



MED437
KING SAUD UNIVERSITY



Pelvis

Lecture (3)

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هذا العمل مبني بشكل أساسي على عمل دفعة ٤٣٦ مع المراجعة والتدقيق وإضافة الملاحظات ولا يغني عن المصدر الأساسي للمذاكرة

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

{وَمَنْ يَتَوَكَّلْ عَلَى اللَّهِ فَهُوَ حَسْبُهُ}

■ Objectives

At the end of the lecture, students should be able to:

- ✓ Describe the anatomy of the pelvic wall, **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 **arterial & nerve supply**
- ✓ List the **lymph & venous drainage** of the pelvis.

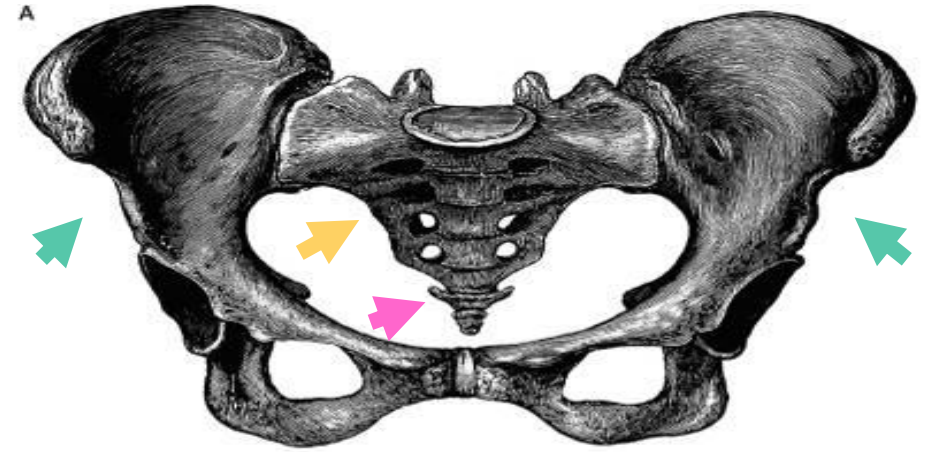
Introduction

- 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 connected by 4 joints and lined by 4 muscles.

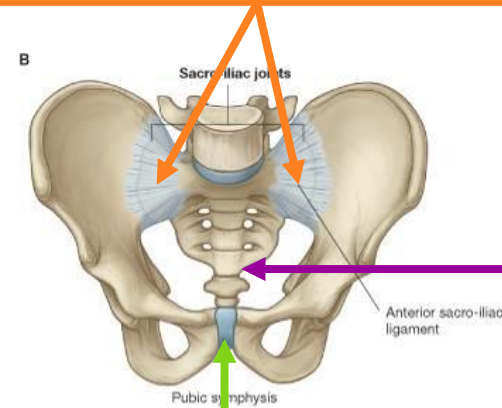
- The bony pelvis with its joints and muscles form a strong **basin-shaped** (حوض) structure (with multiple foramina),

- The pelvis **contains** and **protects** the:
 - (1) lower parts of the alimentary &
 - (2) urinary tracts &
 - (3) internal organs of reproduction.



The four joints are:

2- **Two** Sacroiliac joints. (Synovial joints)
Posteriolateraly



3- Sacrococcygeal joint
(2ry Cartilaginous joint)
Posteriorly
Between sacrum & coccyx

1- Symphysis pubis (2ry Cartilaginous joint)
Anteriorly

Pelvis

○ The pelvis is divided into two parts by the **pelvic brim** (inlet):

False or greater pelvis
ABOVE the brim
 (part of the abdominal cavity)

It supports the abdominal contents
 Bounded by:
Anteriorly → Lower part of the anterior abdominal wall
Posteriorly → Lumbar vertebrae
Laterally → Iliac fossae and the iliacus muscle

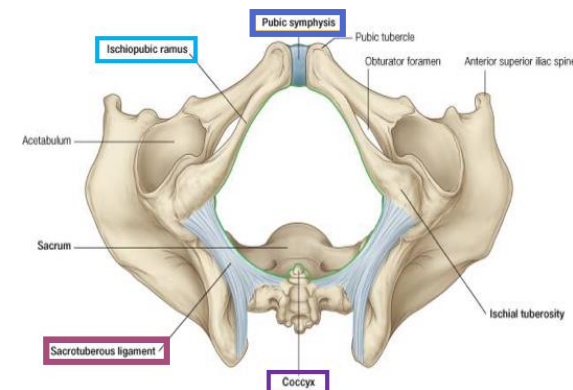
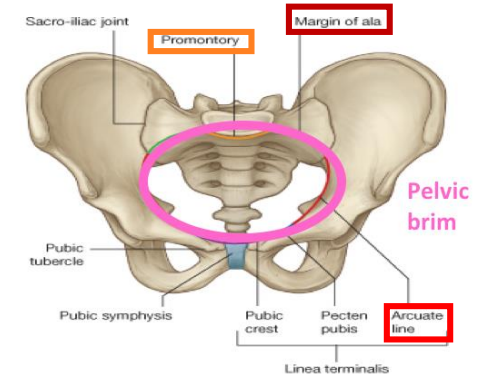
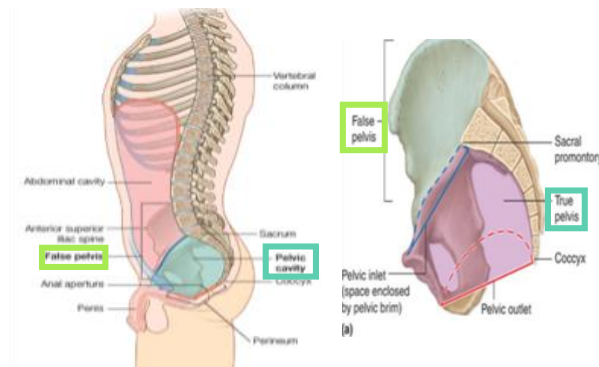
True or lesser pelvis
BELOW the brim
 (3 parts)

1. 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)

2. Inlet (Oval/circular shape):
Anteriorly → Symphysis pubis (upper border)
Posteriorly → Promontory & ala of sacrum
Laterally → Ileopectineal arcuate lines

3. Outlet (Diamond shape):
Anteriorly → Symphysis pubis (lower border)
Posteriorly → Tip of Coccyx
Anterolaterally → ischiopubic ramus
Posterolaterally → Sacrotuberous ligament

IMPORTANT



Pelvis

Main difference between male & female pelvis

○ In female:

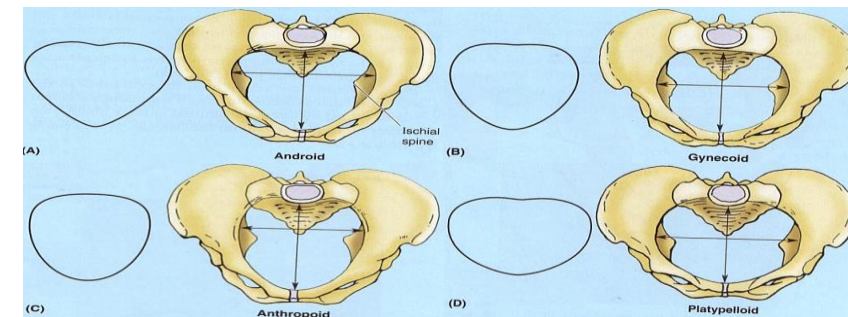
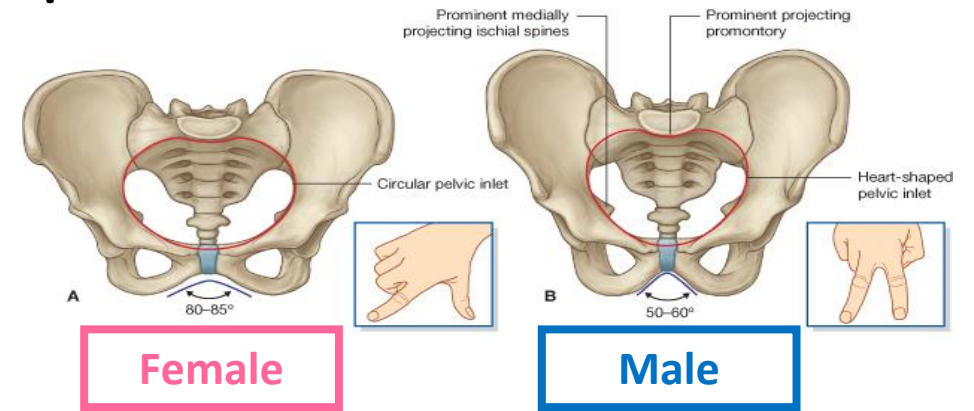
- The **Sacrum** is usually wider and shorter
- The **Angle** of the **pubic arch** is wider
- The **promontory** and the **ischial spines** are less projecting

○ In male:

- The **Sacrum** is usually **long, narrowest** and **curved**
- The **promontory** and the **ischial spines** are **inverted**

○ Types of Female Bony Pelvis:

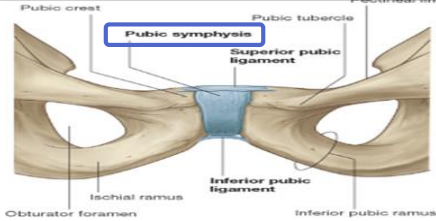
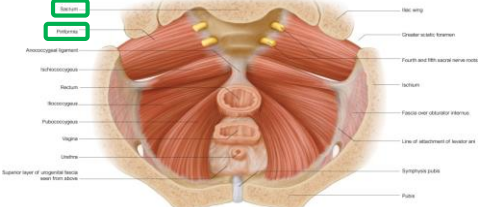
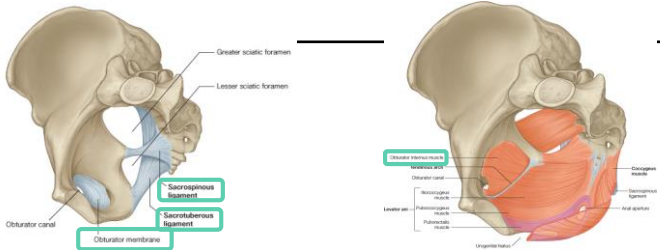
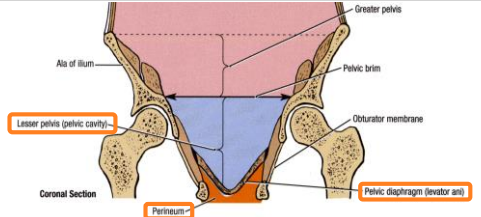
- Android (resembles male pelvis)
 - Gynecoid (typical female type)
 - Anthropoid (has both male and female characteristics)
 - Platypelloid (least common)
- Information of the **shape** and **dimensions** of the female pelvis is of **great importance** for **obstetrics**
- **Why?** because it is the **bony canal** through which the child passes during birth
- **Gynecoid** is the only type that can give normal birth , the other three types can't.



Pelvic Walls

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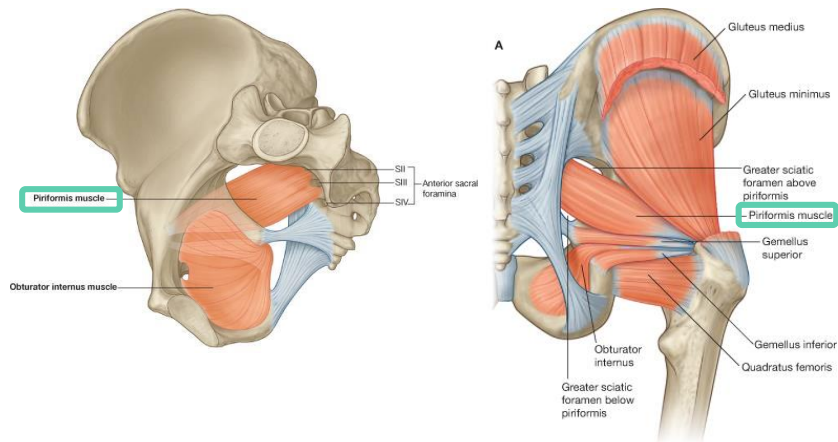
- The walls are formed by bones and ligaments that are lined with muscles covered with fascia and parietal peritoneum

| 1. Anterior pelvic wall <i>very narrow</i> | 2. Posterior pelvic wall <i>deep & wide</i> |
|---|--|
| <p>It is the shallowest wall and is formed by only bones:</p> <p>(1) The posterior surfaces of the bodies of the pubic bones (2) The 2 pubic rami (3) The <u>symphysis pubis</u></p> | <p>It is large and deeper, Formed by:</p> <p>(1) <u>Sacrum</u> (2) Coccyx (3) <u>Piriformis</u> muscles <i>(right and left)</i> (4) Their covering of parietal pelvic fascia</p> |
|  |  |
| 3. Lateral pelvic wall | 4. Inferior pelvic wall (floor) |
| <p>It is formed by:</p> <p>(1) Part of the hip bone below the pelvic inlet (the arrow) (2) <u>Obturator internus</u> and its covering (<u>obturator fascia</u>) (3) <u>Sacrospinous</u> ligament (4) <u>Sacrospinous</u> ligament</p> | <p>Basin-like structure which supports the pelvic viscera and is formed by the <u>pelvic diaphragm</u>, It stretches across the lower part of the true pelvis and divides it into:</p> <ol style="list-style-type: none"> 1. <u>Main (true) pelvic cavity</u> <u>above</u> contains the pelvic viscera 2. <u>Perineum</u> <u>below</u> which carries the external genital organs |
|  |  |

Pelvic Walls Muscles

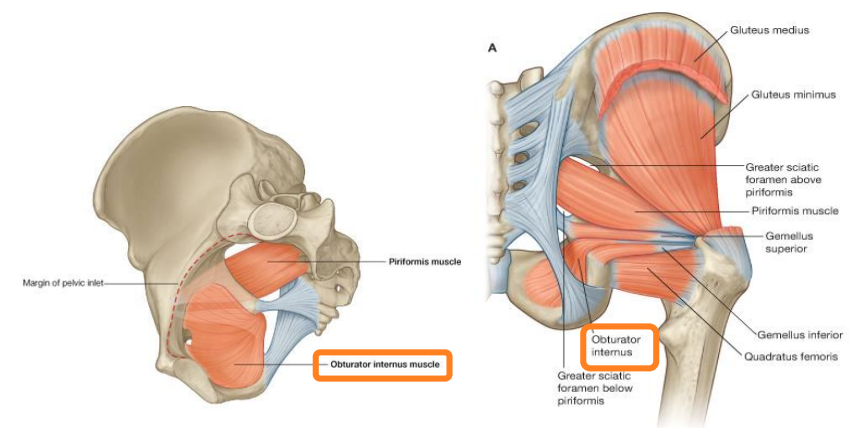
Piriformis muscle (part of posterior pelvic wall)

| | |
|--------------------|---|
| Origin | Pelvic surface (in front of) the middle 3 sacral vertebrae S2,4 & 4 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 |
| Innervation | Sacral plexus (lies in front of the muscles) |



Obturator internus muscle (part of lateral pelvic wall)

| | |
|--------------------|--|
| Origin | Inner surface of the obturator membrane and the hip bone It leaves the pelvis through the lesser sciatic foramen |
| Insertion | Greater trochanter of the femur |
| Action | Lateral rotator of the femur at the hip joint |
| Innervation | Nerve to obturator internus (from sacral plexus) |

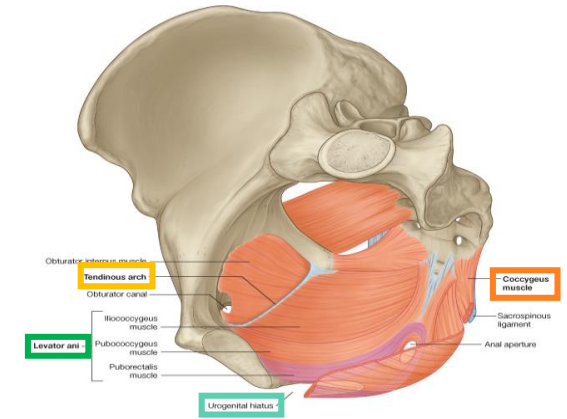
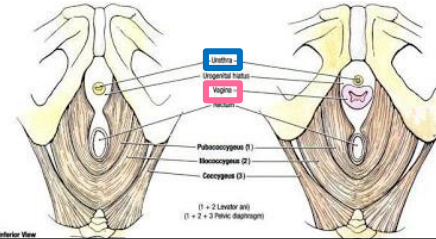


Pelvis Diaphragm



02:54

- It is formed by the levator ani and the coccygeus muscles and **their covering fasciae**
- It is **incomplete anteriorly** to allow passage of:
 - Urethra in males
 - Urethra and vagina in females
- Posteriorly the **muscles of each side meet together**



LEVATOR ANI MUSCLE (wide thin sheet-like muscle that has a linear origin)

| | |
|---|---|
| <p>Origin (look at the dotted yellow line)</p> | <ol style="list-style-type: none"> 1. Back of the body of the pubis 2. <u>Tendinous arch</u> of the obturator fascia 3. Spine of the ischium (ischial spine) |
| <p>Action</p> | <ol style="list-style-type: none"> 1. The muscles of the two sides form an efficient muscular sling that supports and maintains the pelvic viscera in position. (so if it is injured rectal or vaginal prolapse may occur) 2. They resist the rise in intra pelvic pressure during the straining and expulsive efforts of the abdominal muscles (as in coughing) 3. They have a very important role in maintaining fecal continence (puborectalis) by acting as a sphincter at the anorectal junction 4. They serve as a vaginal sphincter in the female. (The most important muscle in labour is levator ani: should be relaxed so the vaginal sphincter isn't closed) |
| <p>Innervation</p> | <ol style="list-style-type: none"> 1. perineal branch of the fourth sacral nerve (S4) → upper surface 2. perineal branch of the puddental nerve → lower surface <p>*The importance of the different supplies is if one of these nerves is affected, the other is still intact</p> |

Levatores Ani Muscles

○ Its fibers are divided into 3 parts:

According to direction

- Pubococcygeus
- Puborectalis
- Iliococcygeus (Ischiococcygeus)

1. Pubococcygeus (Anterior Fibers)

○ Origin: originates from the posterior surface of the body of the pubis and passes downward & medially.

○ Insertion: inserted into the perineal body, anococcygeal body and coccyx.

○ Action: forms a sling around the prostate or the vagina*:

In males

Levator prostatae:

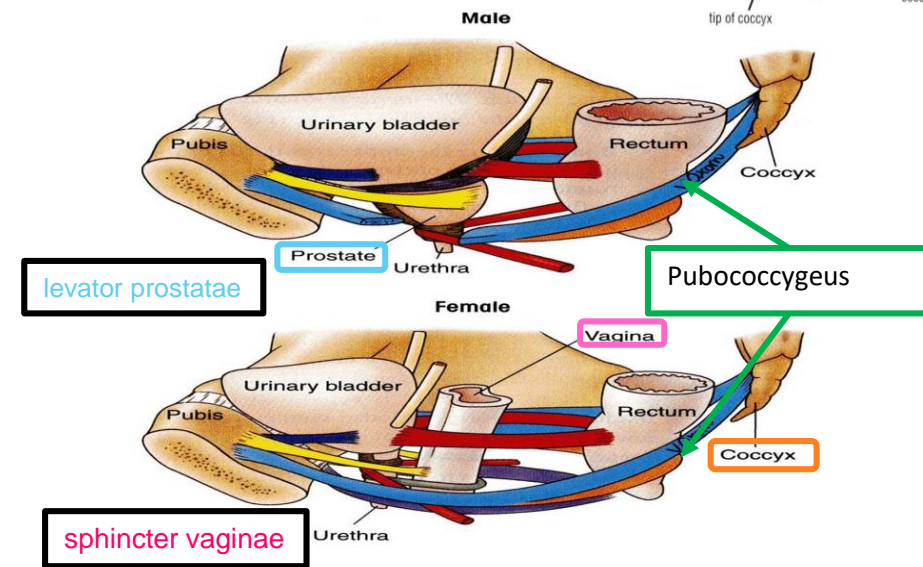
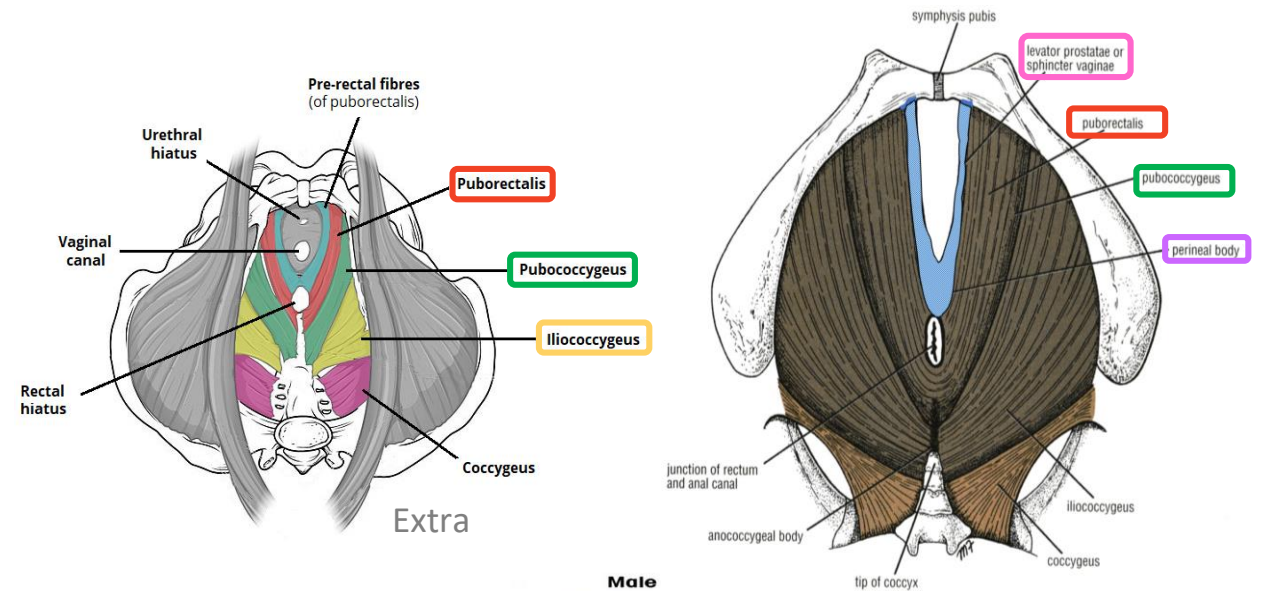
1. Supports prostate.
2. Stabilizes perineal body.

In females

Sphincter vaginae:

1. Supports vagina.
2. Stabilizes perineal body.

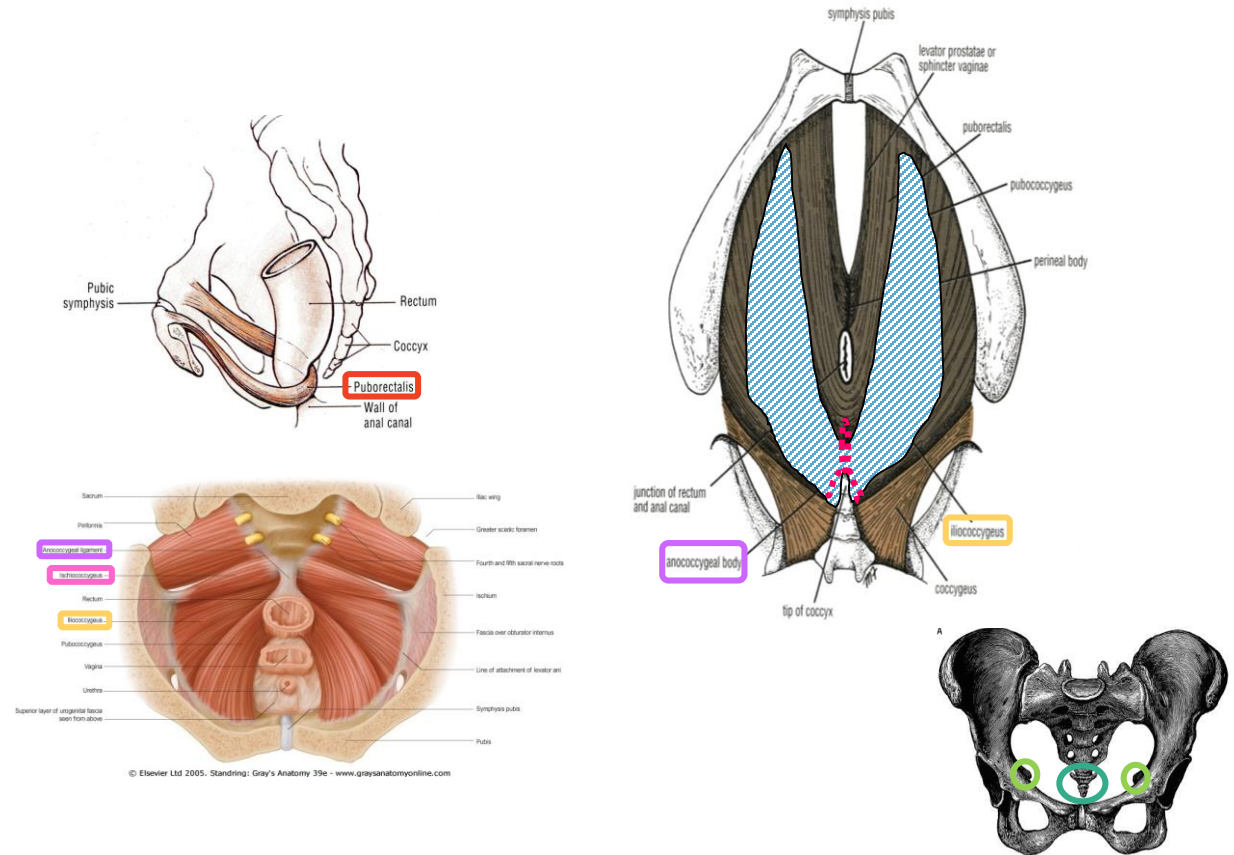
*While the muscle goes from origin to insertion it surrounds these 2 organs (prostate or vagina) and supports them.



Levatores Ani Muscles Intermediate Fibers:

2. Puborectalis (شكلها زي لجام الخيل)

- forms a sling around the recto-anal Junction.
- It has a very important role in maintaining **fecal continence** (تقسم البراز).
- Its tone is important to maintain the angle between rectum & anal canal. When it relaxes, the angle is gone and defecation can occur



Posterior Fibers:

3. Iliococcygeus

- Insertion: Inserted into the anococcygeal body and the coccyx

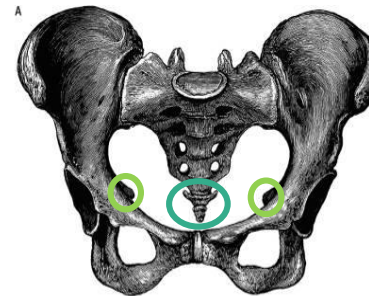
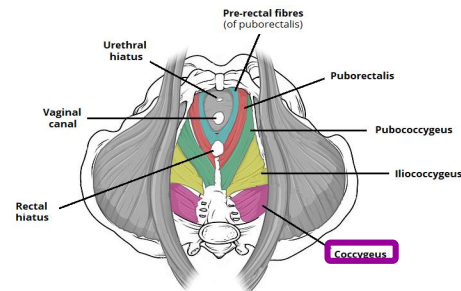
4. Ischiococcygeus

- Origin: Arises from the ischial spine
- Insertion: inserted into the anococcygeal body & coccyx.

Pelvis Diaphragm

| COCCYGEUS MUSCLE*: small triangular muscle | | |
|--|---|---|
| Origin | <u>Ischial spine</u> | Coccygeus muscle has the same attachment as the sacrospinous ligament! |
| Insertion | <u>Lower end of sacrum and coccyx</u> | |
| Action | Assist the levator ani in supporting the pelvic viscera | |
| Innervation | branches of the 4 th and 5 th sacral nerves (S4 & S5) | |

*This muscle is bigger in animals because they have tails.



Supply of the Pelvis



***Posterior division Supplies:** (supplies only walls):

Posterior abdominal wall | Posterior pelvic wall | Gluteal region

***Anterior division supplies:** (supplies wall & viscera)

Gluteal region | Perineum | Pelvic viscera | The fetus (through the umbilical arteries)

Medial (adductor) region of thigh (by obturator artery)

| Arterial supply | | |
|---|---|---|
| <p>Internal iliac artery (IIA): One of the 2 terminal branch of the Common iliac artery</p> | | |
| Course | <ul style="list-style-type: none"> • Arises in front of the sacroiliac joint • It descends downward & backwards over the pelvic inlet • It divides at the upper border of the greater sciatic foramen into: Anterior & Posterior divisions | |
| Branches | | |
| Posterior division | Parietal | <ol style="list-style-type: none"> 1. <u>Iliolumbar artery</u> 2. <u>Lateral sacral arteries</u> (2 branches) 3. <u>Superior gluteal artery</u> |
| | | <ol style="list-style-type: none"> 1. <u>Obturator artery</u> 2. <u>Inferior Gluteal artery</u> |
| Anterior division | Visceral | <ol style="list-style-type: none"> 1. Umbilical artery : gives the superior vesical artery: the distal part of this artery fibrosed and forms the medial umbilical ligament. 2. Inferior Vesical artery in male or vaginal in female: In the male it supplies the Prostate and the Seminal Vesicles. It also gives the artery of the Vas Deferens. 3. Middle rectal artery 4. Internal pudendal artery: It is the main arterial supply to the perineum |
| | | Visceral (In Female) |
| | <p>Ovarian artery (in female): Arises from the abdominal aorta</p> | |

Supply of the Pelvis

| Venous drainage <small>The veins correspond to the arteries</small> | |
|---|--|
| Internal iliac veins | <ul style="list-style-type: none"> • It collect tributaries corresponding to the branches of the internal iliac artery • <u>joins</u> the external iliac vein <u>in front of</u> the sacroiliac joint to <u>form</u> the common iliac vein (the common iliac veins join at the level of L5 to give the inferior vena cava) |
| Ovarian vein | <ul style="list-style-type: none"> • Right vein drains into IVC • Left vein drains into left renal Vein |
| Lymphatic drainage | |
| <ul style="list-style-type: none"> • The lymph nodes and vessels are <u>arranged in a chain</u> along the main blood vessels • Thus, there are external iliac nodes, internal iliac nodes, and common iliac nodes • Lymph from Common iliac nodes & the (Ovaries, uterine tubes & fundus of uterus) <u>passes to</u> Lateral aortic (paraortic) nodes | |
| Nerve Supply | |
| Somatic | <p>Sacral plexus:</p> <ul style="list-style-type: none"> • from ventral (anterior rami) of L4 & L5 (lumbosacral trunk) + S1, S2, S3 and most of S4 • It <u>gives</u> puddental nerve to perineum |
| Autonomic | <p>Sympathetic (Pelvic part of sympathetic trunk):</p> <ul style="list-style-type: none"> • It is the continuation of the abdominal part of sympathetic trunk. It <u>descends in front</u> of the ala of the sacrum • The 2 sympathetic trunks <u>unite inferiorly in front</u> of the coccyx and form a single ganglion (Ganglion Impar) • <u>Superior</u> & <u>Inferior</u> Hypogastric plexuses <p>Parasympathetic (Pelvic splanchnic nerves) (<u>From S2, 3 & 4</u>): preganglionic fibers to pelvic viscera & hindgut</p> |

1- The bony pelvis is composed of four bones :

- A-are connected by 3 joints and lined by 4 muscles.
- B-are connected by 4 joints and lined by 3 muscles.
- C-are connected by 4 joints and lined by 4 muscles.
- D-are connected by 2joints and lined by 8 muscles.

2- The Sacroiliac joints is:

- A- Anteriolateral cartilaginous join
- B-posteriomedial cartilaginous joint
- C- posteriolateral Synovial joint
- D- Anteriomedial Synovial joint

3- The False pelvis is bounded by:

- A- T11
- B-C6
- C-L1
- D-S2

4- Which of the following is true about the PELVIC INLET:

- A- Bounded Posteriorly by the Coccyx
- B- Bounded Anteriorly by the Ileopectineal (arcuate) lines.
- C- Bounded laterally by the Promontory of sacrum
- D-Bounded posteriorly by the ala of sacrum.

5- Which of the following is a female of the pubic arch angle:

- A- 45
- B- 65
- C-75
- D- 85

6- A 28 year old women ,school teacher from Dublin had a positive pregnancy test. Her obstetrician informed her that it is impossible for her to deliver normally because of the type of her bony pelvis ,which of the following types of pelvis can have normal vaginal delivery?

- A- Gynecoid Pelvis
- B- Android Pelvis
- C- Anthropoid Pelvis
- D- Platypelloid Pelvis

7- No muscles are found in:

- A- The anterior pelvic wall
- B- The posterior pelvic wall
- C- The lateral pelvic wall
- D- The medial pelvic wall

8- Which of the following is true about the piriformis muscle :

- A- Origin from the Inner surface of the obturator membrane and the hip bone.
- B- inserted in the pelvic surface of the middle 3 sacral vertebrae.
- C- Supplied by the lumbar plexus.
- D- leaves the pelvis through the greater sciatic foramen.

9- Which of the following is true about the PELVIC DIAPHRAGM :

- A- It is incomplete posteriorly to allow passage of the anal canal.
- B- it forms the INFERIOR PELVIC WALL.
- C- Main (true) pelvic cavity below it.
- D- formed by the levator ani and the coccygeus muscles without their covering fasciae.

MCQs

10- Which one the following fibers of Levatores Ani muscles considered as the intermediate part?

- A. Pubococcygeus
- B. Ischiococcygeus
- C. Iliococcygeus

11- The Nerve supply to the Coccygeus muscle:

- A. Branches of 4th and 5th sacral nerves
- B. Branches of pudendal nerve
- C. both

12- The medial umbilical ligament results from?

- A. Fibrosed umbilical vein
- B. Fibrosed umbilical artery
- C. Superior vesical artery

13- Which of the following arteries supply the urinary bladder in female :

- A. Uterine artery
- B. Inferior vesical artery
- C. Vaginal artery

14- The right ovarian vein drains into:

- A. Renal vein
- B. Common iliac vein
- C. Inferior vena cava

15- The relaxation of which of the following muscle fibers lead to defecation?

- A. Pubococcygeus
- B. Puborectalis
- C. Coccygeus

16- The ovarian artery originate from:

- A. Uterine artery
- B. Abdominal aorta
- C. Internal iliac artery

17- Woman is undergoing hysterectomy and during the ligation of uterine artery which of the following will be endanger:

- A. Ureter
- B. Urinary bladder
- C. Ovarian artery



Good luck
Special thank for team436 ❤️

Team Leaders:

**Faisal Fahad Alsaif
Rawan Mohammad Alharbi**

Team Members:

**Abdulaziz Aldukhayel
Abdulrahman Alduhayyim
Rinad Alghoraiby
Ghaida Alsanad
Ahad Algrain**

- References:
 1. Girls' & Boys' Slides
 2. Greys Anatomy for Students
 3. TeachMeAnatomy.com

 [Twitter.com/Anatomy437](https://twitter.com/Anatomy437)

 Anatomyteam.437@gmail.com