

UROGENITALSYSTEM

THE BONY PELVIS & PELVIC DIAPHRAGM

Dr. Aiman Qais Afar
Surgical Anatomist

College of Medicine / University of Mutah
2024-2025

Sunday 27 April 2025

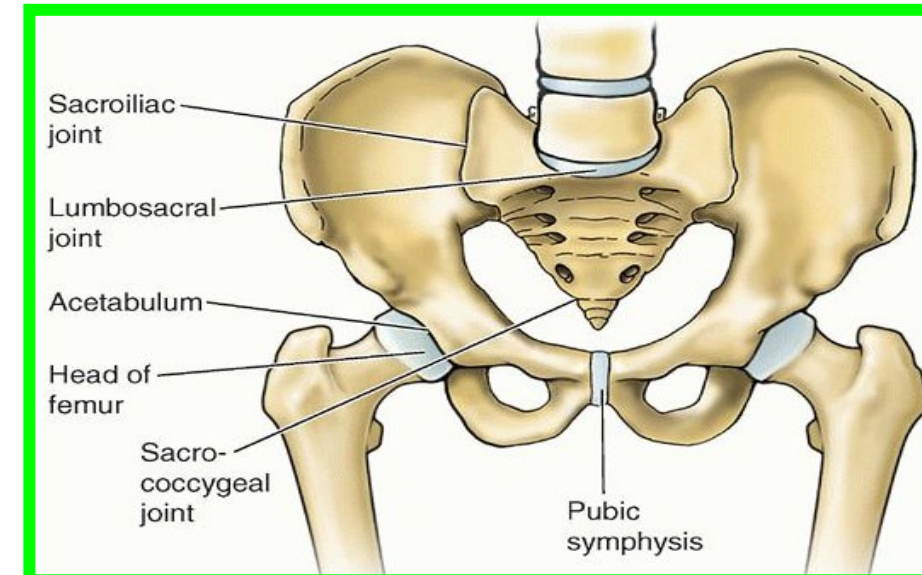
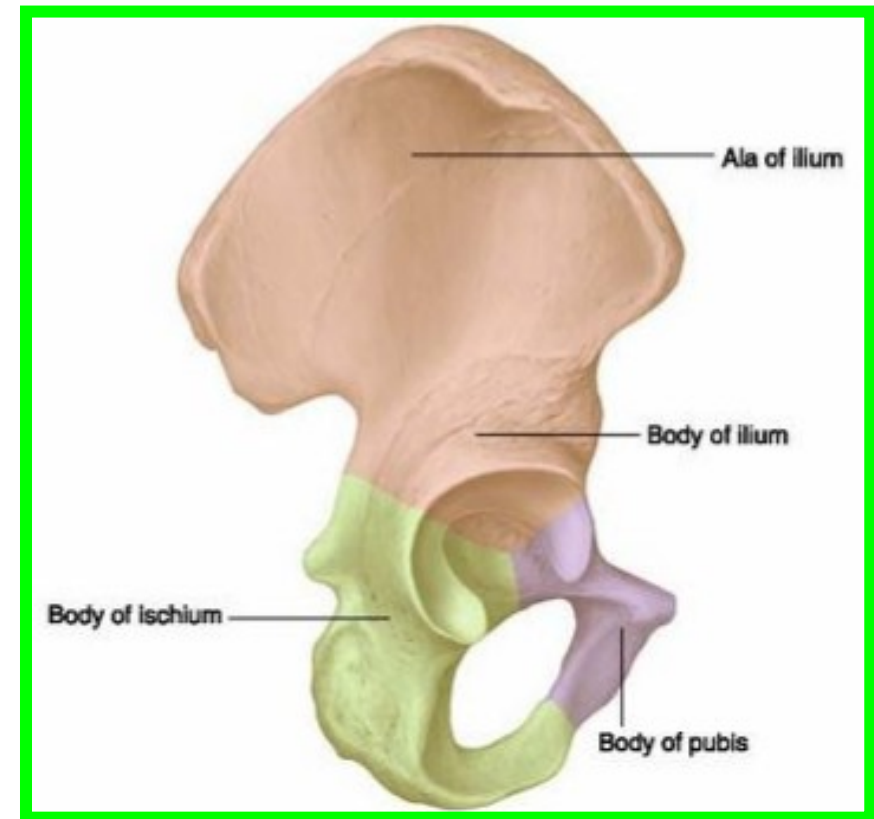
Pelvic bones

Hip Bone

In children, each hip bone consists of **the ilium**, which lies superiorly; **the ischium**, which lies posteriorly and inferiorly; and **the pubis**, which lies anteriorly and inferiorly .

The three separate bones are joined by cartilage at **the acetabulum**.

At puberty, these three bones fuse together to form one large, irregular bone.



Pelvic bones

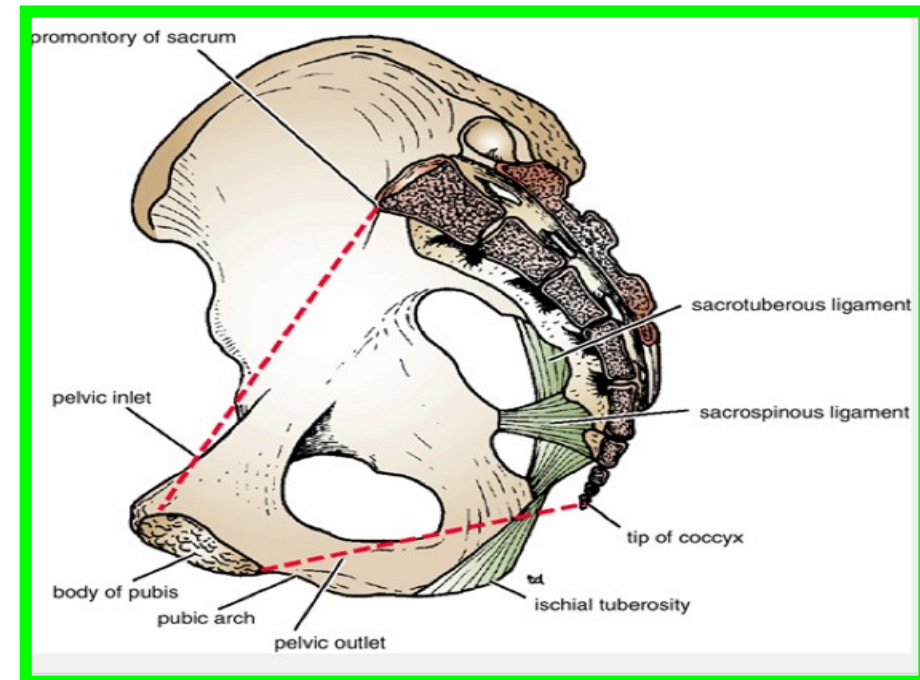
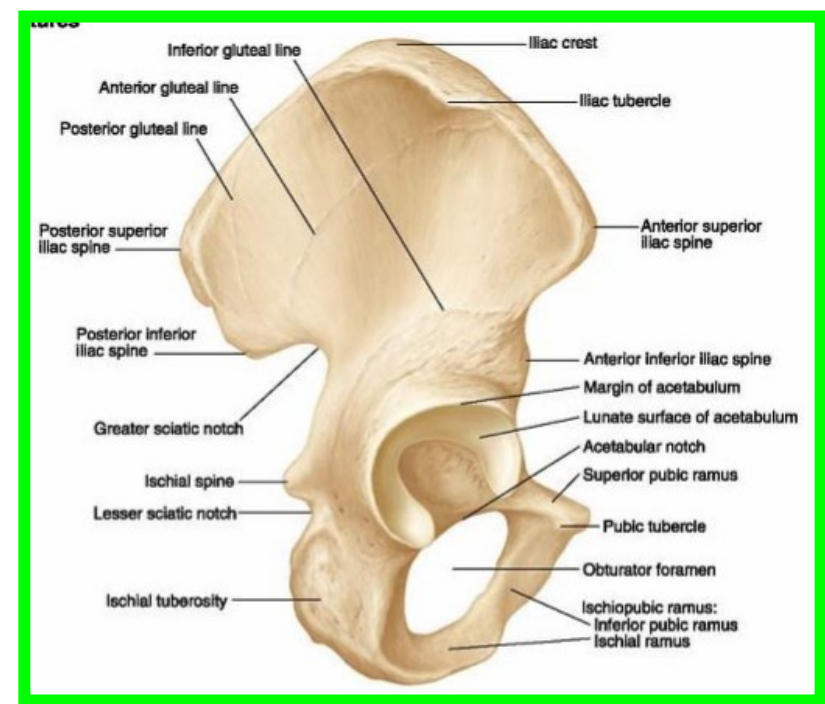
Hip Bone

Dr. Aiman Al-Maathidy
Sunday 27 April 2025

✓ On the outer surface of the hip bone is a deep depression, **the acetabulum**, which articulates with the hemispherical head of the femur

✓ Behind the acetabulum is a large notch, **the greater sciatic notch**, which is separated from the lesser sciatic notch by **the spine of the ischium**.

✓ The sciatic notches are converted into **the greater and lesser sciatic foramina** by the presence of **the sacrotuberous** and **sacrospinous ligaments**



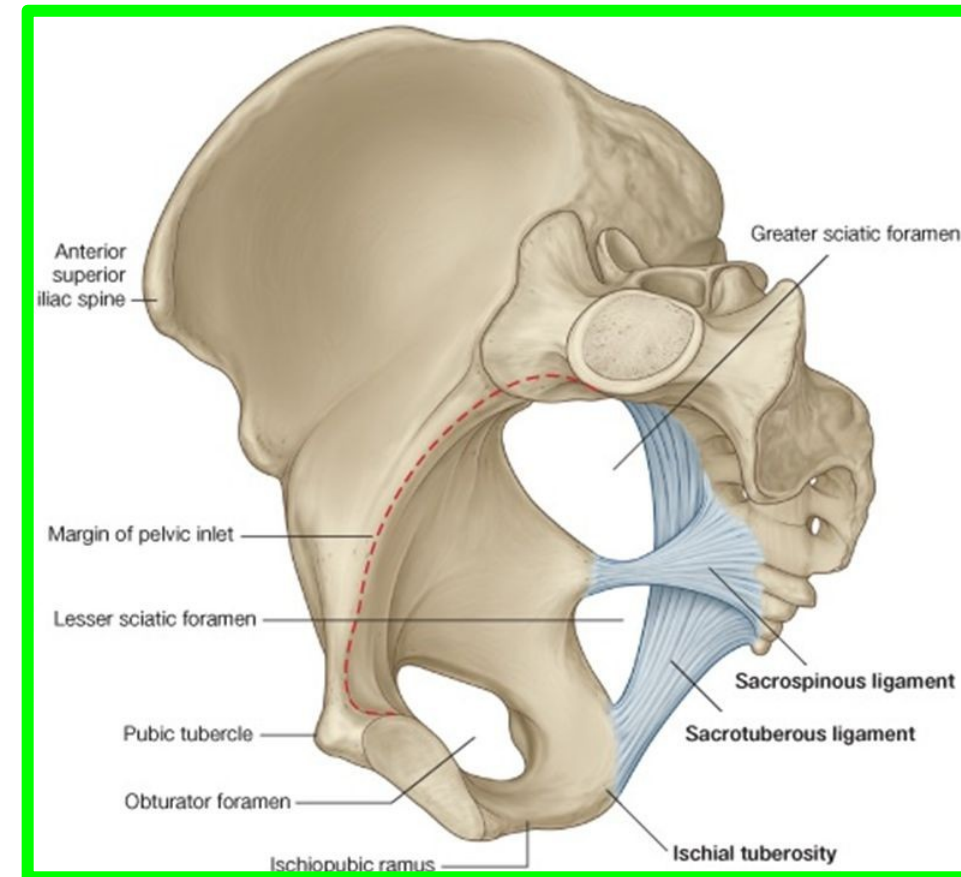
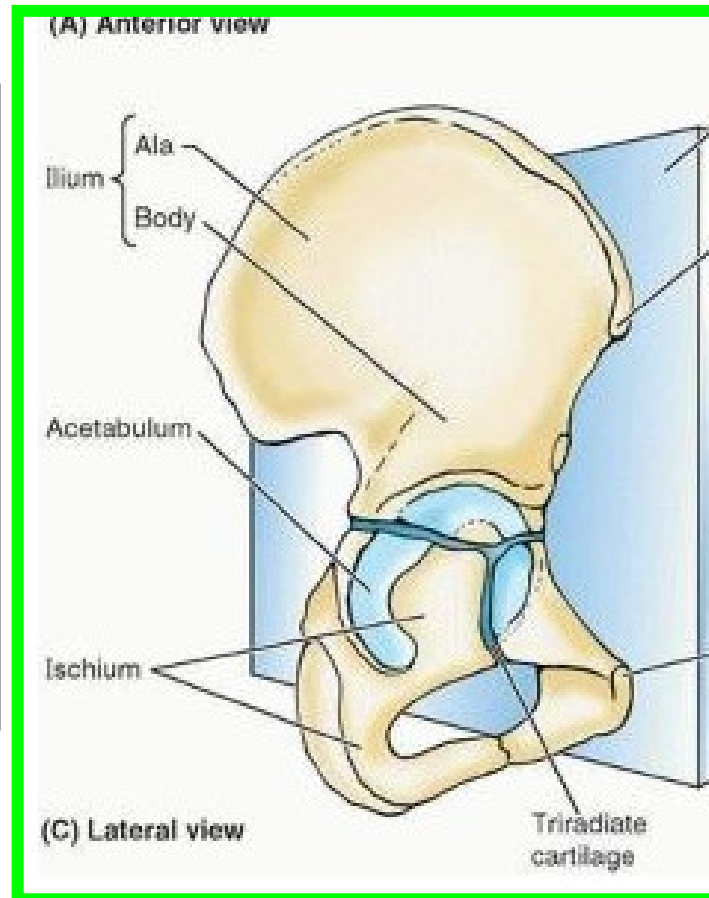
Hip Bone

Dr. Aiman Al-Maathidy

Sunday 27 April 2025

The **ilium** possesses the **iliac crest** which runs between the **anterior** and **posterior superior iliac spines**. Below these spines are the corresponding **anterior** and **posterior inferior iliac spines**. The ilium has a large auricular surface for articulation with the **sacrum**.

❖ The **iliopectineal line** runs downward and forward around the inner surface of the **ilium** and serves to divide the false from the true pelvis.



Hip Bone

Dr. Aiman Al-Maathidy
Sunday 27 April 2025

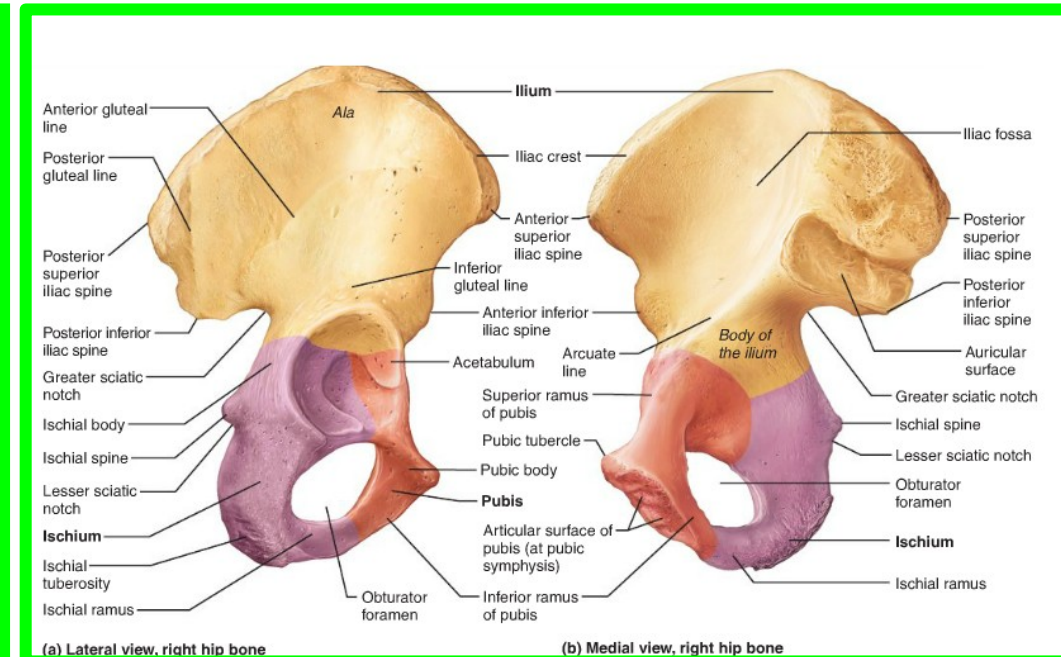
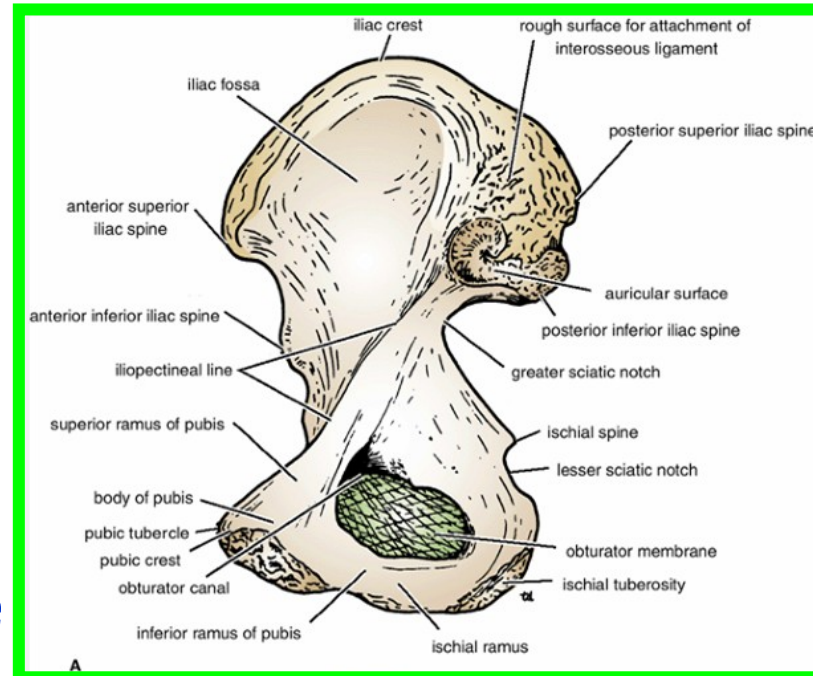
5

❖ The **ischium** is the inferior and posterior part of the hip bone and possesses an **ischial spine** and an **ischial tuberosity**

❖ The **pubis** has a body and superior and inferior pubic rami.

The body of the pubis bears the pubic crest and the pubic tubercle and articulates with the pubic bone of the opposite side at the **symphysis pubis**.

❖ There is a large opening, the **obturator foramen**, which is bounded by the parts of the **ischium** and **pubis** is filled in by the **obturator membrane**



(a) Lateral view, right hip bone

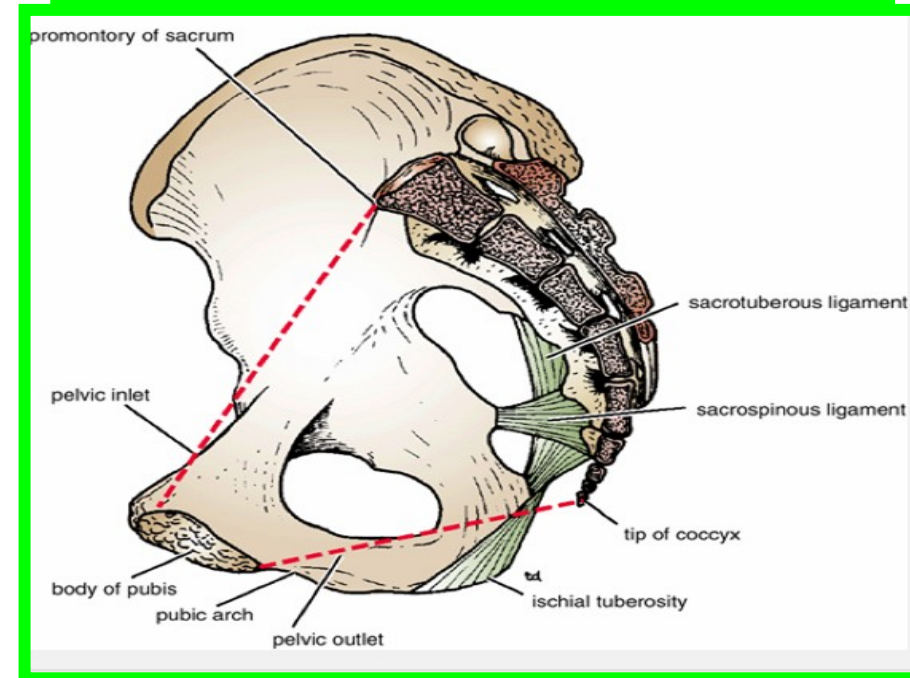
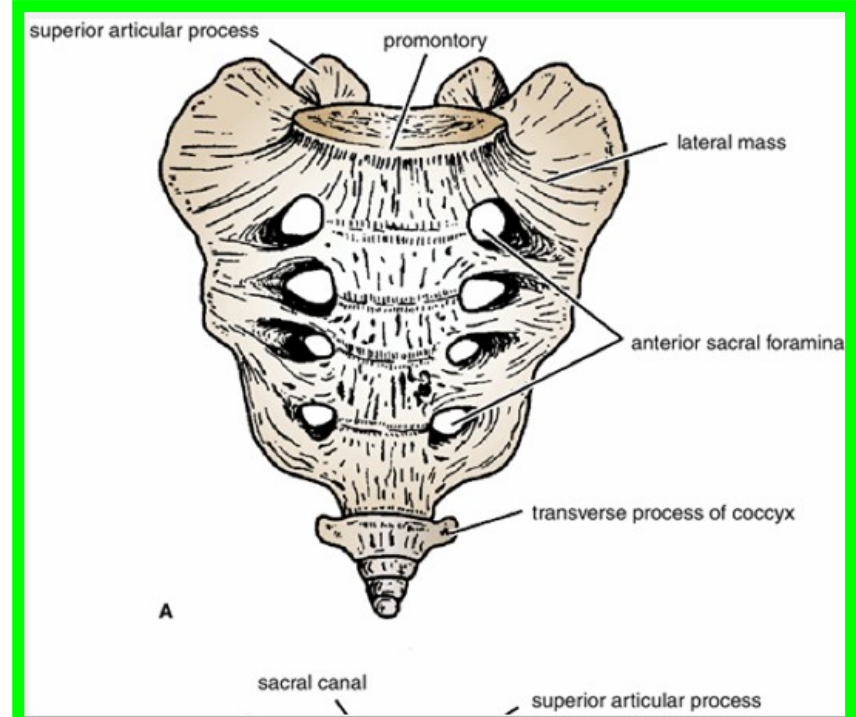
(b) Medial view, right hip bone

Sacrum

Sunday 27 April 2025
Dr. Aiman Al-Maathidy

6

- ✓ Consists of **five rudimentary vertebrae** fused together.
- ✓ The upper border or base of the bone articulates with **the fifth lumbar vertebra**.
- ✓ The narrow inferior border articulates with **the coccyx**.
- ✓ Laterally, the sacrum articulates with the two iliac bones to form **the sacroiliac joints**.
- ✓ The **sacral promontory** which is an **important obstetric landmark** used when measuring the size of the pelvis.



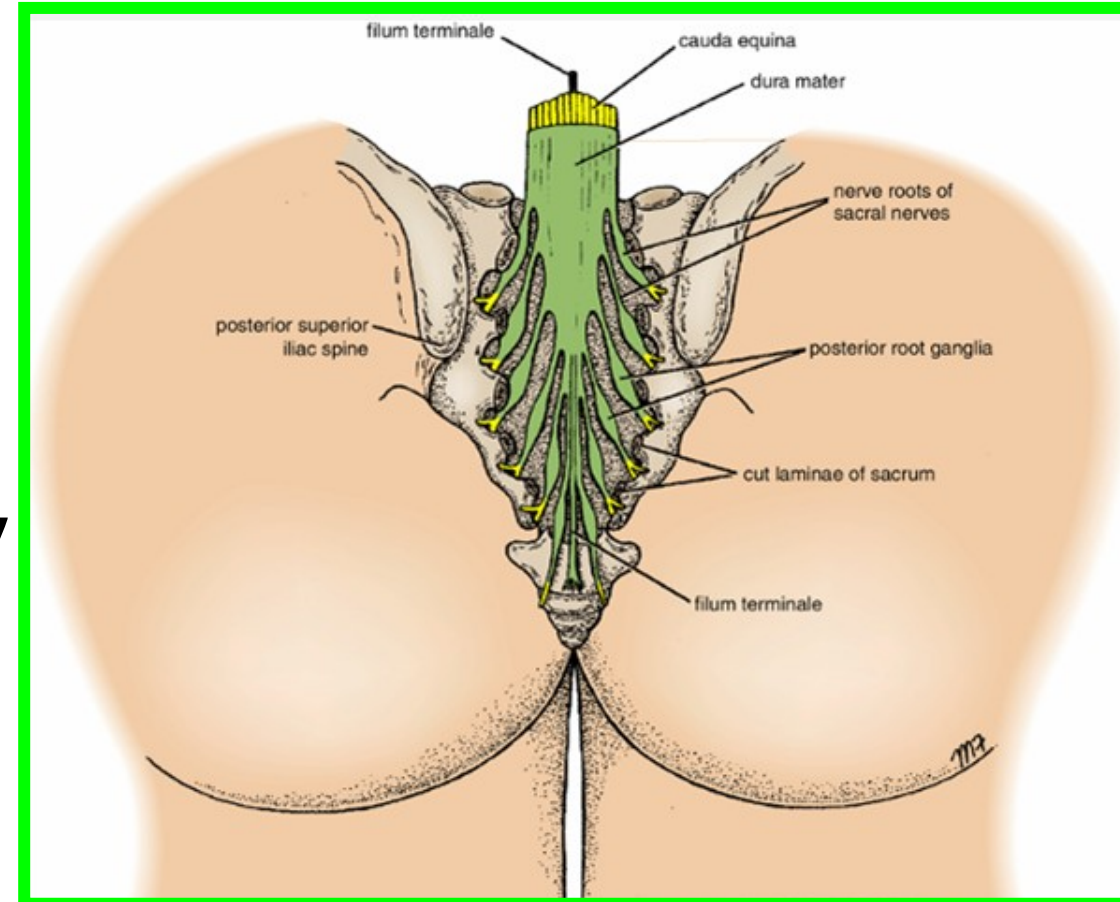
Pelvic bones

Sacrum

The vertebral foramina together form **the sacral canal**.

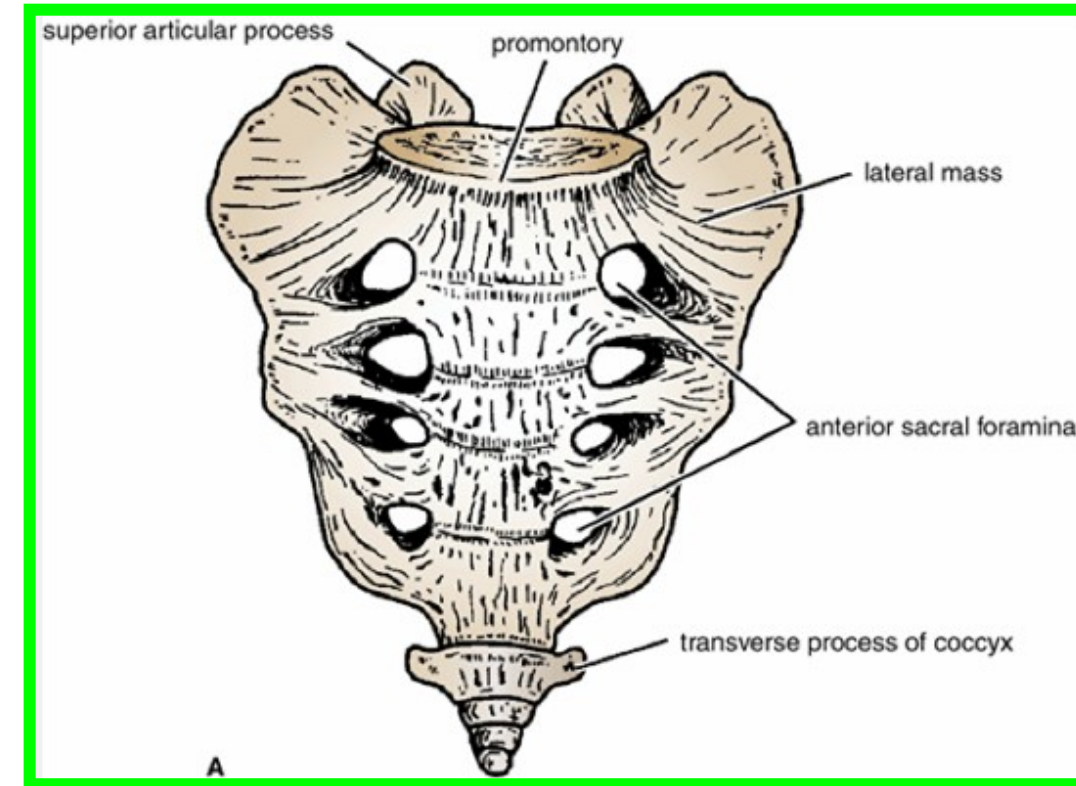
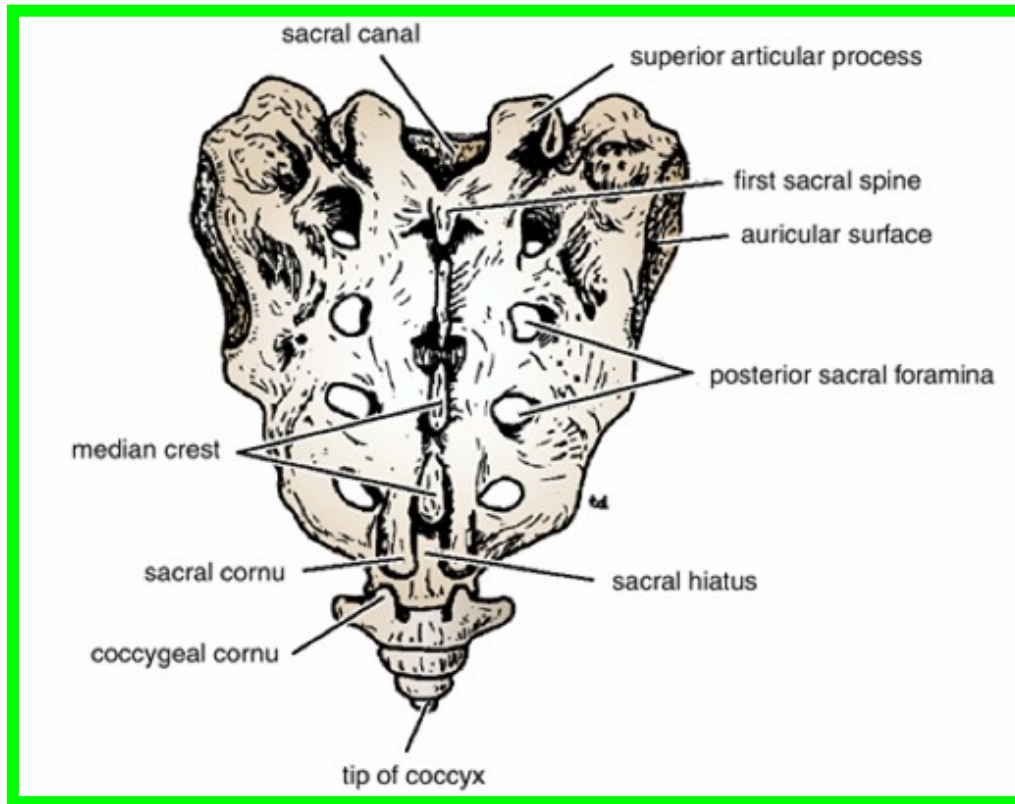
Which contains the anterior and posterior roots of the sacral, and coccygeal spinal nerves; **the filum terminale**; and fibro fatty material.

It also contains the lower part of **the subarachnoid space** down as far as the lower border of the **second sacral vertebra**



Sacrum

- ✓ The anterior and posterior surfaces of the sacrum possess on each side **four foramina** for the passage of the anterior and posterior rami of **the upper four sacral nerves**



- ✓ The sacrum is usually wider in proportion to its length in the female than in the male

Coccyx

Pelvic bones

The coccyx consists of **four vertebrae fused together** to form a **small triangular bone**, which articulates at its base with the lower end of the sacrum

➤ The coccygeal vertebrae consist of bodies only, but the first vertebra possesses a **rudimentary transverse process** and **cornua**.

1. "كل ابن آدم يأكله التراب إلا **عجب الذنب**, منه خلق وفيه يركب"

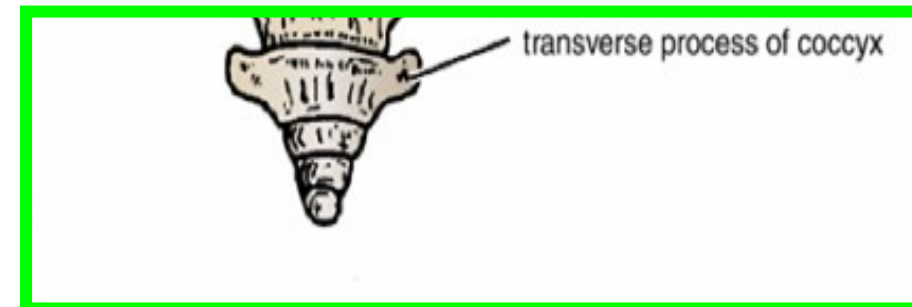
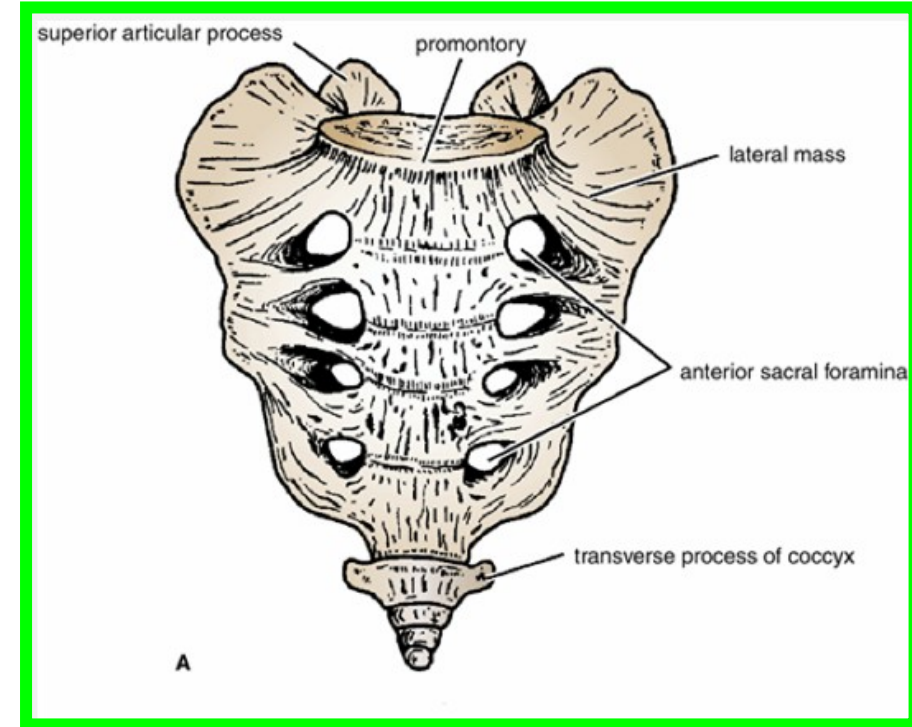
صدق رسول الله

عجب

الذنب

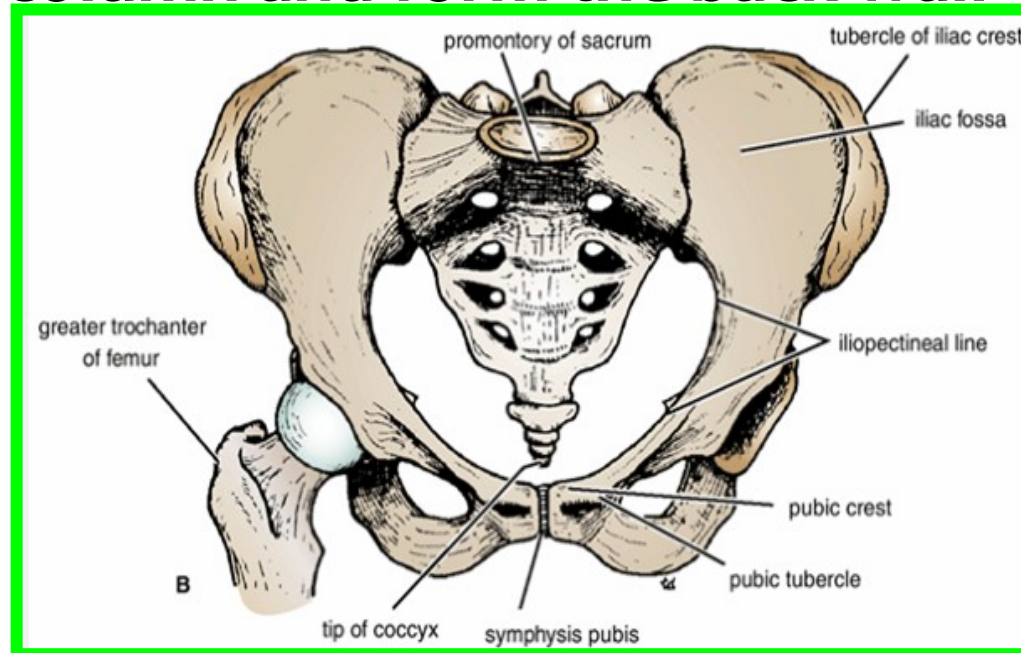
Dr. Aiman Al-Maathidy
Sunday 27 April 2025

9



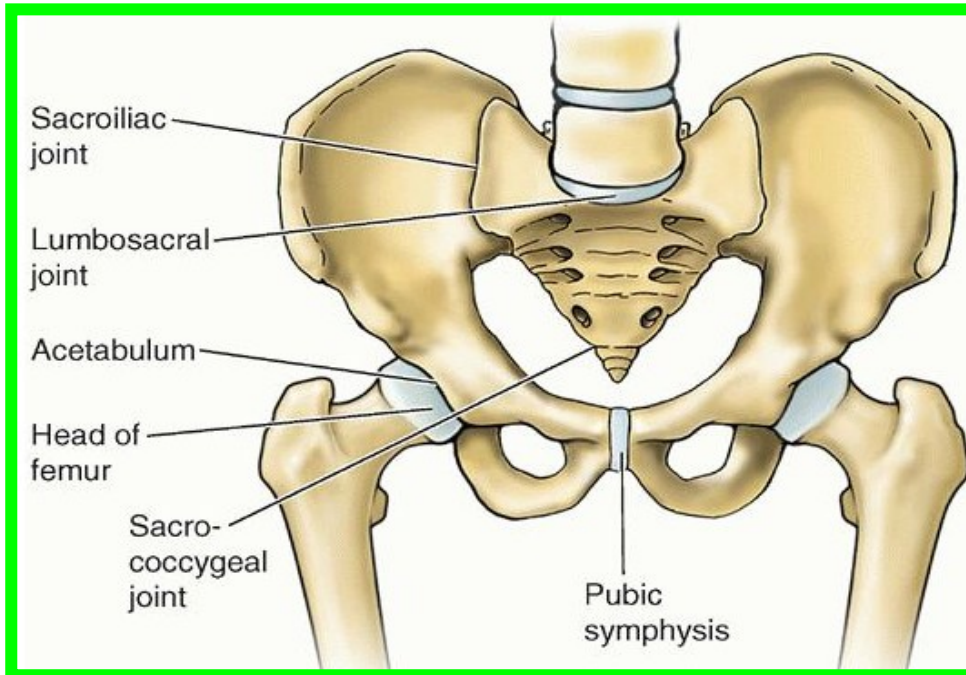
The Pelvis

- The main function is to transmit the weight of the body from the vertebral column to the femurs. In addition, it contains, supports, and protects the pelvic viscera and provides attachment for trunk and lower limb muscles.
- The bony pelvis is composed of four bones: **the two hip bones**, which form the lateral and anterior walls, and **the sacrum** and **the coccyx**, which are part of the vertebral column and form the back wall



The Pelvis

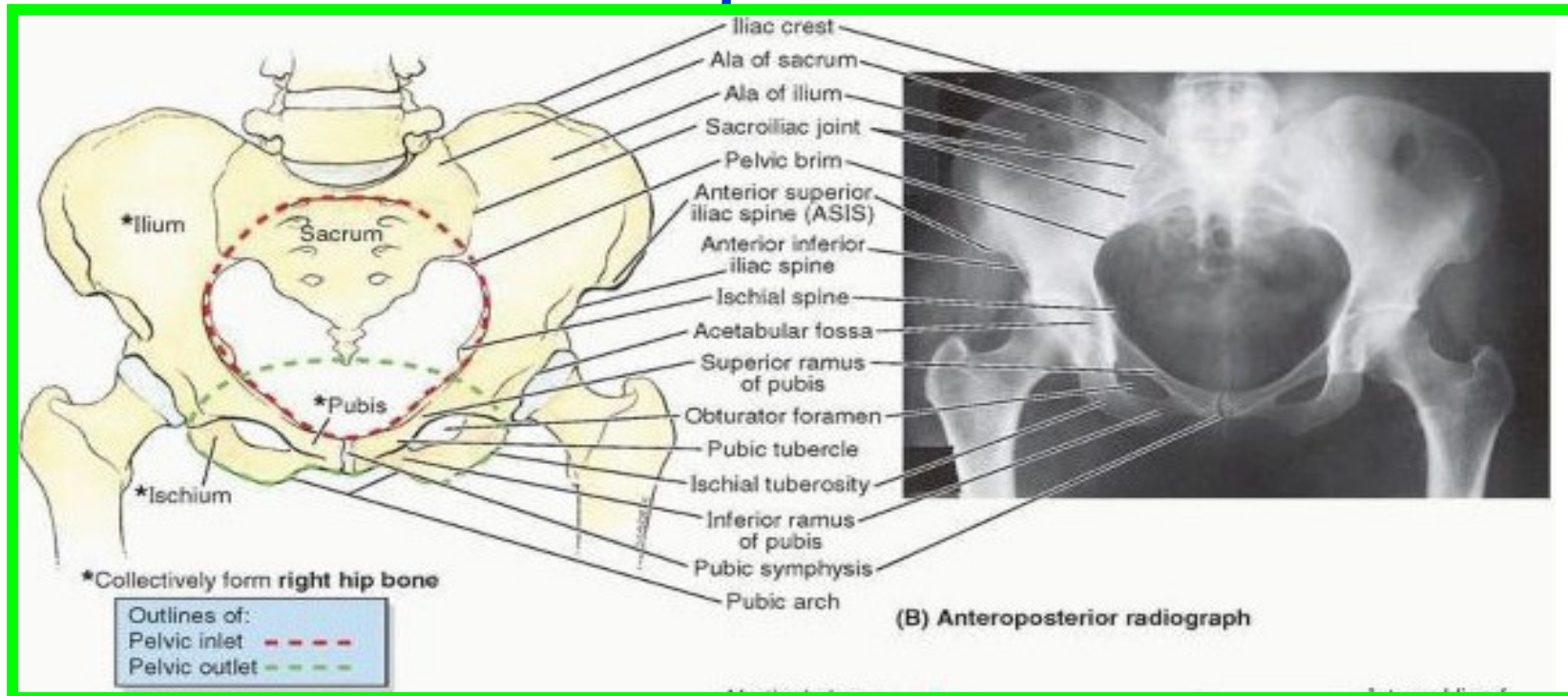
- The **two hip bones** articulate with each other anteriorly at the **symphysis pubis** and posteriorly with the sacrum at the **sacroiliac joints**
- The front of the **symphysis pubis** and the **anterior superior iliac spines** should lie in the same vertical plane. This means that **the pelvic surface of the symphysis pubis faces upward and backward** and **the anterior surface of the sacrum is directed forward and downward**.



The Pelvis

The pelvis is divided into two parts by **the pelvic brim**, which is formed by the **sacral promontory** behind, the **iliopectineal lines** laterally, and the **symphysis pubis** anteriorly.

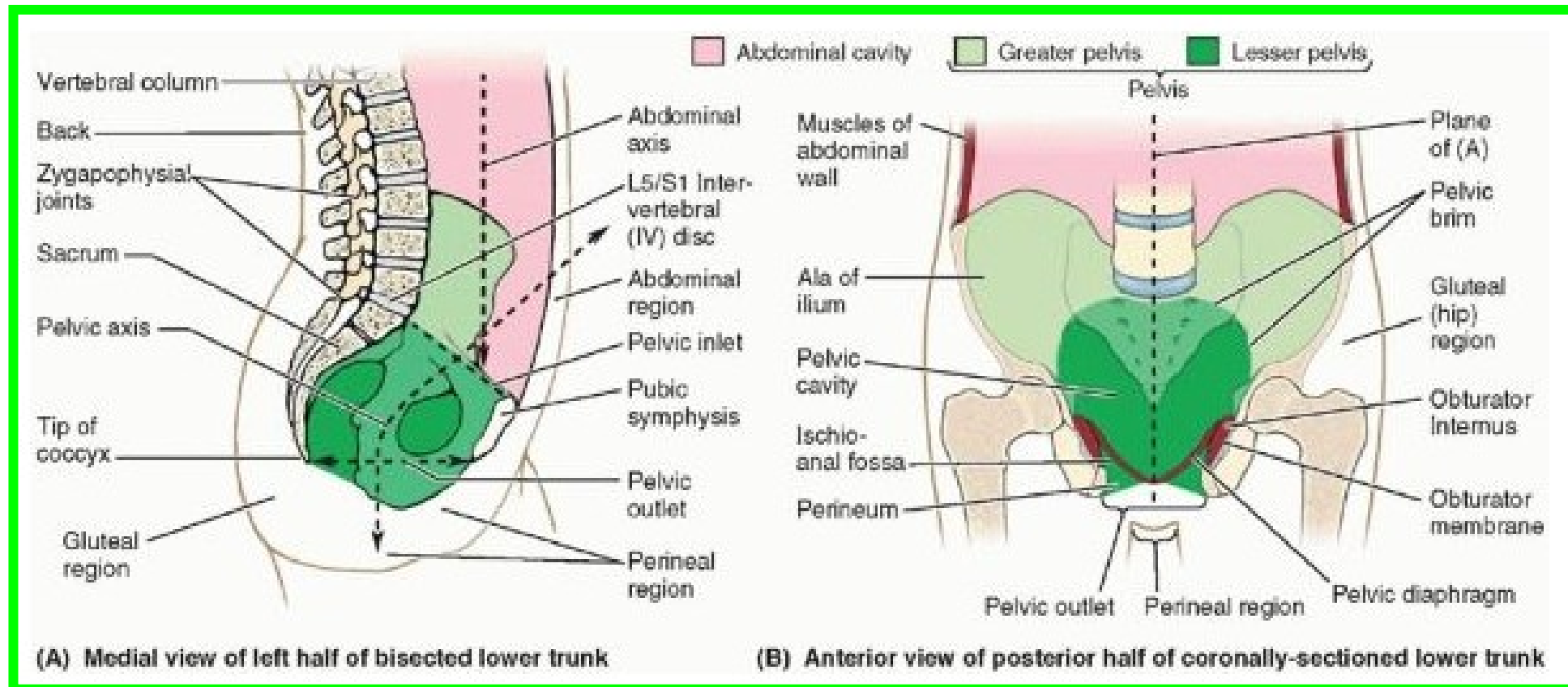
- ✓ Above the brim is **the false pelvis**, which forms part of the abdominal cavity.
- ✓ Below the brim is **the true pelvis**



The Pelvis

❑ False Pelvis

It is bounded behind by **the lumbar vertebrae**, laterally by **the iliac fossae** and the **iliacus muscles**, and in front by **the lower part of the anterior abdominal wall**. It is considered as part of the abdominal cavity.



The Pelvis

Sunday 27 April 2025
Dr. Aiman Al-Maathidy

14

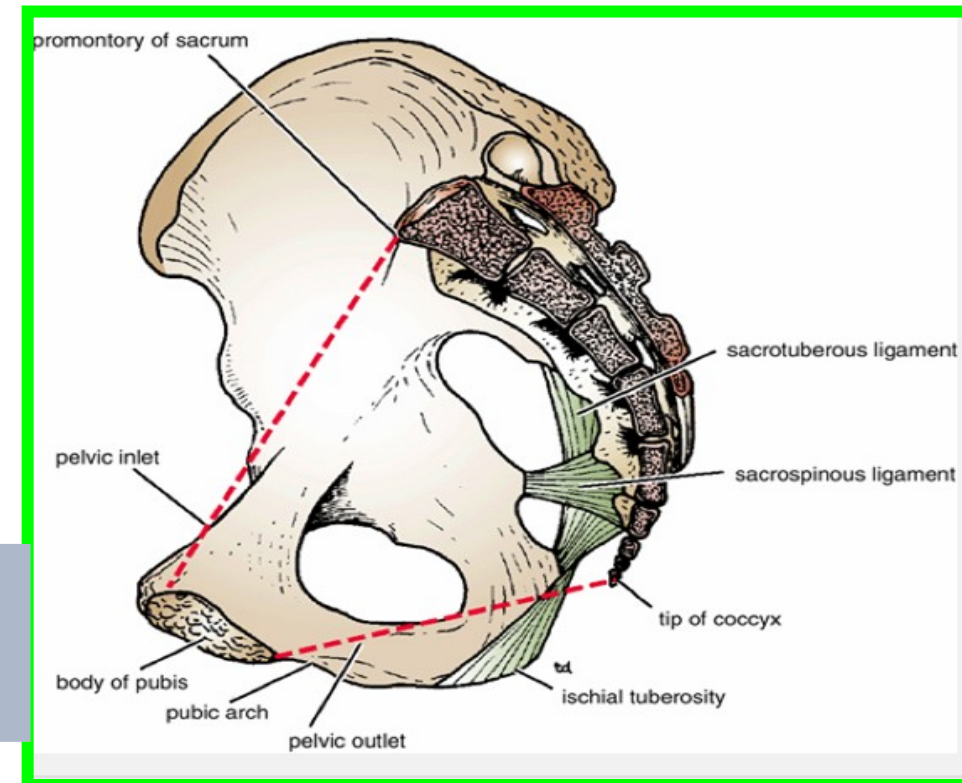
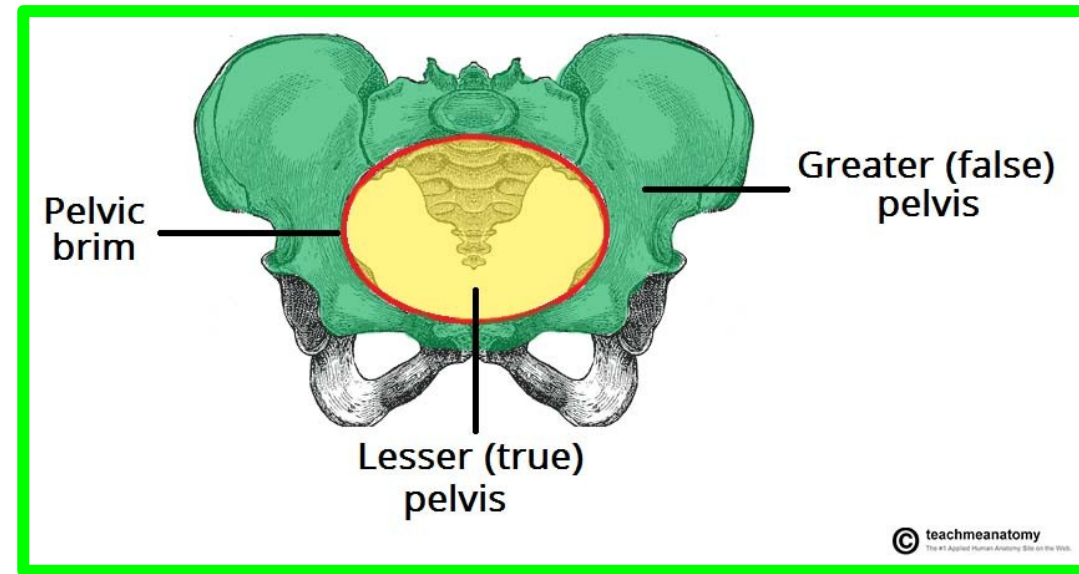
❑ True Pelvis

The true pelvis has an inlet, an outlet, and a cavity.

❖ The pelvic inlet, or pelvic brim, is bounded posteriorly by the sacral promontory, laterally by the iliopectineal lines, and anteriorly by the symphysis pubis

❖ The pelvic cavity lies between the inlet and the outlet.

It is a short, curved canal, with a shallow anterior wall and a much deeper posterior wall.



The Pelvis

Dr. Aiman Al-Maathidy
Sunday 27 April 2025

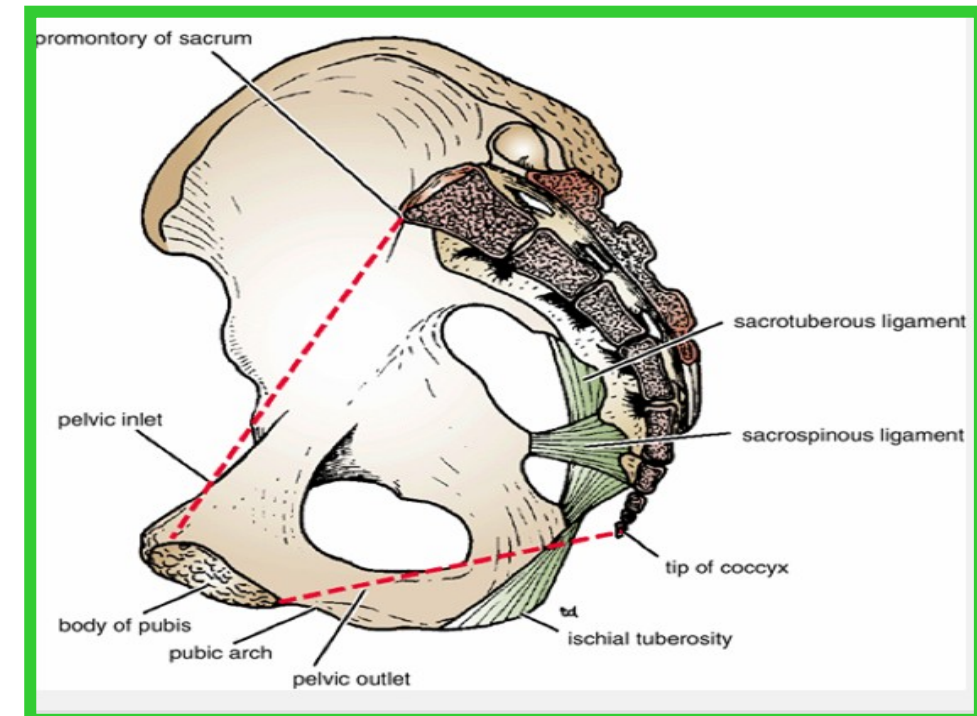
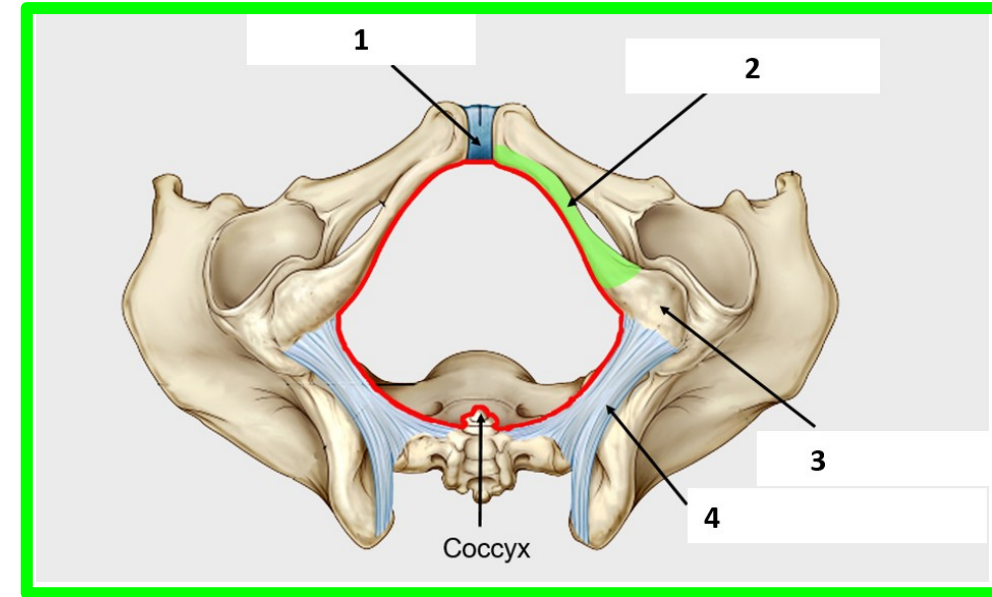
15

❖ **The pelvic outlet** is bounded posteriorly by the **coccyx**, laterally by the **ischial tuberosities**, and anteriorly by **the pubic arch** ...

The pelvic outlet has three wide notches.

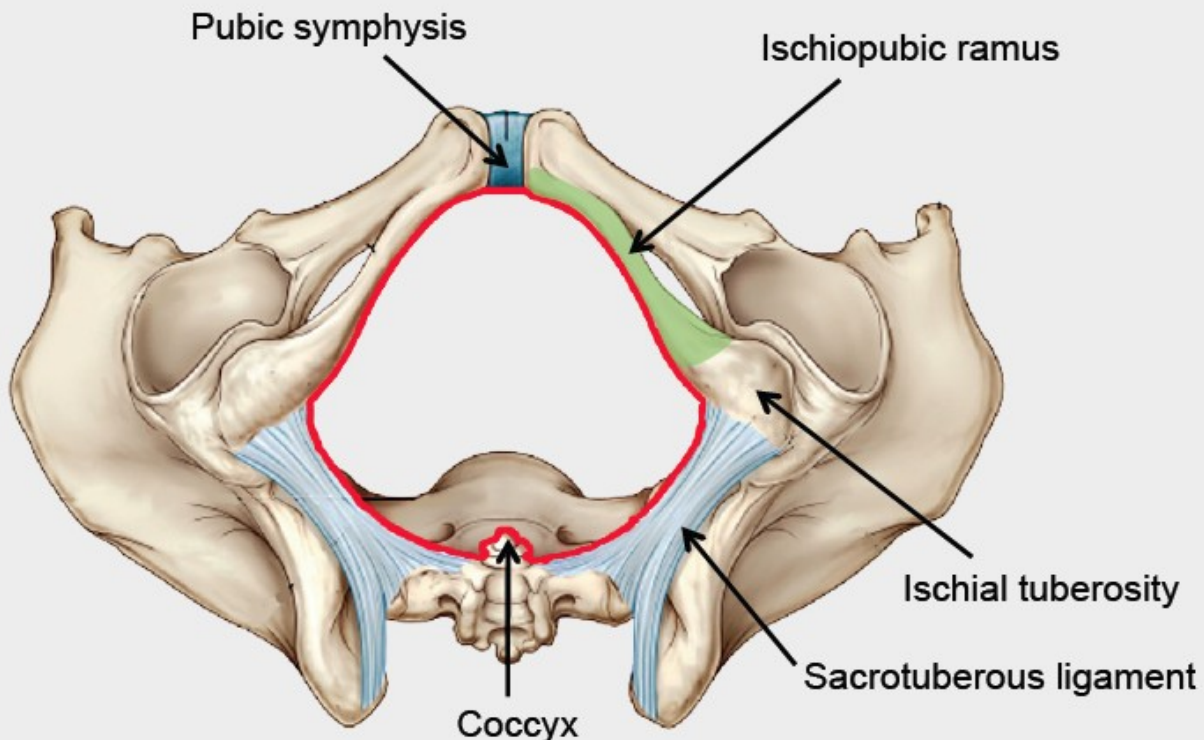
➤ **The pubic arch** is Anteriorly, between the ischiopubic rami, and laterally are **the sciatic notches**.

➤ The sciatic notches are divided by the **sacrospinous** and **sacrotuberous ligaments** into the greater and lesser sciatic foramina



The Pelvis

❖ From an obstetric standpoint, because **the sacrotuberous ligaments** are strong and relatively inflexible, they should be considered to form part of the perimeter of the pelvic outlet.



❖ Thus, the outlet is **diamond shaped**, with the **ischiopubic rami** and the **symphysis pubis** forming the boundaries **in front** and the **sacrotuberous ligaments** and the **coccyx** forming the boundaries **behind**

Dr. Aiman Al-Maathidy
Sunday 27 April 2025

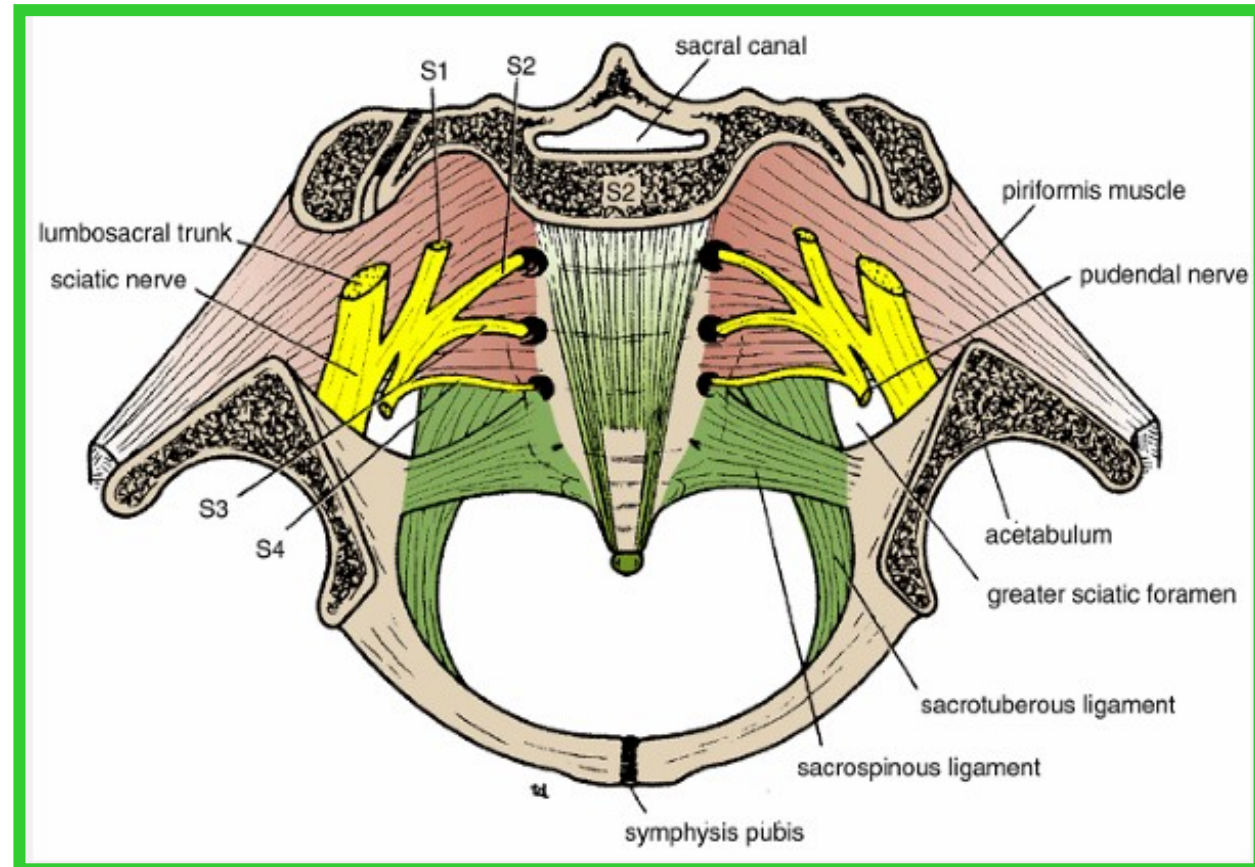
Pelvic Muscles

❖ Piriformis Muscle

Arises from **the front of the lateral mass of the sacrum** and leaves the pelvis to enter the gluteal region by passing laterally through **the greater sciatic foramen**. It is inserted into the upper border of **the greater trochanter of the femur**

Action: It is a lateral rotator of the femur at the hip joint.

Nerve supply: It receives branches from **the sacral plexus**.



Pelvic Muscles

Dr. Aiman Al-Maathidy
Sunday 27 April 2025

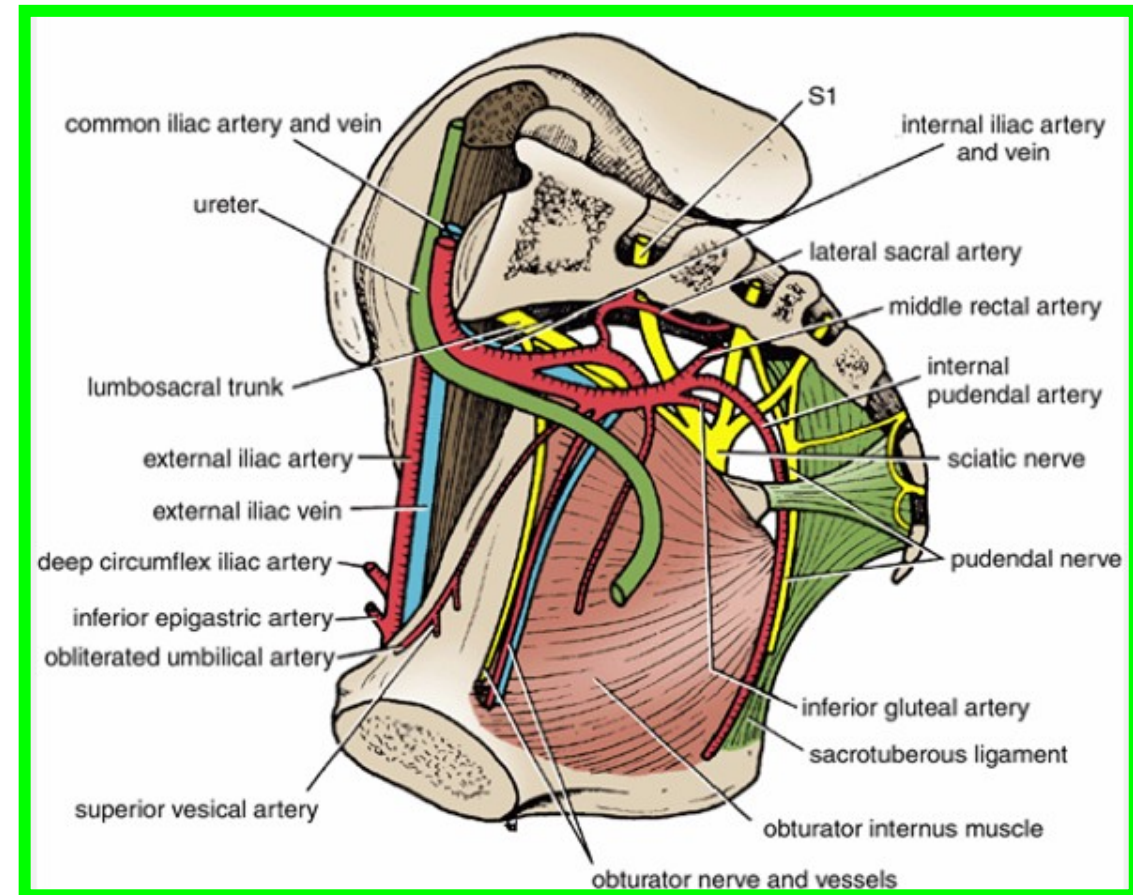
❖ Obturator Internus Muscle

Arises from the pelvic surface of **the obturator membrane** and the adjoining part of the hip bone. The muscle fibers converge to a tendon, which leaves the pelvis through **the lesser sciatic foramen** and is inserted into **the greater trochanter of the femur**.

Action: It laterally rotates the femur at the hip joint.

Nerve supply:

The **nerve to the obturator internus**, a branch from **the sacral plexus**

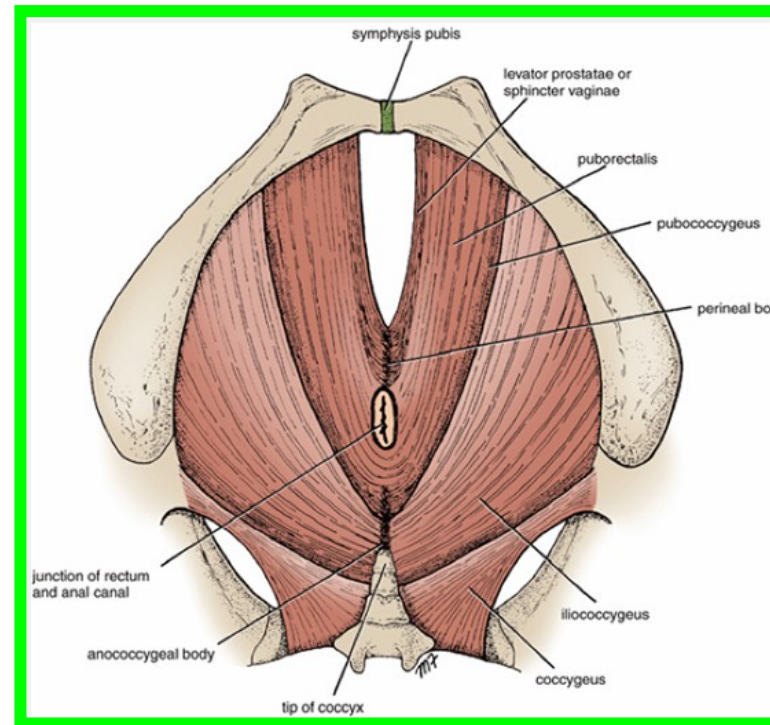
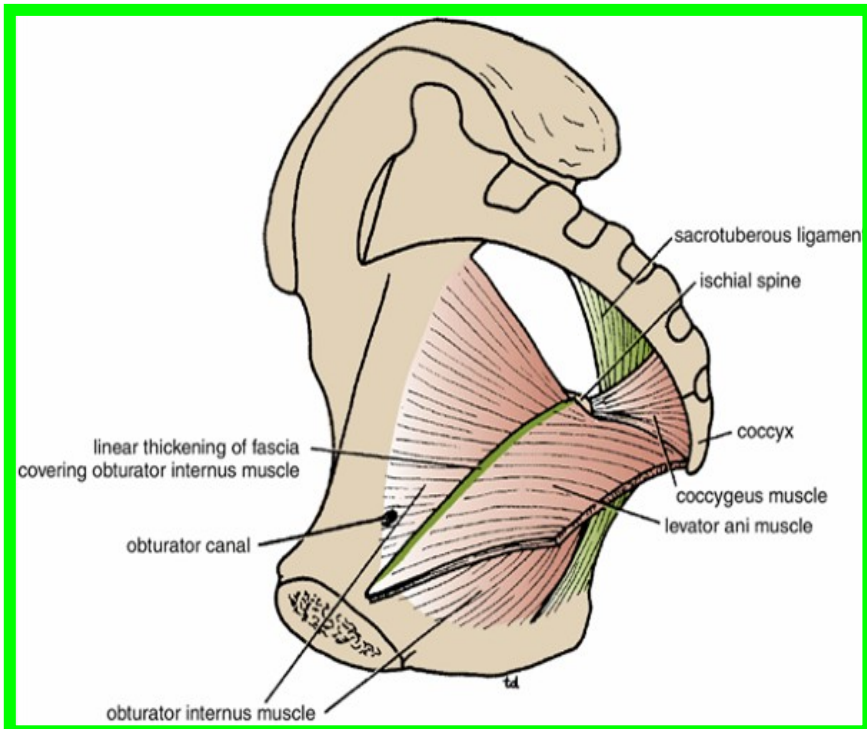


❖ Coccygeus Muscle

This **small triangular muscle** arises from **the spine of the ischium** and is inserted into the lower end of **the sacrum** and into **the coccyx**.

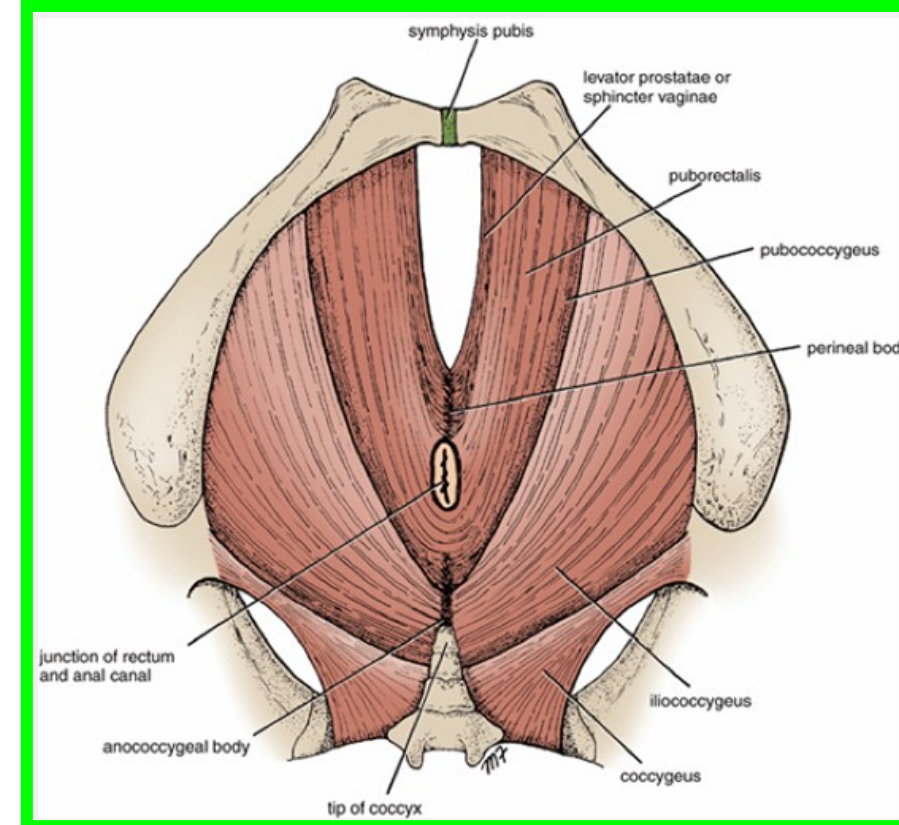
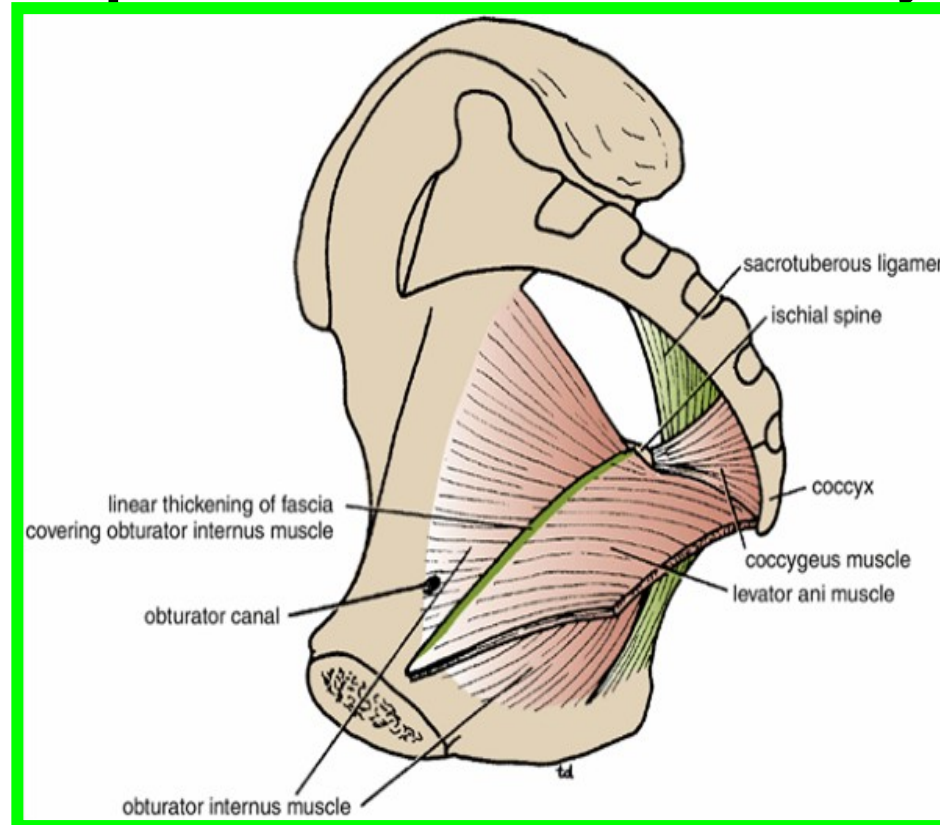
Action: The two muscles assist the levatores ani in supporting the pelvic viscera.

Nerve supply: A branch of **the fourth and fifth sacral nerves**



❖ Levator Ani Muscle

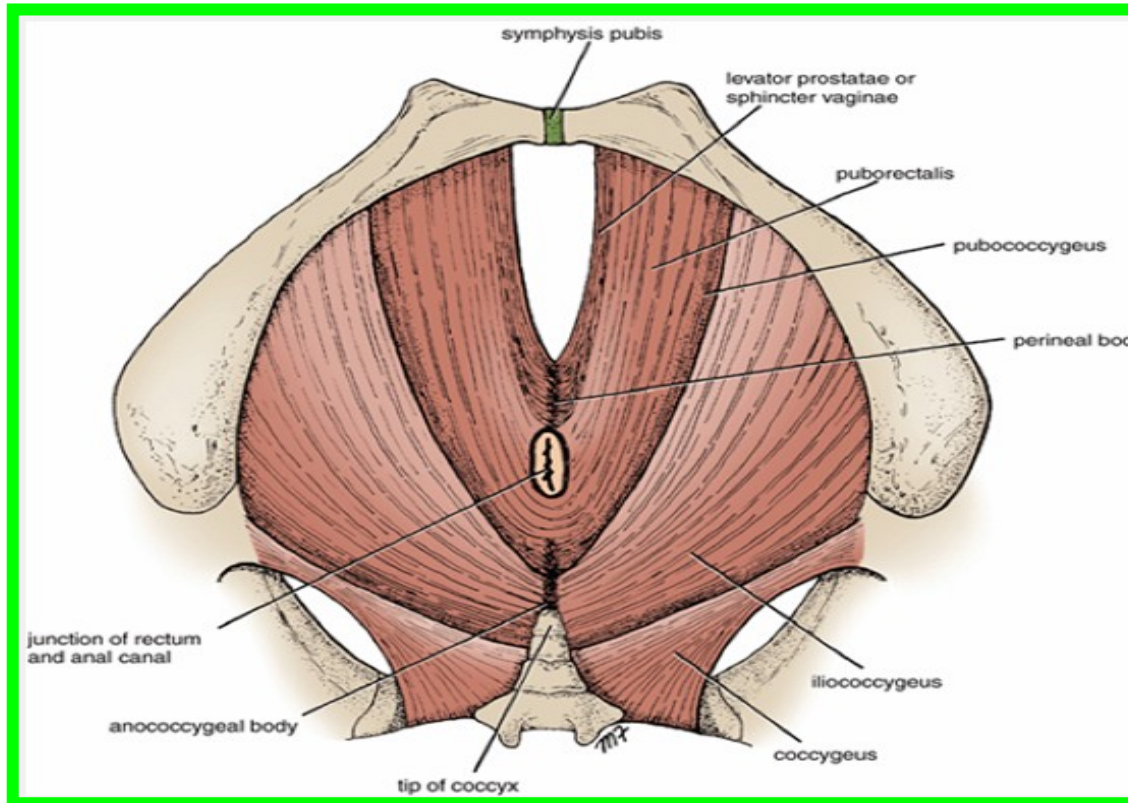
Is a wide thin sheet that has a linear origin from **the back of the body of the pubis**, a **tendinous arch** formed by a thickening of the fascia covering the obturator internus, and **the spine of the ischium**. From this extensive origin, groups of fibers sweep downward and medially to their insertion, **as follows:**



Pelvic Muscles

Dr. Aiman Al-Maathidy

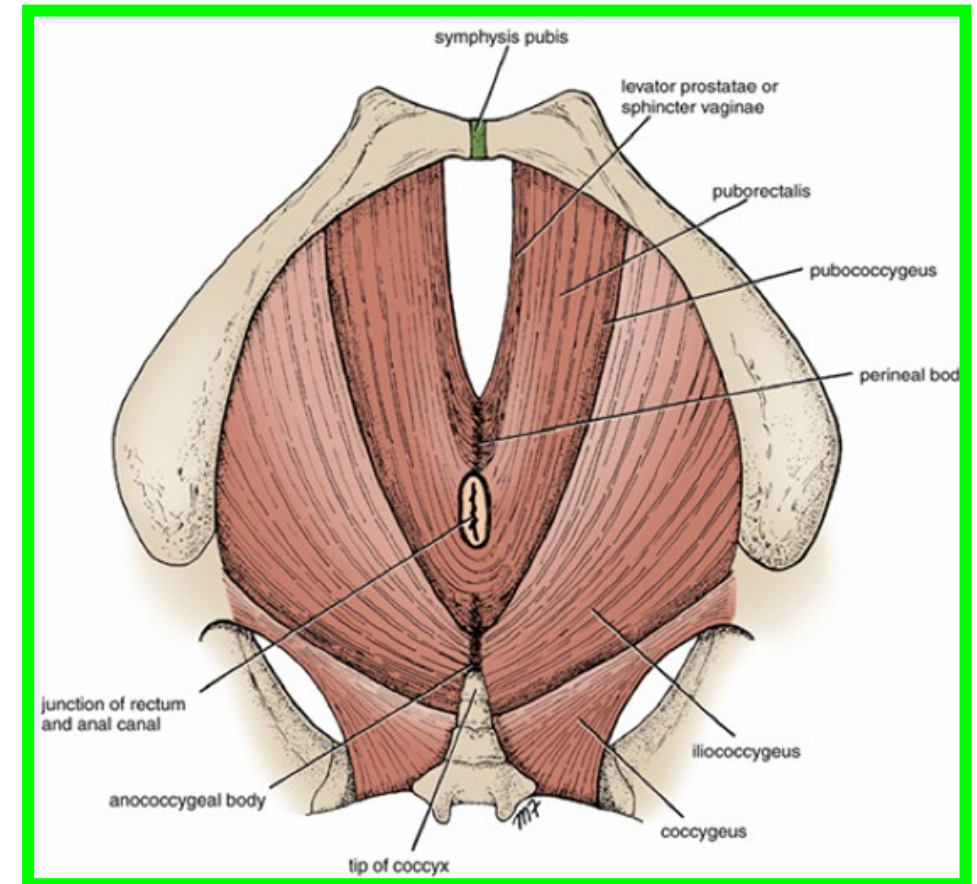
- ❑ **Anterior fibers:** The levator prostatae or sphincter vaginae form a sling around the prostate or vagina and are inserted into a mass of fibrous tissue, called the perineal body, in front of the anal canal.
- ✓ The levator prostatae support the prostate and stabilize the perineal body
- ✓ The sphincter vaginae constrict the vagina and stabilize the perineal body



❑ **Intermediate fibers:** The **puborectalis** forms a sling around the junction of the rectum and anal canal.

The **pubococcygeus** passes posteriorly to be inserted into a **small fibrous mass**, called the **anococcygeal body**, between the tip of the coccyx and the anal canal

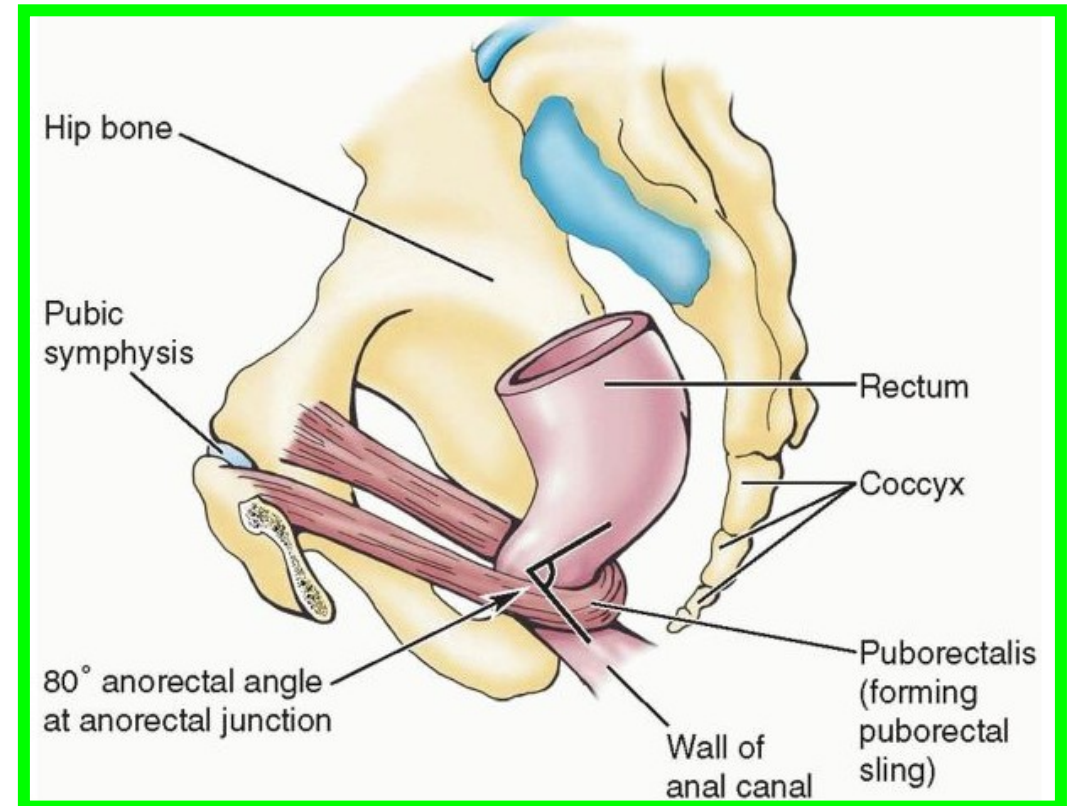
❑ **Posterior fibers:** The **iliococcygeus** is inserted into the **anococcygeal body** and the **coccyx**.



Pelvic Muscles

Action: The levatores ani muscles of the two sides form an efficient muscular sling that supports and maintains the pelvic viscera in position. They resist the rise in intrapelvic pressure during the straining and expulsive efforts of the abdominal muscles (as occurs in coughing). They also have an important sphincter action on the anorectal junction, and in the female they serve also as a sphincter of the vagina.

Nerve supply: The perineal branch of the fourth sacral nerve and from the perineal branch of the pudendal nerve

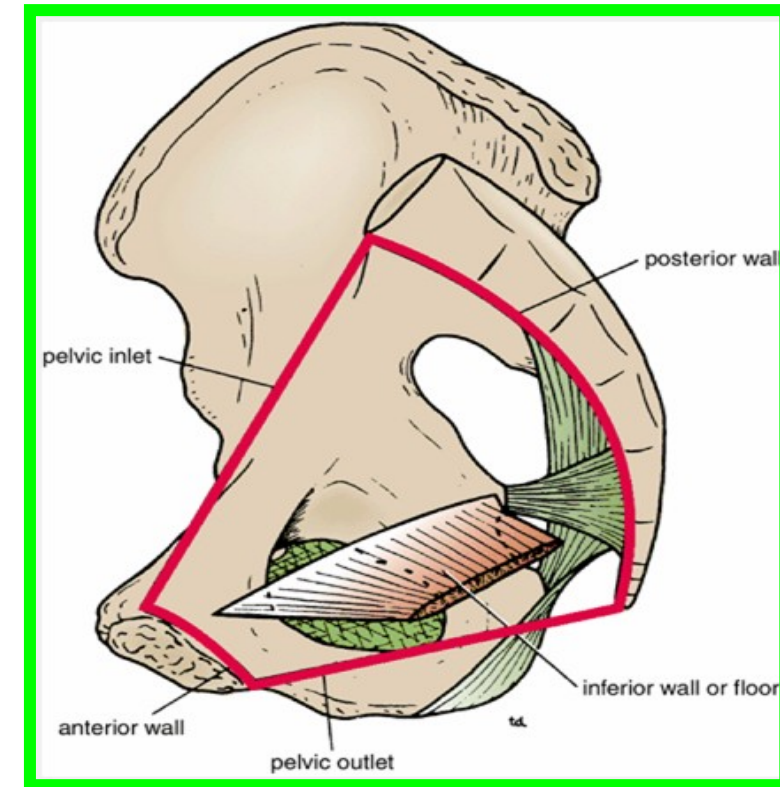
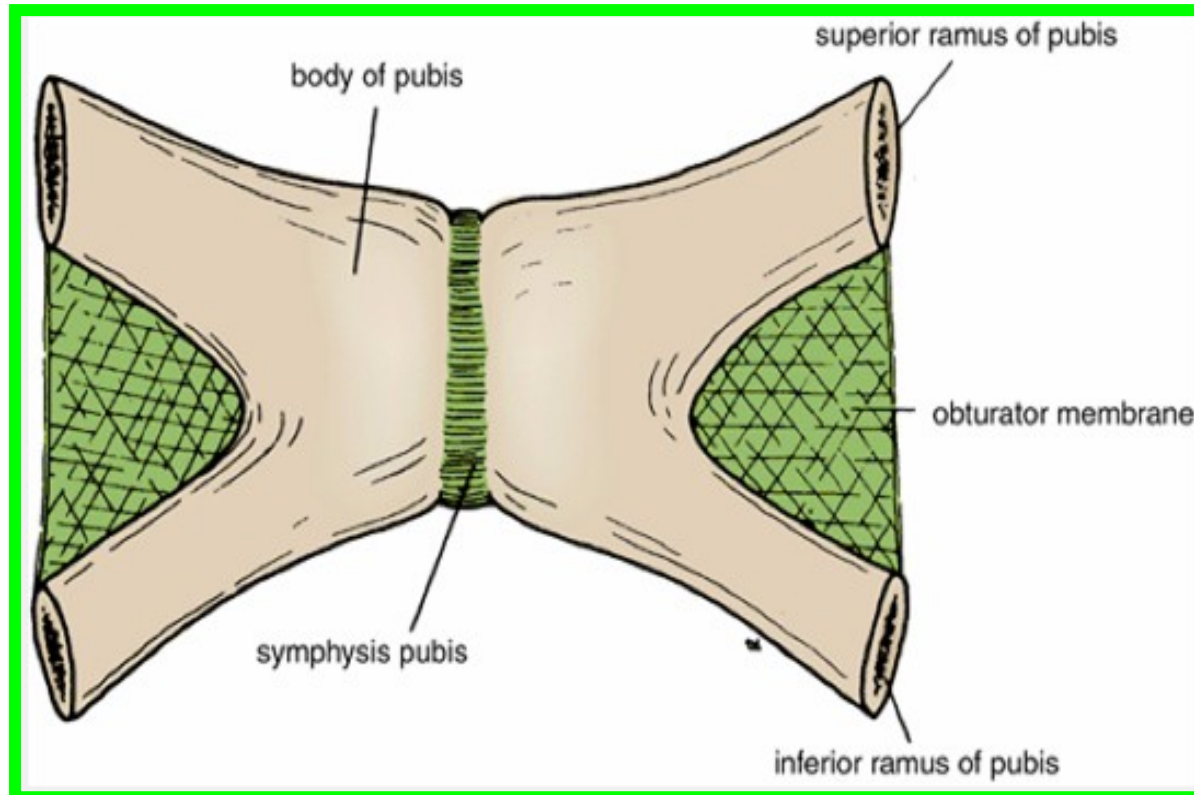


Structure of the Pelvic Walls

The pelvis has anterior, posterior, and lateral walls and an inferior wall or floor.

□ Anterior Pelvic Wall

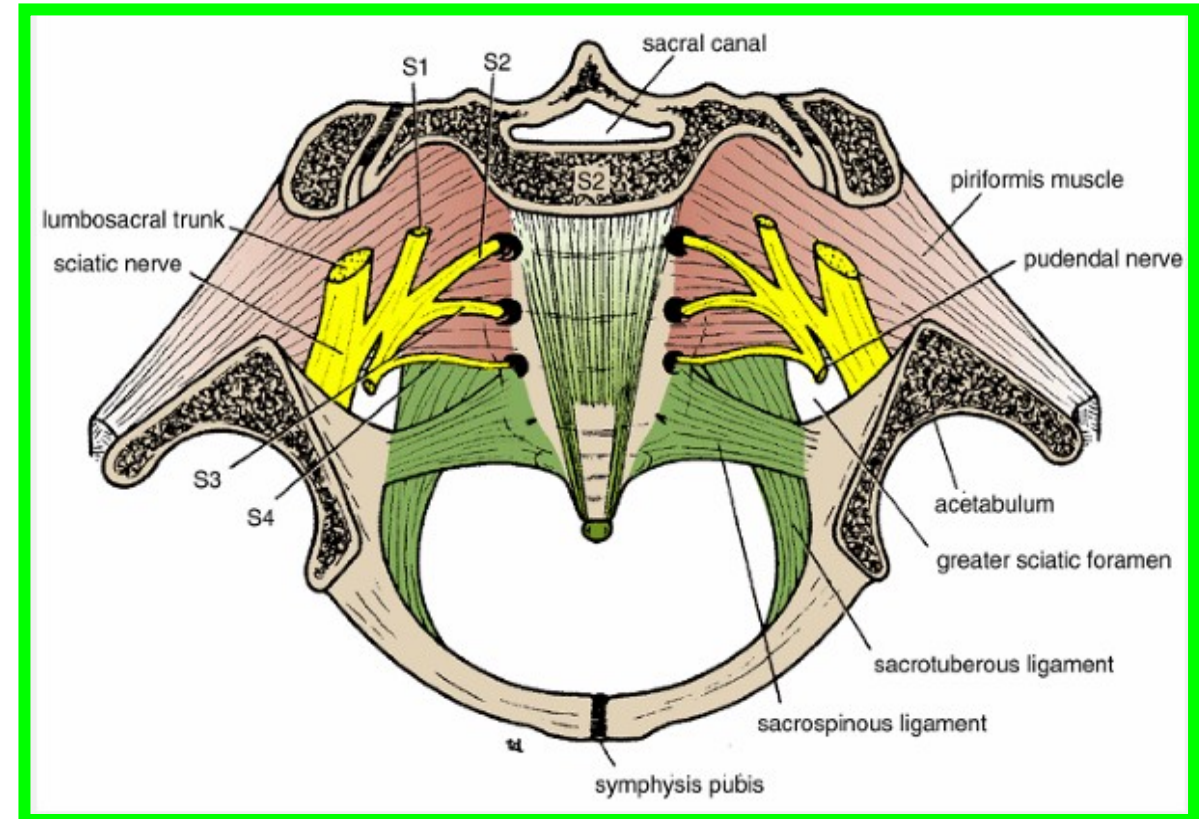
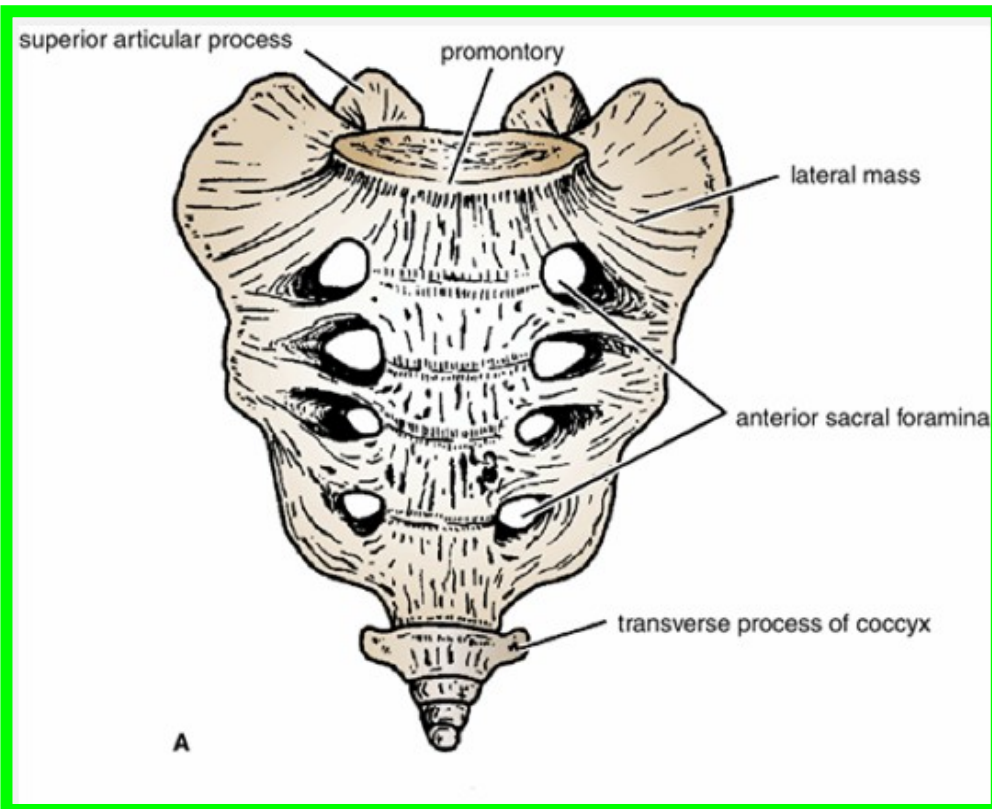
The anterior pelvic wall is the shallowest wall and is formed by the bodies of the pubic bones, the pubic rami, and the symphysis pubis



Structure of the Pelvic Walls

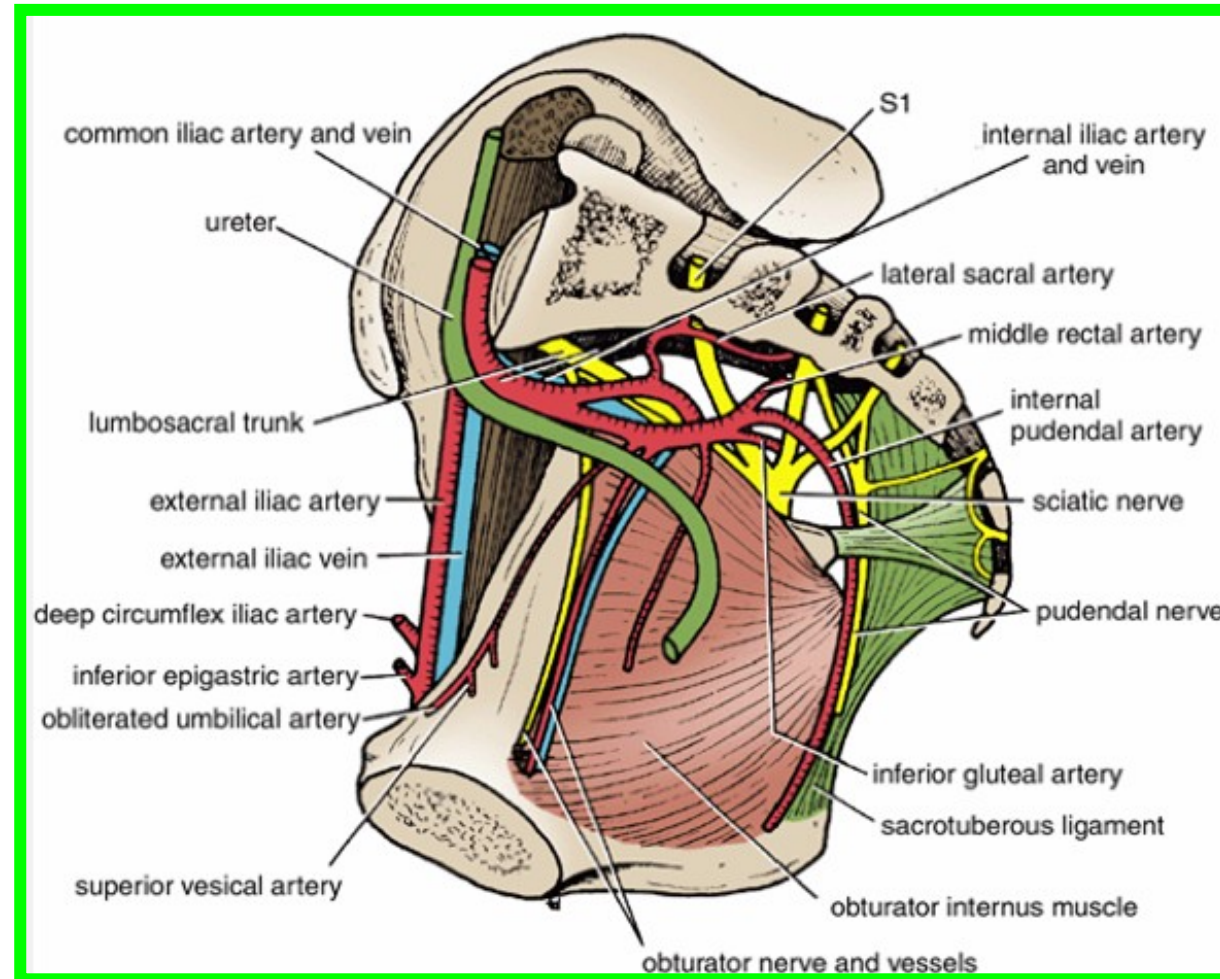
❑ Posterior Pelvic Wall

The posterior pelvic wall is extensive and is formed by **the sacrum** and **coccyx** and by **the piriformis muscles** and their covering of **parietal pelvic fascia**



Structure of the Pelvic Walls

❑ The lateral pelvic wall is formed by part of the hip bone below the pelvic inlet, the obturator membrane, the sacrotuberous and sacrospinous ligaments, and the obturator internus muscle and its covering fascia



Lateral Pelvic Wall

Dr. Aiman Al-Maathidy

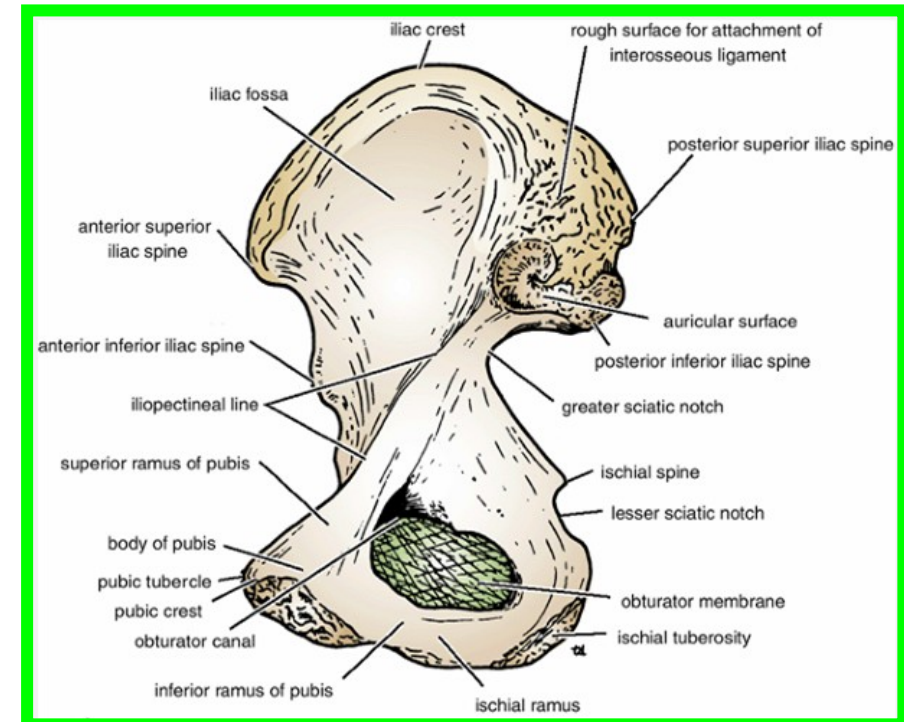
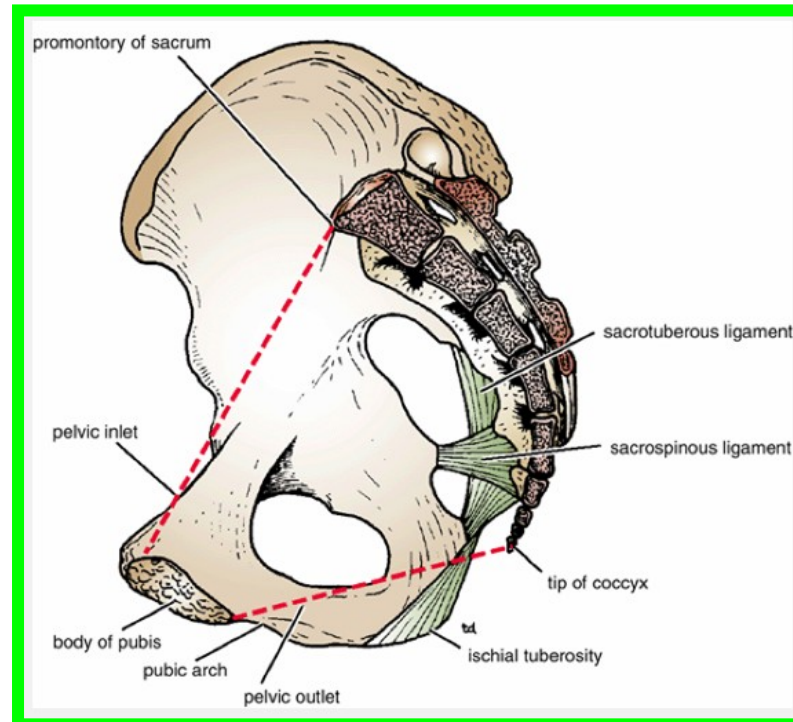
27

Sunday 27 April 2025

Obturator Membrane

is a fibrous sheet that almost completely closes **the obturator foramen**, leaving a small gap, **the obturator canal**, for the passage of the obturator nerve and vessels as they leave the pelvis to enter the thigh .

Sacrospinous Ligament is strong and extends from the **lateral part of the sacrum and coccyx** and **the posterior inferior iliac spine** to the **ischial tuberosity** .

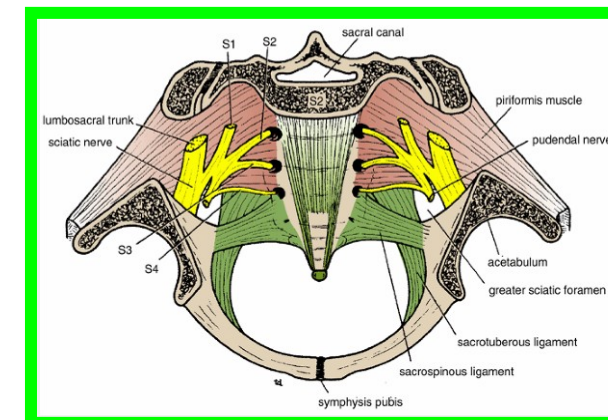
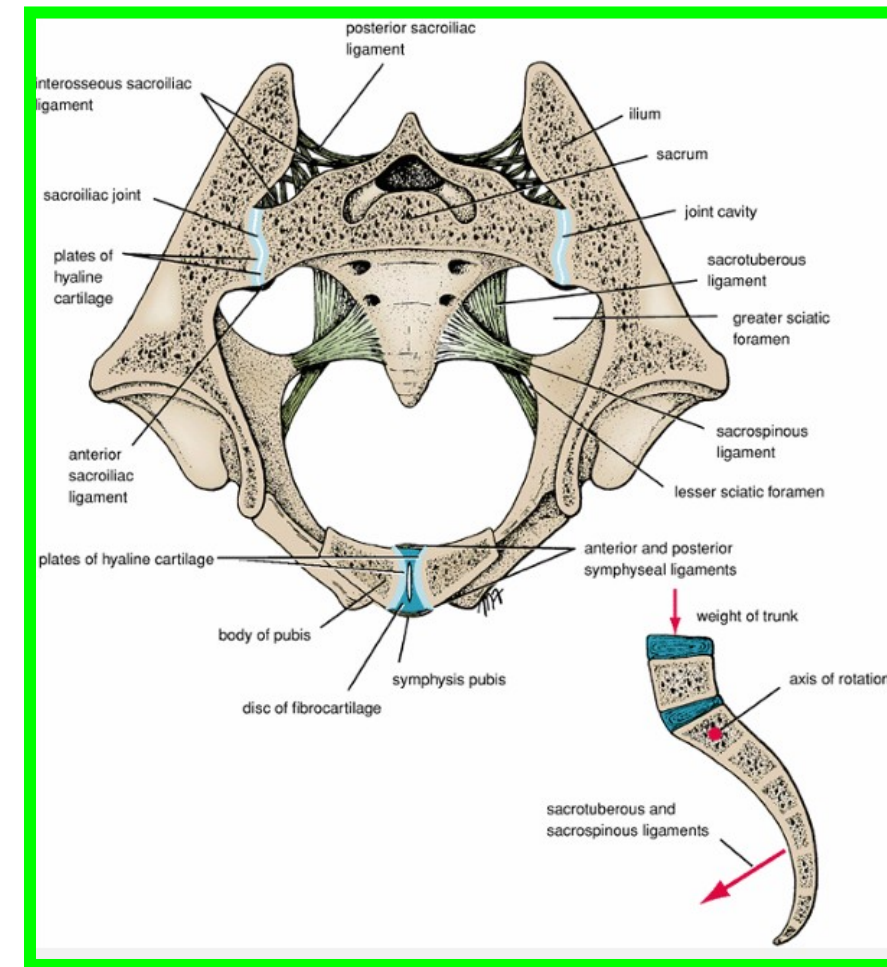


Lateral Pelvic Wall

Sacrospinous Ligament
is strong and triangle shaped.

It is attached by its base to **the lateral part of the sacrum** and **coccyx** and by its apex to **the spine of the ischium**

❖ **The sacrotuberous and sacrospinous ligaments prevent the lower end of the sacrum and the coccyx from being rotated upward at the sacroiliac joint by the weight of the body**

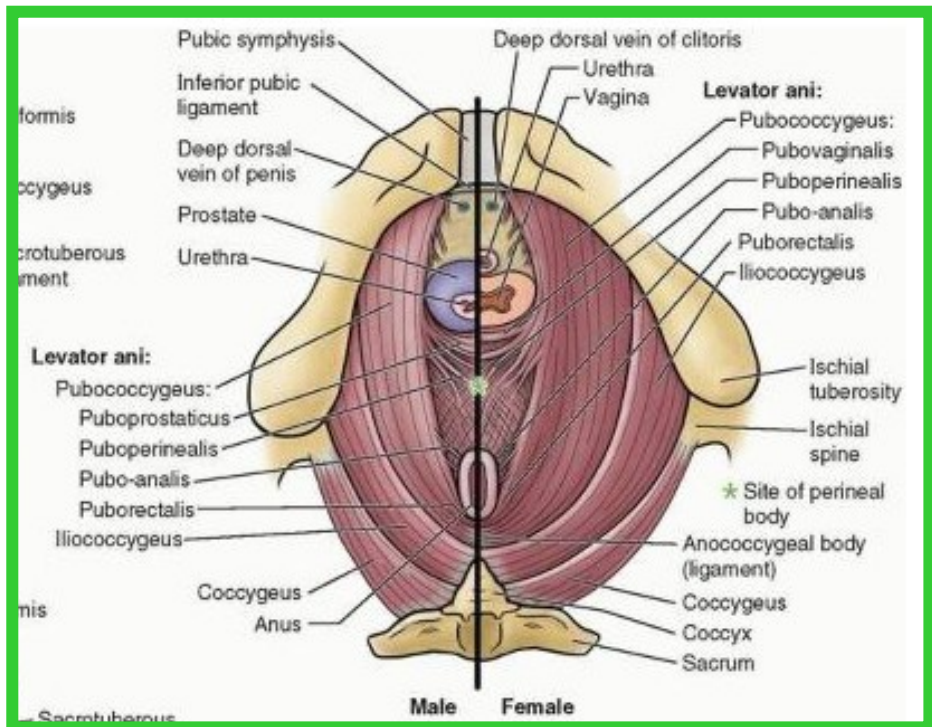


❑ Inferior Pelvic Wall, or Pelvic Floor

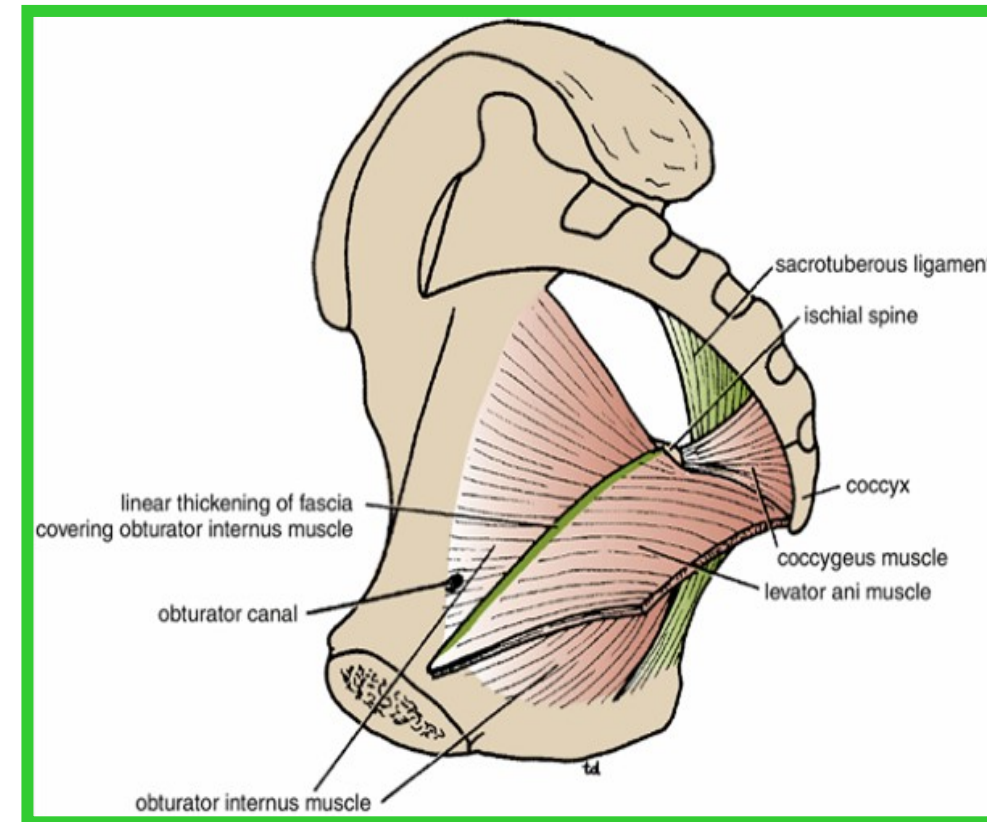
The floor of the pelvis supports the pelvic viscera and is formed by the **pelvic diaphragm**

❖ The **pelvic diaphragm** is formed by the **important levatores ani muscles** and the **small coccygeus muscles** and **their covering fasciae**

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



Dr. Aiman Al-Maathidy
Sunday 27 April 2025

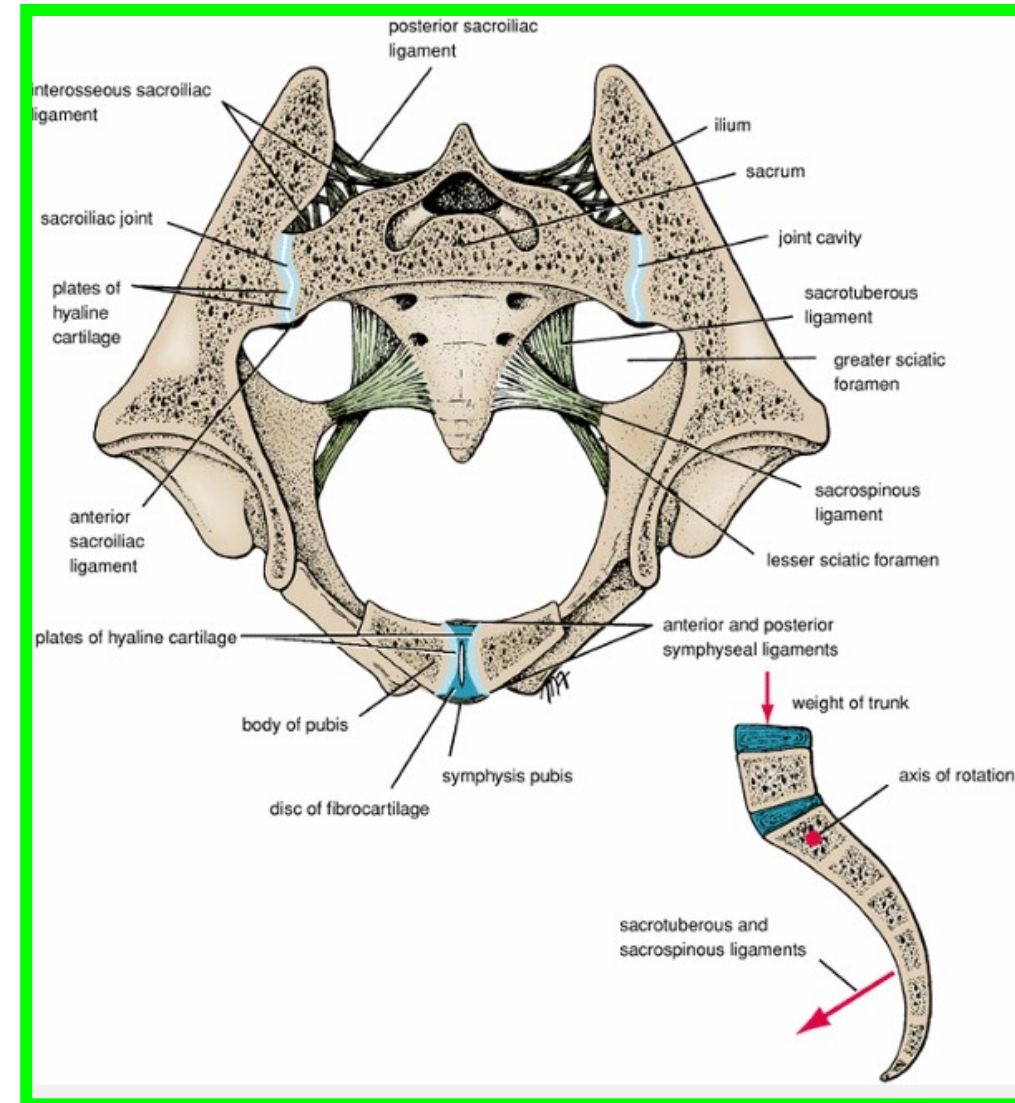


Sacroiliac Joints

Dr. Aiman Al-Maathidy
Sunday 27 April 2025

30

- ❖ strong **synovial joints**.
- ❖ formed between the auricular surfaces of the sacrum and the iliac bones.
- ❖ The sacrum carries the weight of the trunk.
- ❖ The strong **posterior and interosseous sacroiliac ligaments** suspend the sacrum between the two iliac bones.
- ❖ The **anterior sacroiliac ligament** is thin and lies in front of the joint.



Movements

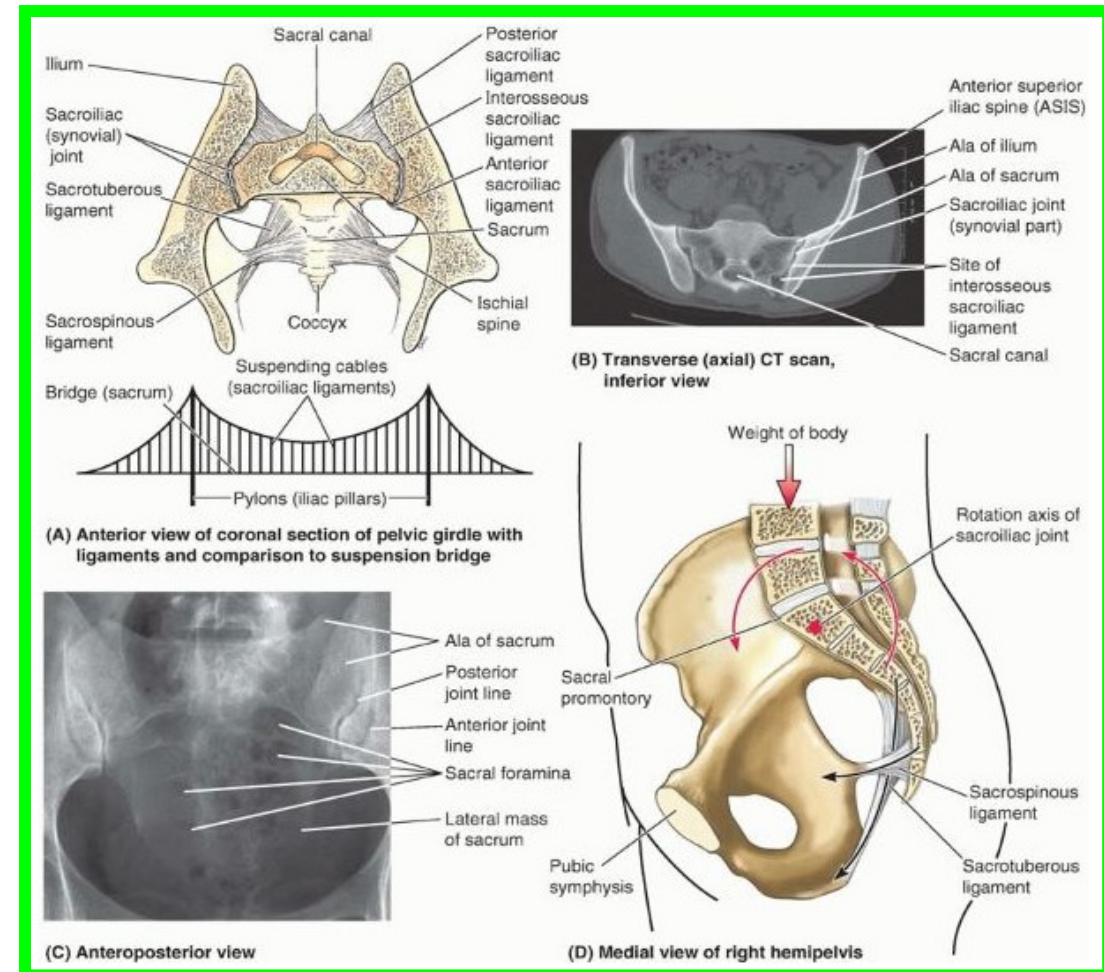
- ❖ A small but limited amount of movement is possible at these joints.
- ❖ In older people, the synovial cavity disappears and the joint becomes fibrosed.
- ❖ Their primary function is to transmit the weight of the body from the vertebral column to the bony pelvis.

Nerve Supply

The nerve supply is from branches of the sacral spinal nerves.

31

Dr. Aiman Al-Maathidy
Sunday 27 April 2025

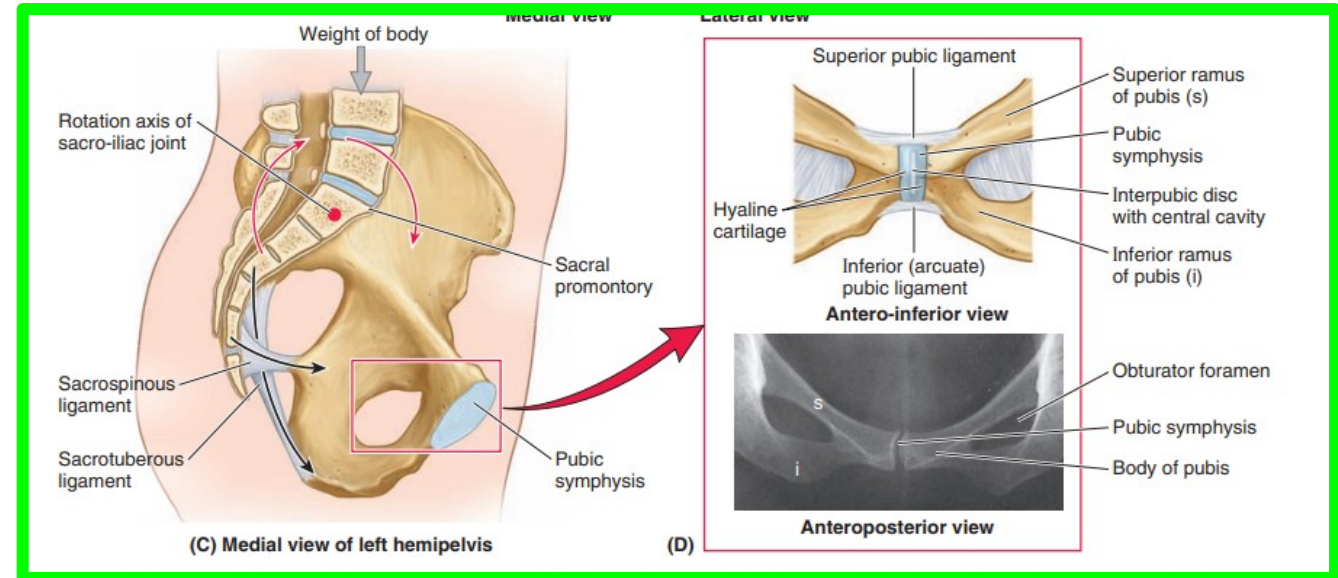
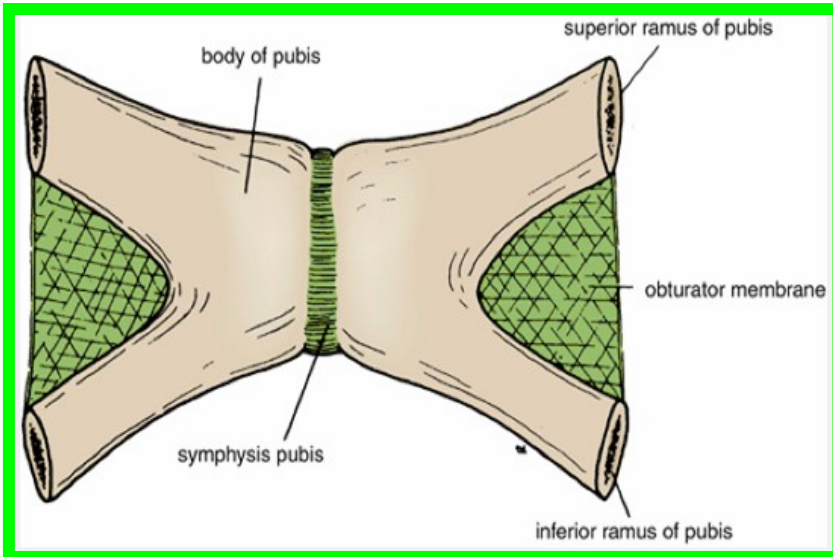


Symphysis Pubis

Dr. Aiman Al-Maathidy

Sunday 27 April 2025

❖ is a **cartilaginous joint** between the two pubic bones.



❖ The articular surfaces are covered by a layer of **hyaline cartilage** and are connected together by **a fibrocartilaginous disc**. The joint is surrounded by ligaments that extend from one pubic bone to the other.

Movements

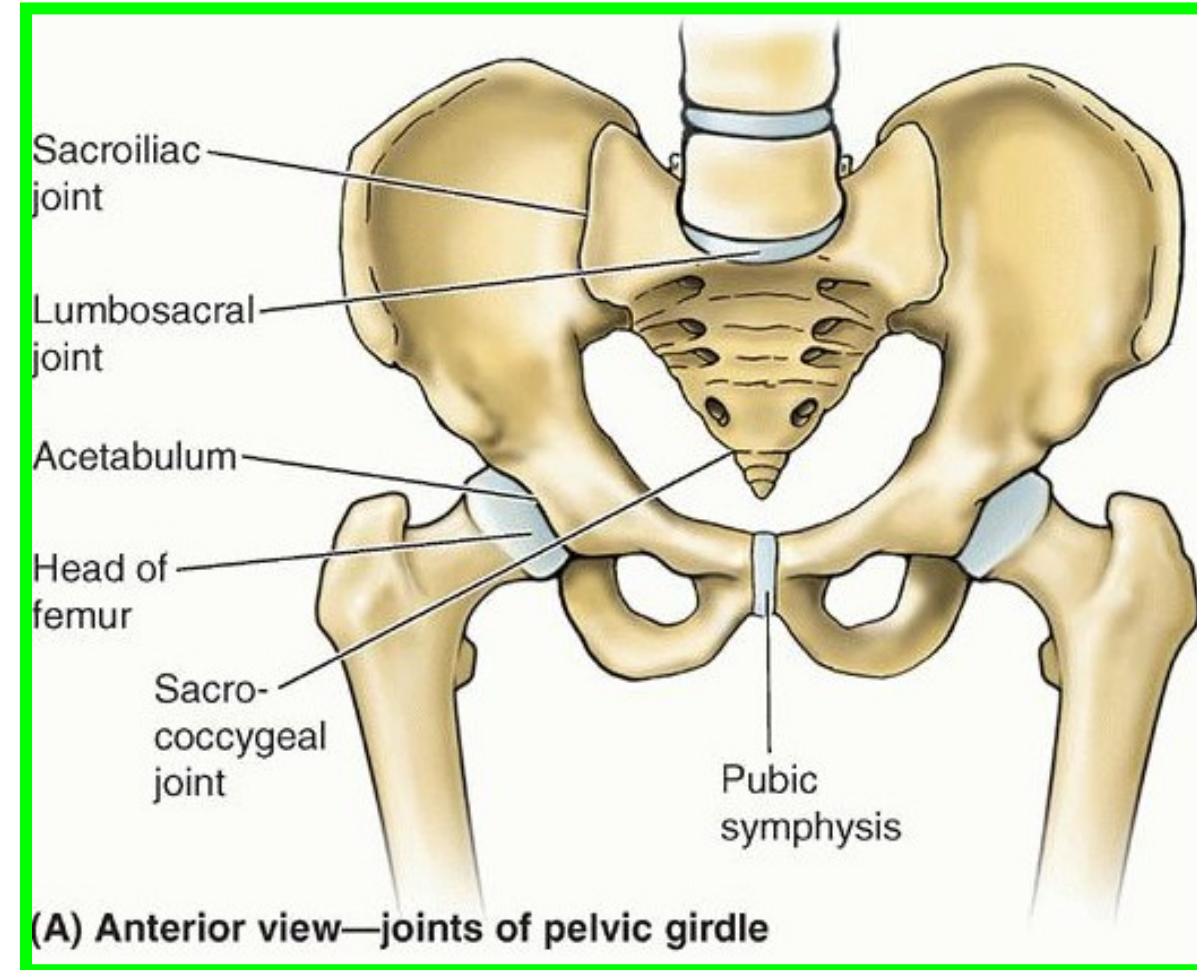
Almost no movement is possible at this joint.

Sacrococcygeal Joint

- ❖ is a **cartilaginous joint** between the bodies of the last sacral vertebra and the first coccygeal vertebra.
- ❖ The cornua of the sacrum and coccyx are joined by ligaments.

Movements

Extensive flexion and extension are possible at this joint



Dr. Aiman Al-Maathidy
Surgical Anatomy
Sunday 27 April 2025