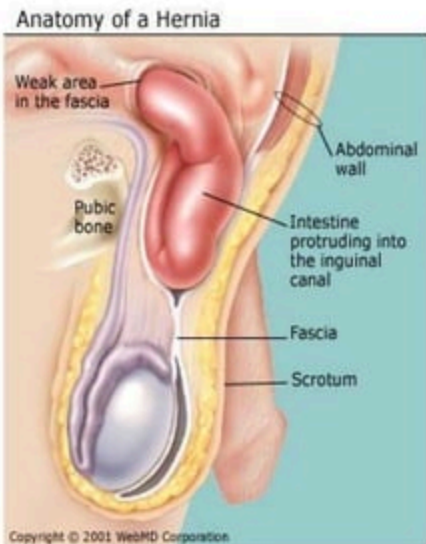


# Abdominal wall herniae



Mr Taha Khan

# Definition

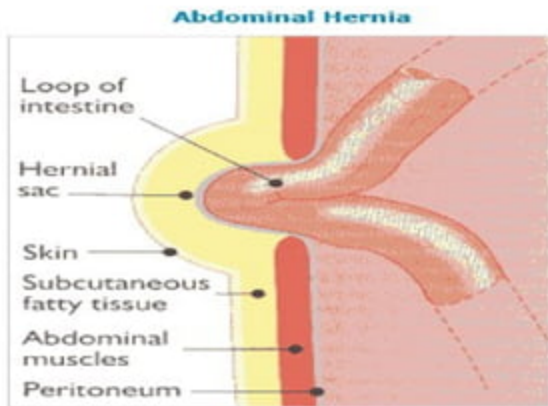
- Hernia is derived from the Latin for "rupture"
- It is the protrusion of an organ or part of an organ through a defect in the wall of the cavity normally containing it.
- May suggest underlying pathology
  - Hepatic disease, BPH, COPD, obstructing colon mass

## Hernia is classified into three types:

- **Reducible:** Hernias can be reducible if the hernia can be easily manipulated back into place.
- **Irreducible or incarcerated:** this cannot usually be reduced manually because the hernia is too large, the defect is too narrow and /or adhesions have formed in the hernia sac.
- **Strangulated:** if part of the herniated intestine becomes twisted or oedematous this may result in intestinal obstruction and necrosis.

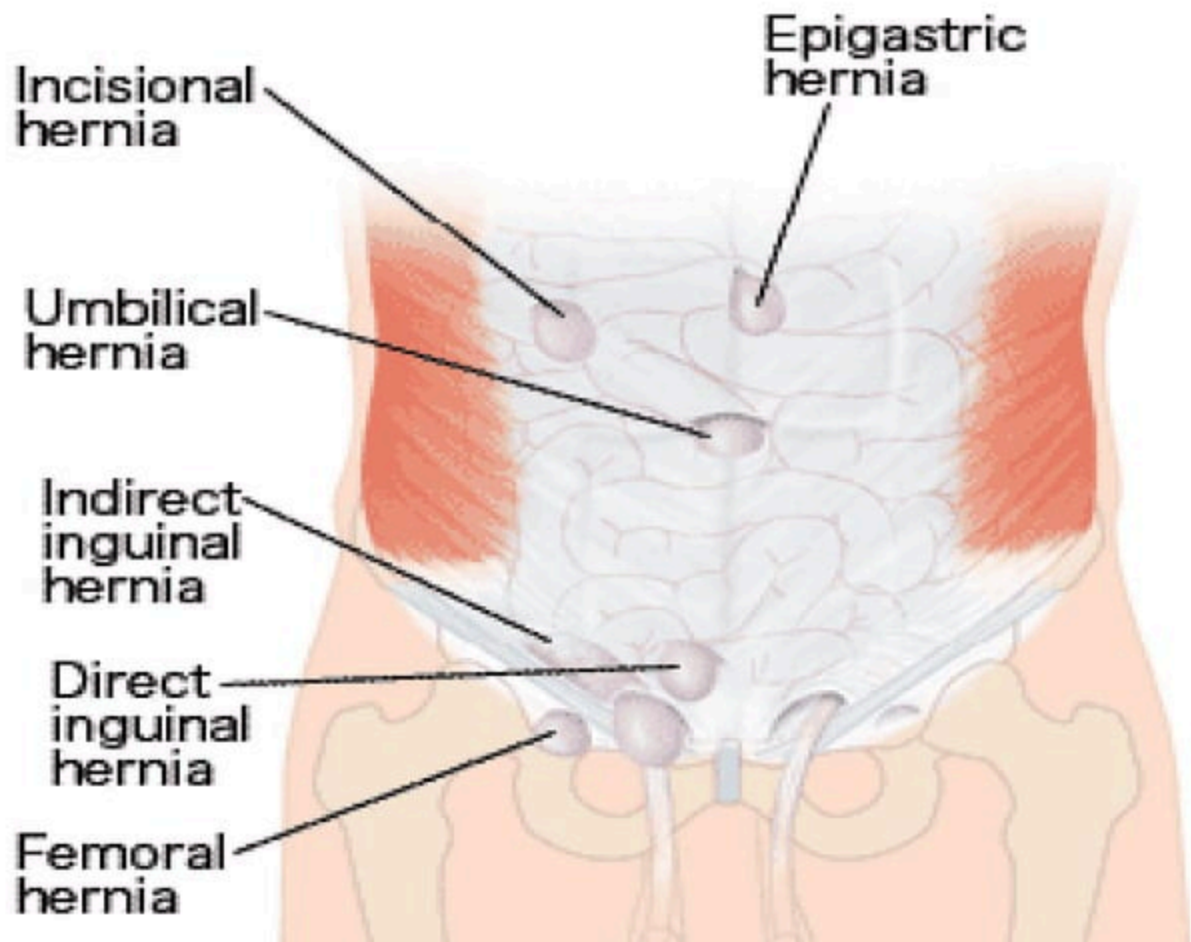
# A hernia is composed of:

1. **Sac:** a folding of peritoneum consisting of a mouth, neck, body and fundus.
2. **Body:** which varies in size and is not necessarily occupied.
3. **Coverings:** derived from layers of the abdominal wall.
4. **Contents:** which could be anything from the omentum, intestines, ovary or urinary bladder.



# Common Herniae

- Inguinal
  - Direct and indirect
- Femoral
- Umbilical
- Incisional
  
- Obturator
- Spigelian
- Lumbar



# 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

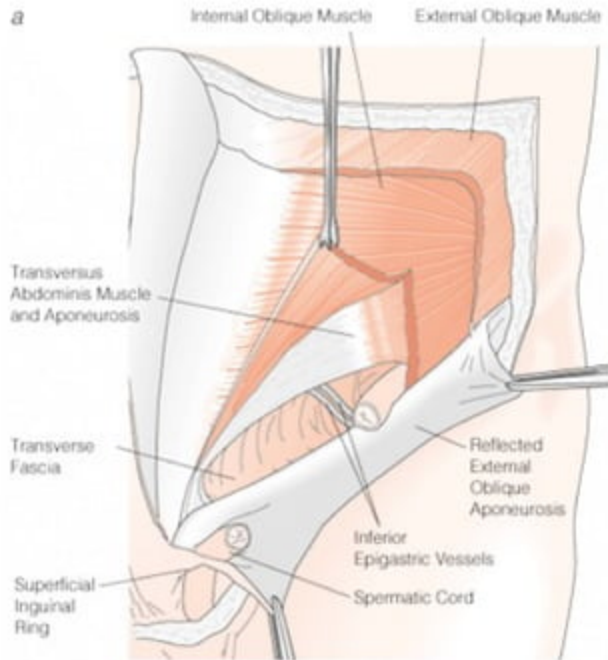


# Pertinent Exam

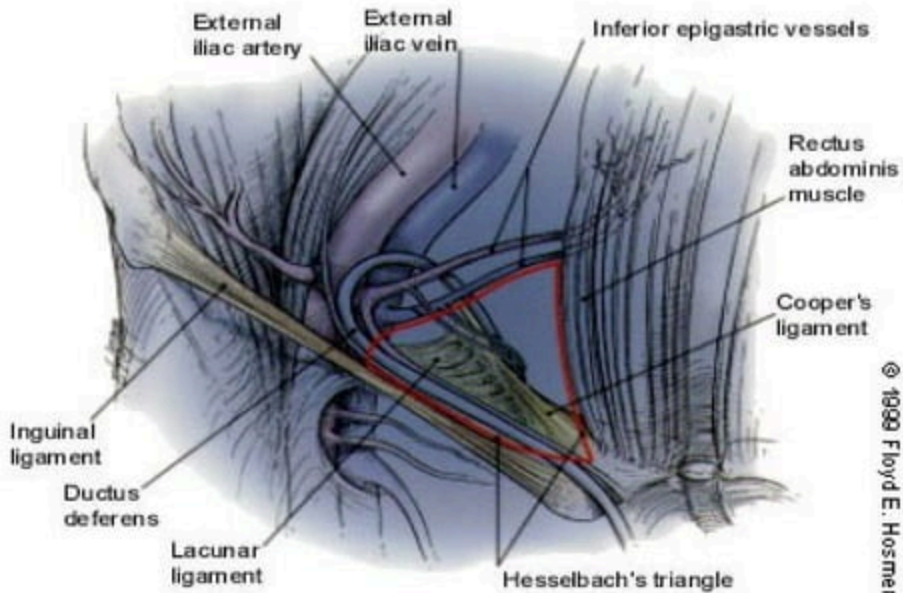
- Location
- Reducible?
- Tender?
- Skin changes?
- Palpable edges
- Genitalia
- Rectal

# Groin Anatomy--Anterior

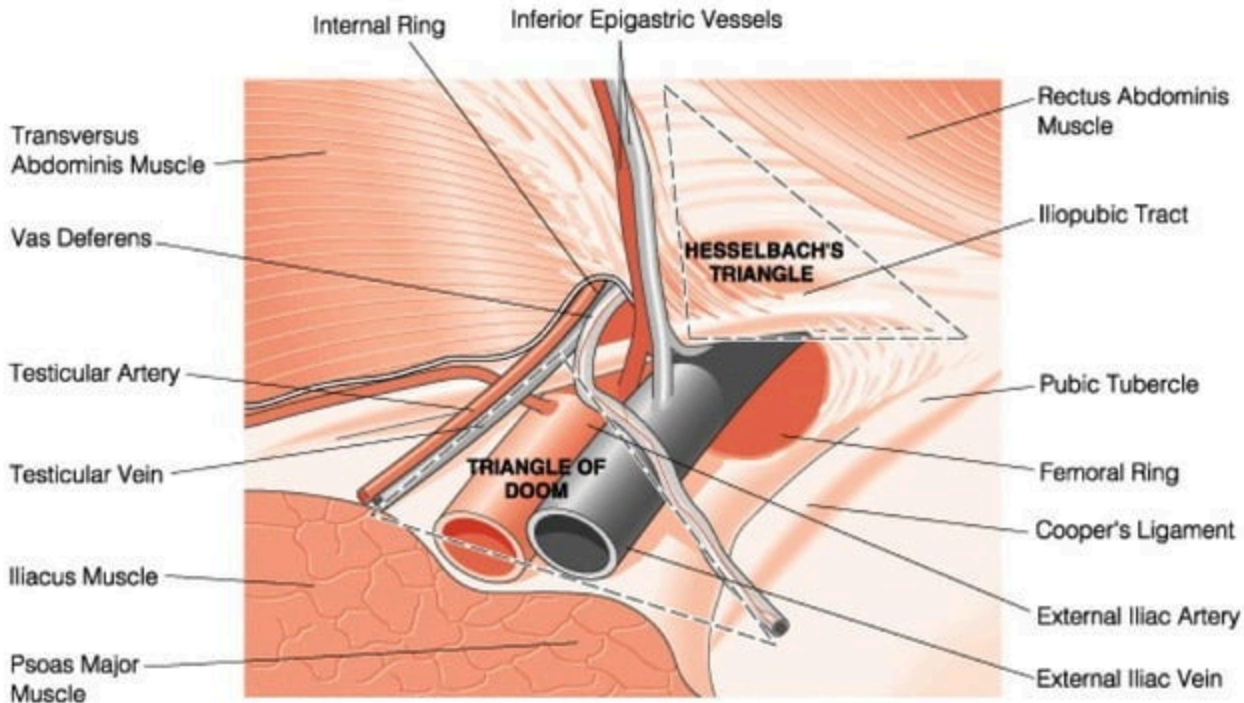
- Inguinal ligament
- Layers
- External ring
- Internal ring
- Spermatic cord
- Inferior epigastric vessels
- Hesselbach's triangle
- Femoral vessels



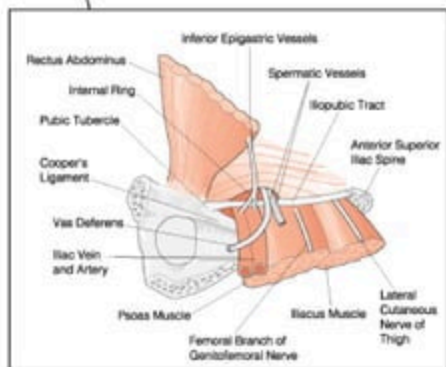
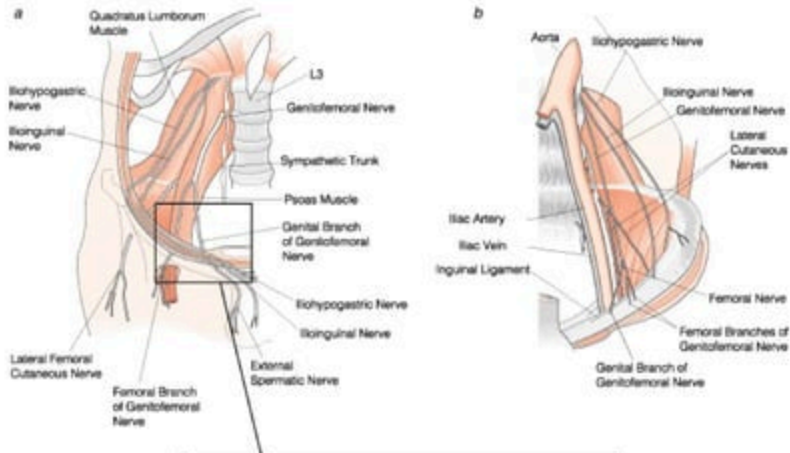
# Hesselbach's Triangle



# Groin Anatomy--Posterior



# Groin Anatomy--Nerves



# Groin Hernia

- Indirect Inguinal
  - Congenital
  - Patent processus vaginalis
- Direct Inguinal
  - Acquired
  - Inguinal floor defect
- Femoral
  - Below inguinal ligament

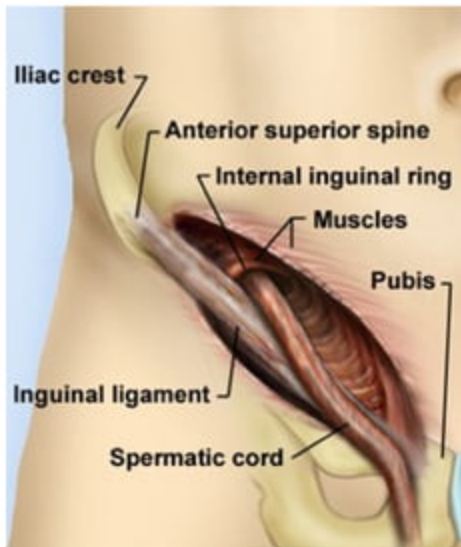


# Groin Hernia

- In the UK 93% are inguinal, 7% femoral
- 20% bilateral
- Most common in both sexes indirect.
- Femoral hernias more common in elderly females
- Male to female ratio in 9:1 for inguinal hernias, 1:3 for femoral hernias

# Inguinal

- *Superficial inguinal ring*—1.25 cm above and lateral to the pubic tubercle
- *Deep inguinal ring*—1.25 cm above and medial to the mid point of inguinal ligament
- *Length of the inguinal canal*—3.25cm





## Inguinal canal Boundaries

**MALT: 2M 2A, 2L, 2T:**

Superior wall [roof]: 2 **M**uscles:

- Internal oblique **M**uscle
- Transverse abdominus **M**uscle

Anterior wall: 2 **A**poneuroses:

- **A**poneurosis of external oblique
- **A**poneurosis of internal oblique

Lower wall [floor]: 2 **L**igaments:

- Inguinal **L**igament
- Lacunar **L**igament

Posterior wall: 2**T**s:

- **T**ransversalis fascia [laterally]
- **T**endon of conjoint [medially]

## Inguinal canal contents

Ilioinguinal nerve.

Spermatic cord, which contains:

**3** arteries:

- Testicular artery.
- Ductus deferens artery.
- Cremasteric artery.

**3** nerves:

- Cremasteric nerve.
- Genital branch of the genitofemoral nerve.
- Autonomics

**3** other things:

- Ductus deferens
- Pampiniform plexus
- Lymphatics

# Nerves

- Major nerves in the region are ilioinguinal, iliohypogastric, genitofemoral nerves.
- Ilioinguinal provides sensory to pubic region, upper labia, scrotum. Most commonly injured.
- Iliohypogastric supplies sensory to skin superior to the pubis.
- Genitofemoral sensory to scrotum and thigh.

# Types of inguinal herniae

## Inguinal

### *Indirect or indirect*

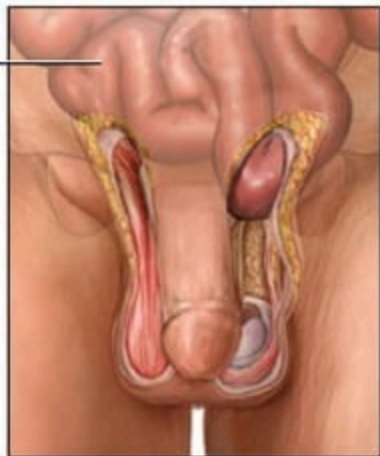
- Inguinal hernias can be **direct** which is herniation through an area of muscle weakness, in the inguinal canal,
- and inguinal hernias **indirect** herniation through the inguinal ring. Indirect hernias, the more common form, can develop at any age but are especially prevalent in infants younger than age 1. This form is three times more common in males.
  
- **Femoral Herniation** through the femoral canal



Indirect inguinal hernia

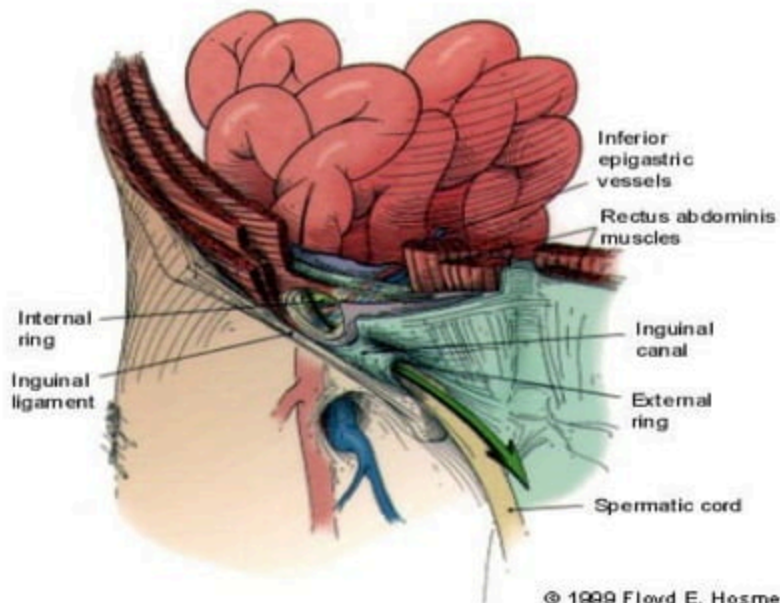
Small intestine

Inguinal canal

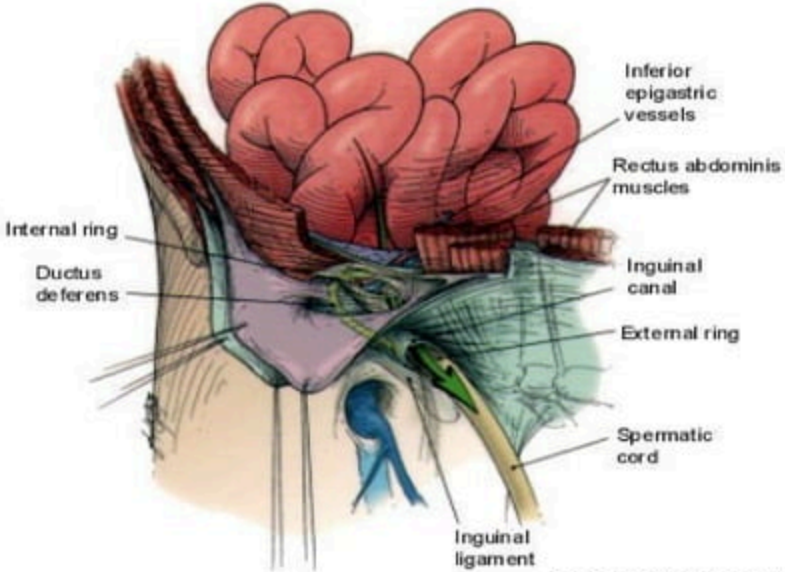


Direct inguinal hernia

# Direct Hernia



# Indirect Hernia



# Examination

## Position

- Pt. stands, exposed area visible.
- best performed with the patient standing and *in supine*
- the physician seated on a stool

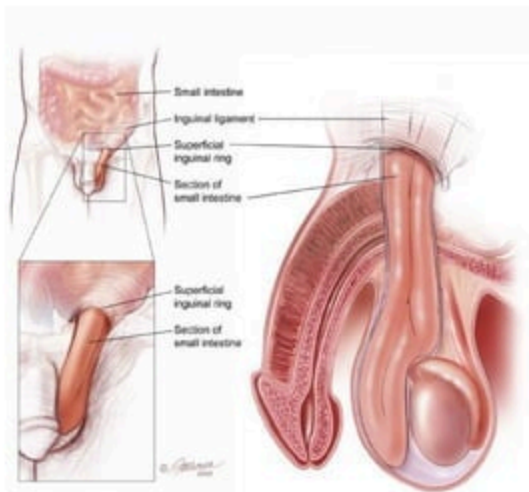
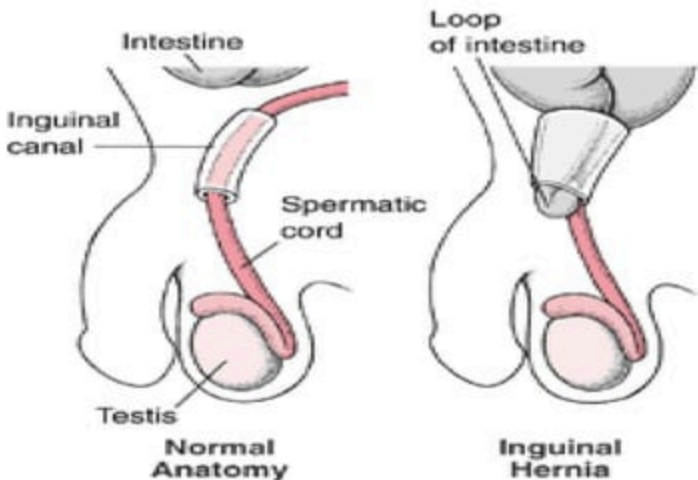
## Prepare

- Stand at the side of the patient,
- one hand on the patients back to support him.
- hand and arm should be roughly parallel to the inguinal ligament when palpating the lump.



# Mass

- Observation of the groin area in oblique light
- *Visible swelling.*
- *Examine as a mass; (site,skin,size,shape,...)*



# Most important

1. Can you get above it?
2. Reducibility test
3. Expansile cough Impulse
4. Invagination test
5. Three finger test  
    Zieman's technique
6. Ring occlusion test

## Also Assess

- Intra or extra abdominal
- Tension
- Composition
- Percussion and auscultation;  
Bowel Sounds
- Always examine both groins
- Transillumination

# 1-Cough Impulse

- Pt. coughs to highlight hernia.
- May not ;if the neck is blocked by adhesions
- Visible & Palpable cough impulse.
- Reappear on straining, standing or coughing



## 2-Reducibility test

- Ask the patient to reduce the hernia
- Usually done in the supine position.

# Relation to Pubic Tubercle

INGUINAL HERNIA; The neck lies above and medial to the pubic tubercle

FEMORAL HERNIA; The neck lies below and lateral to pubic tubercle

### 3-Get above the swelling test

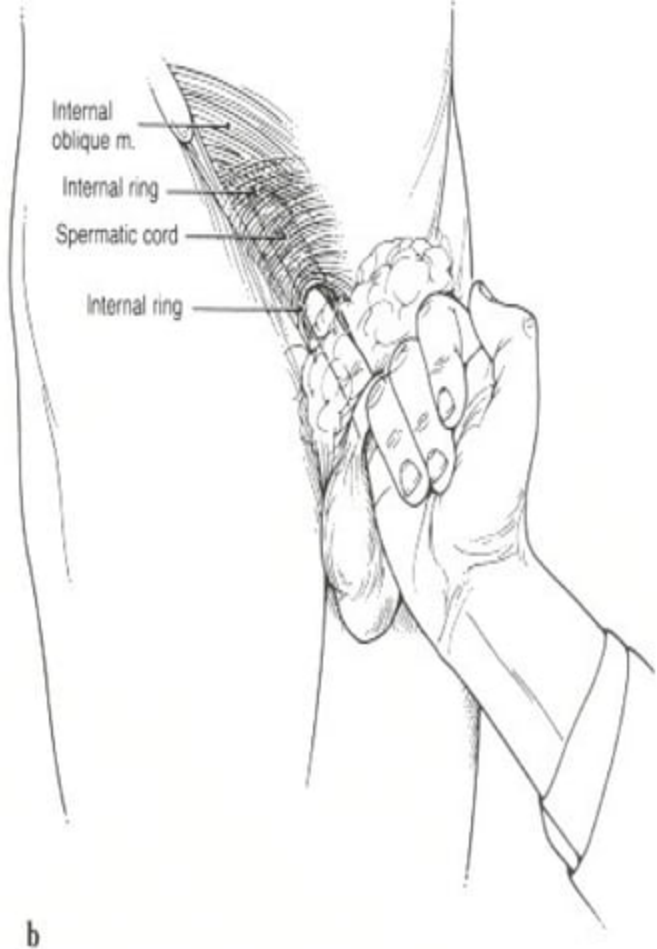
- Ask the patient to stand
- At the root of the scrotum place the thumb in front and the index behind
- Try to reach above the swelling.
- **Inguinal hernia;** cannot get above
- **Pure scrotal swelling;** will get above

## 4-Invagination test

- The scrotum on each side is inverted with the examining index finger
- Entering the inguinal canal along the course of the cord structures.
- The finger push up to the superficial inguinal ring.
- The pulp should feel the ring.
- Patient is asked to cough,
- A palpable impulse will confirm the presence of a hernia;  
felt on the pulp then direct  
felt on the tip then indirect hernia.







## 5-Three finger test/Zieman's technique

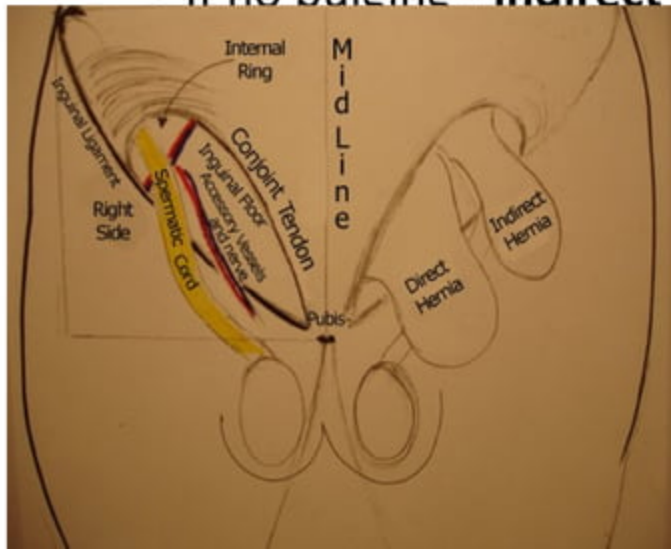
- Index finger; deep inguinal ring (indirect hernia)
- Middle finger; superficial ing. Ring (direct hernia)
- Ring finger; saphenous opening (femoral hernia)

The patient is asked to cough



# 6-Ring occlusion test

- Reduce the hernia
- Occlude the deep ring with index and middle finger
  - Ask the patient to stand and then cough
  - If no bulging - **indirect**

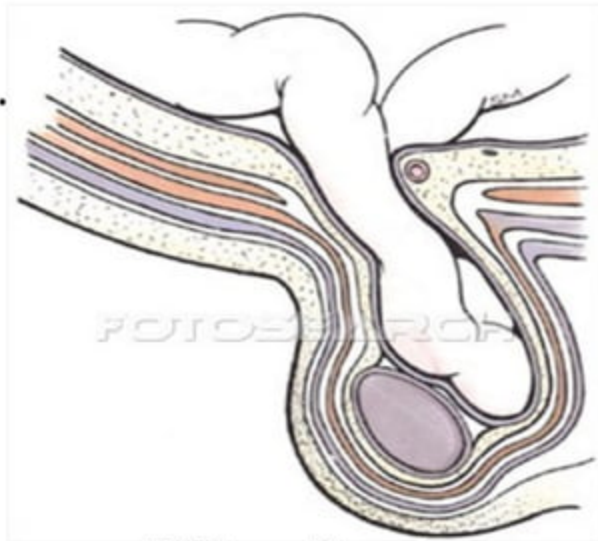


# Complications

- Bowel incarceration (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

# Strangulation

- Any hernia that is tender
- Nausea and vomiting;
- Caution if trying to reduce it manually.
- An acute surgical emergency.



# Nyhus Classification

- I indirect, internal ring normal (kids)
- II indirect, dilated internal ring
- III posterior wall defects, direct inguinal hernia, dilated internal ring, massive scrotal, sliding, femoral hernia
- IV recurrent hernia

# Indications for Operative Repair

- Early repair is justified when potential for strangulation is weighed against minimal risks for surgery.
- Not warranted in terminally ill without incarceration
- Patients with ascites should have it controlled before surgery
- Incarceration, strangulation

# Surgical Techniques

- Open anterior repair (Bassini, McVay, Shouldice).
- Open posterior repair (Nyhus, preperitoneal)
- Tension-free repair with mesh (Lichtenstein, Rutkow)
- Laparoscopic

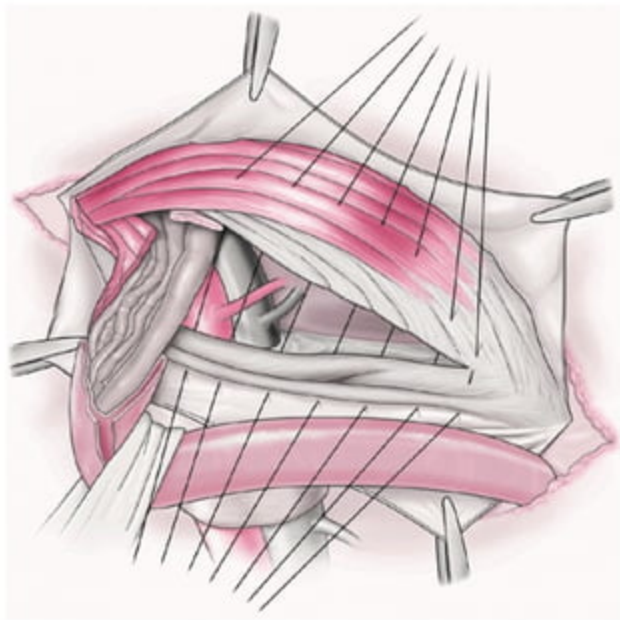


# Open Anterior Repair

- Transversalis opened, hernia sac ligated, canal reconstructed using permanent sutures.
- Tension of the repair can lead to recurrence.

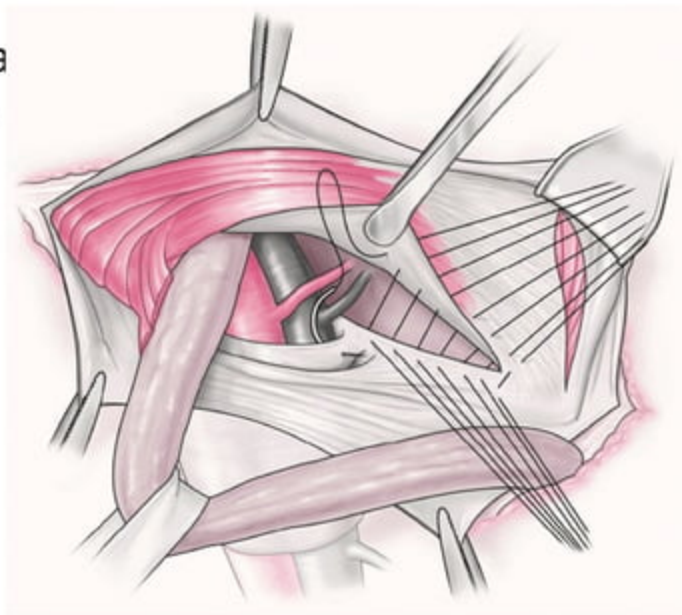
# Bassini Repair

- Conjoined tendon (internal oblique, transverse abdominal, transversalis fascia)
- Shelving edge Inguinal ligament



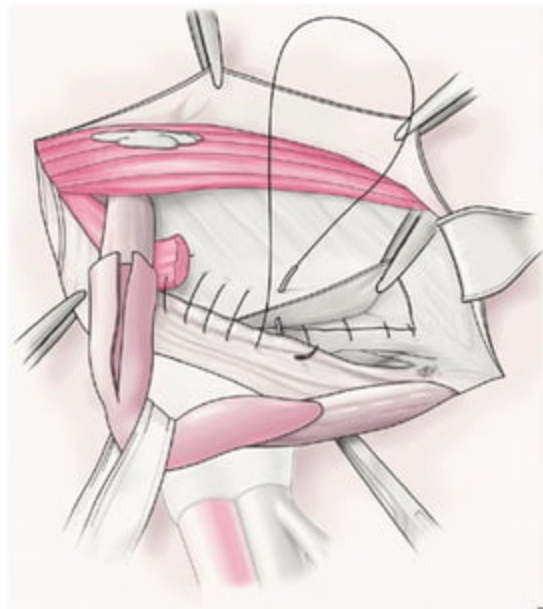
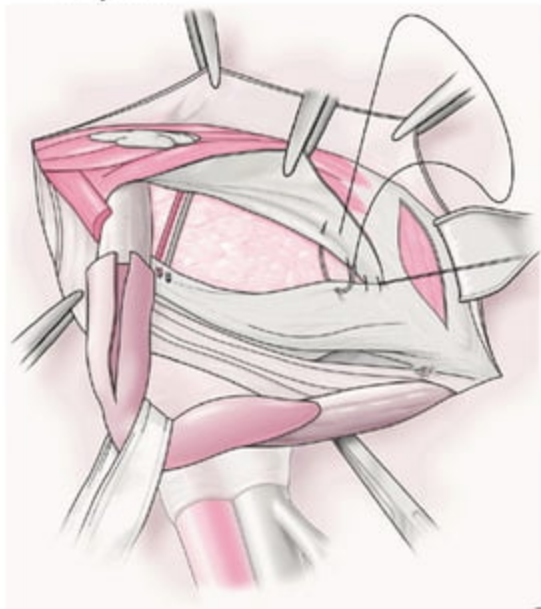
# McVay (Cooper's Ligament)

- Like Bassini but media approximation to the pectineal ligament
- Inguinal and Femoral hernia repair
- Femoral Vessels



# Shouldice Repair

- Imbricated, running repair

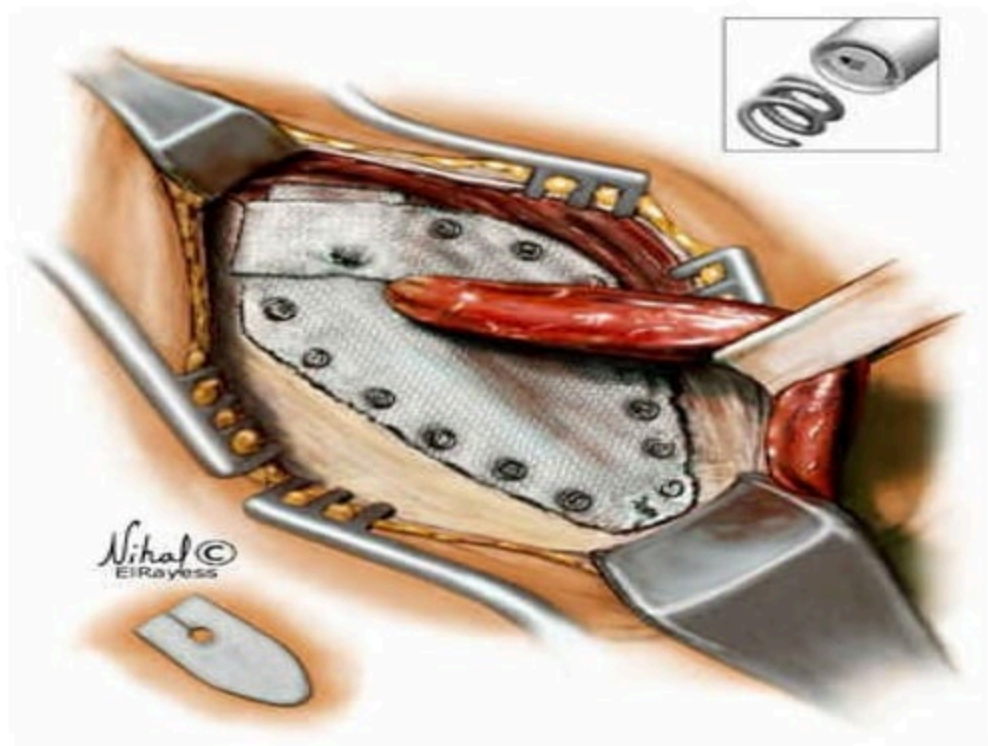


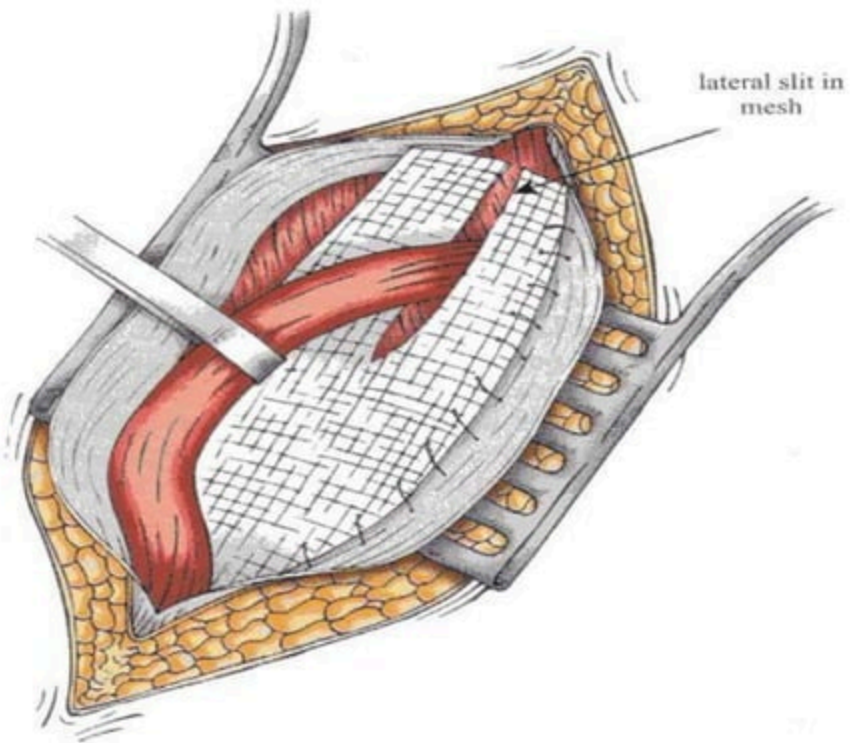
# Open Posterior Repair

- Divide the layers of the abdominal wall superior to the internal ring, enter preperitoneal space. Dissection continues behind and deep to the entire inguinal region.
- Suture tension problems.

# Tension-Free Repair

- Same initial approach as anterior repair
- Instead of sewing fascial layers together to repair defect, a prosthetic mesh onlay used
- Simple to learn, easy to perform, suited for local anesthesia, excellent results with recurrence less than 4%.





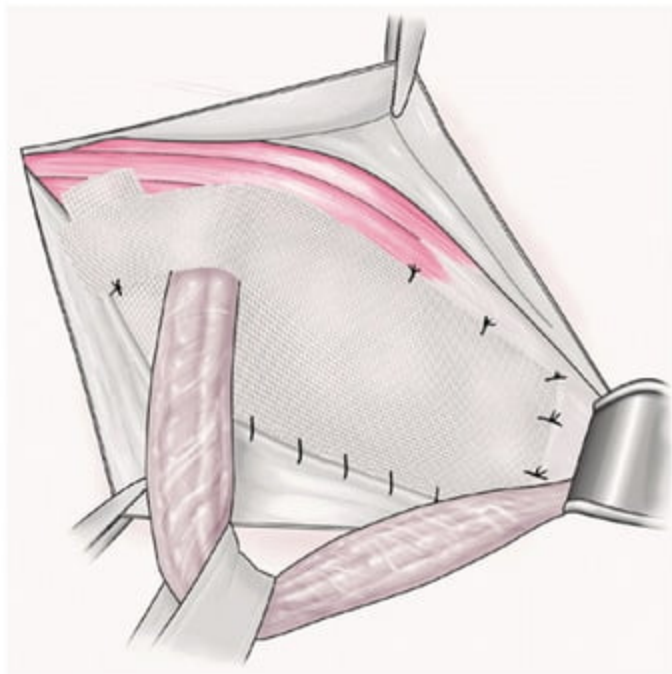
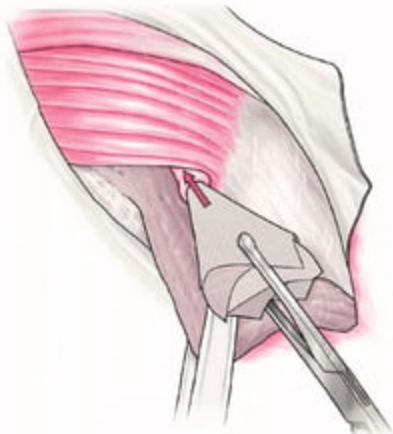


# Techniques

- Coined by Liechtenstein in 1989
- Central feature is polypropylene mesh over unrepaired floor.
- Gilbert repair uses a cone shaped plug placed thru deep ring.
- Slit placed in mesh for cord structures

# Mesh repair

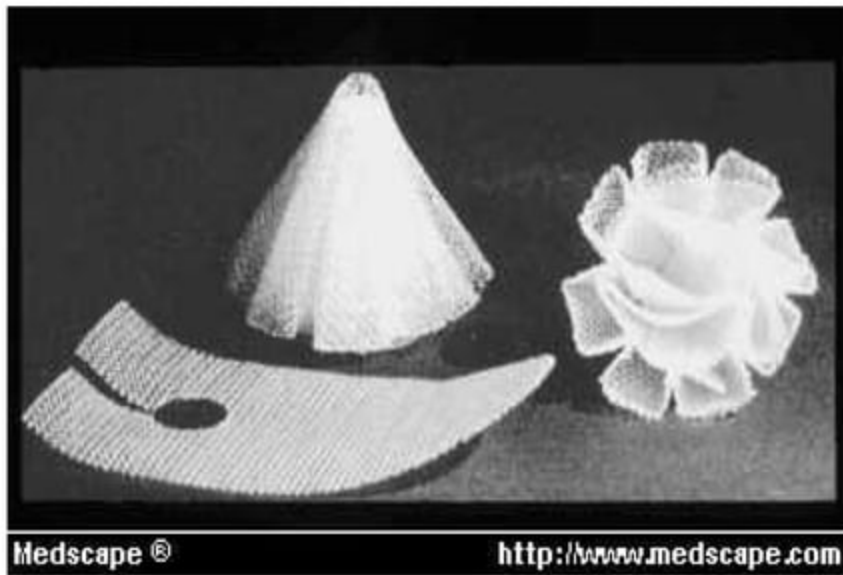
- Tension free
- Less painful
- Foreign body



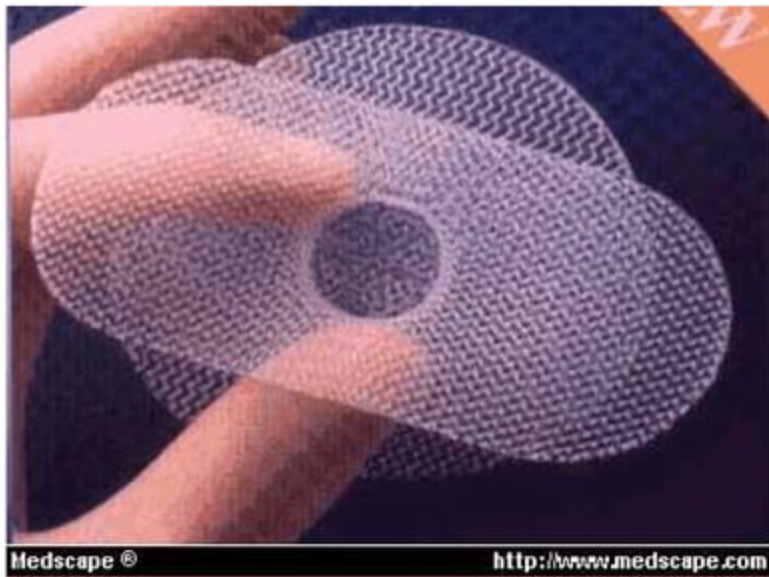
# Kugel Patch



# Bard Perfix Plug and Patch



# Prolene Hernia System



Medscape®

<http://www.medscape.com>

# Techniques

- The genital branch of the femoral nerve, and the ilioinguinal nerve are allowed to pass through the newly constructed deep ring.
- Suturing the plug is not necessary.
- Preformed plugs have no advantage over a hand fashioned one.

# Techniques

- Small indirect sacs are dissected and inverted, large one are transected and ligated.
- Direct sacs are inverted.
- If plugs are placed to repair direct defects, a mesh only must be placed over the plug to prevent expulsion.

# Laparoscopic Procedures

- Increasingly popular, controversial
- Early in the development, hernias were repaired by placing very large mesh over entire inguinal region on top of the peritoneum. Was abandoned because of contact with bowel.
- Today, most performed TEP or TAPP



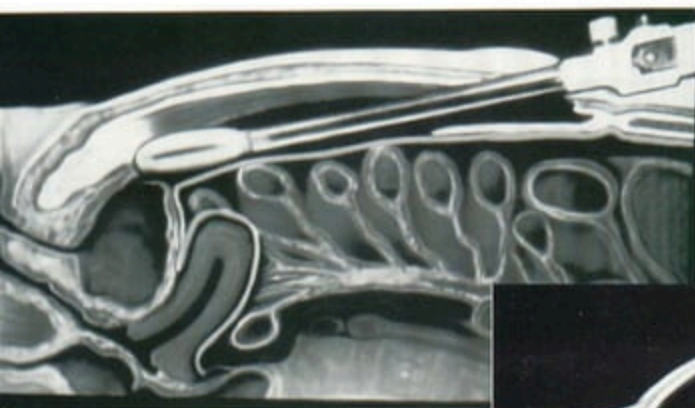
# Laparoscopic Procedures

- In the TEP procedure, an inflatable balloon is placed in the preperitoneal space, and the repair is done preperitoneal. More skill required.
- In both TAPP and TEP, the hernia sac is reduced, and a large piece of mesh is placed to cover defects.

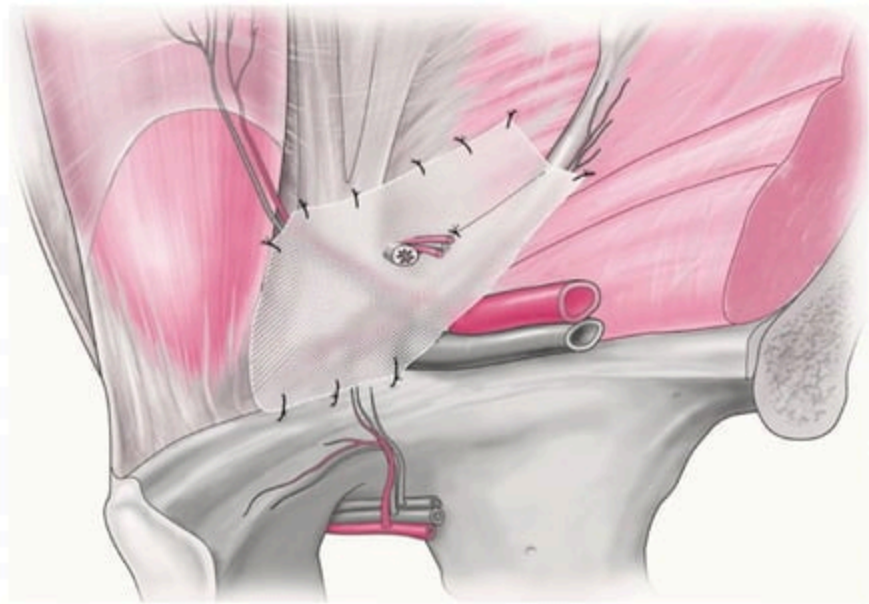
# Balloon Dissector



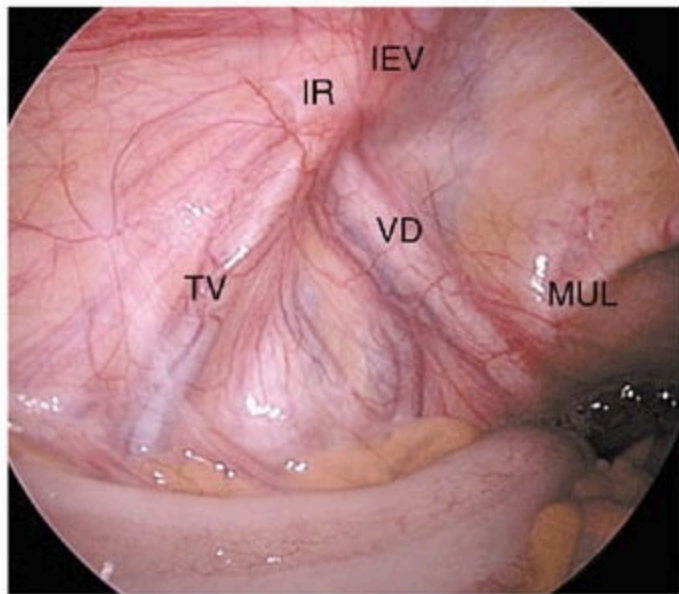
# Laparoscopic Inguinal Hernia Technique



# Unilateral Preperitoneal repair



# Transperitoneal Anatomy



# Laparoscopic Procedures

- The argued advantage of these procedures was less pain and disability, faster return to work.
- Great for bilateral hernia, with no increase in morbidity.
- For recurrent hernia
- Disadvantages are cost, time.

# Complications of surgical repair - Immediate

- Bleeding
- Neurovascular damage
- Damage to the testicular artery leading to testicular atrophy and possibly orchidectomy
- Injury to the Vas Deferens
- Bowel perforation
- Visceral injury

# Complications of surgical repair - Early

- Urinary retention
- Bleeding
- Discomfort



# Complications of surgical repair - Intermediate

- Infection
- Bleeding
- Discomfort
- DVT/PE
- Chest infection

# Complications of surgical repair - Late

- Chronic discomfort
- Recurrence

# Femoral Hernia

- **I. Epidemiology**

- A. Accounts for 4% of Groin Hernias (96% are inguinal)

- B. More common in elderly women

- C. Gender predisposition: Female by 3 to 1 ratio

- Femoral herniae are seen less than inguinal hernia - even in women

- **II. Pathophysiology**

- A. Associated with increased intra-abdominal pressure

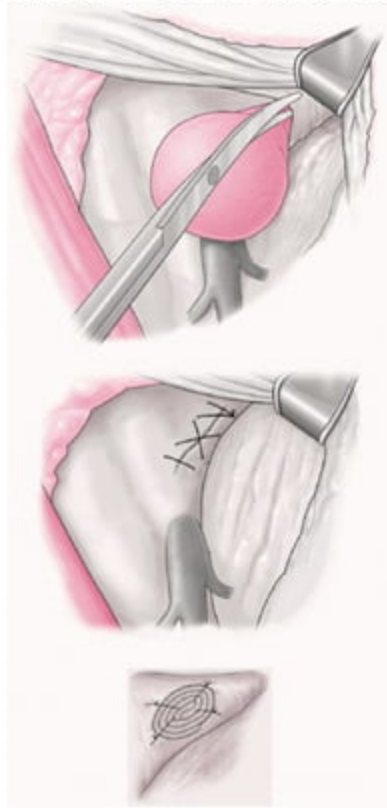
- B. Hernia sac bulges into femoral canal

# ***Femoral Hernia***

- Femoral hernias are more common in women,
- Present as a groin lump.
- The cause of unexplained small bowel obstruction.
- An absent Cough impulse
- Globular lump than the pear shaped lump of the inguinal hernia.
- Differential Diagnoses:
  - Inguinal Hernia.
  - Femoral Artery Aneurism.
  - Femoral Lymphadenopathy.
  - Psoas Abscess.

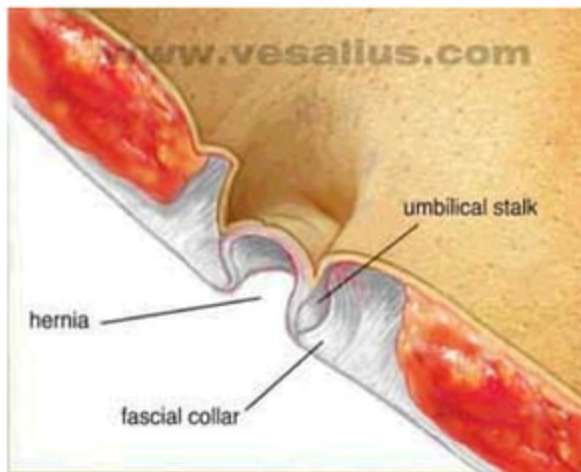


# Femoral Hernia Repair



# Umbilical Hernia

- Obstruction and strangulation is rare in children but can be more common in adults
- May remain small and asymptomatic
- Can increase with obesity, pregnancy, ascites, peritoneal dialysis



# Umbilical Hernia

- In infants & children.
- Boys more than girls.
- Tend to resolve without any treatment by around the age of 5 years.



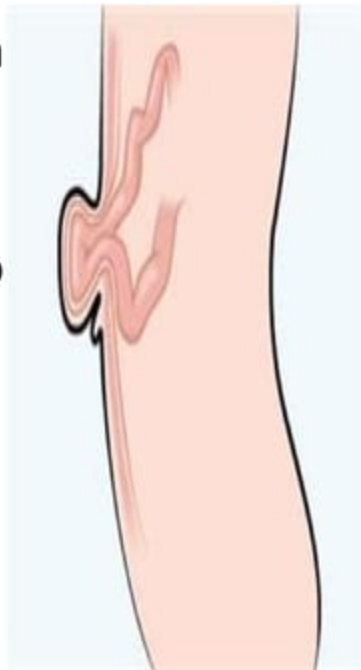
# Umbilical Hernia Repair





# Paraumbilical Hernia

- Affects adults.
- Either supra or infraumbilical through the linea alba.
- The female to male ratio is 20:1.
- Cloicky pain and/or irreducibility due to omental adhesions.



# Incisional hernia

## I. Pathophysiology

A. Type of Ventral Hernia

B. Develops in scar of prior laparotomy or drain site

C. Risks for postoperative hernia development

1. Vertical scar more commonly affected than horizontal
2. Wound infection
3. Wound dehiscence
4. Malnutrition
5. Obesity
6. Tobacco abuse

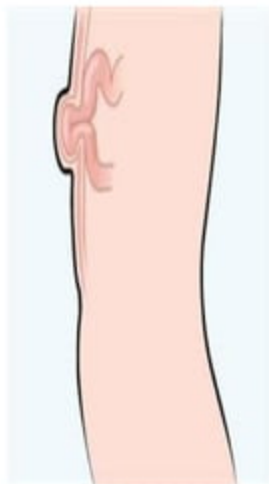
# Incisional Hernia

- More along a straight line from the sternum down to the pubis.
- Swelling at the incisional site +/- pain.



# Epigastric Hernia

- As result of a defect in the linea alba between the xiphoid process and umbilicus
- Starts as a protrusion of the extraperitoneal fat
- Swelling +/- pain



# Ventral Hernia

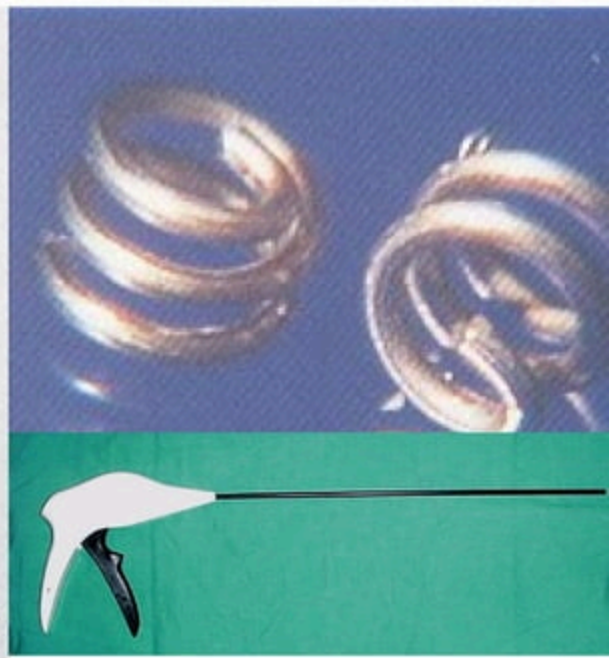
- Usually incisional
- May be associated with adhesions



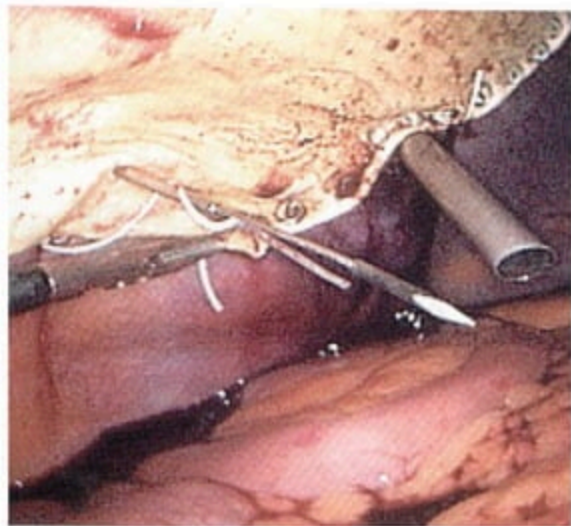
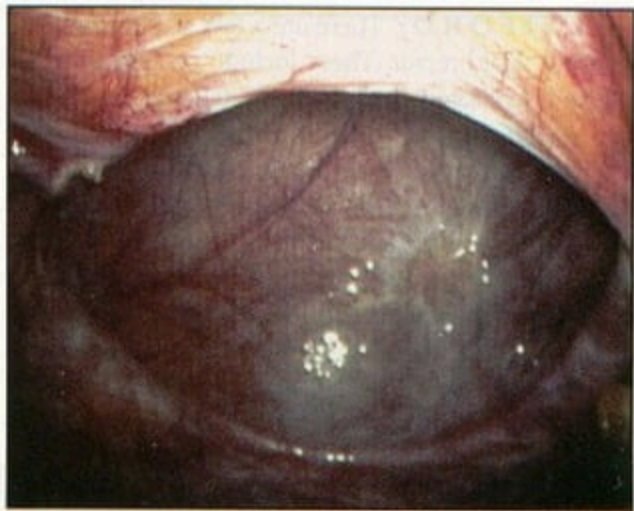
# Laparoscopic Ventral Hernia



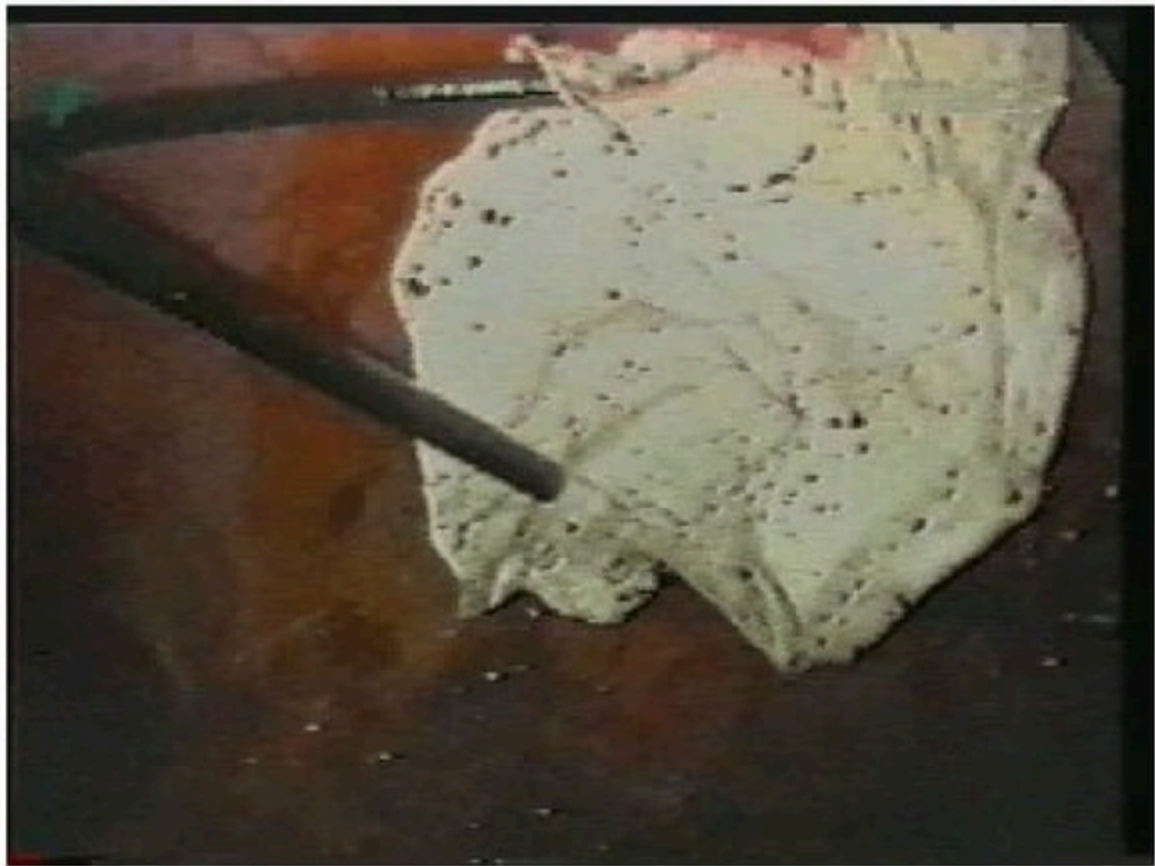
# Laparoscopic Ventral Hernia Technique



# Laparoscopic Ventral Hernia Technique



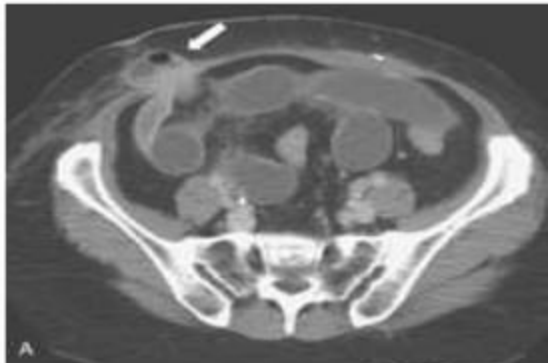


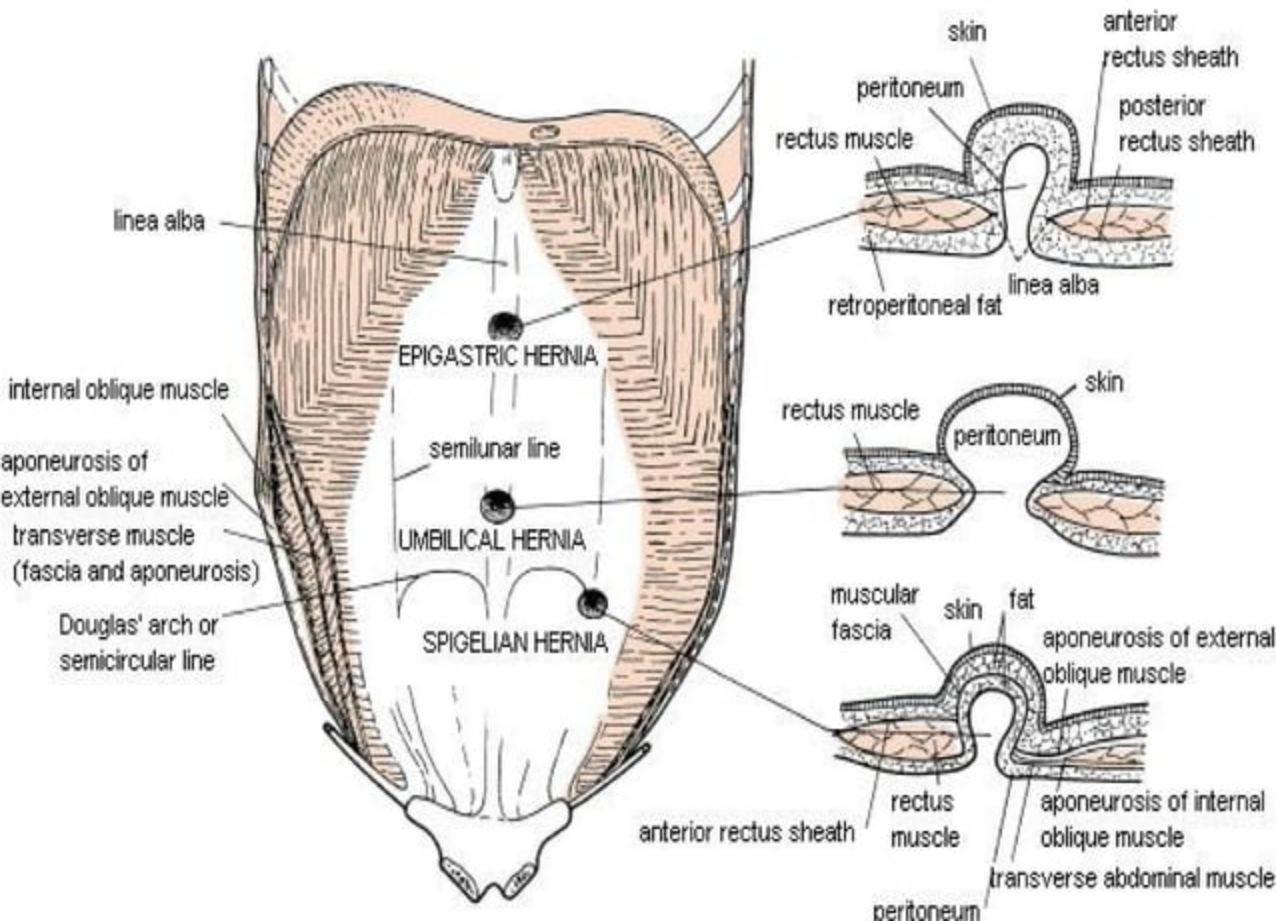


# Rare external Hernias

## Spigelian Hernia:

- *Occurs in the spaces of the semilunar line and the lateral edge of the rectus muscle (inferior to the arcuate line).*
- *The posterior rectus sheath is weak*
- *Preoperative diagnosis is difficult*
- *USS & CT may be helpful*





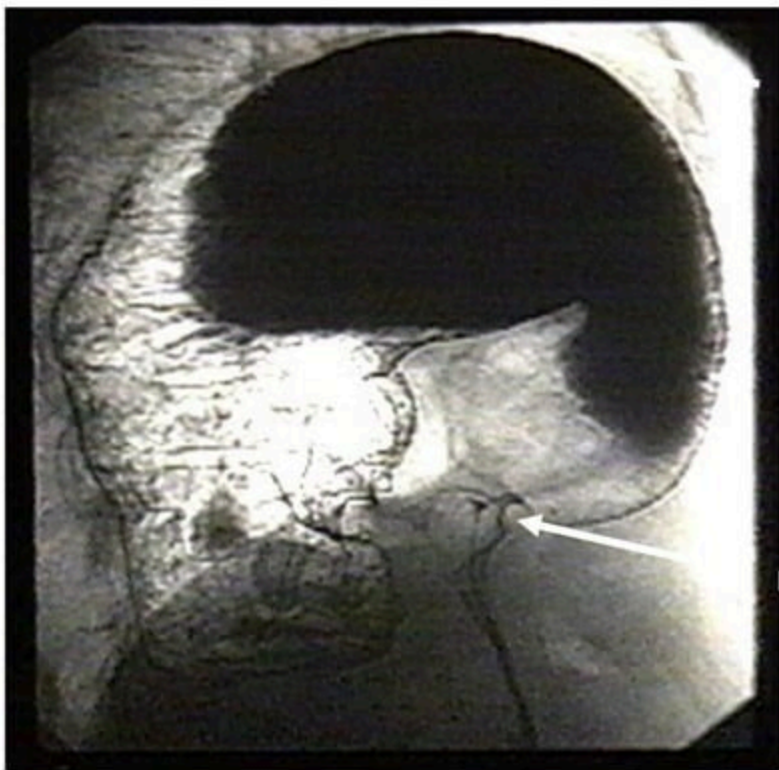
# Lumbar Hernia

- *Broad bulging hernia*
- *Not vulnerable to incarceration.*

**A. *Petit's hernia:*** *inferior lumbar triangle.*

**B. *Grynfeltt's Hernia:*** *superior lumbar triangle and is less common than Petit's.*

# Hiatus hernia

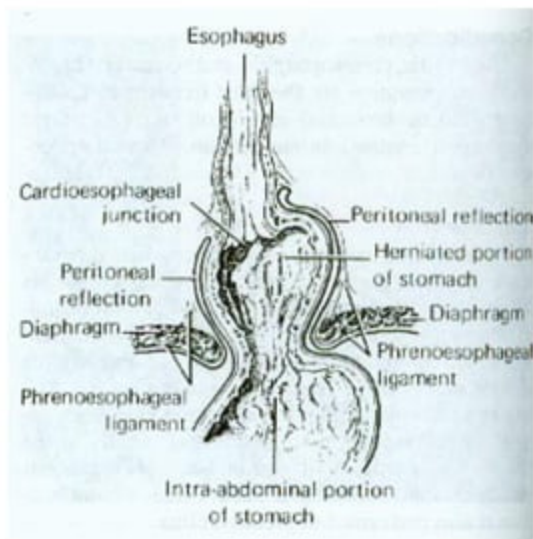


# Types

*Hiatal hernias are classified according to the position of the oesophagogastric junction and the existence of a true hernia sac.*

- **Type I (sliding)**

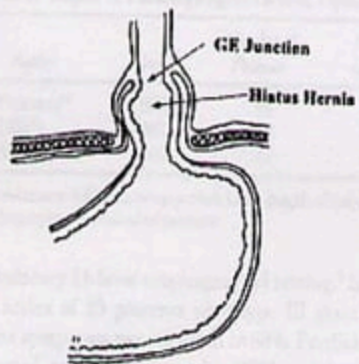
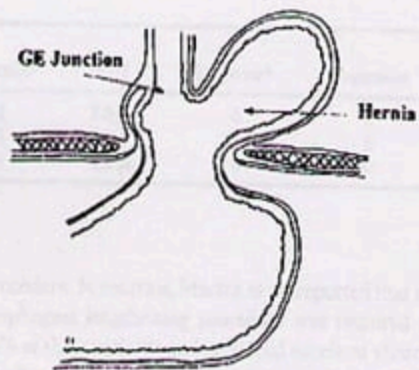
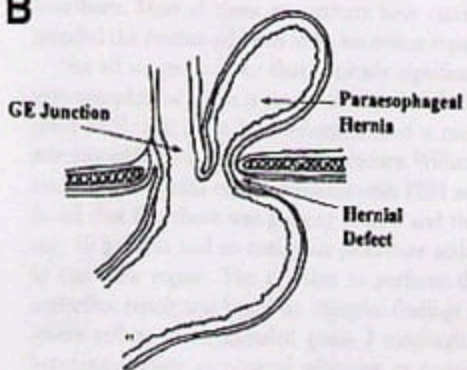
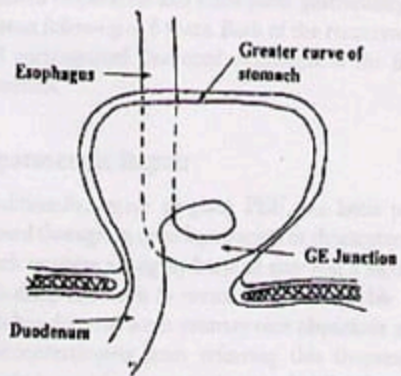
- Leading edge of the hernia is the oesophagogastric junction, which is displaced into an intrathoracic position.
- The longitudinal axis of the stomach is aligned with the esophagus.
- There is often no true hernia sac nor is there any para-oesophageal component.



# Types

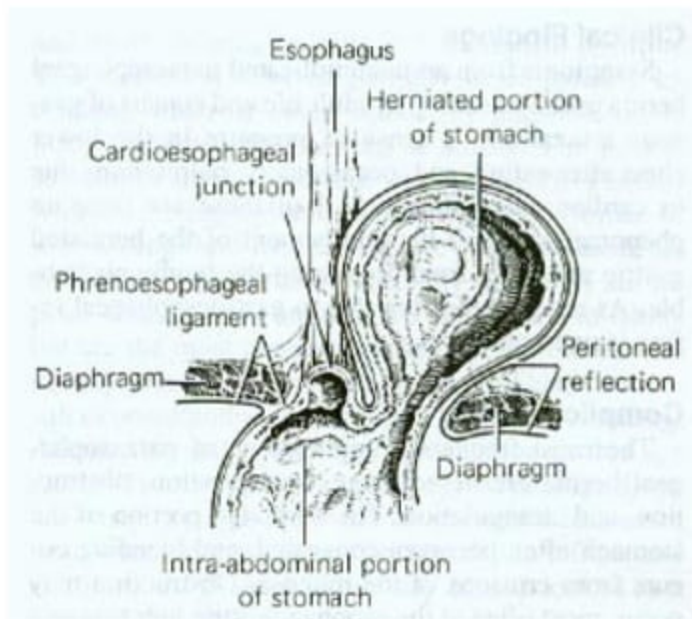
Type II & Type III are referred to as “para-oesophageal herniae”.

- Type II (*rolling*)
  - The oesophagogastric junction is in its normal intra-abdominal location
  - The hernia sac (containing portions of the gastric fundus and body) develops alongside the oesophagus
- Type III
  - The oesophagogastric junction is displaced into the thorax and like a Type II, the hernia sac contains portions of the gastric fundus or body.

**A****C****B****D**



# Type II & Type III = Type IV



# Management

- Evaluation
  - Endoscopy
  - Esophageal Motility Studies
  - Manometry & pH Monitoring
    - 1/3 of pts will have atypical peristalsis of the esophageal body
    - 1/2 of symptomatic patients will have abnormal pH results

# Management

- Indications for Operation
  - Type I
  - Type II & III
    - Associated with a high-risk of complications
    - “catastrophic” in 20 – 30% of pts
    - Symptoms do not predict risk...

# Management

- Findings that may prompt surgery  
*(even in those patients that are “not optimal”)*
  - Symptoms of obstruction
  - Reflux
  - Anemia
  
- Trying to avoid:
  - Further aspiration
  - Hemorrhage
  - Transfusion requirements

# Surgical Techniques

- Principles similar to other hernia operations
- Need to anchor the stomach
- The need for fundoplication varies
- Transthoracic vs. Transabdominal...