Hernia:
Classification and Anatomy

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- DEFINITION
- TYPES OF HERNIA AND ETIOLOGY
- CLASSIFICATION OF HERNIA
- CONTENTS OF HERNIA
- ANATOMY AND CLINICAL FEATURES
- DIFFERENT KINDS OF TEST
- MANAGMENT.

DEFINITION:

Hernia is an abnormal protrusion of an organ or tissue through a defect in its surrounding walls. Abdominal wall hernias occur only at sites where the aponeurosis and fascia are not covered by striated muscle.

- يعني اي منطقة مافيها غطاء facia or muscles بيكون فيها defect.
- الdefect هي مداخل الاعضاء، مثل external inguinal ring, umbilicus, deep inguinal ring, hiatus
هذه الاماكن كلها فيها crus and sphincter وتعتمد على its size and its function

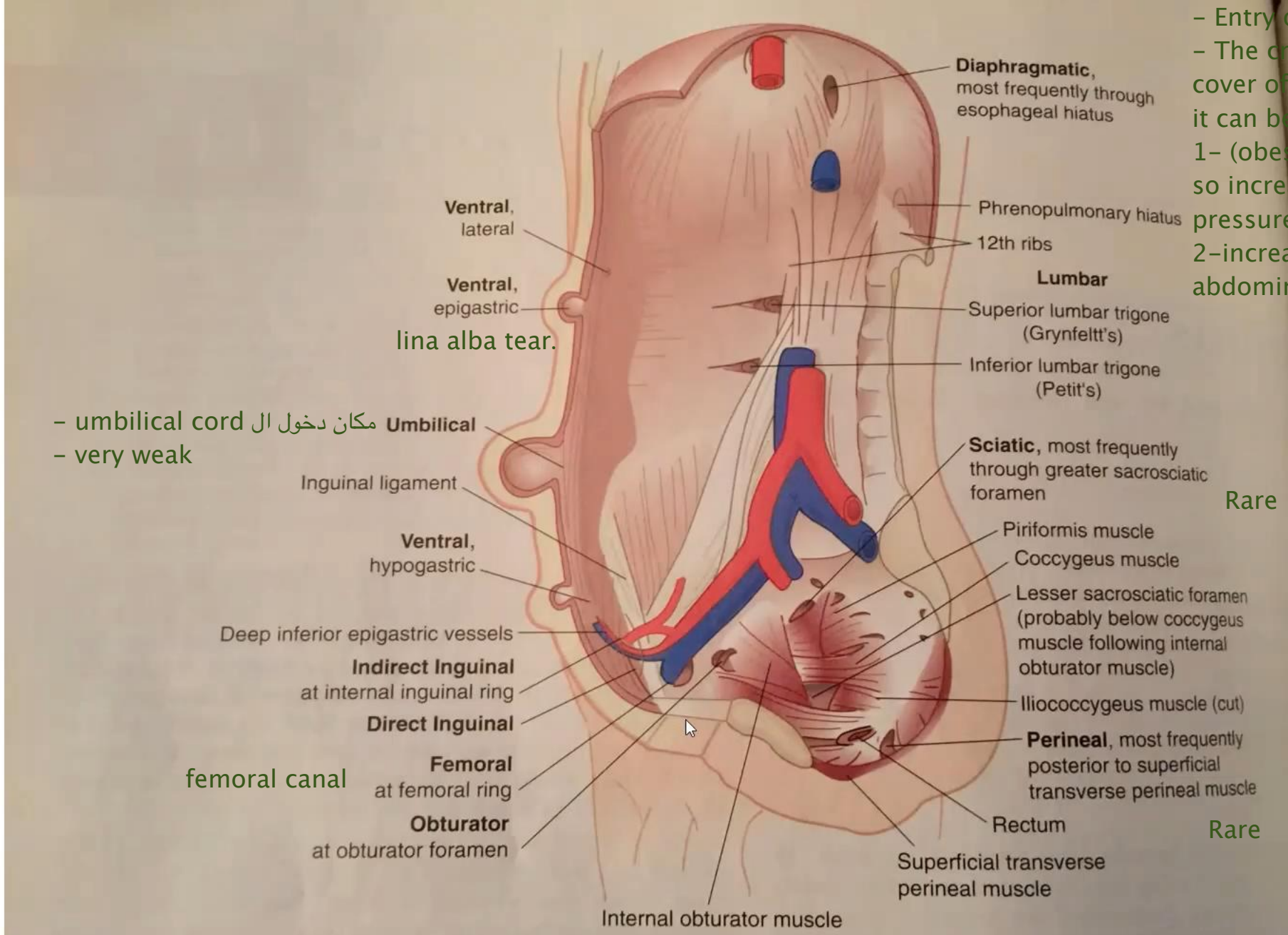


Figure 44-1 Types of abdominal wall hernias. (From Dorland's Illustrated Medical Dictionary, 26th ed, Philadelphia, WB Saunders, 1985, plate XXI.)

- Entry of esophagus
- The crus does not have a cover of muscle or fascia it can be caused by :
1- (obesity) increased weight, so increased abdominal pressure and deposition of fat.
2-increased stress in abdominal wall.

lina alba tear.

- umbilical cord مكان دخول ال
- very weak

Rare

femoral canal

Rare

Types of Abdominal wall hernia:

- Groin Hernia
- Inguinal Hernia
- Indirect inguinal hernia
- Direct inguinal hernia
- Combined (pantaloons) hernia

There are 2 types:
- In the Western books, direct hernia is commonest because of aging.
- here in Saudi Arabia, indirect hernia is more common

Anterior Abdominal Wall hernias:

- Para-umbilical Hernia
- Epigastric Hernia
- Spigelian Hernia

Pelvic Hernias:

- Obturator Hernia
- Sciatic Hernia
- Gluteal Hernia

Posterior Abdominal Wall Hernias:

- Superior Lumbar Hernia
- Inferior Lumbar Hernia

Etiologies:

- Increased abdominal pressure
  - ✓Cough
  - ✓Urinary outflow obstruction
  - ✓Constipation
  - ✓Straining
  - ✓Ascites
  - ✓Intra-abdominal malignancies and pregnancy
- Weakness of abdominal wall
  - ✓Congenital
  - ✓Patent processes vaginalis and patent canal of Nuck in females
  - ✓Acquired / Excess fat (obesity)
  - ✓Post-pregnancy
  - ✓Surgical incisions
  - ✓Connective tissue disorders like marfan's syndrome

Composition of a Hernia:

- A hernia consist of three parts:
  - The sac
  - The coverings of the sac
  - The contents of the sac

All hernias have sac except one, what is it? Epigastric hernia.

- The sac is a diverticulum of peritoneum consisting of:
  - Mouth
  - Neck
  - Body
  - Fundus

The most important thing when you have a narrow nick is you are prone to obstruction.

- The covering are derived from the layers of the abdominal wall through which the sac passes.

Contents

- **omentum** = omentocele;
- **intestine** = enterocele; more commonly small bowel but may be large intestine or appendix;
- a portion of the circumference of the intestine = Richter's hernia;
- a portion of the bladder (or a diverticulum);
- ovary with or without the corresponding fallopian tube;
- a Meckel's diverticulum = a Littre's hernia;
- fluid, as part of ascites or peritoneal fluid.

Classification of Hernia

- *Reducible* – if contents can be returned to abdomen تطلع وتدخل
- *Irreducible* – if contents cannot be returned but there are no other complications تطلع ماتدخل
- *Obstructed* – if bowel in the hernia has good blood supply but bowel is obstructed Gives signs of obstruction
- *Strangulated* – if blood supply of bowel is obstructed
- *Inflamed* – if contents of sac have become inflamed

Gives signs of ischemia

- *Incarcerated* – if the portion of the colon occupying a hernial sac is blocked with faeces

Nyhus Classification of Groin Hernia

very important, it gives you the size of the defect

- **Type I:** Indirect inguinal hernia with internal inguinal ring normal
- **Type II:** Indirect inguinal hernia with internal inguinal ring dilated but posterior wall intact, inferior epigastric vessels not displaced
- **Type III:** Posterior wall defect

  A: Direct inguinal hernia

  B: Indirect inguinal hernia with internal inguinal ring dilated, medially encroaching on or destroying the transversalis fascia of hesselbach's triangle.

  C: Femoral hernia
- **Type IV:** Recurrent hernia

  A: Direct **B:** Indirect **C:** Femoral **D:** Combined

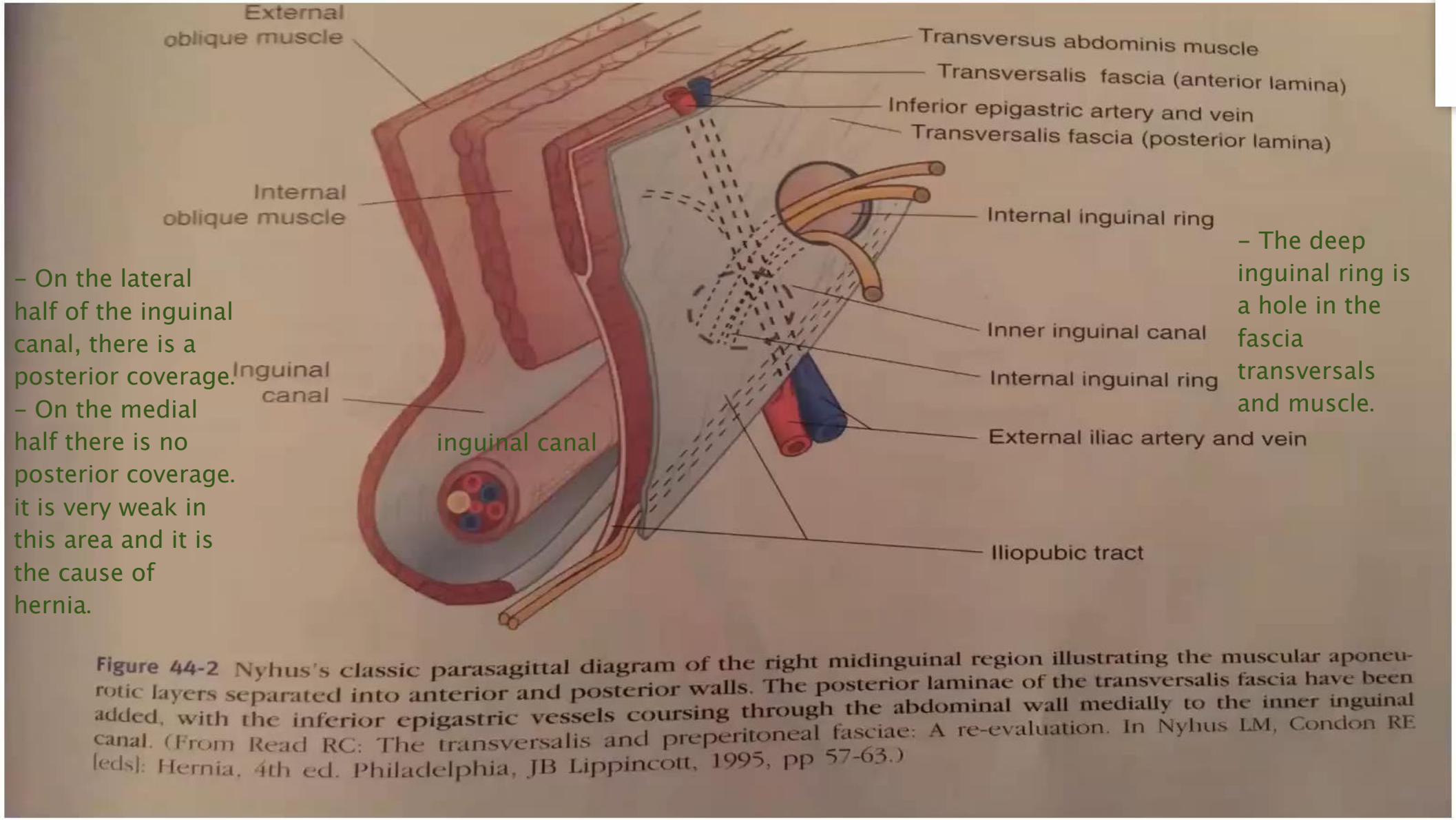


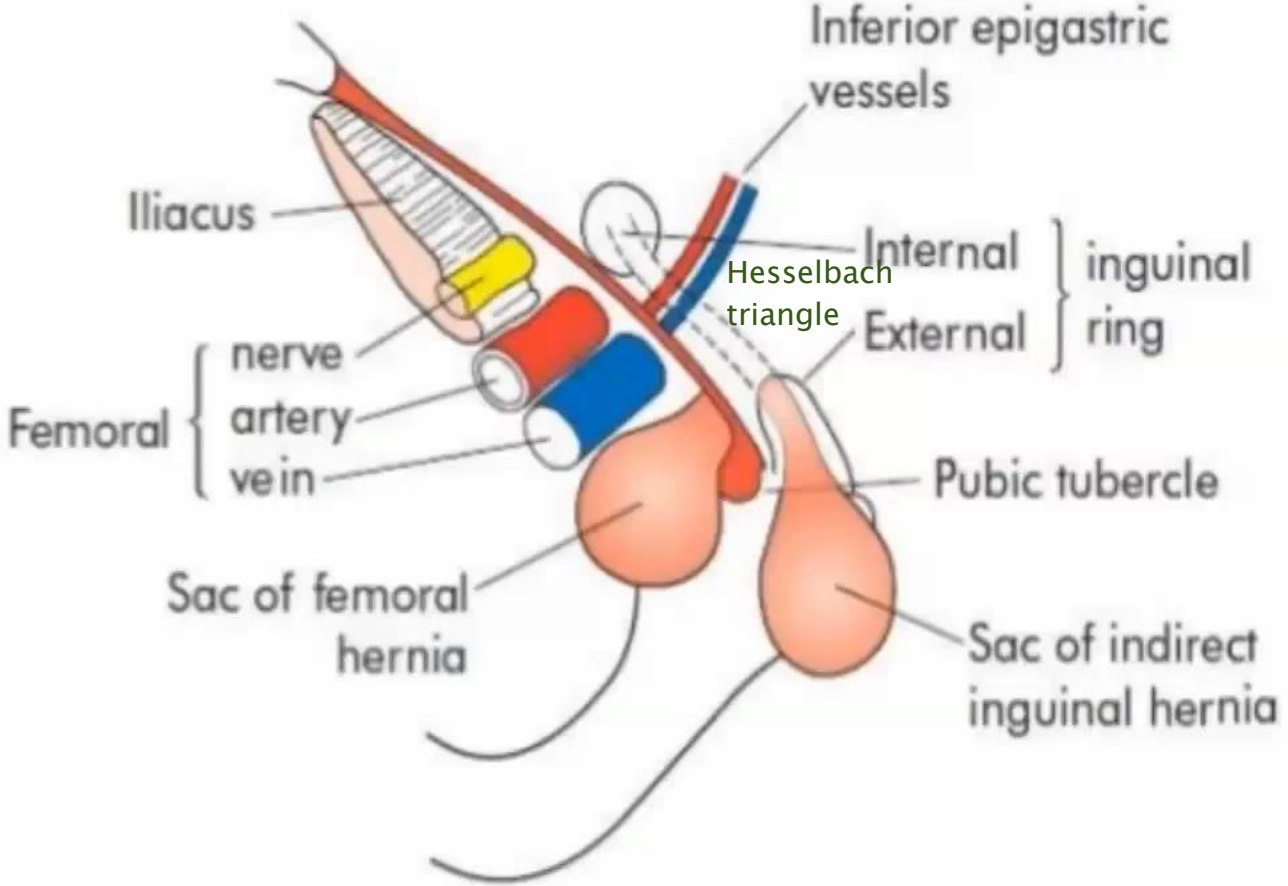
Figure 44-2 Nyhus's classic parasagittal diagram of the right midinguinal region illustrating the muscular aponeurotic layers separated into anterior and posterior walls. The posterior laminae of the transversalis fascia have been added, with the inferior epigastric vessels coursing through the abdominal wall medially to the inner inguinal canal. (From Read RC: The transversalis and preperitoneal fasciae: A re-evaluation. In Nyhus LM, Condon RE [eds]: Hernia, 4th ed. Philadelphia, JB Lippincott, 1995, pp 57-63.)

- On the lateral half of the inguinal canal, there is a posterior coverage.
- On the medial half there is no posterior coverage. it is very weak in this area and it is the cause of hernia.

- The deep inguinal ring is a hole in the fascia transversals and muscle.

There are three types of hernia:
1- Femoral
2- Indirect (comes through the defect of the deep inguinal ring and go through the superfacial inguinal ring to go form a sac in the scrotum).
3- Direct (it happens in Hesselbach triangle, when this area does not have any posterior coverage so increase of age, increase of weight, increase intra-abdominal pressure cause this hernia).

Groin Hernias



Anatomy of inguinal canal

- 4 cm in length passing downward and medially from deep to superficial ring
- Deep/internal ring is 'U' shaped in fascia transversalis which lies 1.25 cm above the mid inguinal point.
- Superficial/External ring is in external oblique aponeurosis situated just above and lateral to the pubic crest.

deep inguinal ring

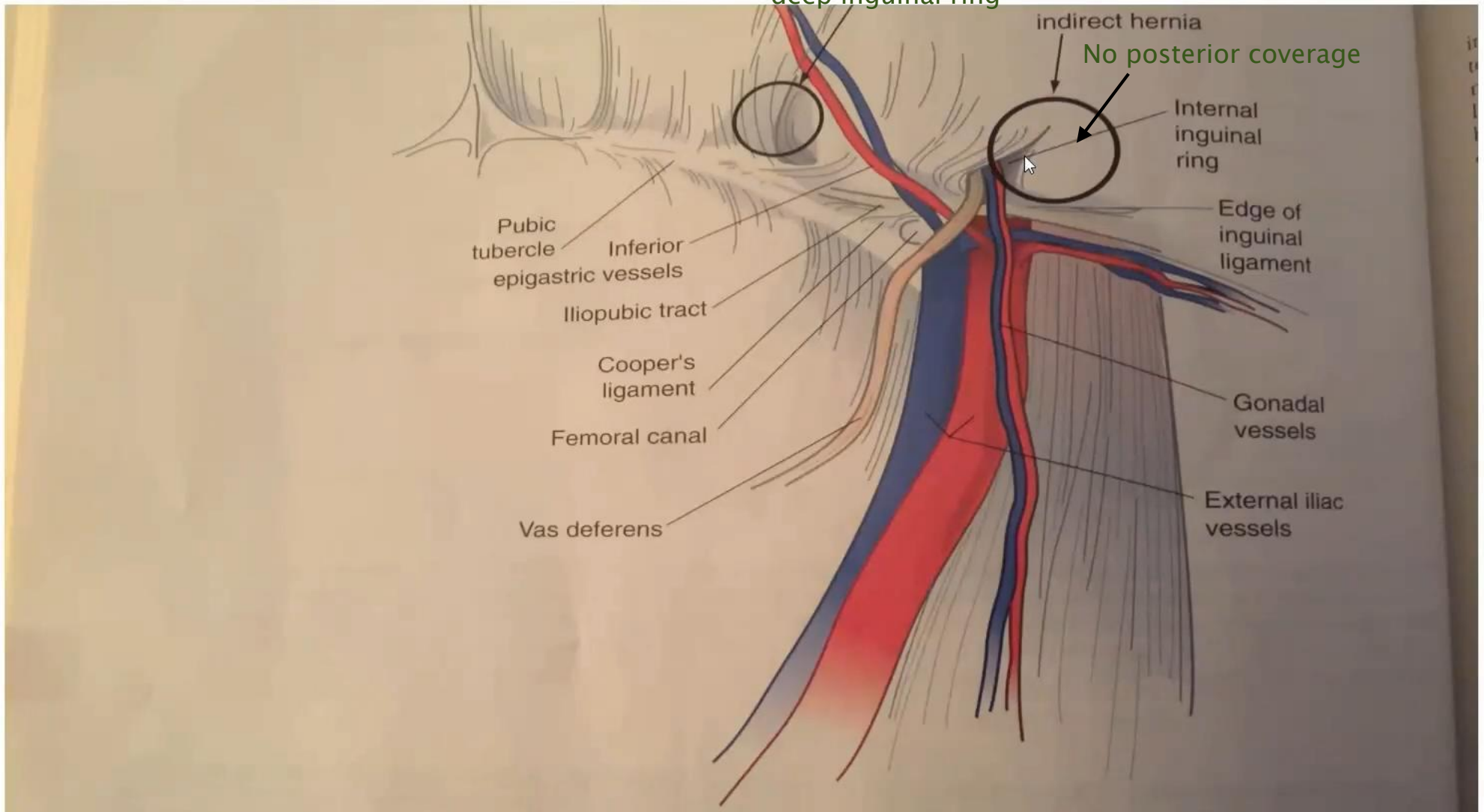
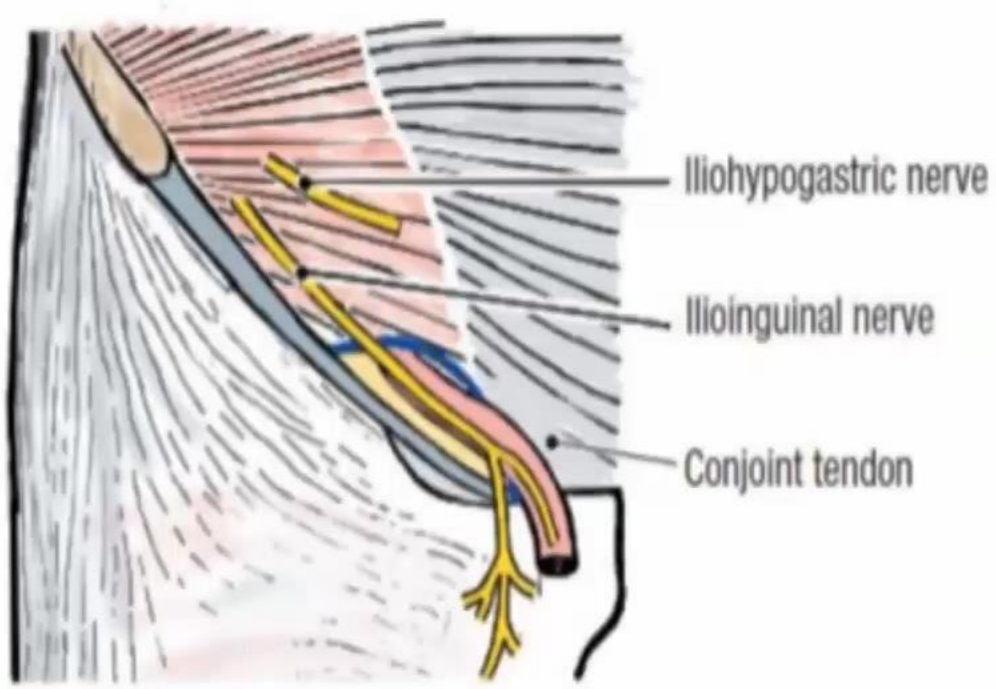
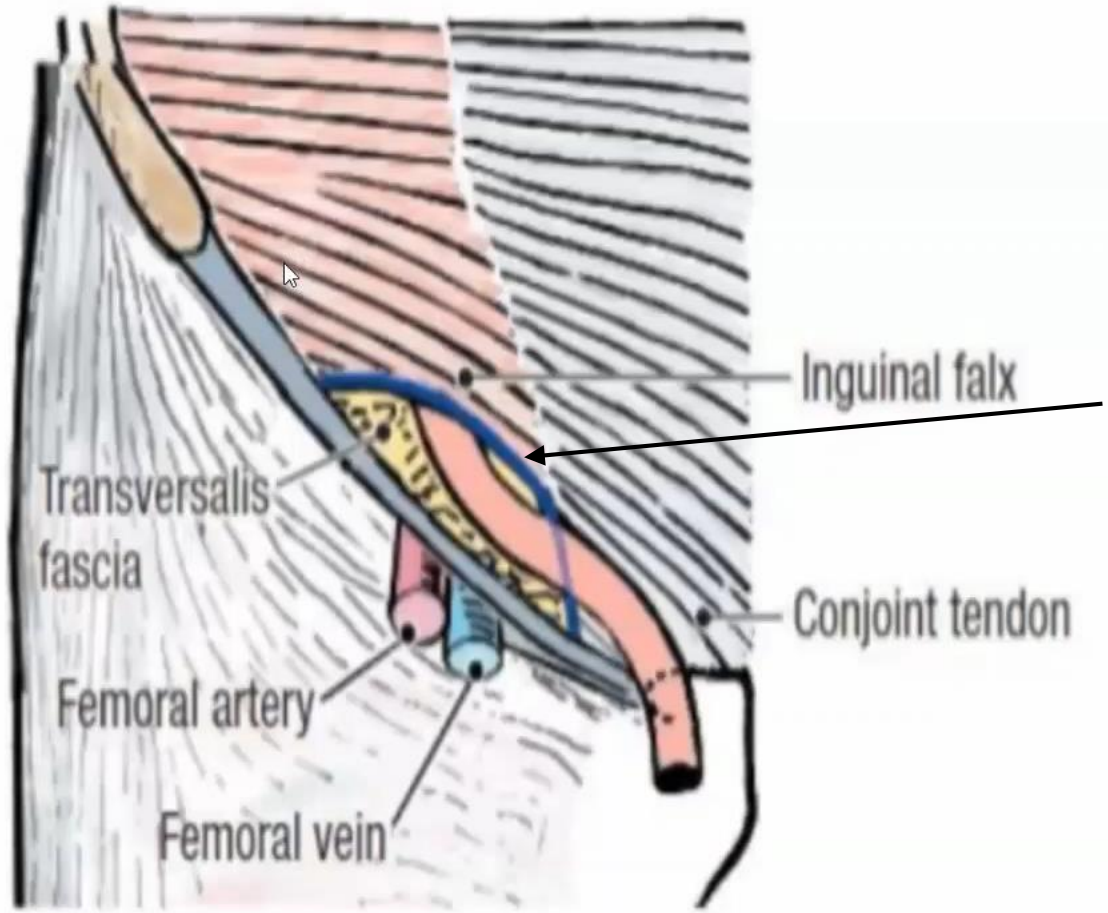


Figure 44-3 Anatomy of the important preperitoneal structures in the right inguinal space. (From Takeuchi M, Are C: Laparoscopic hernia repair. In Zuidema GD, Yeo CJ [eds]: Shackelford's Surgery of the Alimentary Tract, 5th ed. Philadelphia, WB Saunders, 2002, vol 5, p 140.)


Iliohypogastric nerve
Ilioinguinal nerve
Conjoint tendon



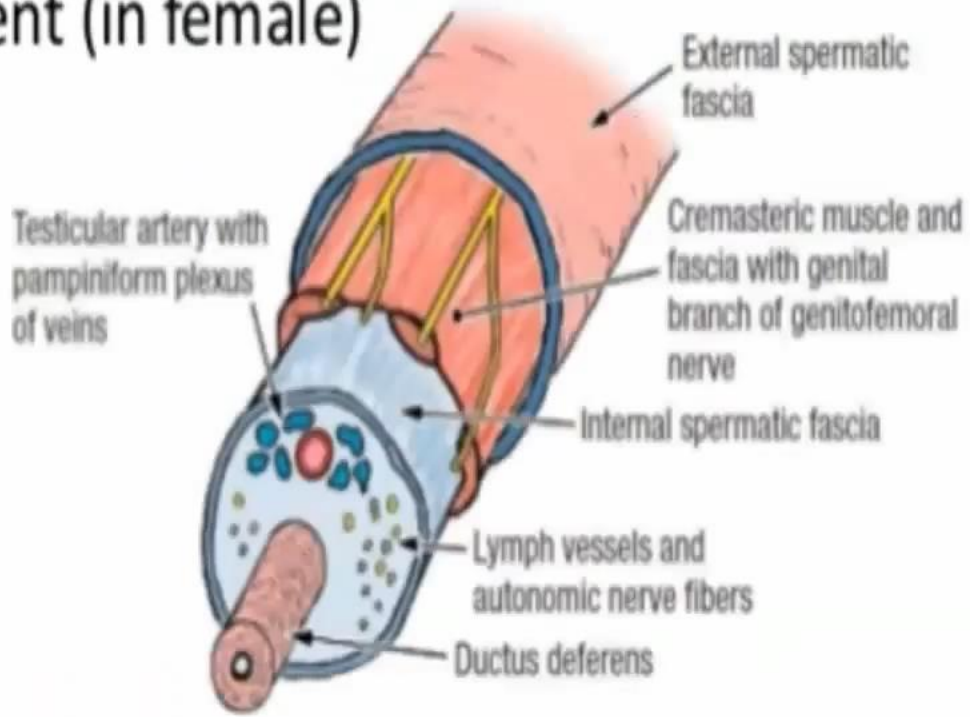
The muscle here is arched over the inguinal ligament. posteriorly there is only fascia and fascia is made of fibrous tissue and fat, so increase in body weight in all ages replaces fibrous tissue with fat cells.

Boundaries of the inguinal canal

- **Anterior –** aponeurosis of the external oblique muscle
- **Inferior** (floor) **–** inguinal ligament and lacunar ligament on medial side
- **Superior** (roof) **–** the arching fibers of the internal oblique and the transversus abdominis muscles
- **Posterior –** transversalis fascia, reinforced medially by the conjoint tendon

Contents of Inguinal Canal

- Ilioinguinal Nerve
- Spermatic Cord (in male)-
- Round ligament (in female)



Transverse section through the spermatic cord.

Why we do not have hernia?
because we have Shutter Mechanism.
when the muscles contract it go to the inguinal ligament. also, there are two crus that contract.
so when intra-abdominal pressure increases, the muscles and fibrous tissue are separated, and predispose to hernia..

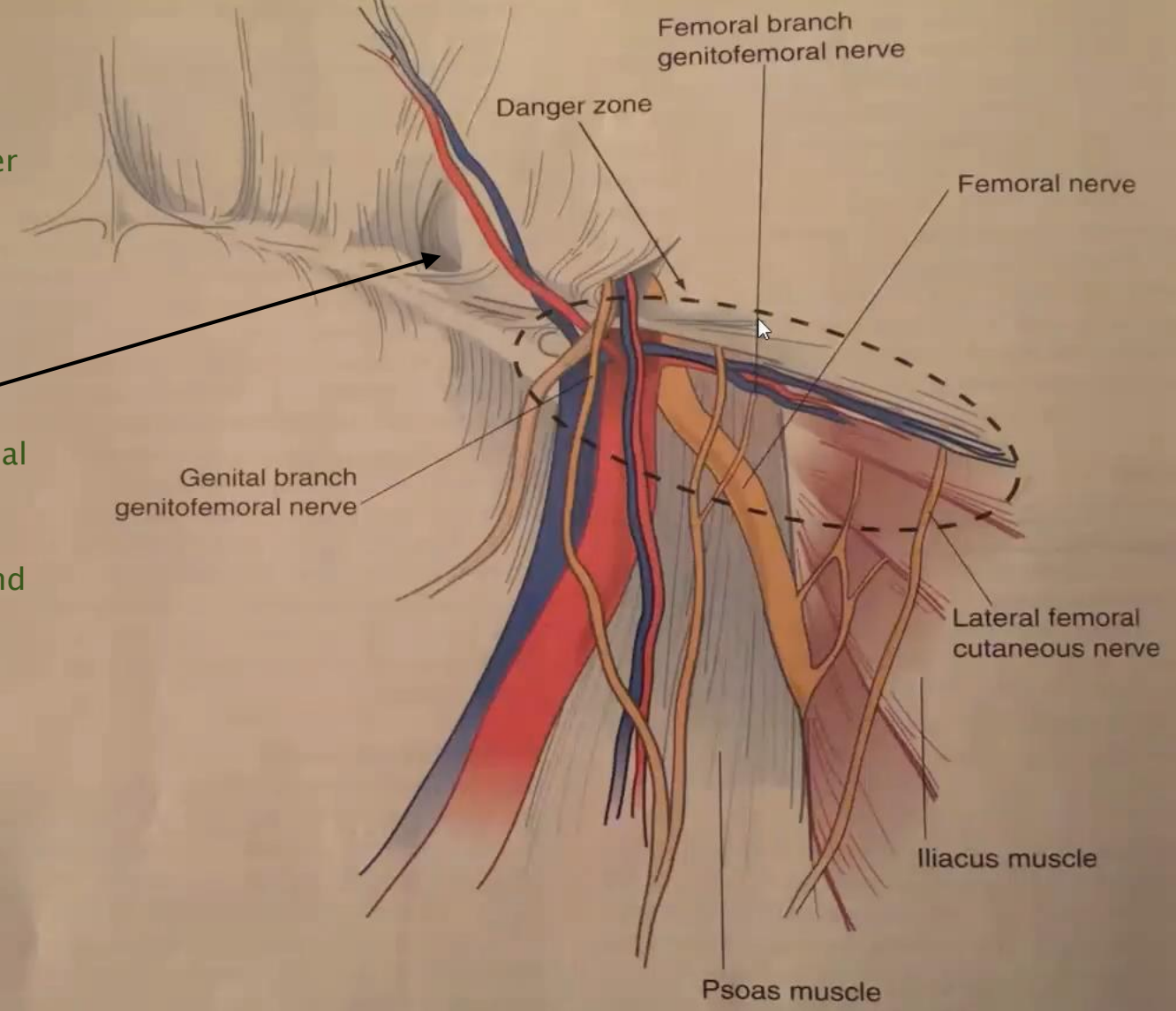
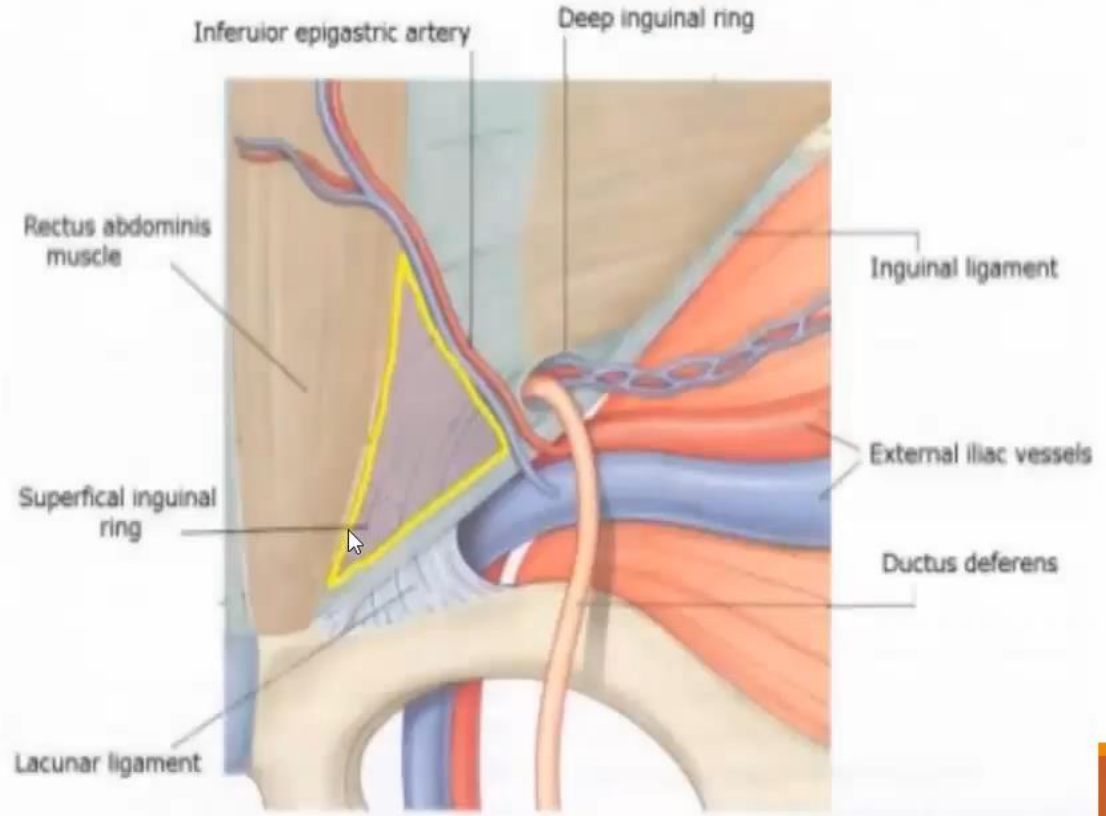


Figure 44-4 Important nerves and their relationship to inguinal structures (right side is illustrated). (From Talamini MA, Are C: Laparoscopic hernia repair. In Zuidema GD, Yeo CJ [eds]: Shackelford's Surgery of the Alimentary Tract, 5th ed. Philadelphia, WB Saunders, 2002, vol 5, p 140.)

Boundries of Hesselbach Triangle

- **Laterally** inferior epigastric artery
- **Medially** lateral border or rectus abdominis
- **Inferiorly** (Base) Inguinal ligament

- This area does not have any posterior coverage.
- This types of hernia is common in the west countries, but not common here.



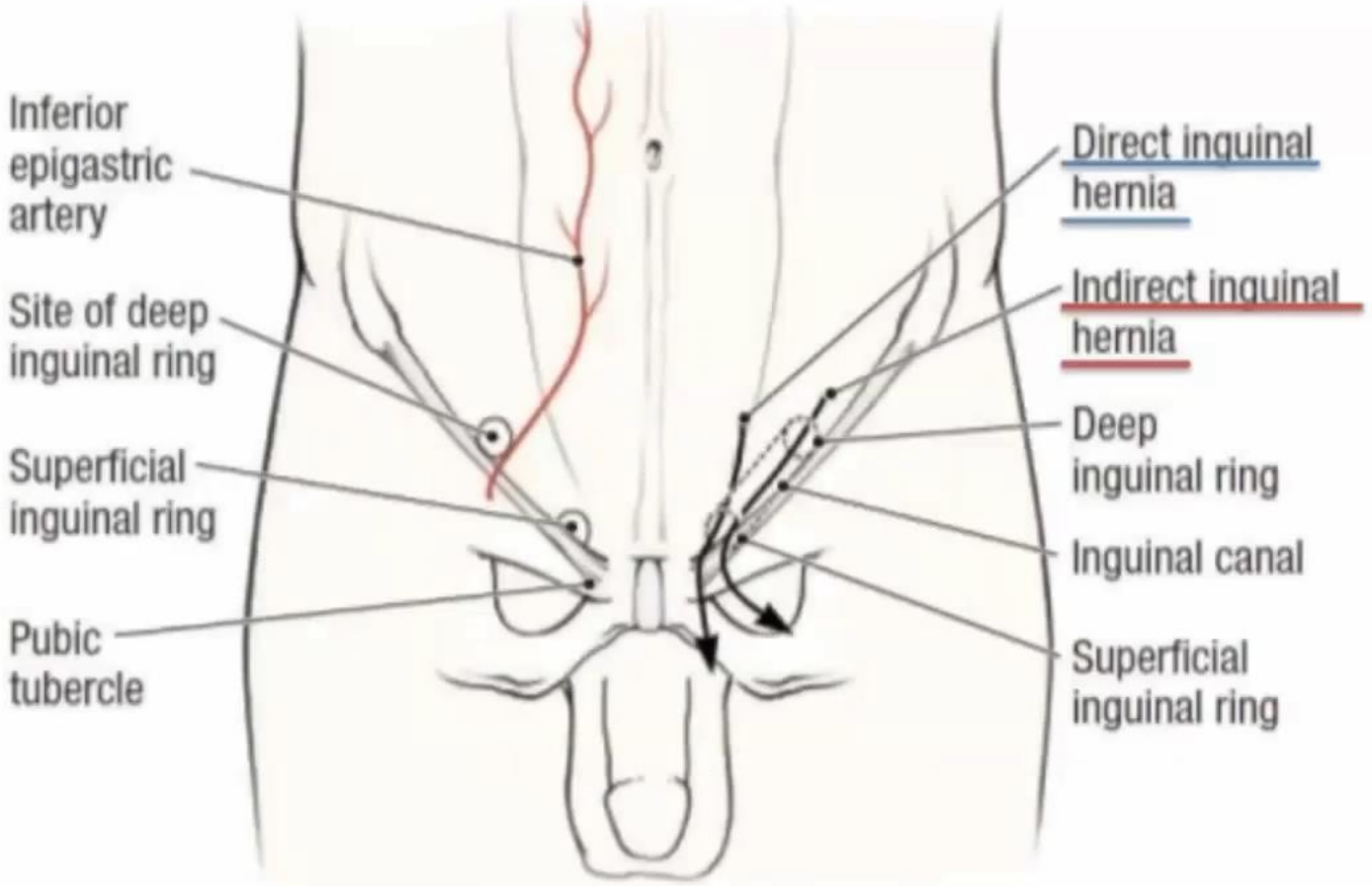
Inferior epigastric vessels:

- Branches of external iliac vessels and are important landmarks for laparoscopic hernia repair. These vessels course medial to the internal inguinal ring and eventually lie beneath the rectus abdominis muscle immediately beneath the transversalis fascia.

Natural mechanism of preventing inguinal hernia

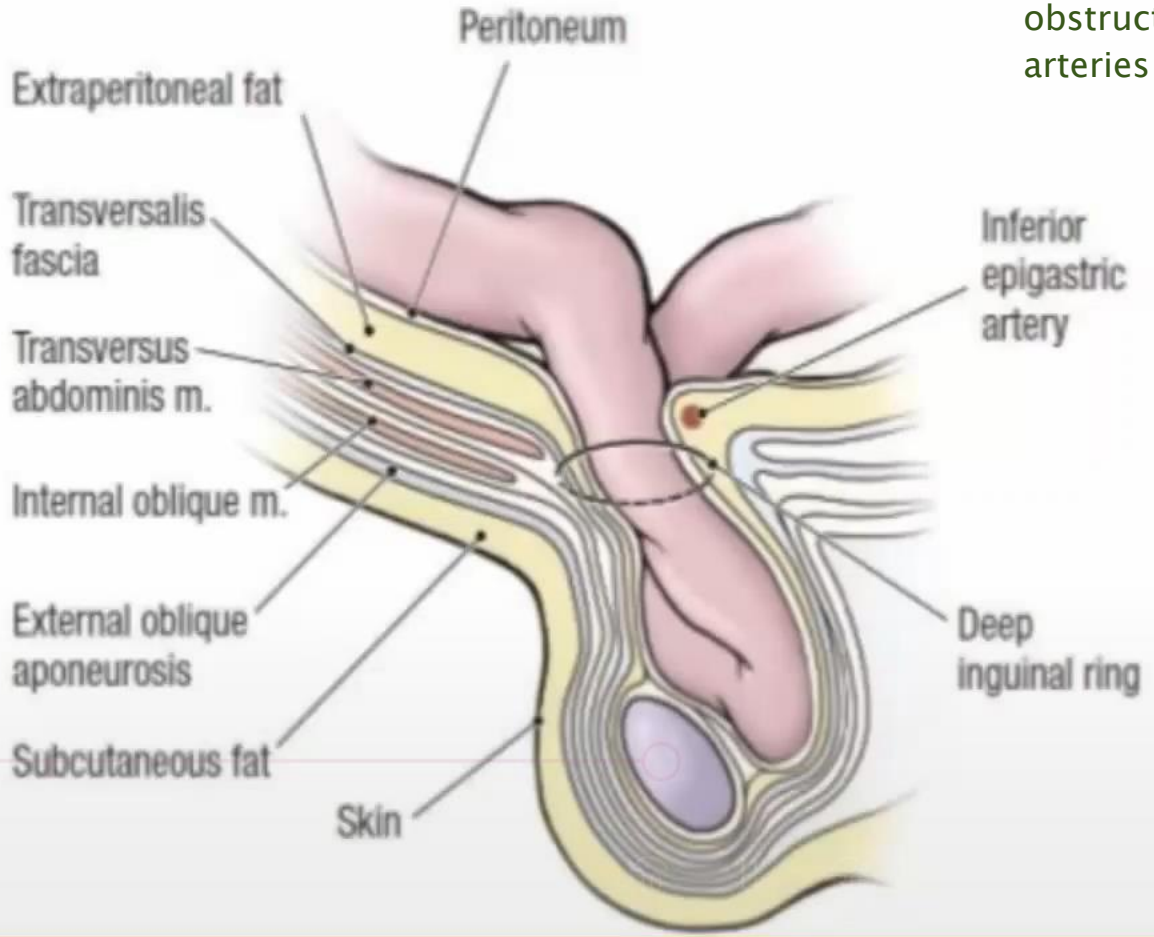
- Obliquity of canal.
- Shutter action of arched fibers of internal oblique and transverse abdominis.
- Plugging action of spermatic cord due to contraction of cremestaric muscles.

Types of Inguinal Hernia



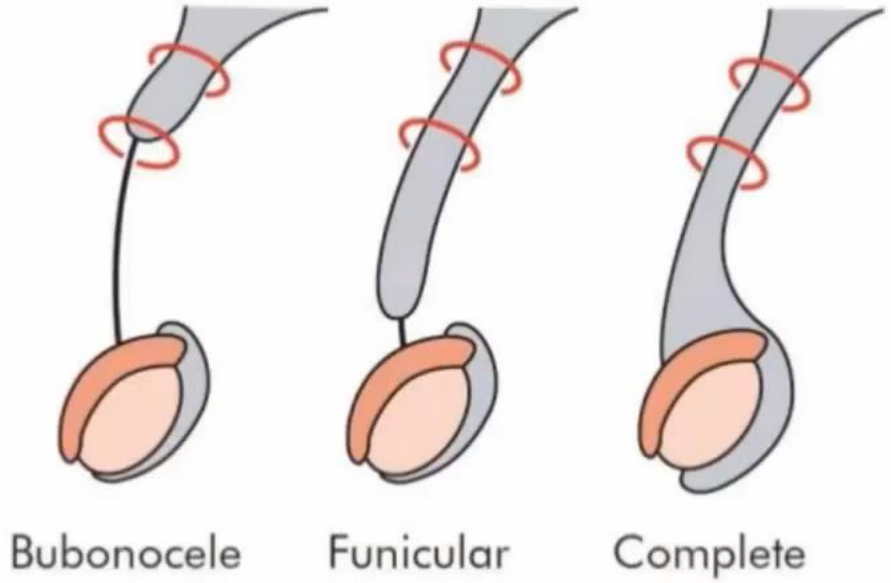
Indirect Inguinal Hernia

- From the internal to external ring.
- Usually due to processus vaginalis.



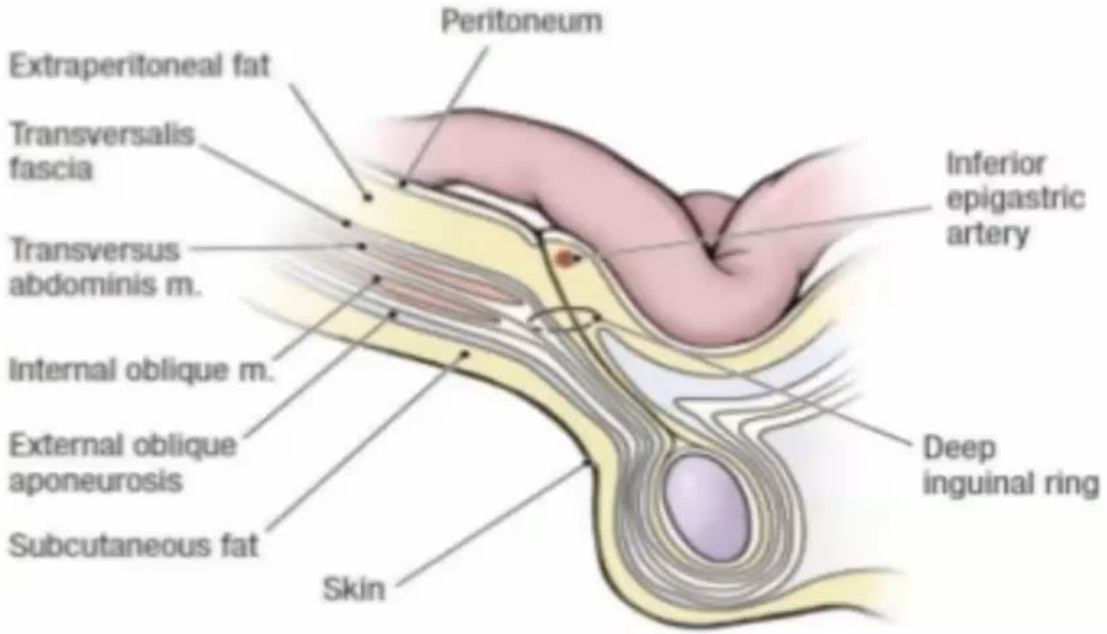
The bowel goes insides the sac, and neck gets narrowed. so, the bowel when it goes there it causes adhesions and becomes irreducible. then it causes obstruction of the blood vessels arteries and produce ischemia.

Types of Indirect Inguinal Hernia



Direct Inguinal Hernia

- A direct inguinal hernia is always acquired.
- The sac passes through a weakness or defect of the transversalis fascia in the posterior wall of the inguinal canal.

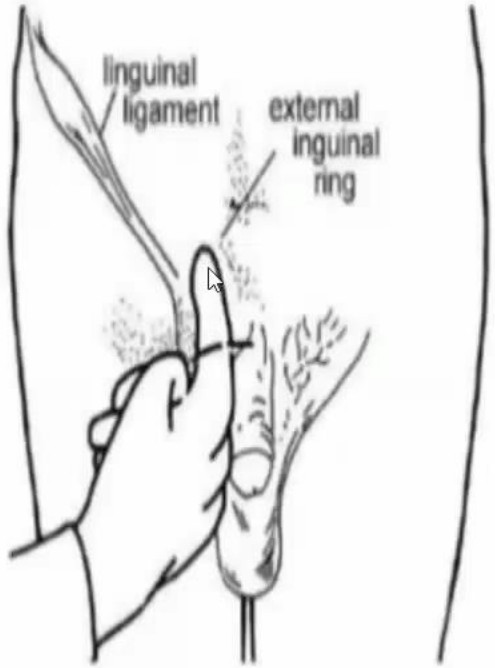


Clinical Features

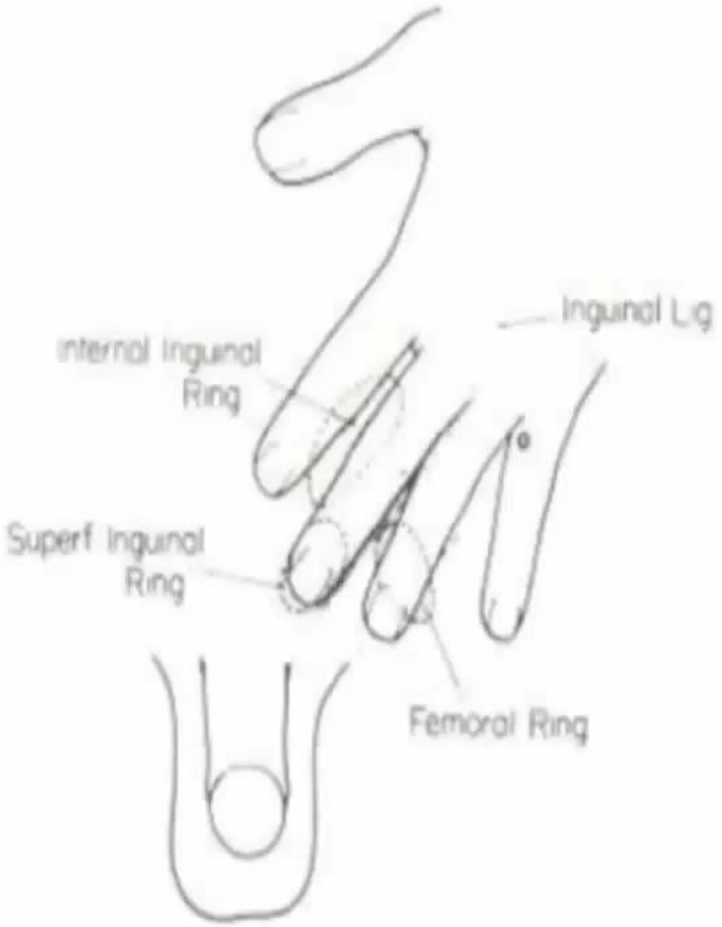
- **Symptoms**
  - Swelling
  - Dragging pain
  - h/o suggesting increased abdominal pressure
  - Symptomless
  - Accidental finding
- **Signs**
  - Inguino-scrotal swelling
  - Expansile cough
  - Cannot get above the swelling
  - Reducibility
  - Finger invagination test
  - Deep ring occlusion test
  - Ziemen test (Three finger test)

Finger invagination test

This test is painful. It is in the books, but nobody do it.



Ziemen test (Three finger test)



DIRECT VS INDIRECT

AGE	ELDERLY	ANY AGE GROUP
AETIOLOGY	WEAKNESS OF POSTERIOR WALL OF INGUINAL CANAL	PREFORMED SAC
PRECIPITATING FACTOR	CHRONIC BRONCHITIS, ENLARGED PROSTATE	----------
ON STANDING	POPS OUT	DOES NOT POPS OUT
SIDE	USUALLY BILATERAL	UNILATERAL (30% BILATERAL)
INTERNAL RING OCCLUSION TEST	SWELLING IS SEEN	SWELLING NOT SEEN
COMPLICATION'S	NOT COMMEN BECAUSE NECK IS WIDE	COMMON , NECK IS NARROW OBSTRUCTION OR STRANGULATION
RELATIONSHIP OF THE SAC TO THE CORD	SAC IS POSTERIOR TO THE CORD	ANTEROLATERAL TO THE CORD
DIRECTION OF THE SAC	COMES OUT OF HESSELBACH'S TRINAGLE	SAC COMES THROUGH THE DEEP RING

Surgical Treatment

All of them are approximation of transvers abdominal muscle to inguinal ligament.

- **Herniotomy** (excision of hernia sac)
  - Usually done in children
- **Herniorrhaphy** (herniotomy with strengthening of the posterior wall)
  - Bassini repair
  - Shouldice repair
  - McVay repair
- **Hernioplasty** (herniorrhaphy with application of prosthesis)
  - Lichtenstein repair
  - Plug and patch repair
- **Laparoscopic repair**
  - TEP (Total Extra Peritoneal)
  - TAPP (Trans Abdominal PrePeritoneal)

now we only do TAPP

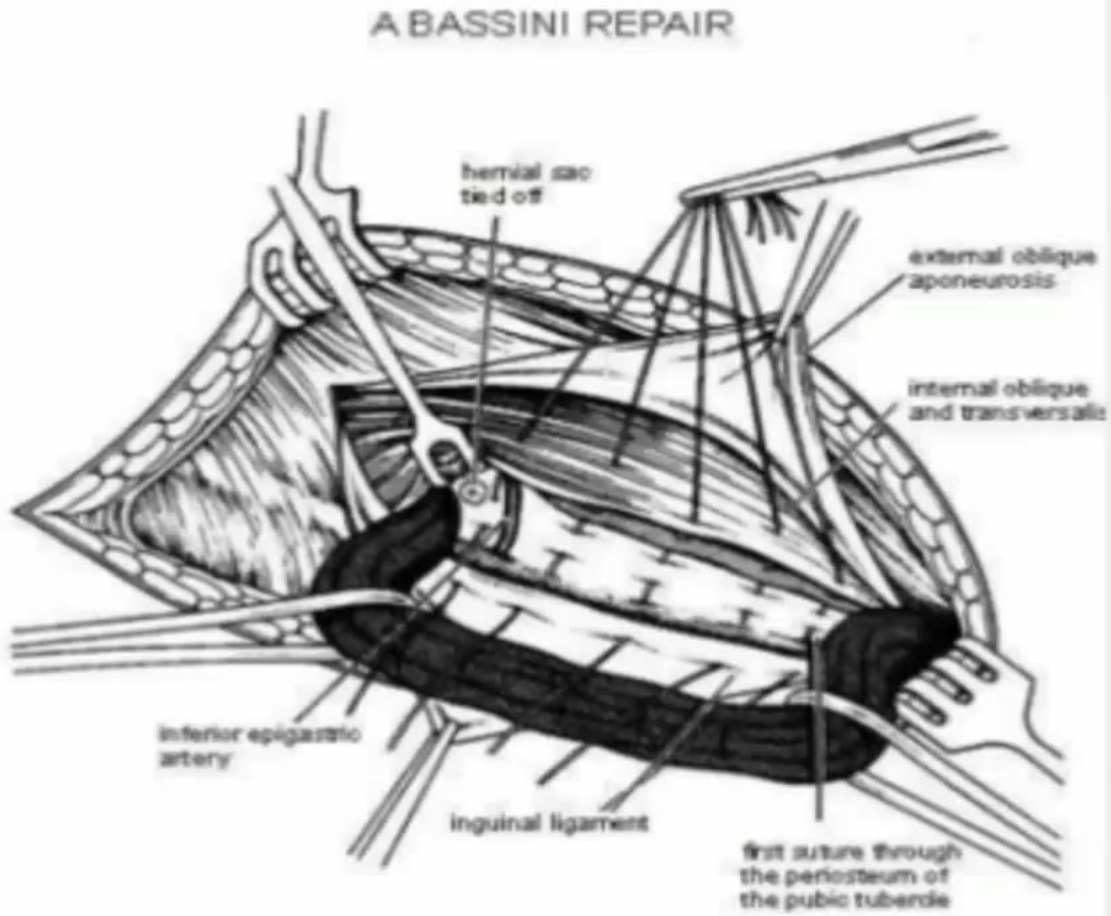
Treatment

- Conservative treatment
- Surgical treatment

Applying Truss as a conservative management of inguinal hernias.

Bassini Repair

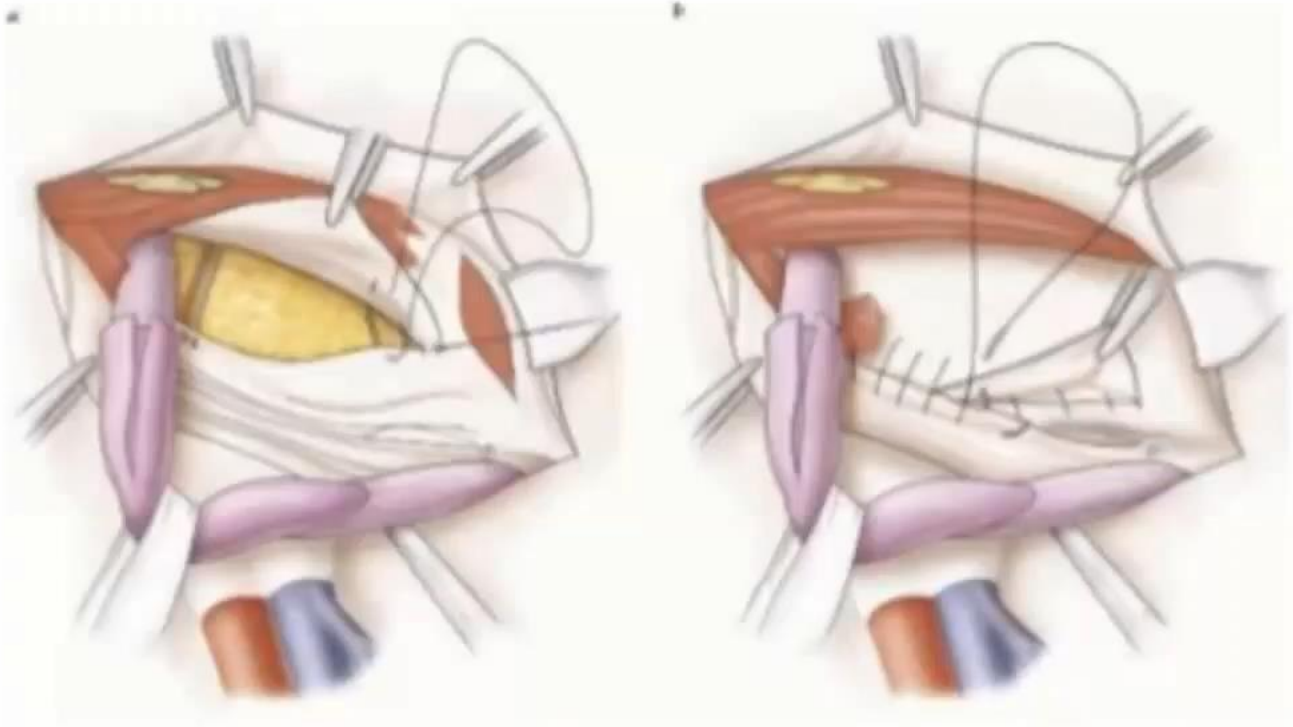
- Conjoined tendon to the inguinal ligament.



- I bring the transverse muscle to inguinal ligament, so I close the Hesselbach triangle.
- Bassini repair is the principle of hernia surgery. They call it tension.

Shouldice Repair

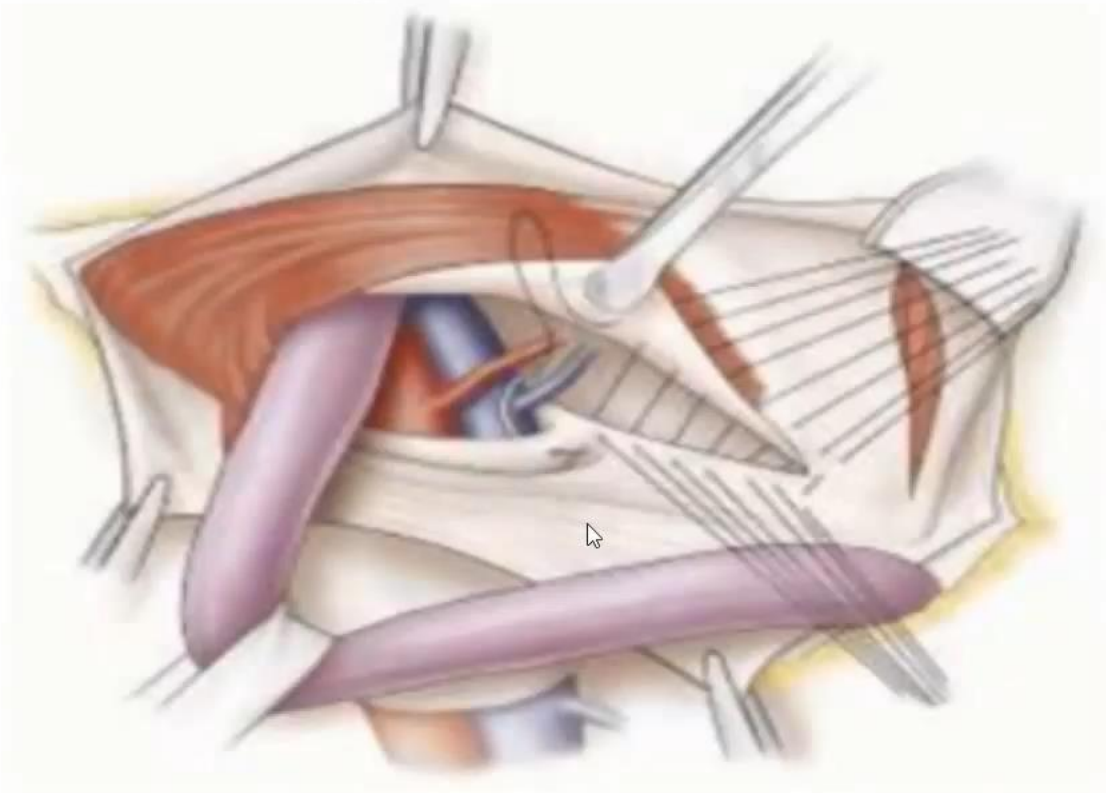
- Multilayer repair of the posterior wall of the inguinal canal
- Double breasting of transversalis fascia
- Transverse abdominis aponeurotic arch to the iliopubic tract and Conjoined tendon to the inguinal ligament



shouldice modified bassini,
- In bassini, he cut the fascia transversalis and he repair it.
- In shouldice, he cut it and overlap it.

McVay Repair

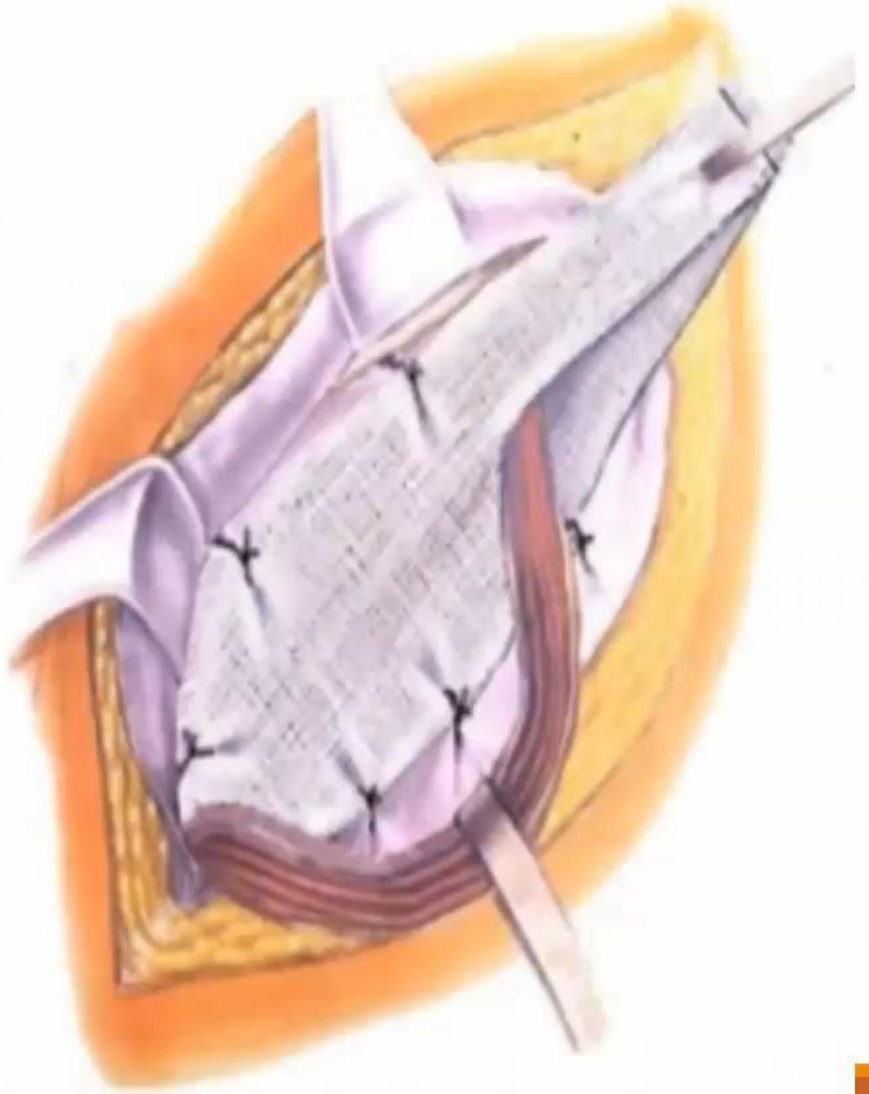
- Transverse abdominis aponeurosis to Cooper's ligament and iliopubic tract



Lichtenstein Repair

I think the best repair is combination of suturing of the defect and cover it with mesh.

- A piece of prosthetic non-absorbable mesh is placed to fit the canal
- The mesh is sutured to the aponeurotic tissue overlying the pubic bone medially, continuing superiorly along the transversus abdominis or conjoined tendon.
- The inferolateral edge of the mesh is sutured to the inguinal ligament



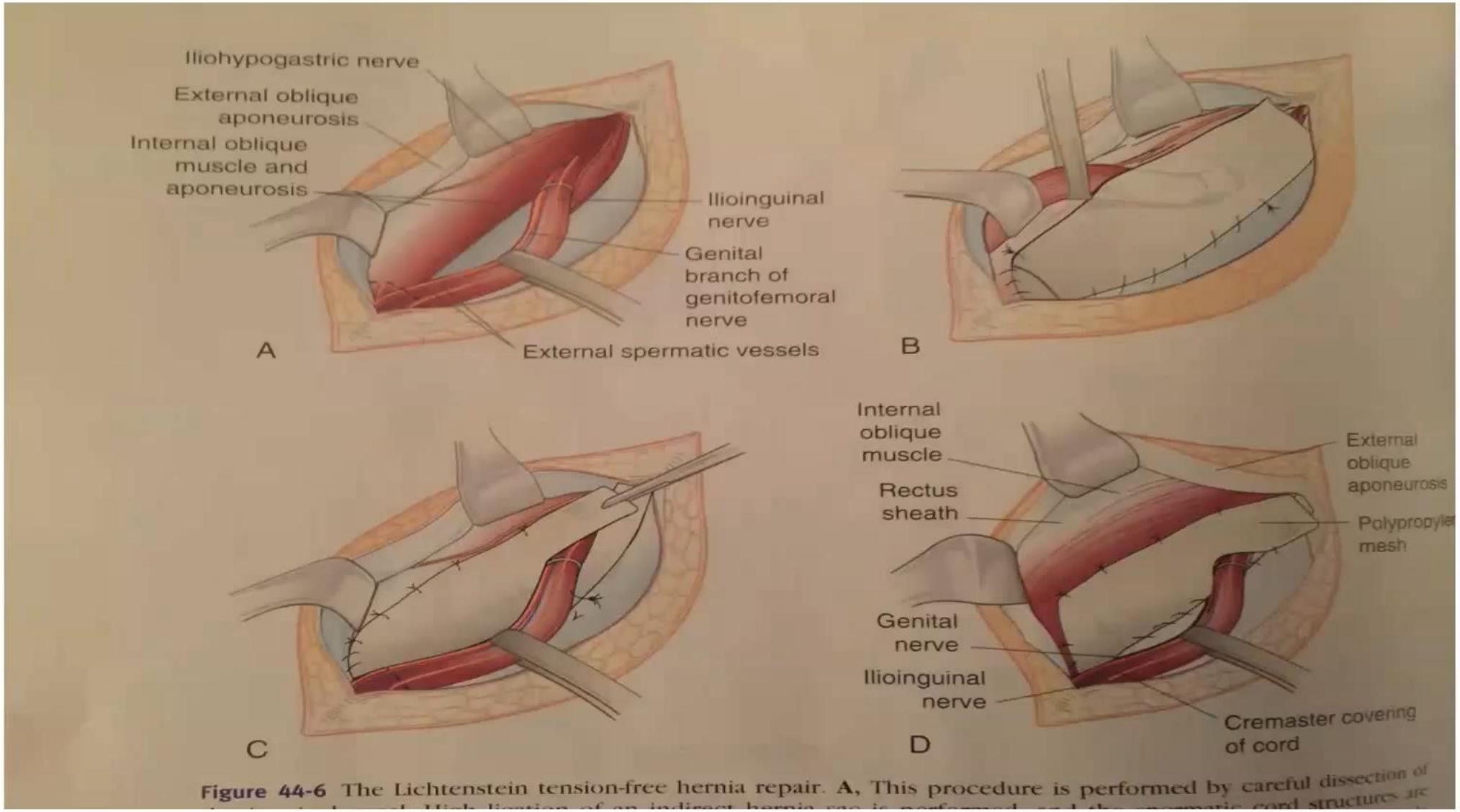


Figure 44-6 The Lichtenstein tension-free hernia repair. **A,** This procedure is performed by careful dissection of

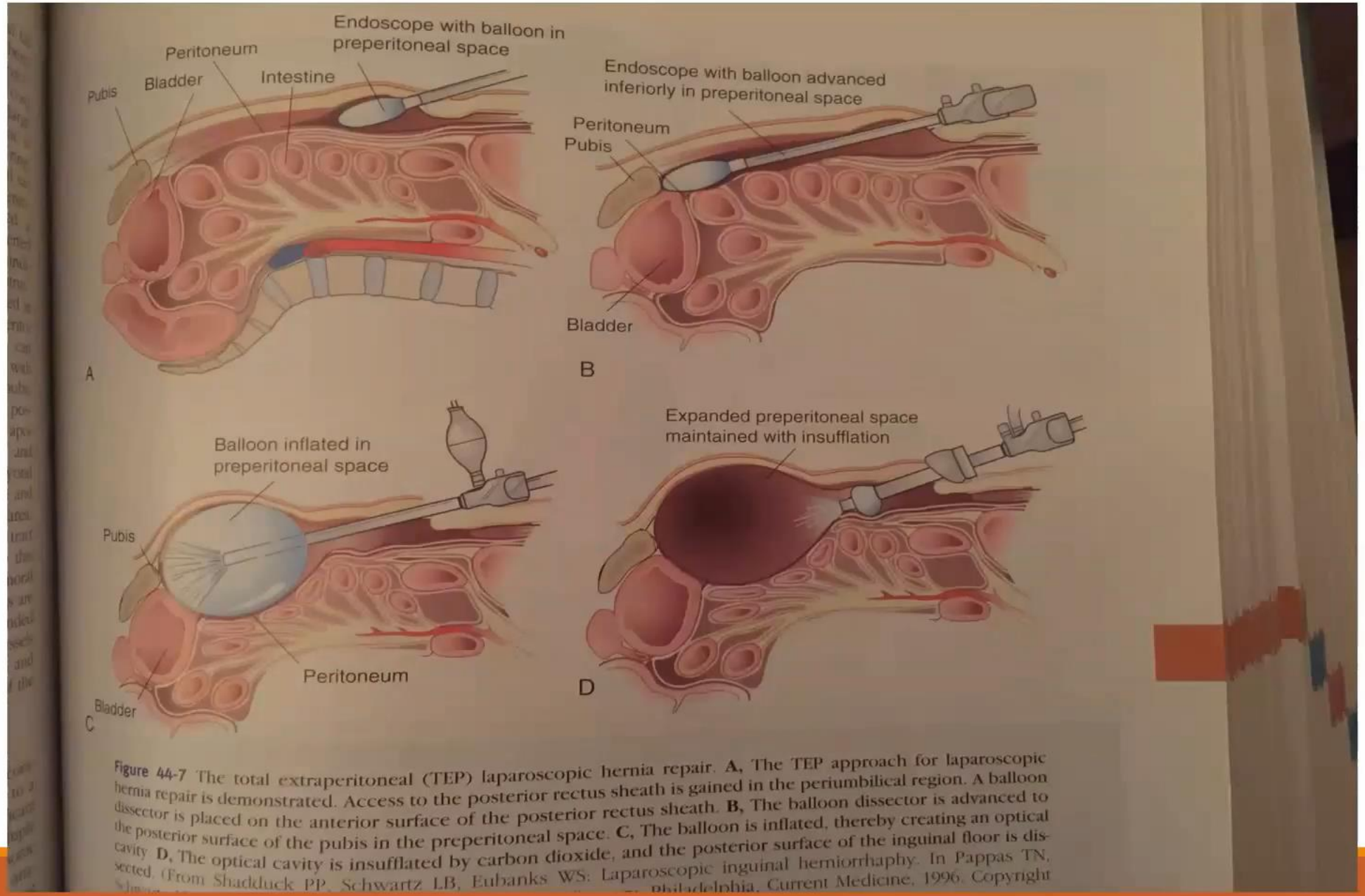
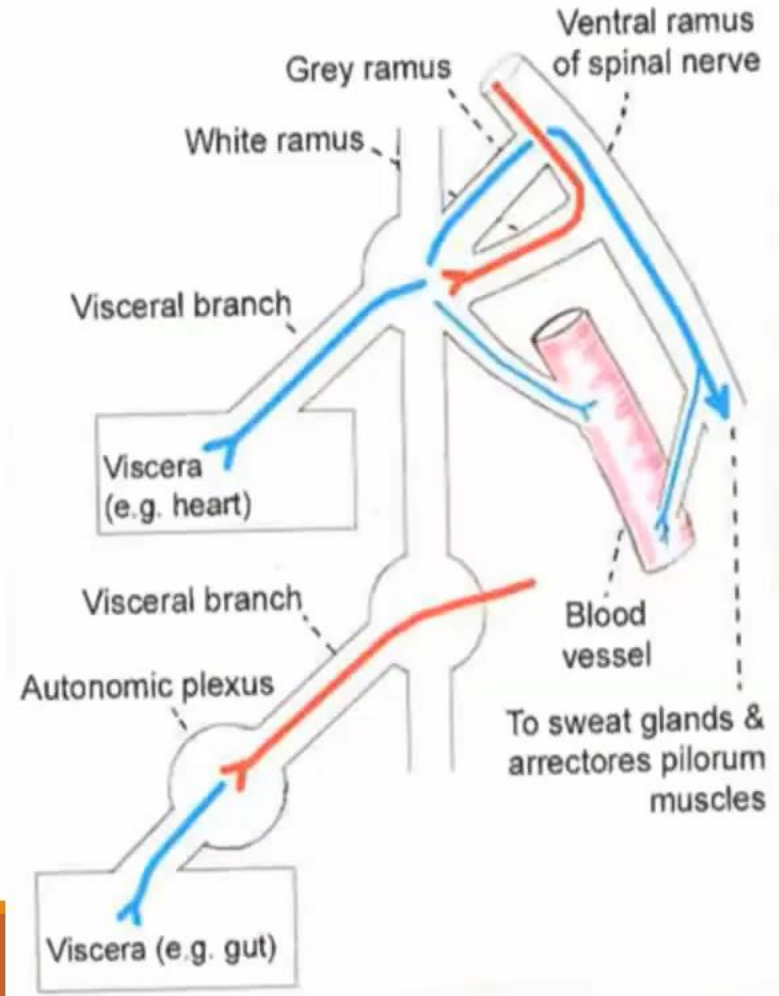


Figure 44-7 The total extraperitoneal (TEP) laparoscopic hernia repair. **A,** The TEP approach for laparoscopic hernia repair is demonstrated. Access to the posterior rectus sheath is gained in the periumbilical region. A balloon dissector is placed on the anterior surface of the posterior rectus sheath. **B,** The balloon dissector is advanced to the posterior surface of the pubis in the preperitoneal space. **C,** The balloon is inflated, thereby creating an optical cavity. **D,** The optical cavity is insufflated by carbon dioxide, and the posterior surface of the inguinal floor is dissected. (From Shadduck PP, Schwartz LB, Eubanks WS: Laparoscopic inguinal herniorrhaphy. In Pappas TN, [illegible] Philadelphia, Current Medicine, 1996. Copyright

- Course and termination of sympathetic postganglionic neurons



(**a**) They may terminate in relationship to cells of the sympathetic ganglion concerned.

(**b**) They may travel up or down the sympathetic trunk to terminate in ganglia at higher or lower levels in the trunk.

(**c**) They may leave the sympathetic trunk through one of its branches to terminate in relation to neurons located in a peripheral autonomic plexus.

Sympathetic postganglionic neurons are located primarily in ganglia located on the sympathetic trunks (Figs. 34.31, 34.32). Some are located in peripheral autonomic plexuses. Axons arising from them behave in one of the following ways (Fig. 34.33).

(**a**) The axons may pass through a grey ramus communicans to reach a spinal nerve. They then pass through the spinal nerve and its branches to innervate sweat glands and arrectores pilorum muscles of the skin in the region to which the nerve is distributed.

(**b**) The axons may reach a cranial nerve through a communicating branch and may be distributed through it as in the case of a spinal nerve.

(**c**) The axons may pass into vascular branches which form plexuses over the vessels and their branches. Some fibres from these plexuses may pass to other structures in the neighbourhood of the vessels. Fibres meant for blood vessels may also reach them through spinal nerves or their branches.

(**d**) The axons of postganglionic neurons located in sympathetic ganglia may travel through visceral branches and through autonomic plexuses to reach some viscera (e.g., the heart).

(**e**) The axons of postganglionic neurons located in peripheral autonomic plexuses innervate neighbouring viscera. These fibres often travel along blood vessels.

Confirm the connections described above in Fig. 34.33.

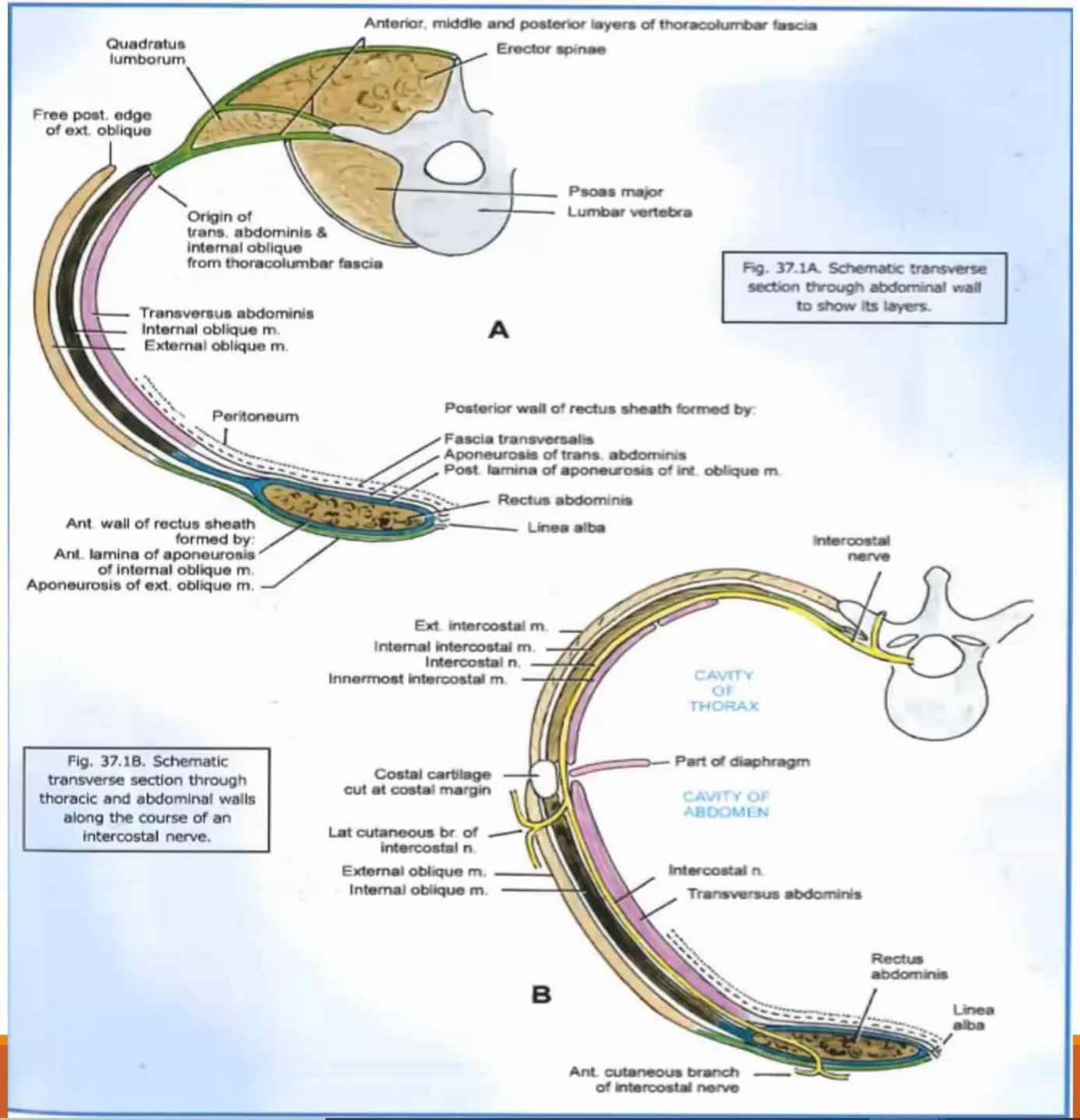
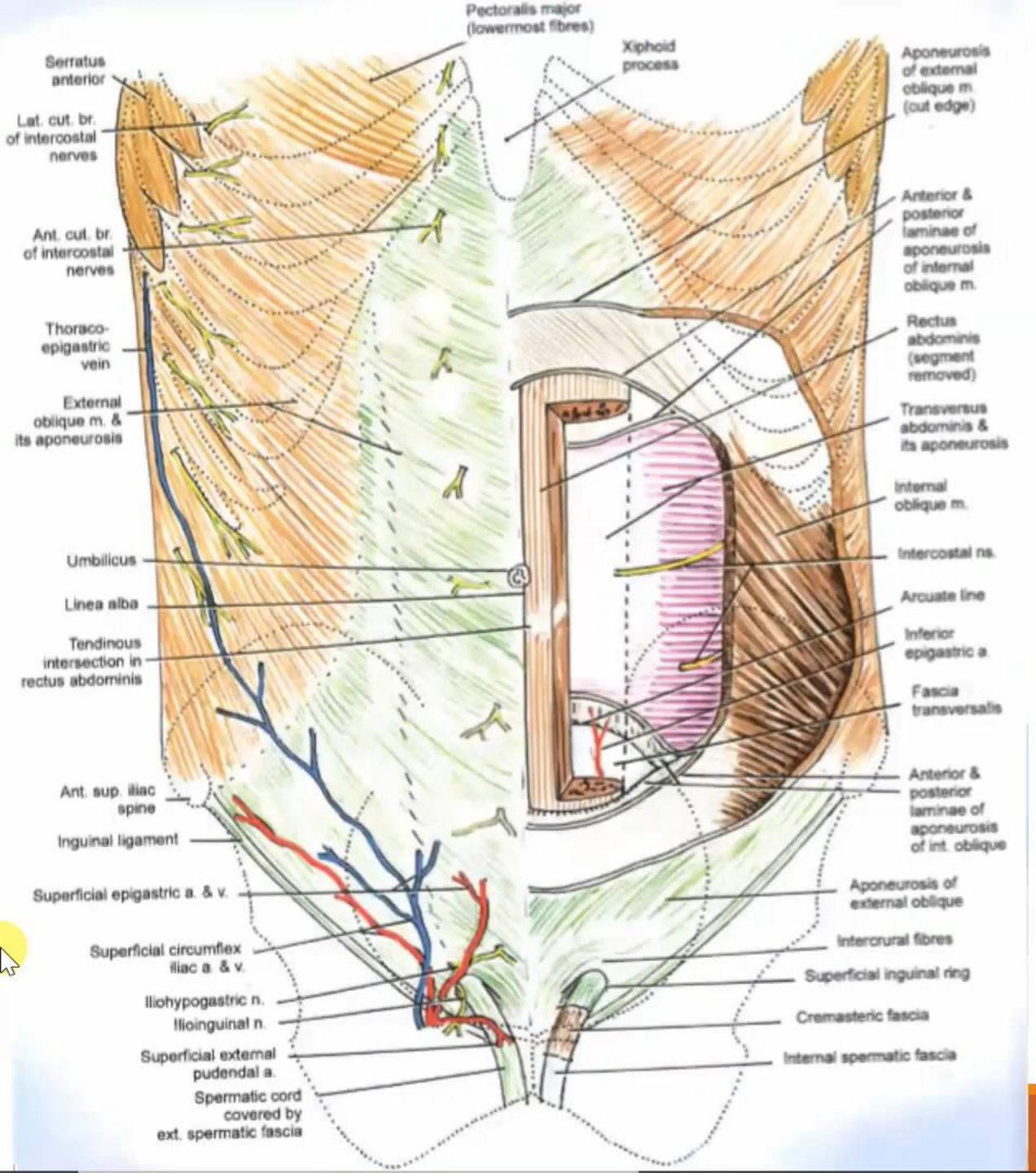
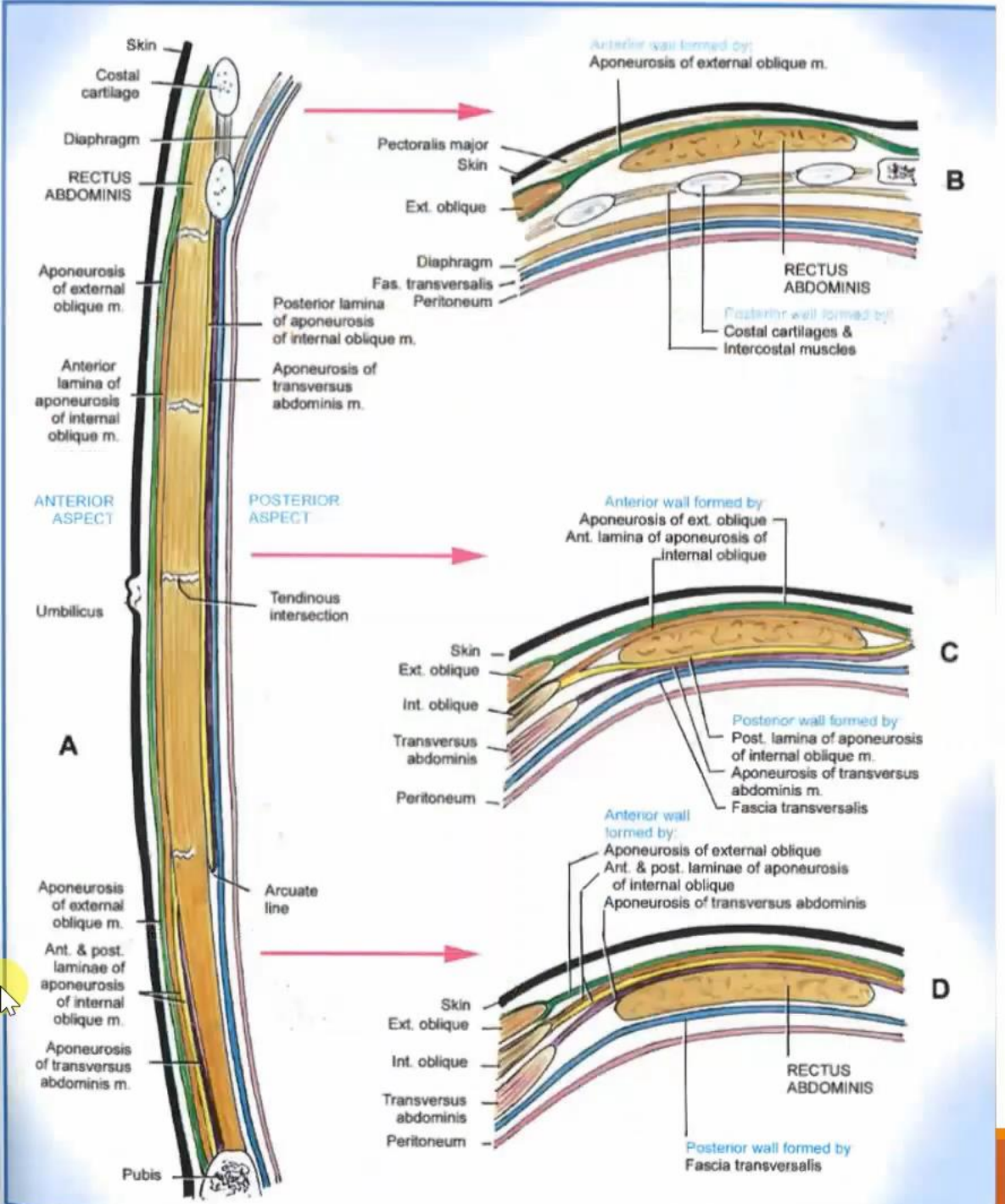


Fig. 37.1A. Schematic transverse section through abdominal wall to show its layers.

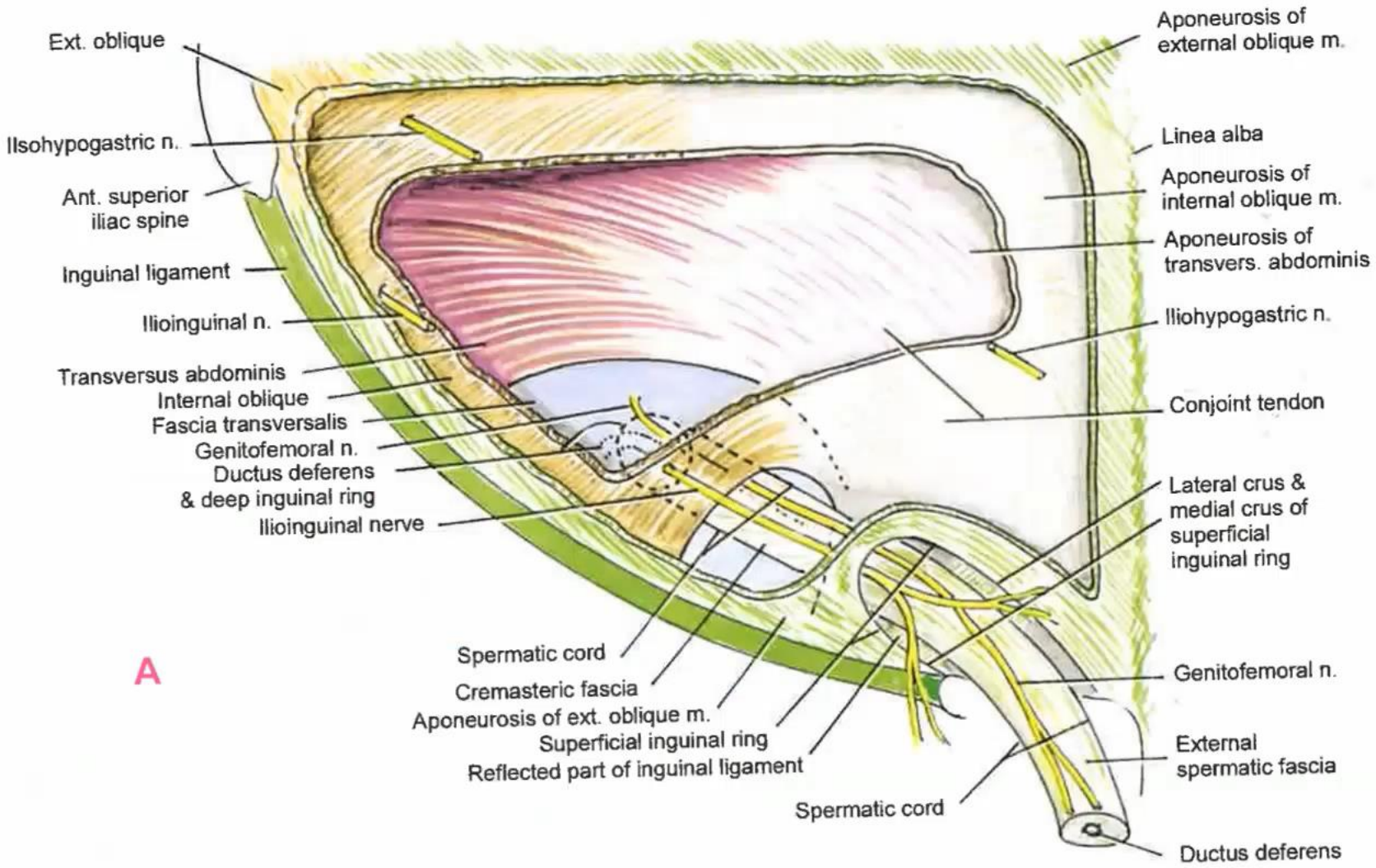
Fig. 37.1B. Schematic transverse section through thoracic and abdominal walls along the course of an intercostal nerve.



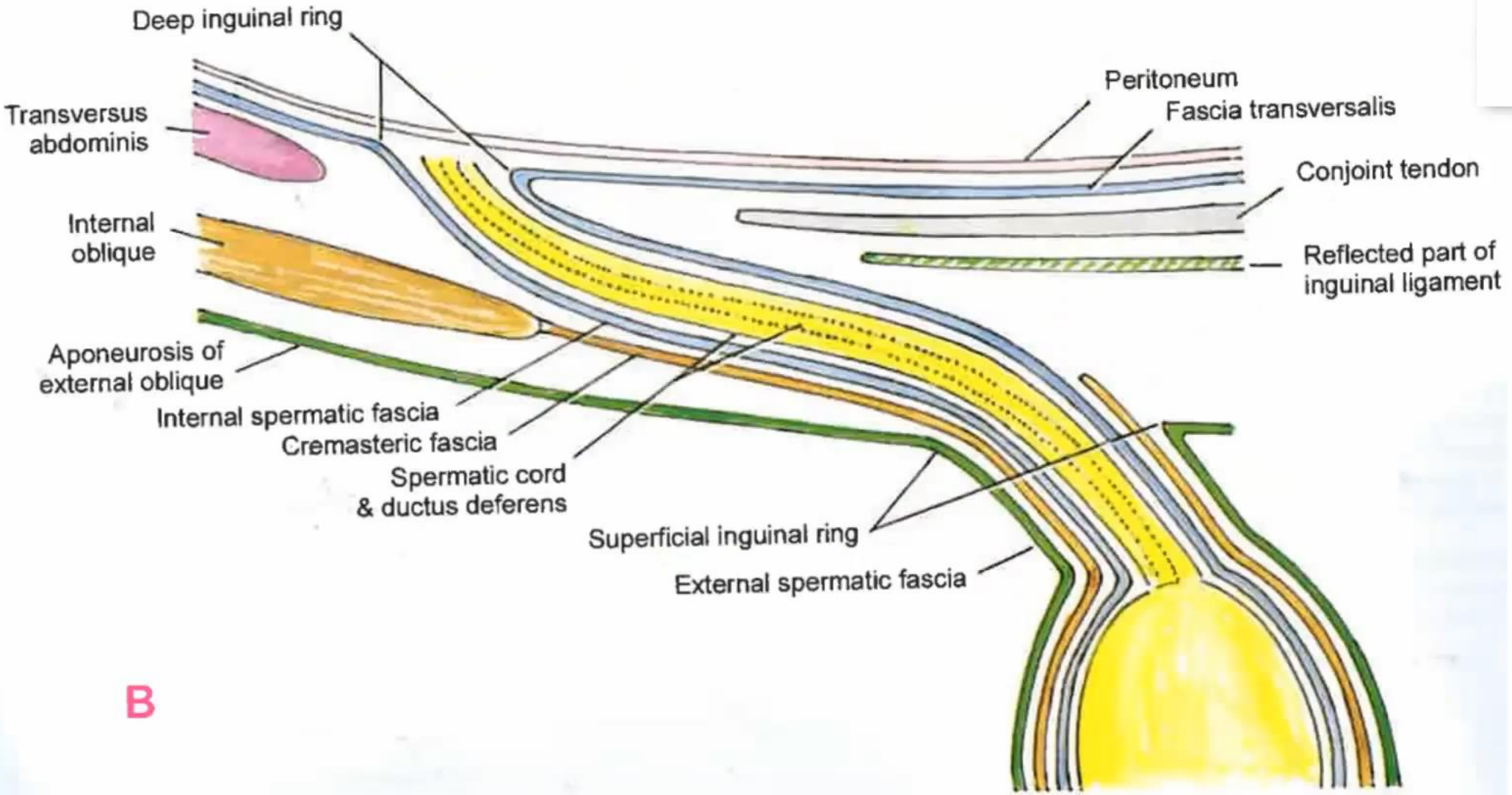
- Abdomen and Pelvis
- Anterior abdominal wall. In the left of the figure (representing right half of the body) skin and fasciae have been removed to expose the external oblique muscle and its aponeurosis. In the right half of the figure windows have been cut to display successive layers of the wall



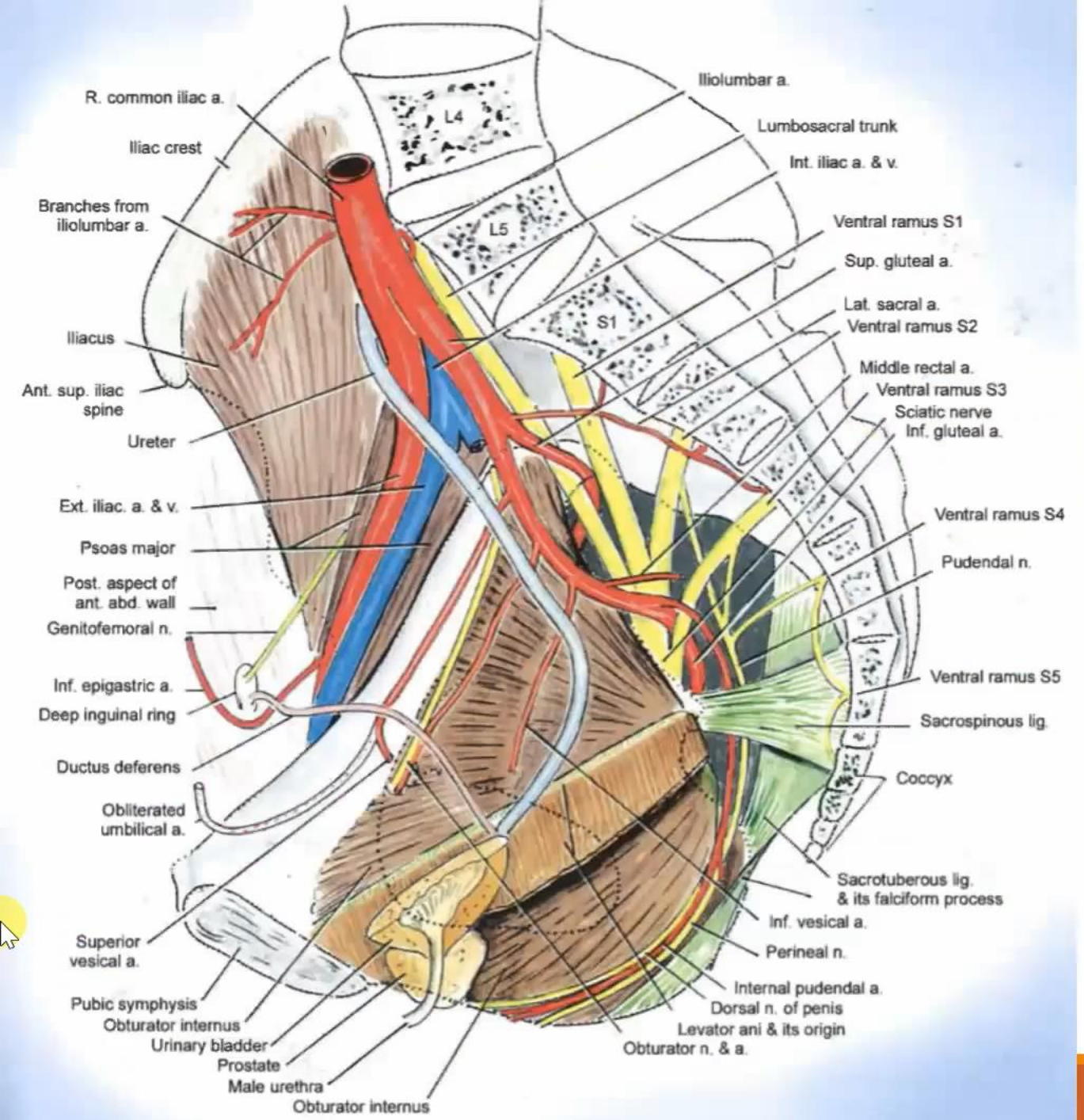
- Fig. A.
  - ✓ Schematic vertical section through the rectus abdominis muscle and its sheath.
- Figs. B,C & D.
  - ✓ Transverse sections through the rectus abdominis muscle and its sheath at upper, middle and lower levels.



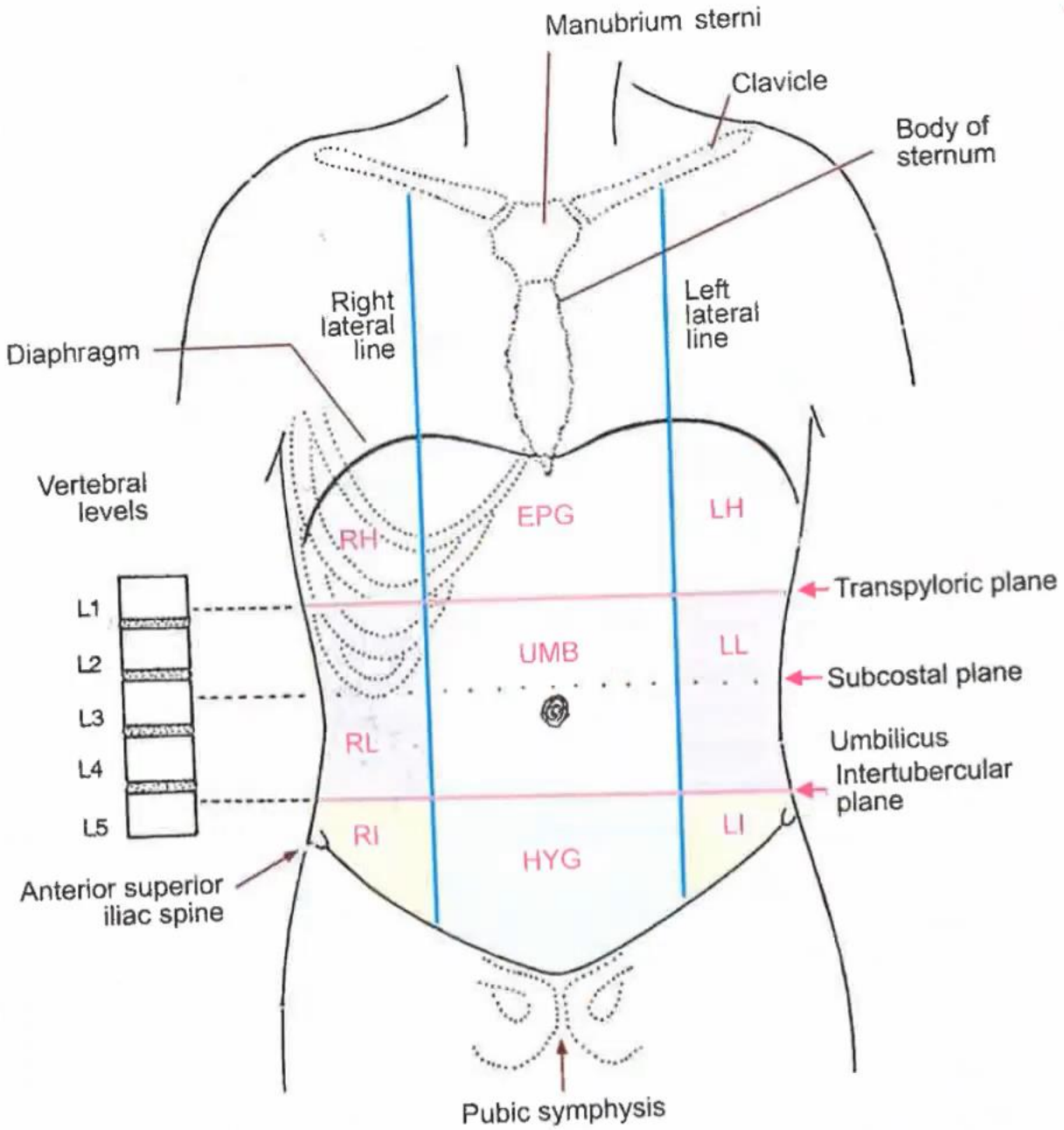
- Fig. A.
  - ✓ Dissection of lower part of anterior abdominal wall to show the inguinal canal.



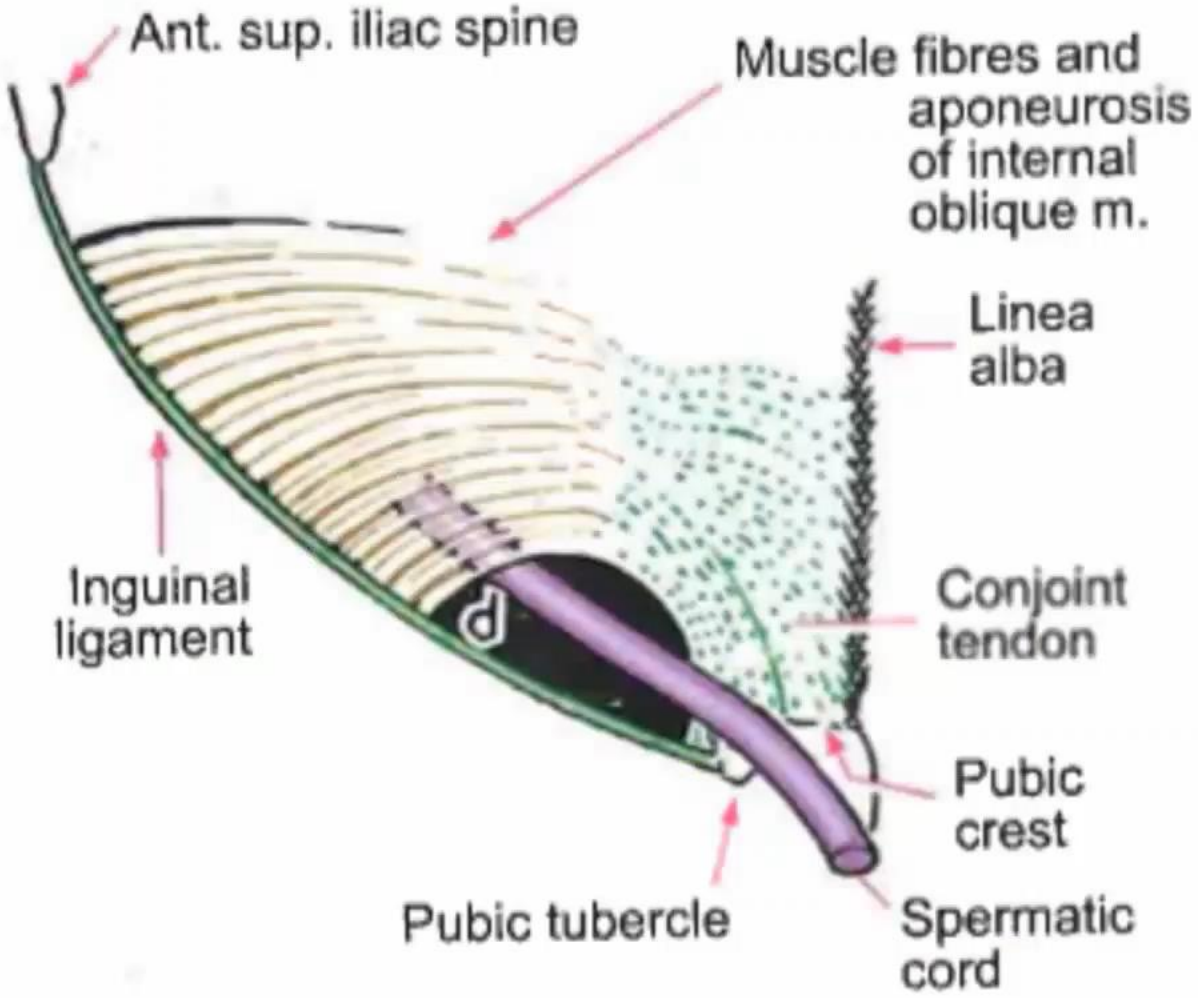
- Fig. B.
  - ✓ Scheme to show the coverings of the spermatic cord and of the testis.



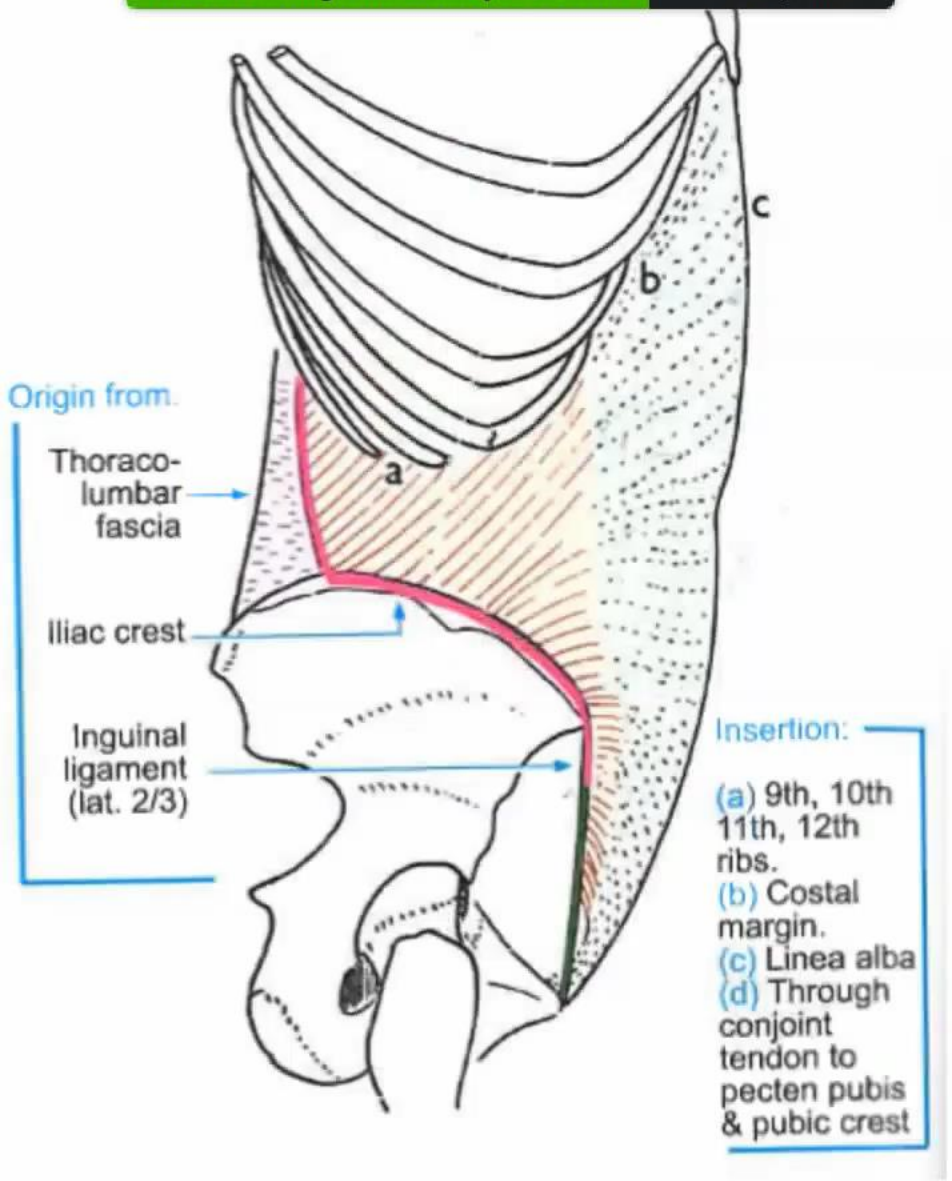
- Right half of pelvis showing structures in its wall. Most of the levator ani, and the coccygeus, have been removed. The grey shaded areas above and below the sacrospinous ligament are the greater and lesser sciatic foramina respectively. Most of the greater sciatic foramen is filled in by the piriformis which is not shown for sake of clarity.



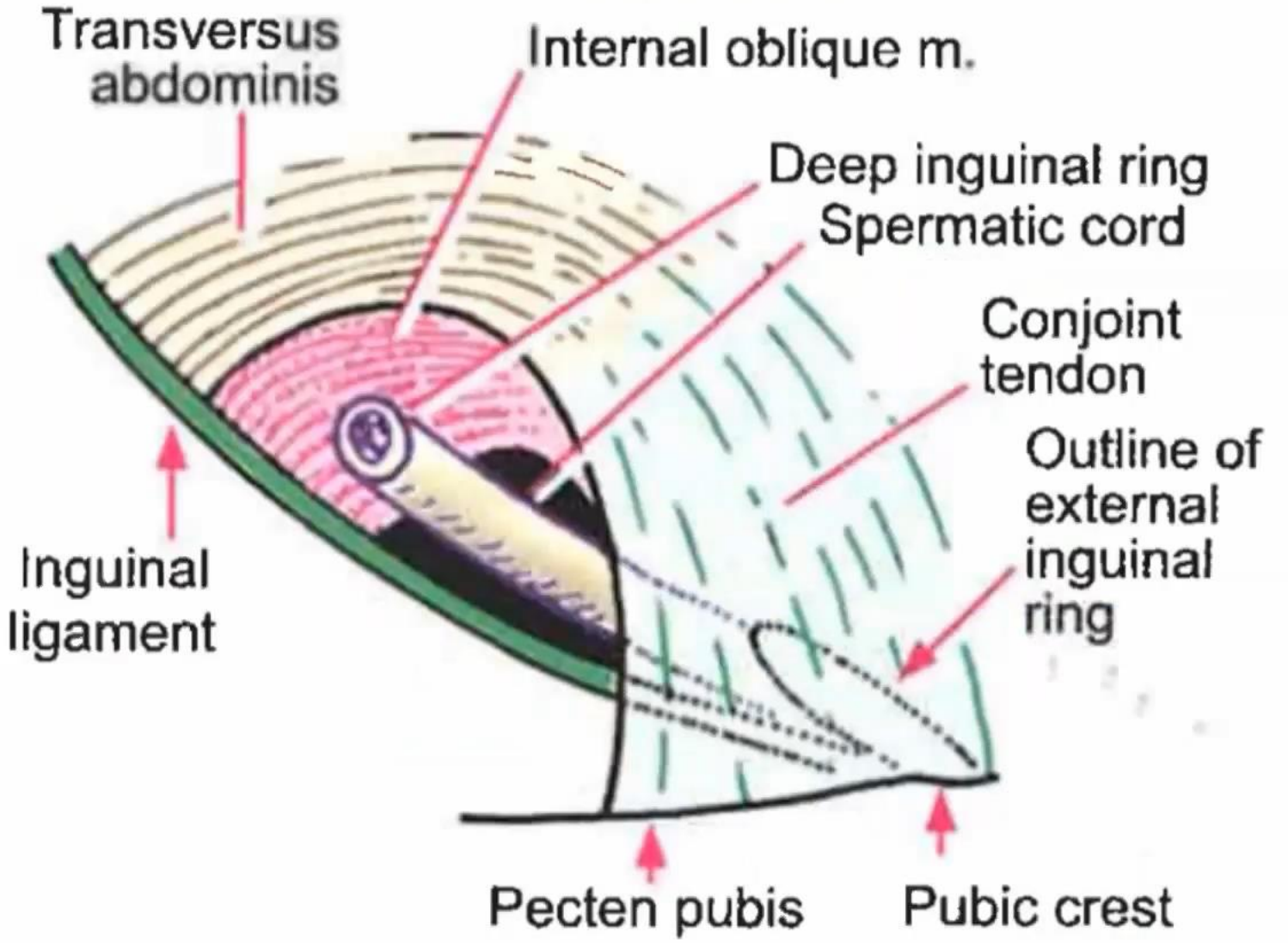
- Regions of the abdomen and the lines demarcating them.



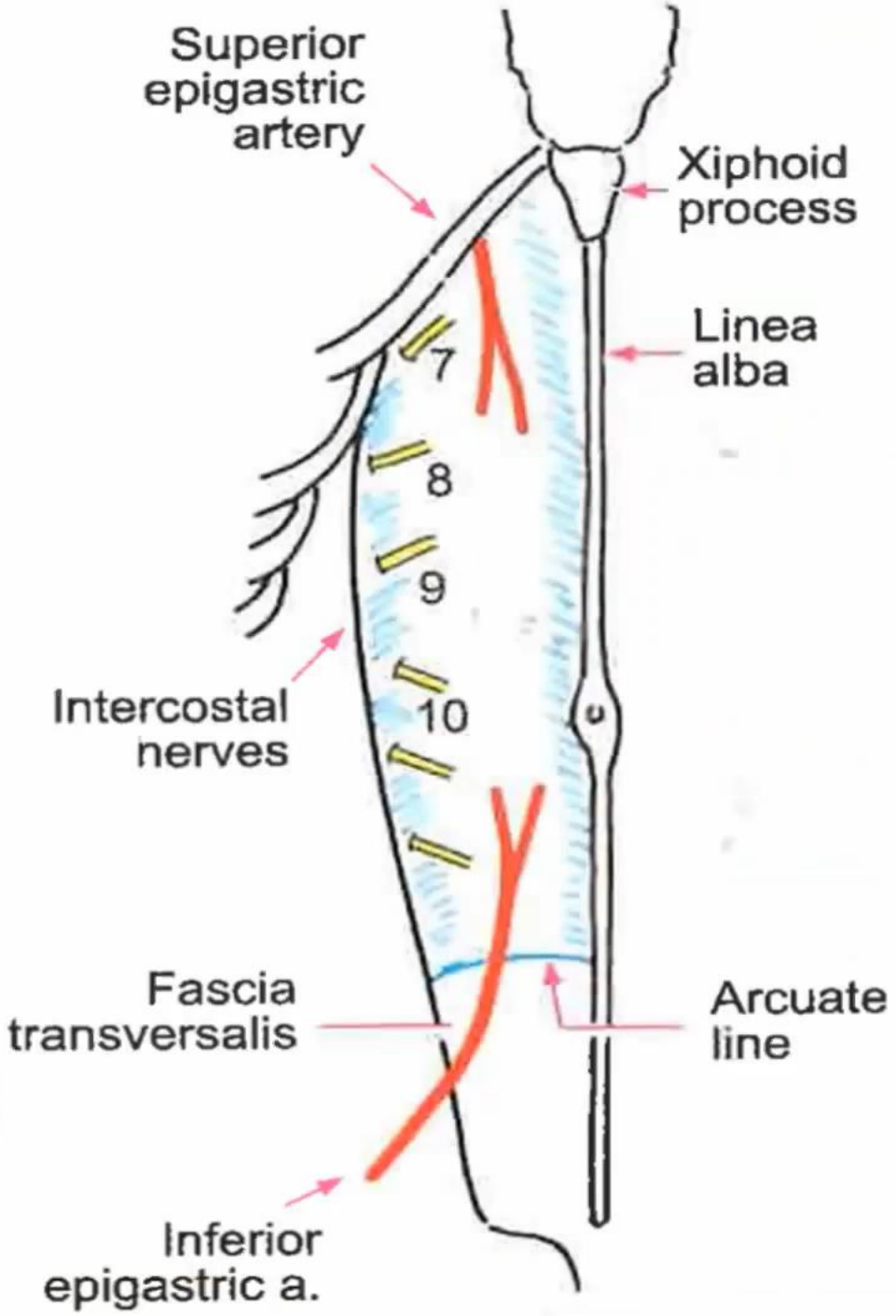
- Diagram to show relationship of the internal oblique muscle to the inguinal canal.



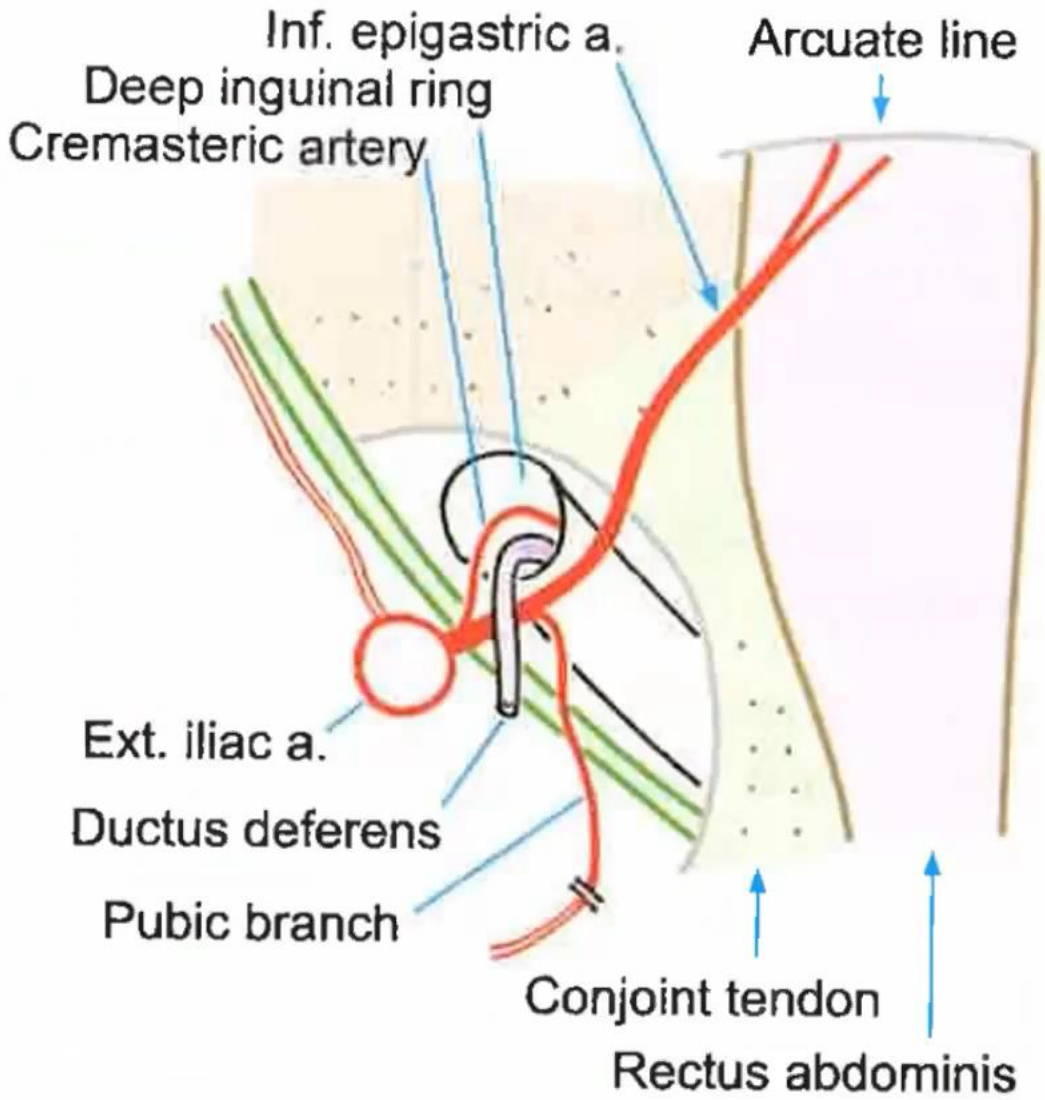
- Lateral view of the trunk to show attachments of the internal oblique muscle of the abdomen.



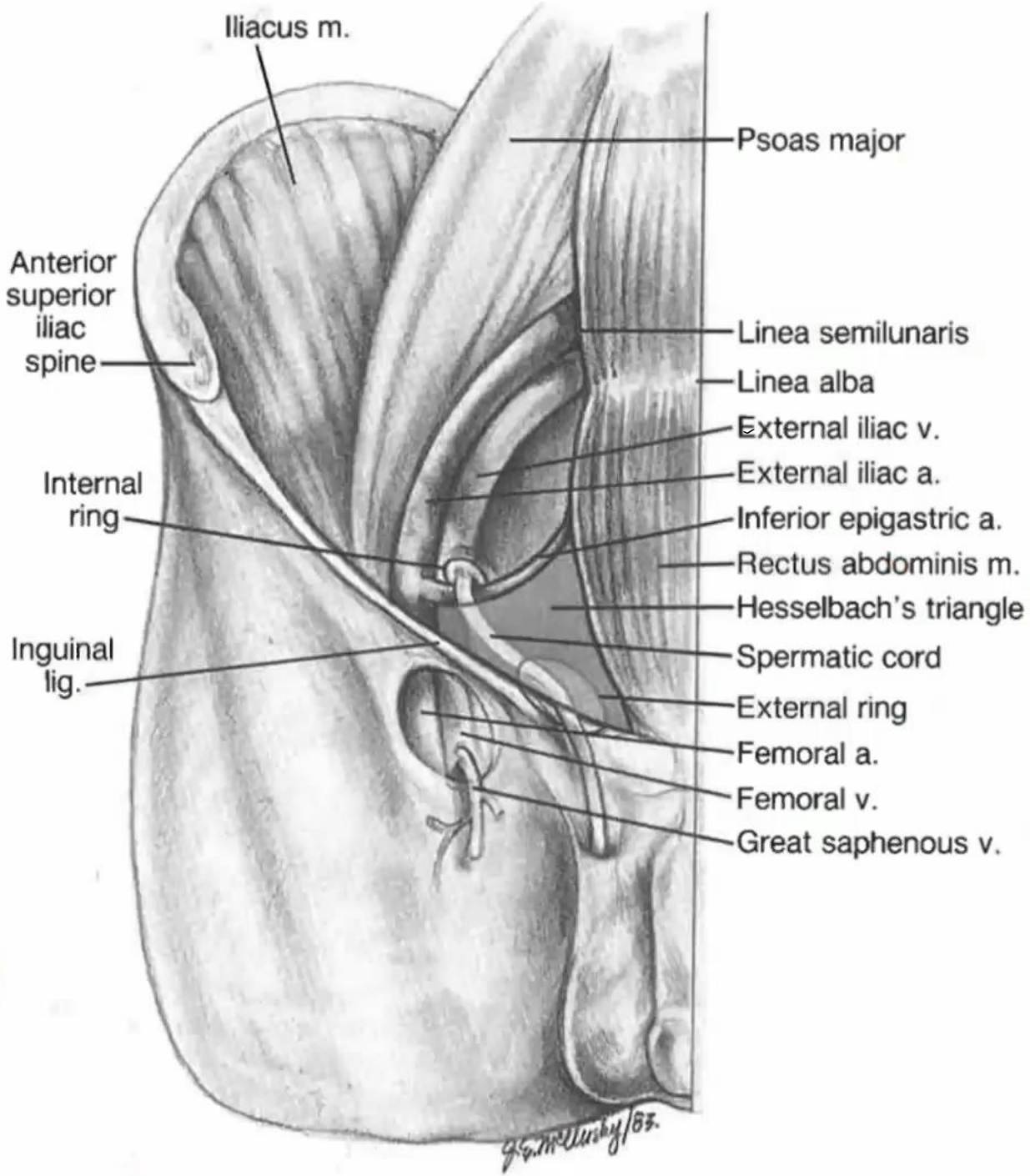
- Inguinal canal seen from behind.



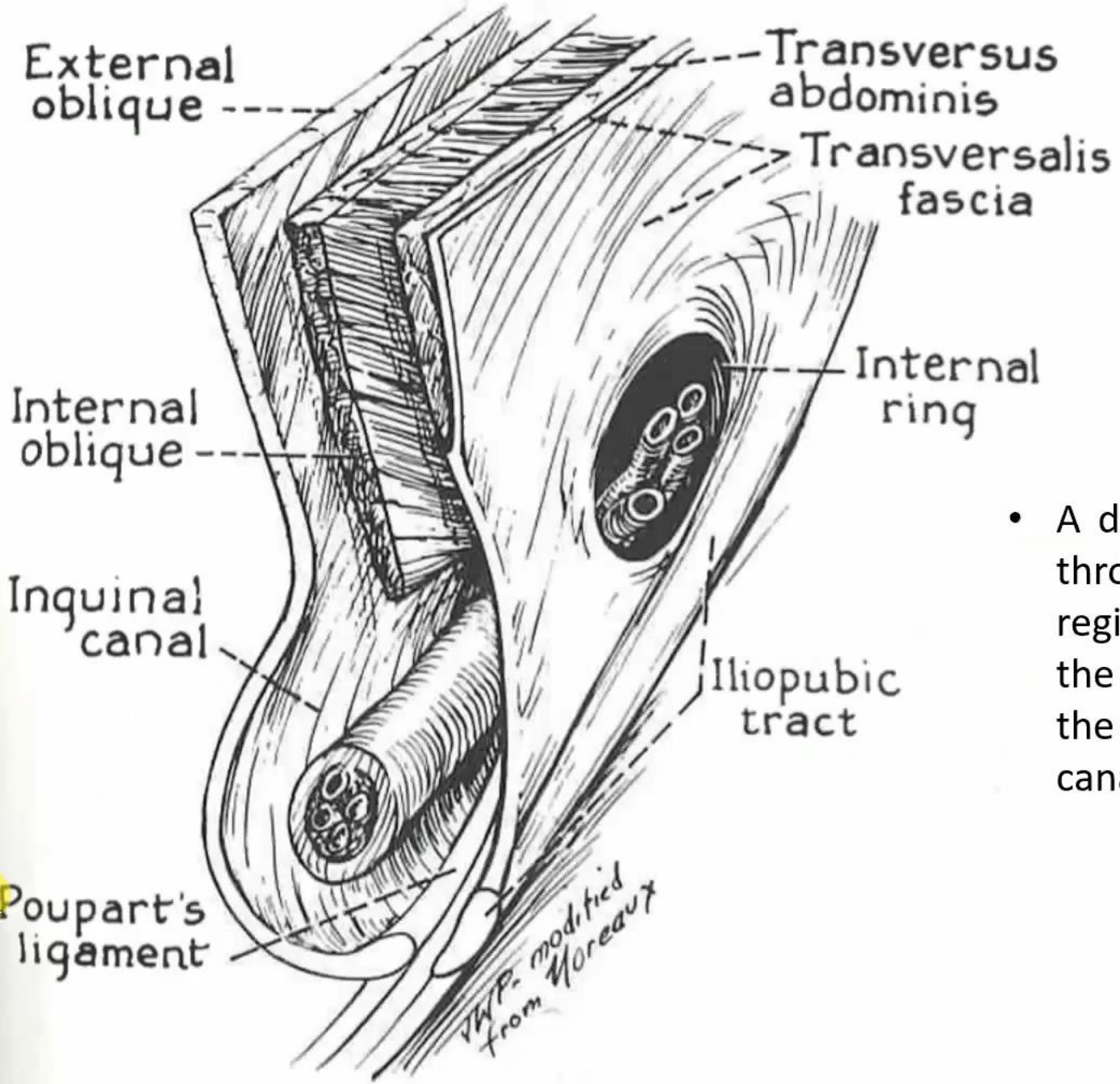
- Diagram showing contents of the rectus sheath.



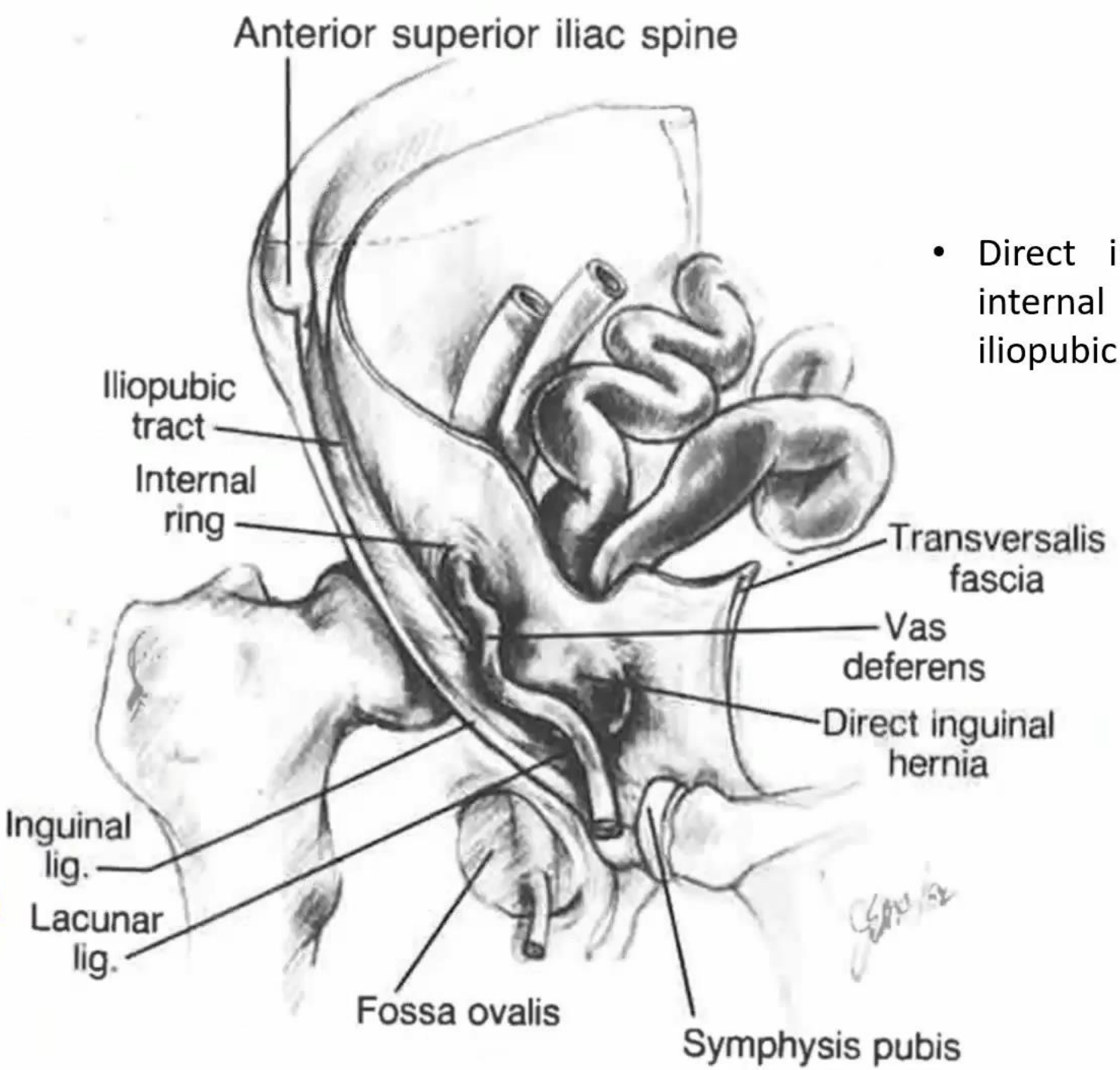
- Scheme to show the course of the inferior epigastric artery. The inguinal region and the lower part of the anterior abdominal wall are viewed from behind.



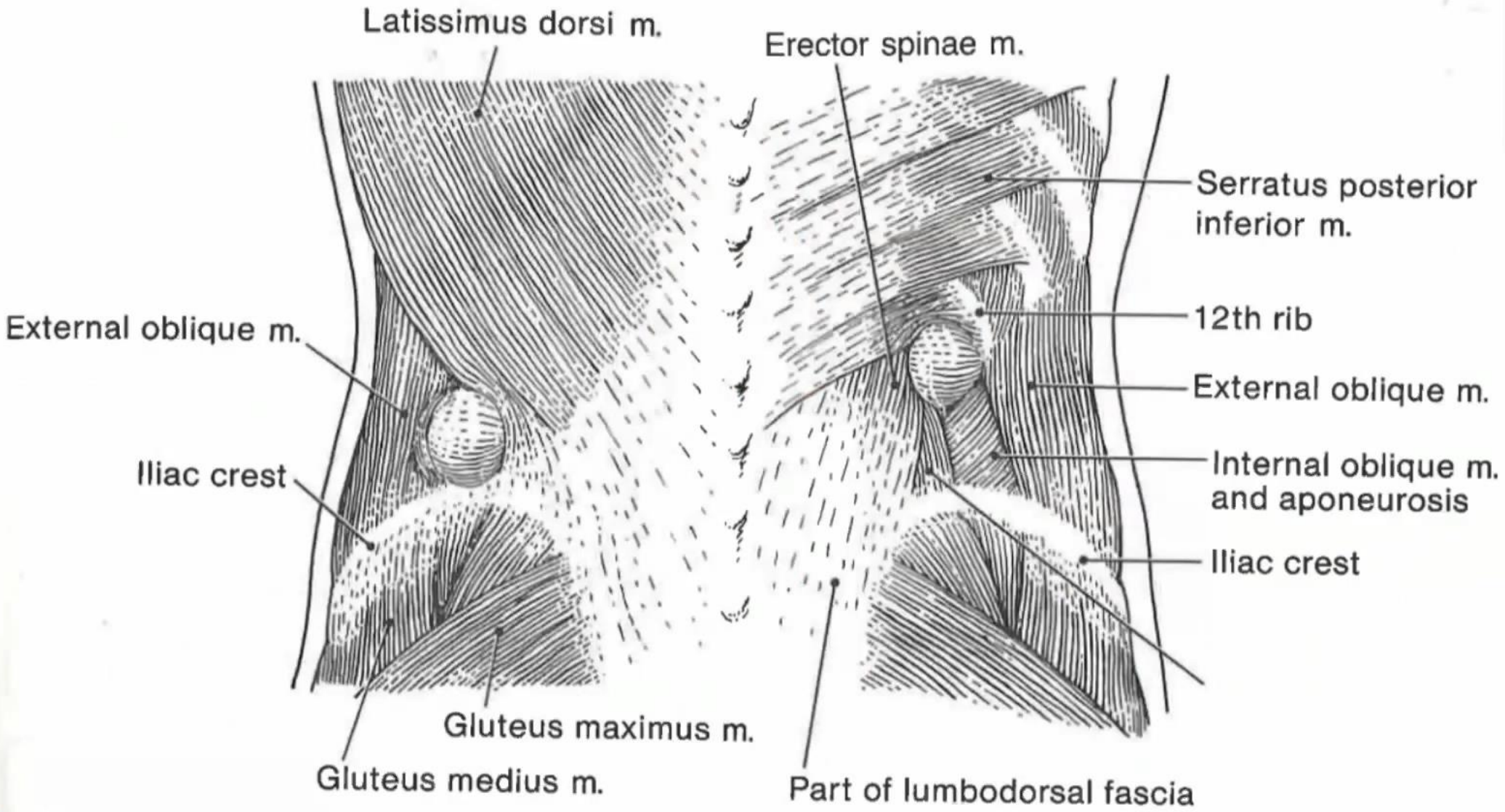
- Hesselbach's triangle is the site of direct inguinal hernia. The medial border of the triangle is the lateral border of the rectus abdominis muscle, the site of supravesical hernia



- A diagrammatic parasagittal section through the right mid-inguinal region illustration the separation of the musculoaponeurotic lamina into the anterior and posterior inguinal canal.

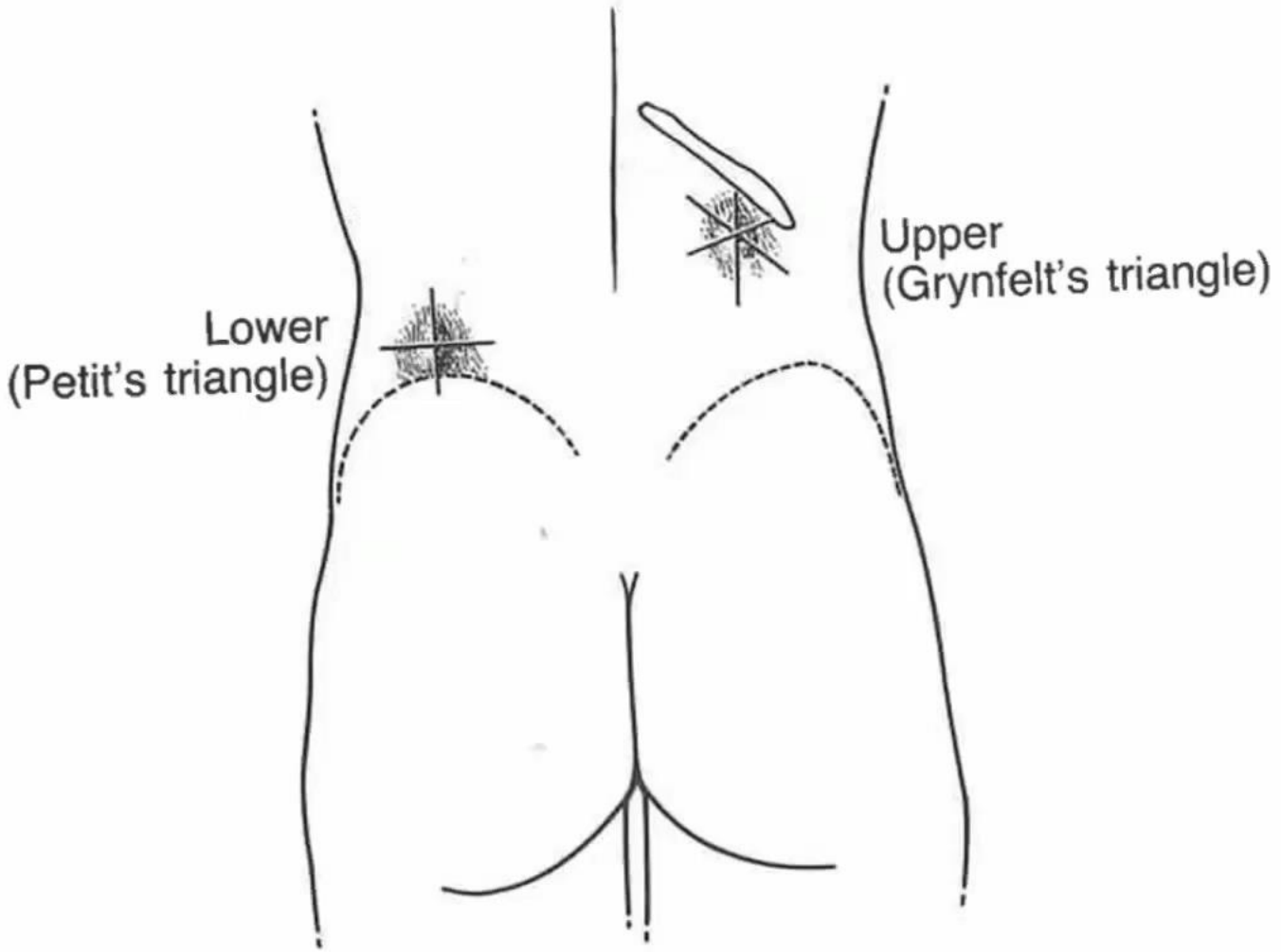


- Direct inguinal hernia. Note the internal inguinal ring and the iliopubic tract.



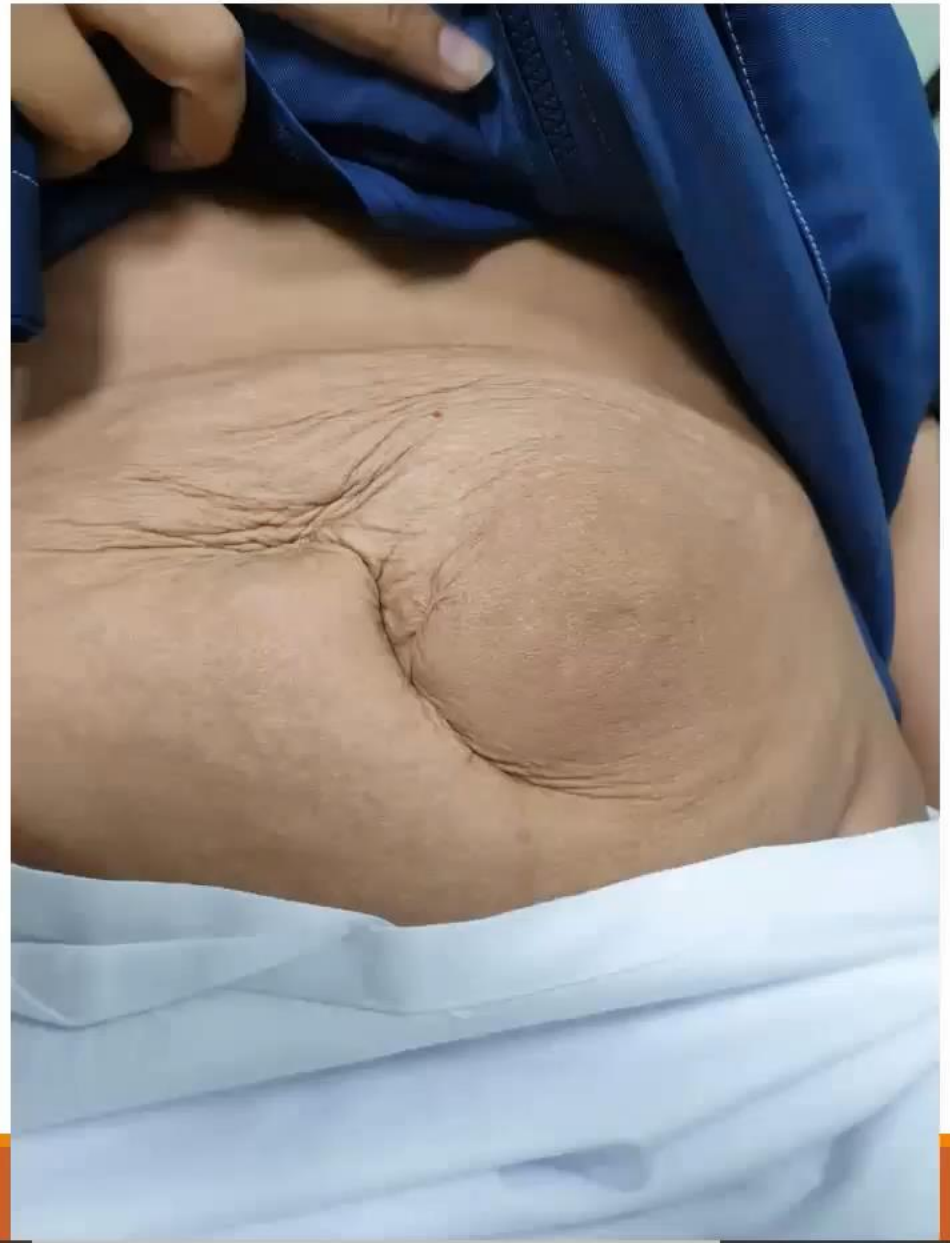
- ***Left:*** An inferior hernia through Petit's triangle. The base of the triangle is formed by the iliac crest. ***Right:*** A superior hernia through Grynfelt's triangle. The base of the inverted triangle is formed by the twelfth rib.

Incisions:



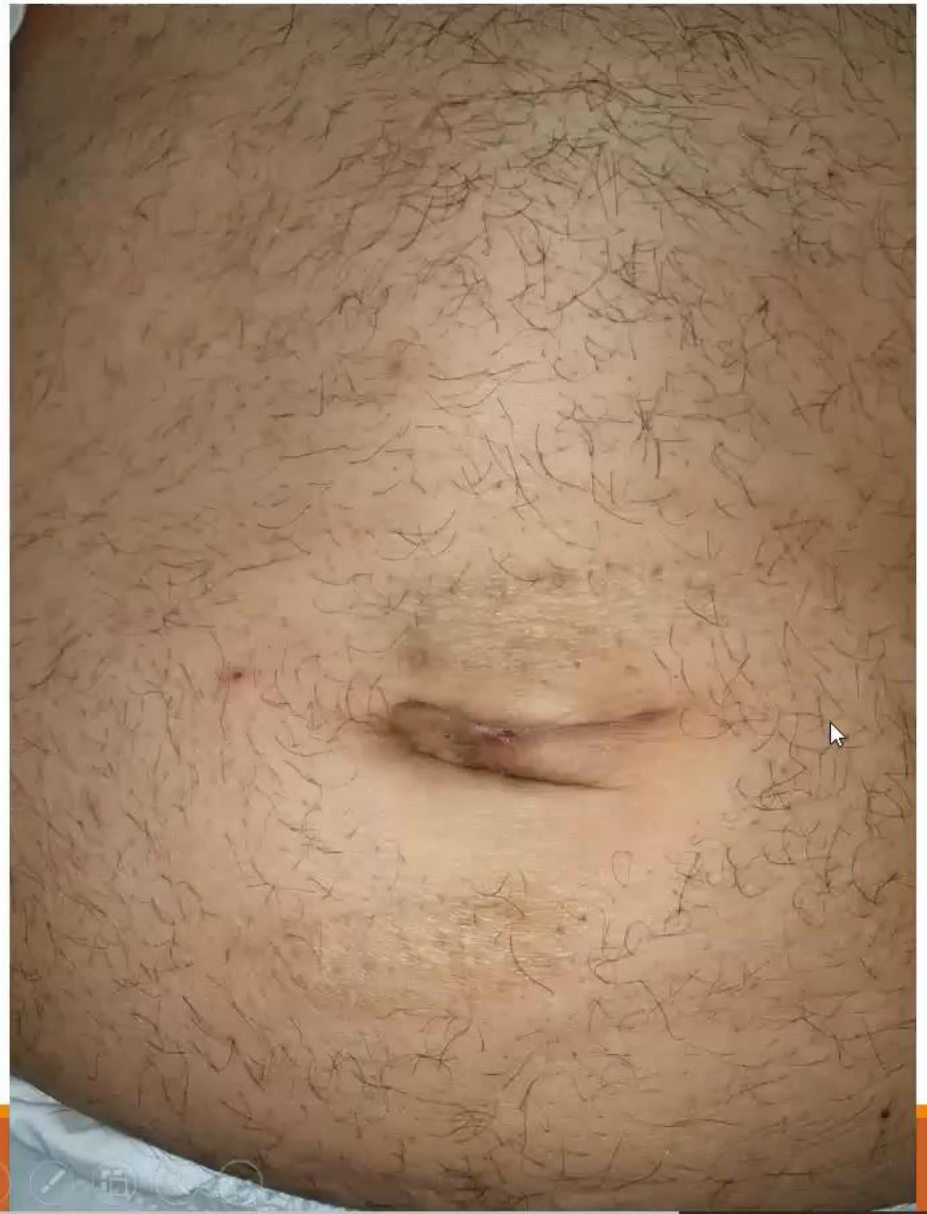
Step 1. Make an incision, oblique or vertical, over the hernia site. Remember that in the upper hernia, the sac lies beneath skin, superficial fascia, and latissimus dorsi muscle; in the lover hernia, there is no layer of muscle.

Picture:



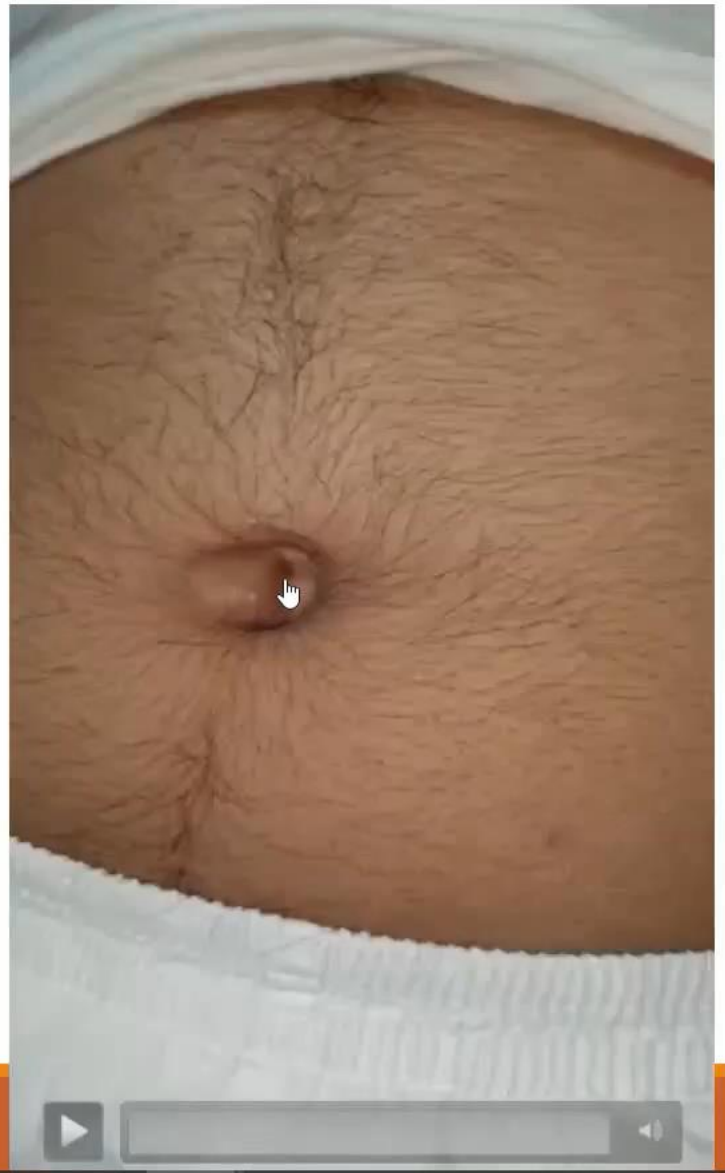
Video:

Pictures:



Picture:

Video:



SRC CENTER OF EXCELLENCE METABOLIC & BARIATRIC SURGERY

SRC CENTER OF EXCELLENCE HERNIA SURGERY

SRC CENTER OF EXCELLENCE MINIMALLY INVASIVE SURGERY

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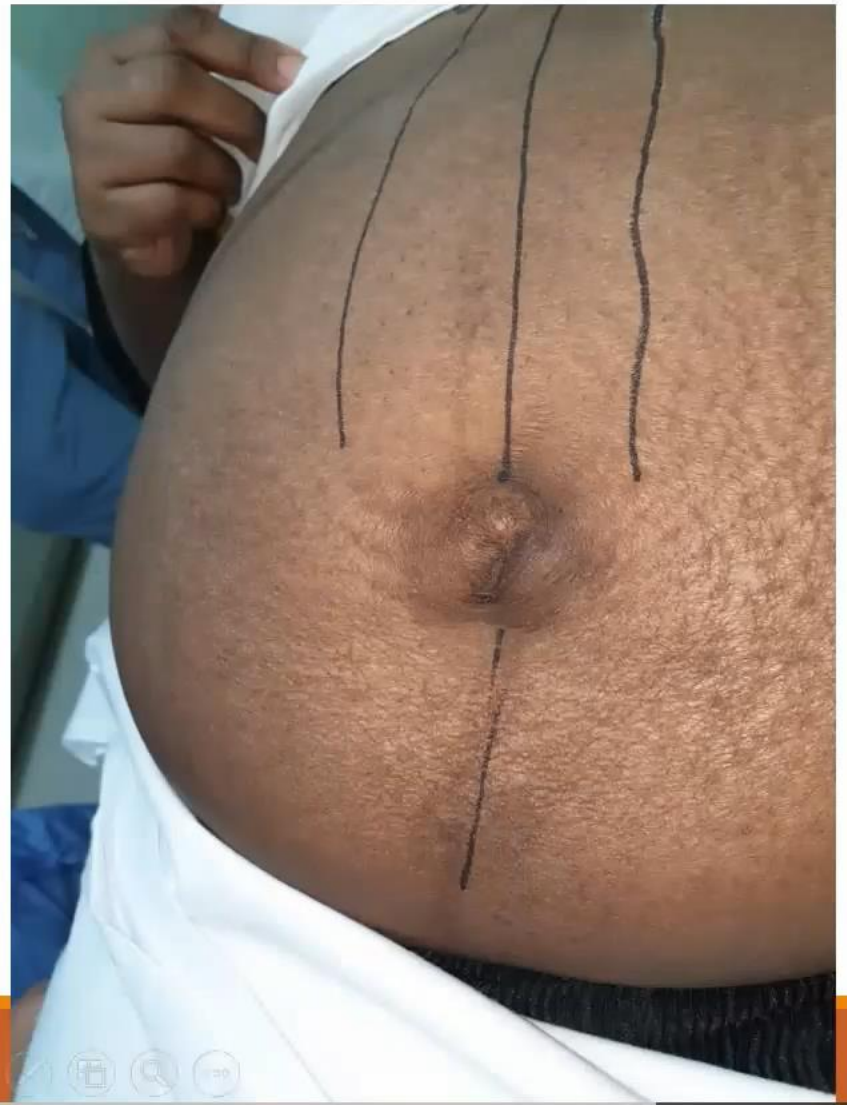
Video:

Pictures:

Picture:



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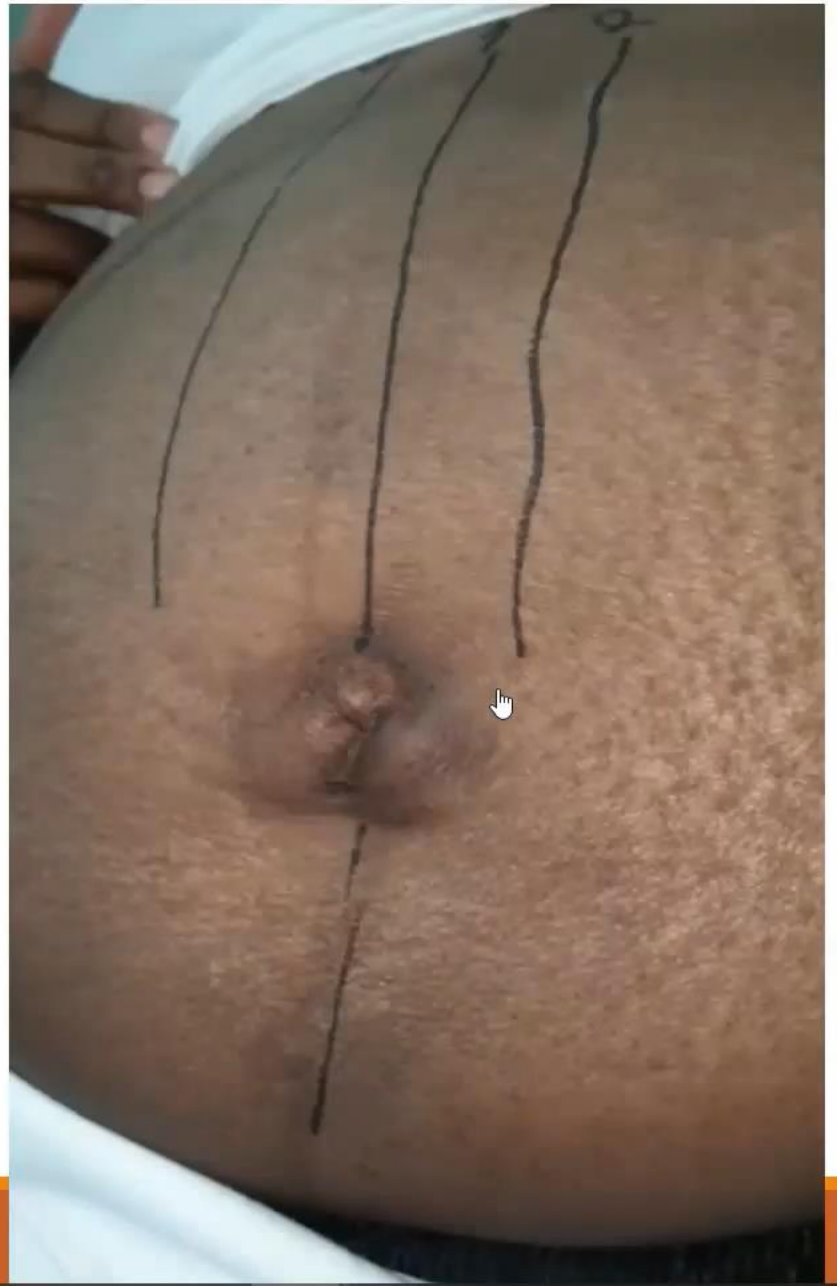

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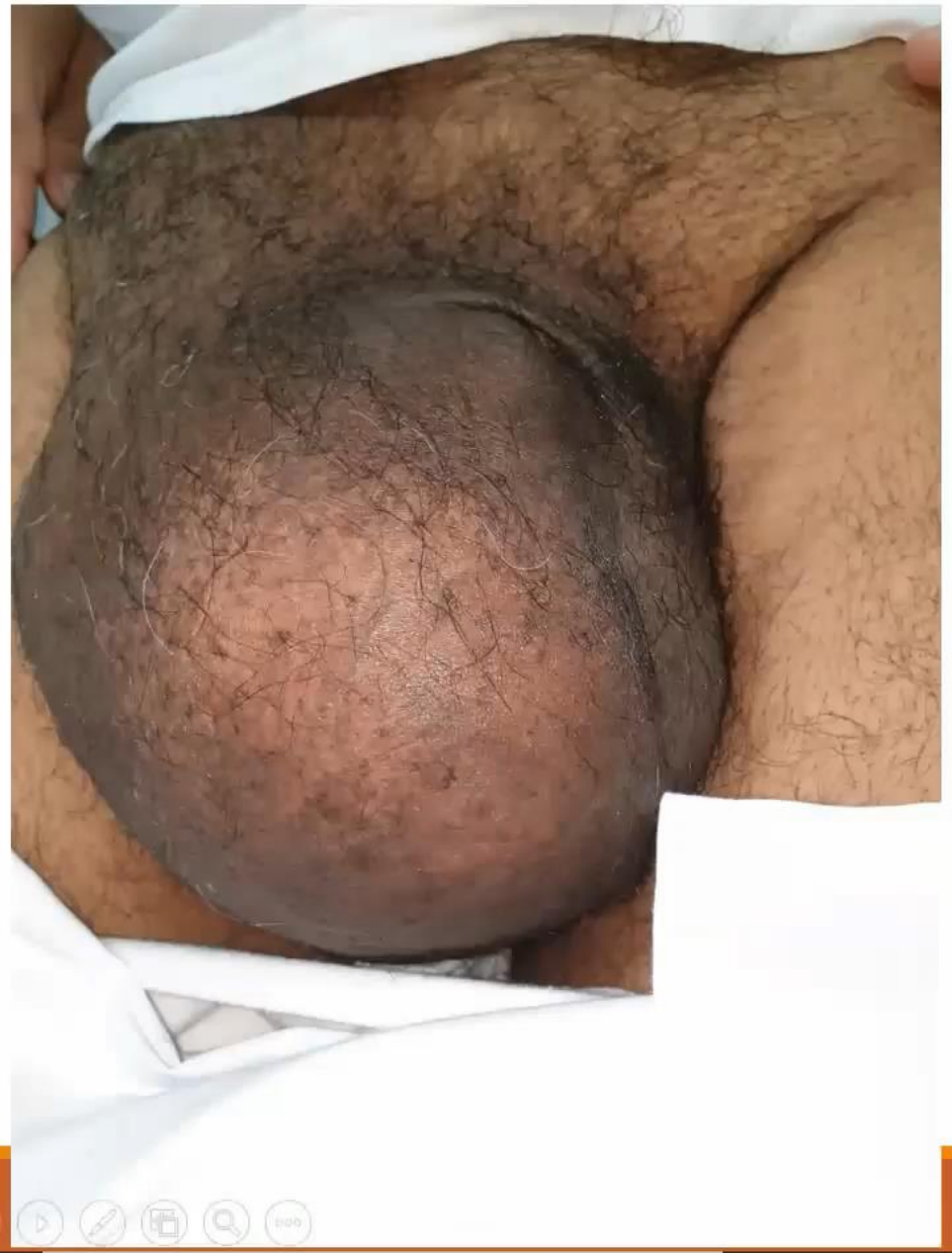

Picture:

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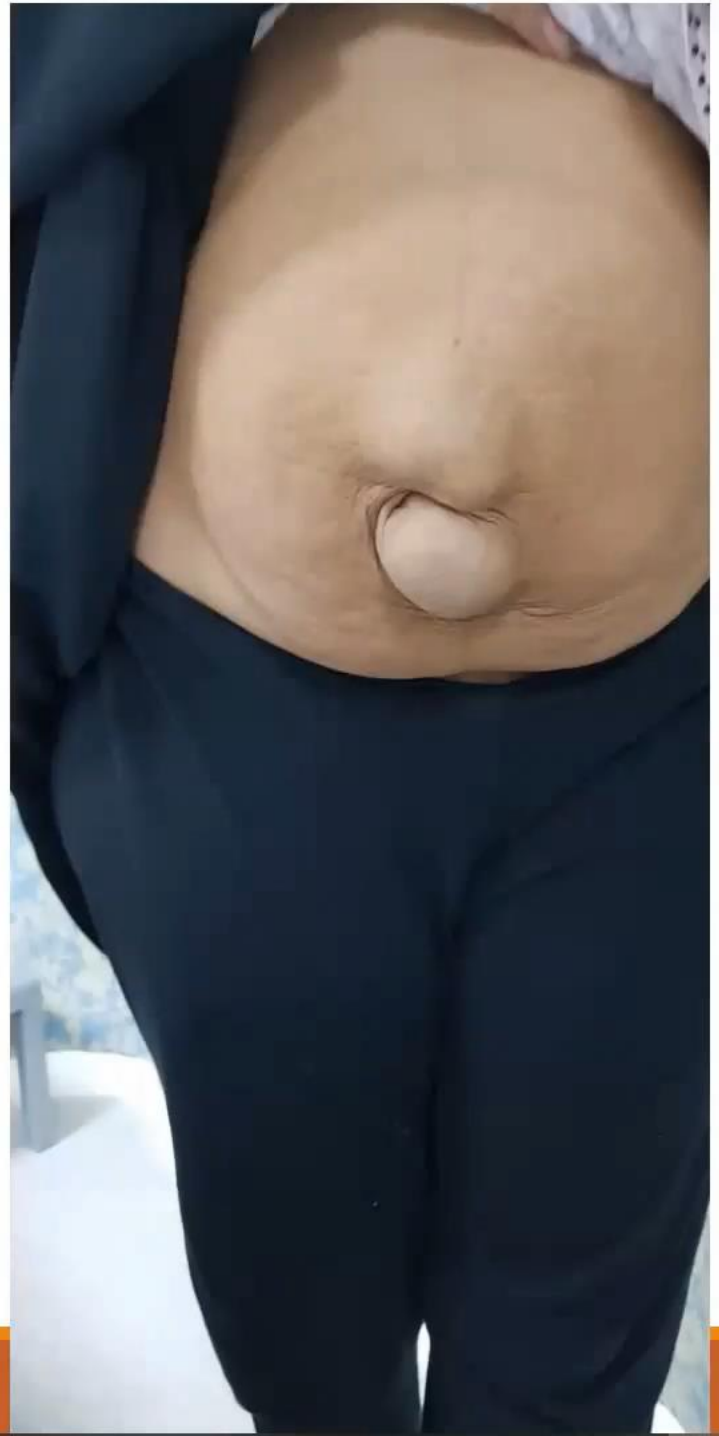

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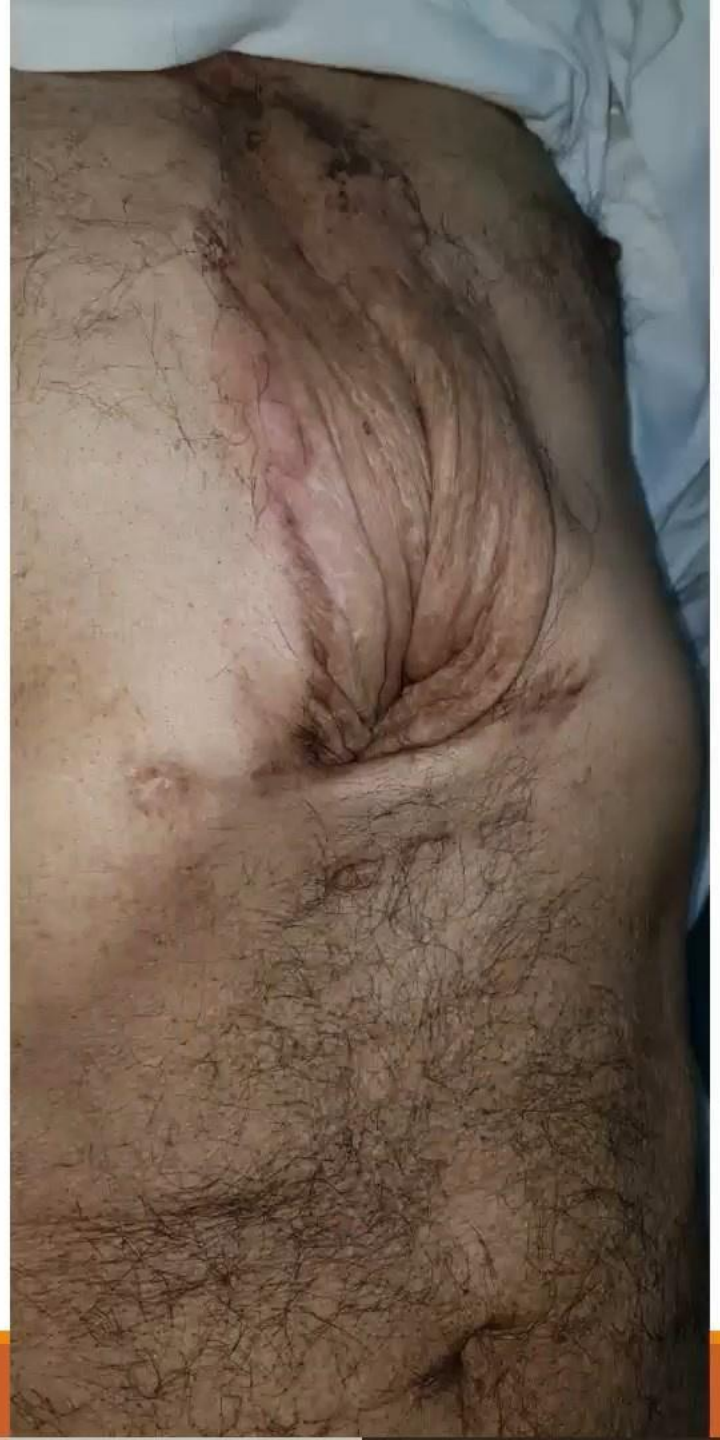

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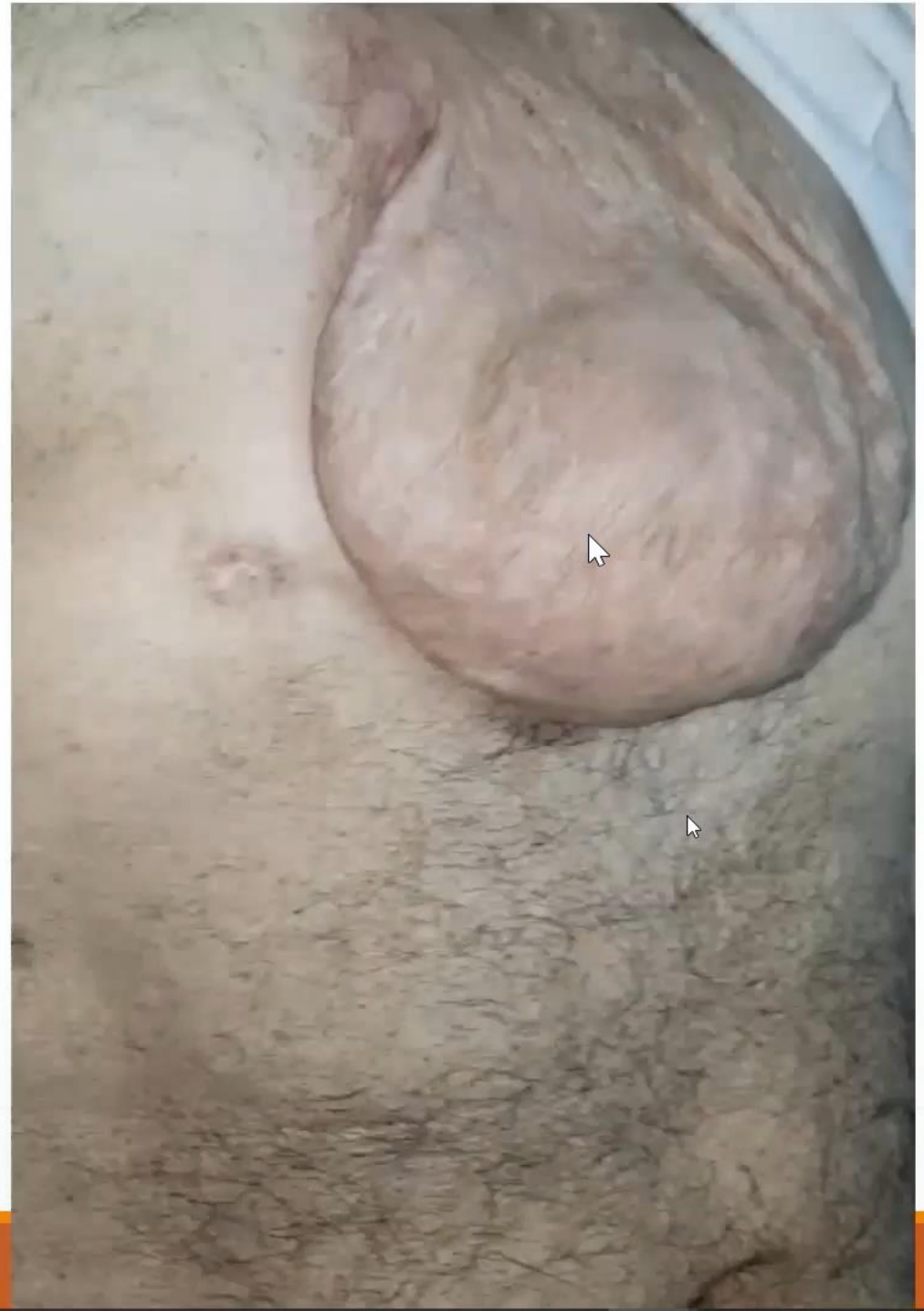

Pictures:

SRC CENTER OF EXCELLENCE METABOLIC & BARIATRIC SURGERY

SRC CENTER OF EXCELLENCE HERNIA SURGERY

SRC CENTER OF EXCELLENCE MINIMALLY INVASIVE SURGERY

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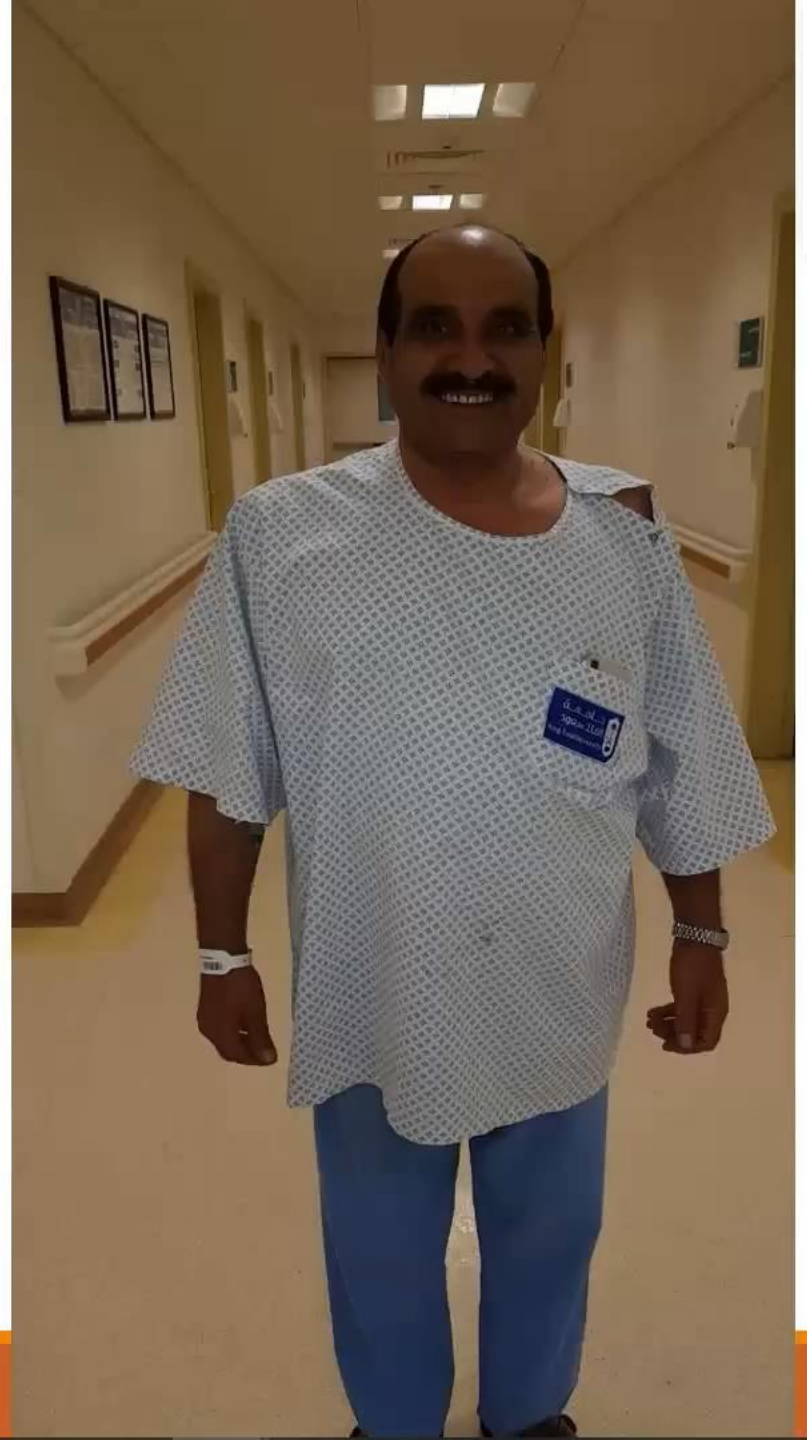
Pictures:



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