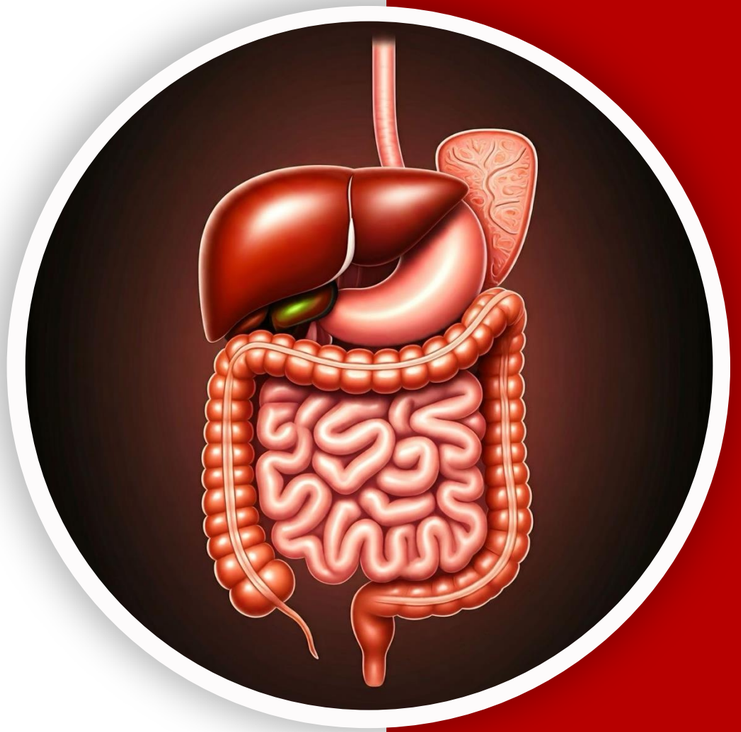
بسم الله الرحمـٰن الرحيم

(وَفَوْقَ كُلِّ ذِي عِلْمٍ عَلِيمٌ)

GIS Anatomy | Lab 2/B

Anterior Abdominal Wall, rectus sheath, Inguinal triangle



Written by : Mais - RST

Sarah Al-bakkar - NST

The practical of the third week

1. Anterior abdominal wall.
2. Rectus sheath
3. Inguinal canal
4. Inguinal triangle
5. Peritoneum

For the inguinal canal click here to go to the file
And peritoneum click here

Anterior abdominal wall.

A. Muscles of the anterior abdominal wall

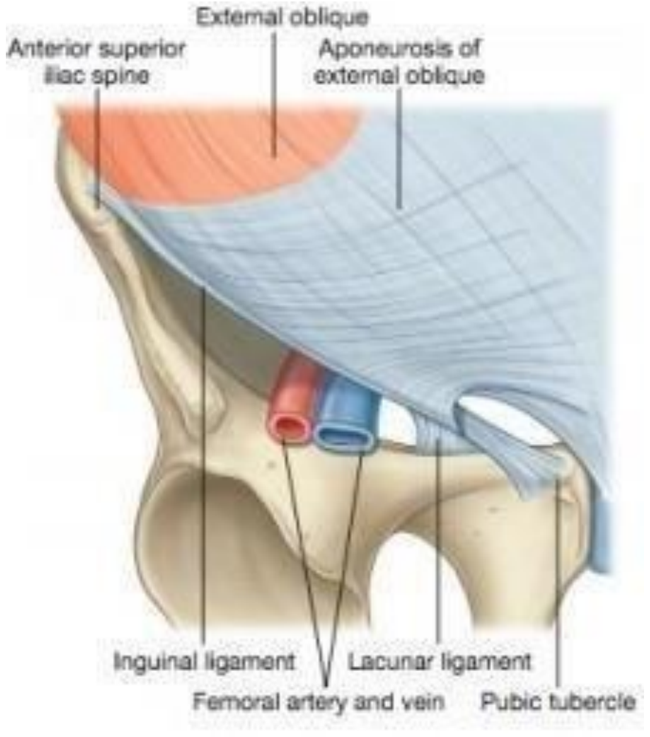
- The students should know and identify the origin/ insertion/ nerve supply / and action of the following muscles :

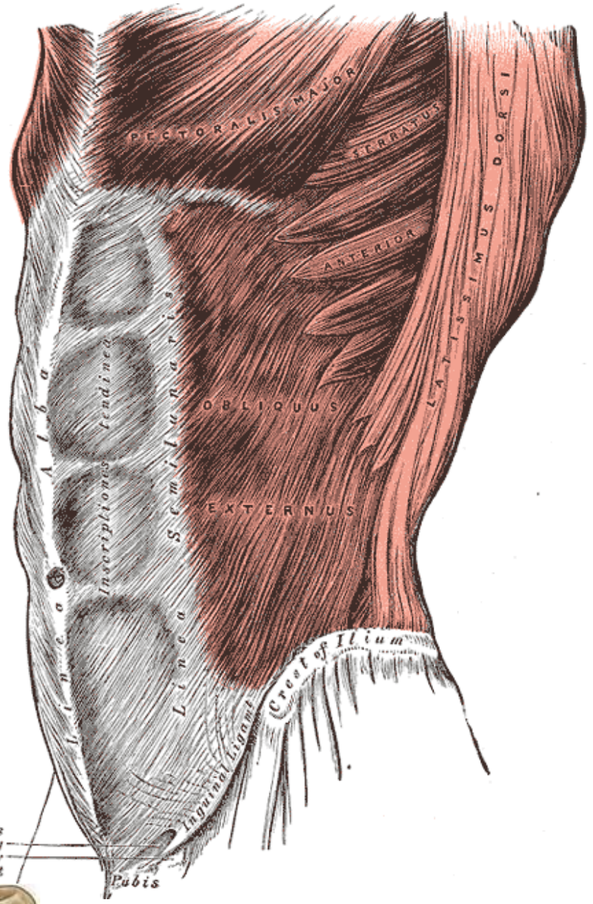
1. External oblique muscle
2. Internal oblique muscle
3. Transversus Abdominis muscle
4. Rectus Abdominis muscle
5. Pyramidalis muscle

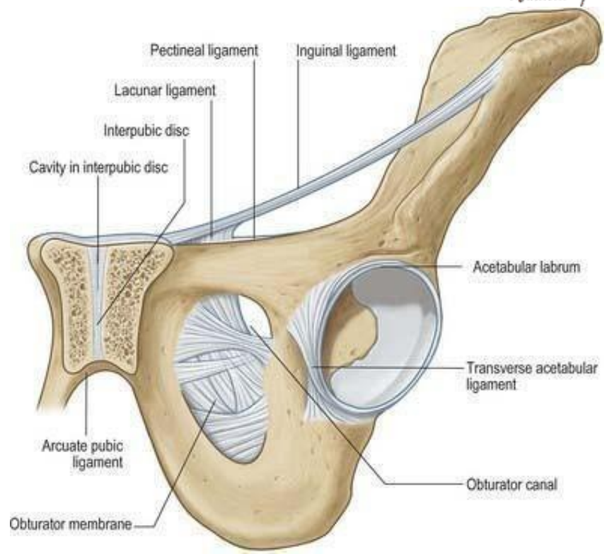
The muscle's name	Origin	Insertion	Nerve supply	Special characteristics	Image
External oblique	Outer surface of lower 8 ribs.	Xiphoid process, linea alba, pubic crest, pubic tubercle, iliac crest (anterior half).	-The lower 6th Thoracic nerves. -The 1st lumbar nerve (with it's2 branches; iliohypogastric and ilioinguinal nerves).	-Broad. -Thin. -Its fibers are directed downward forward medially. -its aponeurosis forms a lot of structures. [1]	
Internal oblique	Lumbar Fascia, Anterior two thirds of the iliac crest, lateral two thirds of inguinal ligament.	Lower three ribs& costal cartilage, Xiphoid process, Linea alba, symphesis pubis.	-The lower 6th Thoracic nerves. -The 1st lumbar nerve (with it's 2 branches; iliohypogastric and ilioinguinal nerves).	-Its fibers are directed upward forward medially. -It contributes with forming conjoint tendon and cremastric facia. [2]	
Transversus abdominis	Inner surface of lower six costal cartilage, lumbar fascia, anterior two thirds of iliac crest, lateral third of inguinal ligament.	Linea alba (from xiphoid process to symphysis pubis).	The lower 6th thoracic nerves. The 1st lumbar nerve (with it's 2 branches; iliohypogastric and ilioinguinal nerves).	-Its fibers run horizontally forward under the internal oblique. -Its lower part fuses with internal oblique to form conjoint tendon which attach to pupic crest and pectineal line.(Assist in the formation of Conjoint tendon and Rectus sheath).	
Rectus abdominis	Symphsis pubis, pubic crest.	5th, 6th and 7th costal cartilage & xiphoid process.	The lower 6th thoracic nerves.	- Long strap muscle. - Extends along the whole length of the anterior abdominal wall. - In the rectus sheath. -It forms Linea semilunaris and Tendinous intersection. [3]	
pyramidalis muscle	Anterior Surface of the pupis.	-Linea alba. -It lies in front of the lower part of the rectus abdominis muscle.	12th subcostal nerve.		

1. External oblique muscle

- <u>The students should observe the following :</u>
  1. Direction of the muscles fibers.
  2. The attachment of the aponeuroses part.
  3. The superficial inguinal ring.
  4. The inguinal ligament
  5. lacunar and pectineal ligaments







External Oblique

Q: Origin?

A: Outer surface of the lower eight ribs.

Q: Insertion?

A: Linea alba, pubic crest, pubic tubercle, and anterior half of the iliac crest

Q: Nerve supply?

A: Lower six thoracic nerves, subcostal nerve (T12), and L1.

Q: Direction of fibers?

A: Downwards, forwards, and medially.

Q: What is the superficial inguinal ring?

A: Opening in external oblique aponeurosis.

Q: What is the inguinal ligament?

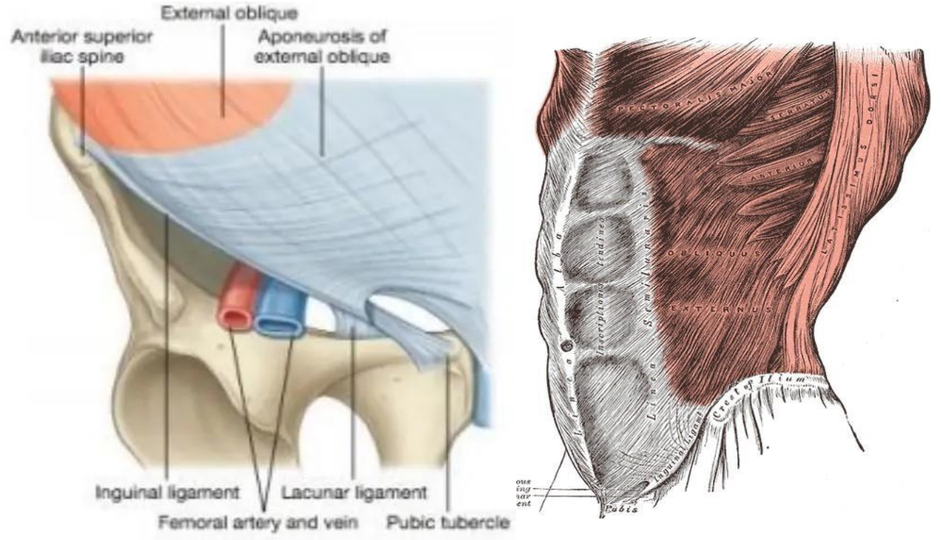
A: Lower border of external oblique aponeurosis folded back on itself.

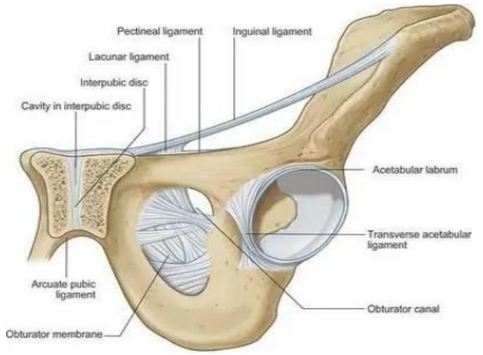
Q: What is the lacunar ligament?

A: Reflection of external oblique aponeurosis.

Q: What is the pectineal ligament?

A: Extension attached to pectineal line.





1. Direction of the fibers: Downward, forward and medially.
2. The attachment of the aponeuroses part: it is attached to xiphoid process, linea alba, pubic crest, pubic tubercle, iliac crest (anterior half), and it forms these contributions: superficial inguinal ring. inguinal ligament, lacunar ligament, pectineal ligament.
3. Superficial inguinal ring:

✓ Triangular shape.
✓ Defect (opening) in the external oblique muscle.
✓ Lies immediately above and medial to the pubic tubercle (opposite to femoral ring).
✓ It's considered an opening for the passage of spermatic cord in males and for the for the round ligament of uterus in females.

4. Inguinal ligament:

✓ Folded backward on itself in the lower border of aponeurosis of external muscle.
✓ Lies between the anterior superior iliac spine and the pubic tubercle.

5. Lacunar ligament:

✓ Extension of aponeurosis of external muscle backward and to the pectineal line upward.
✓ Extends from the inguinal ligament to the superior ramus of pubis (pubic tubercle).
✓ It's sharp, free crescentic edge forms the medial margin of the femoral ring.

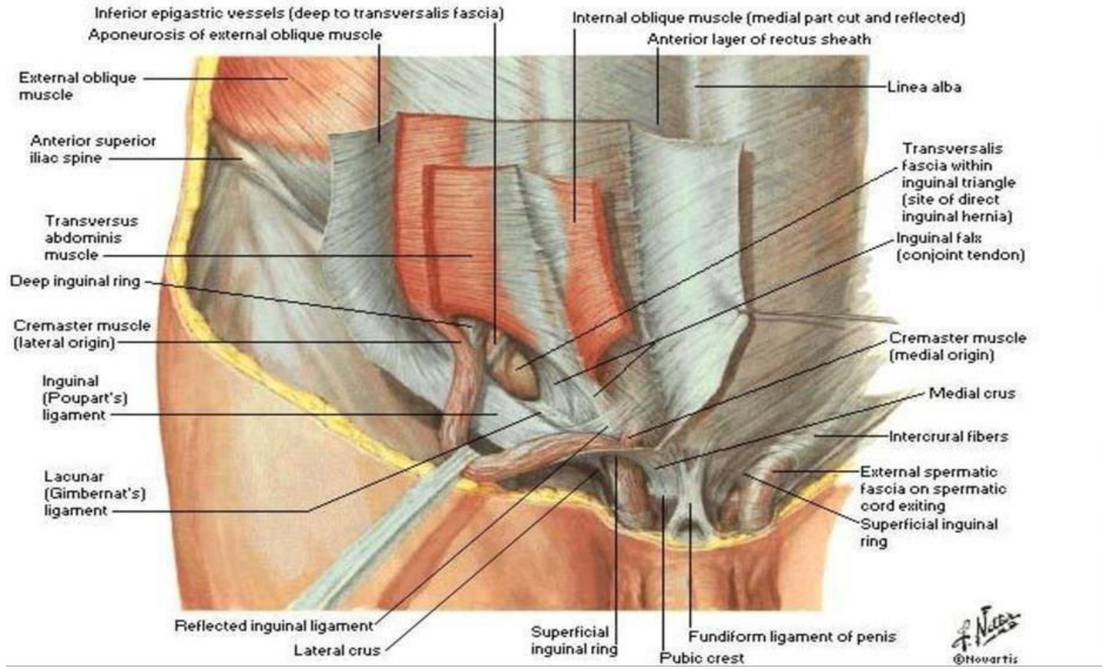
6. Pectineal ligament

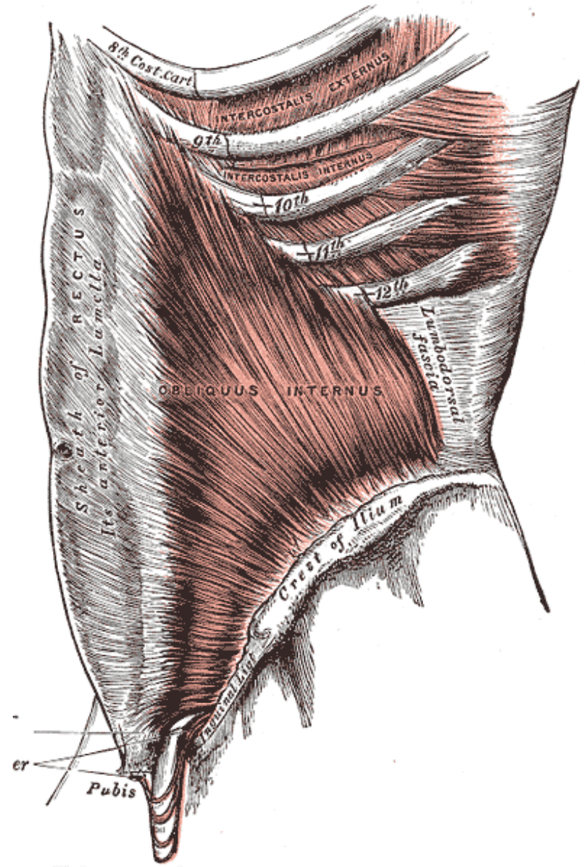
✓ Continuation of the lacunar ligament at pectineal line.
✓ Continuation with a thickening of the periosteum.
✓ Also called inguinal ligament of Cooper.

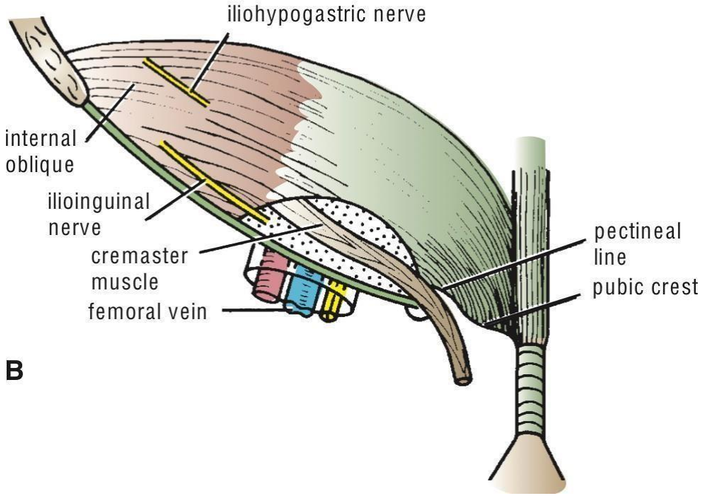
2. Internal oblique muscle

- <u>The students should observe the following :</u>

  1. Direction of the muscles fibers.
  2. The conjoint tendon
  3. The roof of inguinal canal .







Internal Oblique

Q: Origin?

A: Lumbar fascia, iliac crest, inguinal ligament.

Q: Insertion?

A: Lower 3 ribs, xiphoid, linea alba, pubic symphysis.

Q: Nerve supply?

A: Lower six thoracic nerves and L1.

Q: Direction of fibers?

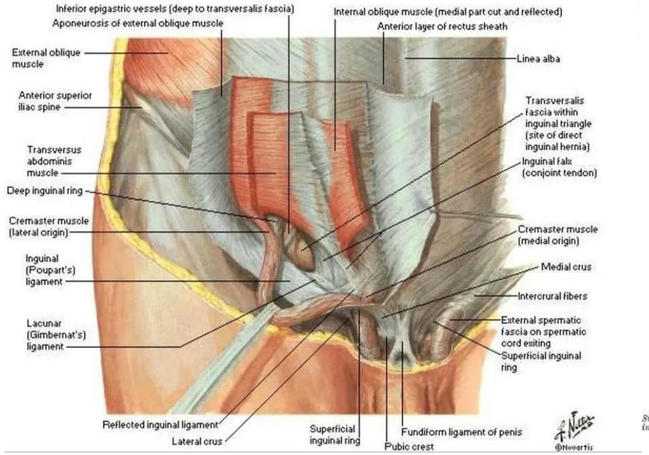
A: Upwards, forwards, and medially.

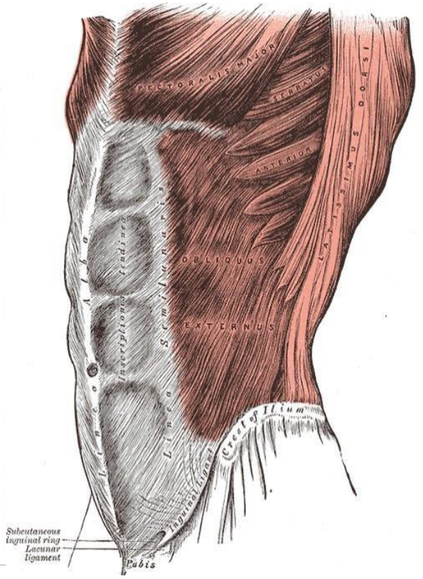
Q: What is the conjoint tendon?

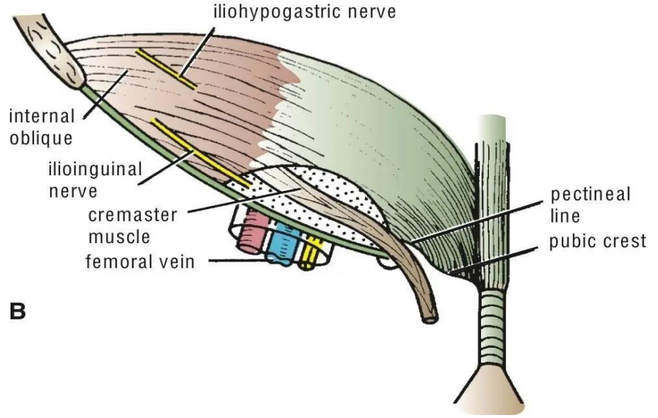
A: Fusion of internal oblique and transversus abdominis.

Q: What forms the roof of inguinal canal?

A: Arching fibers of internal oblique.







1. Direction of the fibers: Upward forward and medial.
2. The conjoint tendon: it’s the fusion of the lowest tendinous fibers of internal oblique and transversalis abdominis muscle.

✓ It’s attached medially to linea alba and it also supports the inguinal canal.
✓ It has a lateral free border.
✓ It’s important in hernia treatment (herniorrhaphy), as it’s important in making stitches for treating indirect hernia since it’s a very strong tendon.
✓ It’s inserted into the pubic crest and pectineal line.

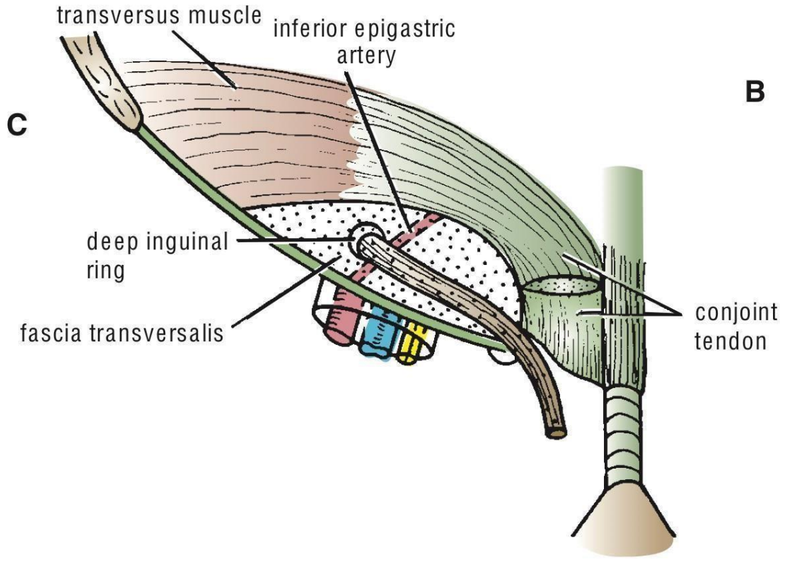
3. Cremasteric fascia and muscle:

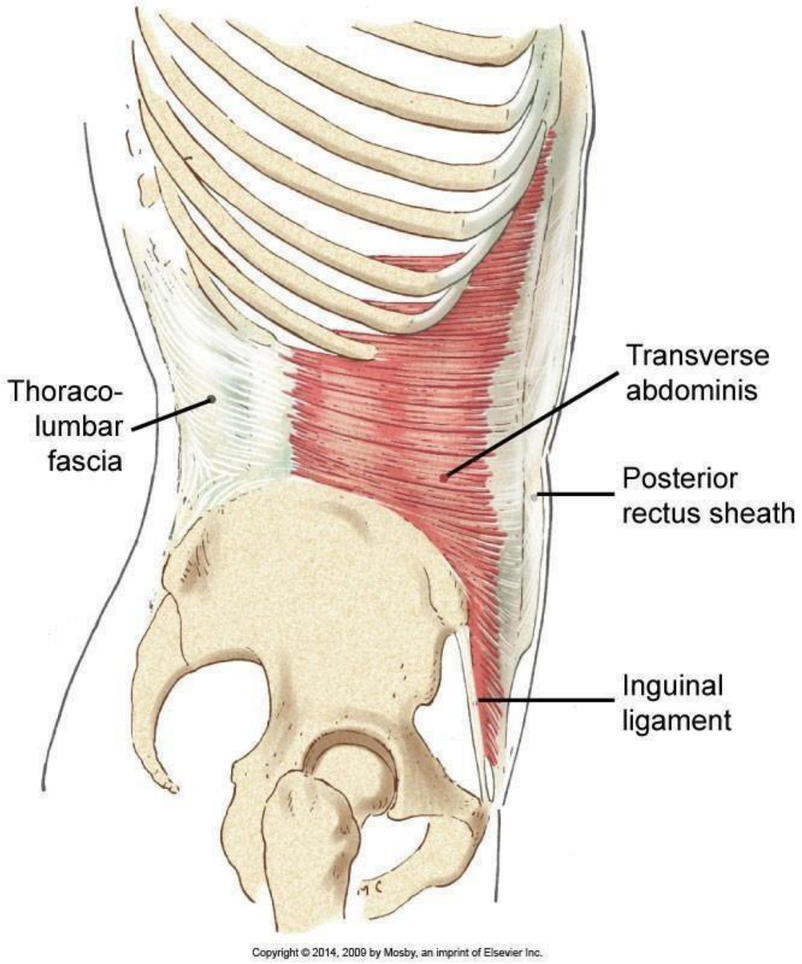
✓ The internal oblique muscle has free lower border arches over the spermatic cord in males or ligament of uterus in females.
✓ Assists in the formation of the roof of the inguinal canal.

3. Transversus Abdominis muscle

- <u>The students should observe the following :</u>

  1. Direction of the muscles fibers.
  2. The conjoint tendon





Transversus Abdominis

Q: Origin?

A: Lower six costal cartilages, lumbar fascia, iliac crest, inguinal ligament.

Q: Insertion?

A: Linea alba.

Q: Nerve supply?

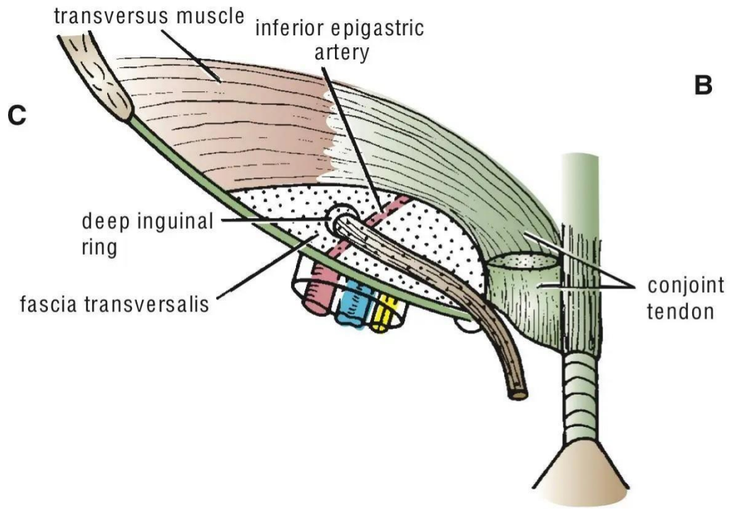
A: Lower six thoracic nerves and L1.

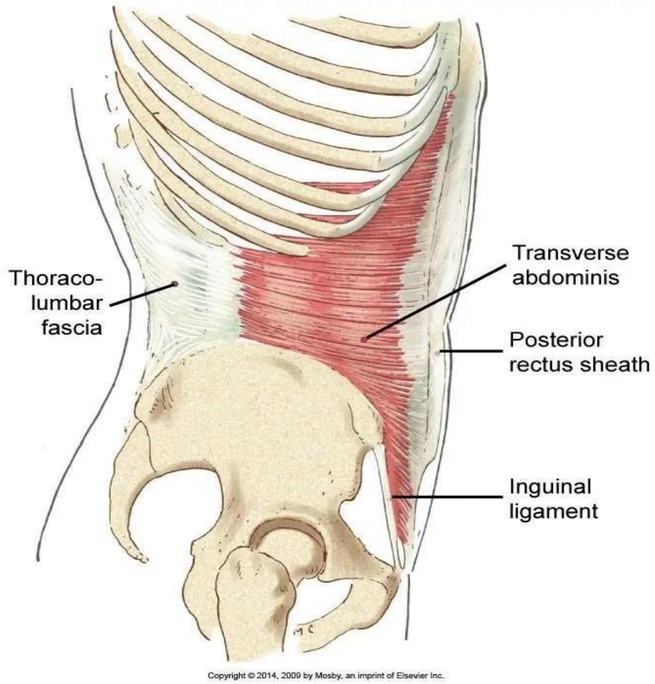
Q: Direction of fibers?

A: Transverse.

Q: Role in conjoint tendon?

A: Participates in its formation.





Transversus Abdominis

1. Direction of the fibers: Horizontally forward under the internal oblique.
2. The conjoint tendon: The lower part fuses with internal oblique to form conjoint tendon which attach to pupic crest and pectineal line.

Assists in the formation of: Conjoint tendon and Rectus sheath.

Rectus Abdominis

1. Direction of the fibers: Vertical
2. Tendinous intersection: linea transverses.

➢ 3 transverse fibrous bands.

➢ divide the rectus abdominis muscle into distinct segments (squares):

1 one at level of xiphoid process.

2 one at level of umbilicus.

3 one halfway between these two.

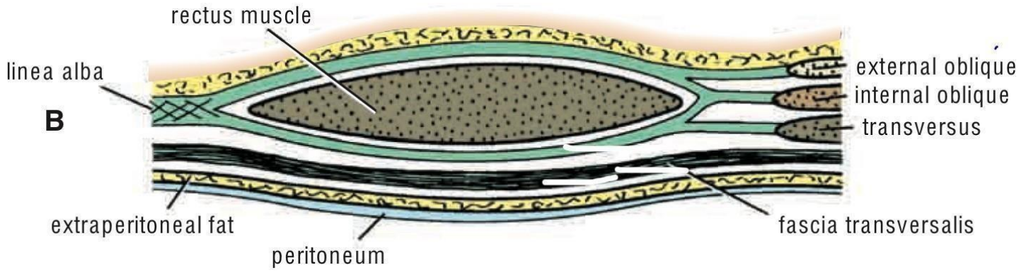
➢ They can be palpated as a transverse depressions.

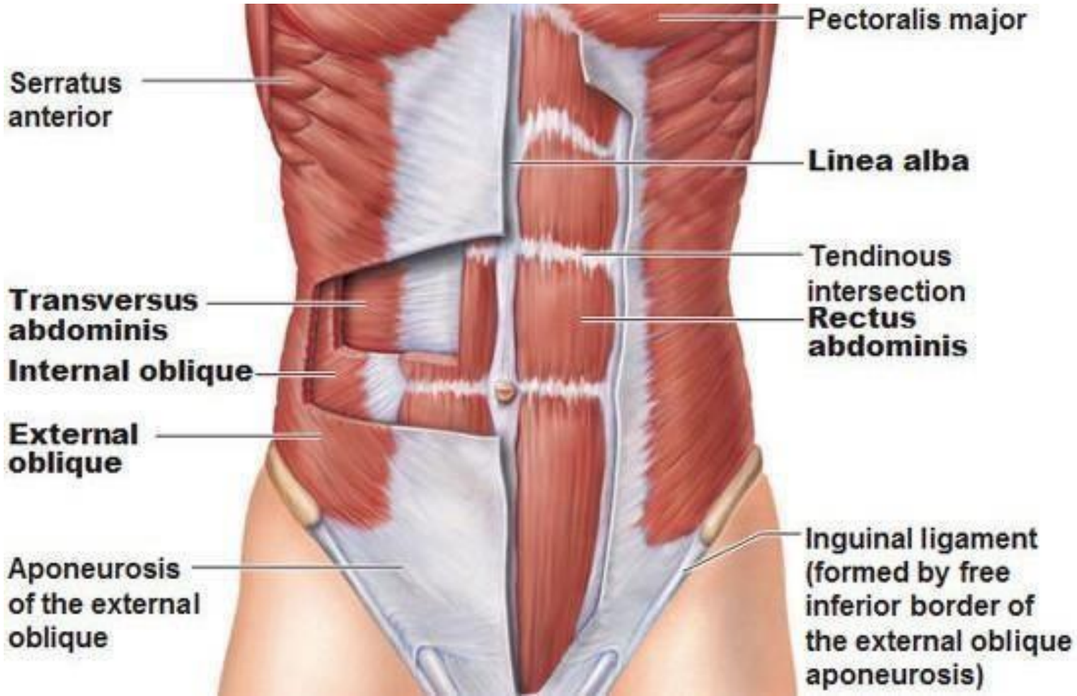
In the embryology, these tendinous intersections come from myotome (group of muscles that a single spinal nerve innervates), but then they continue as a separated myotome.

4. Rectus Abdominis muscle

- <u>The students should observe the following :</u>

1. Direction of the muscles fibers.
2. Tendinous intersections
3. It lies in the rectus sheath.





Rectus Abdominis

Q: Origin?

A: Pubic symphysis and pubic crest.

Q: Insertion?

A: 5th–7th costal cartilages and xiphoid.

Q: Nerve supply?

A: Lower six thoracic nerves only.

Q: Direction of fibers?

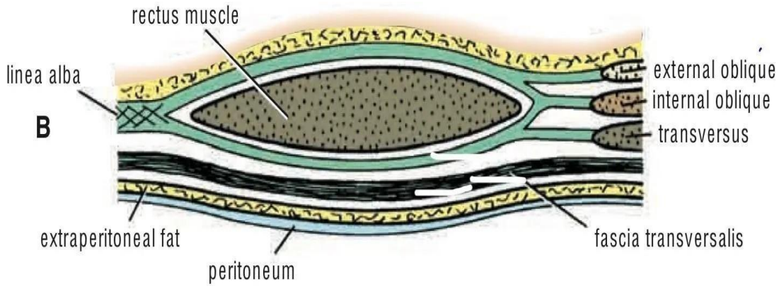
A: Vertical.

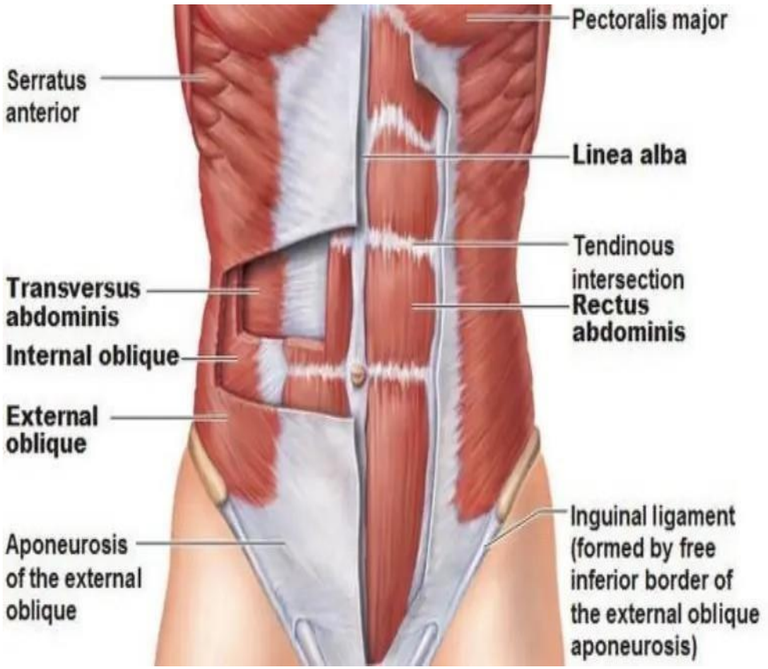
Q: What are tendinous intersections?

A: Fibrous intersections dividing the muscle.

Q: Where is it located?

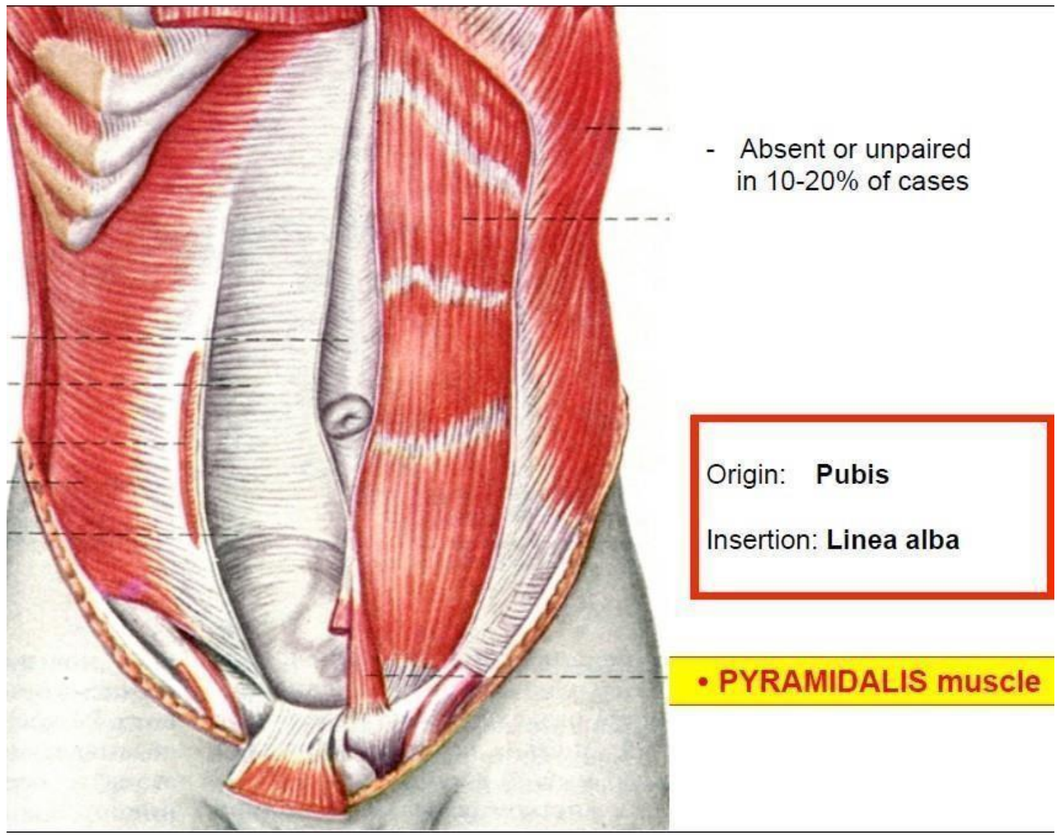
A: Inside rectus sheath.





5. Pyramidalis muscle

- <u>The students should observe the following (if it is present) :</u>
  1. Attached to linea alba.
  2. it lies anterior to rectus abdomenis inside the rectus sheath



Pyramidalis

Q: Origin?

A: Pubis.

Q: Insertion?

A: Linea alba.

Q: Nerve supply?

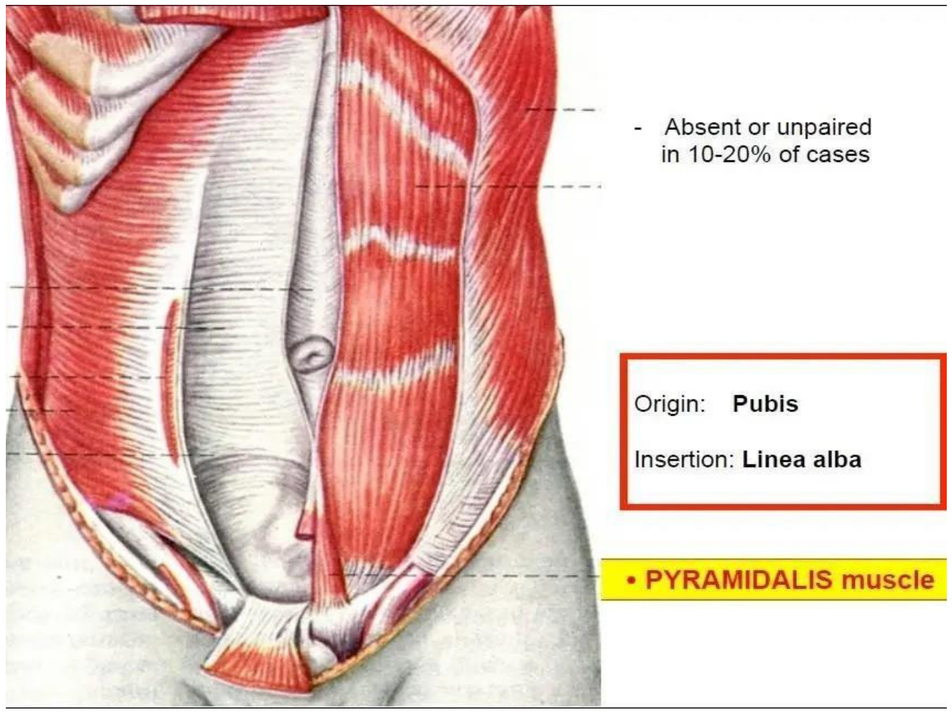
A: Subcostal nerve (T12).

Q: Is it always present?

A: No, may be absent.

Q: To what is it attached?

A: Linea alba.



Q: Where is it located?

A: Anterior to rectus abdominis inside rectus sheath.

Anterior abdominal wall.

B. Rectus Sheath

- There is three levels of rectus sheath, the students should notice the anterior and posterior layers of each level.
- Example : above and below the umbilicus, the anterior wall is formed by ..... ???
- The student should observe the adherent of the tendinous intersection with the anterior wall of rectus sheath

The posterior wall of the rectus sheath is not attached to the rectus abdominis muscle. The anterior wall is firmly attached to it by the muscle's tendinous intersections.

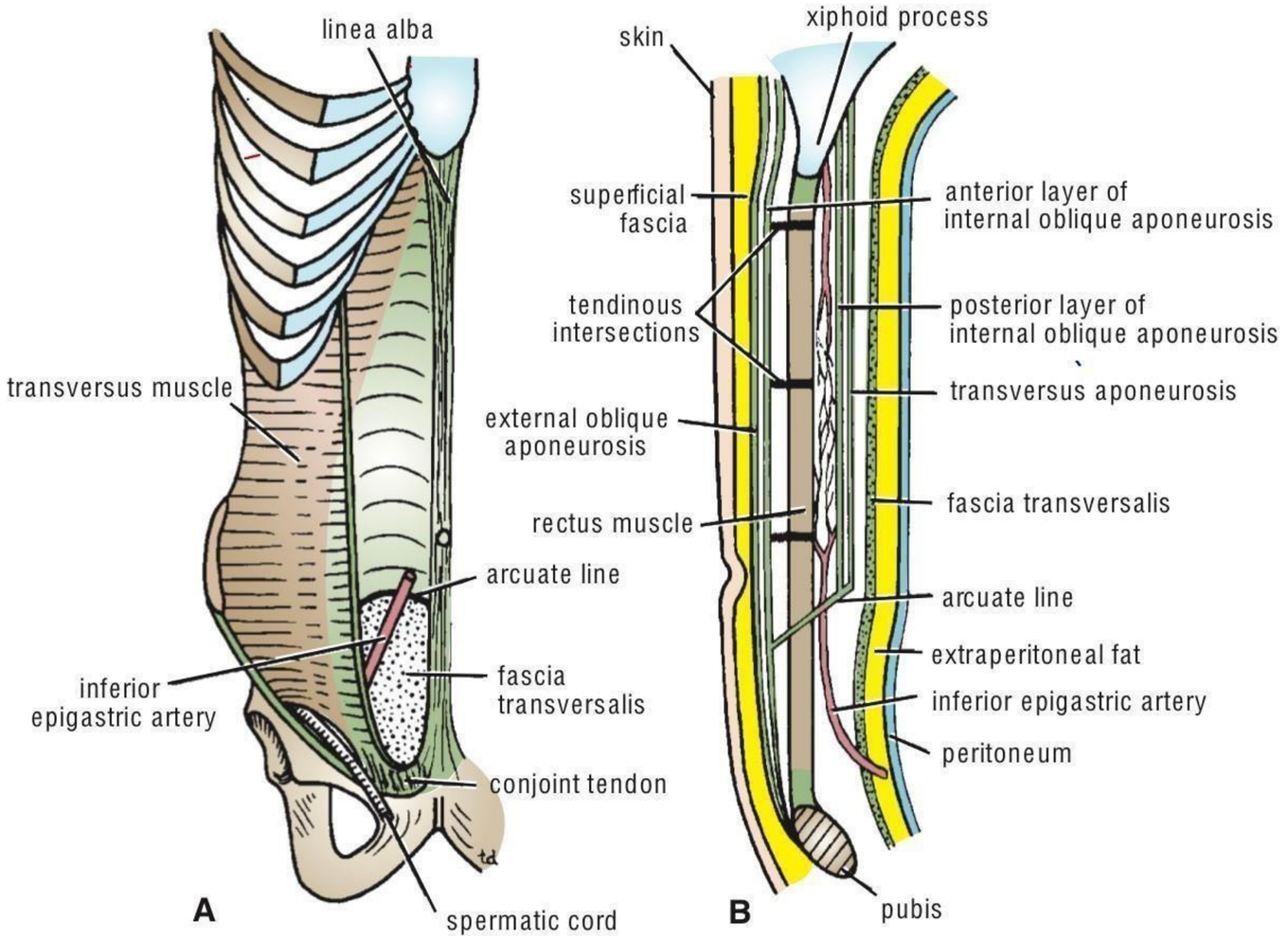
1. Above the costal margin (above the level of xiphiod process):
Anteriorly: aponeurosis of external oblique
Posteriorly: The thoracic wall, that is, 5th, 6th, and 7th costal cartilages and intercostal spaces

2. Between the costal margin and the level of the anterior superior iliac spine (above and below umbilicus):
-The aponeurosis of the internal oblique splits to enclose the rectus muscle
-the external oblique aponeurosis is directed in of the muscle front
- the transversus aponeurosis is directed behind the muscle.
Anterior wall: Skin, superficial fascia, external oblique aponeurosis, 1 layer of internal oblique.
Posterior wall: 1 layer of internal oblique, transversus abdominus, transversalis fascia, extraperitoneal fat & peritoneum

3. Between the level of the anterosuperior iliac spine and the pubis:
Anterior wall: the aponeurosis of all three muscles
The posterior wall is absent, and the rectus muscle lies in contact with the fascia transversalis.

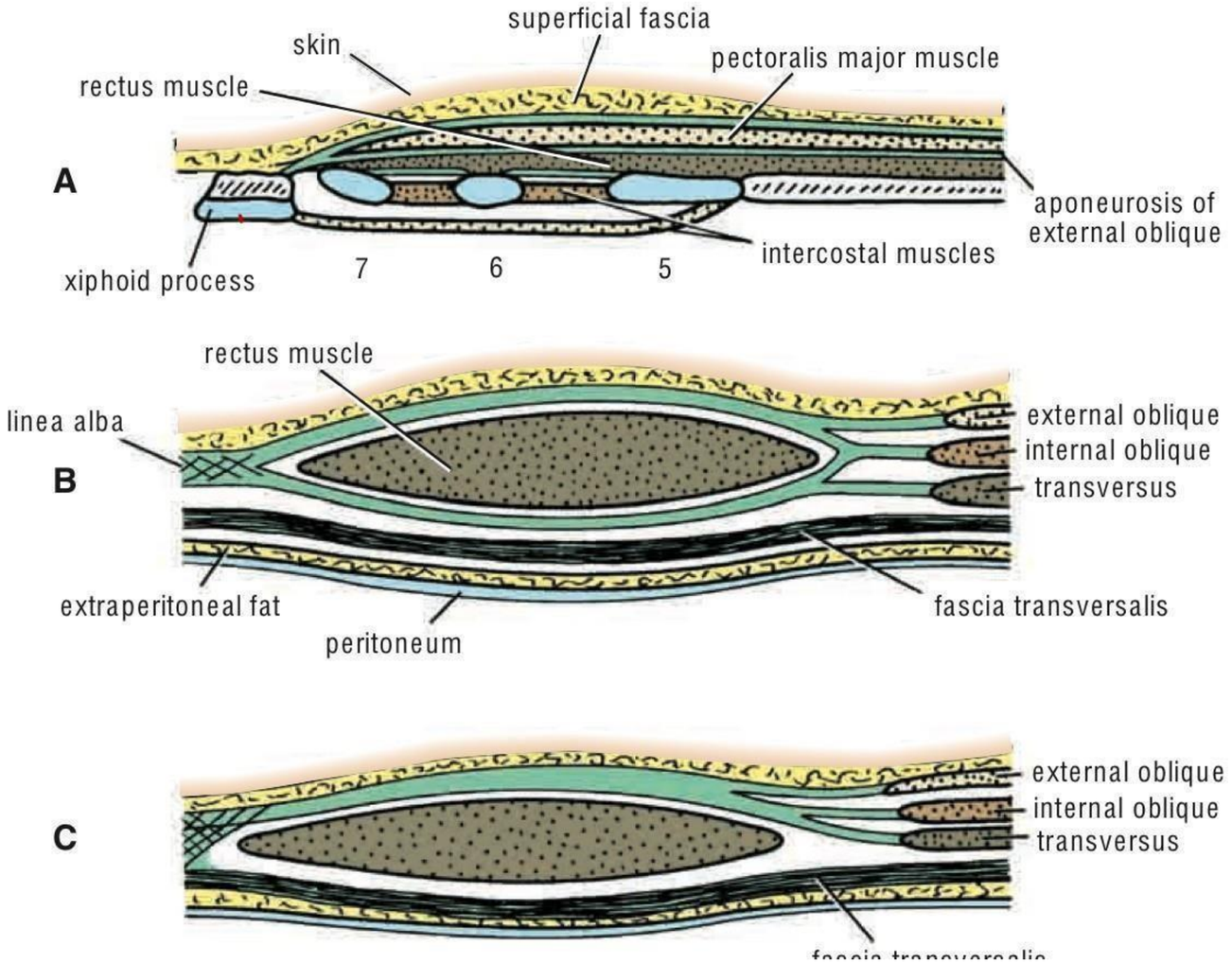
Anterior abdominal wall.

B. Rectus Sheath



Anterior abdominal wall.

B. Rectus Sheath



Rectus Sheath

Q: What is the rectus sheath?

A: Formed by aponeuroses of EO, IO and TA.

Q: Contents?

A: Rectus abdominis, pyramidalis, vessels, nerves and lymphatics.

Q: Anterior wall above umbilicus?

A: EO + anterior lamina of IO.

Q: Posterior wall above umbilicus?

A: Posterior lamina of IO + TA.

Q: Anterior wall below umbilicus?

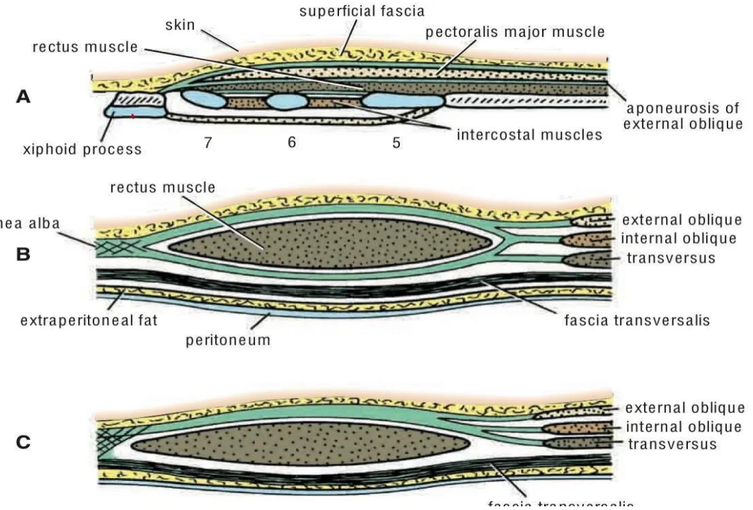
A: All three aponeuroses anteriorly.

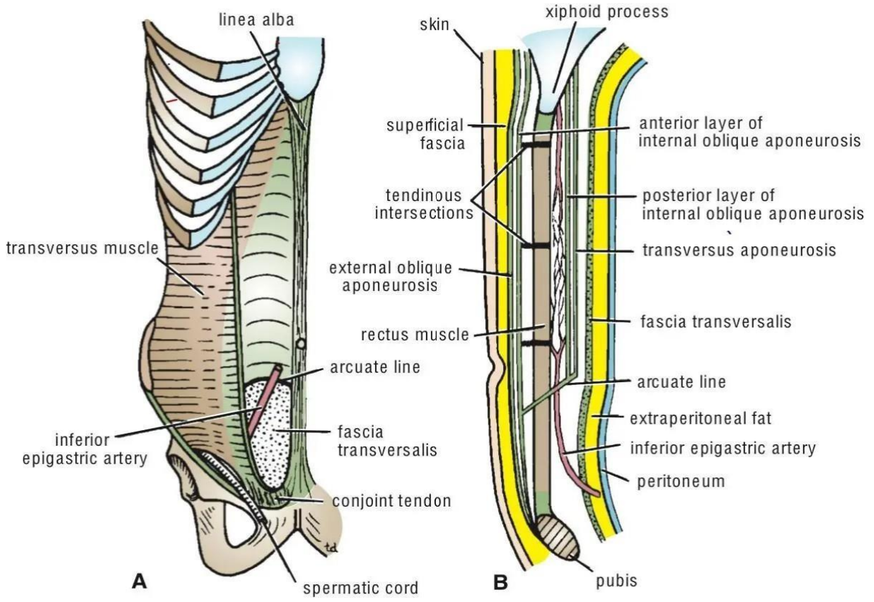
Q: Posterior wall below umbilicus?

A: Transversalis fascia + extraperitoneal fascia + peritoneum.

Q: Tendinous intersections attached to?

A: Anterior wall of rectus sheath only.



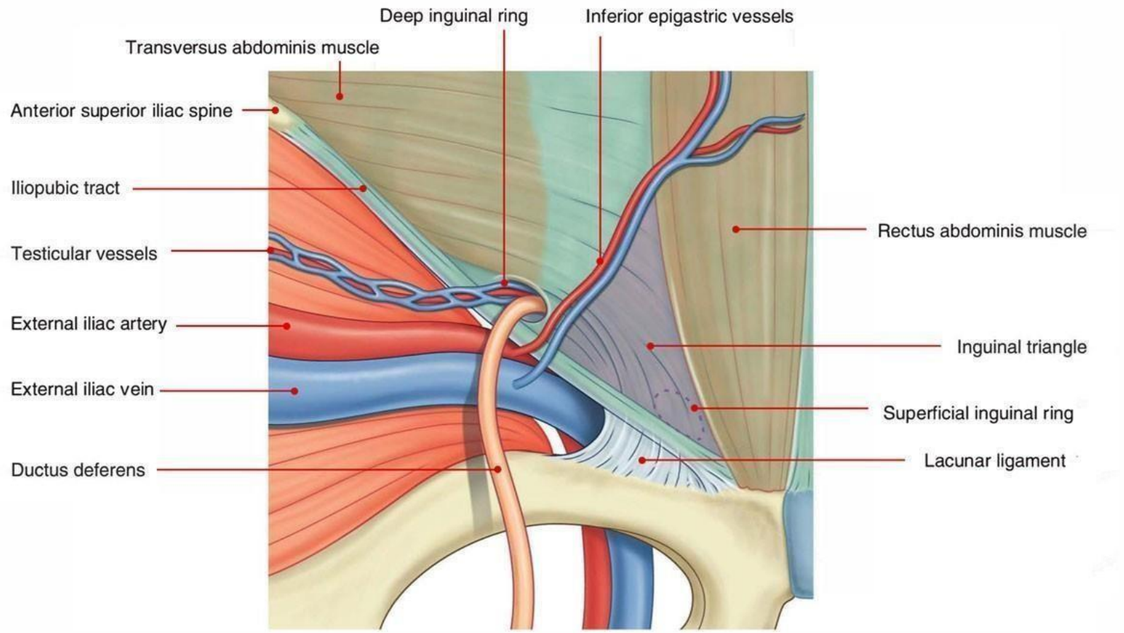


Inguinal triangle.

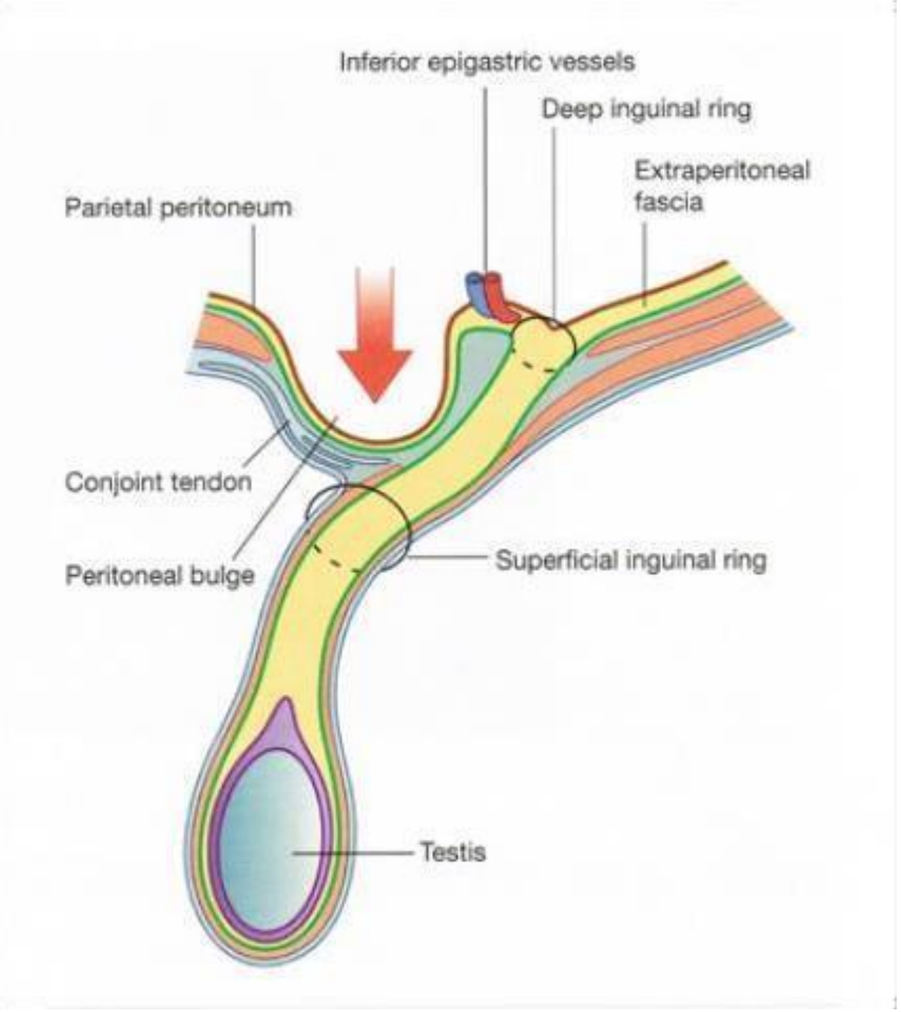
Boundaries of Inguinal Triangle
- Medial border: Lateral margin of the rectus sheath, also called linea semilunaris
- Superolateral border: Inferior epigastric vessels
- Inferior border: Inguinal ligament

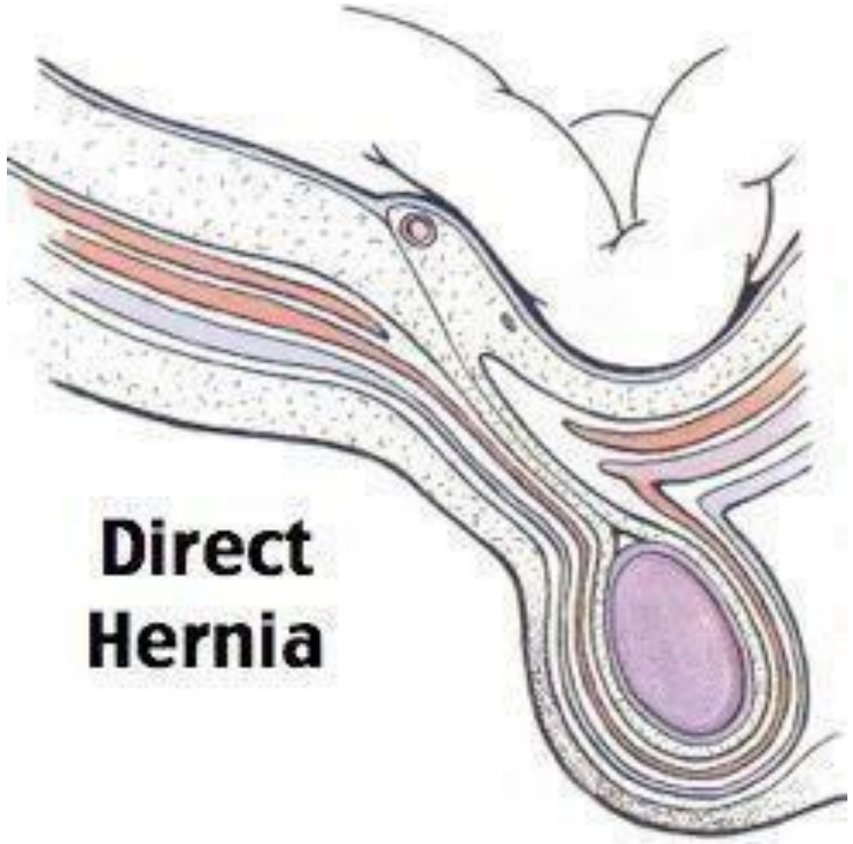
- The students should know and identify the :
  1. Boundaries of inguinal triangle
  2. Type of hernia (direct inguinal hernia)
  3. its relations to inferior epigastric vessels
  4. the direction of hernia and it has no relation with the inguinal canal

- note: know the differences between direct and indirect inguinal hernia



Inguinal triangle.





رسالة من الفريق العلمي:

For any feedback, scan the code or click on it.

Corrections from previous versions:

Versions	Slide # and Place of Error	Before Correction	After Correction
V0 → V1			
V1 → V2			