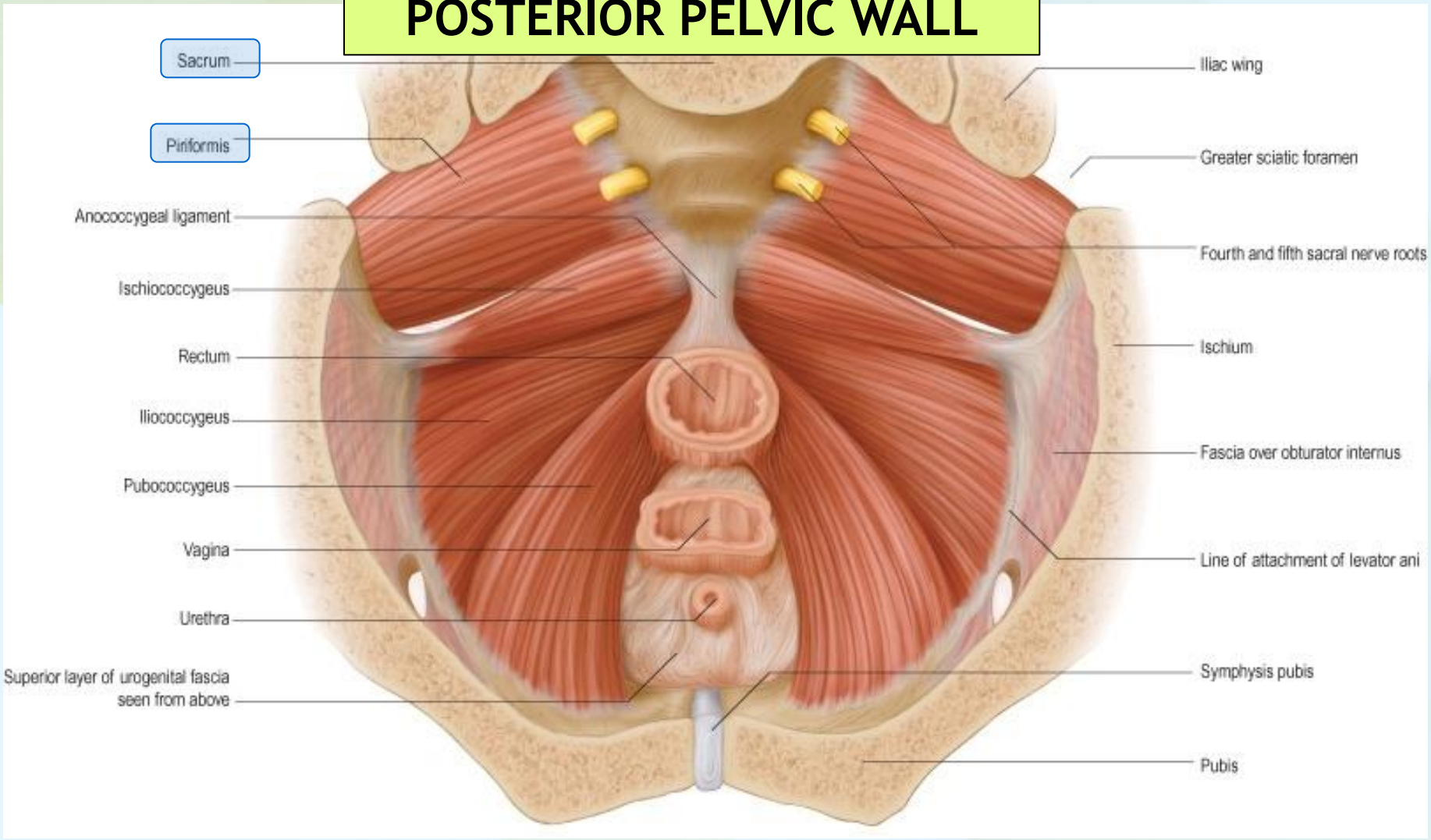
- The walls are formed by bones and ligaments.
- They are lined with muscles covered with fascia & parietal peritoneum.



ANTERIOR PELVIC WALL

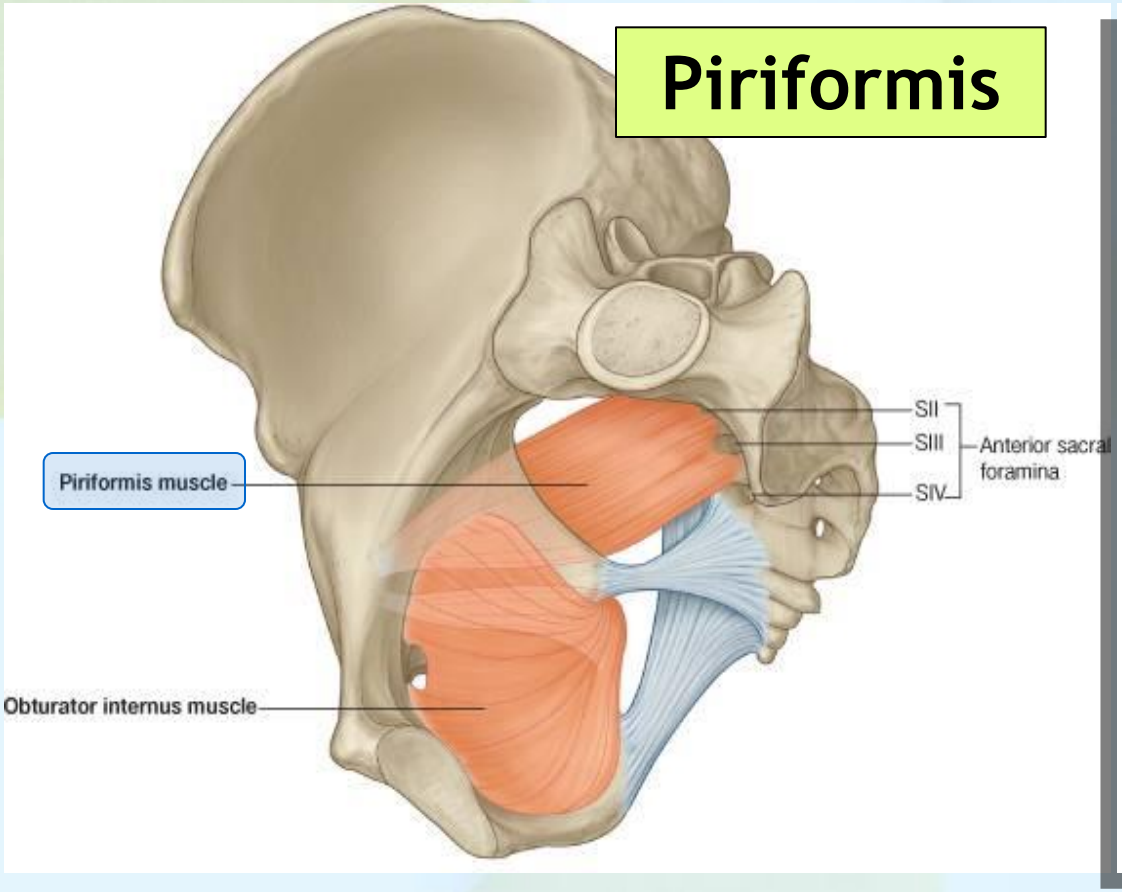
It is the shallowest wall and is formed by the posterior surfaces of the bodies of 2 pubic bones, pubic rami, and symphysis pubis.

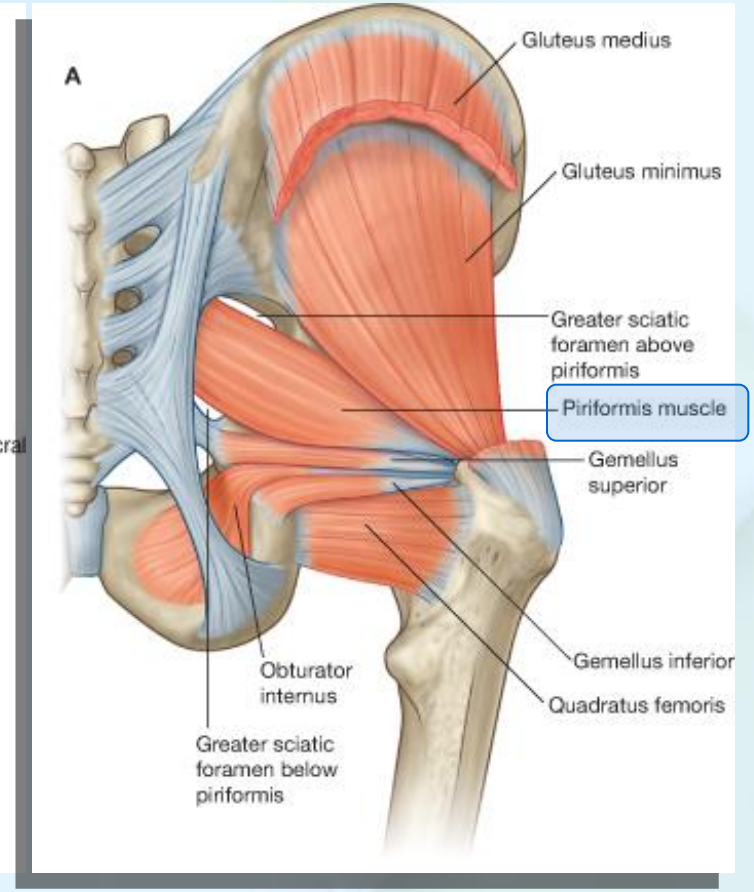
POSTERIOR PELVIC WALL



It is deeper and formed by sacrum, coccyx, piriformis muscles and their covering of parietal pelvic fascia.

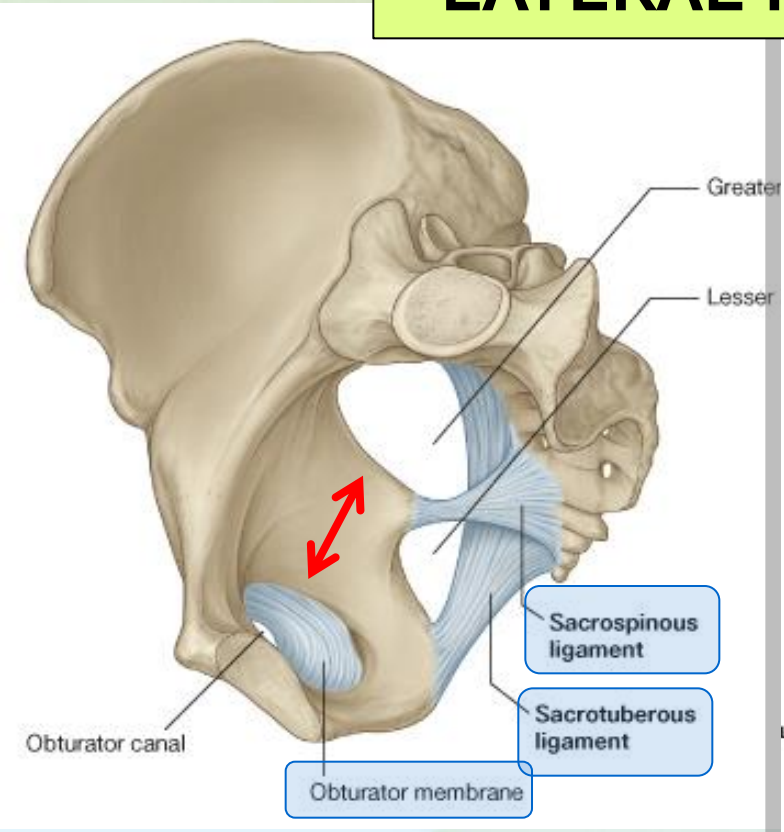
Piriformis

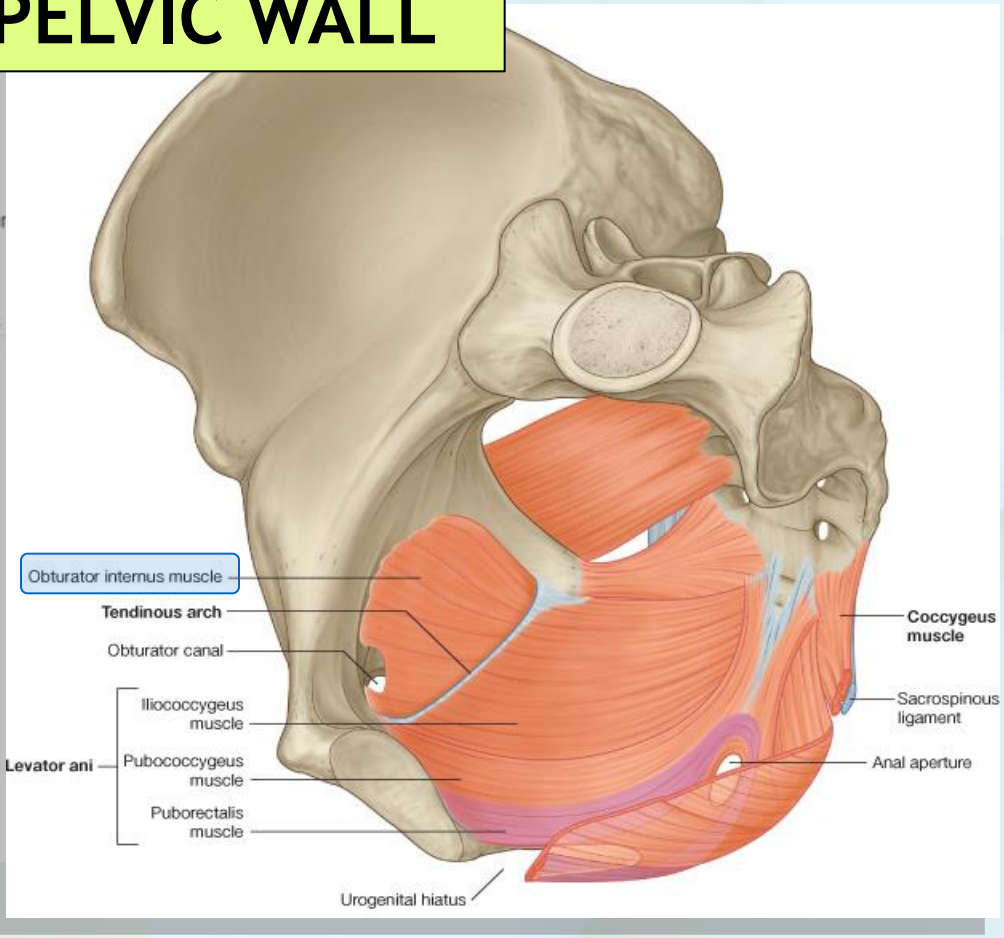




- **Origin:** Front of the middle 3 sacral vertebrae.
- It leaves the pelvis through the greater sciatic foramen.
- **Insertion**: Greater trochanter of the femur.
- **Action:** Lateral rotator of the femur at the hip joint.
- **Nerve supply:** Sacral plexus.

LATERAL PELVIC WALL





It is formed by:

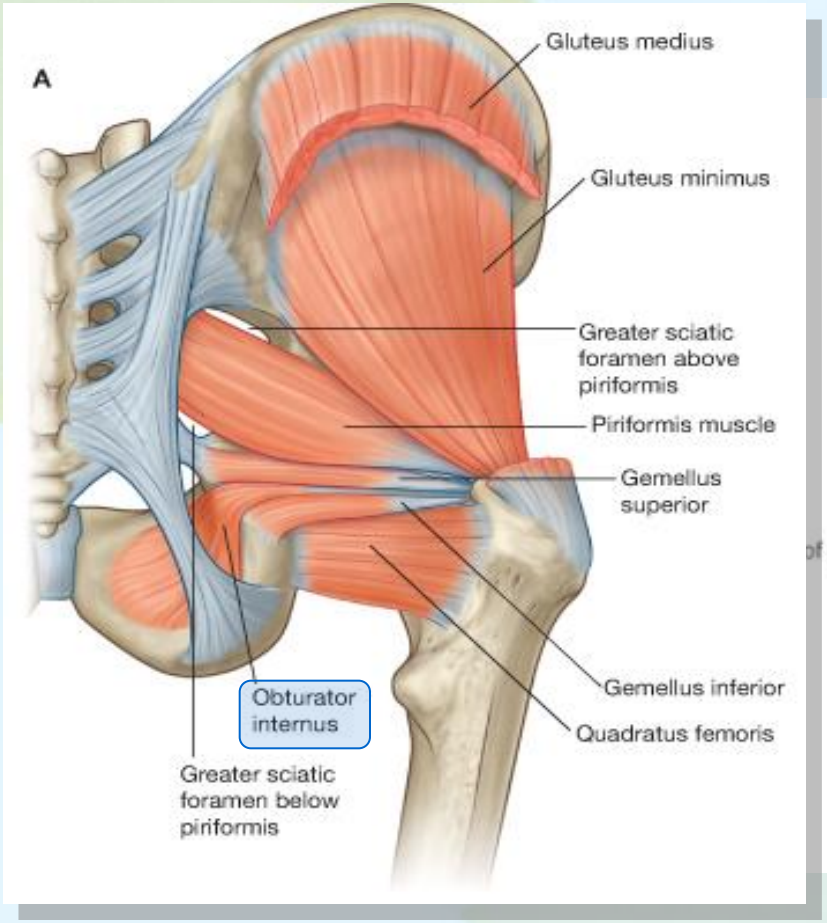
1- Part of the hip bone below the pelvic inlet **(double head arrow),**

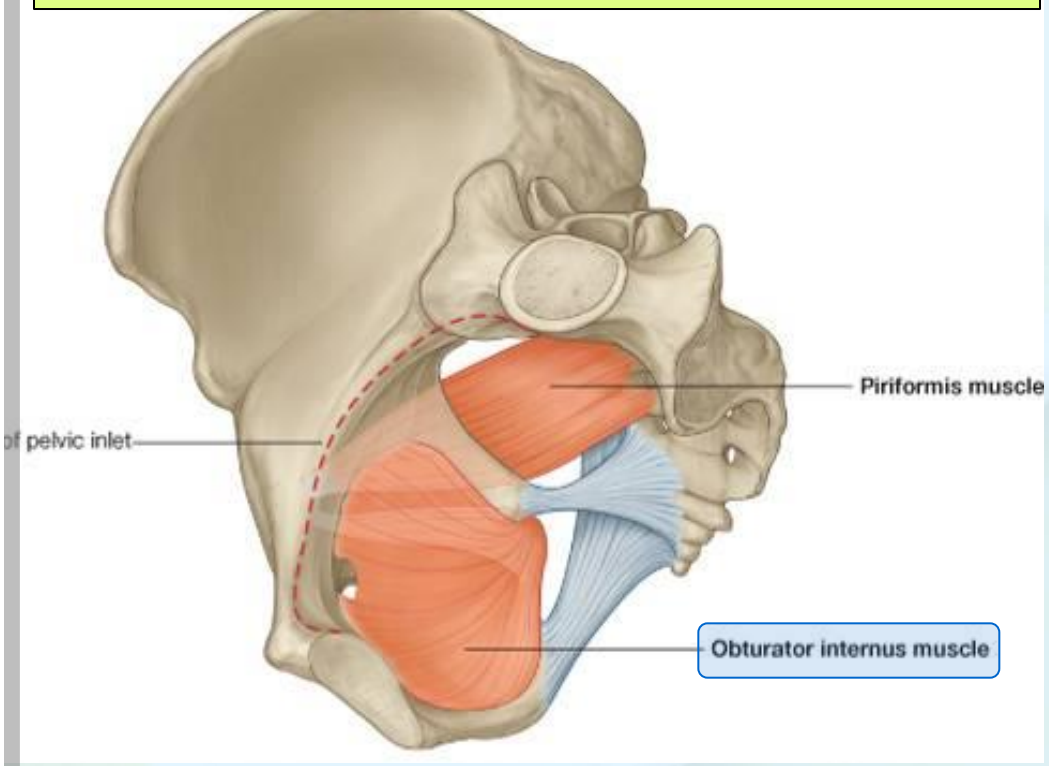
2- Obturator internus and its covering fascia,

3- Sacrotuberous and

4- Sacrospinous ligaments.

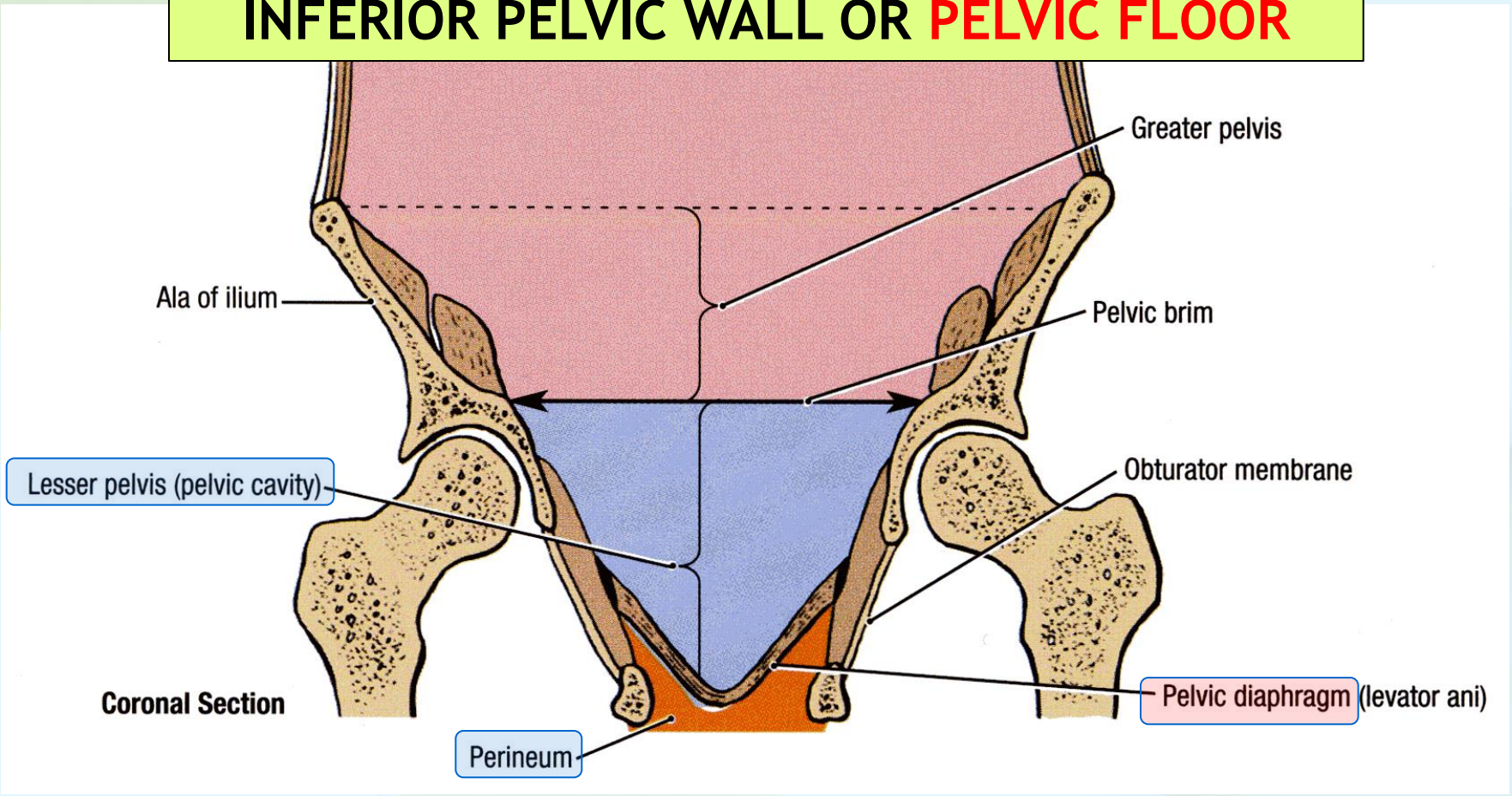
Obturator Internus





- **Origin:** Inner surface of the obturator membrane and the hip bone.
- **Insertion**: It leaves the pelvis through the lesser sciatic foramen to be inserted into the greater trochanter of the femur.
- **Action:** Lateral rotator of the femur at the hip joint.
- **Nerve supply:** Nerve to obturator internus.

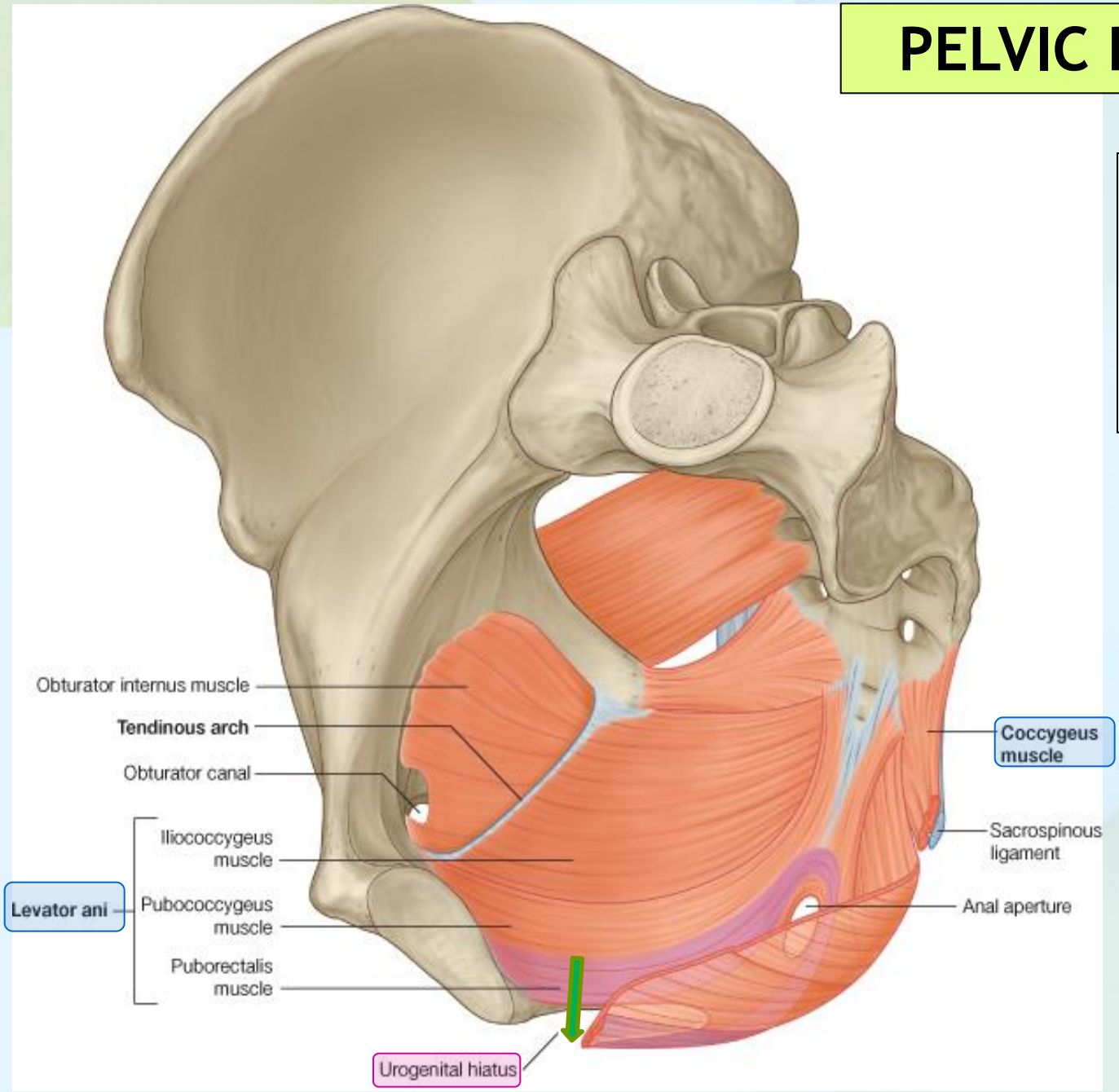
INFERIOR PELVIC WALL OR PELVIC FLOOR



- The pelvic floor supports the pelvic viscera and is formed by the **pelvic diaphragm.**
- It stretches across the lower part of the true pelvis and **divides it into**:

1. **Main pelvic cavity** *above,* which contains the pelvic viscera, and
2. **Perineum** *below which carries the external genital organs.*

PELVIC DIAPHRAGM



It is formed by the **levator ani** and the **coccygeus muscles** and their covering fasciae.

It is *incomplete anteriorly* to allow passage of the urethra in males or the urethra and the vagina in females.

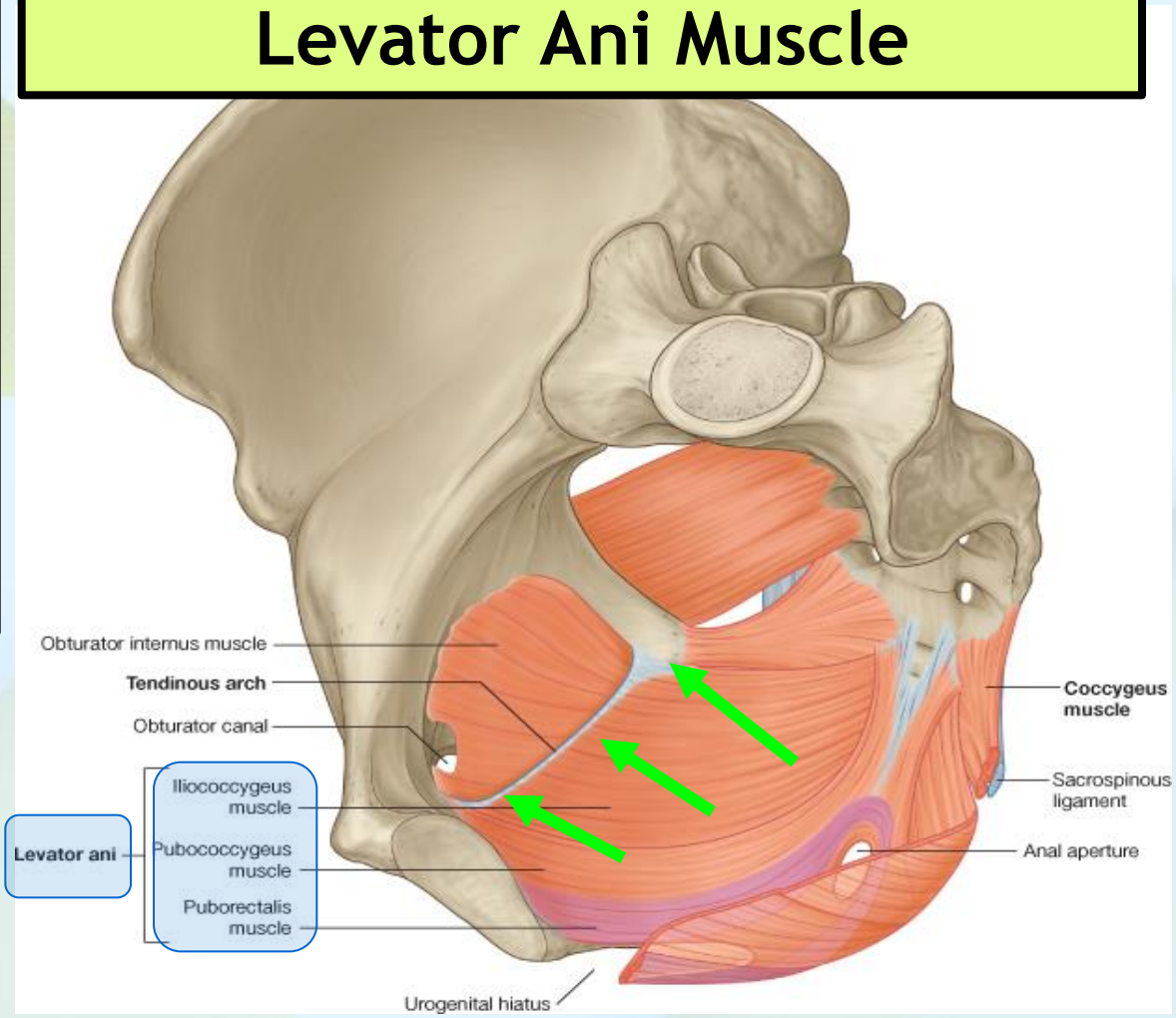
Levator Ani Muscle

It is a wide thin sheet of muscles that has a **linear origin** from:

1-Back of the body of pubis,

2-Tendinous arch of the obturator fascia,

3-Spine of ischium.



Its fibers are divided into 3 parts:

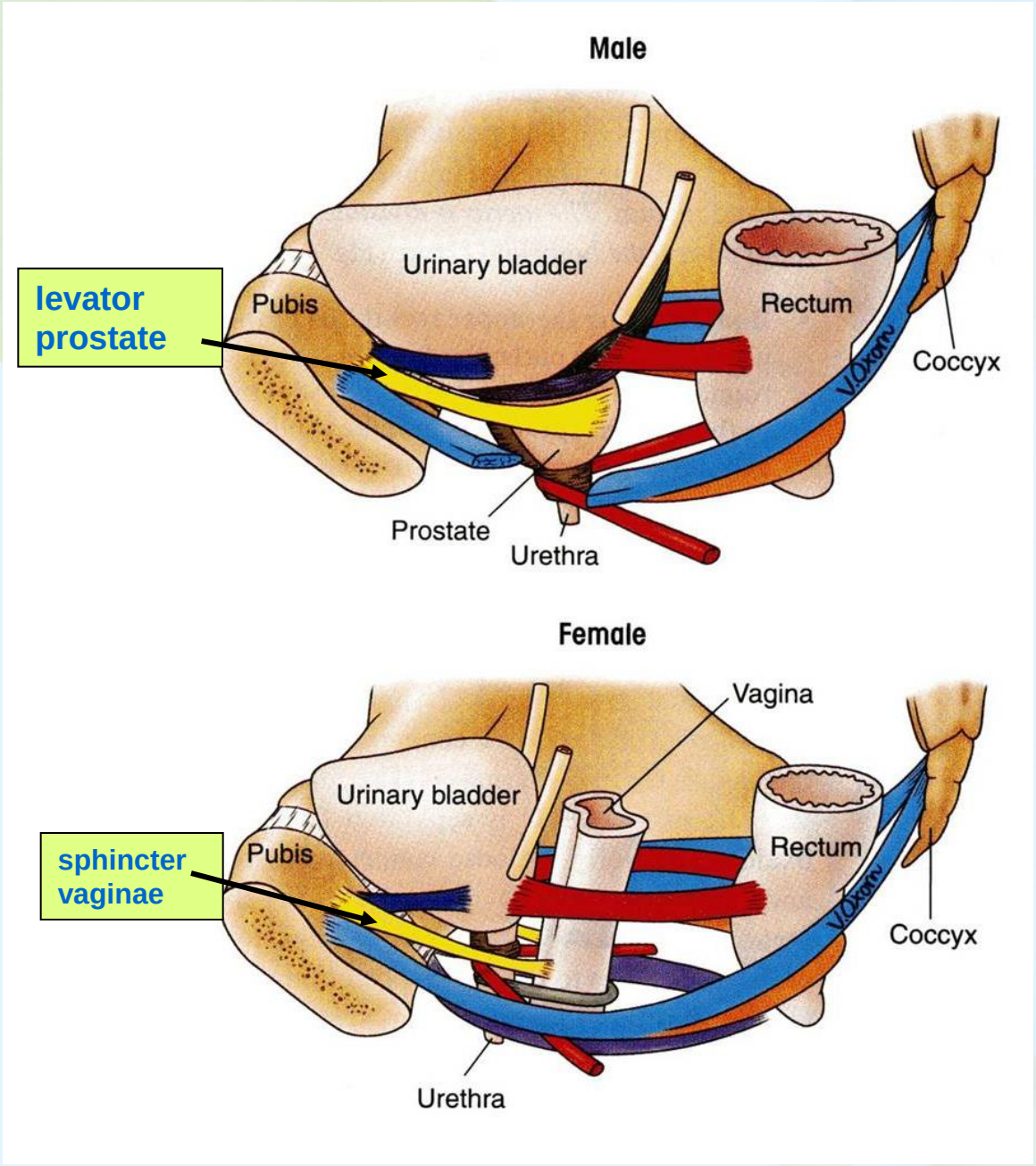
1- Pubococcygeus.

2- Iliococcygeus.

3- Puborectalis.

1. **Pubococcygeus:** it is the anterior part of the muscle that passes backward to be inserted into a small fibrous mass, called the anococcygeal body, between the tip of coccyx and the anal canal.

1- Pubococcygeus.



The anterior fibers sweep downward and medially to their Insertion, as follows:

1. The Anterior fibers

- **(The levator prostate or sphincter vaginae)** form a sling around the prostate or vagina.

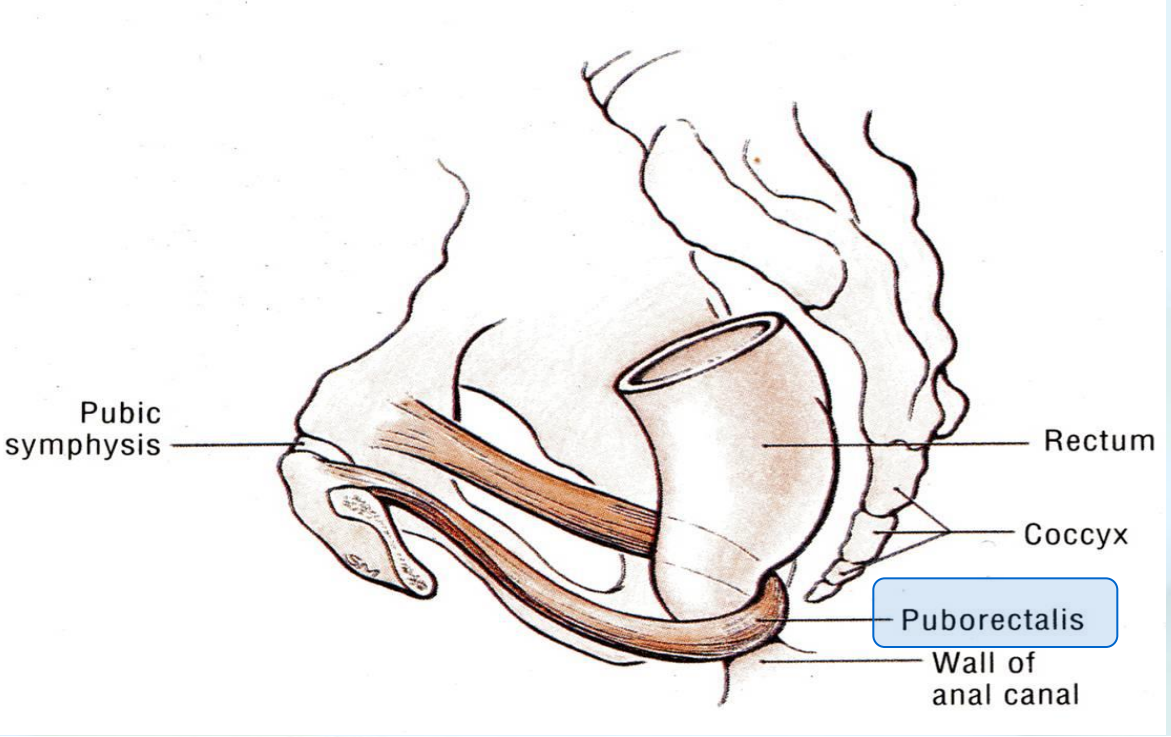
The **levator prostate** supports the prostate and stabilizes the perineal body.

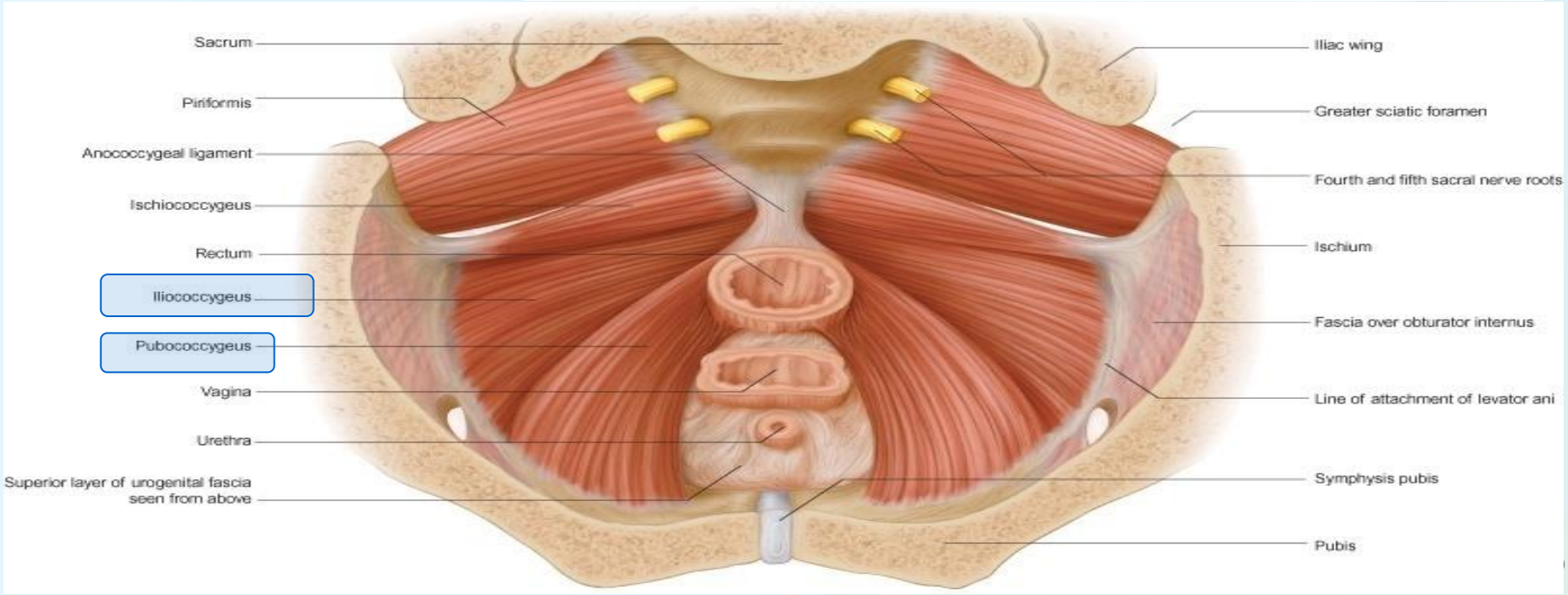
The **sphincter vaginae** constricts the vagina and stabilizes the perineal body.

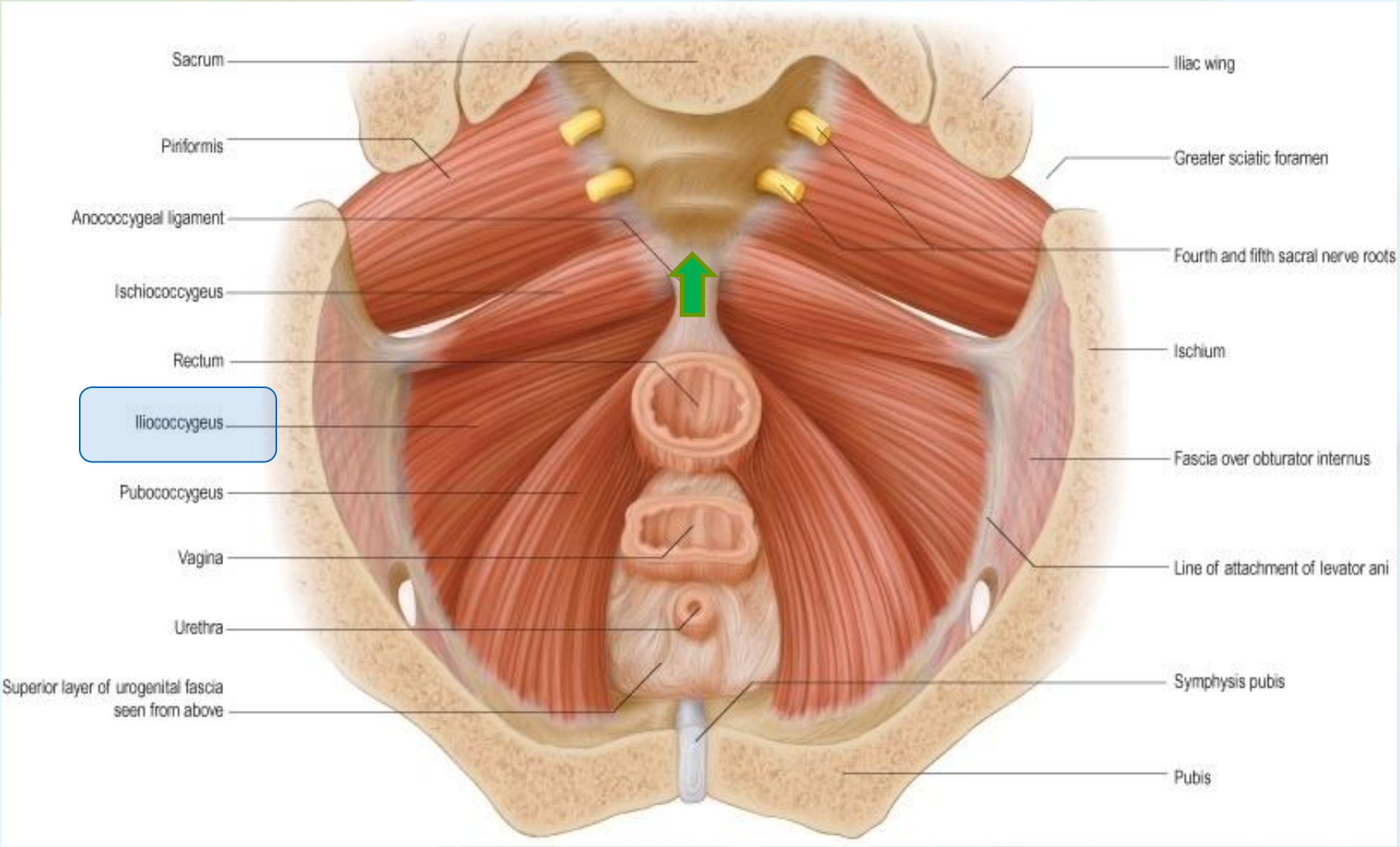
2. Intermediate fibers:

The puborectalis, forms a sling around the junction of the rectum and anal canal.

It has a very important role in maintaining fecal continence.

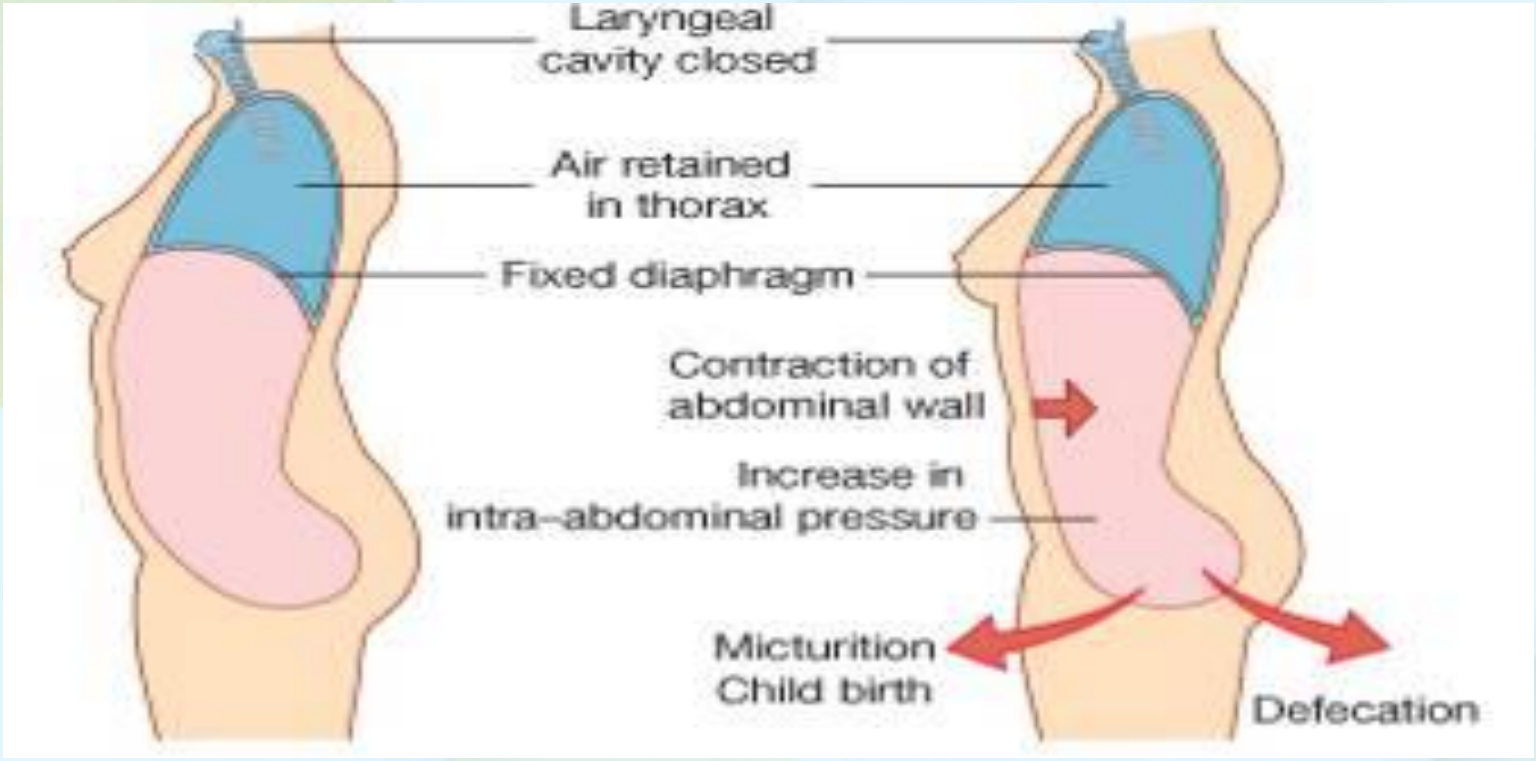






3. Posterior fibers:

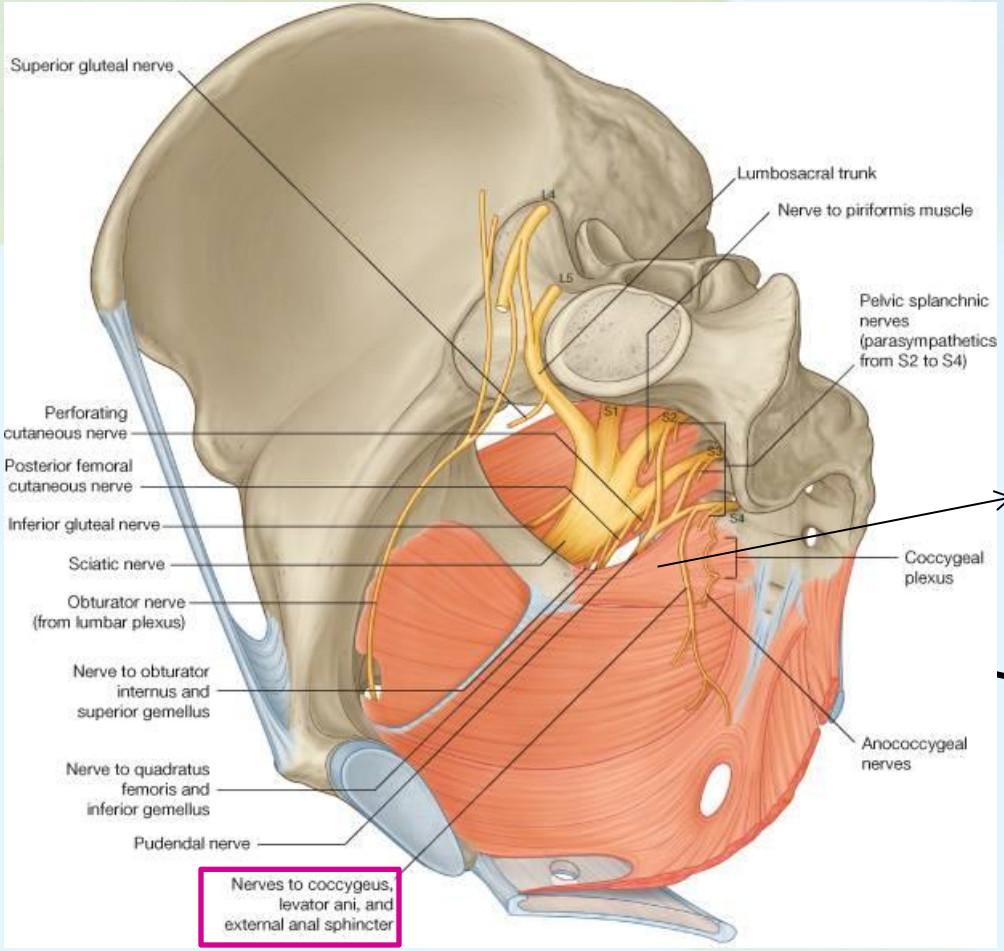
- **(The iliococcygeus)** is inserted into the anococcygeal body and the coccyx.



Actions of levator ani:

1. The muscles of the two sides form an efficient muscular sling that supports and maintains the pelvic viscera in position.
2. They resist the rise in intra pelvic pressure during the straining and expulsive efforts of the abdominal muscles (as in coughing).
3. They also have an important sphincter action on the anorectal junction.
4. They serve as a vaginal sphincter in the female.

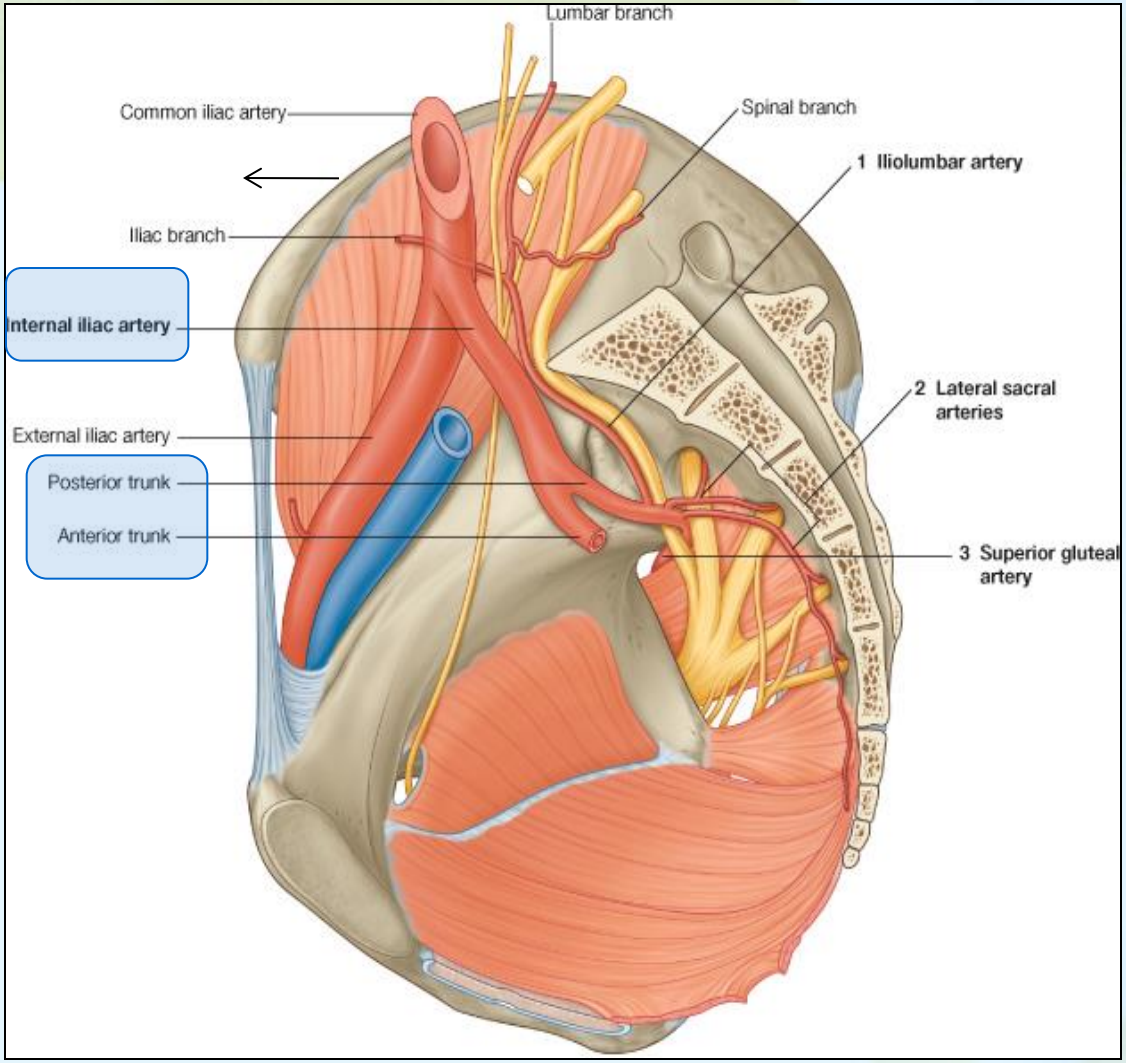
Coccygeus Muscle



- **Origin:**
- Ischial spine.
- **Insertion:**
- Lower end of sacrum and coccyx.
- **Action:**
- It assists the levator ani in supporting the pelvic viscera.
- **Nerve supply:**
- Fourth and fifth sacral nerves.
- **Important!**
- The coccygeus muscle has the same attachment of sacrospinous ligament.

Nerve supply to levator ani:
perineal branch of the fourth sacral nerve
perineal branch of the pudendal nerve.

Arteries of the Pelvis



- I- Internal iliac artery:
- It is a terminal branch of the common iliac artery.
- Arises in front of the sacroiliac joint.
- It descends inferiorly over the pelvic inlet.
- At the upper border of the greater sciatic foramen it divides into
- Anterior & Posterior divisions.

Posterior division Supplies:

Posterior abdominal wall.

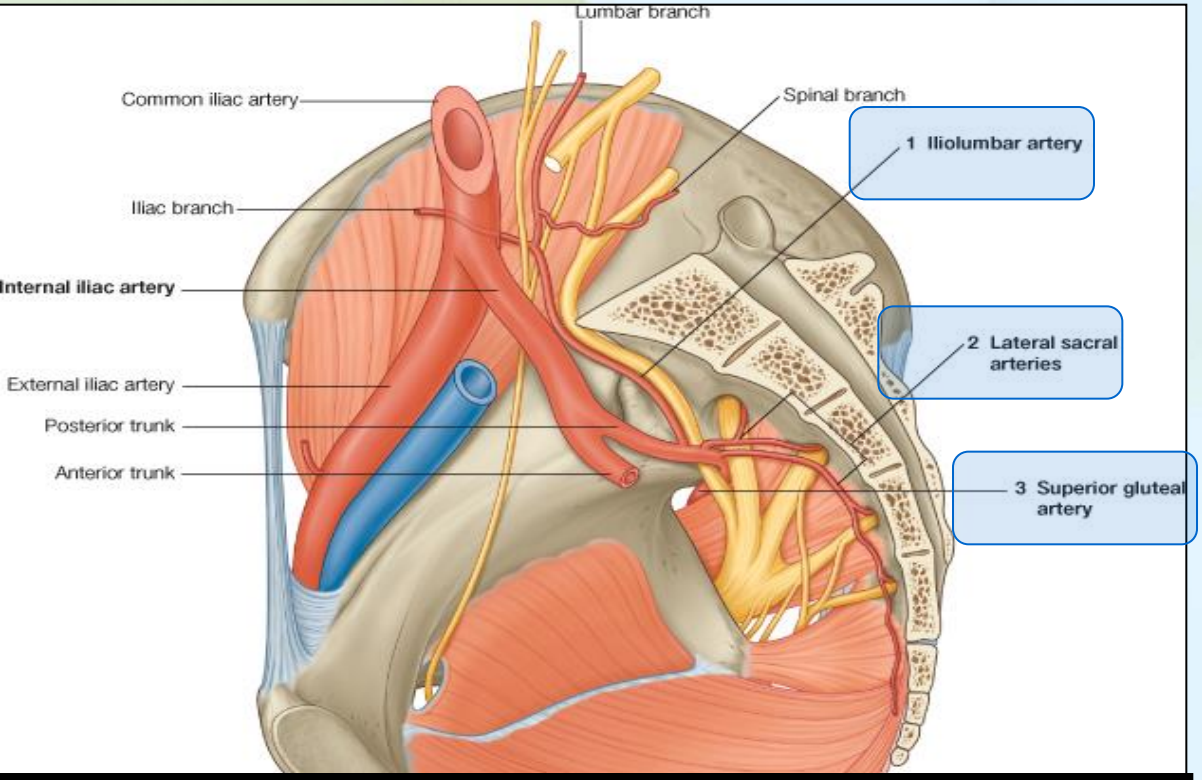
Posterior pelvic wall.

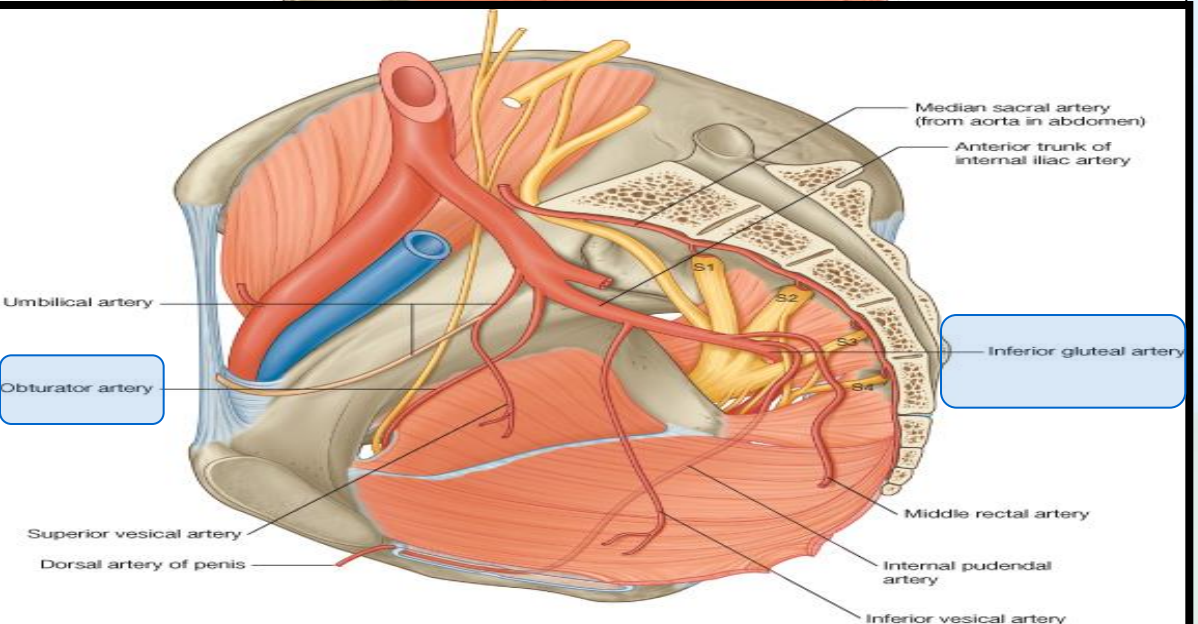
Gluteal region.

Anterior division supplies:

1. Pelvic viscera.
2. Perineum.
3. Gluteal region.
4. Adductor (medial) region of the thigh.
5. The fetus (through the umbilical arteries)

Parietal Branches





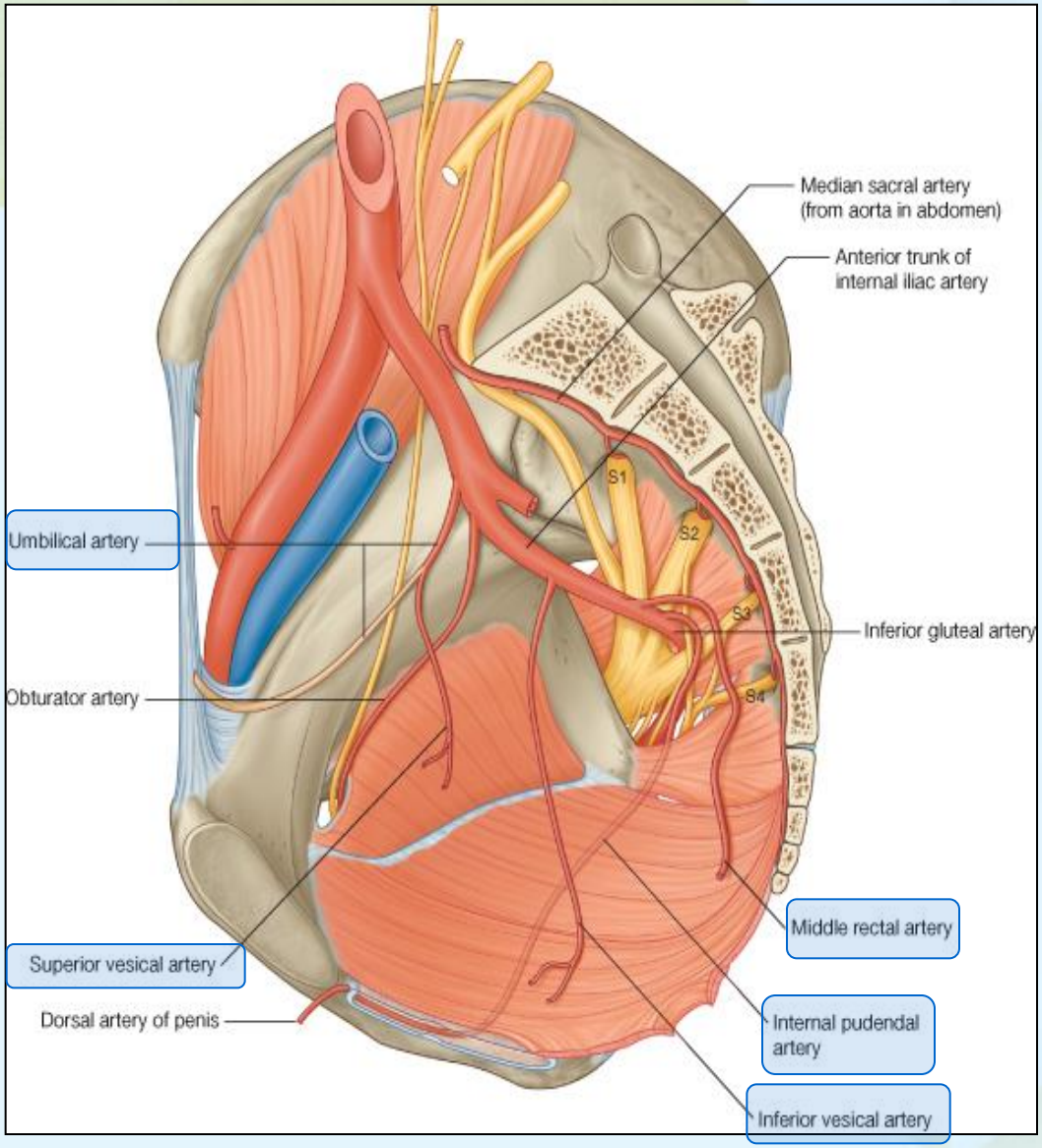
I- From posterior division:

1. Iliolumbar artery.
2. Two lateral sacral arteries.
3. Superior Gluteal artery.

II- From anterior division:

1. Obturator artery.
2. Inferior Gluteal Artery.

Visceral Branches ONLY (anterior division)



1. Umbilical artery:

Gives the superior vesical artery

- The distal part of umbilical artery becomes the Medial Umbilical Ligament.

2. Inferior Vesical artery:

- In the male it supplies, the Prostate and the Seminal Vesicles.
- It gives the artery to the Vas Deferens.

3. Middle rectal artery

4. Internal pudendal artery

- It is the main arterial supply to the perineum.

Visceral Branches (in Female)

Vaginal artery:

Replaces the inferior vesical artery.

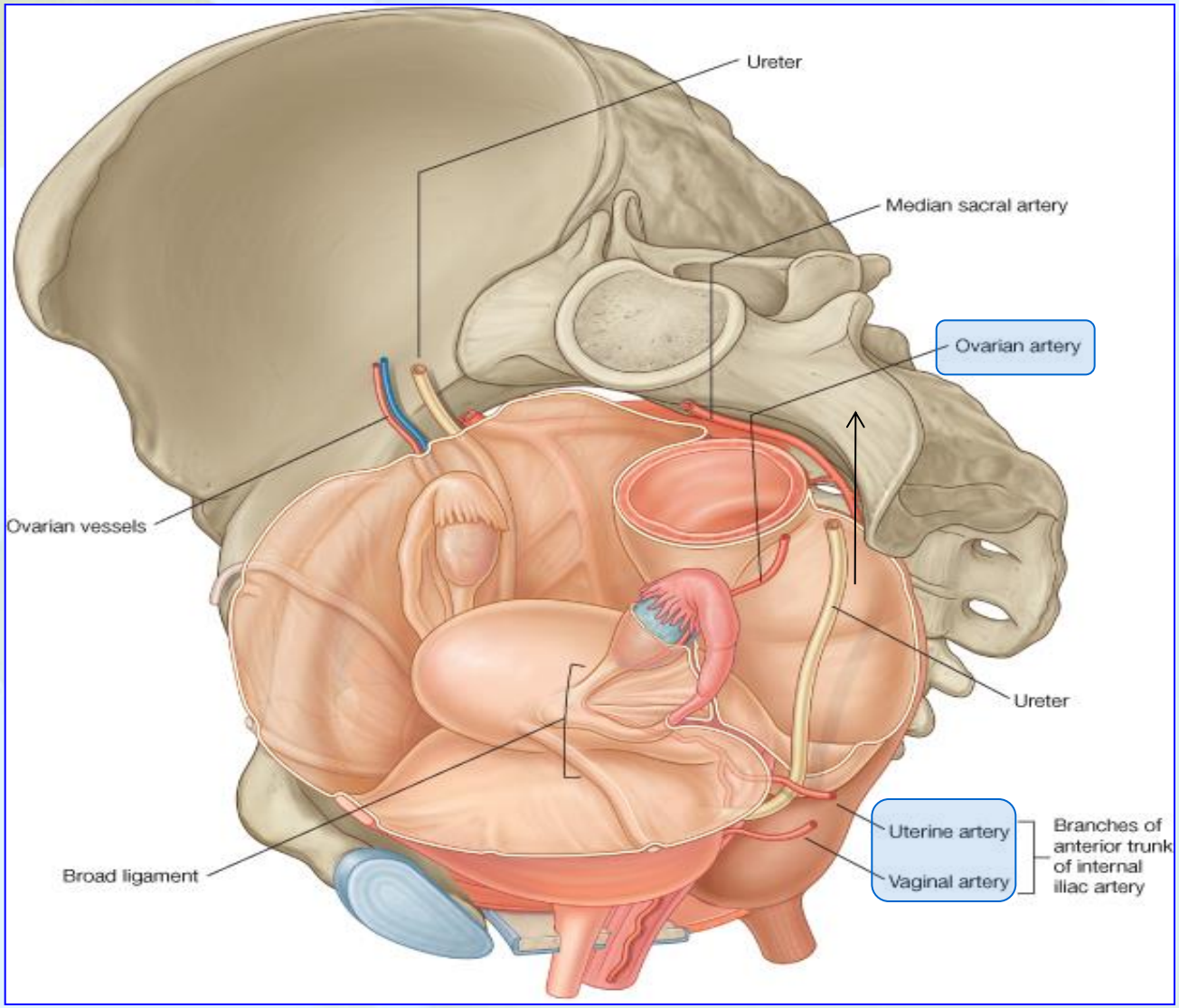
Uterine artery:

Crosses the lower end of the ureter and supplies the uterus & uterine tubes.

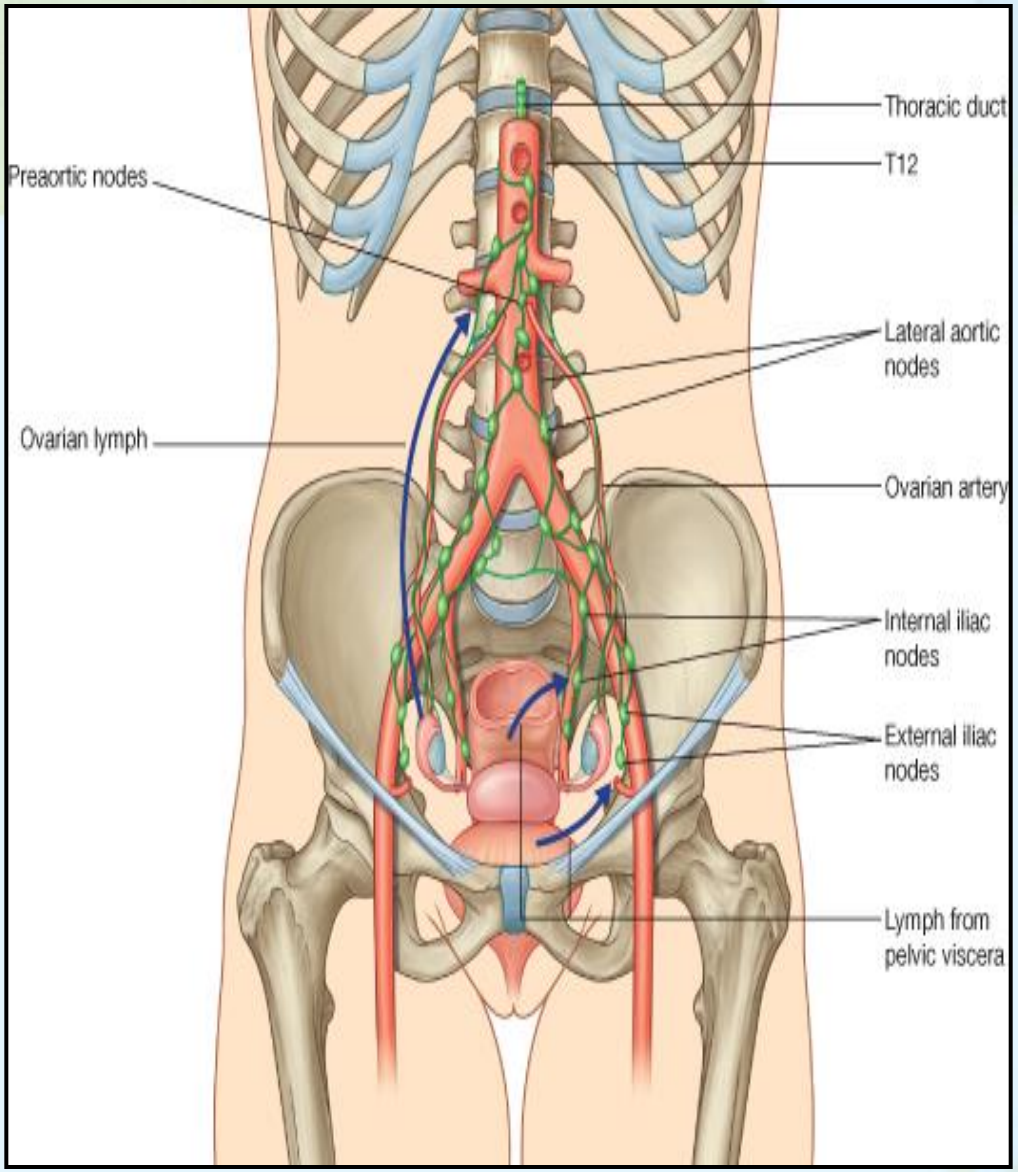
NB. The ureter may be wrongly ligated in hysterectomy operation.

Ovarian artery:

Arises from the abdominal aorta.



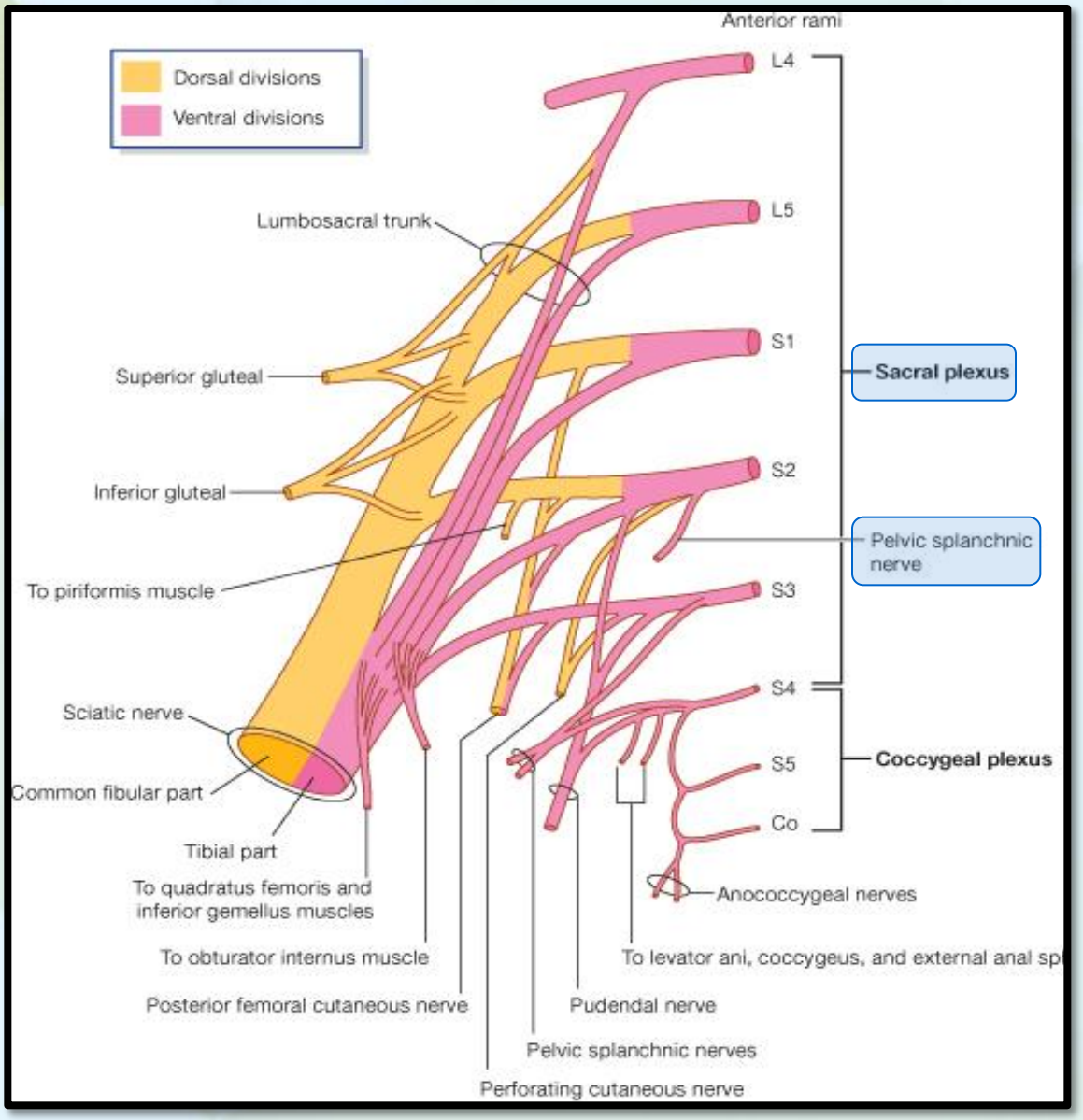
Venous& Lymph drainage



- ***Venous drainage:***
- **Internal iliac vein:**
- It Joins the external iliac vein to form the Common Iliac vein.
- **Ovarian vein:**
- Right vein drains into IVC.
- Left vein drains into left renal vein.
- ***Lymph from the pelvis*** **passes through Internal iliac, External iliac & Common iliac nodes.**
- **The (Ovaries, uterine tubes & fundus of uterus) passes to Lateral aortic (para-aortic) nodes.**

Nerve Supply

- **Somatic:** Sacral plexus
- From Ventral (anterior) rami of L4 & L5 (lumbosacral trunk) + S1,2,3 and most of S4.
- It gives Pudendal nerve to perineum
- Autonomic:
- 1. Pelvic splanchnic nerves (*From S 2 ,3 & 4*)
- They are the Preganglionic parasympathetic nerves to pelvic viscera & hindgut.



Sympathetic Nerve supply

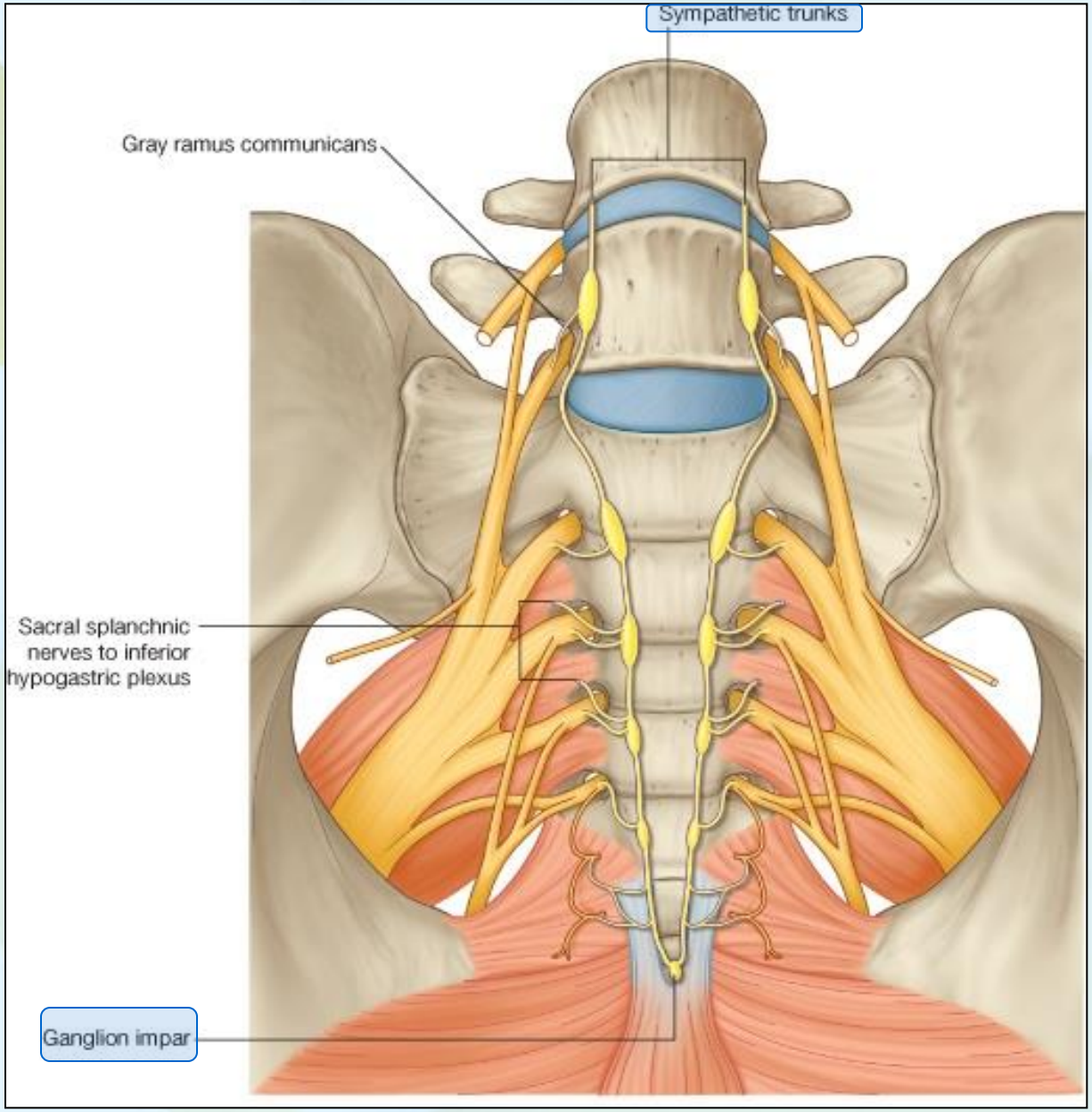
Pelvic part of sympathetic trunk:

It is the continuation of the abdominal part of sympathetic trunk.

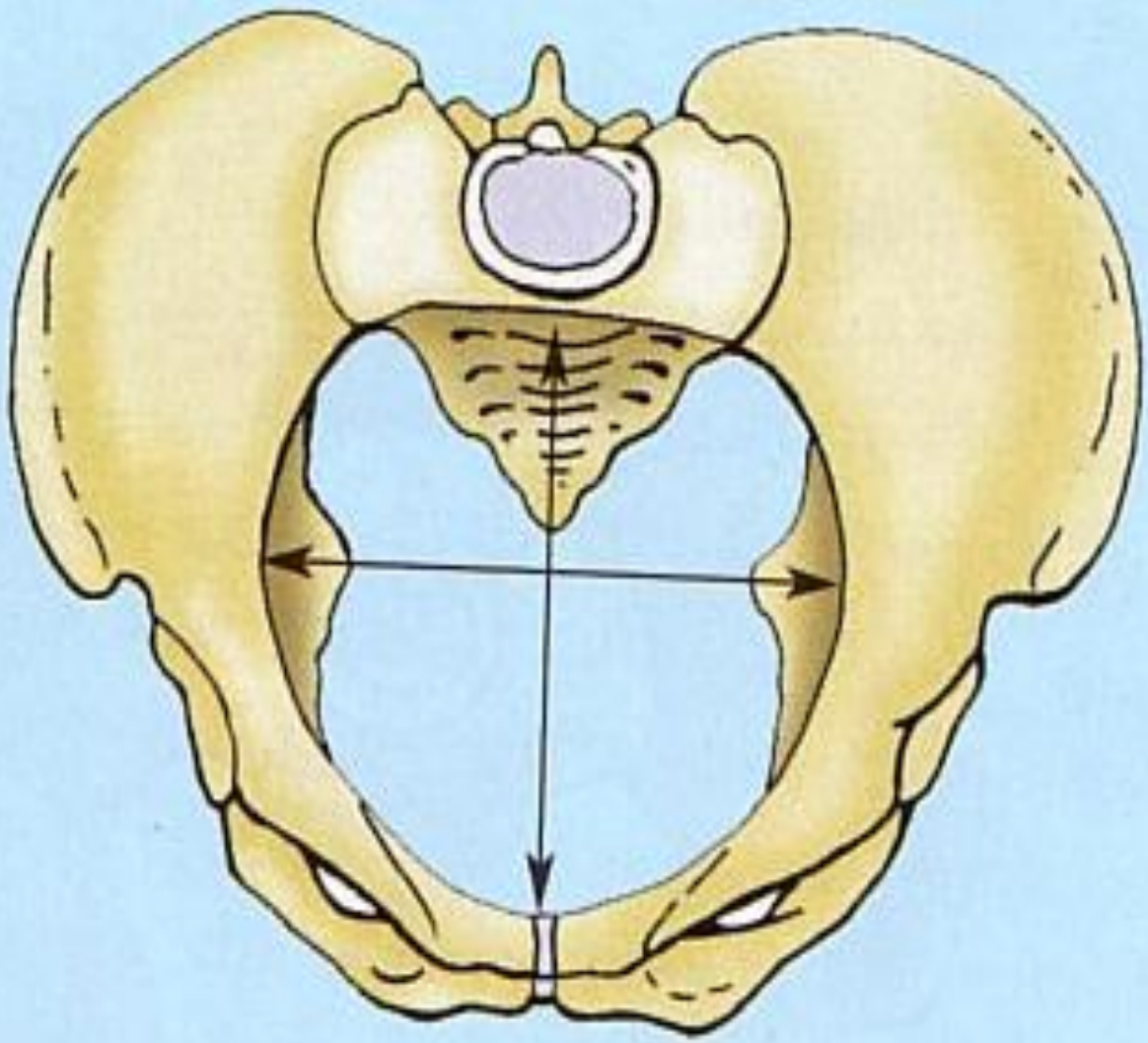
It descends in front of the ala of the sacrum.

The 2 sympathetic trunk unite in front of the coccyx and form a single ganglion called (Ganglion Impar).

Superior & Inferior Hypogastric plexuses.



THANK YOU & Good Luck



(B)

Gynecoid