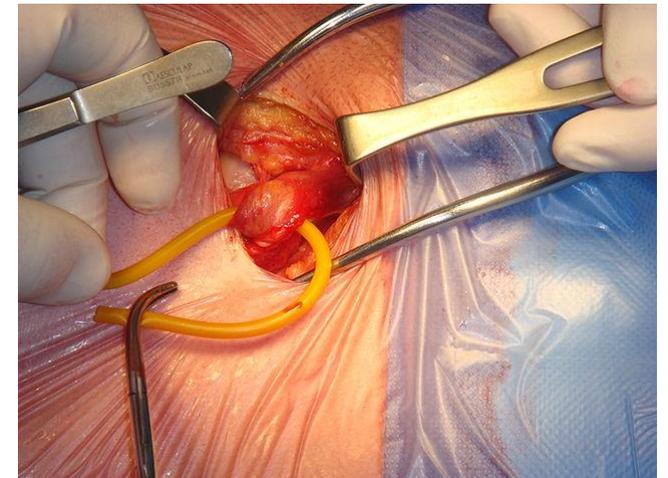
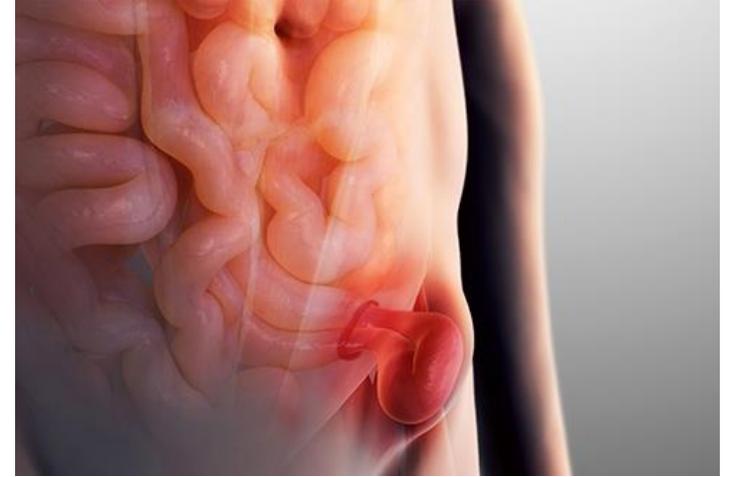


*Dr. Ali Jad Abdelwahab*

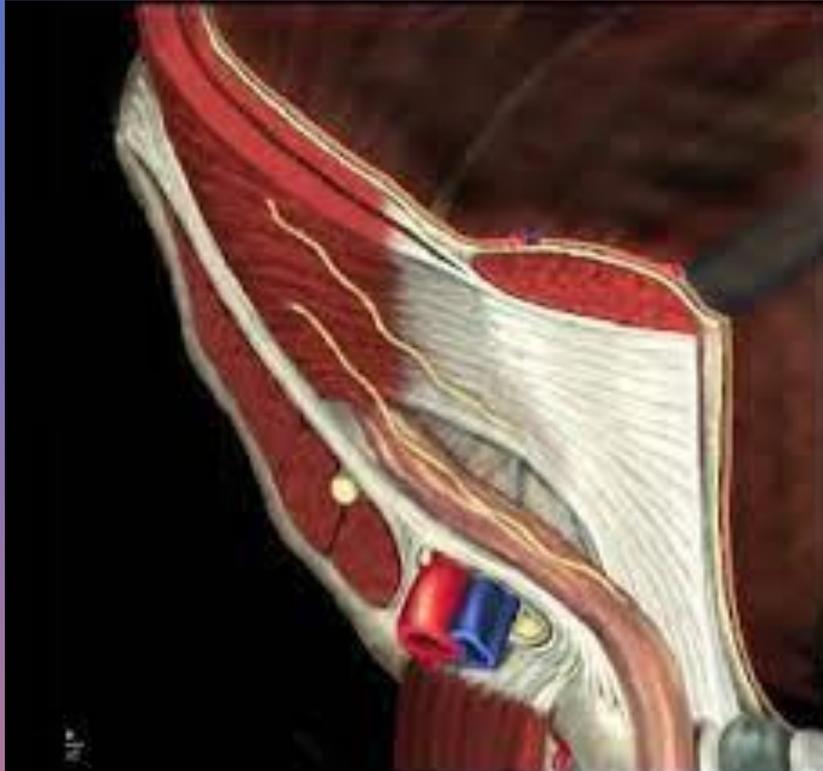
# Inguinoscrotal Conditions



The groin is the area in the body where the upper thighs meet the lowest part of the abdomen

# Outline

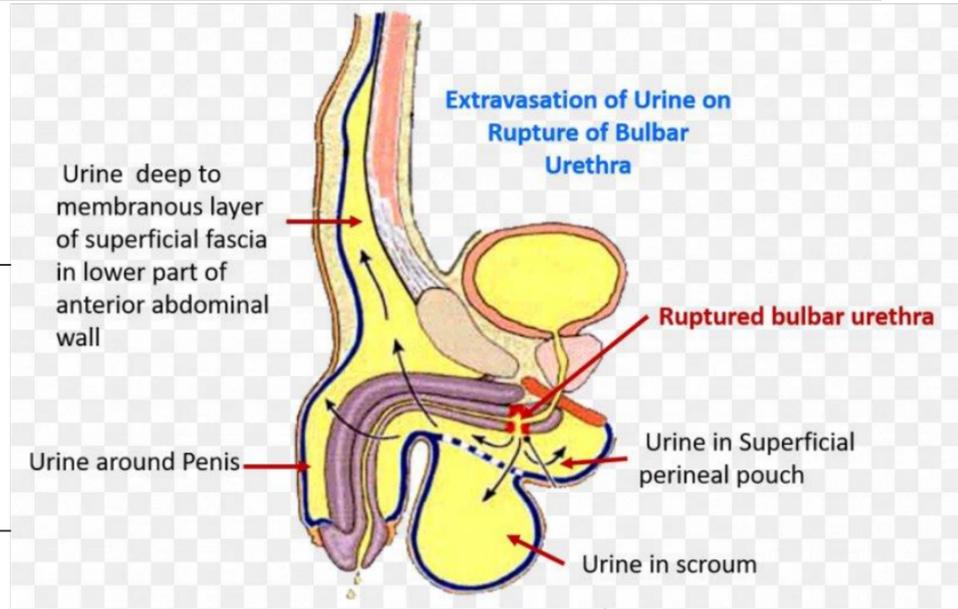
- Groin Hernias
- The Differential Diagnoses

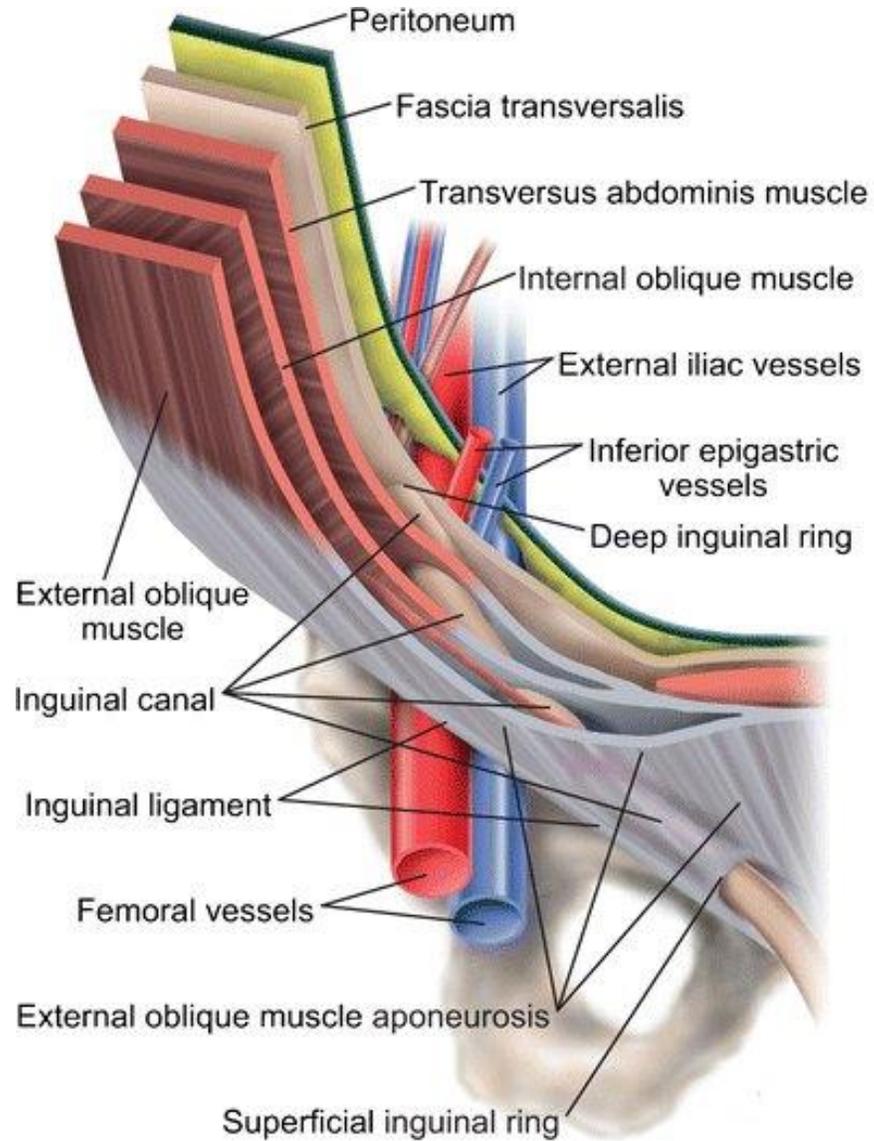


Scarpa's fascia : Membranous layer  
Camper' fascia : Fatty layer

The membranous layer of the superficial fascia is continuous with the superficial perineal pouch via scrotum and penis, thus they form a closed space which doesn't open into the thighs.

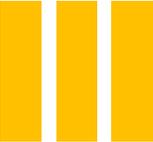
This prevents the passage of extravasated urine due to urethral trauma downward into the thighs

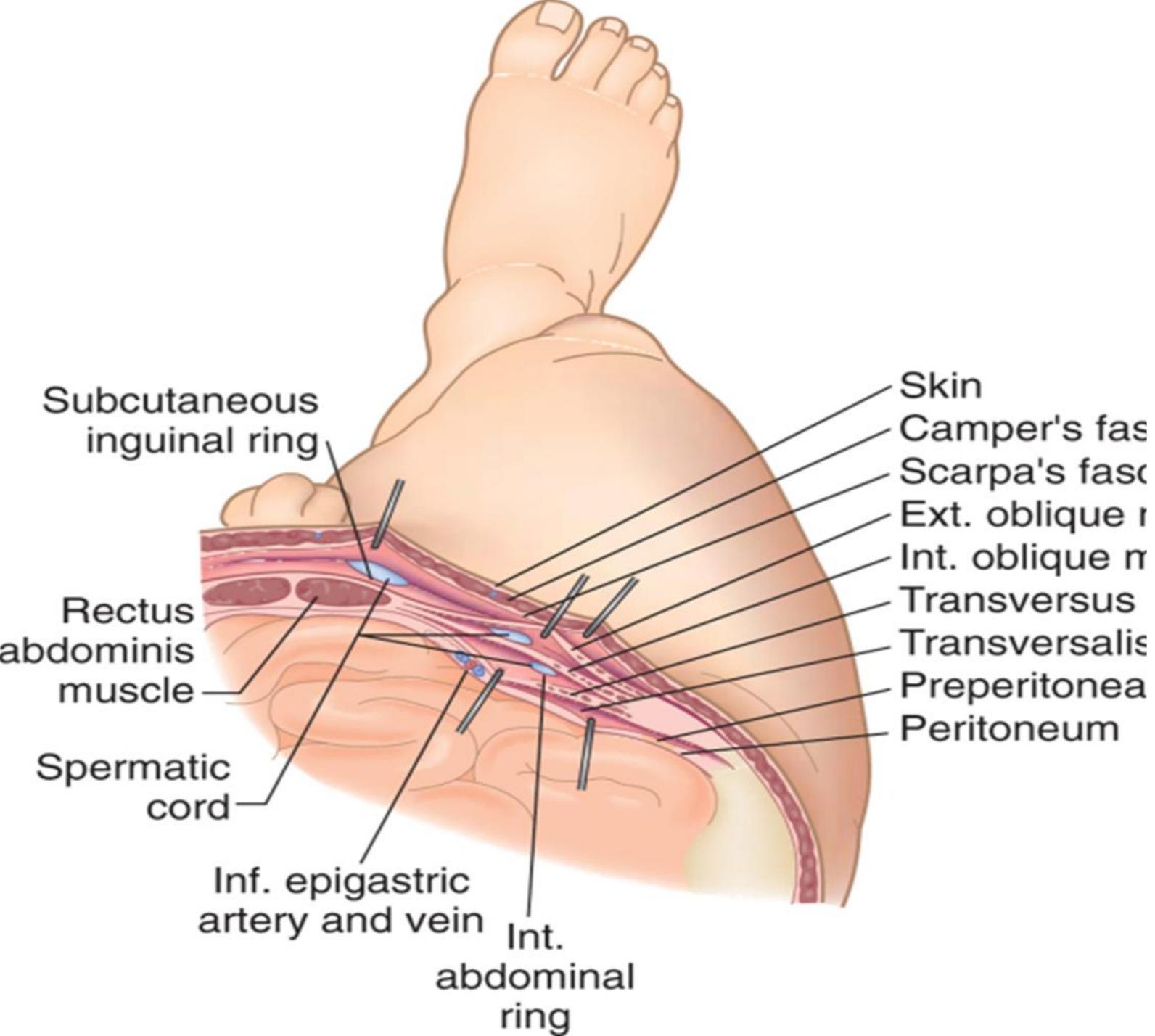




Trauma leading to urethral leak

# Anatomy of the Groin





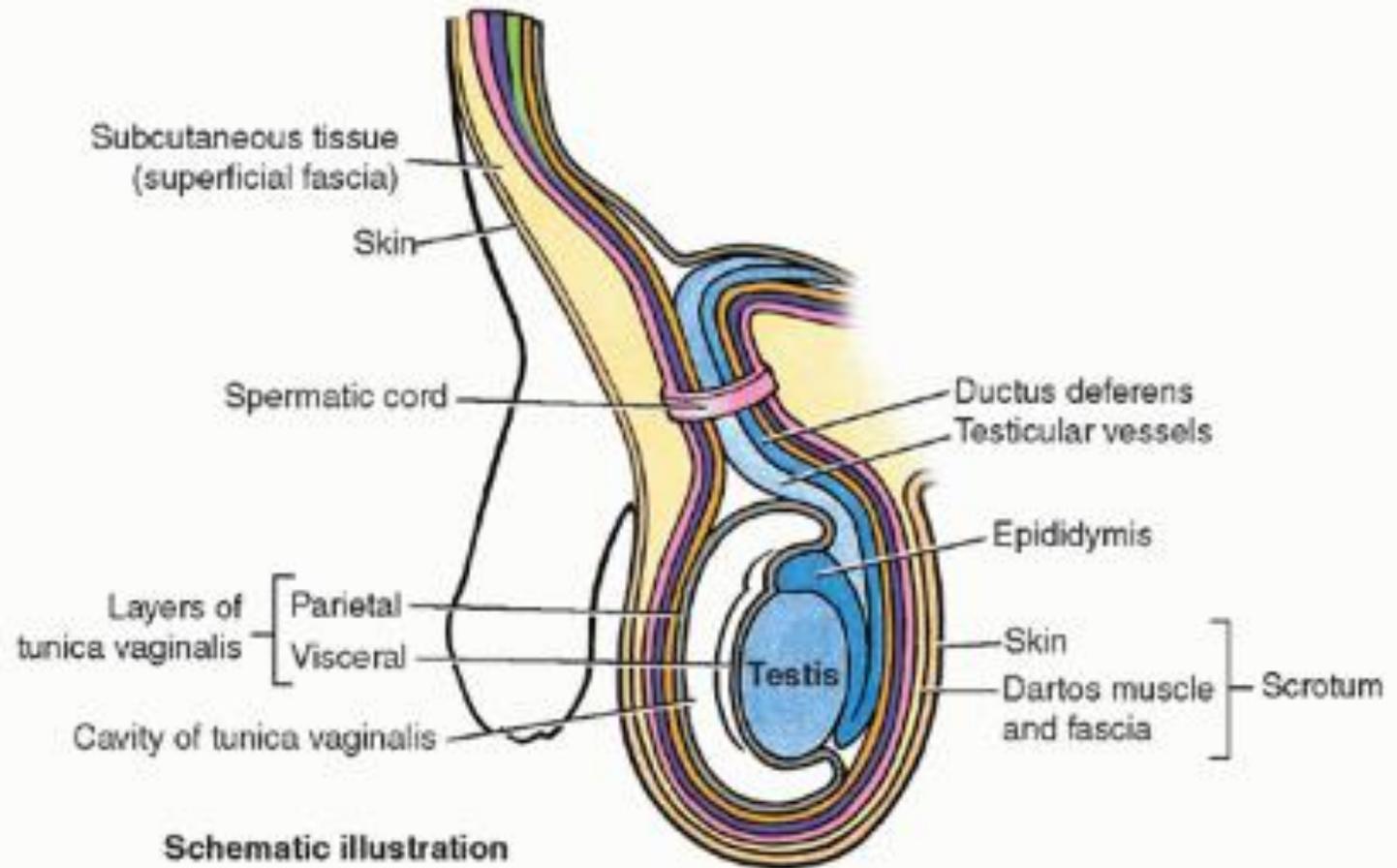
## Abdominal Wall Layers in the Inguinal Region

From superficial to deep:

- Skin
- Subcutaneous tissue
- Scarpa's fascia and Camper's fascia
- External oblique (EO) fascia and muscle
- Internal oblique (IO) fascia and muscle
- Transversus abdominis muscle (TAM)
- Transversalis fascia (TAF)
- Preperitoneal fat
- Peritoneum

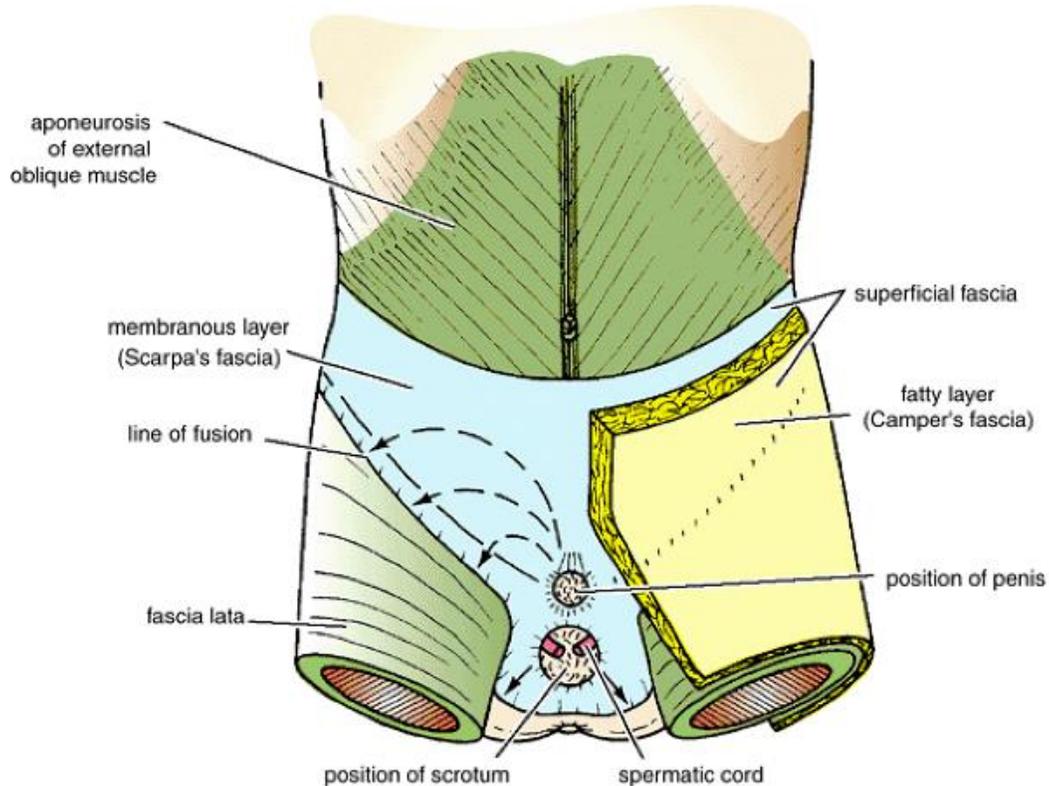
All of the layers of the abdominal wall are reflected into the scrotum, while maintaining constant relation to each other.

Layers	
	External oblique
	External spermatic fascia
	Internal oblique
	Cremaster muscle & Cremaster fascia
	Transversus abdominis
	Transversalis fascia
	Internal spermatic fascia
	Parietal peritoneum
	Tunica vaginalis (parietal and visceral layers)



Schematic illustration

# Subcutaneous Tissue

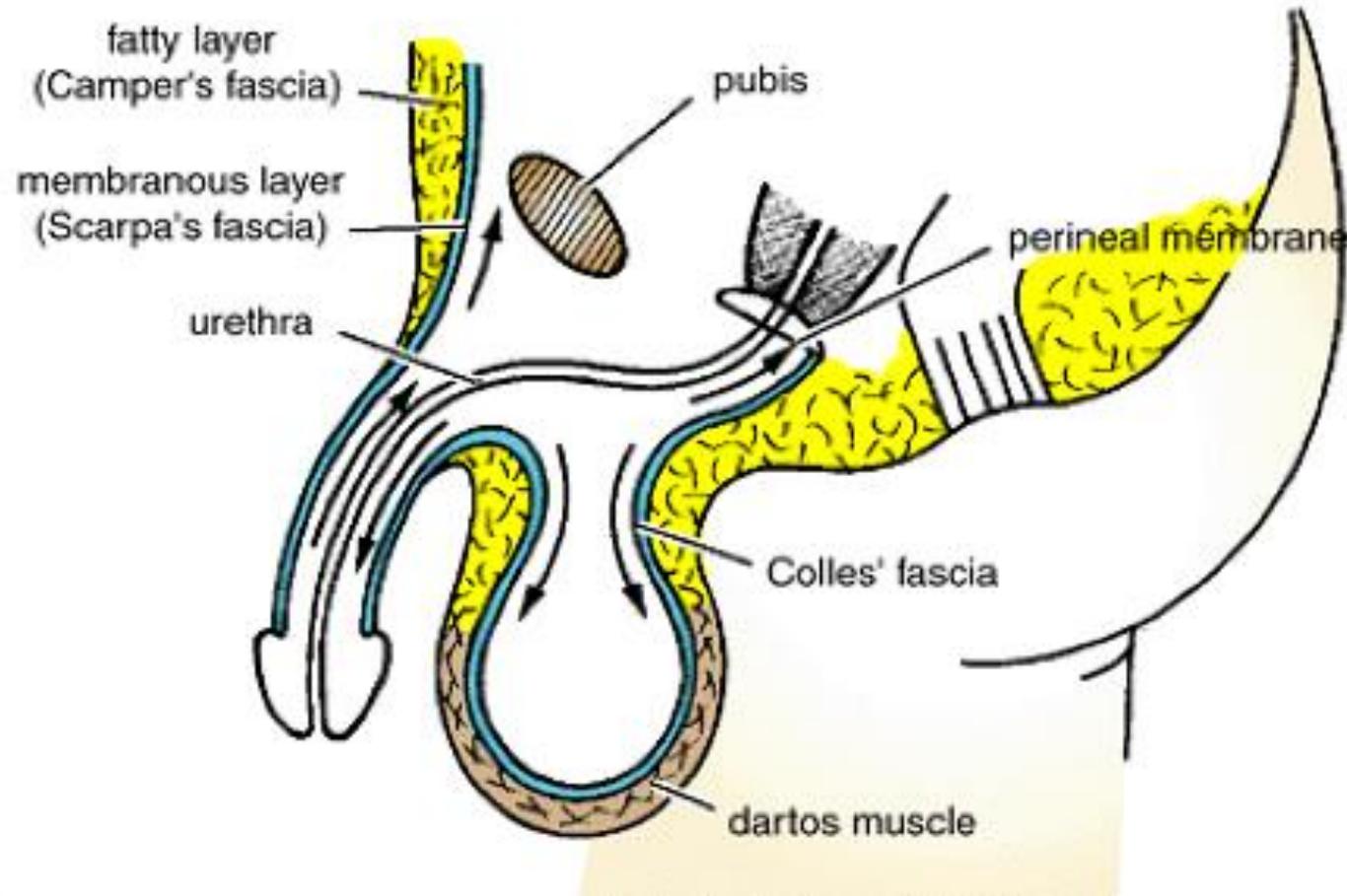


**Two layers:**

- 1) Camper's :** more superficial and fattier
  - 2) Scarpa's :** Deeper, more fibrous , and dense
- Can be incised in any plane with little adverse effects

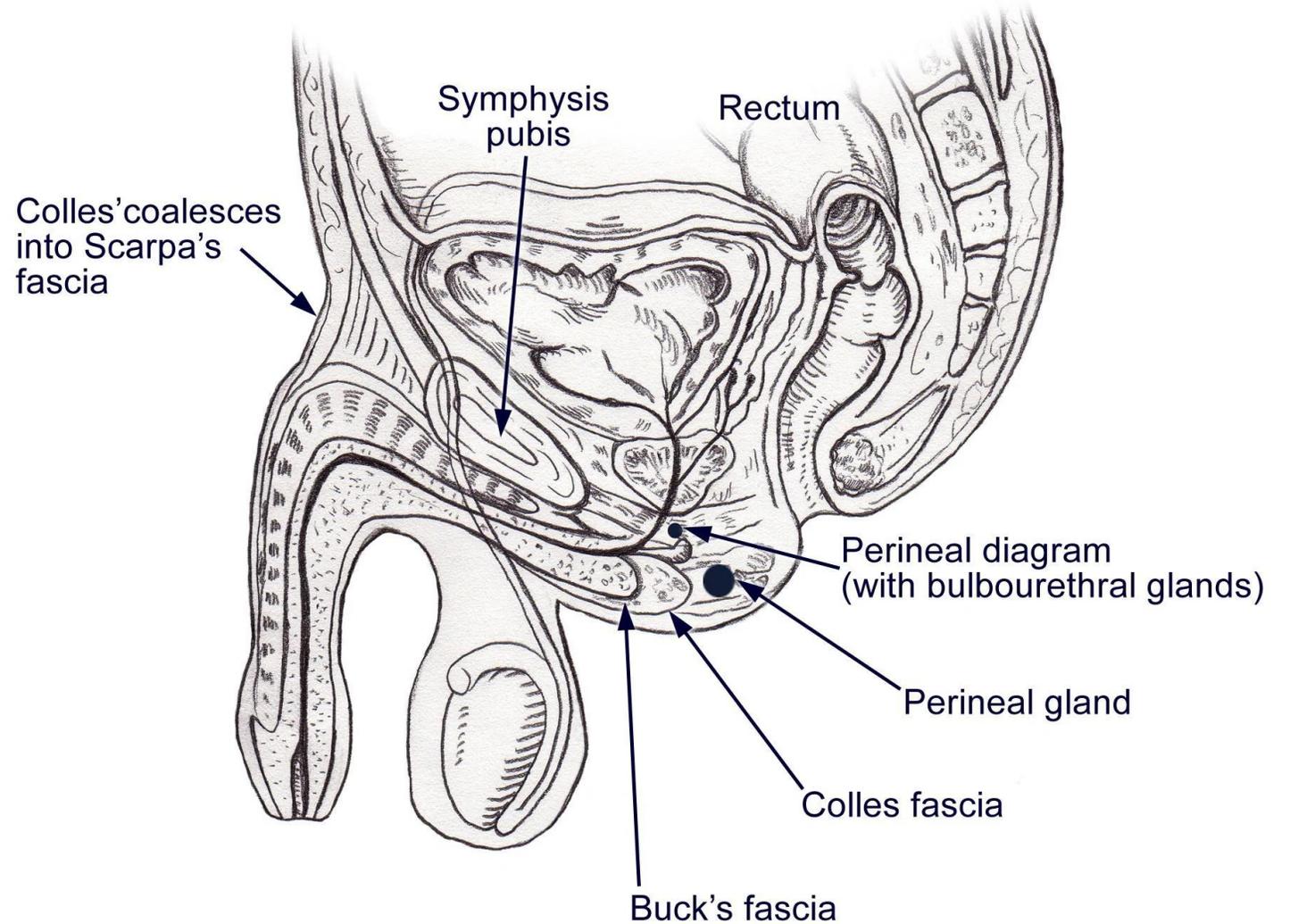
Continuous into the perineum as the superficial perineal fascia of  
Colles of the penis and the tunica dartos of the scrotum

It's Scarpa's fascia, but differently named



It is from this continuity that **infections** and **urinary extravasations** proceed out of the perineum and into the abdominal wall.

## Perineal fascia



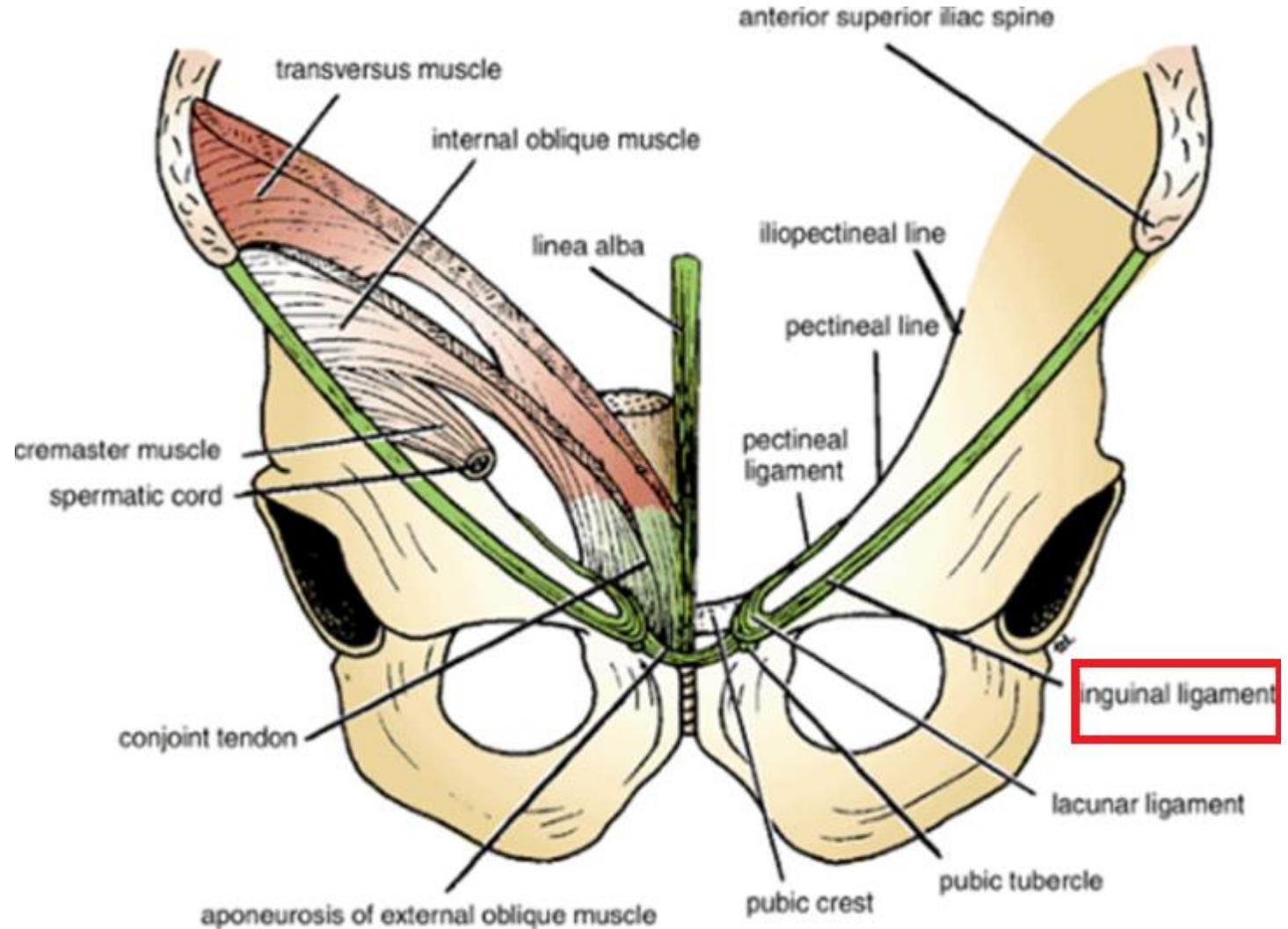
Unobliterated processus vaginalis will get filled with fluids from the peritoneum,  
If fluid was accumulated between inguinal canal and scrotum.→ Communicating hydrocele

# Inguinal Ligament:

- Fibrous band
- Thickened folds of the EOA
- Extends from the ASIS to the pubic tubercle

It's the external oblique aponeurosis

It's the floor of the inguinal canal



It's part of the inguinal, medially when the inguinal ligament attaches to the pubic tubercle, it forms the lacunar ligament

Lacunar ligament can be associated with treatment of femoral hernia.

# Lacunar (Gimbernat) Ligament

لما يلف حوالي نفسه يعني

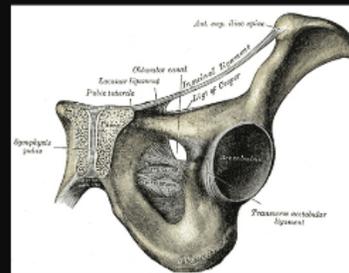
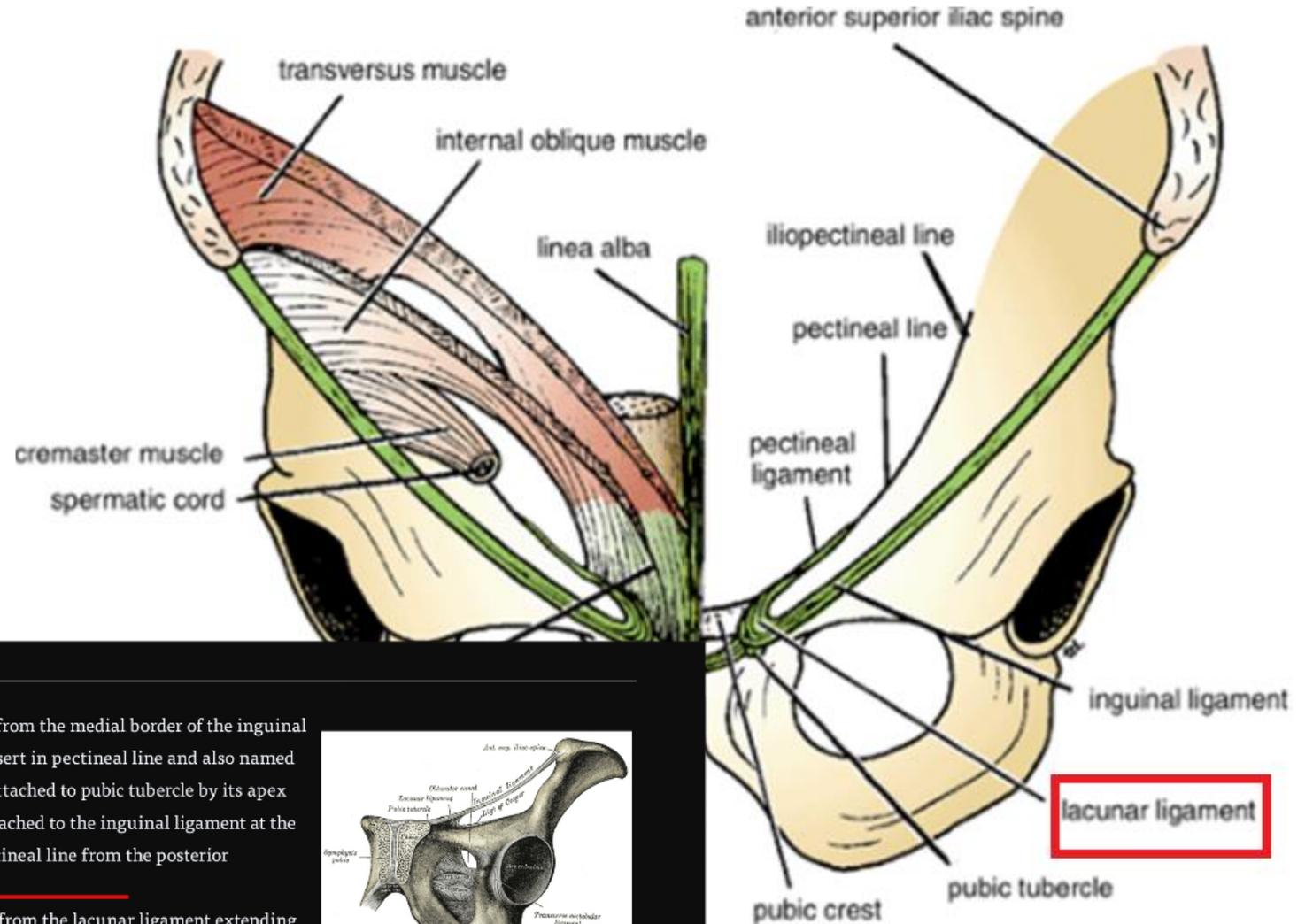
It is the **triangular fanning** of the **inguinal ligament** as it attaches to the **pubic tubercle**.

## Attachments

Lacunar/ Gimbernat's ligament, extends down from the medial border of the inguinal ligament, reflected backward and laterally to insert in pectineal line and also named as the pectineal part, it is triangular in shape attached to pubic tubercle by its apex while the base is free and directed laterally. Attached to the inguinal ligament at the anterior margin or upper border, and to the pectineal line from the posterior margin/or lower border.

Pectineal/ cooper's ligament, it is an extension from the lacunar ligament extending from the lacunar ligament and attaches to the pectineal line run on the superior ramus of the pubic bone forming the posterior border of the femoral ring<sup>[1]</sup>.

Reflected part of the ligament, thin band extend from the medial end of the inguinal ligament to the **linea alba**.



Lacunar and cooper ligament

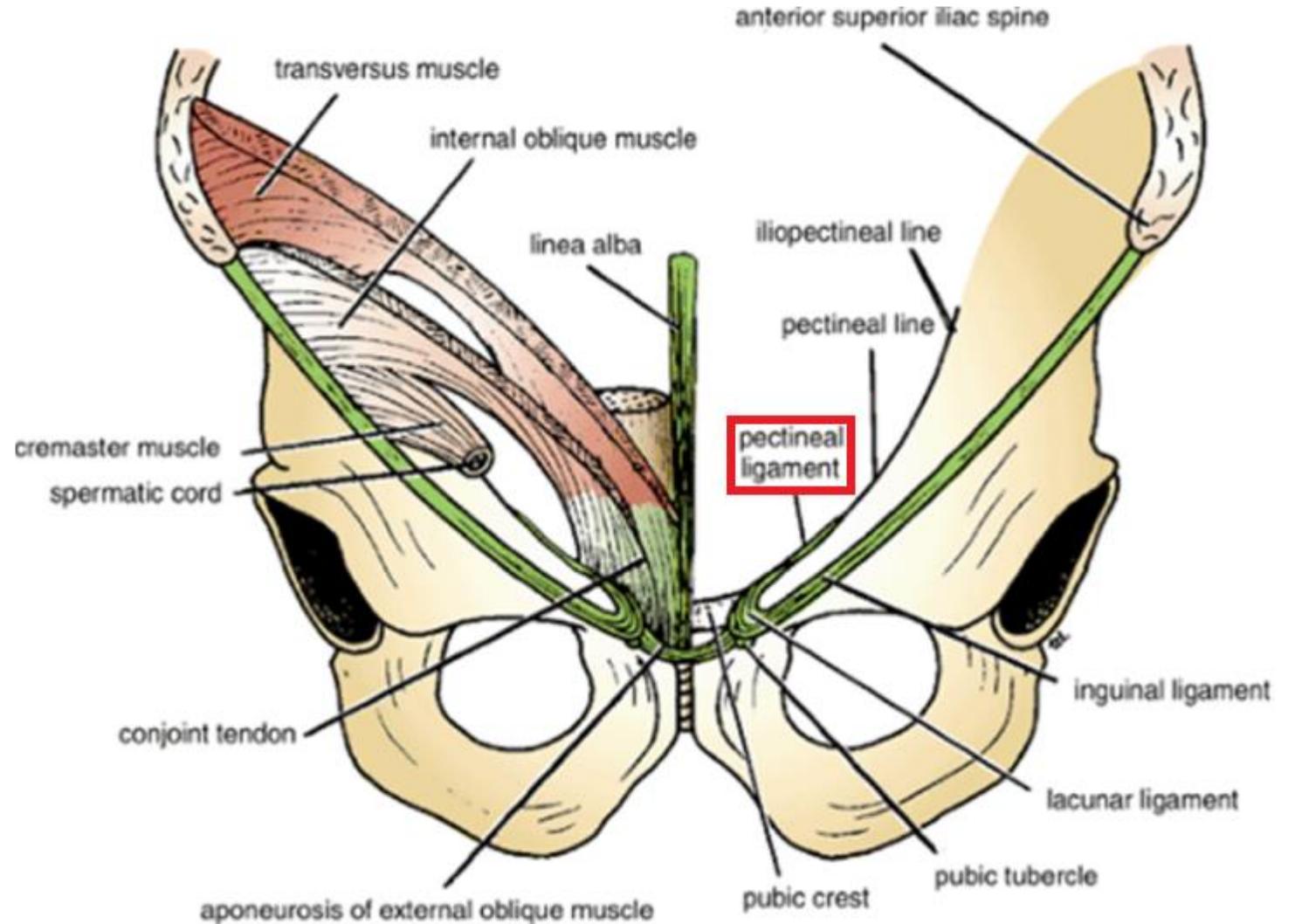
# Cooper (Pectineal) Ligament

It is the lateral portion of the lacunar ligament that is attached to the pubic tubercle's periosteum.

Communicates with iliopubic tract

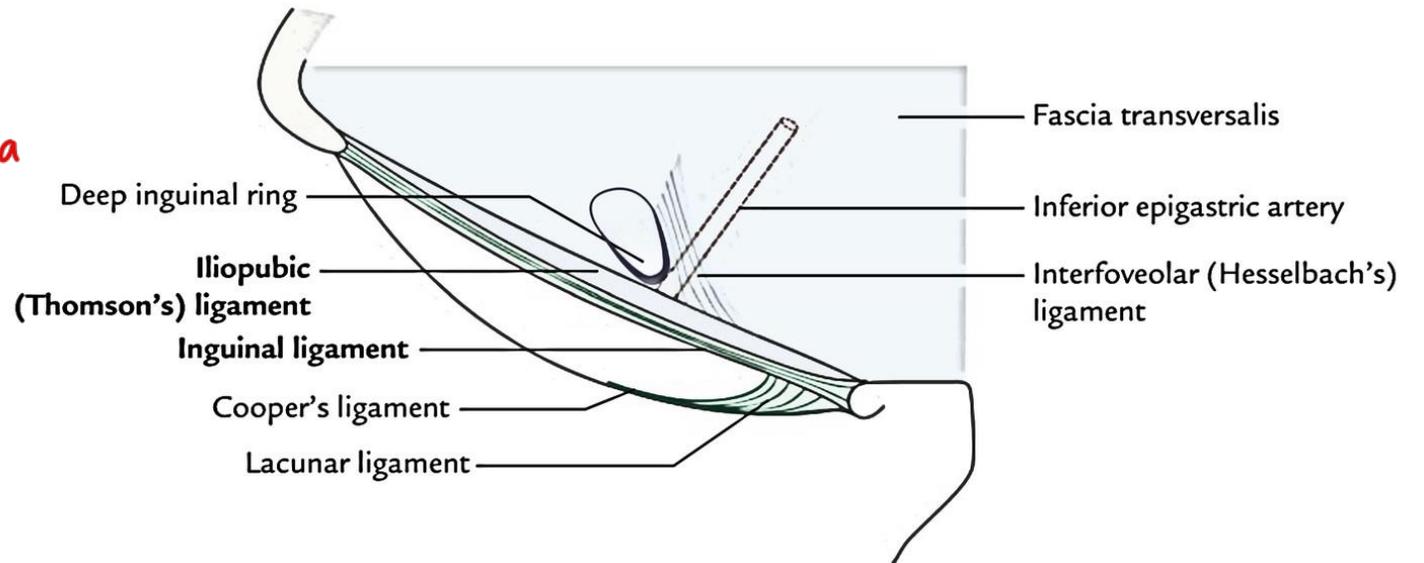
Iliopubic tract is the inguinal ligament, but from the inside.

بتشوفه اذا بدك تصلح هيرنا لابروسكوب

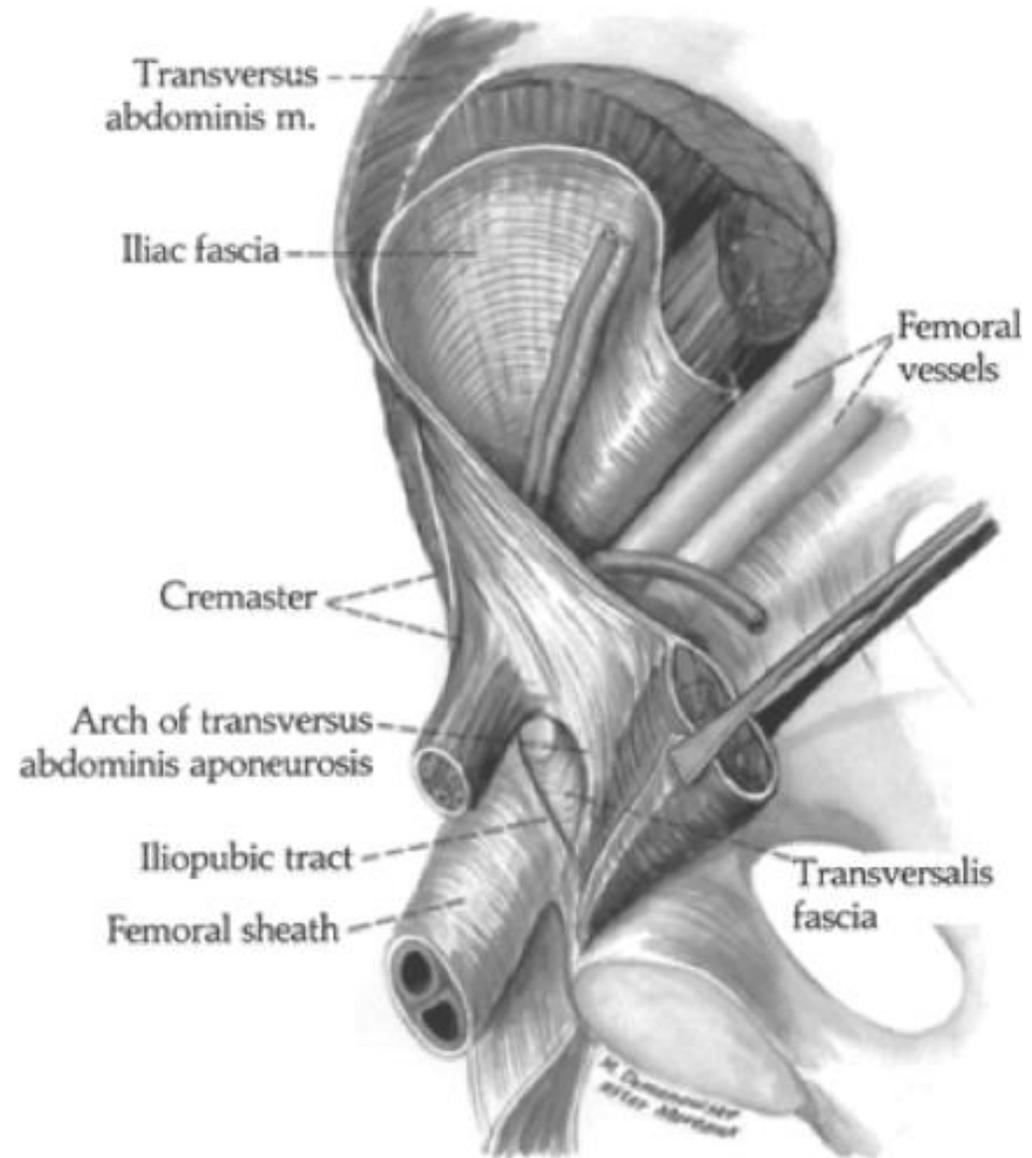


# Iliopubic Tract (IPT):

- A thickening of the *Transversalis fascia* that fans out laterally in the transversalis and iliac fasciae.
- It begins at the anterior superior iliac spine and inserts into Cooper's ligament from above medially, and it runs parallel and deep to the inguinal ligament.
- It forms on the deep inferior margins of the transversus abdominis and transversalis fascia.



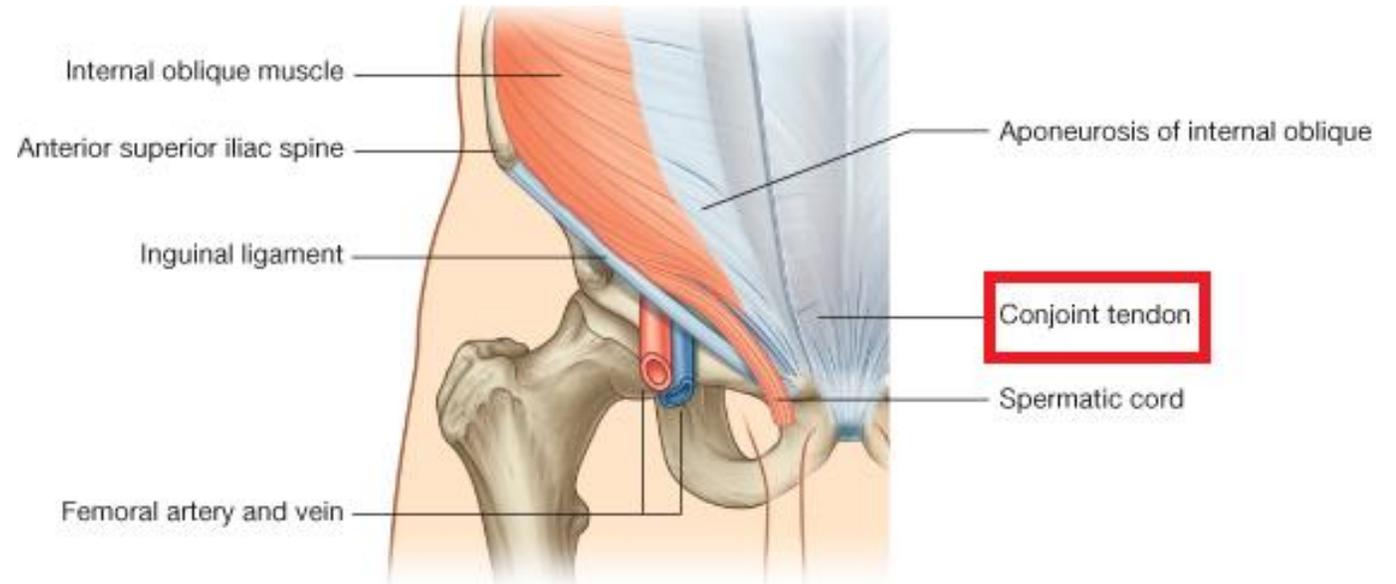
- 
- As it runs medially, the iliopubic tract contributes to the inferior margin of the internal inguinal ring and continues as the anteromedial border of the femoral canal.



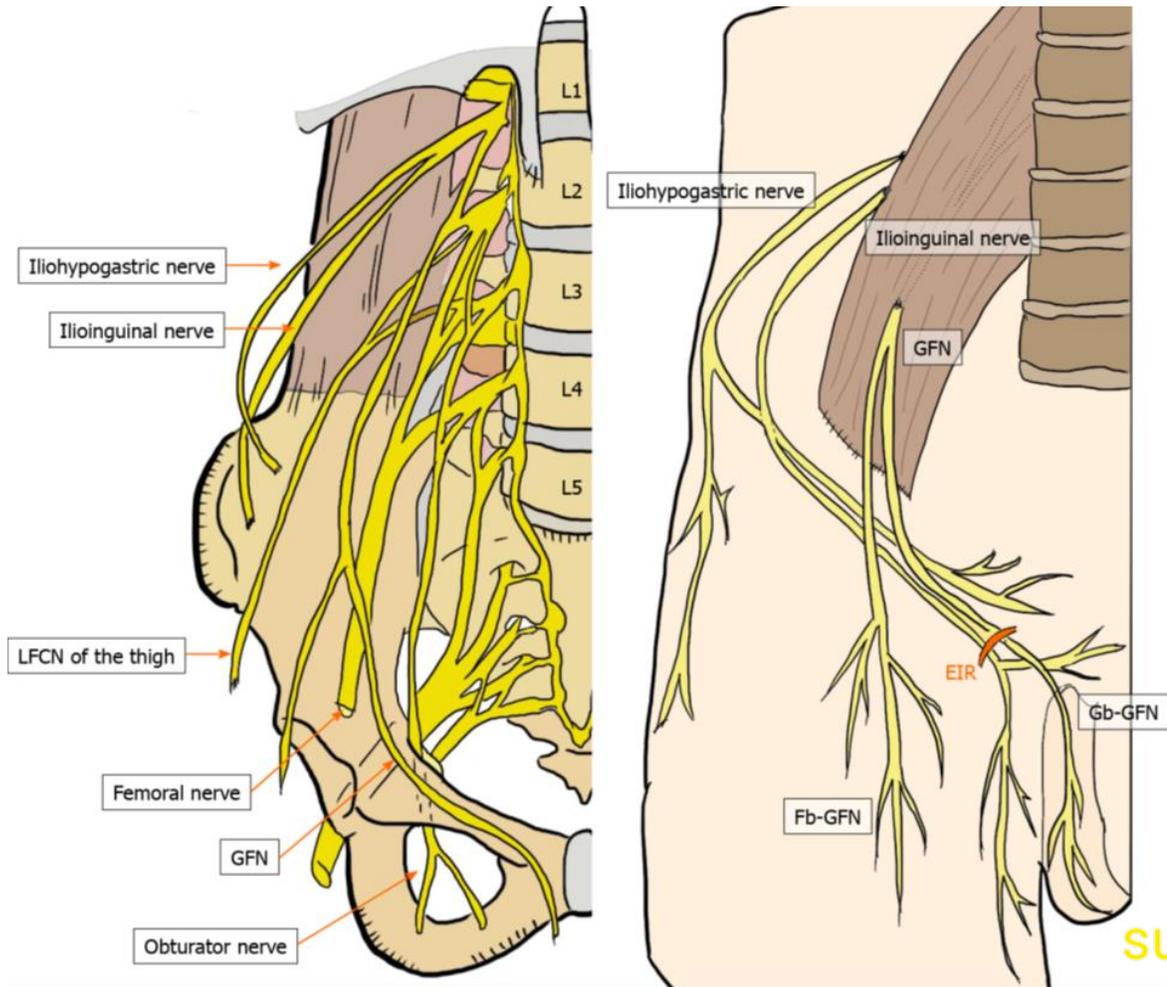
# Conjoint tendon:

Fusion of the IO aponeurosis (IOA) medial fibers and the transversus abdominis fascia, which then turns inferiorly to insert into the pubic crest and the Cooper ligament.

*Rarely seen*



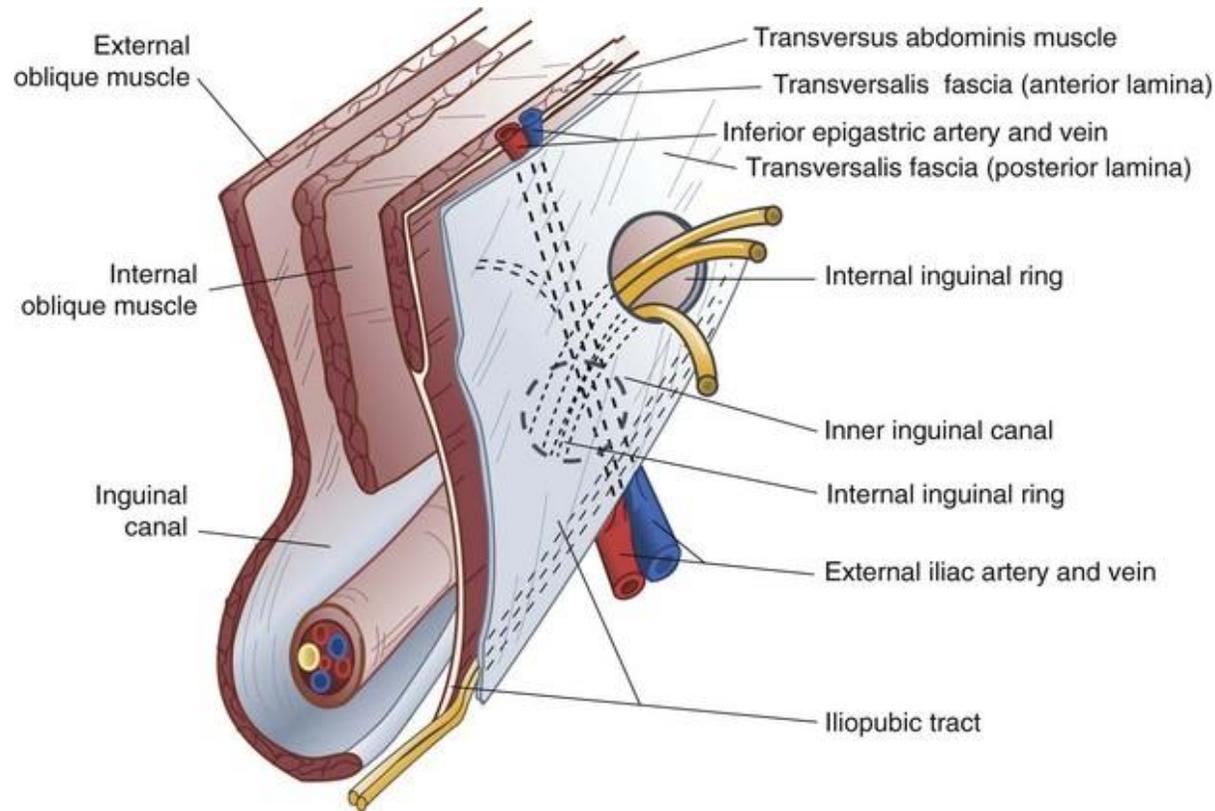
# Post-op pain is the most serious complication of hernia surgery, inguinodynia



## Nerves

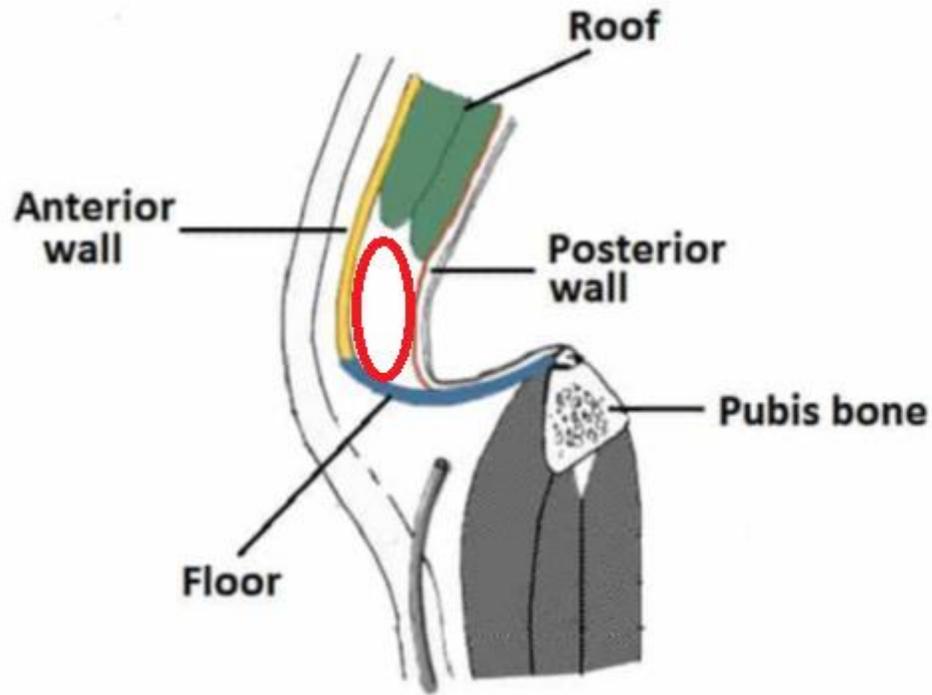
- The six nerves of interest are the **iliohypogastric**, **ilioinguinal**, femoral (including the anterior cutaneous branch), **genitofemoral** (femoral and genital branches), lateral femoral cutaneous of the thigh, and obturator nerves.

suspected for injury during inguinal hernia repair



## The Inguinal Canal

- is a **cone-shaped** region in the anterior portion of the pelvic basin that is **about 4 to 6 cm** long **connecting the internal and external inguinal rings**



- Aponeurosis of the external oblique
- Internal oblique and transversus abdominis.
- Transversalis fascia
- Inguinal ligament

*Memorize*

## Boundaries of the inguinal canal:

**Anteriorly:** the external oblique aponeurosis

**Posteriorly:** the transversalis fascia and transversus abdominis muscle

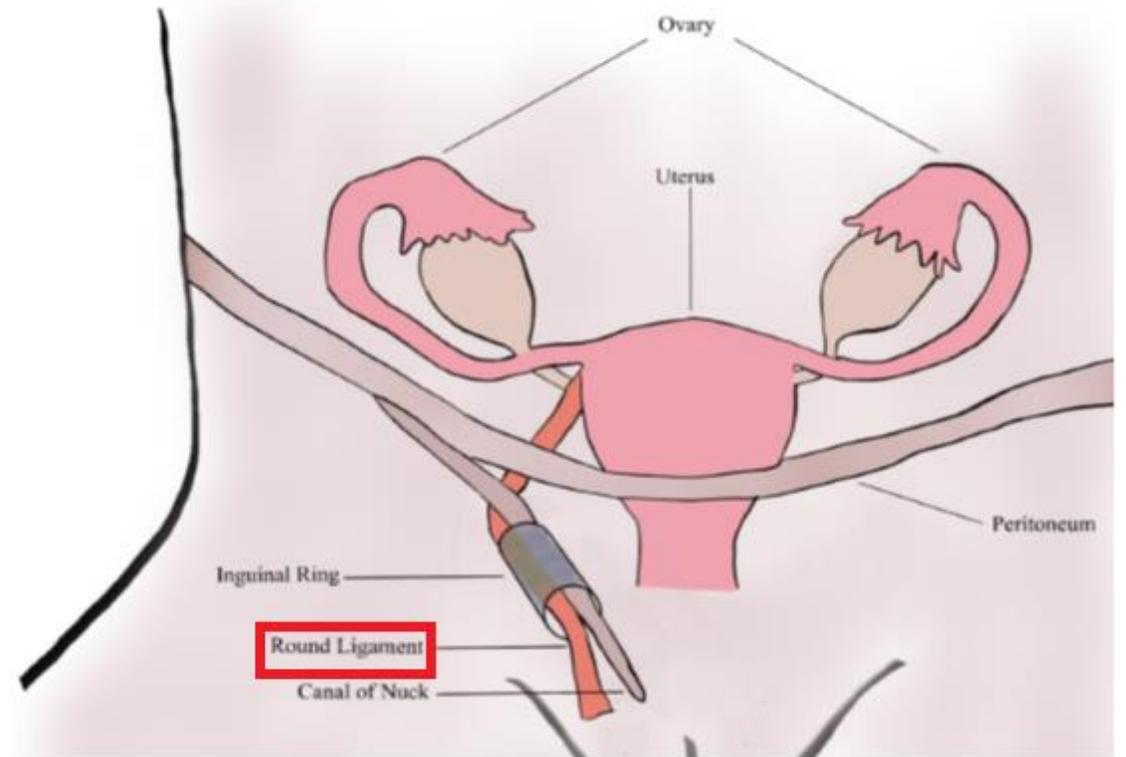
**Laterally:** the internal oblique muscle

**Superiorly:** the internal oblique and transversus abdominis muscle

**Inferiorly:** the inguinal (Poupart's) ligament

# Structures traverse the Canal

- In women: The round ligament



# In male

Memorize :C

The spermatic cord crosses the inguinal canal, and it contains

**3 arteries, 3 nerves, 3 fasciae, 3 other things:**

**3 arteries:** testicular, deferential, cremasteric

**3 nerves:** genital branch of the genitofemoral, cremasteric nerve, sympathetic nerve fibers

**3 fasciae:** external spermatic fascia, cremasteric fascia, internal spermatic fascia

**3 other things:** ductus deferens, pampiniform plexus, lymphatic vessels

Venous drainage of testis

Vas deferans

From external oblique aponeurosis

From internal oblique aponeurosis, internal oblique has no insertions, it continues as this ligament

From transversus abdominus

## Papers Don't Contribute to A Good Specialist Level

**P:** pampiniform plexus

**D:** ductus deferens

**C:** cremasteric artery

**T:** testicular artery

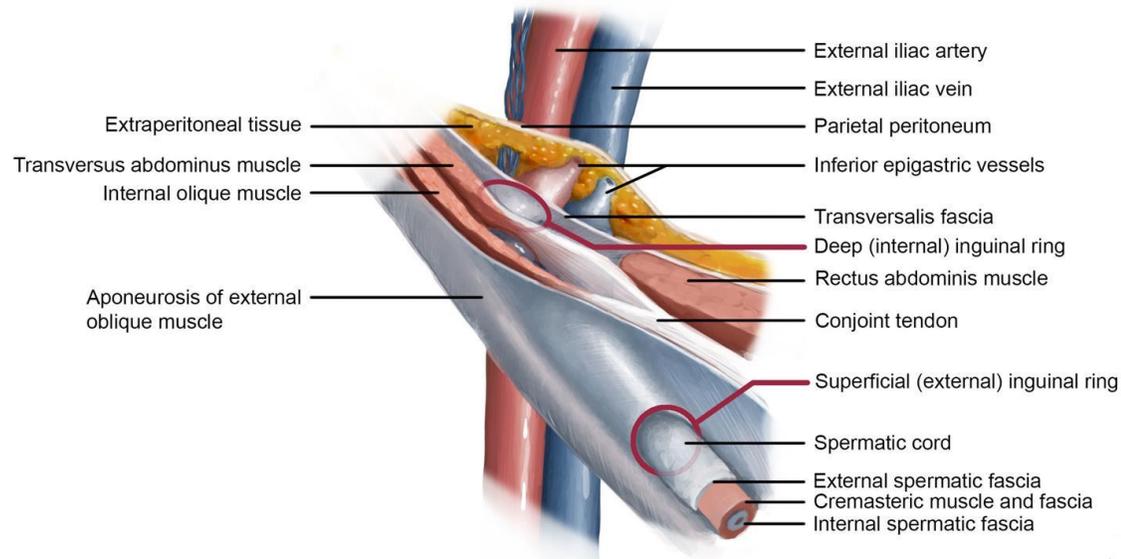
**A:** artery of the ductus deferens (deferential artery)

**G:** genital branch of the genitofemoral nerve

**S:** sympathetic nerve fibers

**L:** lymphatic vessels

### Inguinal Canal



# The Myopectineal Orifice (MPO):

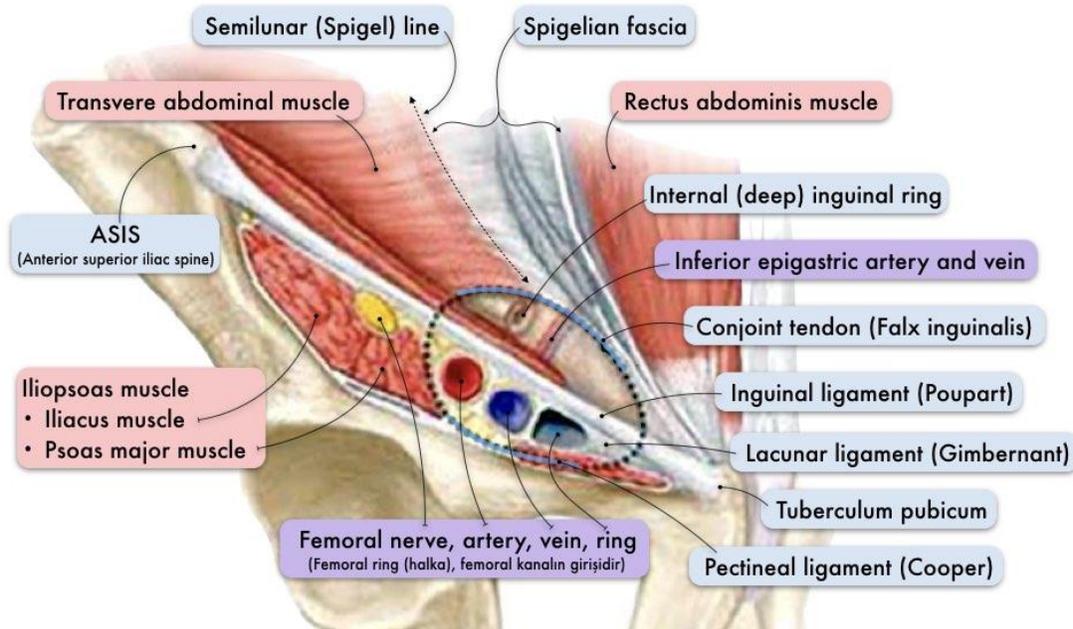
Extends from psoas major muscle to rectus abdominus muscle

- **A distinct area of weakness in the pelvic region**
- **Weakened during the evolutionary process as humans became bipedal, stood, and stretched it**
- **Contained natural openings and areas of weakness for the passage of the testicle or round ligament and the iliac neurovascular bundle from the intra-abdominal compartment.**

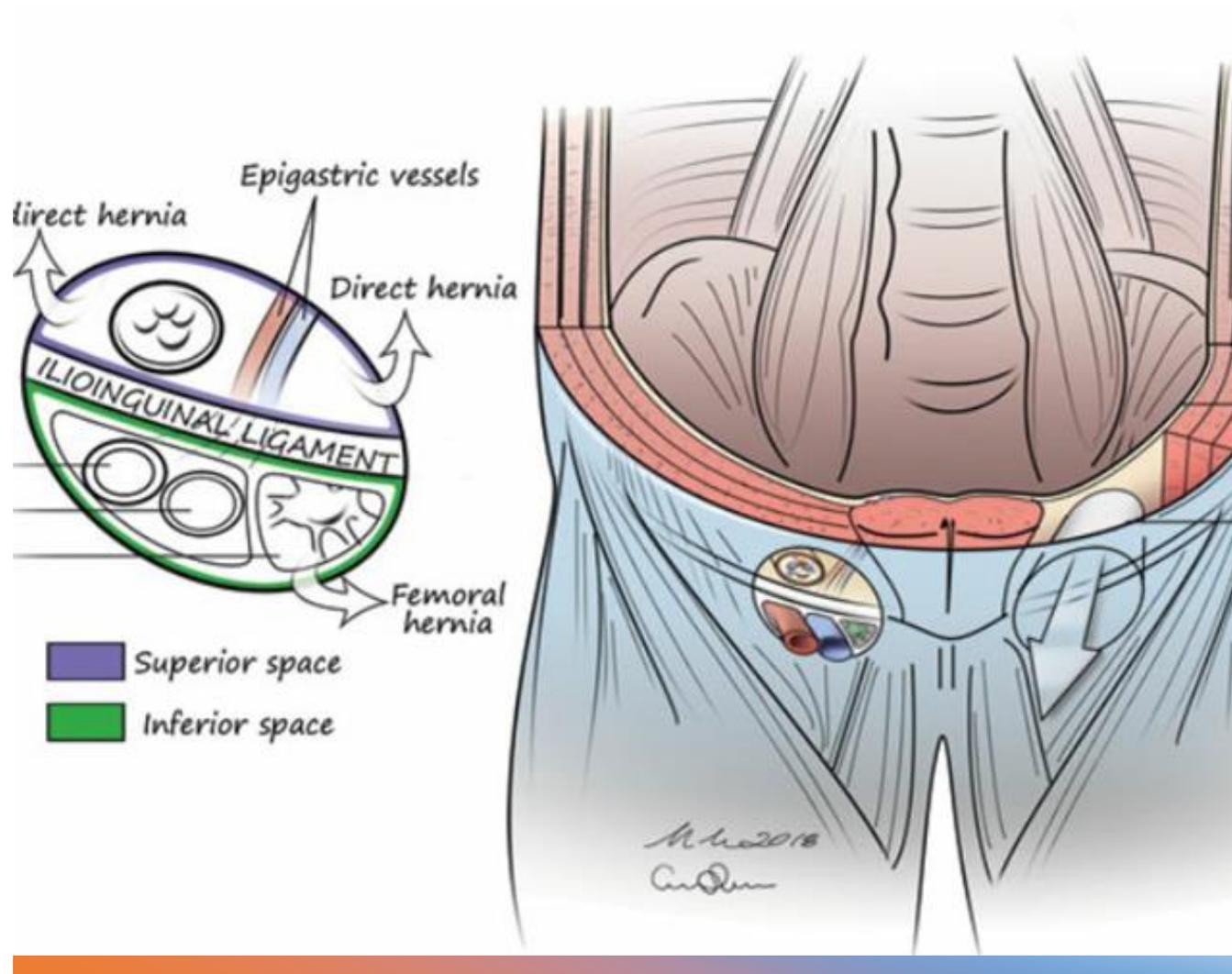
In the anterior view, you'd see the inguinal canal and ligament in it's center

In the posterior view, you'd see the iliopubic tract in it's center

## Myopectineal Orifice of Fruchaud (Right)



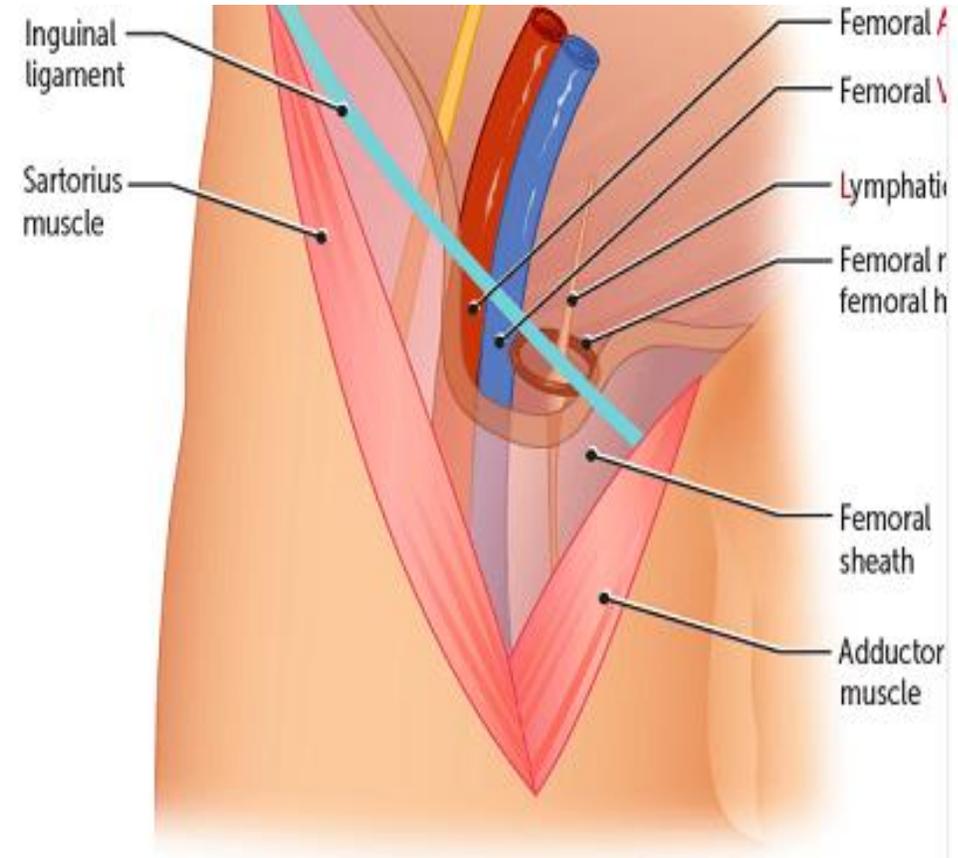
The entire MPO is vulnerable to hernia development because of the normal tissue anatomic gaps that allow structures to pass out of the abdomen into the lower extremities or pelvis, in addition to the aponeurotic nature of the area, whereas the rest of the abdominal wall is covered thick muscle layers.



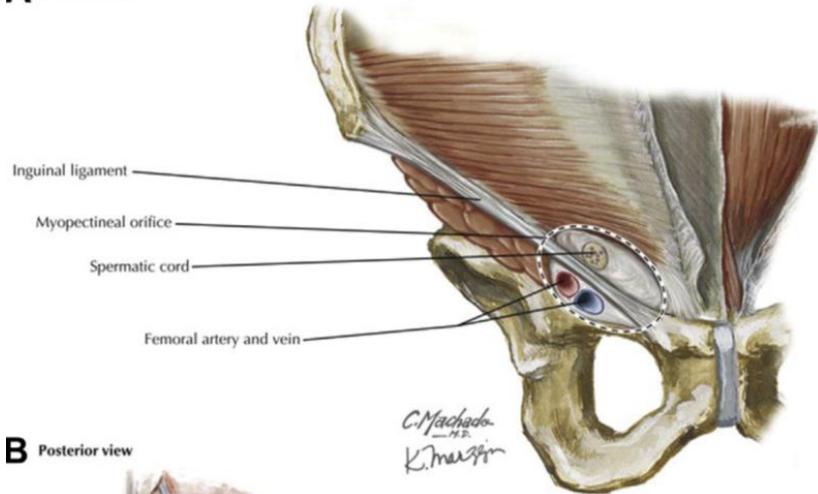
- The MPO is divided by the inguinal ligament.
- The suprainguinal space of the MPO is the inguinal outlet that contains the internal inguinal ring . This is the site of an indirect inguinal hernia.
- The subinguinal space is femoral outlet and contains the opening for the femoral canal, allowing the femoral vessels to pass through the abdominal wall and allowing for weakness in the TAF, especially in women, due to a wider pelvic shape.

- 
- **Being the posterior divider of the MPO, the IPT has a particular significance as an important landmark for the preperitoneal approach to inguinal hernia repair.**
- 

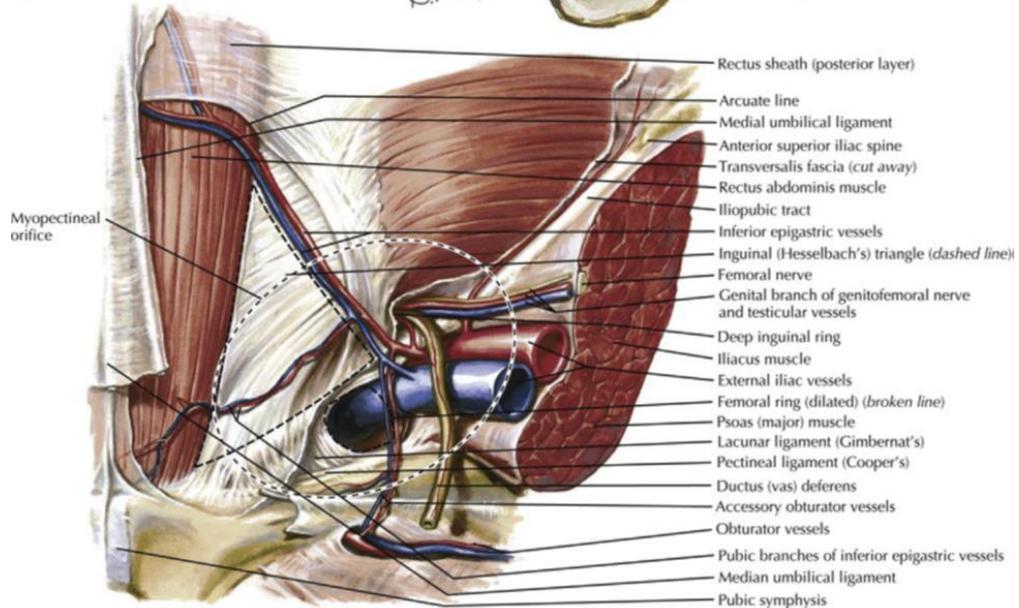
- Fascia transversalis covers the entire myopectineal orifice
- In the suprainguinal part, it is penetrated by the spermatic cord and extends like a sleeve as the internal spermatic fascia.
- In the subinguinal part, it extends over the femoral vessels as the femoral sheath.



**A** Anterior view



**B** Posterior view



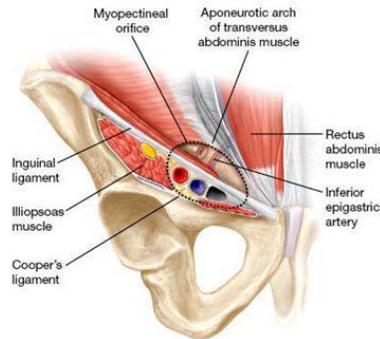
- The MPO's irregular three-dimensional cylindrical shape
- When viewed from the front, it is oval ; when viewed from the back, it resembles a quadrilateral.

## MYOPECTINEAL ORIFICE OF FRUCHARD

□ A single weak point where all groin hernias originate from

□ Only consists of transversalis fascia

- Superior – Conjoint tendon
- Inferior – Cooper's ligament (Pectineal)
- Medial – Rectus muscle
- Lateral – Iliopsoas muscle

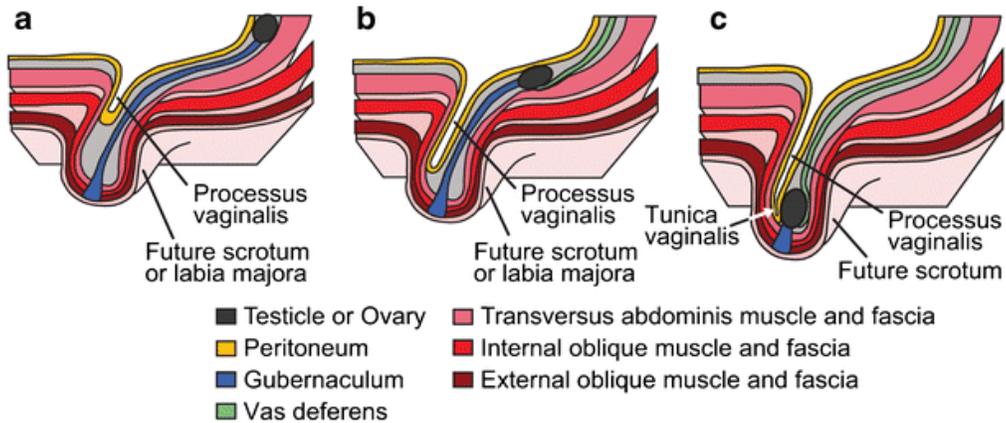


## MPO borders:

- Superior: conjoint tendon
- Inferior: the pecten of the pubis covered by Cooper's (pectineal) ligament
- Medial: rectus abdominis muscle and rectus sheath
- Lateral: medial edge of the iliopsoas muscle and fascia

- 
- **Failure of the transversalis fascia to stop intraabdominal contents from protruding through the myopectineal orifice is the final factor in the development of all groin hernias**
- 

# Testicular Descent

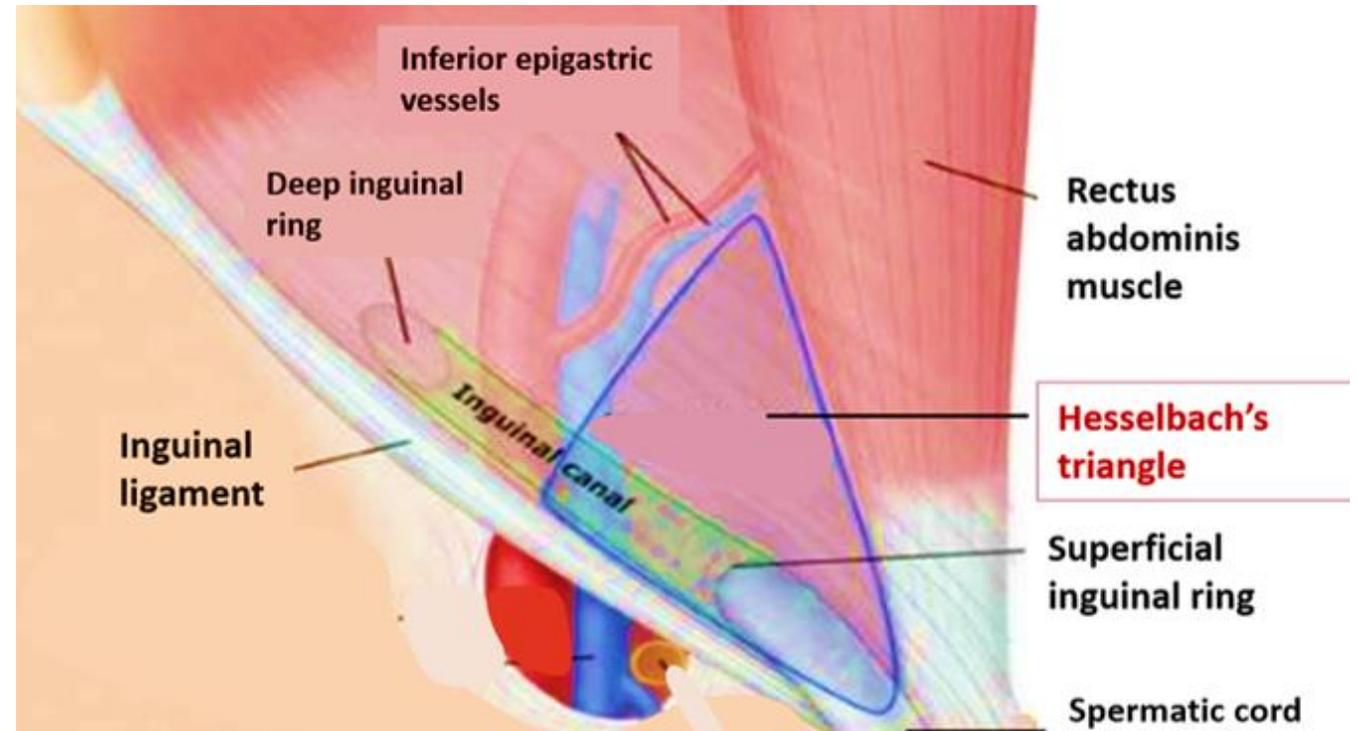


- If the connection between the tunica vaginalis and the intra-abdominal peritoneum remains, the result is a "pediatric hernia".
- If left untreated, the peritoneum in the scrotum enlarges, fills with fluid, and develops into a hydrocele.

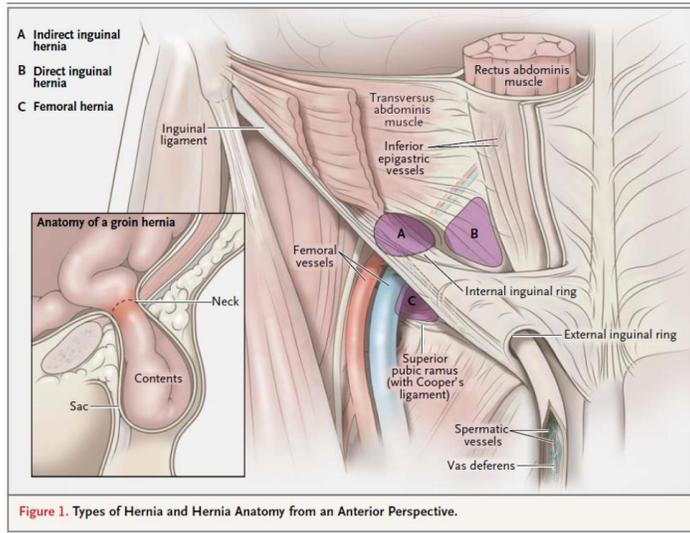
# The Hesselbach Triangle: Found in the anterior abdominal wall

Site for direct inguinal hernia

- Lateral: inferior epigastric vessels
- Medial: rectus abdominis muscle
- Inferior: inguinal ligament



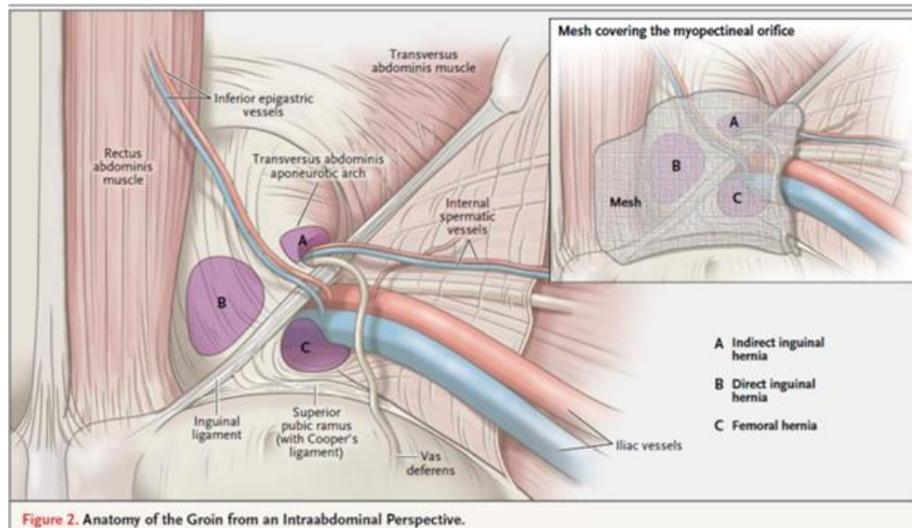
It's covered by fascia transversalis



# Groin Hernia:

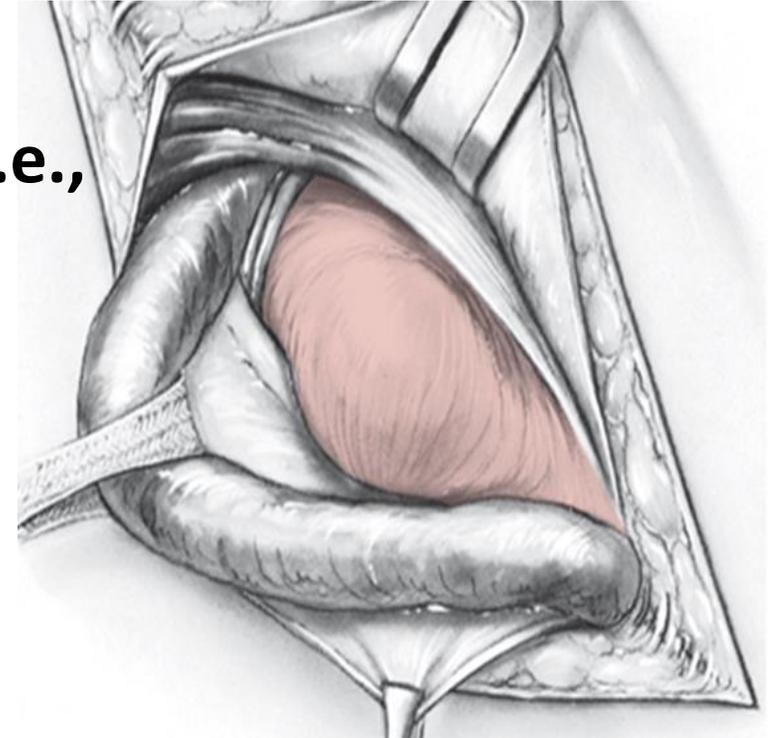
**Protrusion of viscera** and/or adipose tissue through the inguinal or femoral canal.

**10 times more common in men** than in women.



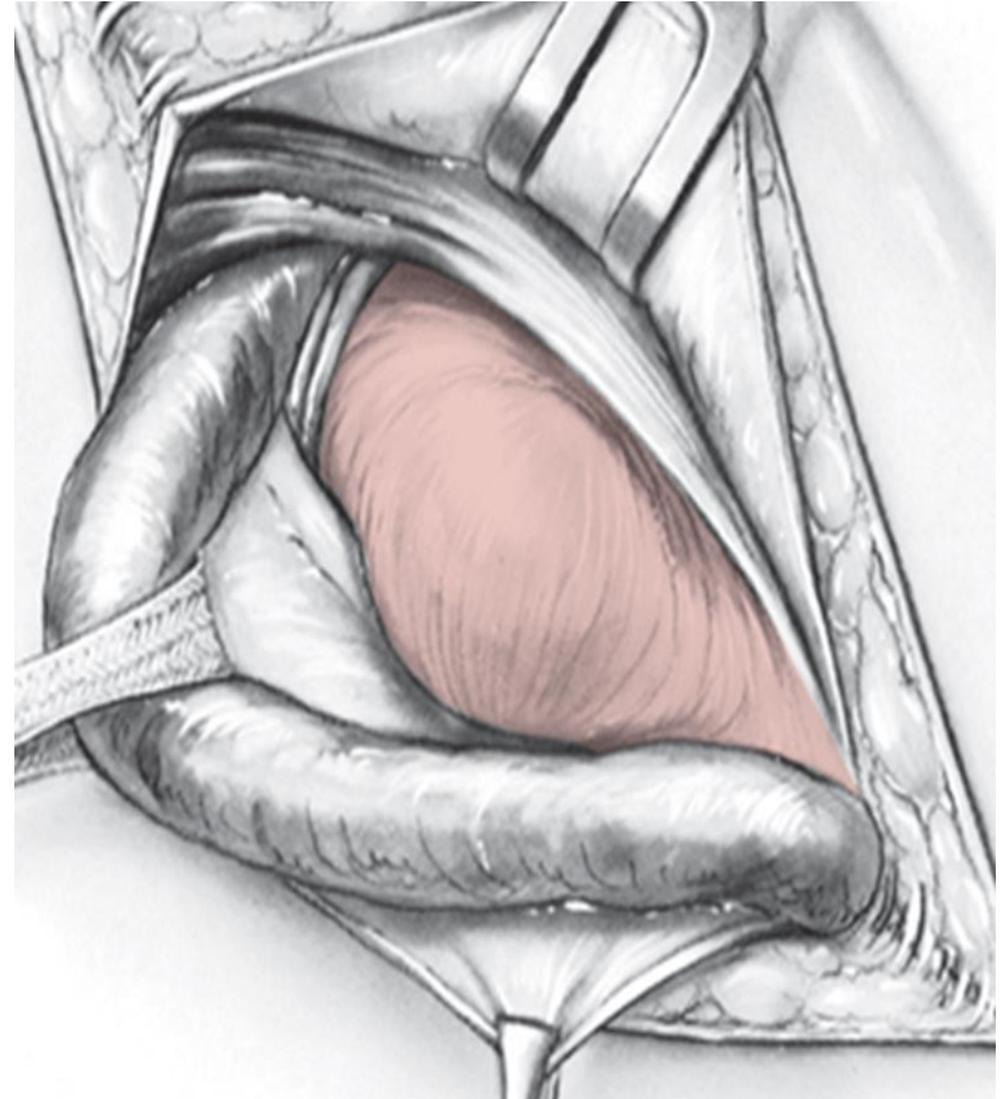
# Direct or Medial Inguinal Hernia

Occurs through the floor of the inguinal canal, i.e.,  
through Hesselbach's triangle



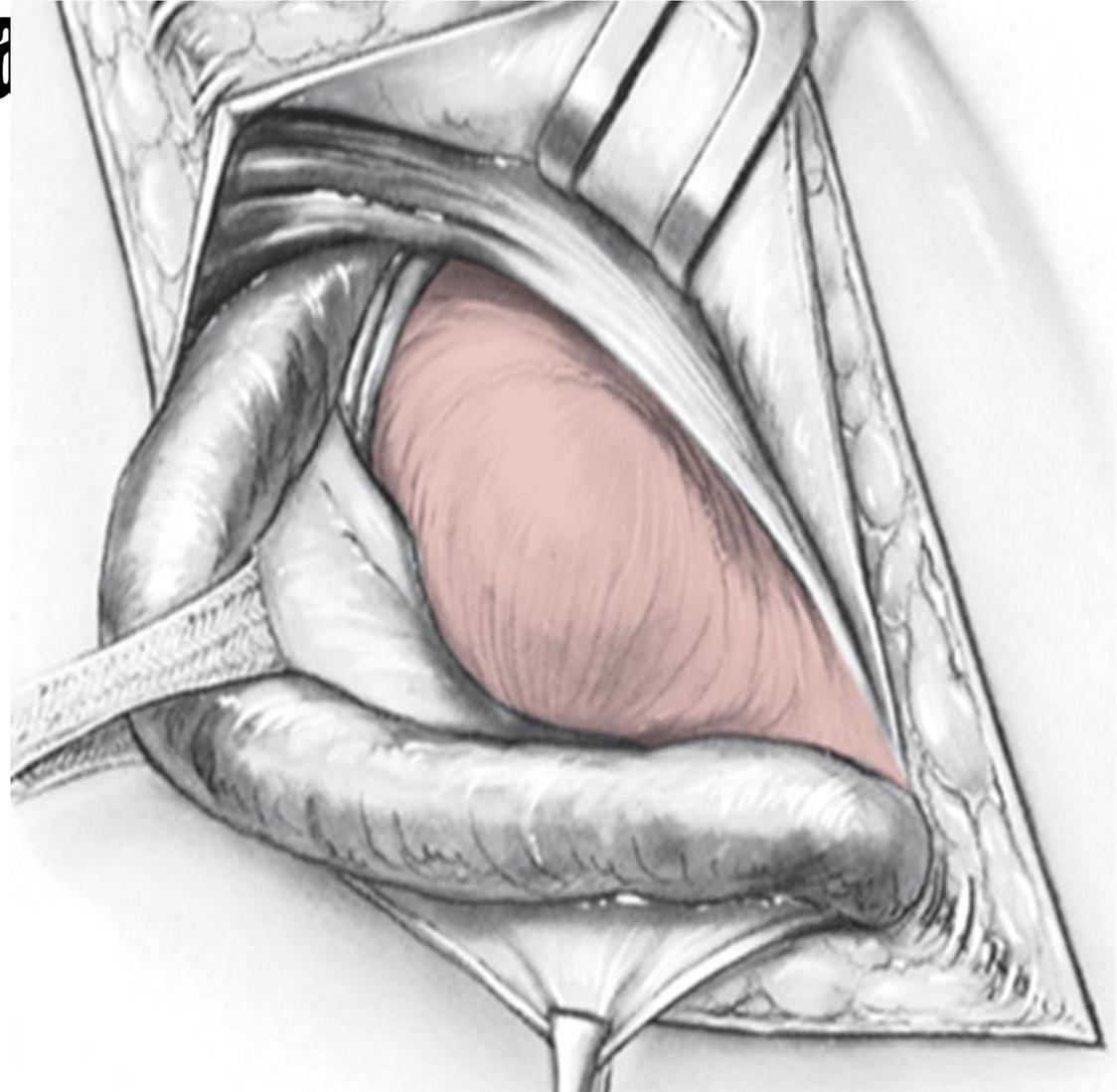
# Direct (Medial) Inguinal Hernias:

- It is not contained in the cord as is an indirect hernia
- It does not pass into the scrotum
- The sac is a broadly based defect *not reducible*
- It is much less often associated with strangulation than an indirect inguinal hernia



# Direct (Medial) Inguinal Hernias:

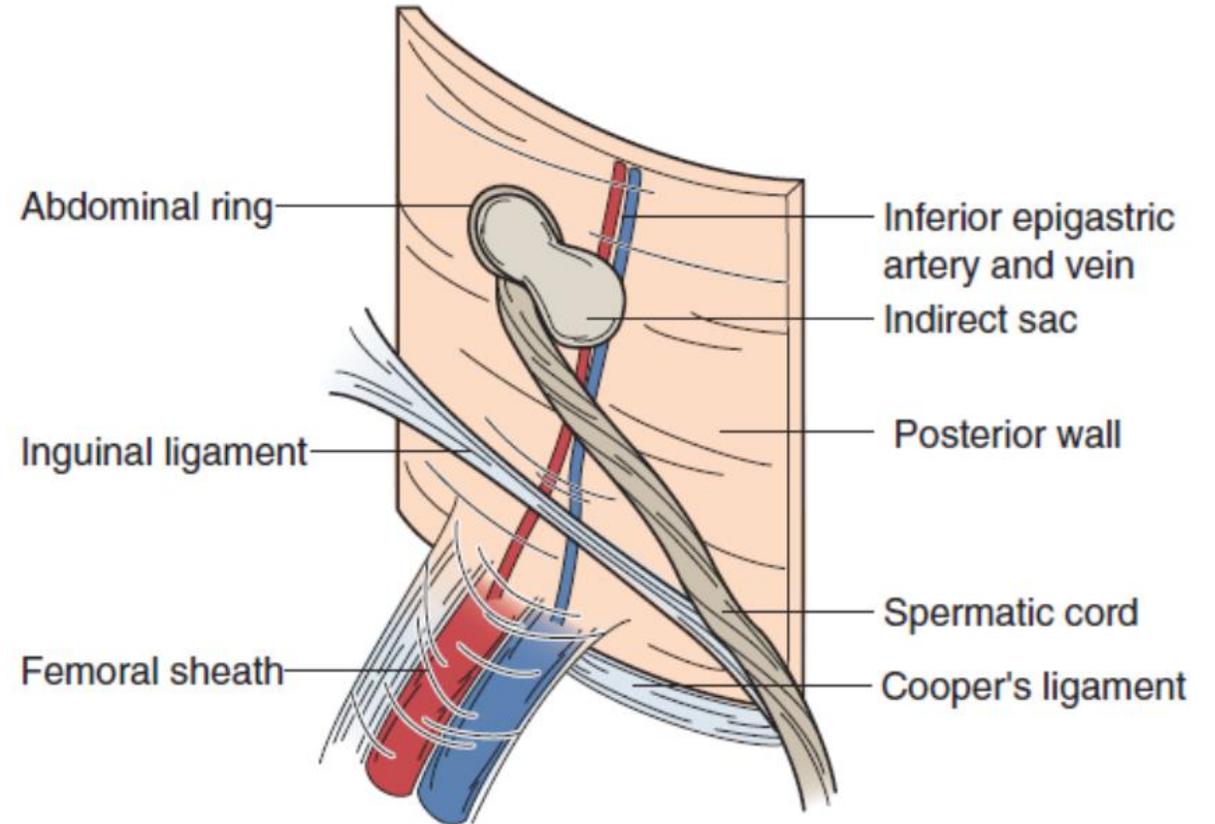
- In elderly men
- In patients with associated risk factors
- Rare in women
- Rarely strangulate because of broad base
- **Bilateral in 50%**



In hydrocele, testis aren't palpable, unlike testicular tumour

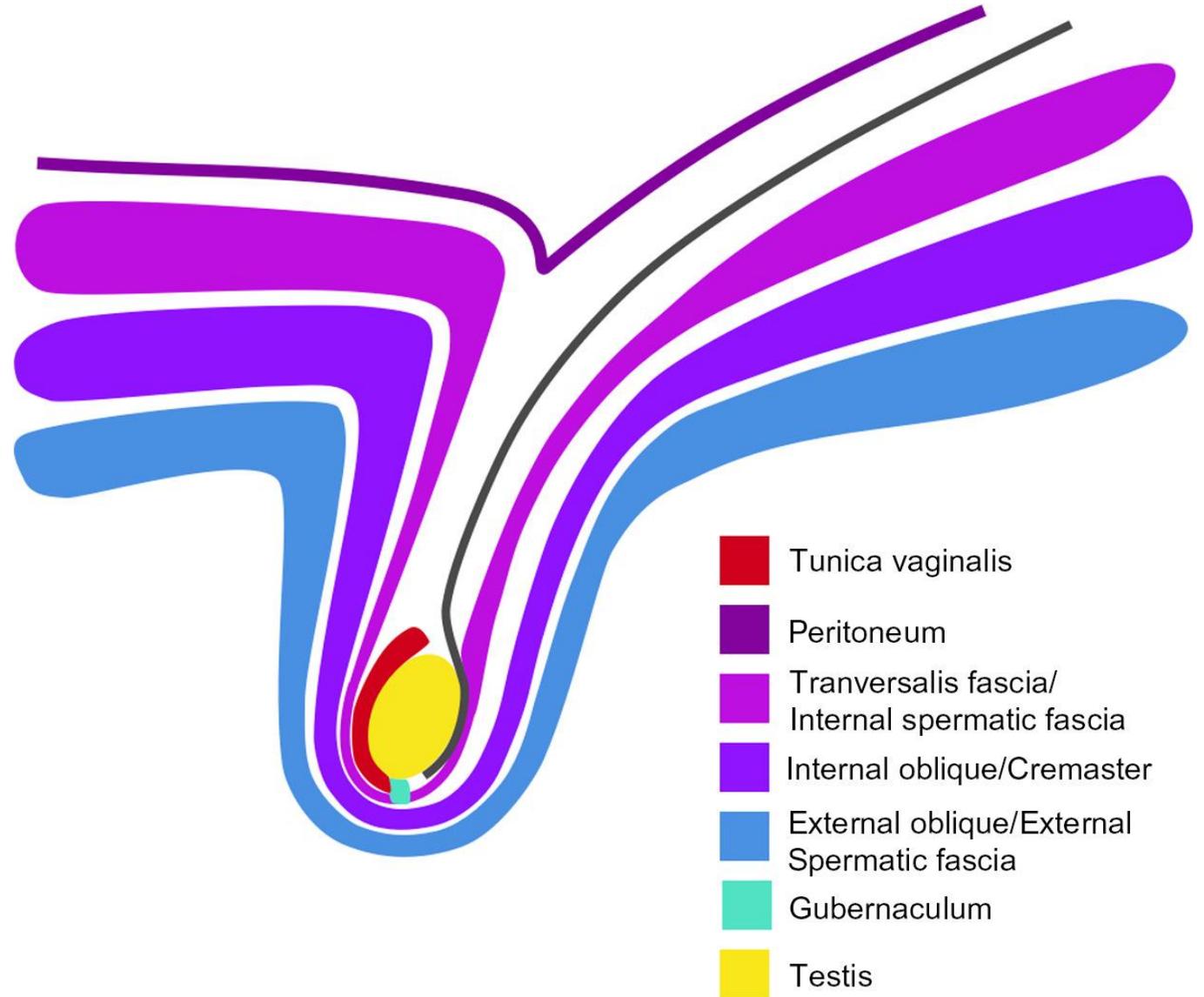
# Indirect (Lateral) Inguinal Hernias:

- **Congenital:** cannot develop if the processus vaginalis is closed
- **Patency of the vaginal process** is required but not adequate for the progression of an indirect hernia.
- **Abdominal contents herniate lateral to the epigastric vessels**



# Processus Vaginalis

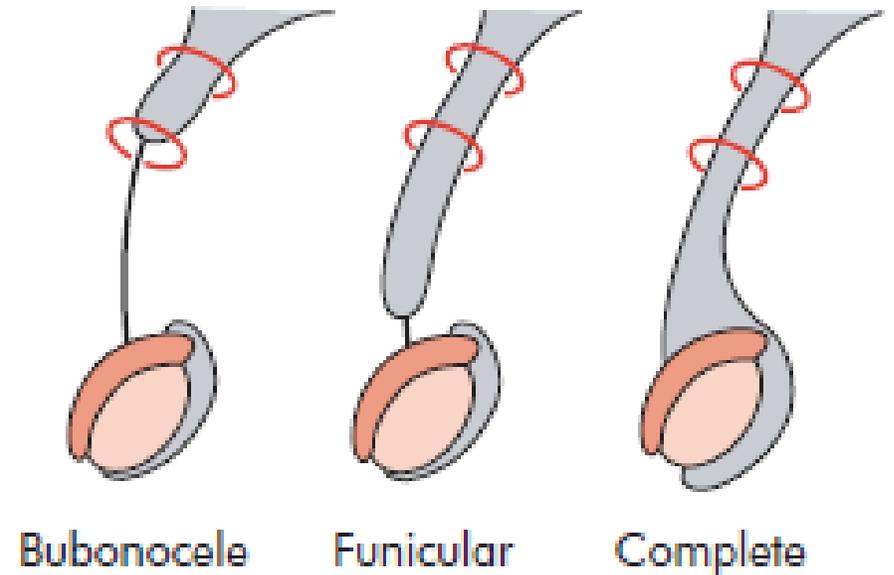
- Failure to obliterate the processus vaginalis results in the clinical entities described below.
- The lowest level at which the processus vaginalis is sealed will result in one of three patterns of groin pathology:



# Types of Indirect Inguinal Hernia

---

1. **Bubonocoele**: The hernia is limited to the inguinal canal.
2. **Funicular** : The processus vaginalis is closed just above the epididymis. The contents of the sac can be felt separately from the testis, which lies below the hernia.
3. **Complete** (synonym: scrotal): The testis appears to lie within the lower part of the hernia.



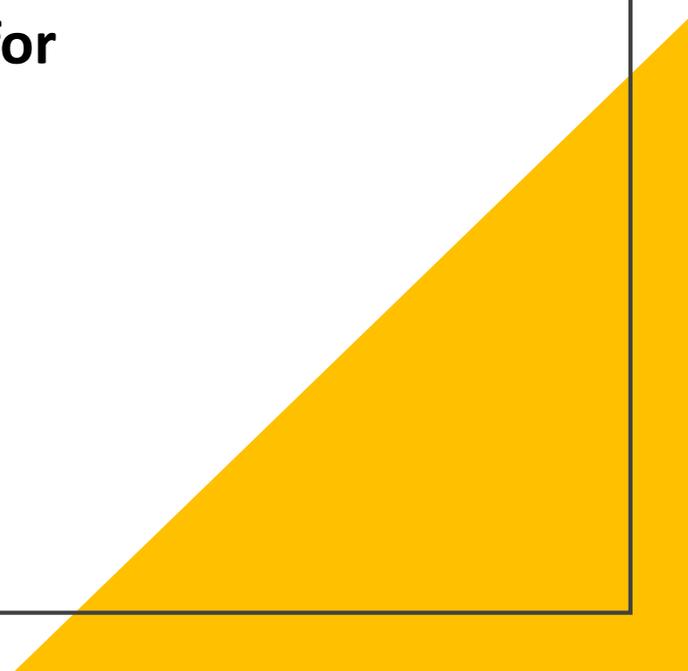
# Indirect Inguinal Hernias

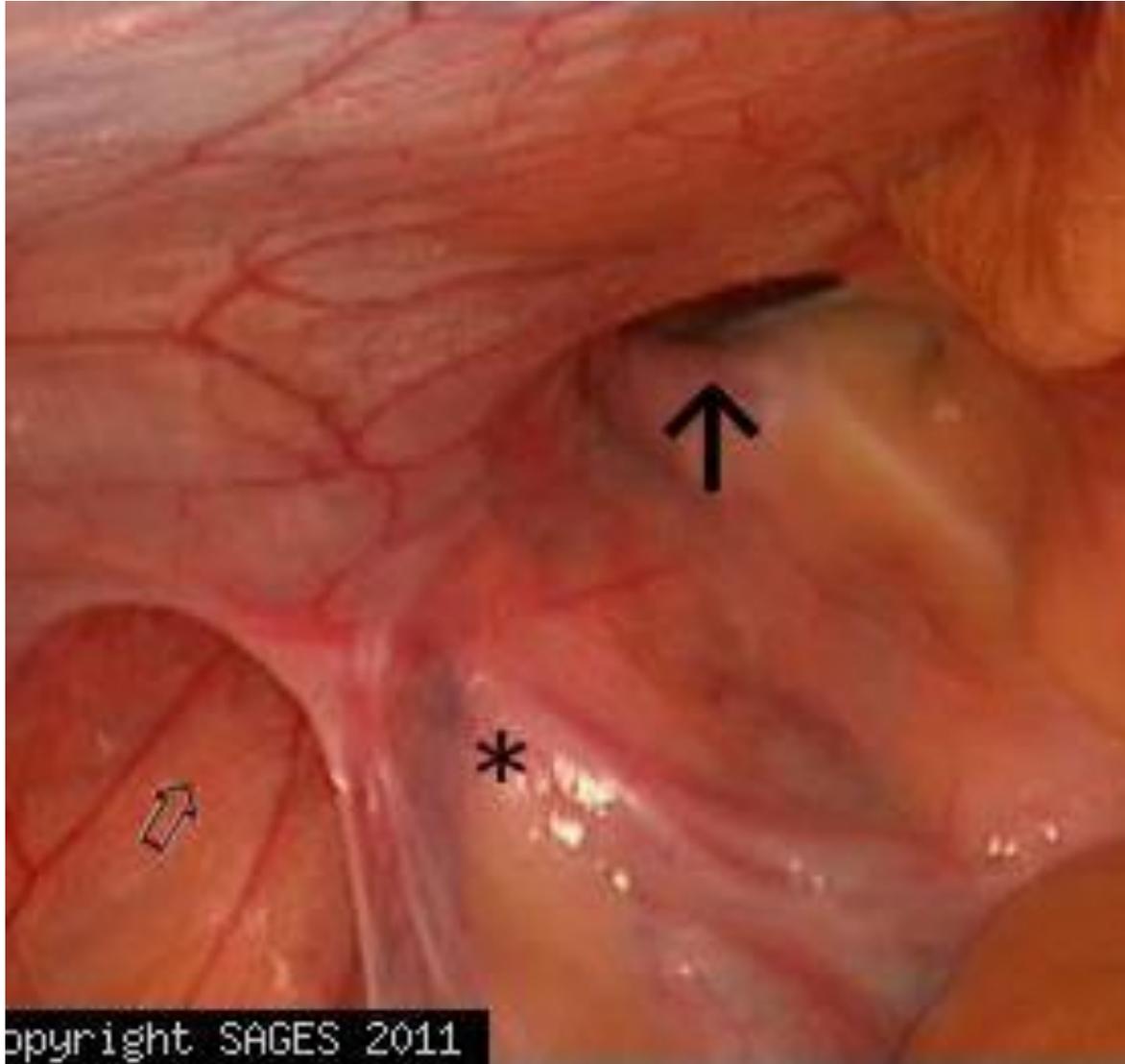
- The most common hernias in both sexes and all age groups
- Are twice as common as direct hernias
- Are more common on the right side because of delayed descent of right testicle.
- Because of narrow neck, strangulation is not uncommon.
- Often seen in the younger patient

The most common type of hernia in women is indirect inguinal hernia,  
Femoral hernia is more common in women than in men

Inguinal hernia is above the Inguinal ligament  
Femoral is below

# **Indirect Inguinal Hernias**

- **When seen in patients over 50 years of age, routine examination should include digital rectal examination for prostatic enlargement and occult blood.**
  - **Routine screening colonoscopies, if not previously performed, should also be recommended.**
  - **Bilateral in 20%**
- 
- A yellow triangular graphic is located in the bottom right corner of the slide, pointing towards the top right.



# Pantaloon Hernias

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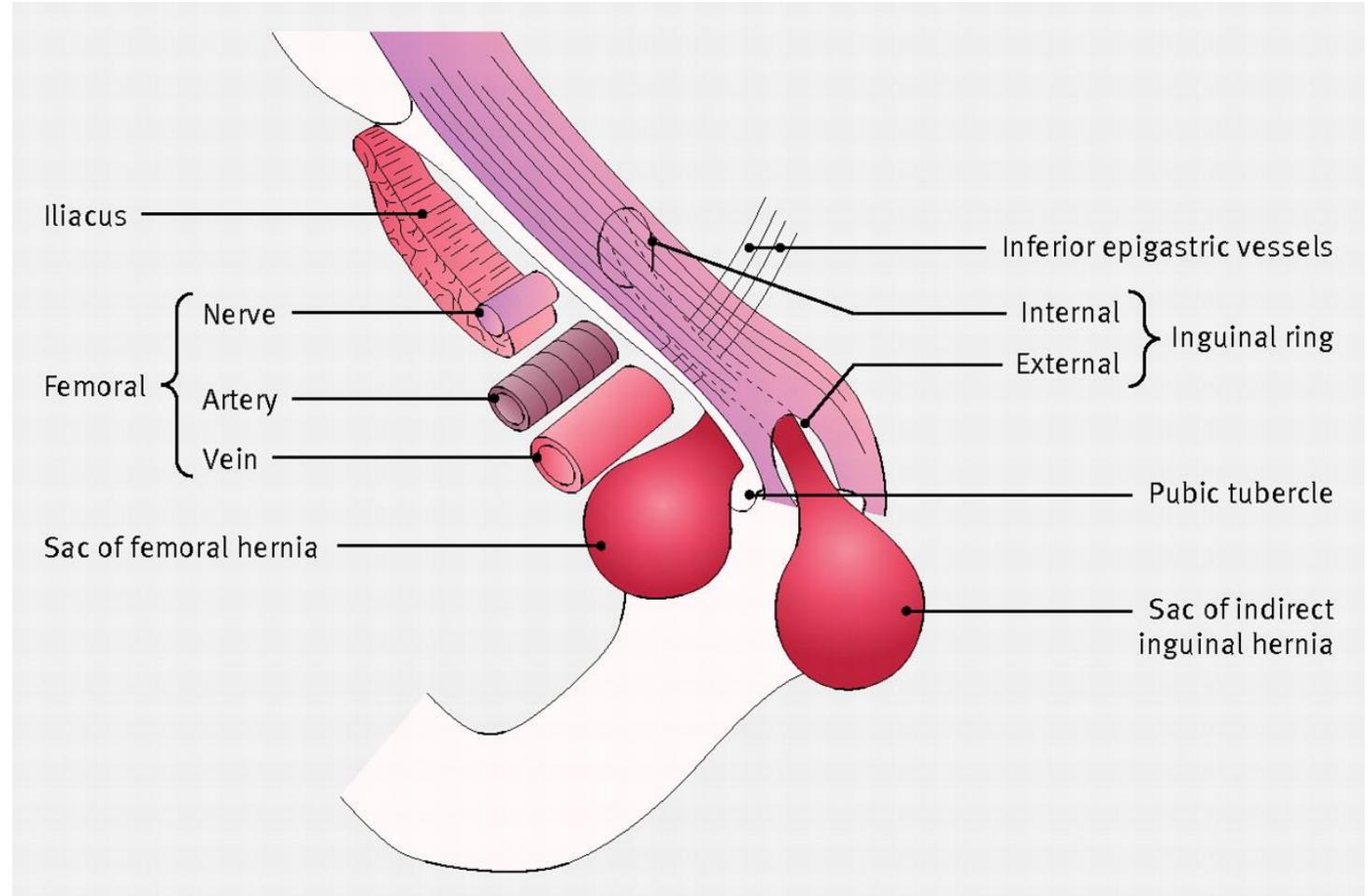
2 sacs, one is medial to the Inferior epigastric vessel, the other is lateral

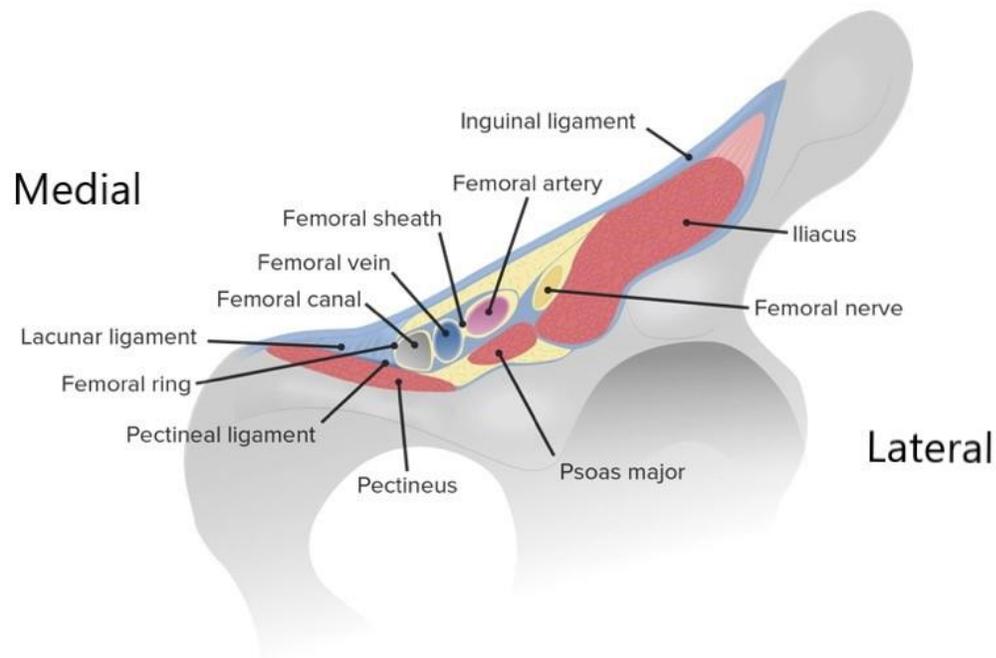
- Are combinations of **direct and indirect** hernias in which the hernia sac passes both **medially and laterally to the epigastric vessels**

The most medial compartment, which contains the lymphatic, is the one that contains the hernia

# Femoral Hernia

- The femoral artery and vein are in the lateral and middle compartments of the femoral sheath, respectively.
- A lymph node and several lymphatic vessels are in the medial compartment of the femoral canal, which is made up of loose, areolar tissue. The location of the femoral hernia is in this canal.





- The femoral canal is conical in shape and approximately 1.25 cm long.
- The femoral ring is the opening at the proximal, abdominal end of the femoral canal, and represents the superiorly oriented base of the conically shaped femoral canal.
- The lower, more distal opening into the thigh is narrower due to the femoral sheath cone shape.

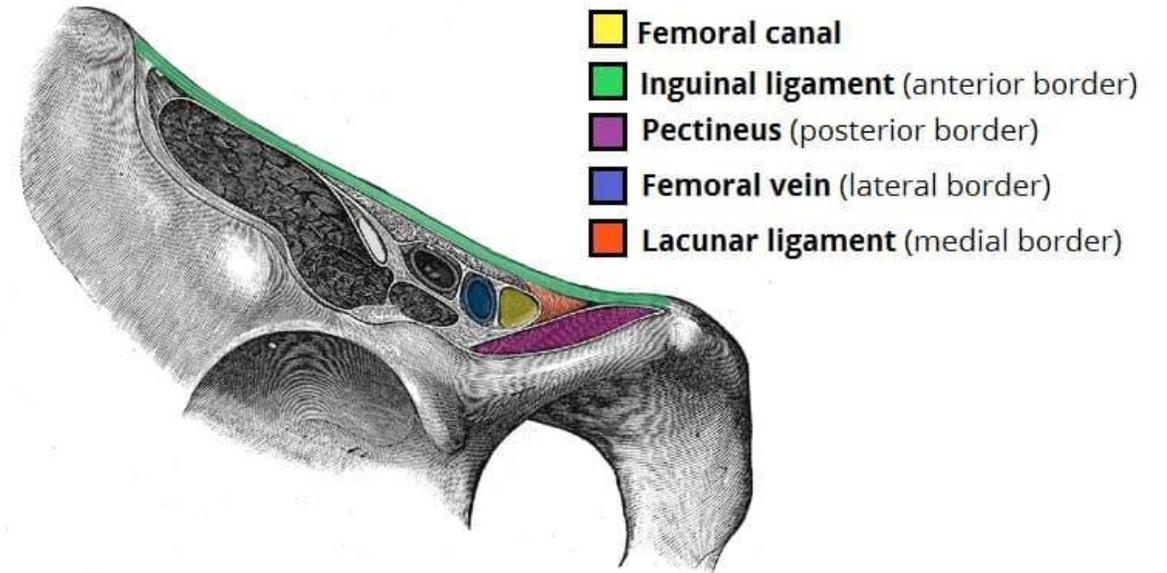
**The fusion of the femoral sheath with the deep fascia of the thigh and repeated thigh flexion change the direction of the herniating fundus upward and anterior to the inguinal ligament, making a femoral hernia difficult to distinguish from an inguinal hernia.**

Surrounded by tough structures from 3 sides and a vein laterally



# Boundaries of the Femoral Canal:

- **Posteriorly: Cooper's ligament**
- **Laterally: the femoral vein**
- **Anteriorly: the inguinal ligament**
- **The medial boundary was previously misidentified as the lacunar ligament.(IPT)**



# Femoral Hernia

- The incidence increases steadily with age and is higher among patients with recurrent hernias.
- Femoral hernias are more common in women than in men, but a woman with a groin mass is still 5 times more likely to have an inguinal hernia than a femoral hernia; inguinal hernias in women are almost always indirect.

Can be confused with inguinal, due to patients pushing the hernia upwards making it look similar to inguinal



# Femoral Hernia

- Bilateral in 20%
  - They frequently occur in patients **who have lost weight as they age.**
  - Strangulation risk has been reported to be **as high as 20%-40% in incarcerated femoral hernias.**
  - The window for successful treatment to avoid bowel resection is believed to be 4 to 6 hours.
-



# **Diagnosis and Evaluation**

- **A history and physical examination are usually sufficient to confirm the diagnosis of a clinically obvious groin hernia and**
  - **describe it as direct, indirect, or femoral; complete or incomplete; complicated or uncomplicated, and finally,**
  - **describe the content, e.g., omentocele, enterocele.**
-

# History

One-third of patients show no symptoms.

*No intervention*

Symptoms when present:

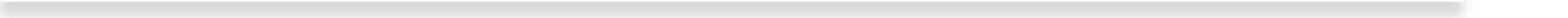
- Typical presentation: groin pain or mass groin that disappears with minimal pressure or when the patient lies down.
- A heavy or dragging or burning or pinching sensation
- Pain or discomfort when coughing, urinating, defecating, exercising, or sexual intercourse

*Hernia vs Testicular torsion*

*In Hernia, you can't get above the swelling, the intestine descended into the scrotum*

# Physical Examination:

- Should be carried out with the patient both standing and lying down
- Examine the patient while standing first.
- A hernia can be detected in 75% just by inspection
- Groin scars from previous open or laparoscopic repairs
- Demonstrate a lump with a cough impulse or muscle straining and palpate the external ring during these maneuvers
- Always evaluate the contralateral side, both femoral rings, and the scrotum content.

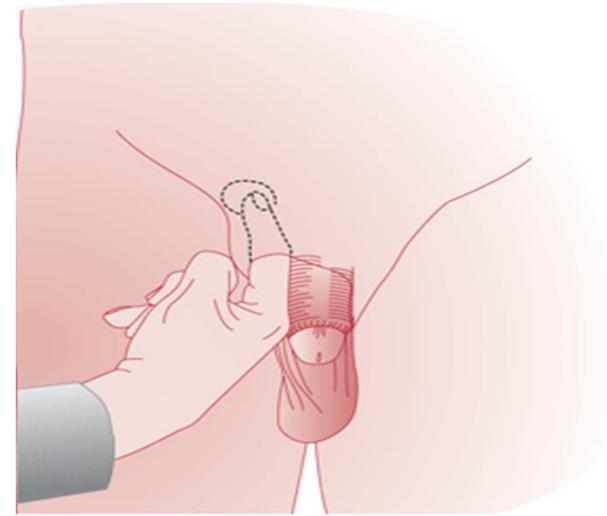
- 
- **The femoral space can be examined by applying pressure medially in the groin just cephalad to the pubic bone**
  - **The presence of the femoral hernia may occasionally be revealed by distension of the superficial saphenous vein, which is a very important sign to always look for in suspected cases.**
- 

# Examination Tests:

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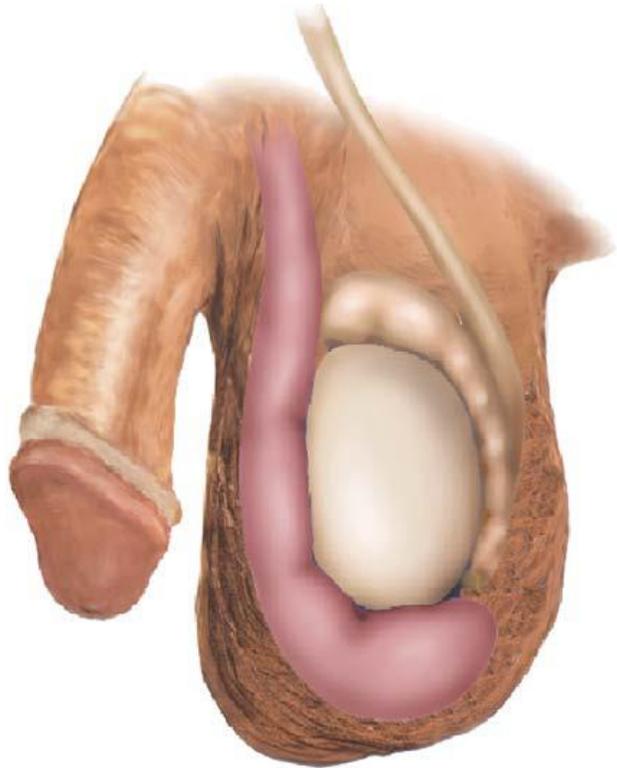
*This isn't done anymore*

- Deep ring occlusion test
- Superficial ring invagination test
- Ziemann's technique of three fingers palpation for deep ring, superficial ring, femoral ring.

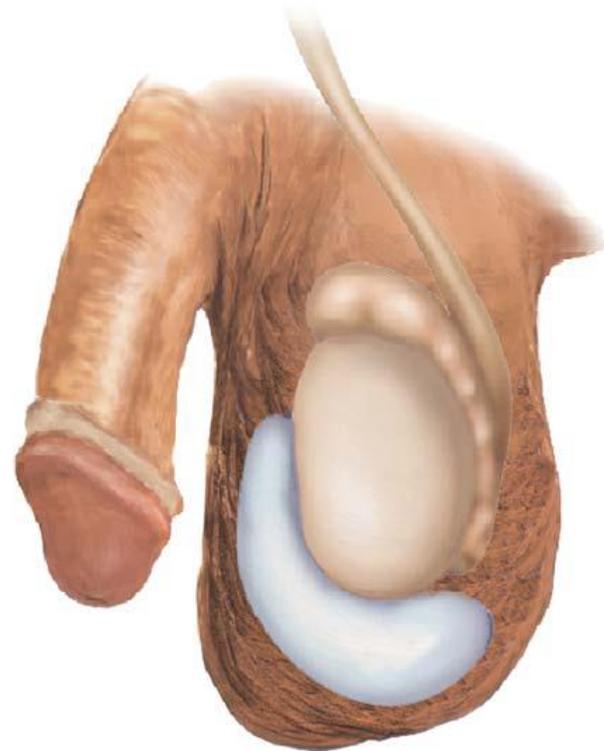


# “Can or can not get above it”

**Indirect hernia: can not get above it**



**Hydrocele: can get above it**



# Imaging studies:

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- When the symptoms and signs of a groin hernia are obvious, the diagnosis is clinical, and no further confirmation is required.



## **Indications for imaging:**

- 1. Exclude an occult hernia (e.g., especially small femoral hernias in patients with obesity)**
- 2. Vague groin swelling with diagnostic uncertainty (e.g., multiple hernias where only some of the hernias are apparent with physical examination)**
- 3. Poor localization of swelling**
- 4. Intermittent swelling does not present at time of physical examination**
- 5. Other groin complaints without swelling**

# Ultrasound

- **Ultrasound specificity in relation to surgical exploration is 81–100%, and sensitivity is 33–100% in the clinical diagnosis of a groin hernia.**
- **When groin US is negative or non-diagnostic, dynamic (Valsalva maneuver during testing) MRI, dynamic CT, and even herniography may be utilized to determine the diagnosis.**

# **MRI**

- **MRI provides the best anatomic detail specially for patients who present with pain that may be attributed to sports pathologies and for differentiation of soft tissue inflammation or tumor.**
- **It has 94.5% sensitivity and 96.3% specificity.**

# CT

- **The use of CT is limited to rare situations in which the hernia wall incorporates the urinary bladder and to the assessment of intra-abdominal diseases that may elevate intra-abdominal pressure and result in hernia formation.**
- **It has sensitivity of 83% and specificity 67-83%.**

# Differential Diagnosis of Groin Mass

- Inguinal hernia
- Hydrocele
- Inguinal adenitis
- Varicocele
- Ectopic testis
- Lipoma
- Hematoma
- Sebaceous cyst
- Hidradenitis of inguinal apocrine glands
- Psoas abscess
- Lymphoma
- Metastatic neoplasm
- Epididymitis
- Testicular torsion
- Femoral hernia
- Femoral artery aneurysm or pseudoaneurysm



# Management

The goals of inguinal hernia repair are to:

- provide long-term, safe closure of the hernia defect
  - decrease pain
  - improve quality of life.
-

# Surgical Treatment

## Open repair

- Sutured repair (also called herniorrhaphy): e.g., Bassini, McVay, Marcy, Halsted, Shouldice repairs.
- Tension-free repair with the use of a prosthetic mesh (also called hernioplasty): Anterior (Lichtenstein), Posterior (Stoppa)

## Laparoscopic repair

- Total extraperitoneal (TEP)
- Trans abdominal preperitoneal (TAPP)

# Complications of Repair: (in 20%)

## EARLY:

*→ Complicated*

- Death(emergency: 7%, overall: 0.2%)
- Urinary retention and urinary tract infection
- Orchitis
- Wound surgical site infections and complications (1-7%)
- Osteitis pubis
- Prosthesis-related complications
- Nerves injury
- Specific complications of laparoscopic surgery

# Complications of Repair: (in 20%)

## LATE

- Hernia recurrence *surgery success is measured by recurrence rate*
- Chronic pain or inguinodynia (the most common and most serious)
- Infertility

**HAVE A NICE DAY !**

