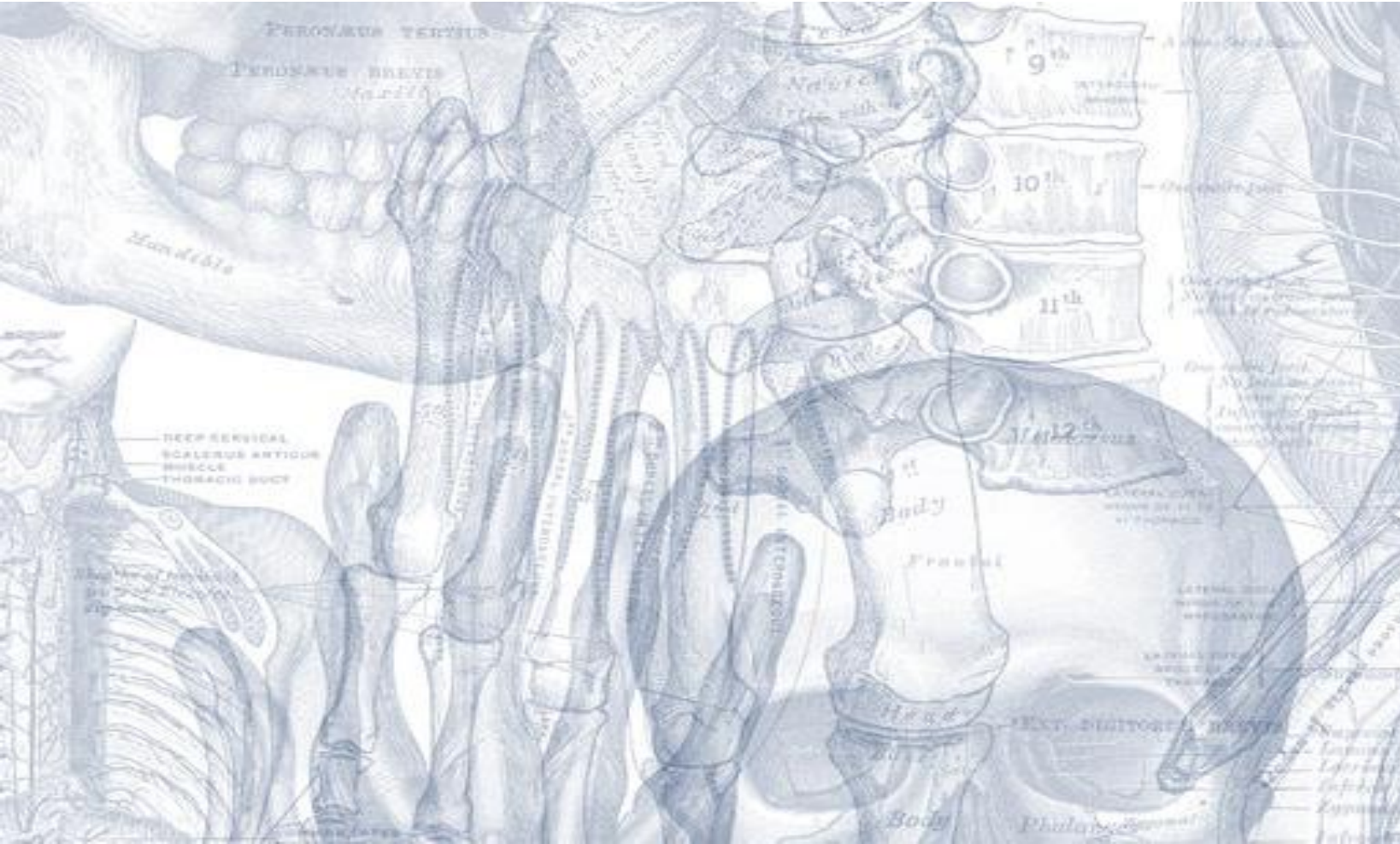


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PELVIS & SACRUM

EDITING FILE

Color Code

- **Important**
- **Doctors Notes**
- **Notes/Extra explanation**

Objectives:

- ✓ Describe the bony structures of the pelvis.
- ✓ Describe in detail the hip bone, the sacrum, and the coccyx.
- ✓ Describe the boundaries of the pelvic inlet and outlet.
- ✓ Identify the articulations of the bony pelvis.
- ✓ List the major differences between the male and female pelvis.
- ✓ List the different types of female pelvis.

Overview:

- check this video to have a good picture about the lecture:

<https://www.youtube.com/watch?v=PJOT1cQHFqA>

<https://www.youtube.com/watch?v=3v5AsAESg1Q&feature=youtu.be>

- BONY PELVIS = 2 Hip Bones (lateral) + Sacrum (Posterior) + Coccyx (Posterior).
- Hip bone is composed of 3 parts = Superior part (Ilium) + Lower anterior part (Pubis) + Lower posterior part (Ischium)

only on the boys slides'

BONY PELVIS

Location

Pelvis is the region of the trunk that lies below the abdomen.

SHAPE

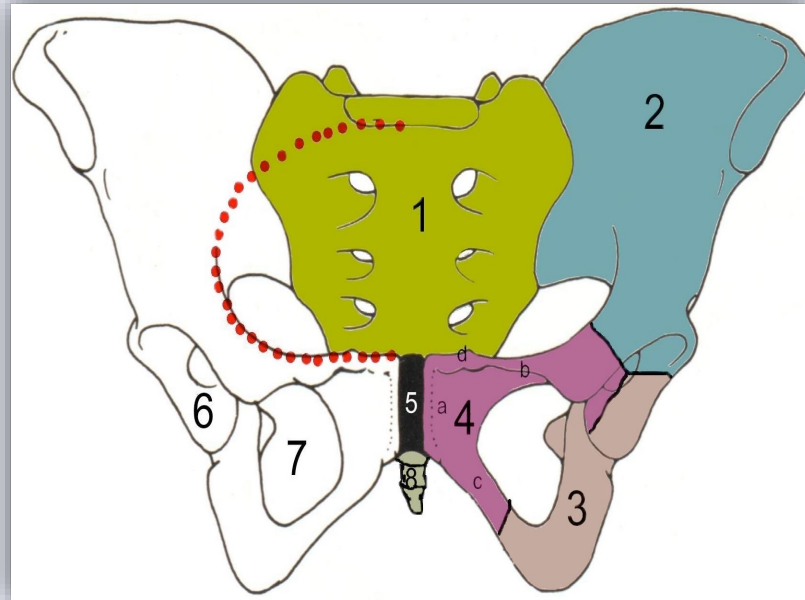
Bowl shaped

Structure: Pelvis can be regarded as a basin with holes in its walls. The structure of the basin is composed of:

4 bones

4 joints

- 1-sacrum
- 2-iliac
- 3-ischium
- 4-pubic
- 5-pubic symphysis
- 6-Acetabulum



A. Two hip bones: These form the lateral and anterior walls of the bony pelvis.

B. Sacrum: It forms most of the posterior wall.

C. Coccyx: It forms most of the posterior wall.

Function

Primary: The skeleton of the pelvis is a basin-shaped ring of bones with holes in its wall connecting the vertebral column to both femora.

Its primary functions are:

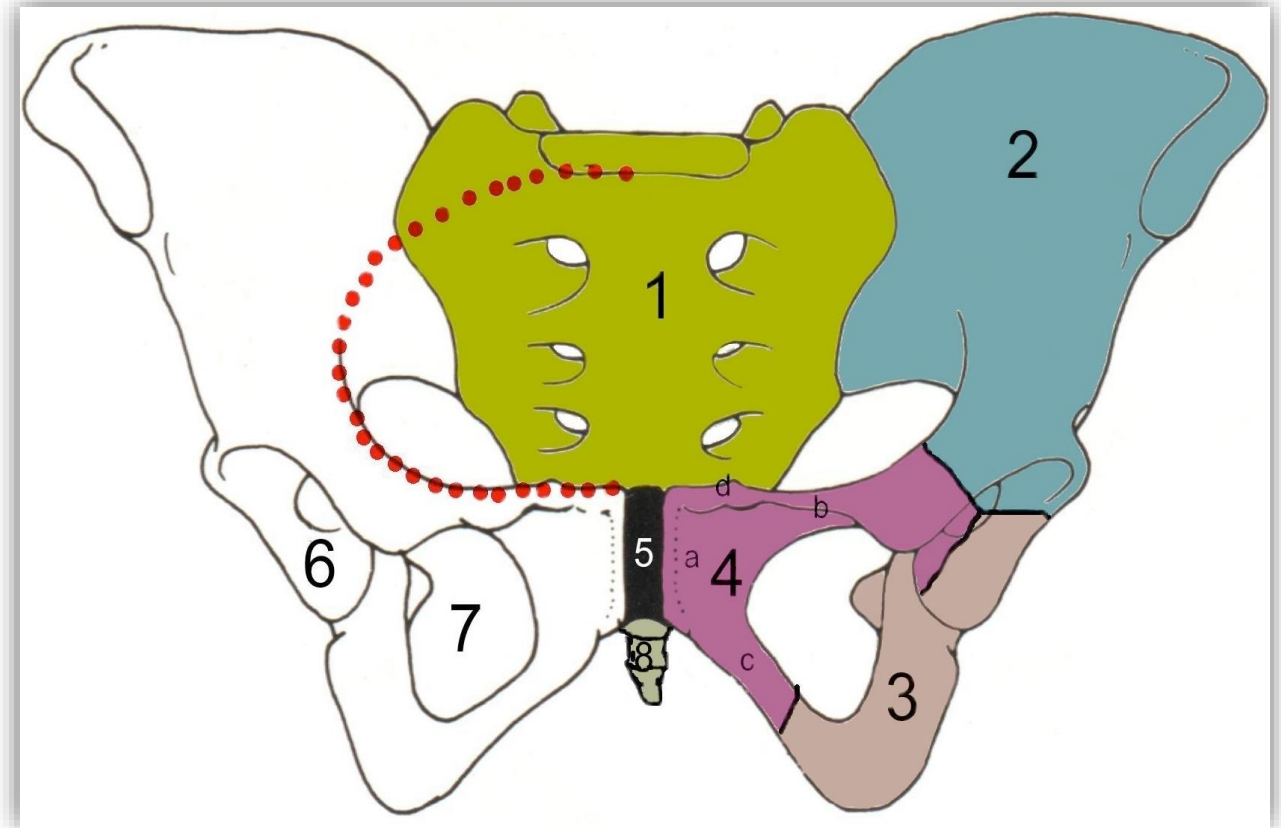
- bear the weight of the upper body when sitting and standing;
- transfer that weight from the axial skeleton to the lower appendicular skeleton when standing and walking;
- provide attachments for and withstand the forces of the powerful muscles of locomotion and posture.

Secondary:

- Its secondary functions; are to
 - contain and protect the pelvic and abdominopelvic viscera (inferior parts of the urinary tracts, internal reproductive organs);
 - provide attachment for external reproductive organs and associated muscles and membranes.
-
- Protect pelvic and abdominal viscera.
 - Attachment for organs.

Pelvic Girdle

- Compared to the shoulder girdle, the pelvic girdle is thus stronger and heavier.
- It is composed of **Two Hip (Coxal) Bones**.
- Each one is a large irregular bone.
- Composed of three (elements) bones:
1.Ilium. 2.Ischium. 3.Pubis.
- They are joined at a deep socket (the Acetabulum)
- During childhood, these sections are separate bones, joined by Y shaped cartilage.
- During puberty, they fuse together to form a single bone.



1.Sacrum

2. Ilium

3. Ischium

4. Pubic bone

5. Pubic

symphysis

6. Acetabulum

7. Obturator

foramen

8. Coccyx

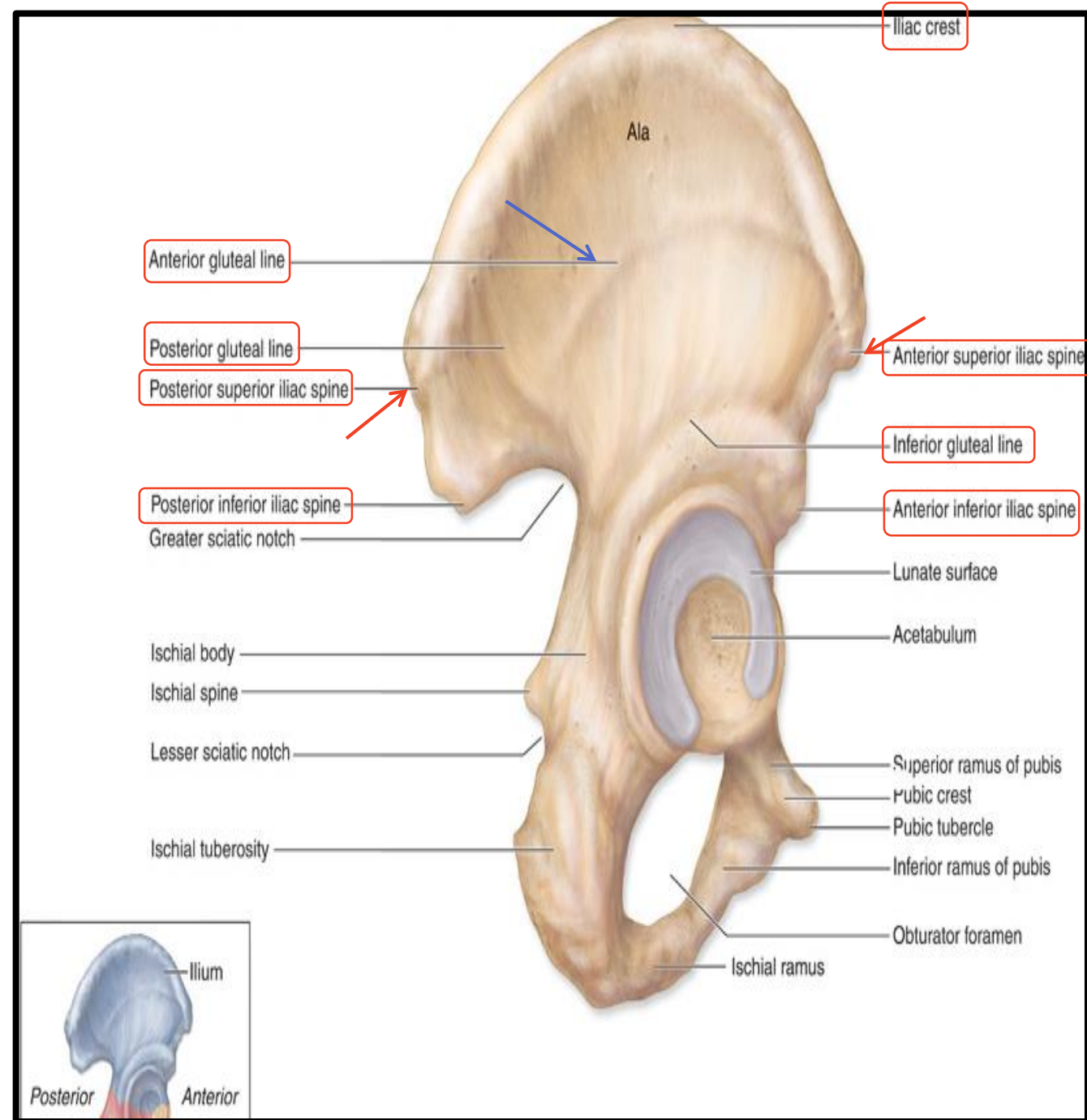
Red line:

Terminal

line/pelvic brim

Ilium

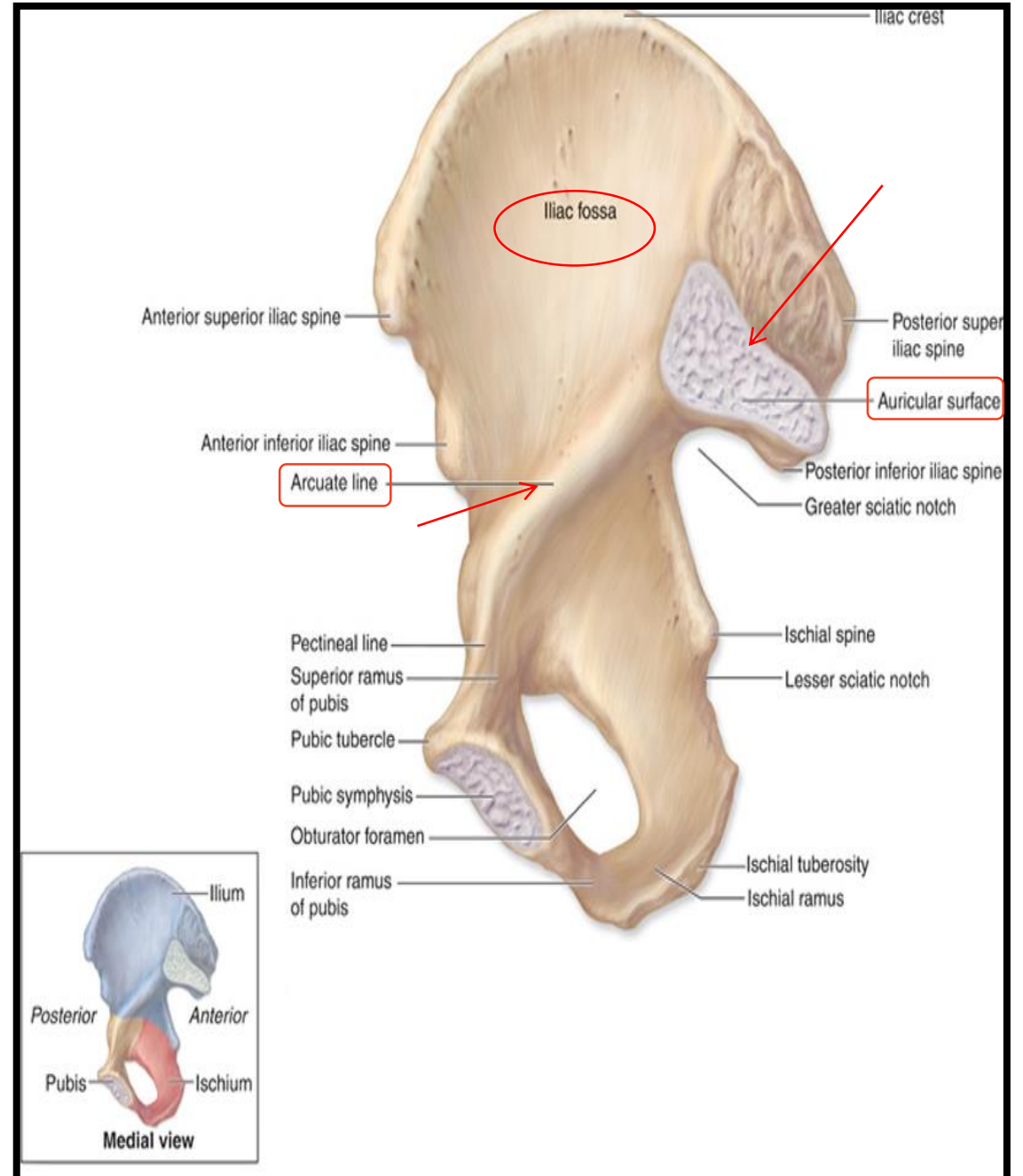
- It is the **Upper Flattened Part** of the hip bone.
- It Possesses:
 - **Iliac Crest:** it is an important anatomical landmark below the waist.
- It runs between the Anterior and Posterior **Superior Iliac Spines**.
- Below are the corresponding Anterior and Posterior **Inferior Iliac Spines**.
- It has two surfaces:
 - 1-The Outer Surface: rough and has three **Gluteal Lines** (anterior, posterior, and inferior).



Ilium(con.)

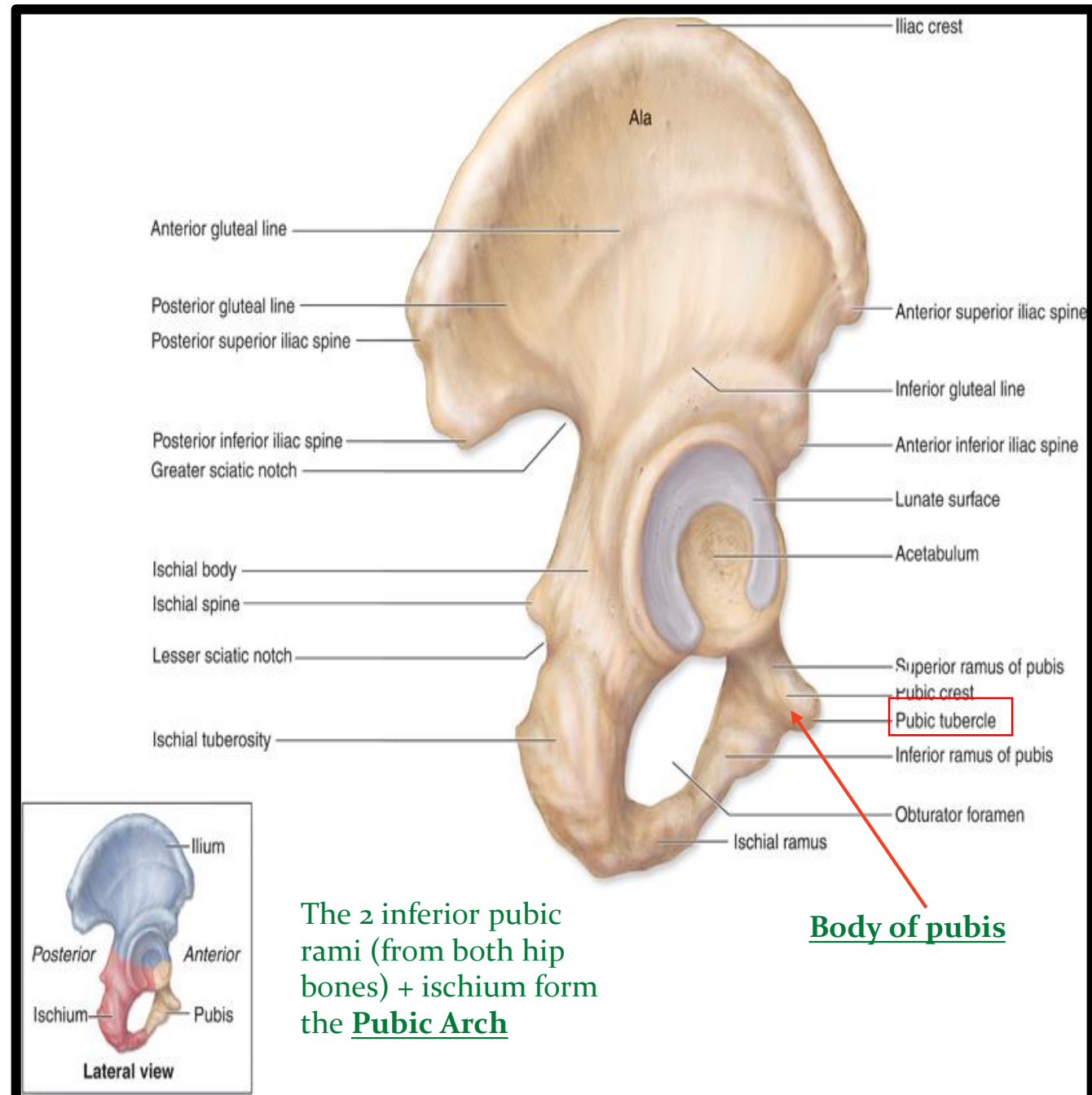
2-The Inner surface shows:

- **Iliac Fossa** (forms false pelvis)
- **Auricular surface** (for articulation with the sacrum). **Looks like an ear (Auricle)**
- **Iliopectinial (Arcuate) Line:**
- runs Downwards & Forwards,
- it separates the False & the True pelvis. (discussed later)



Pubis

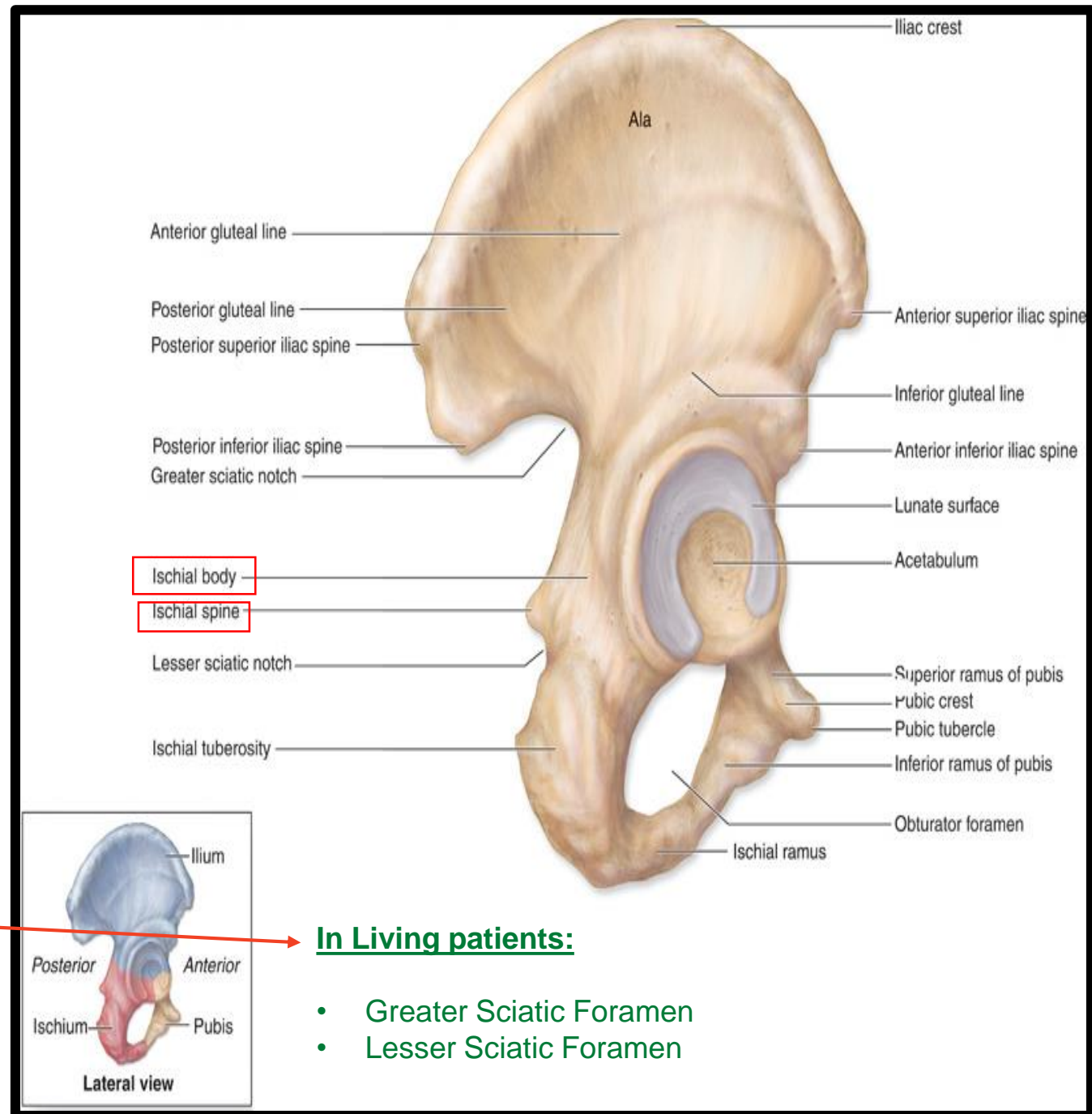
- Forms the Anterior & inferior part.
- It is composed of:
 1. **Body**; bears the **Pubic Crest** and **Pubic Tubercle**.
 2. **Two pubic Rami**;
 - Superior & Inferior.
 - They bound the **Obturator Foramen**, which is closed partially by the obturator membrane.



Ischium

- Forms the Inferior and Posterior part of the hip bone
- It has;
 - **Ischial Tuberosity:**
- It is a roughened area that receives body weight in sitting.
- Ischial Spine:
- Superior to the tuberosity, it is important landmark in pregnant women.
- **Greater sciatic notch.**
- **Lesser sciatic notch.**

#The distance between the 2 spines help us know whether a woman is going to give normal birth or not.



Articulations of Hip Bone

Symphysis Pubis

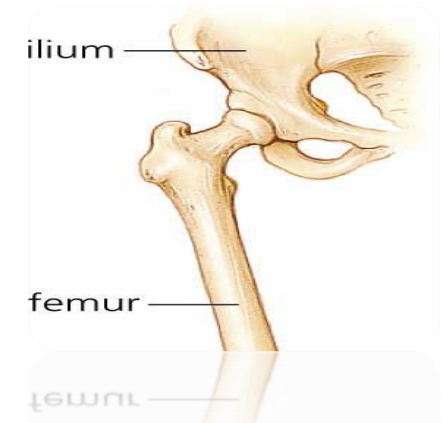
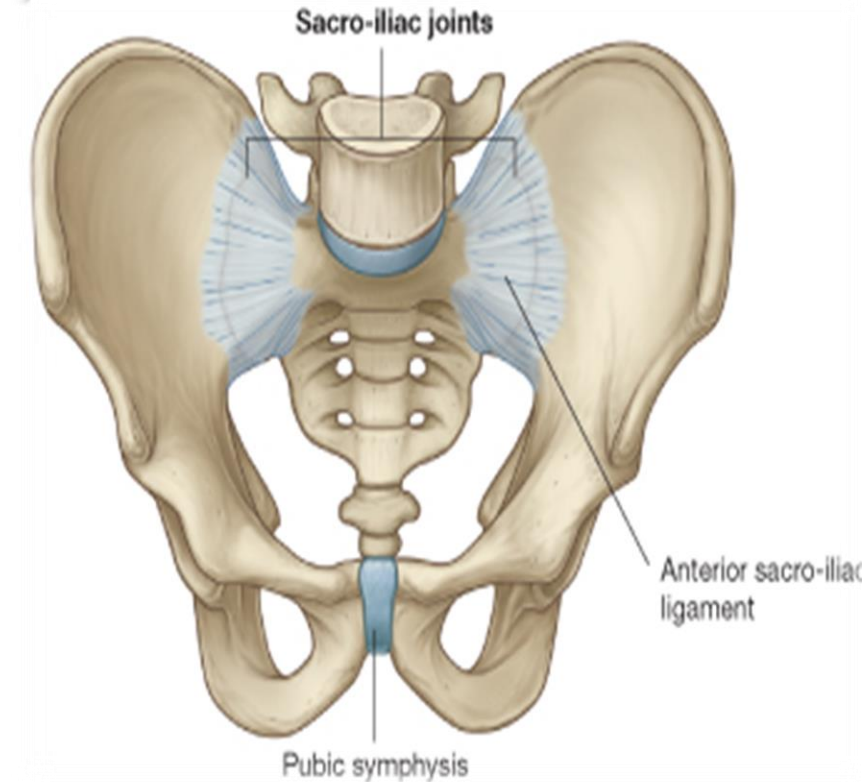
- A secondary cartilagenous joint between the two pubic bones

Sacroiliac Joints

- Strong synovial joints, between the auricular surfaces of both iliac bones and the sacrum.

Hip Joints

- The acetabulum articulates with the head of the femur.



Sacrum

A **Single Wedge** shaped bone.

(consists of **Five** rudimentary vertebrae fused together).

Sacral Promontory:

#: The anterior and upper margin.

#: It is tilted forward forming the **lumbosacral angle**.

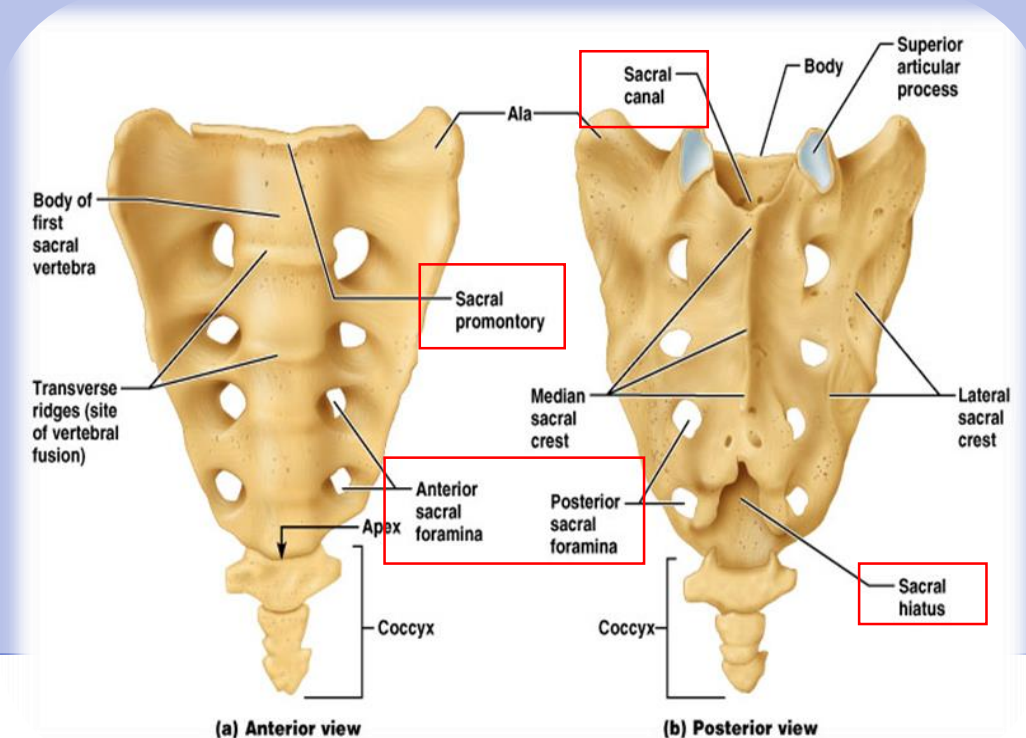
The anterior and posterior surfaces possess on each side **four Sacral Foramina**.

The fused vertebral foramina form the **Sacral Canal**.

Its lower limit is the **Sacral Hiatus**.

Coccyx

Consists of four vertebrae fused together forming a **single Triangular piece**.



Articulations of Sacrum

Lumbosacral joint

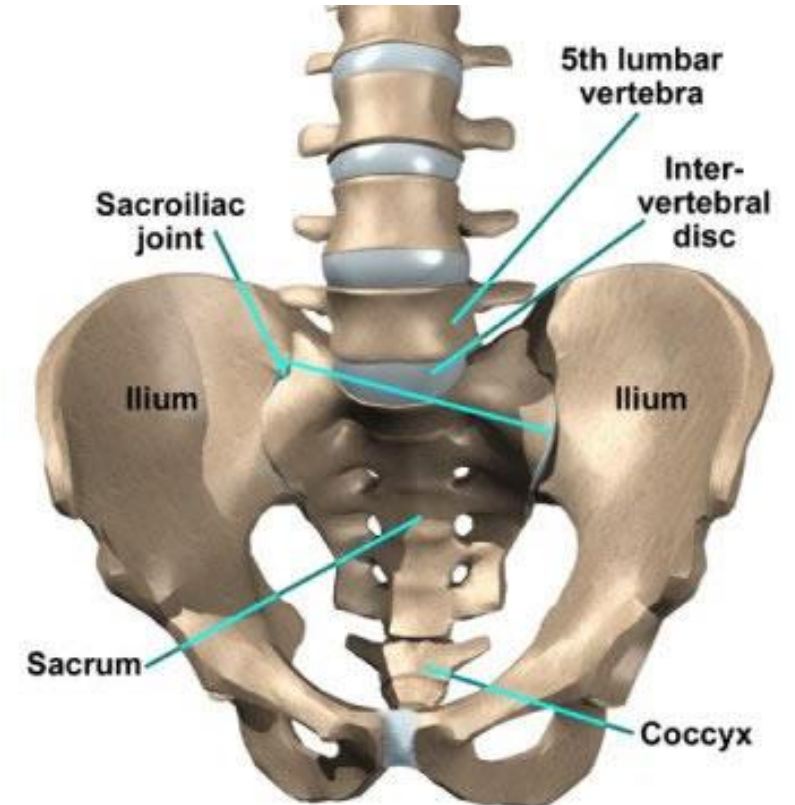
- The upper border articulates with the 5th Lumbar vertebra

Sacrococcygeal joint

- The inferior part articulates with the Coccyx.

Sacroiliac joints

- Lateral articulation with the both Hip bones

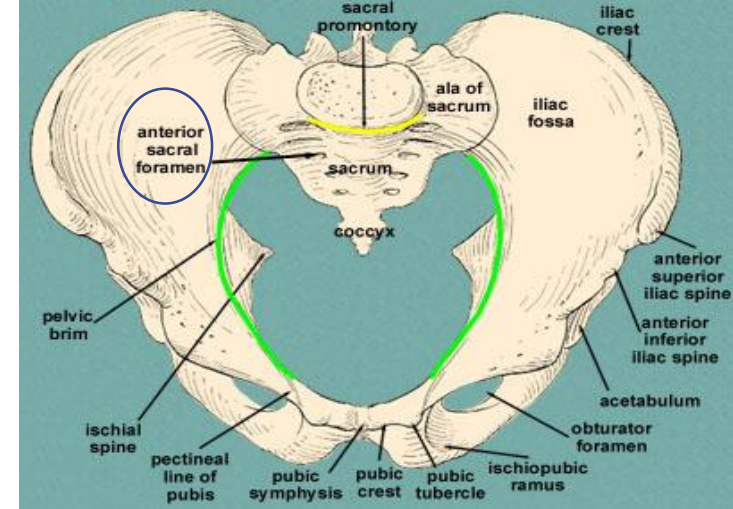


Anterior sacral foramina:

Formina : The holes of the basin.

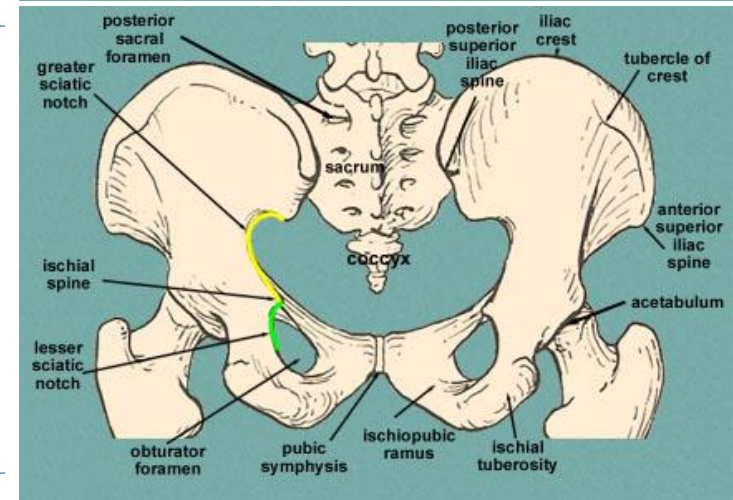
These are present on the anterior surface of the sacrum (which forms the posterior surface of the bony pelvis). Through these foramina pass the anterior rami of the sacral spinal nerves.

Four on each side.



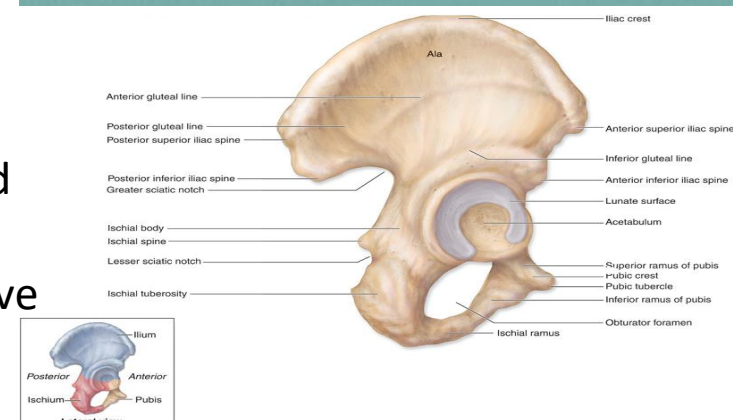
Obturator foramen:

- Each lateral wall of the pelvis has a large hole, called the obturator foramen.
- In living subjects, this hole is closed by the obturator membrane except for a small opening, which represents the obturator canal .
- Obturator nerve passes through this small opening.



Greater and lesser sciatic foramina:

- These are the major foramina of the pelvis.
- In the bony pelvis, they are present as greater and lesser sciatic notches but by the attachment of sacrotuberous and sacrospinous ligaments, these notches are converted to respective foramina.
- Through these foramina various structures enter and leave the pelvis. (*Sacrotuberous: ligament between sacrum and ischial tuberosity. **Sacrospinous: ligament between sacrum and ischial spine)

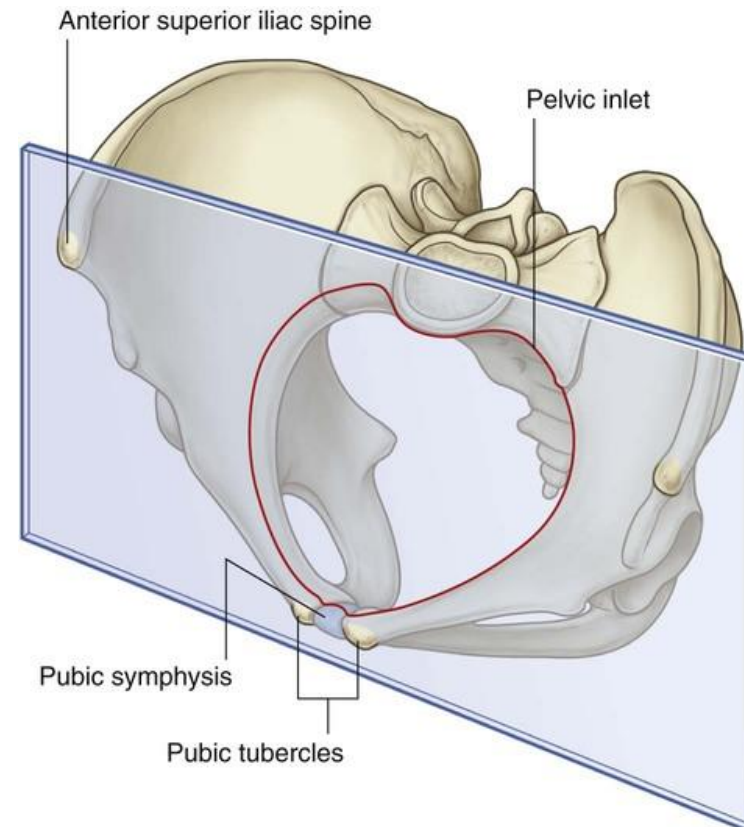
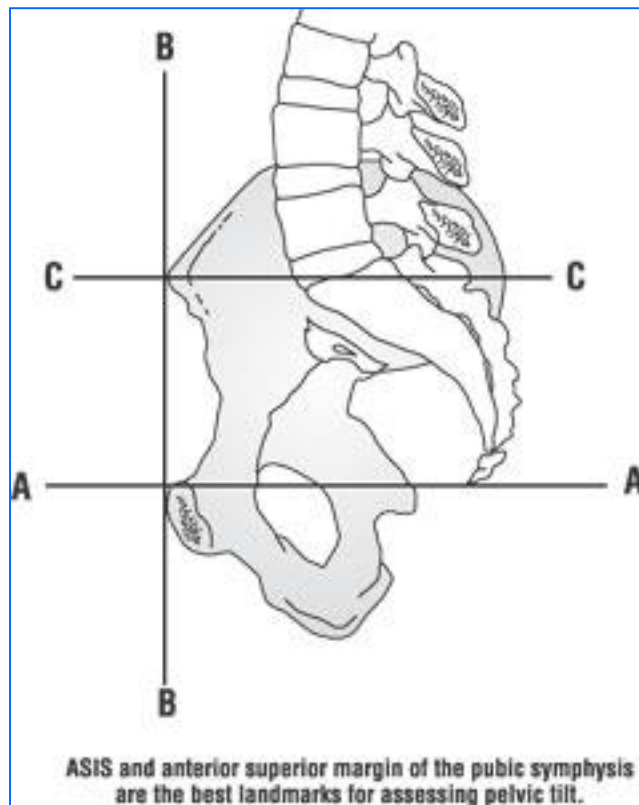


Orientation of the Pelvis

- Orientation of the Pelvis: **It is the Correct Position** of the bony pelvis relative to the trunk (in the anatomical position):

1. Vertical Plane: The anterior-superior iliac spine and the pubic tubercles are in the same **vertical plane**

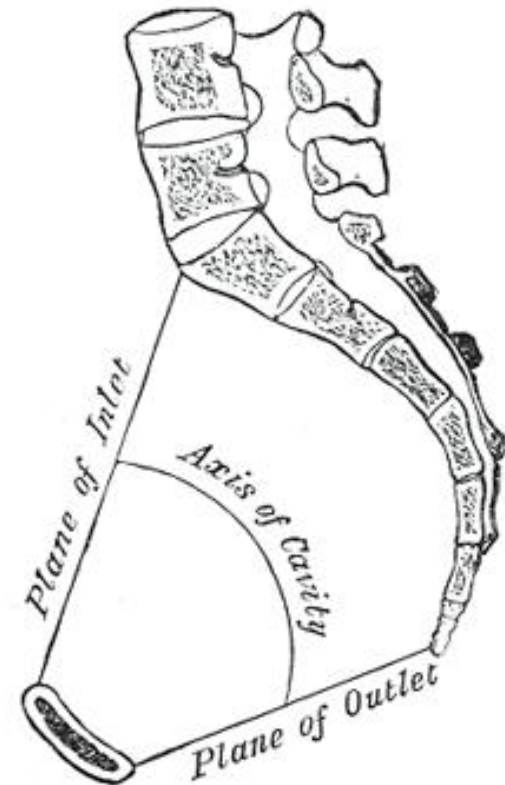
2. Horizontal Plane: The coccyx and the upper margin of the pubic symphysis are in the same **horizontal plane**



Orientation of the Pelvis

3. The axis of the pelvic cavity: running through the central point of the inlet and the outlet. almost parallels the curvature of the sacrum.

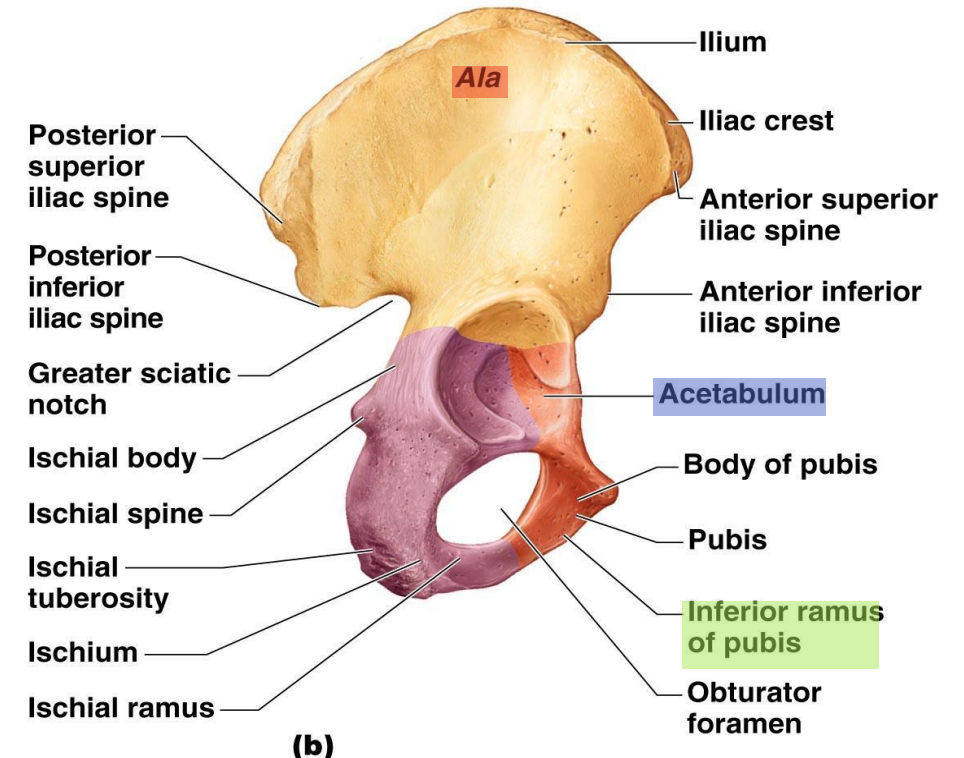
In this position: The anterior surface of the Sacrum is directed forward and downward while the pelvic surface of symphysis pubis faces upward and backward.



Fractures of the Bony Pelvis

The weakest parts of the bony pelvis are:

- Pubic rami.
- Acetabula.
- Region of sacroiliac joint.
- Alae of the ilium.
- Pelvic Fractures can result from direct trauma to the pelvic bones as occurs in car accidents or by forces transmitted to these bones from the lower limbs during falls on the feet.
- Pelvic fractures may cause injury to:
The pelvic soft tissues, Blood vessels, Nerves, organs.



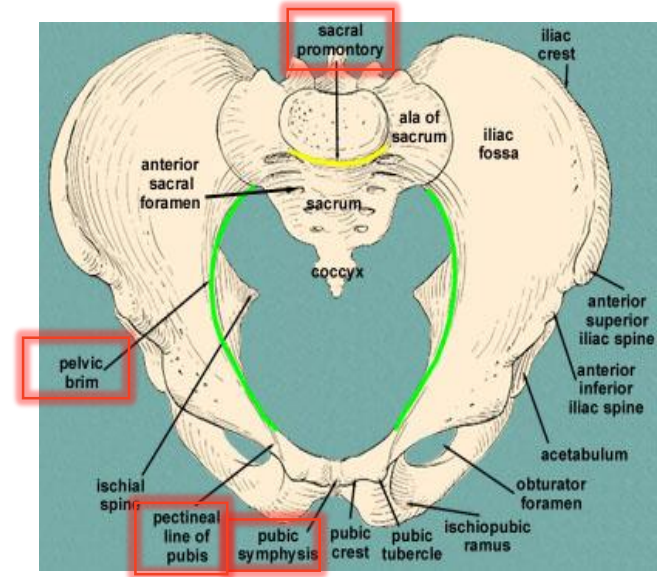
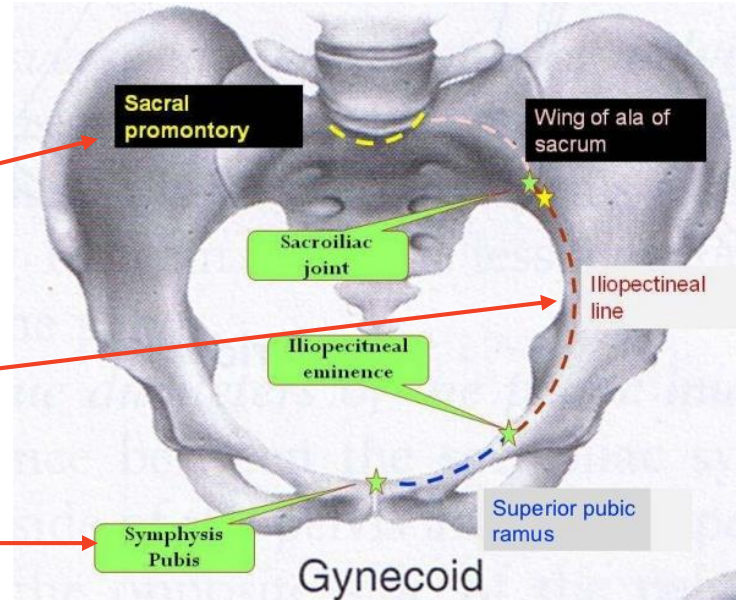
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Subdivision of the Bony Pelvis

-The bony pelvis is divided into two parts by the **Pelvic Brim**.

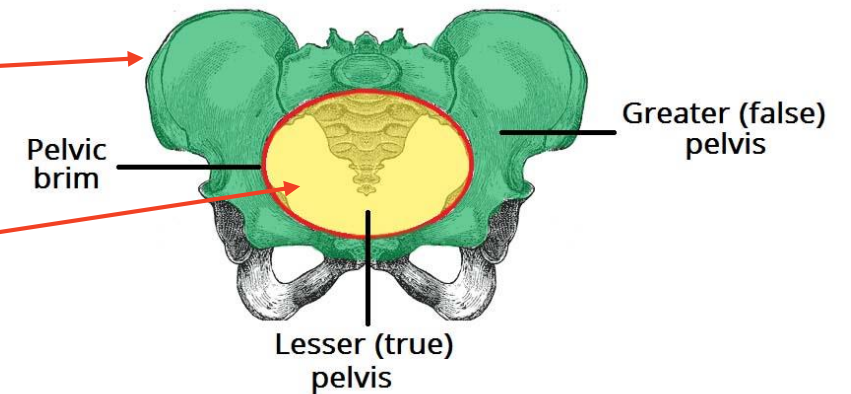
-The brim is formed

- Posteriorly:
Sacral Promontory
- Laterally:
Iliopectineal line.
- Anteriorly:
Symphysis pubis.



-**Above** the pelvic brim lies the **False Pelvis**, which is not of much clinical importance.

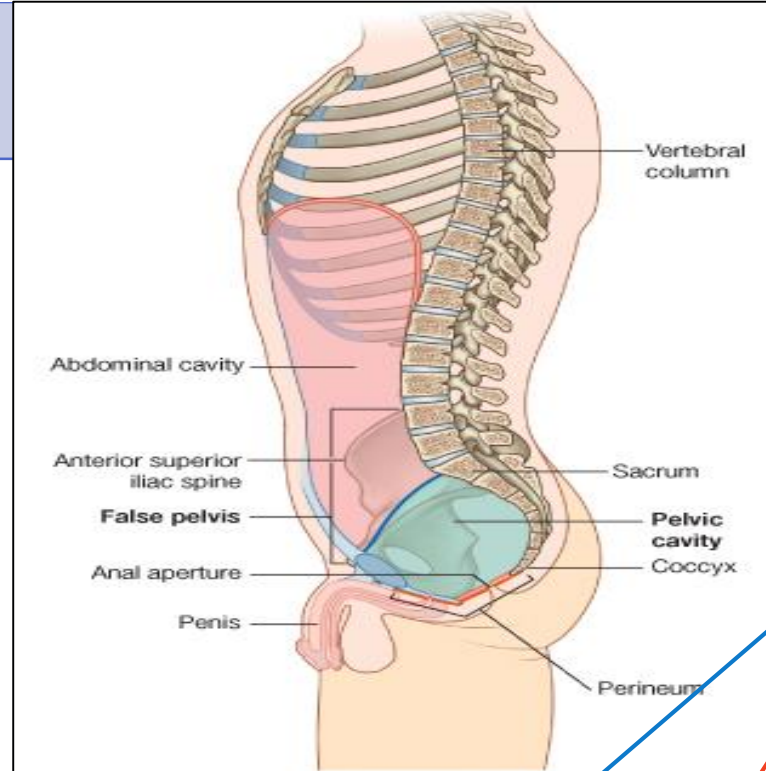
-**Below** the brim is the **True Pelvis**



True & False Pelvis

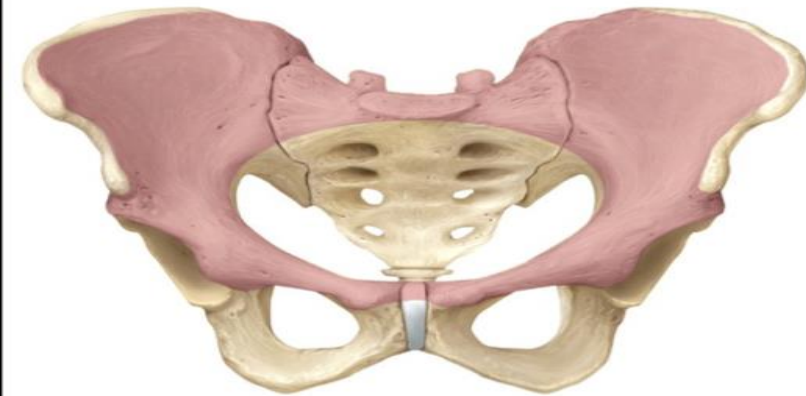
False pelvis

- Lies **superior** to the pelvic brim.
- Enclosed by the **Fossae of the iliac bones**
- Forms the inferior region of the abdominal cavity.
- Houses the **Inferior abdominal organs**

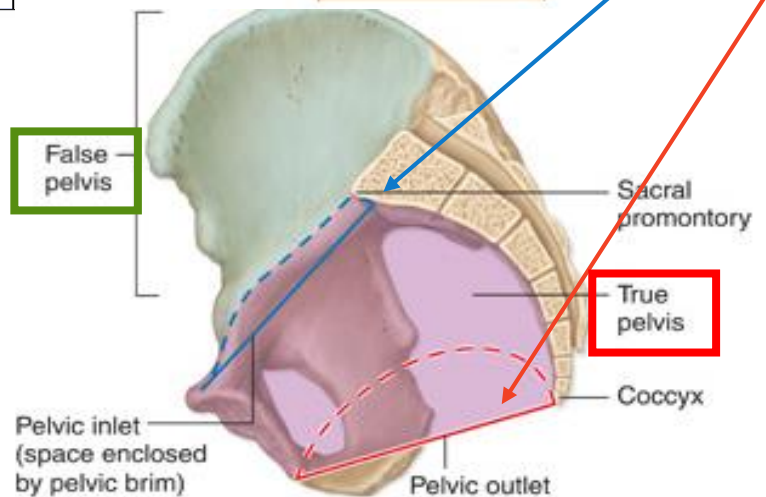


True Pelvis

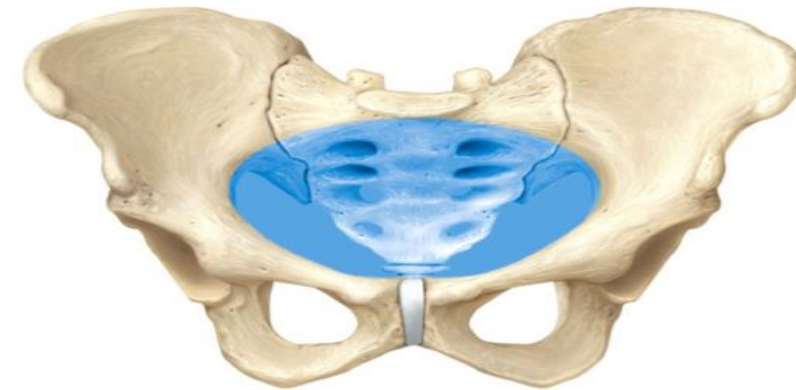
- Lies **inferior** to the pelvic brim.
 - Encloses the **pelvic cavity**.
 - Contains the **pelvic organs**.
- It has :
- Inlet Pelvic walls.**
 - Outlet Pelvic walls.**



(c) Anterior view of false pelvis (pink)



(a)



(d) Anterior view of true pelvis (blue)

Pelvic Inlet (pelvic Brim) & Pelvic Outlet

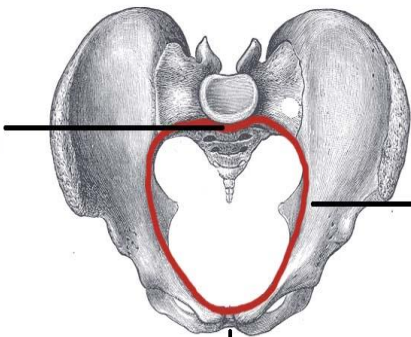
Pelvic Inlet (pelvic Brim)

Bounded by:

- Sacral promontory.
- Iliopectineal lines.
- Symphysis pubis.



Posterior Border
Sacral promontory



Lateral border
Iliopectineal line

Anterior border
Pubic symphysis

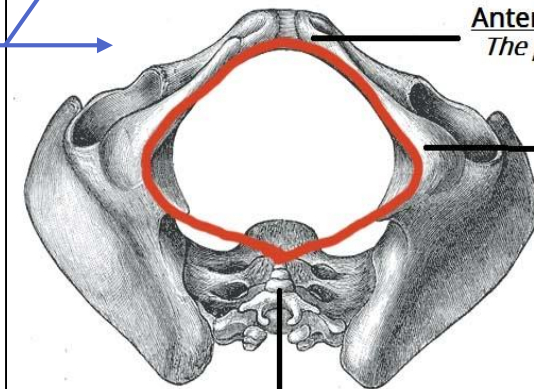
Pelvic Outlet

Bounded by:

- Coccyx.
- Ischial tuberosities.
- Pubic arches.

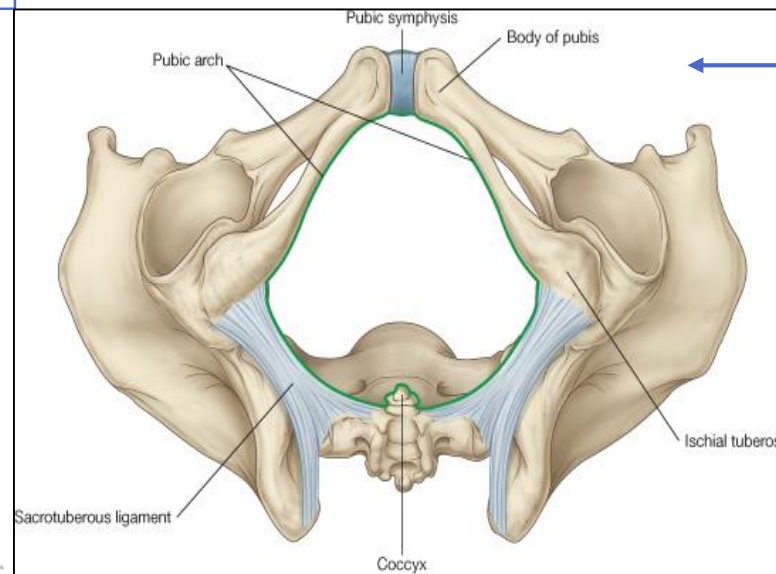








Anterior border
The pubic arch

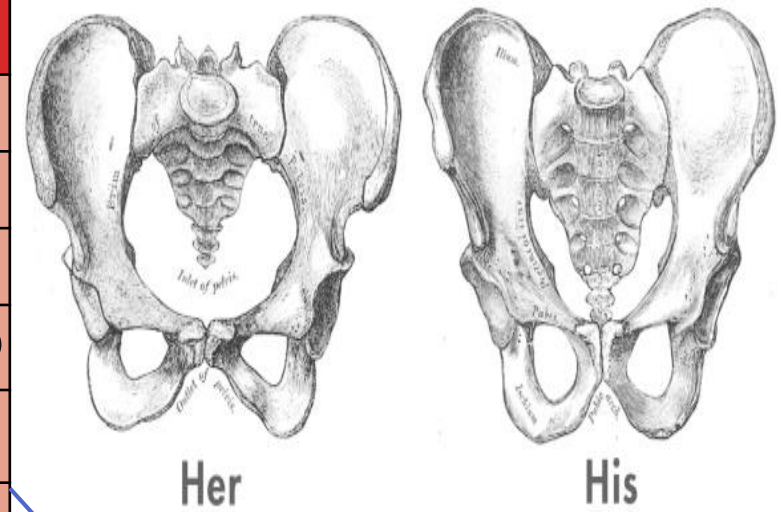


Lateral border
Ischial tuberosity and the sacrotuberous ligament (not visible)

Posterior Border
The tip of the coccyx



Bony pelvic	Male	Female
General structure	Thick & heavy	Thin, Smaller & lighter
False (major) pelvis	Deep	Shallow
True (lesser) pelvis	Narrow & Deep	Wide & Shallow
Pelvic inlet	Heart shaped 	Oval or Rounded 
Pelvic outlet	Small 	Larger 
Pubic arch & subpubic angle	Narrow 	Wide 
Obturator foramen	Round	Oval
Acetabulum	Large	Small

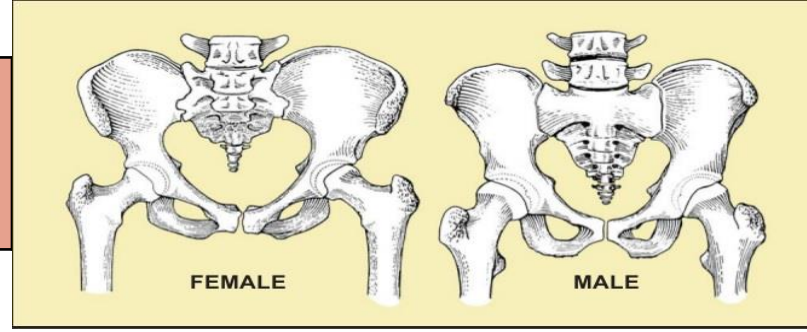


Because of the everted ischial tuberosities

Pelvic Cavity



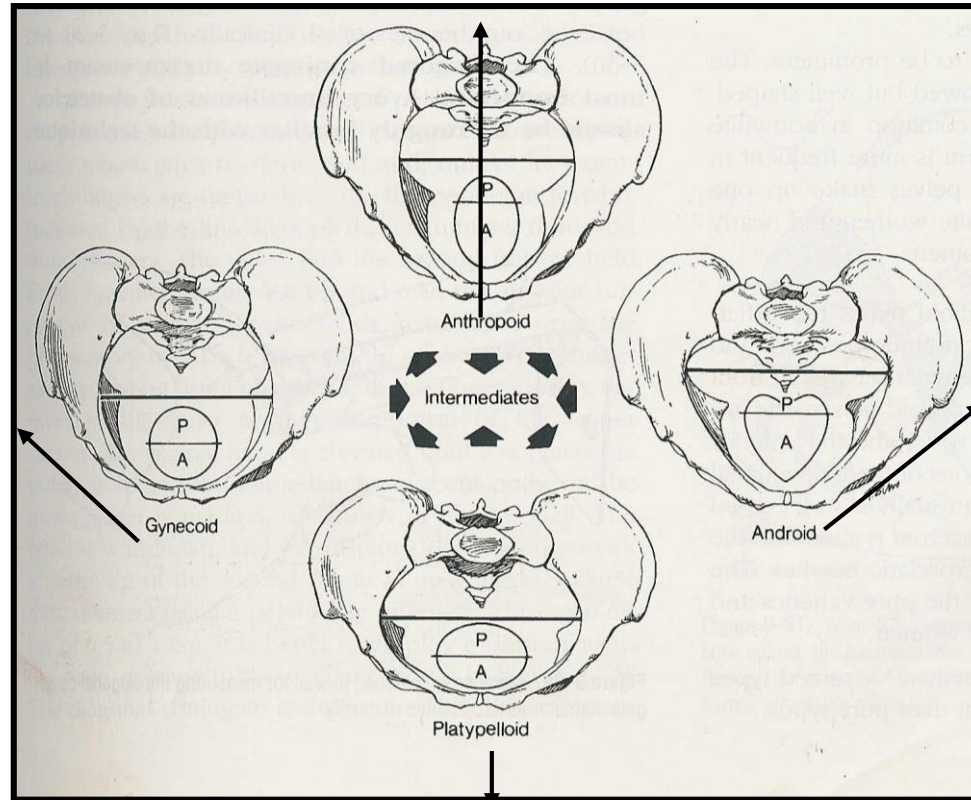
Sacrum	Male	Female
	Longer Narrower More curved	Shorter Wider Less curved
	Length	
	Breadth	



CLINICAL NOTES Types of Obstetrical Female Pelvis

Anthropoid: long narrow and oval shaped.



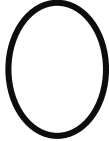

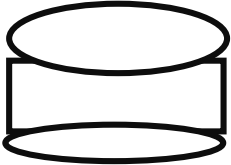
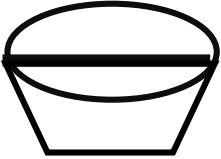
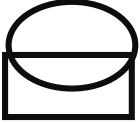

Gynaecoid:
it is the typical
female type



Android: it is funnel shaped with contracted outlet.
(it causes hazards to normal vaginal delivery)

Platypelloid: wide, flattened at the brim, with forward promontory.

Forensic Medicine & Bony Pelvis

	female	male
Pelvic inlet		
Pelvic outlet		
Pelvic cavity		
Pubic arches		
	wide	Narrow

For identification of human skeletal remains, the bony pelvis is of prime focus of attention because sexual differences are clearly visible. Even parts of the pelvis are useful in making a diagnosis of sex.

MCQ's



1. Which one of the following is a weak part of the pelvis ?

- A) Ischial Spine B) Iliac Crest C) Iliac Fossa
D) Acetabula

2. During.....the pelvic girdle bones fuse together to form a single bone.

- A. Adulthood. B. Puberty.
B. Childhood. D. Senescence.

3. Houses the inferior abdominal organs :

- A- True pelvis B- False pelvis
C- Both of them D- None of them

4. During childhood the sections of bones are separate in :

- A- Sacrum B- Hip bone
C- coccyx D- Femur

5. The number of lines in outer surface of ilium of hip bone :

- A- 3 B- 4
C- 5 D- 6

6. Which of the following bone will be prominent during pregnancy :

- A- iliac fossa B- Pubic tubercle
C- Ischial tuberosity D- Ischial spine

SAQ's



1. How can you get Pelvic Fractures ?

2. What part of the pelvis that carries the body weight while sitting?

3. forensic scientist was asked to identify the gender of human remains in a homicide.

a) Which part of the skeleton will he examine?

b) He determined that the victim was a female. List 3 characteristics he could have seen.

Answers:

- 1.D
- 2.B
- 3.B
- 4.B
- 5.A
- 6.D

1. Direct trauma or transmitted force
2. Ischial tuberosity
- 3A. The bony pelvis.
- 3B. The pelvis will be thin, light, and small.
The pelvic outlet is oval or round
The obturator is oval



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