# HERNIA

Jacek Szeliga MD, PhD

Hernia: The protrusion of tissue through a defect in fascial and/or muscular layer(s) that normally contain it.

- The *sine qua non* of a hernia is a **bulge**.
- *16th century illustration of femoral hernia*

Source: Undetermined

# A hernia consist of 3 parts:

The sac:
- mouth
- neck
- body
- fundus

1.Sac:

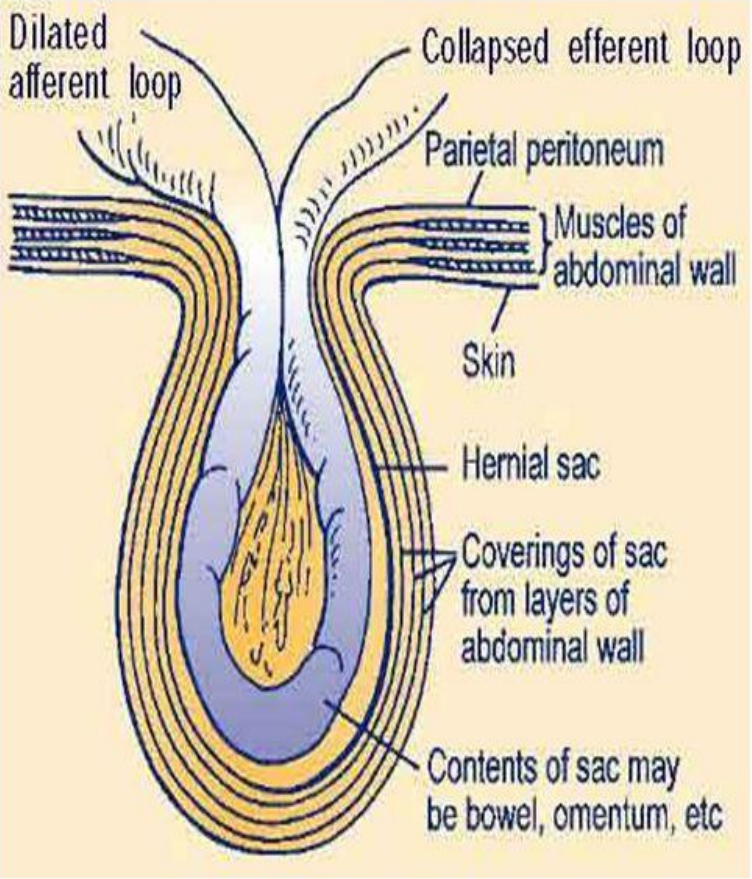
consist of a diverticulum of peritoneum.

2.Contents:

Omentum, small or large intestine, urinary bladder, Omentum, ovaries malignant nodules or ascetic fluid.

3.Coverings:

derived from the layers of abdominal wall.



| Types of abdominal wall hernia | Location | Congenital | Acquired |
|---|---|---|---|
| Epigastric | Upper midline | | * |
| Umbilical | Umbilicus | * | ? |
| Inguinal/femoral | Groin | * | * |
| Incisional | Anywhere | | * |
| Lumbar | Petit's Δ | | * |
| Interparietal | Lateral hypogastric | | * |
| Obturator | Obturator foramen | | * |
| Spigelian | Arcuate *x* semilunar lines | ? | ? |
| Traumatic | Anywhere | | * |
| Diastasis | Upper midline | Not a hernia | Not a hernia |

# Why Do Hernias Occur?

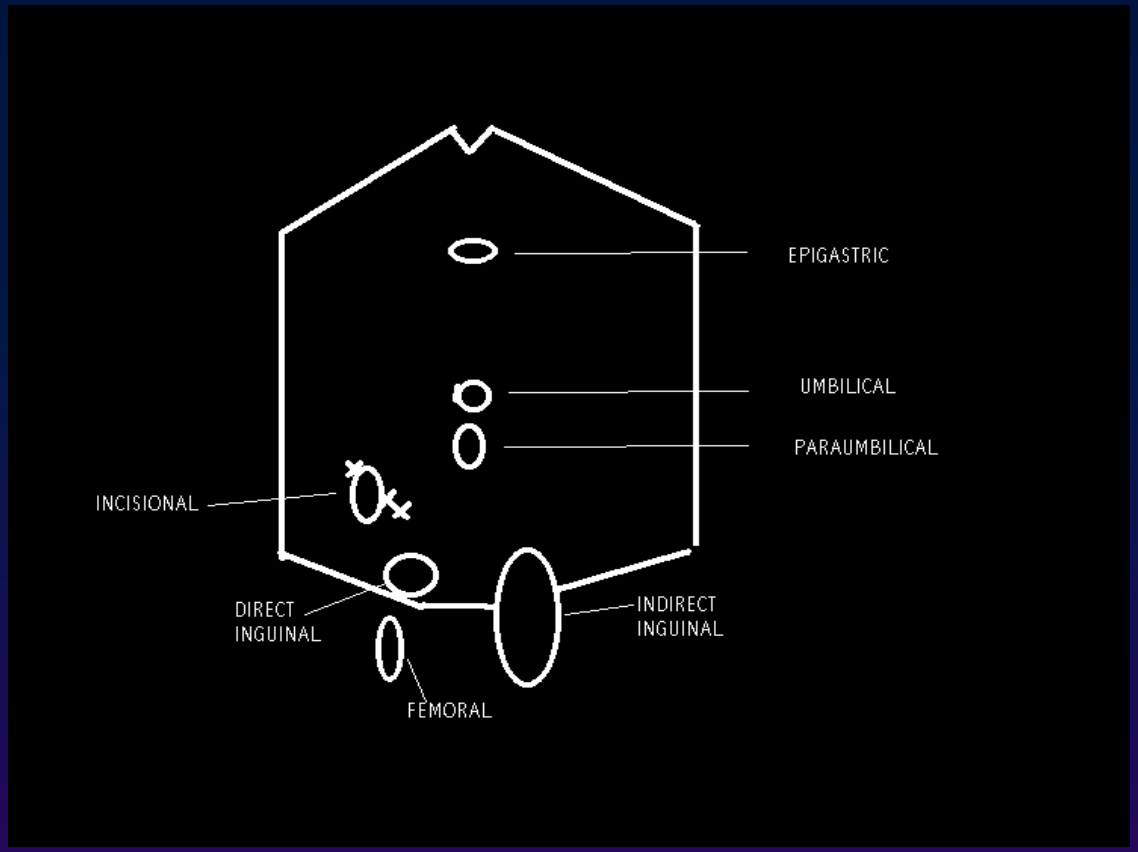
1. There is a congenital developmental defect
   - Failure of fascial opening to close (e.g. umbilical)
   - Failure of process to obliterate itself (e.g. processus vaginalis)
2. There is an acquired weakness
   - Deterioration/thinning of fascia with age
   - Loss of tissue (injury, infection, poor wound healing, etc.)
3. Repeated increase in abdominal pressure

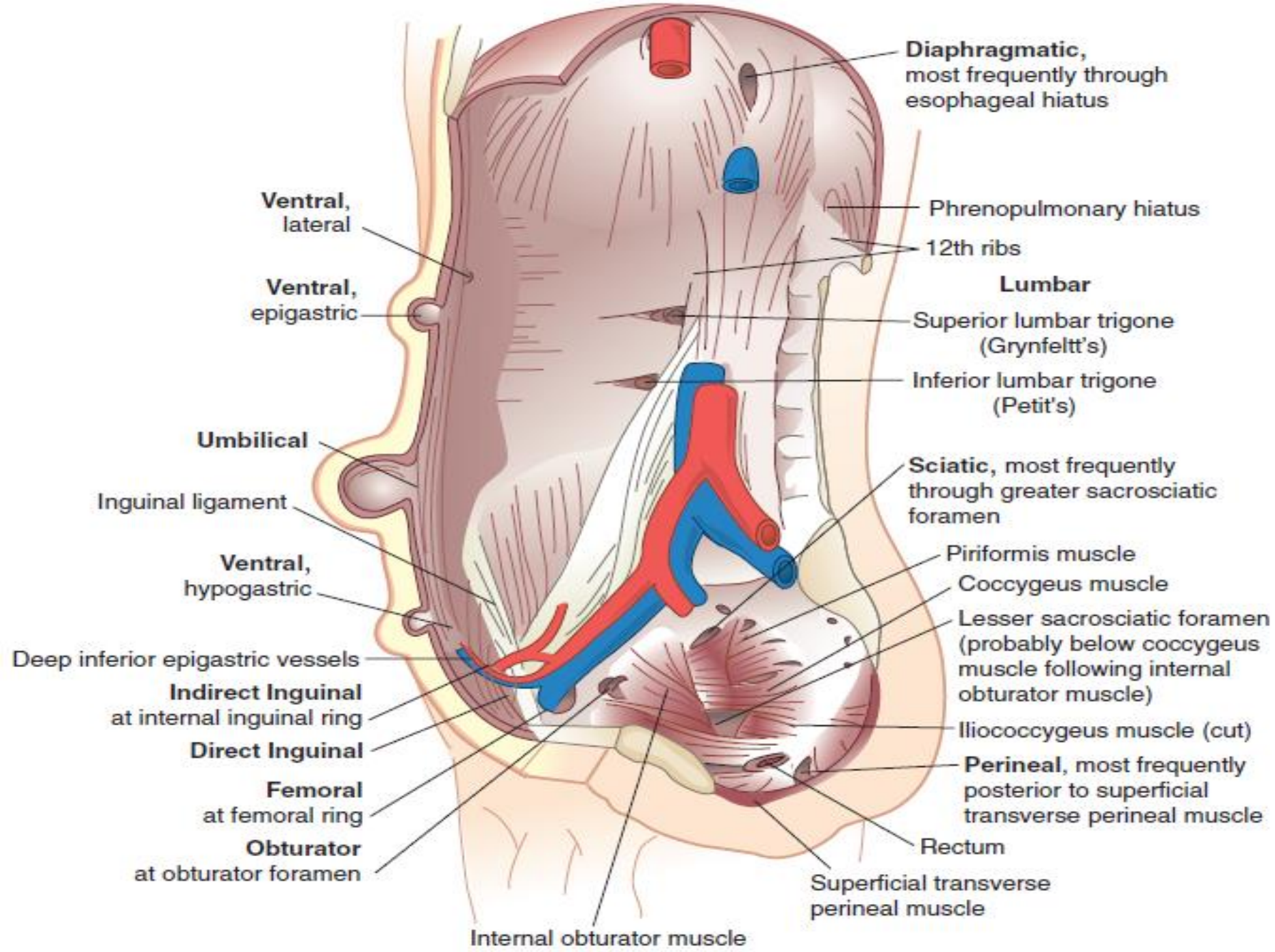
## Repeated INCREASE in abdominal pressure is usually due to

- Chronic cough
- Straining
- Bladder neck or urethral obstruction
- Pregnancy
- Vomiting
- Sever muscular effort
- Ascetic fluid

# Common Hernia

- Umbilical
- Incisional
- Inguinal
  - Direct and indirect
- Femoral




Diaphragmatic, most frequently through esophageal hiatus
Phrenopulmonary hiatus
12th ribs
Lumbar
Superior lumbar trigone (Grynfeltt's)
Inferior lumbar trigone (Petit's)
Sciatic, most frequently through greater sacrosciatic foramen
Piriformis muscle
Coccygeus muscle
Lesser sacrosciatic foramen (probably below coccygeus muscle following internal obturator muscle)
Iliococcygeus muscle (cut)
Perineal, most frequently posterior to superficial transverse perineal muscle
Rectum
Superficial transverse perineal muscle
Internal obturator muscle
Ventral, lateral
Ventral, epigastric
Umbilical
Inguinal ligament
Ventral, hypogastric
Deep inferior epigastric vessels
Indirect Inguinal at internal inguinal ring
Direct Inguinal
Femoral at femoral ring
Obturator at obturator foramen

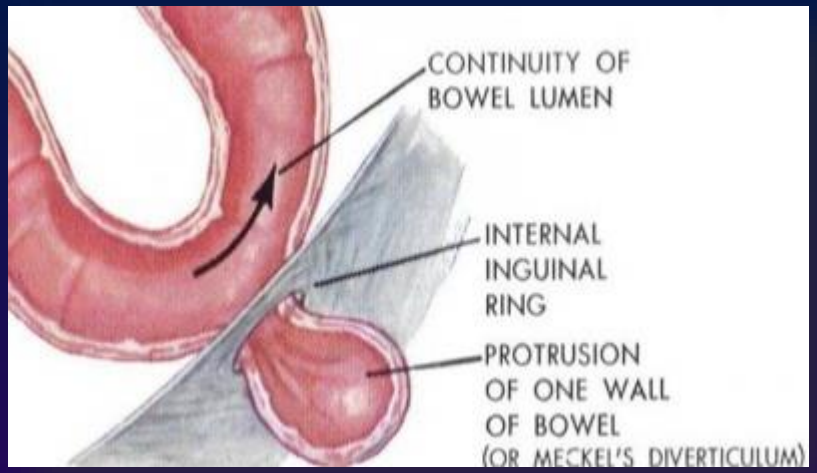
# Clinical types of hernia

- **reducible hernia** is one in which the contents of the sac return to the abdomen spontaneously or with manual pressure when the patient is recumbent.
- **irreducible hernia** is one whose contents or part of contents cannot be returned to the abdomen, without serious symptoms.
- **incarcerated hernia**: is one whose contents cannot be returned to the abdomen, with severe symptoms.
- **strangulated hernia**: denotes compromise to the blood supply of the contents of the sac. Incarcerated hernia and strangulated hernia are the two stages of a pathologic course

Hernias are trapped by the narrow neck

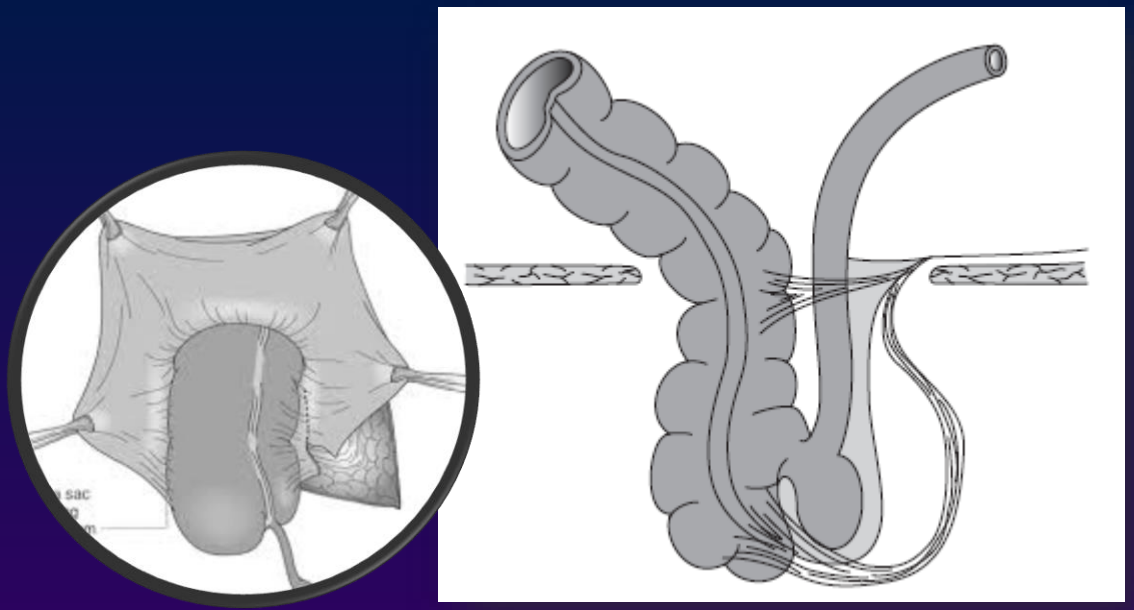
# Clinical types of hernia

**Richter's hernia** (intestinal wall hernia) a hernia that has strangulated or incarcerated a part of the intestinal wall without compromising the lumen.



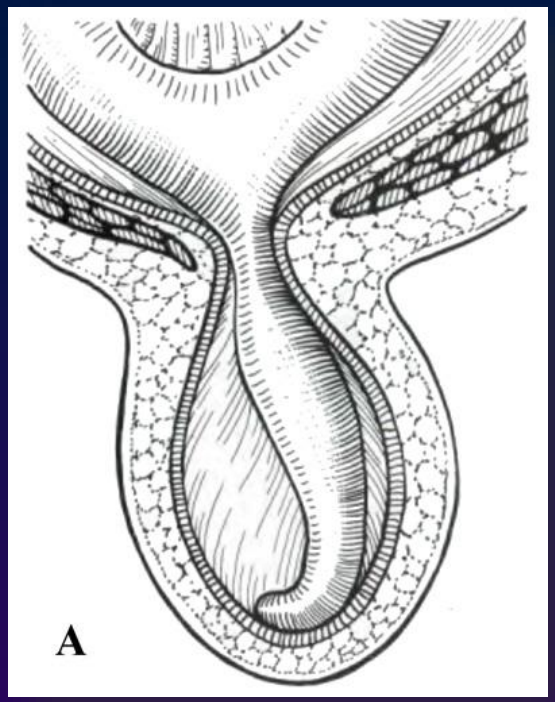
# Clinical types of hernia

**Sliding hernia** is one in which the wall of a viscus forms a portion of the wall of the hernia sac. It is may be colon (on the left), caccum (on the right) or bladder (on either side). Belongs to irreducible hernia.



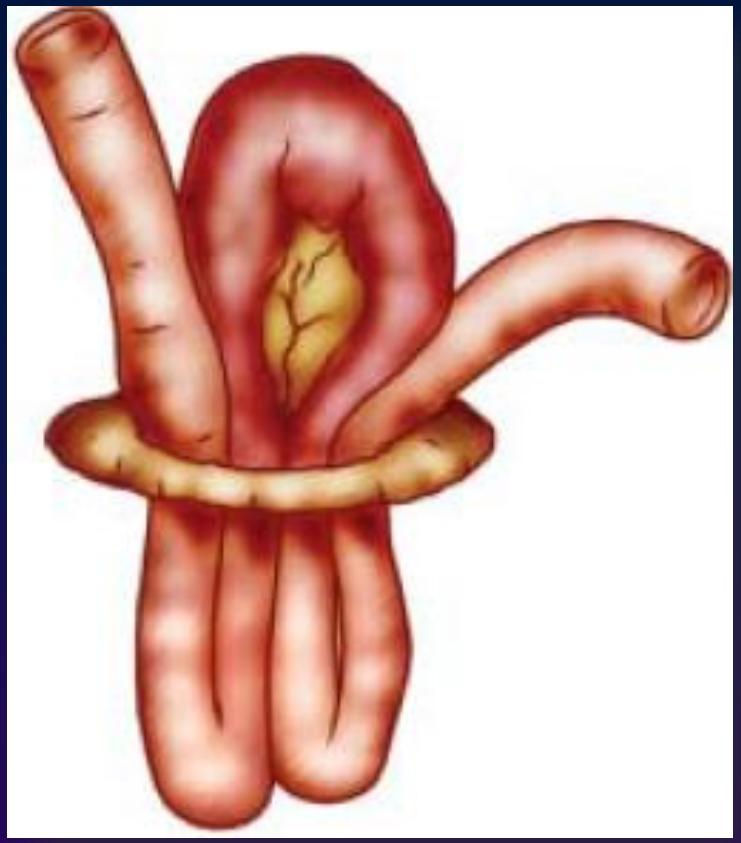
# Clinical types of hernia

**Littre hernia:** a hernia that has incarcerated the intestinal diverticulum (usually Meckel diverticulum).



# Clinical types of hernia

**Maydls hernia:** **‘W’** loop of intestine



# Groin hernia

- Indirect inguinal and scrotal
- Direct inguinal
- Femoral

# Groin Hernias incidence

- Groin hernias are found in 5% of male population.

- Represents 86% of all hernia cases.

- It occurs 5 times more often in males than females.

- Inguinal 96% (indirect 75%, direct 25%).

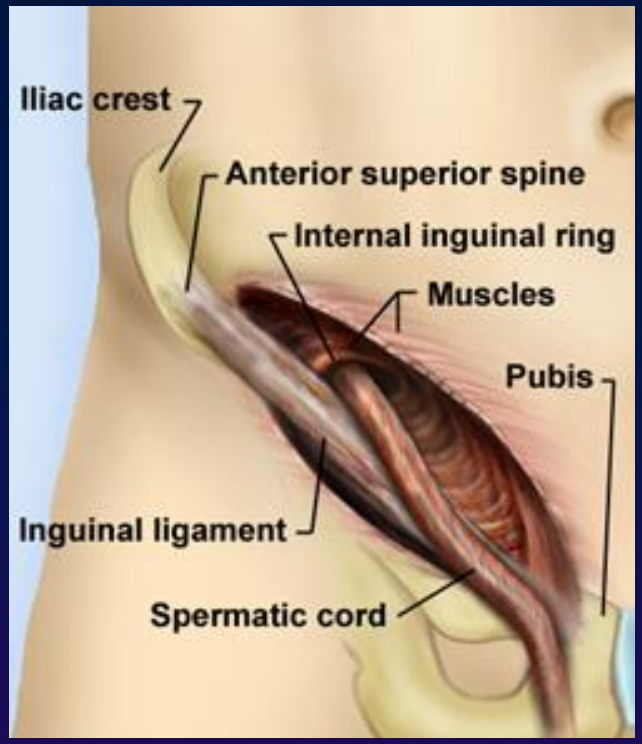
    - Bilateral in 20% of cases

    - Right sided hernias are more frequent than left sided ones

- Femoral 4%.

# Inguinal Anatomy

- Floor
  - Transversalis fascia
  - Medially the conjoint tendon
- Roof
  - External oblique aponeurosis
  - Laterally the conjoint tendon
  - Skin and superficial fascia
- Above
  - Conjoint tendon
- Below
  - The inguinal ligament



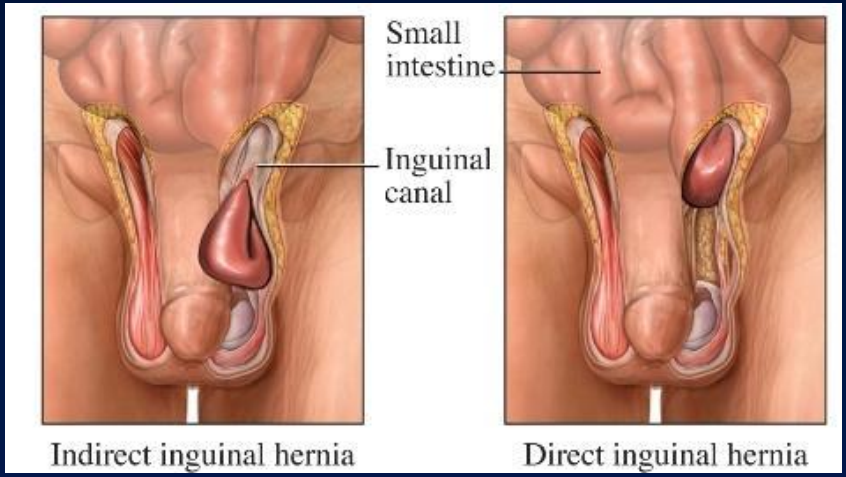
# Inguinal Anatomy

- Three nerves
  - Ilio-inguinal (on not in)
  - Sympathetic fibers
  - Genitofemoral
- Three layers of fascia
  - Internal spermatic (transversalis f.)
  - Cremasteric (conjoint tendon)
  - External spermatic (ext. oblique)

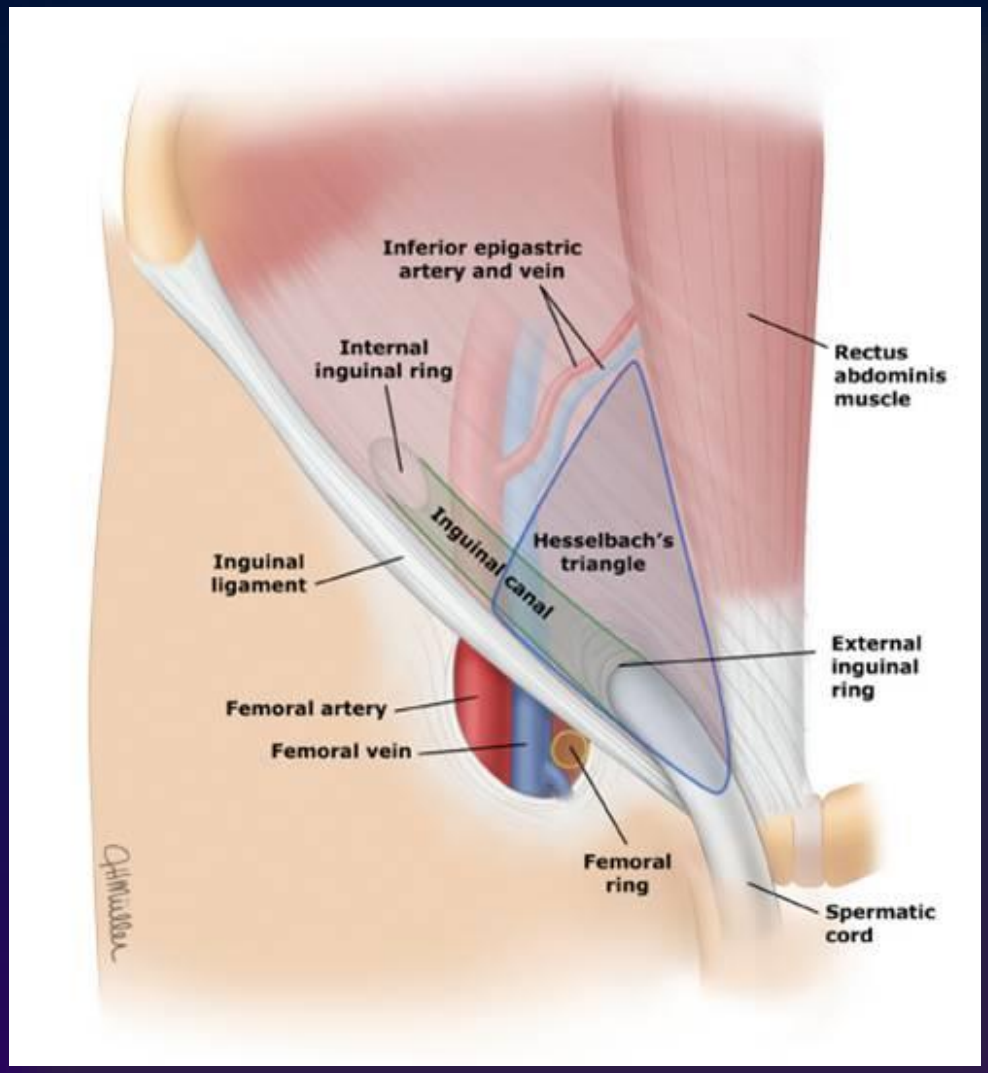
# Inguinal Anatomy

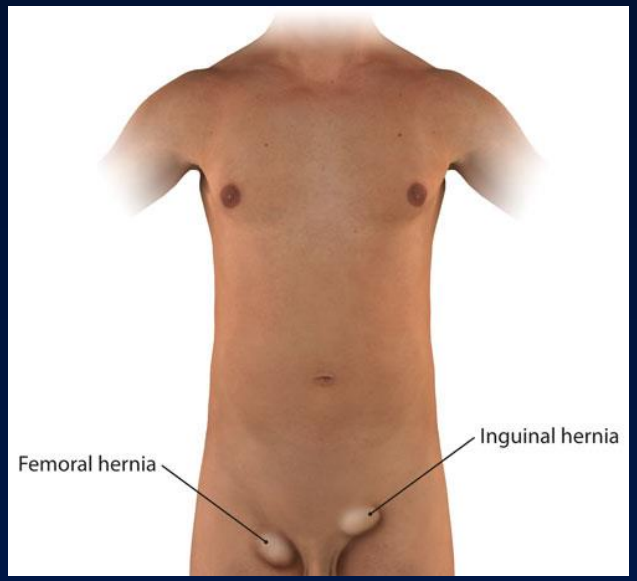
- Three arteries
  - Testicular (from the aorta)
  - Artery of the vas (external iliac)
  - Cremasteric (inferior epigastric)
- Three other structures
  - The vas deferens
  - The pampniform plexus of veins
  - Lymphatics (to aortic nodes)

# Inguinal


Small intestine
Inguinal canal
Indirect inguinal hernia
Direct inguinal hernia

# Inguinal/femoral

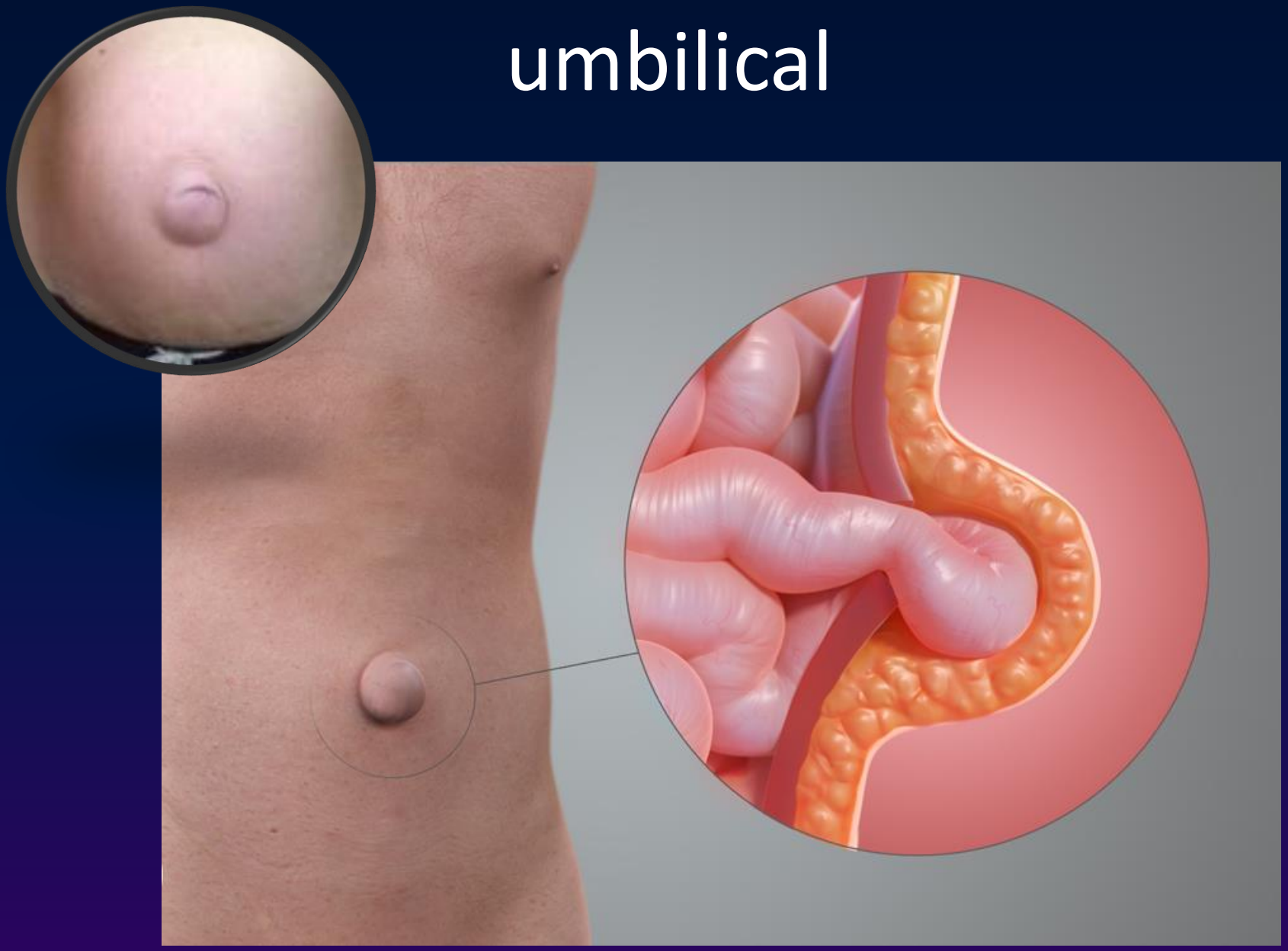


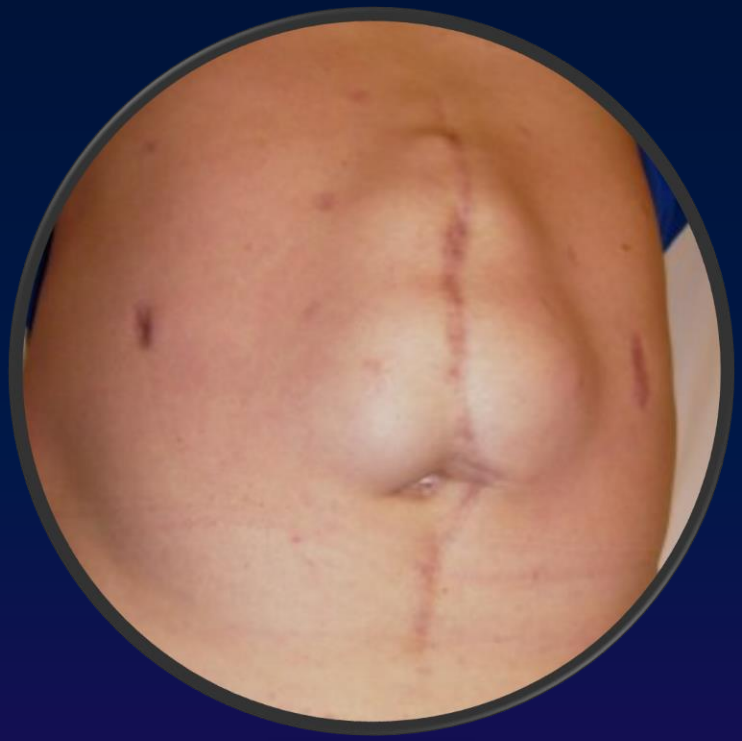

| Indirect Inguinal Hernia | Direct Inguinal Hernia |
| --- | --- |
| Pass through inguinal canal. | Bulge from the posterior wall of the inguinal canal |
| Can descend into the scrotum. | Cannot descent into the scrotum. |
| Lateral to inferior epigastric vessels. | Medial to inferior epigastric vessels. |
| Reduced: upward, then laterally and backward. | Reduced: upward, then straight backward. |
| Controlled: after reduction by pressure over the internal (deep) inguinal ring. | Not controlled: after reduction by pressure over the internal (deep) inguinal ring. |
| The defect is not palpable (it is behind the fibers of the external oblique muscle). | The defect may be felt in the abdominal wall above the pubic tubercle. |
| After reduction: the bulge appears in the middle of inguinal region and then flows medially before turning down to the scrotum. | After reduction: the bulge reappears exactly where it was before. |
| Common in children and young adults. | Common in old age. |

| Inguinal hernia | Femoral hernia |
| --- | --- |
| 1- more common in male | 1- more common in females |
| 2- pass through the inguinal canal | 2- pass through the femoral canal |
| 3- neck of the sac is above and medial the pubic tubercle | 3- neck of the sac is below and lateral the pubic tubercle |
| 4- less common to be strangulated | 4- more common to be strangulated |
| 5- can be treated without surgery | 5- must be treated surgically |
| 6- the two diagnostic signs of hernia + | 6- the two diagnostic signs of hernia - |
| 7- the sac mainly contain ; bowel | 7- the sac mainly contains ; omentum |

# umbilical



# Incisional



# Hernia Complications

- Incarceration
- Strangulation
- Intestinal obstruction

# Pertinent History

- Duration/onset
- Symptoms
  - Local
  - Obstructive
    - Nausea, emesis, pain, distension, obstipation
- Prior Incarceration
- Related comorbidity
  - Cough/Urinary flow/Constipation
  - Operative risk

# Pertinent exam

- Distension
  - Bowel obstruction
- Scars
  - Incisional hernias
  - Recurrence
  - Contraindications for certain approaches
- Rectal--blood/masses

# Hernia

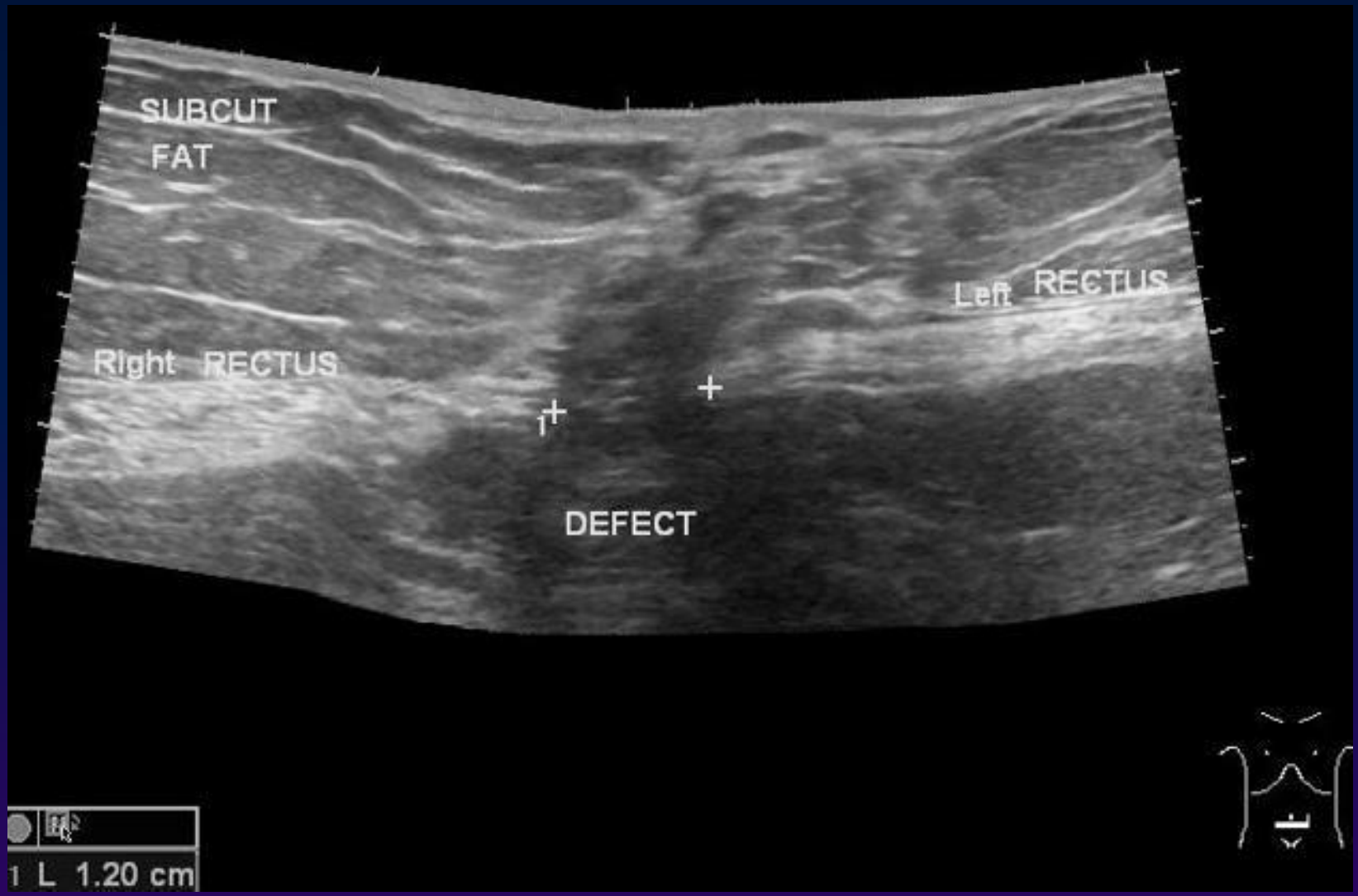
Examination:

1. Inspection for site, size, shape and color.
2. Palpation for surface, temp, tenderness, composition and reducibility.
3. Expansible cough impulse.
4. General exam: for common causes of increase intra abdominal pressure

# Surgical Exam

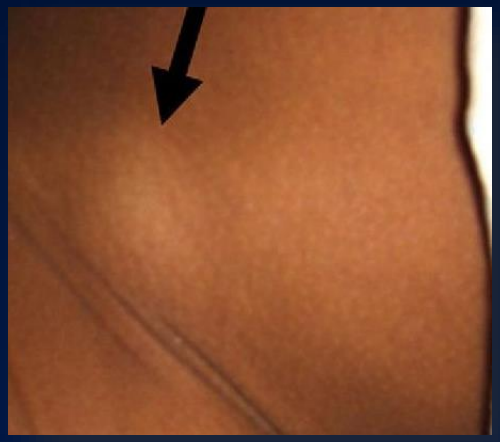
- Location
- Reducibility
- Tenderness
- Skin changes
- Palpable edges
- Genitalia
- Rectal

# US



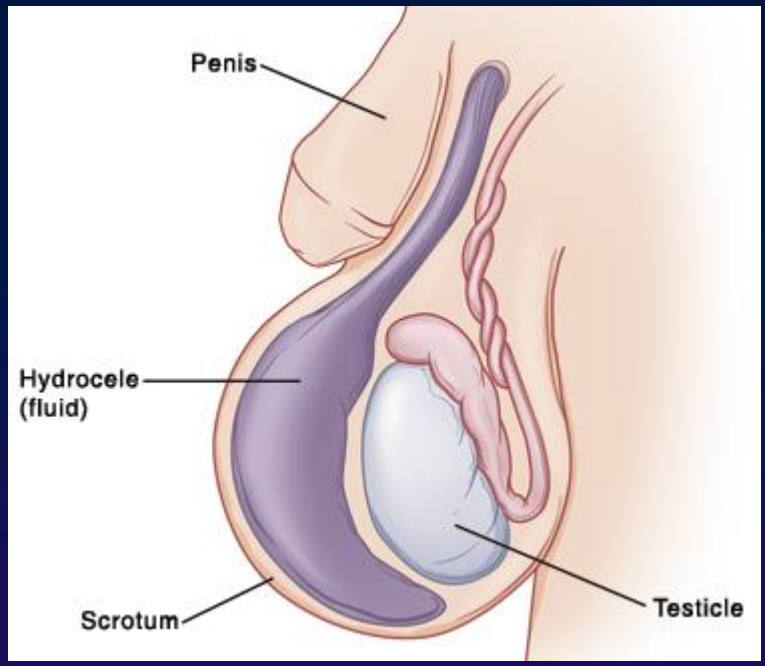
# Groin Hernia Differential Diagnosis

- Hydrocele
- Varicocele
- Epididymoorchitis
- Torsion of testis
- Undescended testis
- Ectopic testis
- Testicular tumor
- Femoral artery aneurysm
- Lipoma
- Lymphadenopathy



# Hydrocele

- Fluid collection in scrotum.
- Contained in peritoneal sac that may or may not communicate with peritoneal cavity via *processus vaginalis*.
- ‘Communicating’ hydrocele if peritoneal communication is present.
- Differentiated from true hernia by finding of normal (i.e., no bulge in) inguinal canal.



# Umbilical hernia

- Signs and symptoms
- Age; doesn’t appear until the umbilical cord has separated and healed
- No specific symptoms
- Have wide neck and reduce easily, rarely give intestinal obstruction
- Nature history; 90 % disappear spontaneously during the first year

# Examination

- Inspection
- Site; in the center of the umbilicus
- Size and shape; size can vary from vary small to very large.

  Shape is usually hemispherical.
- Palpation
- Composition; contain bowel, which makes it resonant to percussion.

  They reduce spontaneously when the child lies down.
- Reducibility; easy
- Cough impulse; invariably present.

# Epigastric hernia

- Incidence 1-5%
- Men > women
- Pre-peritoneal fat protrusion through decussating fibers at linea alba
- Between xiphoid and umbilicus
- 20% multiple
- Repair primarily

# Incisional Hernia

Can occur ANYWHERE

an incision has been made, no matter how small.

# Incisional Hernia

- Can develop in the original incision site because of dehiscence or failure of wound healing, or
- Can develop at the sites where sutures are passed through the tissue during closure (Swiss cheese-type hernia), or
- Both

# Incisional hernia risk factors

- Technical
- Wound infection
- Smoking
- Hypoxia/ ischemia
- Tension
- Obesity
- Malnutrition

# Incisional hernia - diagnosis

Signs and symptoms

- Previous operation or accidental trauma
- Age; all ages, but more common in old age
- Symptom; lump, pain, intestinal obstruction (distention, colic, vomiting, constipation, sever pain in the lump)

Examination

- reducible lump
- expansile cough impulse
- if the lump dose not reduse and dose not have cough impulse, than it may be not a hernia

Differential diagnosis

- Tumor
- Chronic abscess
- Hematoma
- Foreign body granuloma

# Incarcerated incisional hernia

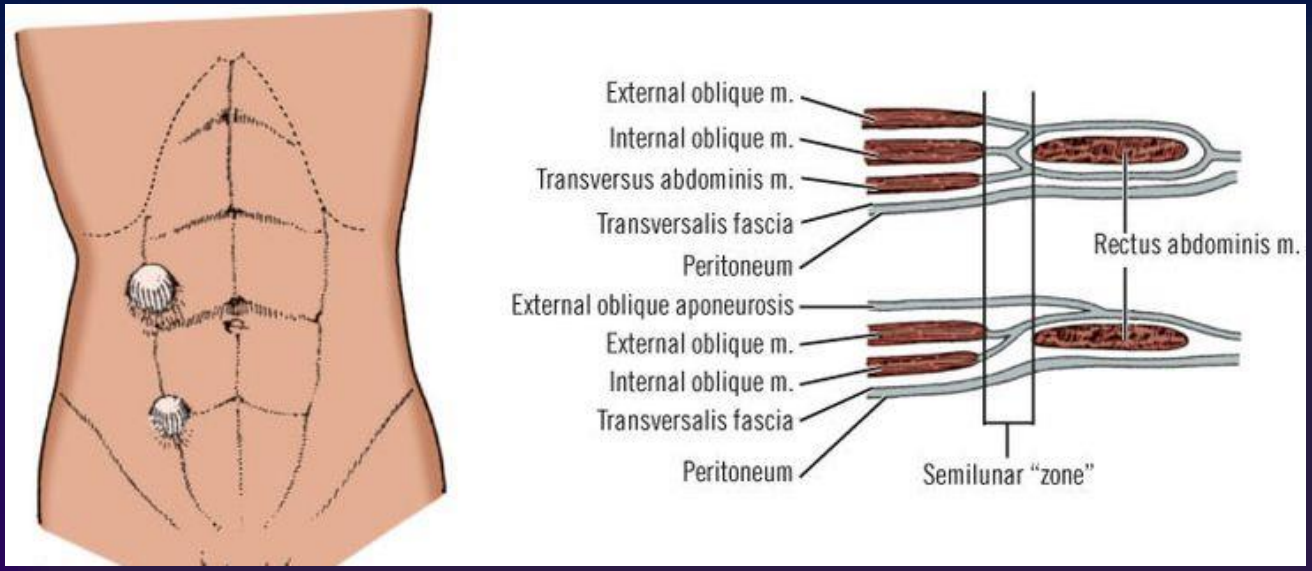
- Cannot be reduced.
- Tender

# Incisional Hernia

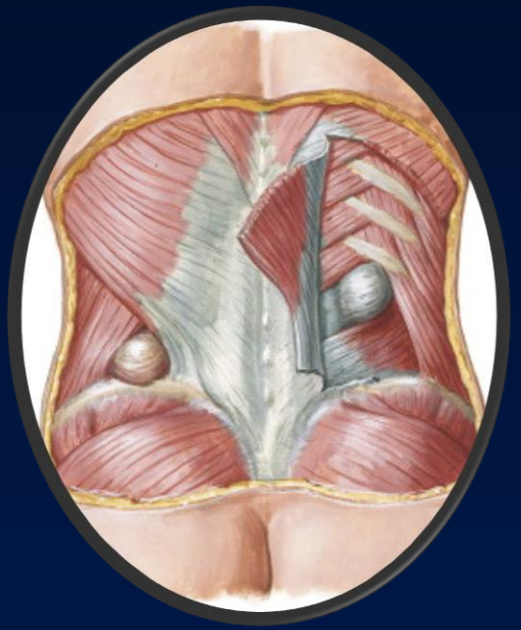
Pressure on skin can cause ulceration

# Rare: Spighellian hernia

- Hernia through subumbilical portion of semi-lunar line
- Difficult to diagnose
  - Clinical suspicion (location)
  - CT scan
- Repair primarily or with mesh



# Rare: Lumbar hernia

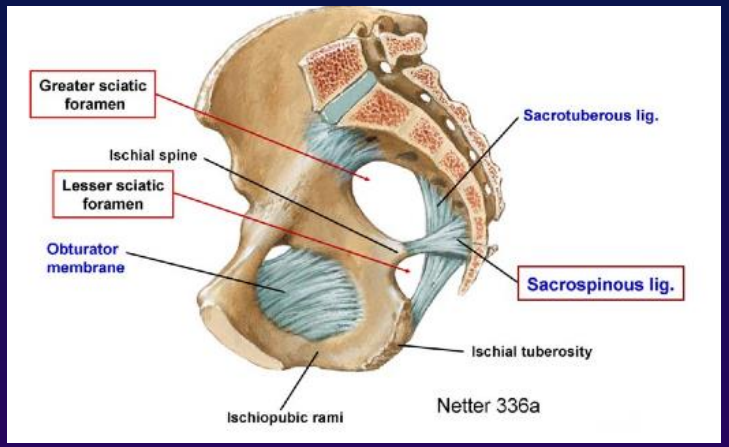


- Congenital, spontaneous or traumatic
- Grynfeltt's  triangle
  - 12th rib, internal oblique and sacrospinalis muscle
  - Covered by latissimus dorsi
- Petit's triangle
  - Latissimus dorsi, external oblique and iliac crest
  - Covered by superficial fascia

# Pelvic hernia

- Obturator hernia
  - Most commonly in women
  - Howship-Romberg sign (obturator nerve neuropathy due to compression of it, by an obturator hernia. Patients present with pain and paresthesia along the inner aspect of the thigh, down to the knee).

- Sciatic hernia
- Perineal hernia



# Hernia Management

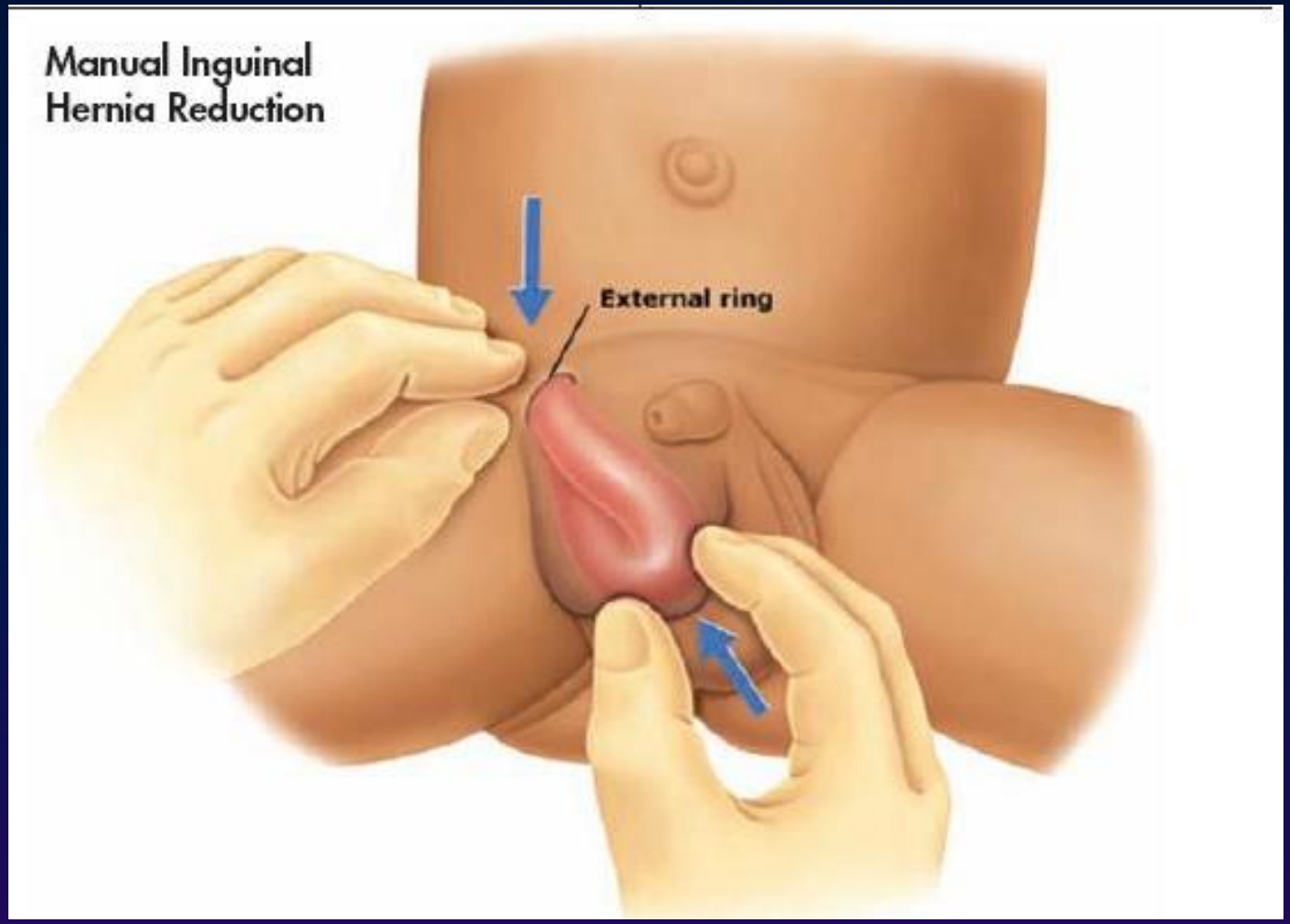
Investigations:

- None required for routine uncomplicated case
- Plain X-ray for suspected bowel obstruction
- Ultrasound in case of diagnostic uncertainty
- Herniogram rarely used
- Routine pre-op investigations

# Reduction

- Uncomplicated: Manual → Gentle pressure over hernia → Gentle traction over the mass → sedation and trendelenburg position.

- Complicated (strangulated): **no attempt** should be made to reduce the hernia because of potential reduction of gangrenous segment of bowel with the hernial sac.


Manual Inguinal
Hernia Reduction
External ring

# Surgery

The primary goals of surgery are to:

- Repair the hernia
- Minimize the chance of recurrence
- Return the patient to normal activities quickly
- Improve quality of life
- Minimize postsurgical discomfort and the adverse effects of surgery

# Hernia Treatment

- Surgery
  - To relieve symptoms
  - To prevent complications
- Operations
  - Open hernia repair
  - Laparoscopic hernia repair
    - Pre-peritoneal
    - Intra- abdominal

# Open Hernia Repair

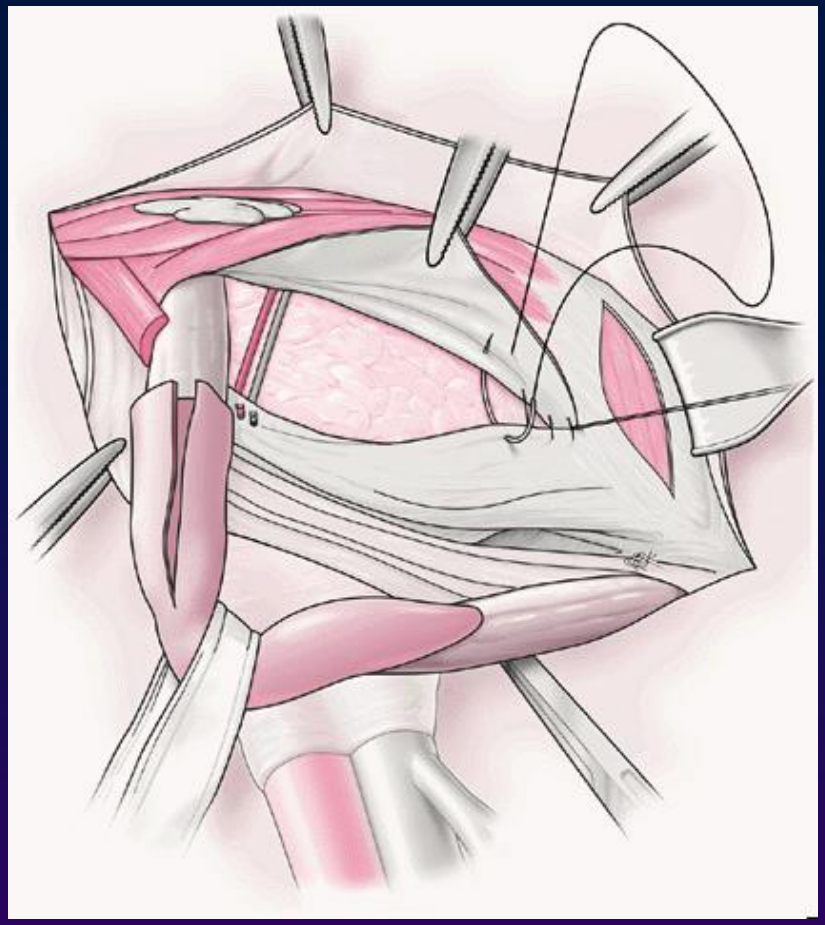
- Day-case surgery
- Anaesthesia
  - General
  - Local
- Operations
  - Tension free Mesh repair *(Lichtenstien)*
  - Darn repairs *(Shouldice, Bassini)*

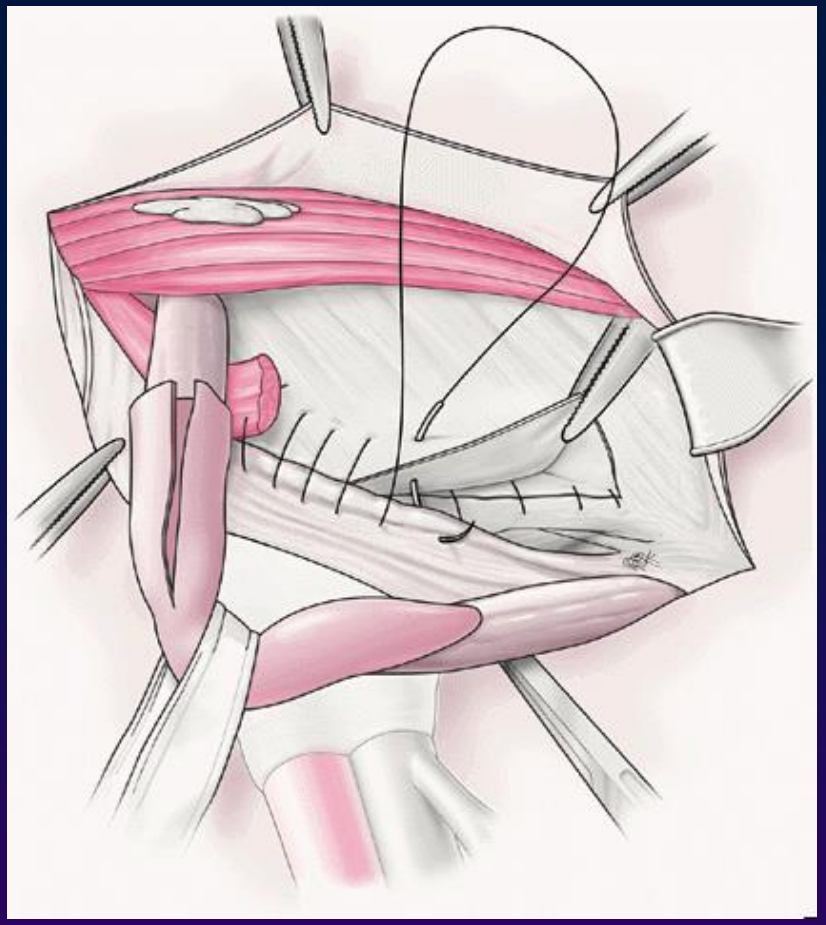
# Types of Surgical Repair for Inguinal Hernias

- Surgical repairs of inguinal hernia generally fall into 3 categories:
  - Open repair without a mesh implant (i.e., sutured)
  - Open repair with a mesh
  - Laparoscopic repair with a mesh
- Several procedures have been employed within each of these categories.
- The nearly universal adoption of mesh (except in pediatric cases) means that the most relevant questions about hernia repair involve various mesh procedures.

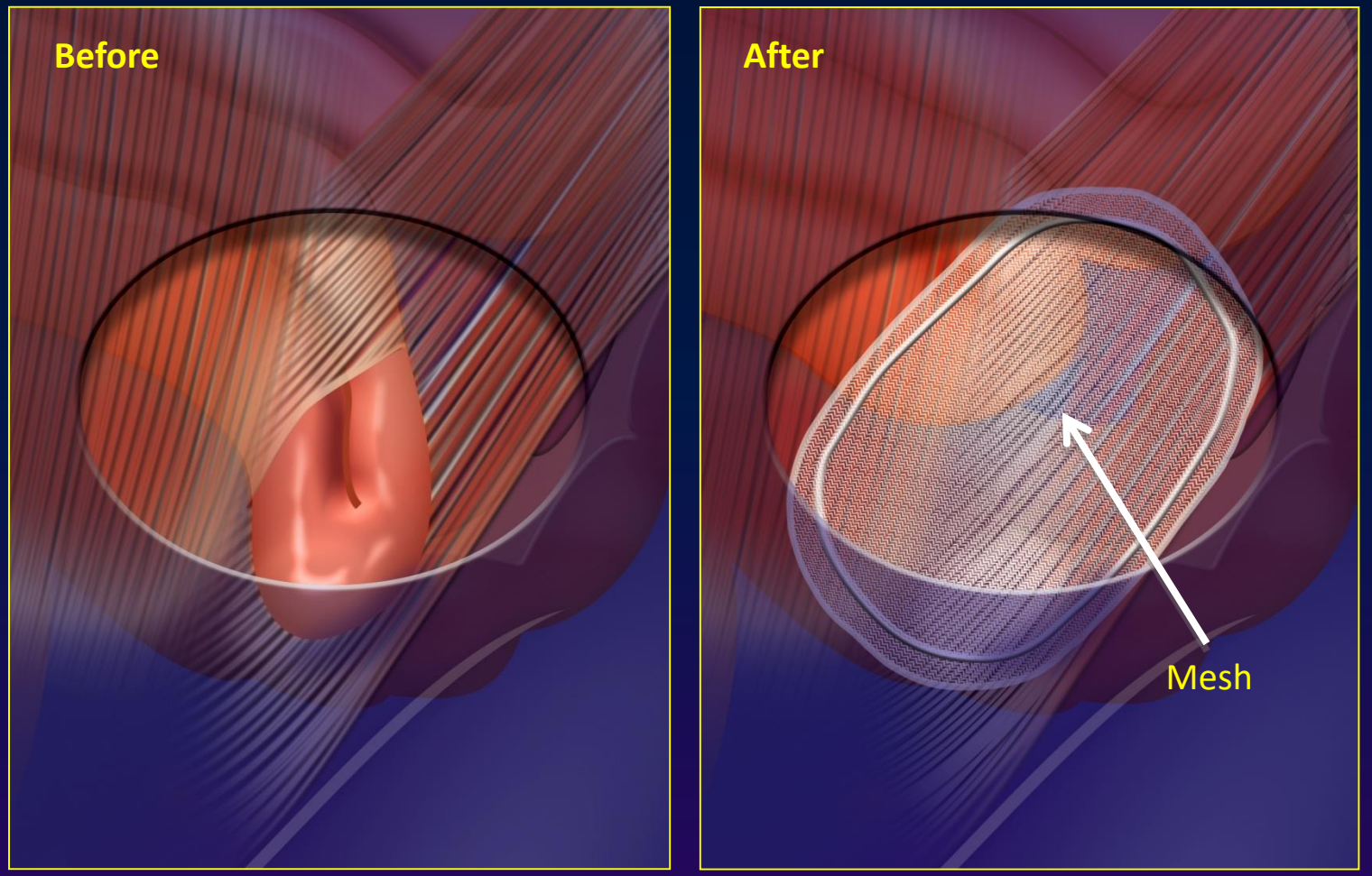
# Shouldice Repair

Imbricated, running repair





# Open Mesh-Based Repair of an Inguinal Hernia

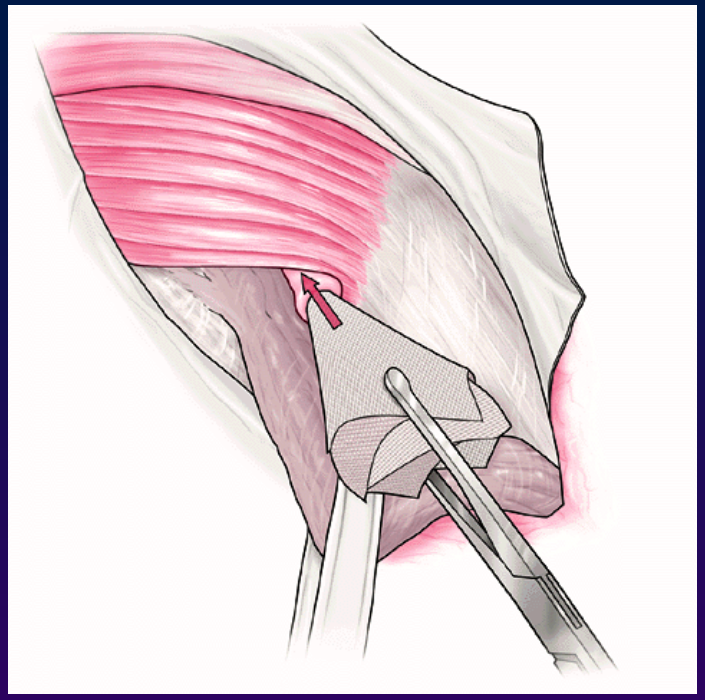


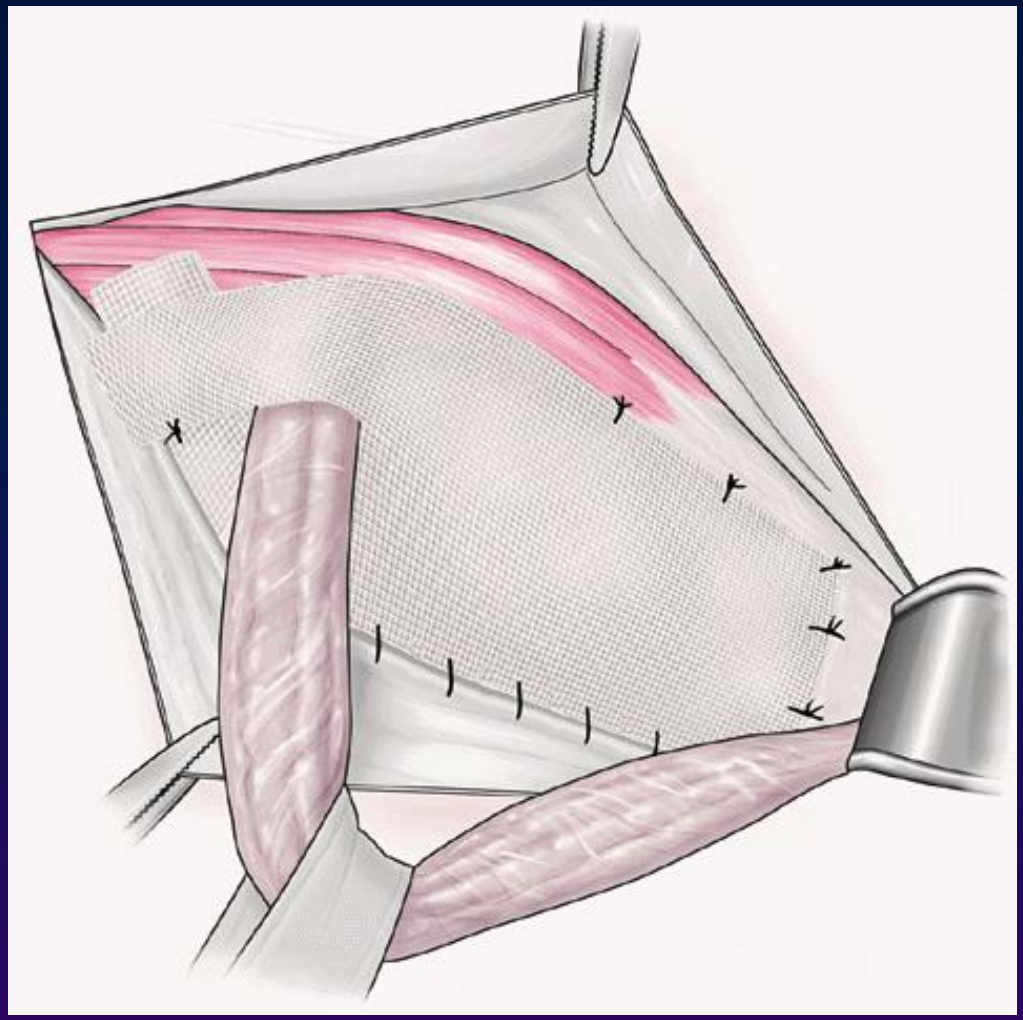
# Open Mesh-Based Repair of Inguinal Hernias

- Kugel® patch repair: An oval-shaped mesh is held open by a memory recoil ring and inserted behind the hernia defect and held in place with a single suture.
- Lichtenstein technique: A tension-free open repair wherein mesh is sutured in front of the hernia defect (anteriorly).
- Mesh plug technique: A preshaped mesh plug is introduced into the hernia weakness during surgery.
- Open preperitoneal mesh technique: A tension-free repair wherein mesh is sutured posteriorly.

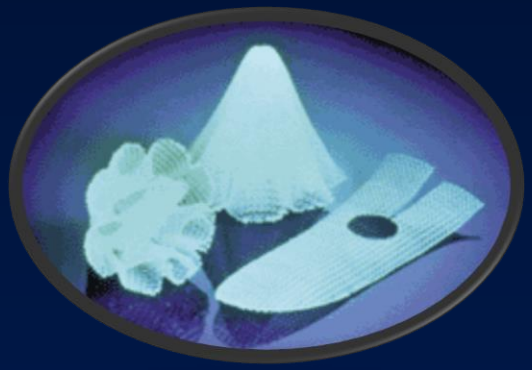
# Lichtenstein repair

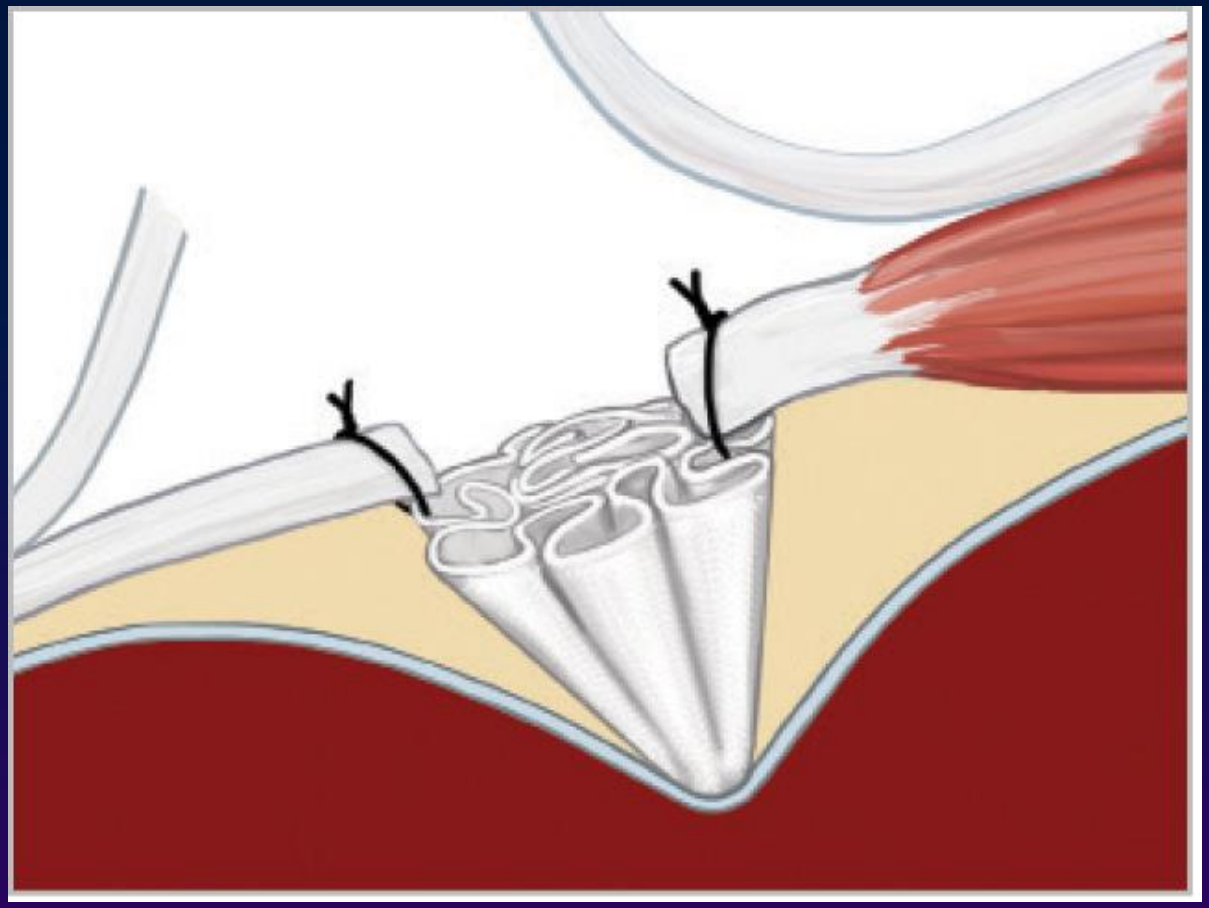
- Tension free
- Less painful
- Foreign body





# Mesh plug

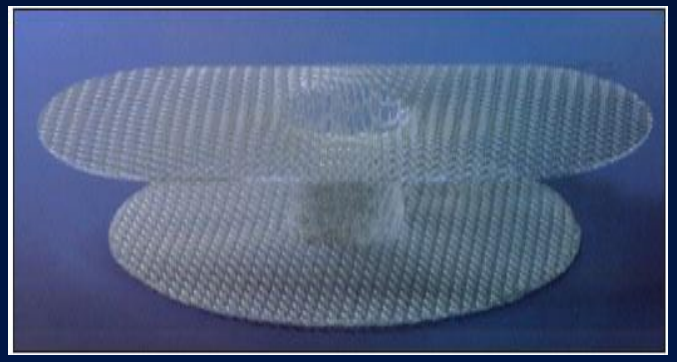


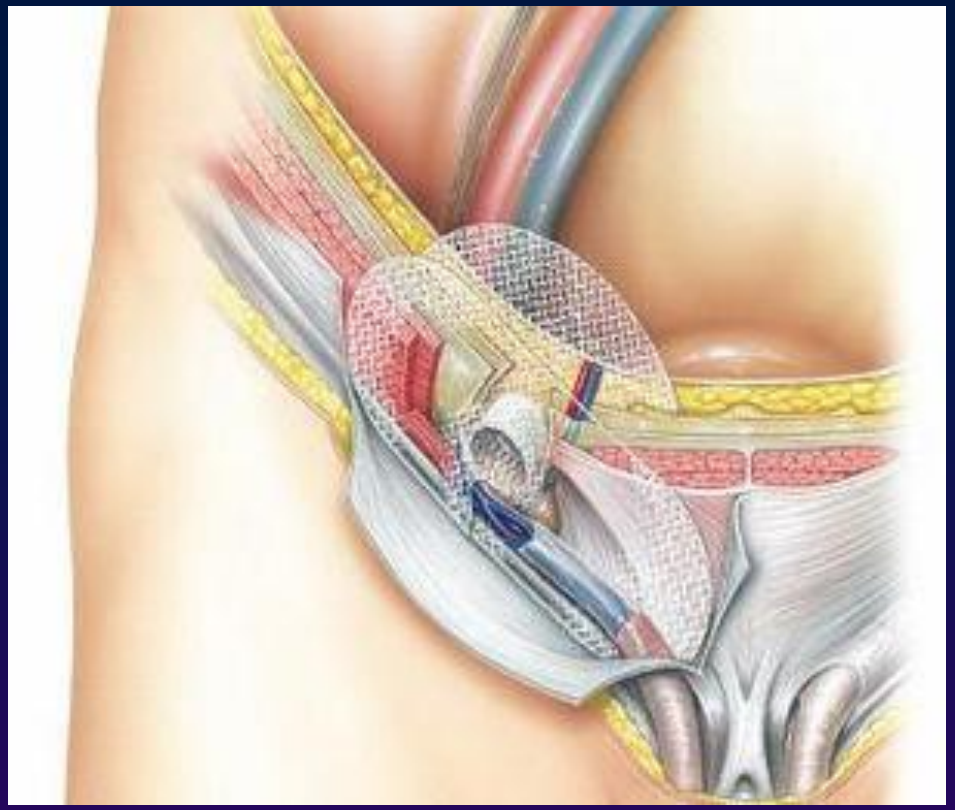


# Open Mesh-Based Repair of Inguinal Hernias

- PROLENE™ Hernia System: A one-piece mesh device constructed of an onlay patch connected to a circular underlay patch by a mesh cylinder.
- Read-Rives repair: A tension-free repair wherein mesh is placed just over the peritoneum.
- Stoppa technique: A large polyester mesh is interposed in the preperitoneal connective tissue between the peritoneum and the transversalis fascia to prevent visceral sac extension through the myopectineal orifice.
- Trabucco technique: A hernia repair procedure that involves placing a single preshaped mesh without using sutures.

# PHS

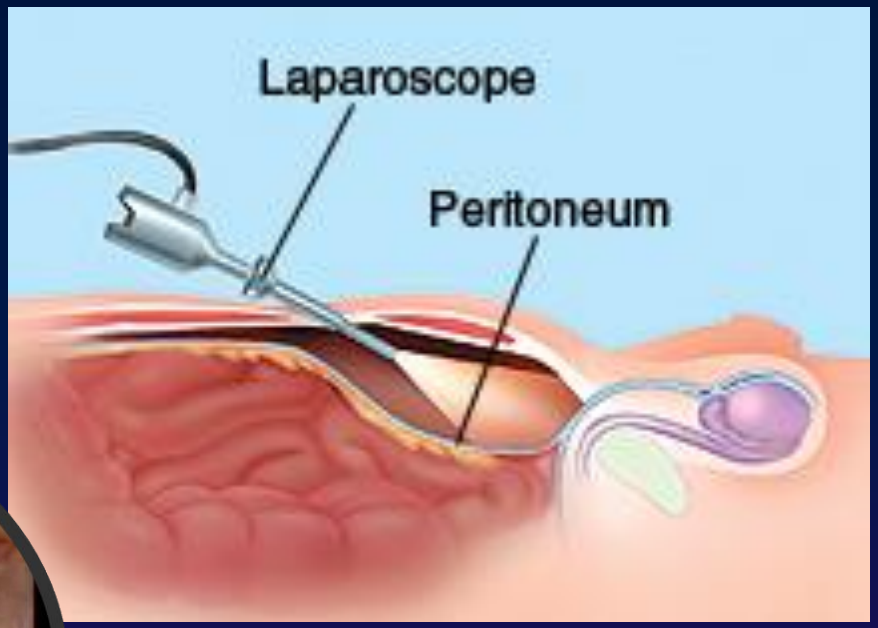


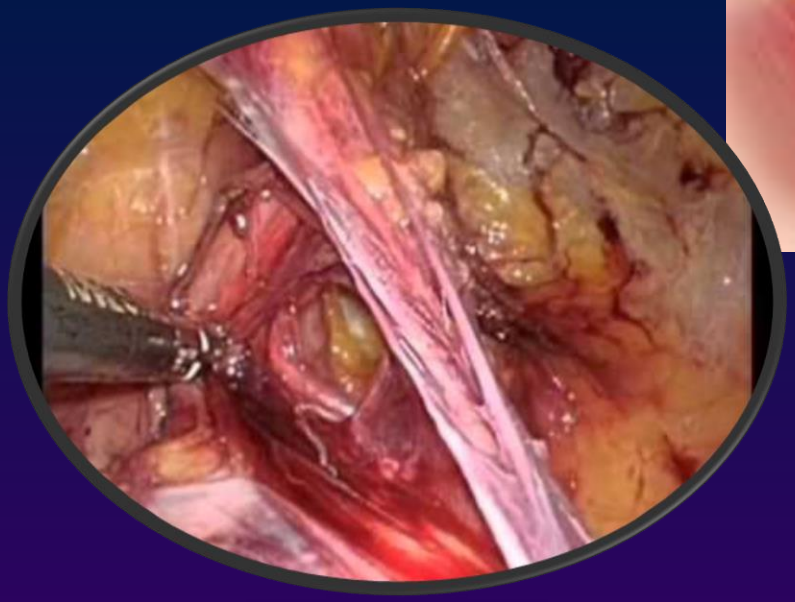


# Laparoscopic Mesh-Based Repair Procedures for Inguinal Hernias

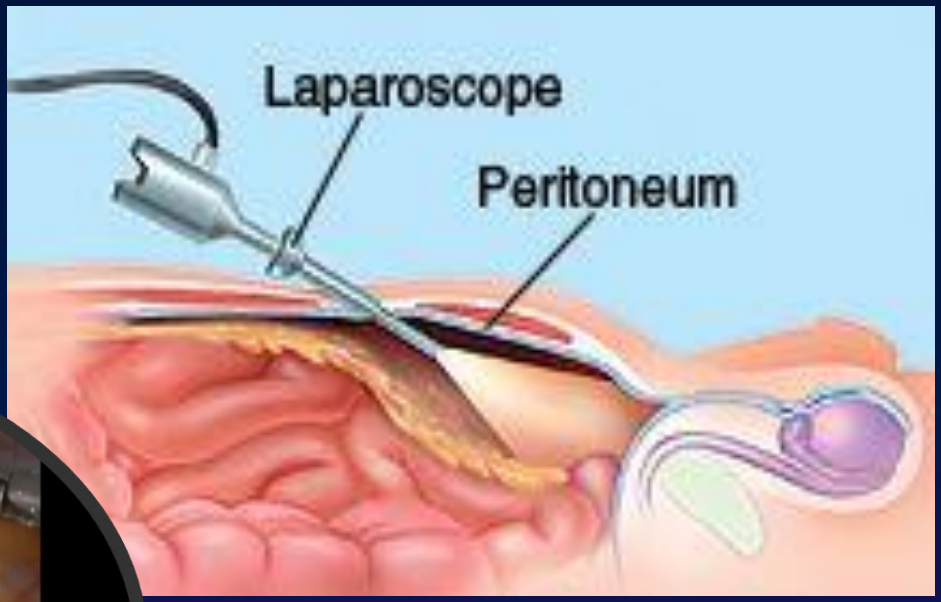
- Intraperitoneal onlay mesh technique IPOM: A mesh is placed under the hernia defect intra-abdominally to circumvent a groin dissection.
- Totally extraperitoneal patch TEP: The peritoneal cavity is not entered, and a mesh is used to cover the hernia from outside the preperitoneal space.
- Transabdominal preperitoneal patch TAPP: A laparoscopic repair procedure wherein the surgeon enters the peritoneal cavity, incises the peritoneum, enters the preperitoneal space, and places the mesh over the hernia; the peritoneum is then sutured and tacked closed.

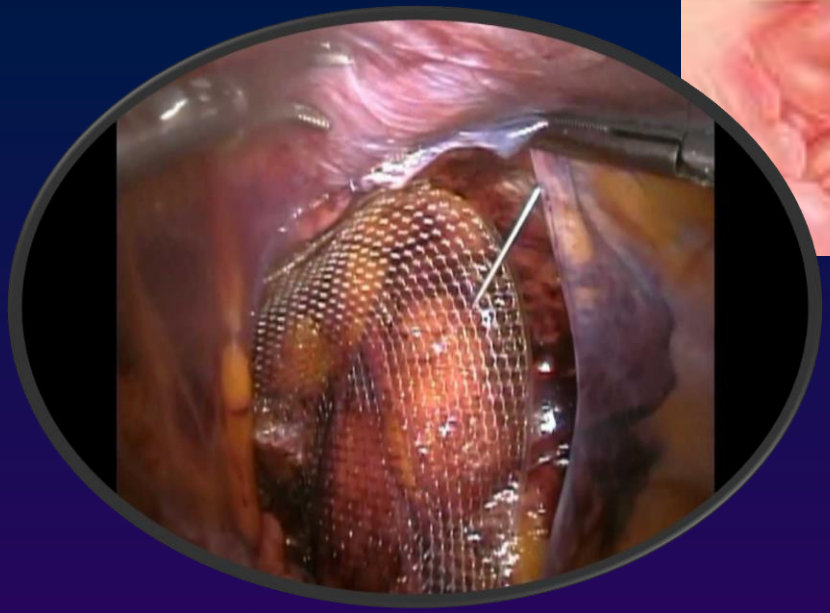
# TEP



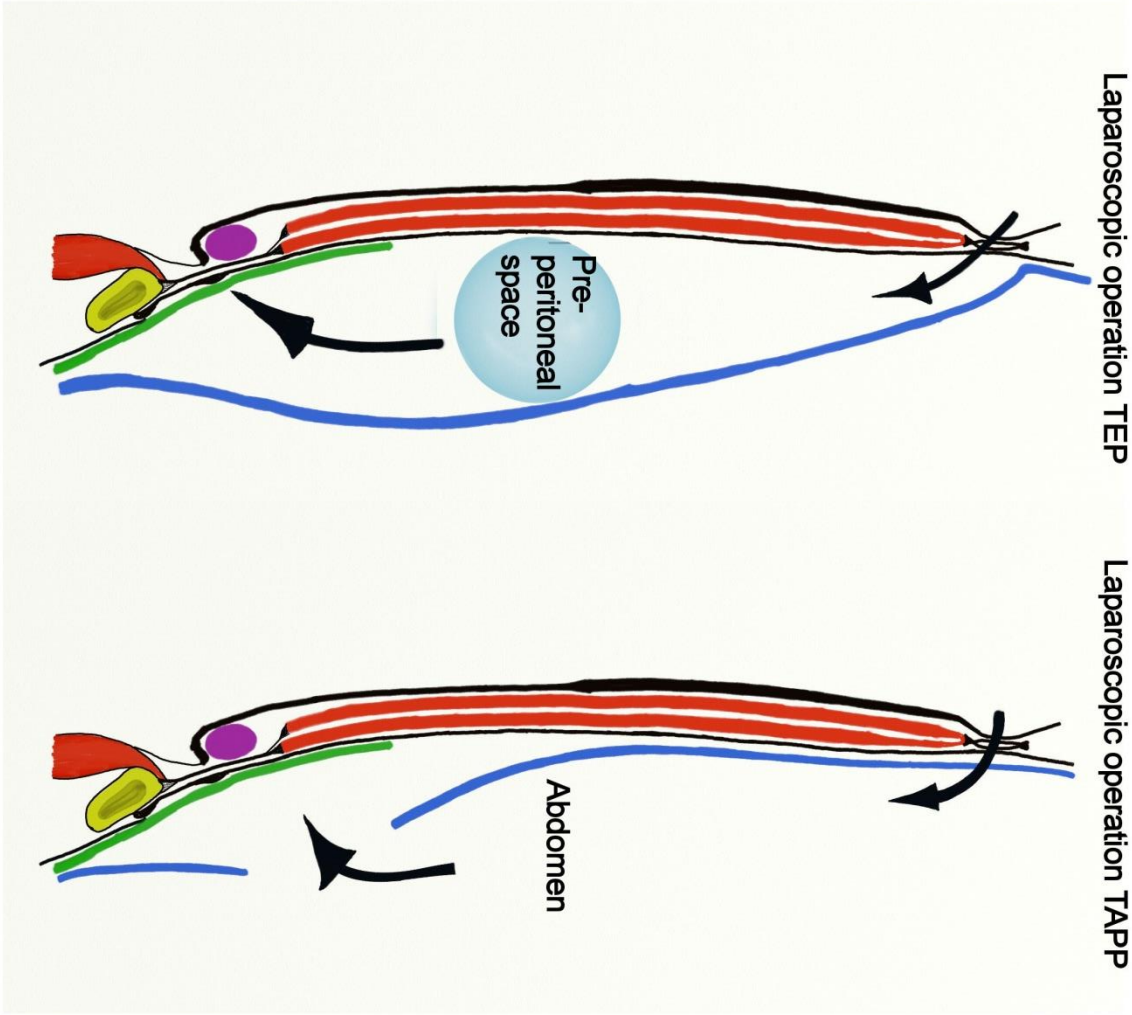



# TAPP



# TEP &TAPP

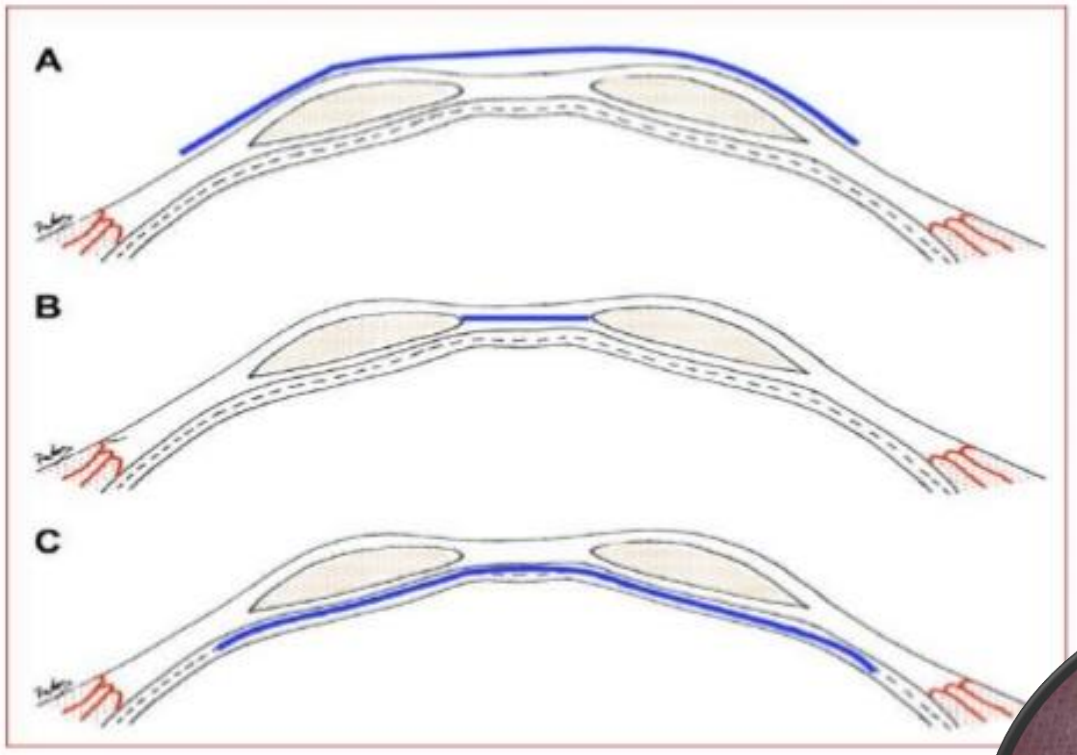

Laparoscopic operation TEP
Pre-
peritoneal
space
Laparoscopic operation TAPP
Abdomen

# Surgical repair – ventral hernias

Primary suture repair:

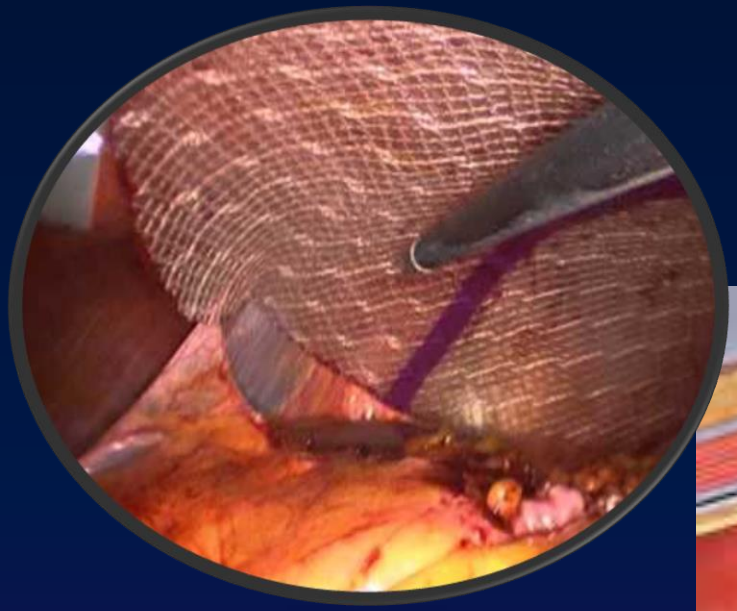
- not recommended  > 3cm
- high recurrence (25-63%)

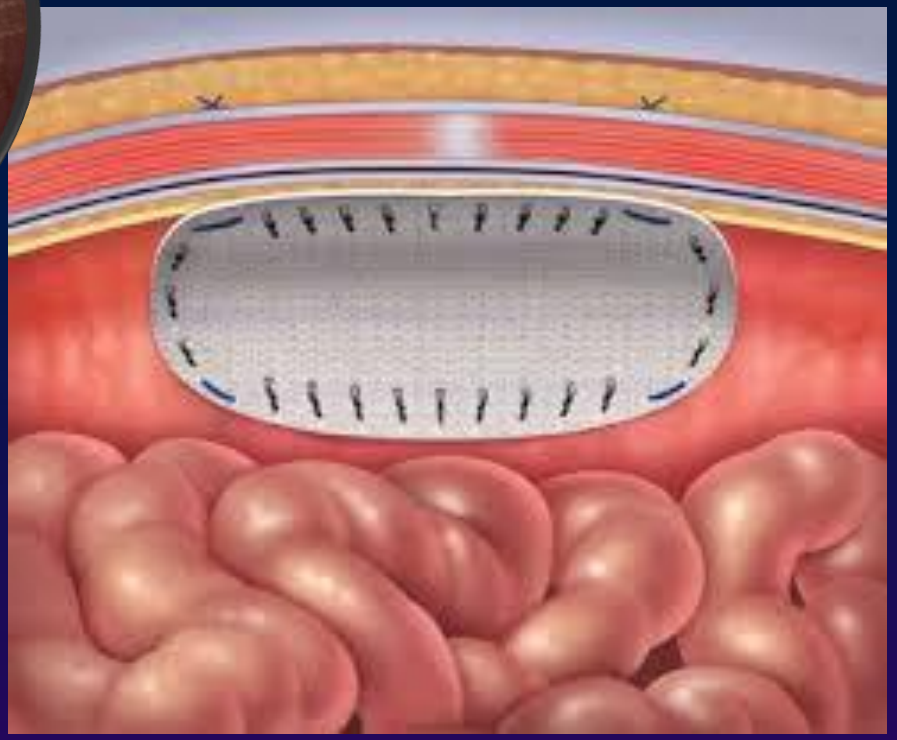
# Ventral (epigastric) hernia - Mesh placement techniques




A.Only B.inlay C.underlay

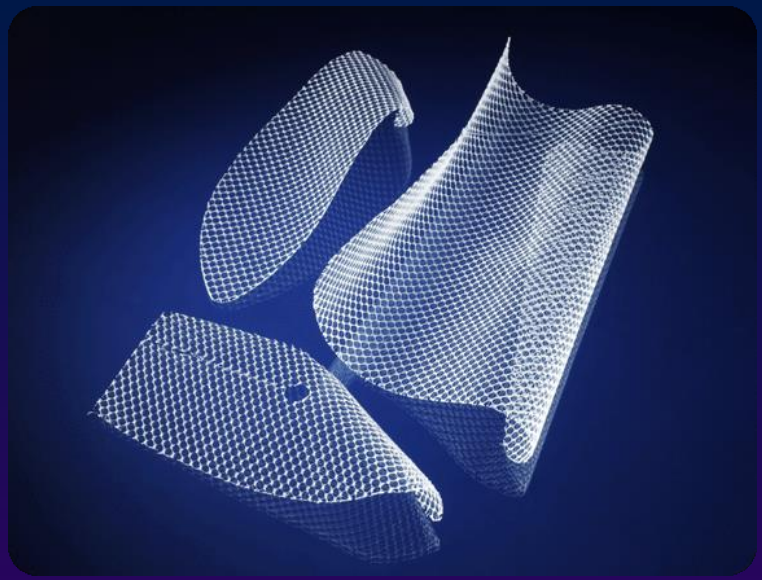
# IPOM





# Surgical Mesh Products for Hernia Repair

- Surgical mesh products are typically made from polypropylene or polyester.
- Other available materials include:
  - Polytetrafluoroethylene
  - Polyglactin
  - Polyglycolic acid
  - Polyamide



# Properties of Mesh Products for Hernia Repair

Seven important properties of mesh are:

1. Withstands physiologic stresses over time
2. Conforms to the abdominal wall
3. Mimics normal tissue healing
4. Resists the formation of bowel adhesions and erosions into visceral structures
5. Does not induce allergic reaction or foreign body reactions
6. Resists infection
7. Is noncarcinogenic

# Surgery Complications

- Trauma
  - Nerve
  - Artery (testicular atrophy)
  - Intestine
- Haemorrhage
  - Haematoma (infection)
- Infection
  - Wound infection
  - Chest Infection

*Thank you*