Hernia: Inguinal – Surgical anatomy, presentation, treatment, complications

Introduction

Abnormal protrusion of viscus or a part of it

through a weak point in the abdominal wall

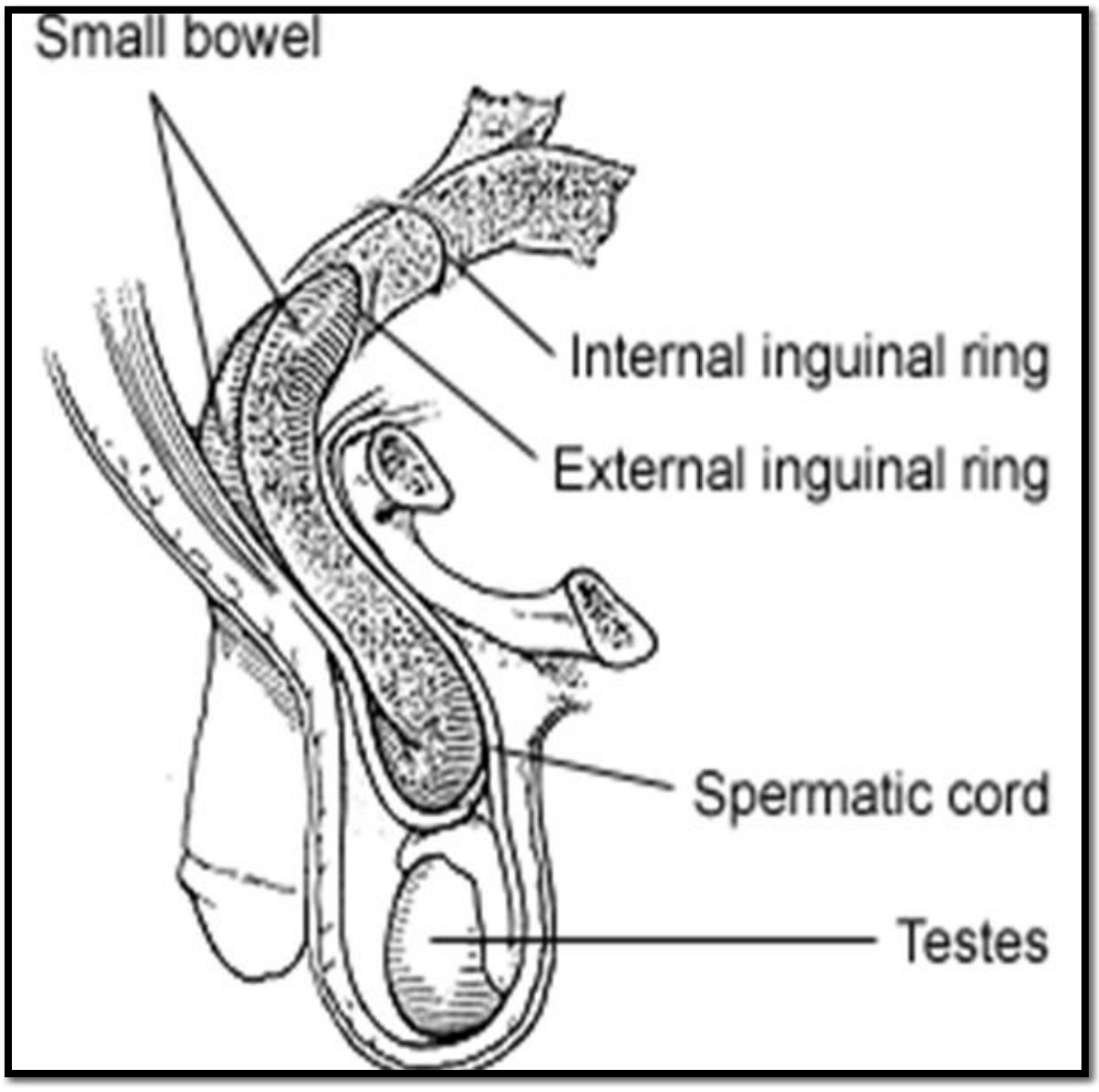
Anatomy of inguinal region

- **Superficial inguinal ring-**
  - triangular aperture in the aponeurosis of the ext oblique muscle .
  - Lies 1.25 cm above the pubic tubercle .
  - Normally it doesn't admit the tip of the little finger.

- **Deep inguinal ring –**
  - U shaped condensation of the fascia trasversalis
  - Lies 1.25cm above the mid inguinal point.

Inguinal canal

- Oblique passage in the lower part of the anterior abdominal wall.
- Extends from deep inguinal ring to superficial inguinal ring.
- Directed downwards forwards and medially
- About 4cm long



Boundaries

- Anterior – Ext. oblique aponeurosis & conjoined muscle laterally.
- Posterior – Fascia transversalis & the conjoined tendon.
- Superiorly – conjoined muscle.
- Inferiorly – inguinal ligament.

Contents

- Spermatic cord
- Ilioinguinal nerve
- Genital branch of genitofemoral nerve
- Females – Round ligament is present instead of spermatic cord.

Spermatic cord constitutes- vas deferens, testicular & cremastic arteries , pampiniform plexus of veins, lymphatics

Defence mechanism of inguinal canal

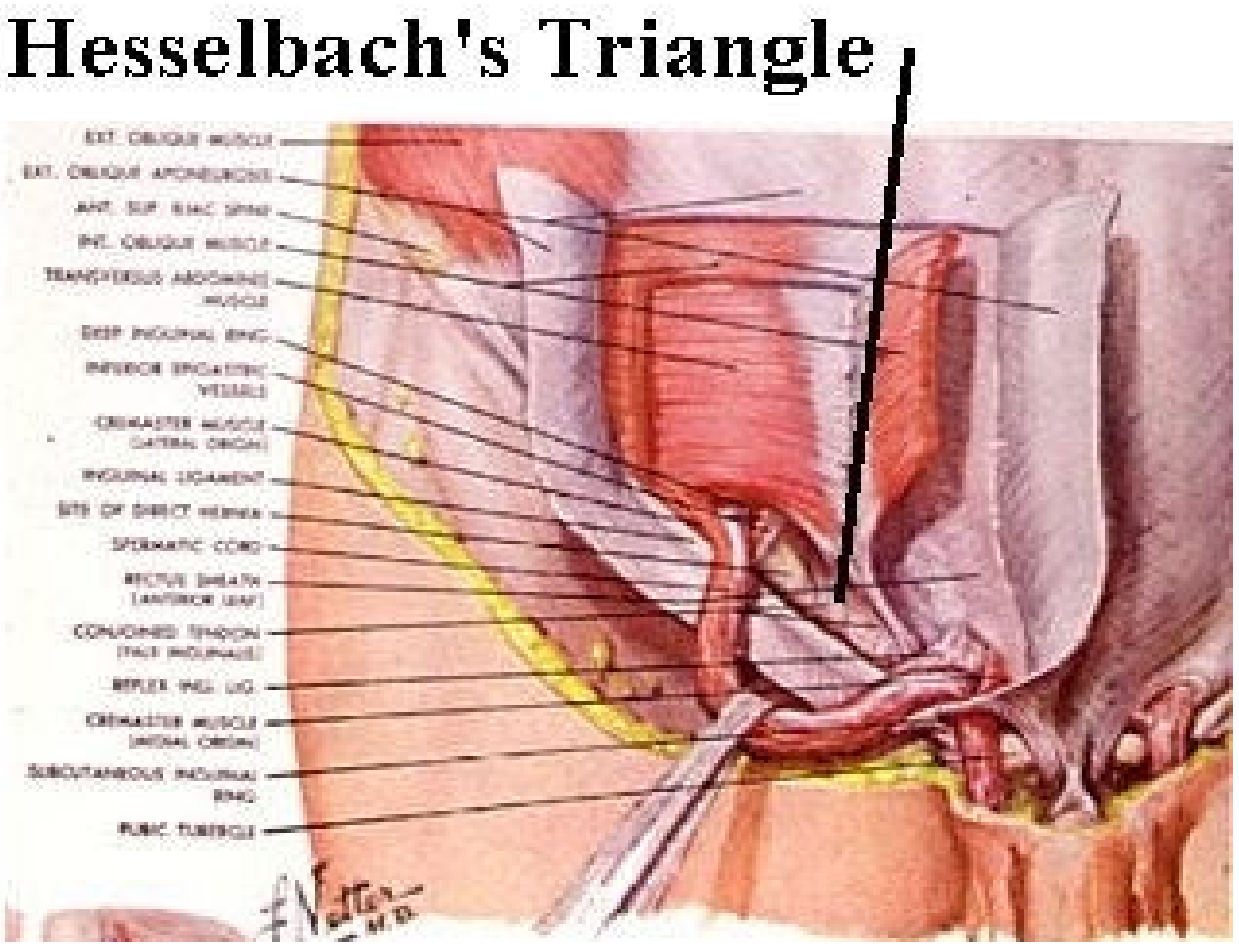
- Obliquity of the inguinal canal.
- Shutter mechanism-due to conjoined tendon contraction

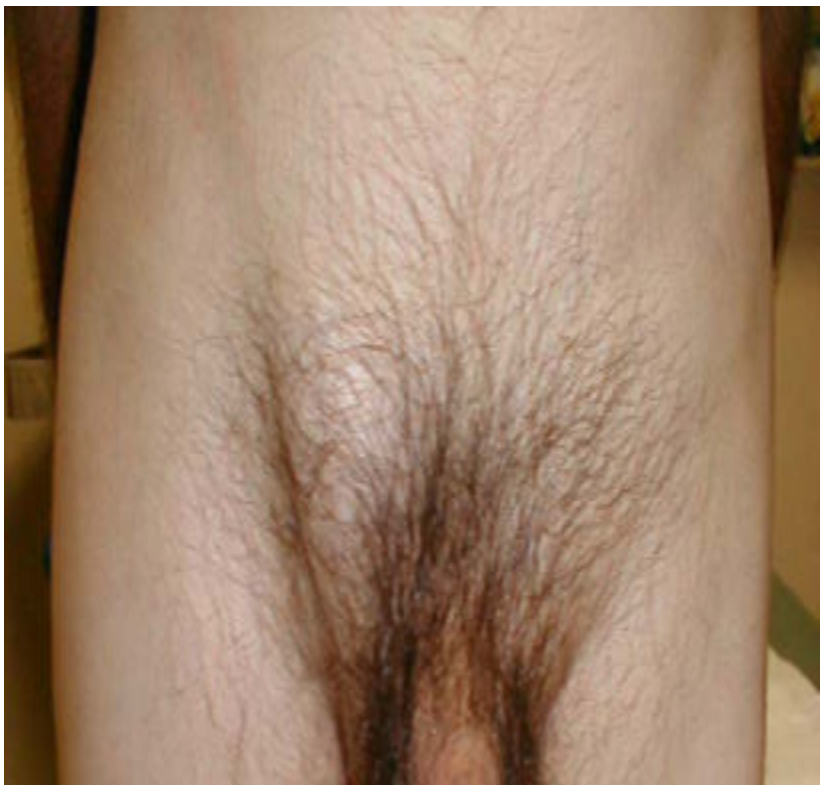
Anatomical classification

- Indirect hernia – more common about 2/3 of inguinal hernia .
- It is more common in young
- Direct hernia- more common in old

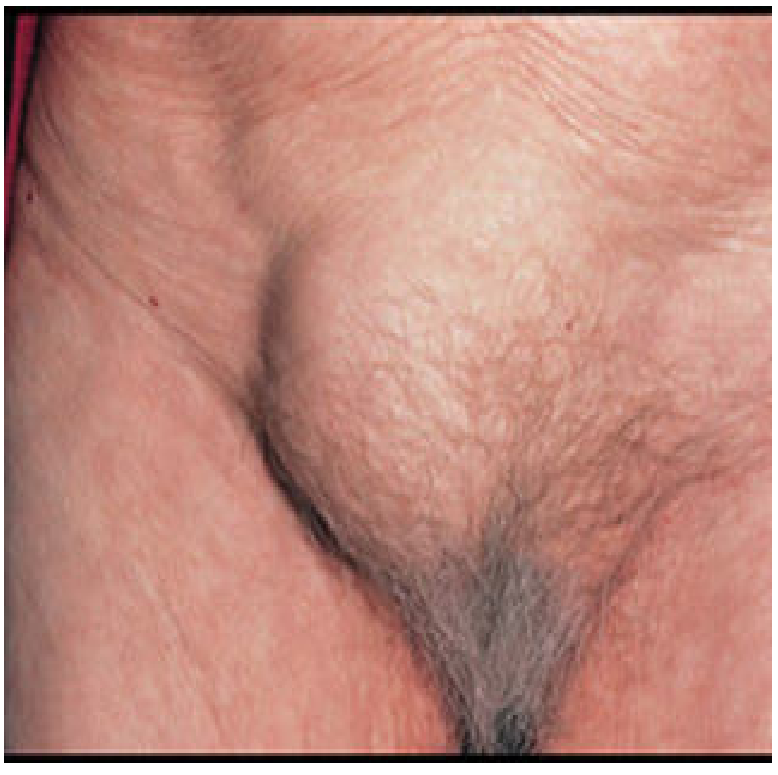
- **Indirect hernia** – the abdominal contents herniation occurs through the deep ring into the inguinal canal.
- Comes out through the superficial ring.
- It may extend into the scrotum.
- Depending upon extent it may be complete or incomplete.

- **Direct hernia** – contents herniate directly through the posterior wall of the inguinal canal through the Hesselbach's triangle
- It is a weakness in posterior wall of the inguinal canal
- It is bounded laterally -inferior epigastric artery, medially – lateral border of rectus abdominus muscle inferiorly – inguinal ligament





Male inguinal hernia



Female inguinal hernia

Clinical types

- **Reducible** –contents can be returned into the abdominal cavity.
- **Irreducible** – contents cannot be returned into the abdominal cavity.
- **Obstructed** – irreducibilty + intestinal obstruction, but the blood supply is not impaired.
- **Strangulated**- irreducibilty + intestinal obstruction+ arrest of the blood supply.
- **Inflammed**- rare condition. Occurs when contents eg. Appendix,meckel's diverticulum is inflamed

Epidemiology

- **Approximately 7% of all surgical outpatient**.
- Accounts for 96% groin hernias (other 4% are femoral)
- Bilateral in 20% of cases
- Lifetime risk of inguinal hernia: 10%
- M:F 9:1

- Affects 1-3% of young children
- In men the incidence rises from 11 per 10,000 person years aged 16 -24 years to 200 per 10,000 person years aged 75 years or above.
- Extremely common; represents the most frequent problem requiring surgical intervention in the paediatric age group
- Much more common in boys (90% of cases) than girls
- Definite familial tendency,
- more frequent on the right side as a result of later descent of the right testis and delayed obliteration of the right processus vaginalis.

Risk factors

In infants:

prematurity

male

In adults:

male

Obesity

Constipation

chronic cough

Heavy lifting

Smoking

Urinary obstructive symptoms

Presentation

- Pain
  - Localized pain
  - Referred pain
  - Generalized pain
- Nausea and vomiting
- Constipation
- Urinary symptoms

Presentation

- At first appearance, it is easily reducible.

- With time it can no longer be reduced, it is irreducible or incarcerated.
- Strangulation: when visceral contents of the hernia become twisted or entrapped by the narrow opening.

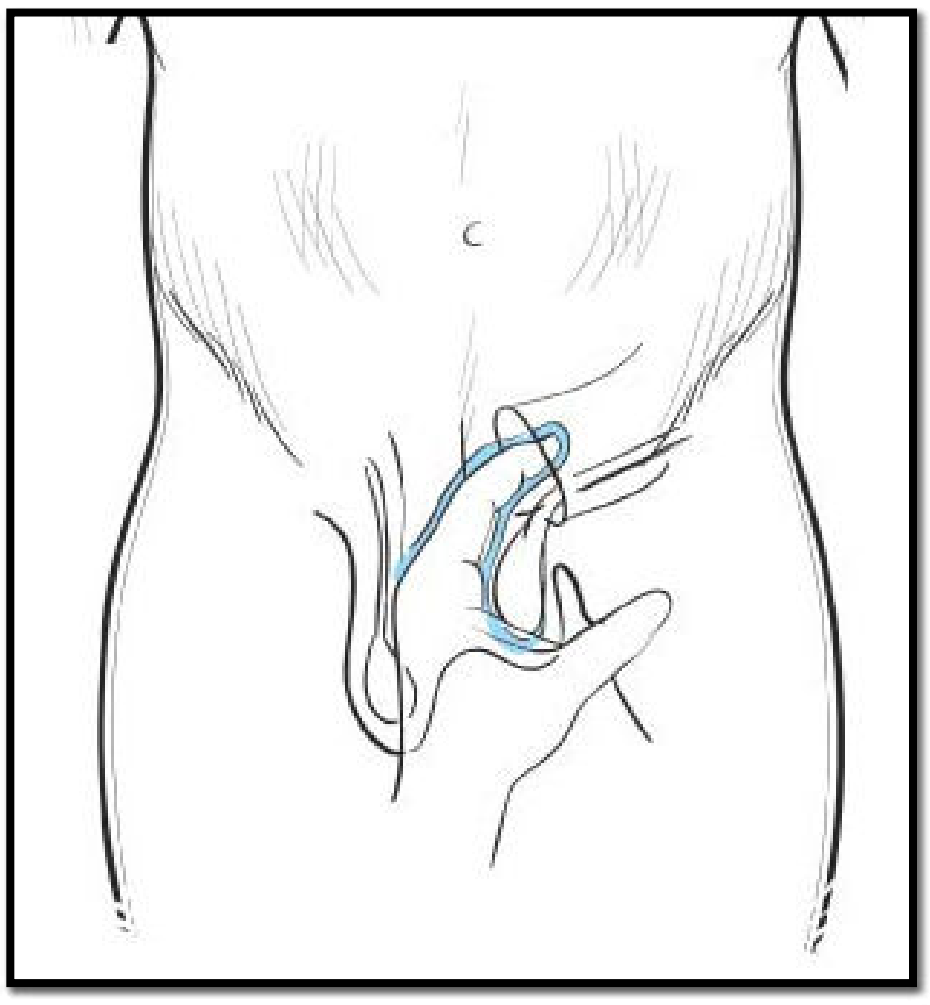
Strangulation usually leads to bowel obstruction with sudden, severe pain in the hernia, vomiting and irreducibility.

Nyhus Classification System

Type I	Indirect hernia; internal abdominal ring normal; typically in infants, children, small adults
Type II	Indirect hernia; internal ring enlarged without impingement on the floor of the inguinal canal; does not extend to the scrotum
Type IIIA	Direct hernia; size is not taken into account
Type IIIB	Indirect hernia that has enlarged enough to encroach upon the posterior inguinal wall; indirect sliding or scrotal hernias are usually placed in this category because they are commonly associated with extension to the direct space; also includes pantaloon hernias
Type IIIC	Femoral hernia
Type IV	Recurrent hernia; modifiers A–D are sometimes added, which correspond to indirect, direct, femoral, and mixed, respectively

Diagnosis- Inspection

- Inguinal hernias are best examined with the patient standing.
- Coughing may increase the size of the hernia.
- Site and shape of the hernia:
  - those appearing above and medial to the pubic tubercle are inguinal hernias
  - those appearing below and lateral to the pubic tubercle are femoral hernias
- whether the lump extends down into the scrotum
- any other scrotal swellings
- any swellings on the 'normal' side
- scar from previous surgery or trauma



Digital examination of the inguinal canal

Palpation

- Confirm inspectory findings
- Examine the scrotum- Getting above the swelling is not possible
- Consistency, temperature, tenderness and fluctuance.
- One should attempt to reduce the hernia:Ask the patient to reduce. Otherwise flex and medially rotate the hip and reduce
- If the hernia cannot be reduced the probable identity of the hernia is: femoral > indirect inguinal > direct inguinal
- Expansile cough impulse
- **Deep ring occlusion test-** reduce the swelling
- Locate the deep ring 1/2 “ above the midpoint of the inguinal ligament and occlude it asking the patient to cough.
- Impulse seen- direct, not seen- indirect
- Leg raising test- Malgaigne’s bulgings seen
- **Zieman’s method**
- Swelling gurgles- enterocoele, firm/granular- omentocoele.
- Always palpate the other inguino-femoral region as herniae are often bilateral

Percussion

The characteristics of hernias depend on their contents:

- bowel is hyper-resonant and has bowel sounds unless it is strangulated
- omentum and fat is dull and does not have bowel sounds

Investigations

Ultrasound

- High Test Sensitivity (>90%)
- High Test Specificity
  - Distinguish Incarcerated Hernia from firm mass

Herniography

- Suspected hernia, but clinical dx unclear
- Procedure done under flouroscopy following injection of contrast medium
- Frontal and oblique radiographs are taken with and without increased intra-abdominal pressure

Systemic examination

- Examine respiratory system
- Per rectal examination
- Abdominal
- Ext genitalia

Complications

Bowel incarcération (acute, chronic): The trapping of abdominal contents within the *Hernia* itself

Strangulation: pressure on the hernial contents may compromise blood supply (especially veins, with their low pressure, are sensitive, and venous congestion often results) and cause ischemia, and later necrosis and gangrene, which may become fatal.

Small Bowel Obstruction

Management

Non operative Treatment

- Watchful waiting: for asymptomatic or minimally symptomatic

Truss is a mechanical appliance ,belt with a pad applied to groin after spontaneous or manual reduction of hernia

The purpose is twofold: to maintain reduction and to prevent enlargement.

Surgery

Mesh repairs

Open repair (Lichtenstein, Shouldice, Bassini)

Most commonly performed: Lichtenstein repair

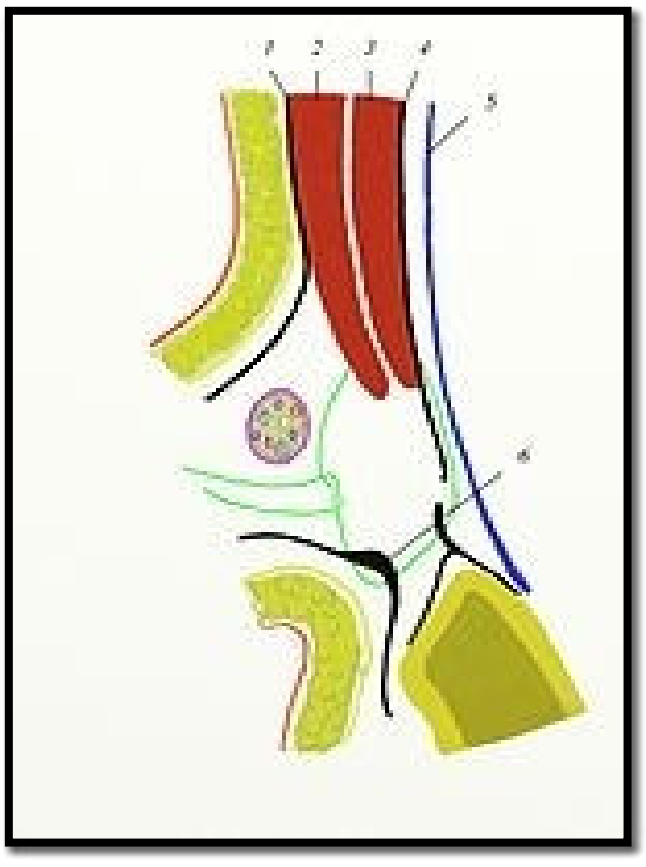
It’s "tension-free" repair

Tension-free repairs

- Desarda
- Guarnieri

Bassini technique,first suture:

- Aponeurosis musculi obliq. ext.
- Musculus obliquus internus
- Musculus transversalis
- Fascia transversalis
- Peritoneum
- Ligamentum inguinale.

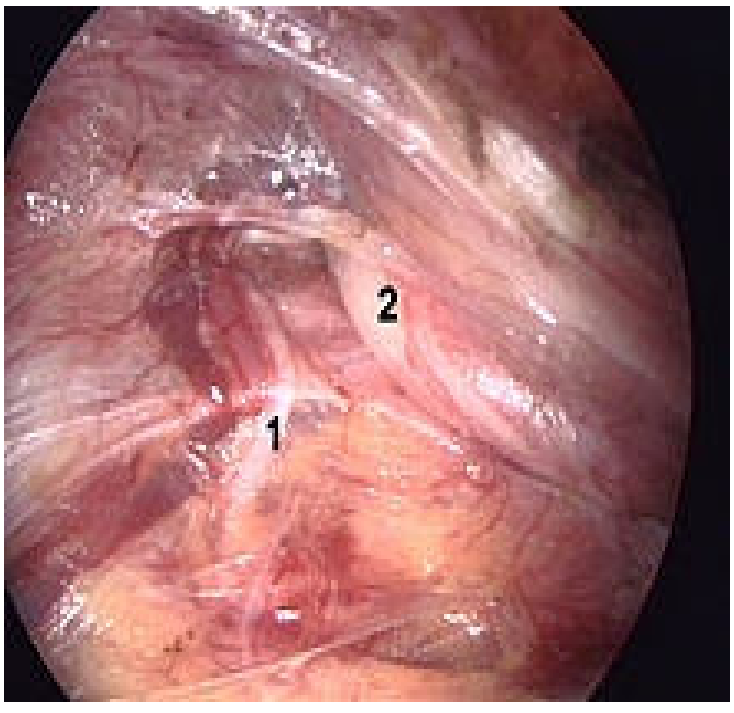


Laparoscopic repair

- transabdominal preperitoneal (TAPP)
- totally extra-peritoneal (TEP) repair

Intraoperative view by TEP Operation.

1. Genital ramus of genitofemoral nerve.
2. Preperitoneal lipom and spermatic cord.



Laparoscopic mesh surgery, as compared to open mesh surgery

Advantages	Disadvantages
•Quicker recovery	•Needs surgeon highly experienced
•Less pain during first days	Longer operating time
•Fewer postoperative complications such as infections, bleeding and seromas	Increased recurrence of primary hernias if surgeon not experienced enough
•Less risk of chronic pain	

Meshes

- Permanent mesh
- Commercial mesh
- Mosquito-net mesh

Complications are frequent (>10%).

- Foreign-body sensation
- Chronic pain
- Ejaculation disorders
- Mesh migration
- Mesh folding (meshoma)
- Infection
- Adhesion formation
- Erosion into intraperitoneal organs

- In the long term, polypropylene meshes face degradation due to heat effects.
- obstructive azoospermia

Biomeshes

- they can be used for repair in infected environment,an incarcerated hernia

- reduce the risk of inguinodynia