# HERNIA



# Hernia is defined as an abnormal protrusion of a viscous or a part of a viscous through an opening, artificial or natural with a sac, covering it.



- Inguinal hernia is the commonest hernia (73%) because the muscular anatomy in the inguinal region is weak and also due to the presence of natural weakness like deep ring and cord Inguinal Hernia
- Umbilical is 17%
- Femoral is 8.5%
- Others are 1.5%



#### AETIOLOGY (increased intra abdominal pressure)

- Straining
- Lifting of heavy weight
- •Chronic cough (tuberculosis, chronic bronchitis, bronchial asthma, emphysema)
- Chronic constipation (habitual, rectal stricture)
- Urinary causes
- Old age: BPH, carcinoma prostate
- Young age: stricture urethra
- Very young age: phimosis, meatal stenosis
- Obesity
- Pregnancy
- Smoking
- Ascites
- Appendicectomy
- Congenital
- Familial-collagen disorder—Prune Belly syndrome



# Composition of a hernia



- Sac is a diverticulum of peritoneum with mouth, neck, body and fundus
- Neck is narrow in indirect hernia but wide in direct hernia
- Body of the sac is thin in infants, children and in indirect sac thick in direct and long standing hernia



#### Contents of Sac

- Omentum—Omentocele (Epiplocele) initially it can be reduced easily difficult to reduce the sac later
- Intestine—Enterocele— commonly small bowel, but sometimes even large bowel difficult to reduce the sac initially
- *Richter's hernia* A portion of circumference of bowel is the content
- Cystocele-Urinary bladder may be the content or part of the posterial wall of the sac
- Ovary, often with fallopian tube
- Meckel's diverticulum-*Littre's hernia*
- Appendix Amyand's hernia
- Maydl hernia



## INGUINAL HERNIA INGUINALCANAL

It is an oblique passage in lower part of abdominal wall, 4 cm long extending from deep inguinal ring to superficial inguinal ring



## Normal Anatomy

- Inguinal canal is a 3d cylinder between the deep and superficial inguinal rings
  - Superior Wall fibres of internal oblique and transversus abdominis
  - Posterior wall conjoined tendon on internal oblique, transversus abdominis and fascia transversalis
  - Anterior wall aponeurosis of the external oblique
  - Inferior wall inguinal ligament, lacunar ligament and the ilio-pubic tract
- Inguinal Canal
  - Spermatic cord in men
  - Ilioinguinal nerve
  - Genito-femoral nerve
  - Round ligament in females.



## Superficial inguinal ring

*triangular opening in the* external oblique aponeurosis and is 1.25 cm above the pubic tubercle

bounded by a superomedial and inferolateral crus

## <u>Deep inguinal ring</u>

U-shaped condensation of the transversalis fascia, lies 1.25 cm above the inguinal ligament midway between the symphysis pubis and the anterior superior iliac spine

## Hesselbach's triangle

### **Boundries** medially : lateral border of rectus muscle laterally : inferior epigastric artery below:

inguinal ligament



### **Contents of spermatic** cord

- Vas deferens
- Artery to vas
- Testicular and cremasteric artery
- Genital branch of genitofemoral nerve
- Pampiniform plexus of veins
- Remains of processus vaginalis



### **Spermatic Cord: Coverings**



- 1. Internal spermatic fascia:
  - Derived from transversalis fascia

#### 2. Cremasteric fascia:

- Derived from the investing fascia of internal oblique muscle.
- Cremasteric muscle is <u>striated</u> and innervated by the genital branch of the genitofemoral nerve to elevate the testis (GSE) (draws testis closer to body for protection e.g. in response to cold temperatures)

#### 3. External spermatic fascia:

 Derived from the investing fascia of external oblique muscle

# Defence mechanism of inguinal canal

- Obliquity of inguinal canal(flap valve mechanism)
- Arching of conjoint tendon
- 'Shutter mechanism' of internal oblique
- 'Ball valve mechanism' due to contraction of cremaster muscle which plugs to superficial ring
- When external oblique muscle contracts intercrural fibres of superficial ring appose causing '*slit valve mechanism*'

## CLASSIFICATION OF INGUINAL HERNIA

1)Anatomical classification

### Indirect hernia:

- It comes out through internal ring along with the cord
- lateral to the inferior epigastric artery

### **Direct hernia:**

It occurs through the posterior wall of the inguinal canal through 'Hesselbach's triangle medial to the inferior epigastric artery

#### Direct

#### Indirect



## INDIRECT (OBLIQUE) INGUINAL HERNIA

This is the most common type of hernia (65%)

It is more common in younger age group as compared to direct inguinal hernia which is more common in elderly Inguinal Hernia



# Coverings of indirect hernia(from inside out)

- Extraperitoneal tissue
- Internal spermatic fascia
- Cremasteric fascia
- External spermatic fasc
- Skin



# TYPES OF INDIRECT HERNIA

Bubonocele: Where the hernia is limited to inguinal canal

**Funicular:**hernia present at the root of the scrotum

Processus vaginalis is closed just above the epididymis. Contents of the sac can be felt separately from testis, which lies below the hernia

**Complete (Scrotal):** hernia present in the bottom of the scrotum Testis appears to lie within the lower part of hernia



## DIRECT HERNIA

- 35% of inguinal hernias are direct.
- It is common in <mark>males</mark>.
- It is always acquired, due to weakening of posterior wall of inguinal canal.
- Hernia is medial to the inferior epigastric artery

# Coverings of direct hernia (from inside out)

- Extraperitoneal tissue
- Fascia transversalis
- Conjoined tendon
- External spermatic fascia
- Skin



# **CLINICAL EXAMINATION**

- Indirect hernia is most common in males and and direct is uncommon in females
- Direct hernia is reducible on lying down
- Indirect is irreducible
- □ Shape : pyriform in indirect

spherical in direct

If swelling is soft and elastic : enterocele firm and granular: omentocele

<u>Cough impulse</u>: a characteristic feature of hernia can be felt on palpation seen as bulging in inspection

<u>Get above the swelling</u>: complete scrotal swelling its positive

Inguinoscrotal swelling will not be able to get above the swelling

## Internal ring occlusion test

Internal ring is located half inch above the mid-inguinal point (center point between anterior superior iliac spine and pubic symphysis) After reducing the contents, in lying down

position, internal ring is occluded using the thumb

Patient is asked to cough

□ If a swelling appears

medial to the thumb, then it is a direct hernia

If swelling does not appear and on releasing the thumb

swelling appears during coughing, then it is an indirect hernia

## Ring invagination test

After reduction of hernia, the little finger/index finger of the examiner is used to invaginate from the bottom of the scrotum, gradually pushed up and rotated to enter the superficial inguinal ring impulse on coughing if impulse is felt at the

tip of the invaginated finger:indirect Pulp of the inaginated finger : direct This test is done only in males

## Indirect inguinal

<u>hernia</u>

## Direct inguinal hernia

- Can occur in any age from childhood to adult
- Occurs in a pre-existing sac
- Protrusion through the deep ring
- Pyriform/oval in shape;
- descends obliquely and downwards
- Can become complete
   by descending down into scrotum

- Common in elderly
- Always acquired
- Protusion occurs through posterior wall
- Globular/round in shape
   descends directly
   forwardwards bulge
- Descent down into the scrotum is rare

- Neck of the sac is narrow and lateral to inferior epigastric artery
- Sac is antero-lateral to the cord
- Ring occlusion test does not show any impulse after occluding the ring
- ring Invagination test shows impulse on the tip of the of the little finger
- Commonly unilateral but can be bilateral
- Obstruction/strangulation are common
- Sac should be opened during surgery

- Neck of sac is wide and medial to inferior epigastric artery
- Sac is posterior to the cord
- Test shows impulse even after occluding the deep ring
- Impulse is felt over the pulp little finger
- Commonly bilateral
- Sac is not necessarily opened unless obstruction

#### **Differential diagnosis**

- •Hydrocele
- Undescended testis
- Femoral hernia
- Lipoma of the cord
- Inguinal lymph node enlargement
- Groin abscess

# INVESTIGATIONS

- Routine investigations
- Chest x-ray
- USG abdomen & pelvis
- CT Abdomen and pelvis in cases of complications.

## Treatment

- Treat the precipitating cause first
- Surgeries are the treatment of choice
- In children always HERNIOTOMY is done

In adults

HERNIOPLASTY HERNIORAPHY

## Herniorrhaphy

- Shouldice
- Mac Vay
- Modified Bassini

high recurrence rate as it is repair with tension

## Modified Bassini's Herniorrhaphy

It is strengthening of the posterior wall of the inguinal canal by approximation of the conjoint tendon to inguinal ligament using INTERUPPTED monofilament nonabsorbable suture material

- External oblique is closed and other layers are also closed
- Commonly used suture material is either polypropylene [prolene (blue in colour)] or polyethylene [ethylon (black in colour)].



## Shouldice Repair

- > multilayered repair
- After doing herniotomy ,transversalis fascia is incised from deep ring to pubic tubercle
- Lower flap of fascia is sutured to posterior
- part of the upper flap
- Upper flap is sutured to the inguinal ligament
- It is called DOUBLE BREASTING of
  - transversalis fascia

- Then conjoint tendon and inguinal ligament is further approximated by two layers of continuous sutures.
- External oblique aponeurosis is sutured in two layers (double-breasting) in front of the cord. Hence the original Shouldice repair is 6 layered procedure.
- First two layers of transversalis fascia,
- Next two layers of conjoint tendon and last two layers of external oblique apponeurosis.

# Complications of herniorrhaphy

- Haemorrhage
- Haematoma
- Infection—1-5%
- Haematocele
- Post-herniorrhaphy hydrocele, lymphocele
- Hyperaesthesia over the medial side of inguinal canal due to injury to ilioinguinal nerve neuralgia
- Recurrence
- Osteitis pubis
- Injury to urinary bladder/bowel
- Testicular atrophy, penile oedema rarely can occur

## Hernioplasty

- It is strengthening of posterior inguinal wall in case of indirect hernia or in any large hernia with weak abdominal wall using a supportive material.
- This allows and supports good fibroblast proliferation which in turn strengthens the weak posterior wall of inguinal canal or abdominal wall

- Hernioplasty is the present choice (ideal) for all inguinal and groin hernias.
- Mesh is placed either over conjoint tendon to inguinal ligament or in preperitoneal space
   Polypropylene mesh is used

### Material Used

- Synthetic: Prolene mesh (white in colour) Dacron mesh, Morlex mesh, Mersilene sheath
- Biological: Tensor fascia lata, temporal fascia (presently biological materials are not well accepted as infection is common and its efficacy is not proved

#### Indications

- Direct hernia.
- Recurrent hernia.
- Re-recurrent hernia.
- Incisional hernia.
- Old age.
- Hernia with weak abdominal muscle tone.
- Sliding hernia.

#### Complications

- Infection.
- Mesh extrusion.
- Foreign body reaction

# LICHENSTIEN METHOD

- Tension free, simple, flat polypropylene mesh repair
- After HERNIOTOMY

a piece of mesh is placed over posterior wall and split to wrap the spermatic cord at deep inguinal ring interrupted sutures are made between mesh, inguinal ligament and conjoint tendon





# Laproscopic & preperitoneal repairs

TAPP

- Trans abdominal Pre-peritoneal Patch
- TEPP
  - Totally Extraperitoneal Pre-peritoneal Patch
- Both place a Mesh patch over the hernial defect inside the abdominal muscle layer, outside the peritoneum.

#### TAPP (transabdominal prepeitoneal procedure):

peritoneal space entered by conventional lap at umbilicus and peritoneum overlaying inguinal floor is dissected away as flap.

#### TEP (Total extraperitoneal repair):

preperitoneal space is developed with a balloon inserted between posterior rectus sheath and peritoneum  $\rightarrow$  balloon inflated to dissect the peritoneal flaps away from posterior abdominal wall and the direct and indirect spaces, other ports inserted into this preperitoneal space without entering peritoneal cavity.



## Complications of hernia

• Irreducible hernia: Here contents cannot be returned to the abdomen due to narrow neck, adhesions, overcrowding Irreducibility predisposes to strangulation

 •<u>Obstructed hernia</u>: It is an irreducible hernia with obstruction, but blood supply to the bowel is not interfered
 ✓ It eventually leads to strangulation.
 Garrey's stricture: Constriction that occurs due to ischaemic narrowing of small bowel which has reduced

from an obstructed hernia

**Inflamed hernia**: It is due to inflammation of the contents of the sac e.g. appendicitis, salpingitis. Here hernia is tender but not tense; overlying skin is red and oedematous.

## STRANGULATED HERNIA

- It occurs when blood supply of the contents of hernia is seriously impaired leading to formation of gangrene
- Strangulation commonly occurs in the small bowel and also in large bowel
- Occasionally strangulated omentocele also can occur without any intestinal obstruction
- Strangulation can occur in inguinal, femoral,
- obturator, umbilical or any hernias.
- Indirect inguinal hernia is more prone for strangulation than direct inguinal hernia. It is due to

narrow neck, adhesions, narrow external ring in children

#### Obstruction

```
Abd wall
                                                                                    Peritoneum
Initially venous return is impaired
                                        Ring
                                                                                    Gangrenous
                                        blocking
Congestion of the bowel
                                                                                         bowel
                                        the content
                                                                                      Toxic fluid
                                        Inquinal canal
Further dilatation of the bowel which
                                        Inguinal ligament
becomes purple coloured
                                                                                   Sac of hernia
                                                                  Thigh
Fluid collects in the sac
Eventually arterial blood supply is impaired
Bowel becomes dark, brownish black
coloured with flabby and friable wall
Bacteria migrate transerosally and
multiply in fluid of the sac
Perforation occurs at the site of constriction ring
Peritonitis occurs
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## TREATMENT

- The patient is admitted.
- DINGT.
- Intravenous fluids to correct dehydration and electrolyte imbalance.
- Antibiotics.
- Catheterization to maintain adequate urine output.
- Emergency surgery (options vary according to the scenario and the viability of the bowel)

## OTHER TYPES OF HERNIA



## FEMORAL HERNIA

#### **Surgical Anatomy of Femoral Canal**

- It is the medial, most compartment of the femoral sheath, which extends from femoral ring above to saphenous opening below
- It contains fat, lymphatics, lymph node of Cloquet
- It is 1.25 cm long and 1.25 cm wide at the base.
- Below it is closed by cribriform fascia.

#### Femoral ring is bounded

- anteriorly by inguinal Ligament
- posteriorly by ilio pectineal ligament of Cooper, pubic bone and fascia covering the pectineus muscle;
- medially by concave, sharp lacunar Ligament
- laterally by a thin septum separating from femoral vein





## Clinical Features

- Common in females (2:1 ratio), common in multipara
- Rare before puberty. 20% occurs bilateral, however more common on right side
- •Presents as a swelling in the groin below and lateral
- to the pubic tubercle. (Inguinal hernia is above and
- medial to the pubic tubercle)
- •Swelling, impulse on coughing, reducibility, gurgling sound during reduction, dragging pain, are the usual features
- When obstruction and strangulation occurs which is more common, presents with features of intestinal obstruction—painful, tender, inflamed, irreducible swelling without any impulse

They also present with abdominal distension, vomiting and features of toxicity.

## Femoral hernia repair

- Lockwood low operation
- Mc'Evedy-High operation
- Lotheissen's operation



## McEvedy's high approach

- Vertical incision is made over the femoral canal and continued upwards above the inguinal ligament.
- This incision provides good access to the preperitoneal space and then to the peritoneum itself.
- Use finger dissection to sweep peritoneum from anterior abdominal wall, so the neck of the sac can be identified.
- Dissect the sac , reduce the contents and repair the defect by mesh or sutures.
- Conjoint muscle to cooper ligament.

## Lockwood's infra-inguinal approach

- The sac is dissected out below the inguinal ligament via groin crease incision.
- Then the sac is opened and the contents are inspected and reduced into the abdomen.
- Then the neck of the sac is pulled down , ligated and allowed to retract through femoral canal.
- Then close the femoral canal by mesh plug or non absorbable sutures.
- Approximation of inguinal ligament to cooper liga ment..

## PANTALOON HERNIA (DOUBLE HERNIA) SADDLE HERNIA, ROMBERG HERNIA

Here both direct and indirect inguinal sacs are present and clinically present as direct hernia.

 During surgery, indirect sac may be missed and so leads to recurrent hernia through indirect sac

## **Umbilical hernia**

- Develops due to absence of umbilical fascia or incomplete closure of umbilical defect
- It can be congenital or acquired
- Acquired through weak umbilical scar
- Congenital will be presented few months after birth which presents as a swelling in the umbilical region which increase during crying

### <u>TREATMENT</u>

#### Initially conservative INDICATIONS FOR SURGERY

Persists after 3 years of age >2 cm size acquired



# Spigelian hernia

It is a type of interparietal hernia(between external oblique and internal oblique)
Hernial sac lies either deep to the internal oblique external and internal oblique muscles

#### **Clinical Features**

 Presents as a soft, reducible mass lateral to the rectusmuscle and below the umbilicus impulse on Coughing Strangulation is common

#### Treatment

lengthy transverse incision herniotomy and closure of the defect layer by layer using Nonabsorbable interrupted sutures
mesh is required to cover the defect properly



## **Obturator hernia**

It is hernia occurring through obturator canal between superior ramus of pubis and obturator membrane

Presents with features of intestinal obstruction

Howship-Romberg sign

Referred pain in knee joint through geniculate branch of obturator nerve

#### Treatment

Laparotomy is done and the sac is identified dissected and ligated If strangulation is present resection and anastomosis is done
Mesh placement is the ideal way of repairing obturator defect



# Epigastric hernia(Fatty hernia of linea alba)

It occurs usually through a defect in the decussation of the fibres of linea alba, any where between xiphoid process and umbilicus.

- Extraperitoneal fat protrudes through the defect as fatty hernia of the linea alba presenting like a swelling in the upper midline with an impulse on coughing.
- It is sacless hernia

## **Clinical Features**

- Often symptomless
- Swelling in the epigastric region which is tender.
- Pain in epigastric region

## TREATMENT

- Through a vertical incision, sac is dissected
- Defectis closed with non-absorbable interrupted sutures
- Large defect is supported with preperitoneal mesh

## **RICHTER'S HERNIA**

It is a hernia in which the sac contains only a portion of the circumference of the intestine (small bowel). It Is usually seen in femoral and obturator hernia. **Clinical Features** 

 It mimics gastroenteritis with pain abdomen, diarrhoea, toxicity, vomiting, Gangrene (strangulation) of a part of bowel occurs, eventually leading to peritonitis

#### **Treatment**

Resection and anastomosis

