

Inguinal Hernia: An Overview

E.A Agbakwuru, A.O Adisa, A.R.K Adesunkanmi

Professor/Consultant General Surgeons
Department of Surgery, O.A.U.T.H.C Ile-Ife

ABSTRACT

A hernia is the protrusion of a viscus or a part of it through a defect in the walls of its containing cavity¹. A hernia may be internal when the protrusion is not seen on the body wall or external when the protrusion may be seen on the body wall. External hernias, including inguinal, femoral, epigastric, incisional, umbilical, paraumbilical, lumbar, spigelian, obturator and sciatic hernias are commoner than internal hernias^{1,2}.

Inguinal hernias, i.e. hernia occurring through the inguinal canals, are the commonest type of all hernias^{1,2,3}. It may account for 75-90% of all external hernias. All over the world, surgeries for inguinal hernias remain one of the most common elective operations performed by general surgeons^{4,5,6}. In developing countries such as Nigeria, many patients present first with complications of inguinal hernias^{7,8}. Inguinal hernias are commoner in males and may occur in all age groups.^{3-6,9}

Surgical Anatomy

The inguinal canal is an oblique intermuscular slit lying above the medial half of the inguinal ligament. It is not well formed in children but is about 4cm long in adults^{10,11}. The canal transmits the ilioinguinal nerve and the genital branch of the genitofemoral nerve in both sexes along with the spermatic cord in males and the round ligament of the uterus in females. It begins at the internal (deep) ring and ends in the external (superficial) ring. The internal ring is a V-shaped opening in the transversalis fascia and lies about 1.25cm above the midpoint of the inguinal ligament. An indirect hernia passes through this ring to enter the canal and large hernia sacs may hence dilate this narrow opening. The external ring is a triangular aperture in the external oblique aponeurosis. It is situated above and medial to the pubic tubercle and through it an inguinal hernia, commonly the indirect type, may descend into the scrotum.

The anterior wall of the canal is formed by the external oblique aponeurosis, reinforced laterally by the internal oblique muscles^{10,11}. The posterior wall is formed by the strong conjoint tendon medially and the weak transversalis fascia throughout. This is why increased intra-abdominal pressure may lead to a defect in the posterior wall through which a direct hernia enters the canal. Such herniations commonly occur through the Hasselbach's triangle which is bounded laterally by the inferior epigastric vessels, medially by the lateral border of the rectus sheath and inferiorly by the inguinal ligament¹⁰. The roof of the canal is formed by the arching fibers of the internal oblique and transversus abdominis muscle while the floor of the canal is formed by the inguinal ligament (Poupart's ligament).

A hernia sac is a diverticulum of peritoneum. It consists of a mouth, neck, body and fundus. The neck, when narrow can predispose to strangulation of the contents of the sac which may be omentum (omentalocele), intestine (enterocele), or Merkel's diverticulum (Littre's hernia)^{11,12}. When only a portion of the circumference of the intestine is included, the hernia is called Richter's hernia, and when part of a bowel (e.g bladder wall) forms part of the hernia sac, it is called a sliding hernia^{1,2,13}.

AETIOLOGY

The testes descend from the posterior abdominal wall into the scrotum through the inguinal canal with a pouch of the peritoneum, the processus vaginalis, attached to it. The portion of the processus vaginalis above the external ring usually obliterates at or soon after birth. Failure of its obliterations may lead to an indirect hernia in infancy, childhood or later in adult life. Congenital anomalies, prematurity, low birth weight, pelvic floor deformities, bladder atrophy and cystic fibrosis are all associated with increased incidence of inguinal hernia in childhood^{9,16-16}.

Weakness of the wall of the inguinal canal may be acquired with ageing or following nerve injury (e.g after a gridiron incision). Obesity causes stretching of the abdominal musculature just as fat accumulation may separate muscle fibers, weaken aponeurosis and thereby favours appearance of direct hernias¹³.

Raised intra-abdominal pressure from chronic cough, bladder outlet obstruction, chronic constipation, weight lifting, heavy manual work, intra-abdominal masses, ascites or frequent pregnancies may lead to the formation of inguinal hernias.

CLASSIFICATION

Inguinal hernias are classified in different ways.

- (a) Based on the site of entry of the sac into the canal
 - Indirect- the sac enters the canal through the internal ring
 - Direct- the sac herniates through the posterior wall
 - Pantaloon hernia contains both direct and indirect hernias in the same canal
- (b) Based on the completeness of descent through the canal
 - Bubonocele- a sac limited to the canal
 - Funicular- one that is out of the canal with the fundus just above the pubic tubercle.
 - Complete (inguinoscrotal) hernia- the sac has descended into the scrotum.
- (c) Based on the state of the contents of the hernia sac.
 - Reducible hernia- content returns to the abdominal cavity spontaneously or with manipulation.
 - Irreducible hernia- content cannot be returned to the abdominal cavity. It is commoner with omentoceles and may be due to adhesions between the sac and its contents or between the contents alone, overcrowding of the contents, inflammatory swelling or impaction of luminal contents may limit reducibility. This condition is sometimes referred to as an "*incarceration*" of the contents.
 - Obstructed hernia- in enteroceles, when there is obstruction to the flow of luminal contents with no impairment of blood supply to the bowel.
 - Strangulated hernia- this occurs when the blood supply to the bowel/viscus is impaired. Gangrene and bowel perforation may follow. A Richter's hernia may hence strangulate without features of luminal obstruction to the flow of luminal contents with no impairment of blood supply to the bowel.

- (d) Nyhus classification^{13,17} –based on the state of the internal ring and the posterior wall.
 - Indirect inguinal hernia – internal ring normal (e.g. paediatric hernia)
 - Indirect inguinal hernia – internal ring dilated but posterior inguinal wall intact; inferior epigastric vessels not displaced.
 - Posterior wall defect e.g. direct inguinal hernia, femoral hernia or indirect hernia with widely dilated internal ring such as large inguinoscrotal hernias.
 - Recurrent hernias.

CLINICAL FEATURES

The clinical presentation of patients with inguinal hernia may vary. A swelling in the groin which appears on straining or coughing and may or may not disappear on lying down is common. History of occasional discomfort or dragging sensation over the swelling may be given. In obstruction, colicky abdominal pain, vomiting, and constipation may occur. The pain usually becomes more severe, generalized and continuous when the content strangulates. On examination, the site of the swelling is noted. A palpable or visible cough impulse confirms the swelling as a hernia. The neck of an inguinal hernia sac lies above the pubic tubercle as different from a femoral hernia which is below the tubercle. To distinguish a direct from and indirect inguinal hernia, a finger is used to occlude the internal ring and the patient asked to cough. Nonappearance of the swelling is observed in indirect hernias while direct hernias still protrude on coughing despite the occlusion. Completeness of the hernia is also noted. Examination for possible underlying factors e.g. abdominal masses, urethral stricture, enlarged prostate and hyper inflated lung in obstructive airway diseases are important.

Differential Diagnoses

In males – femoral hernia, vaginal hydrocele, imperfectly descended testes, encysted hydrocele of the cord, Malgaignes bulges, epididymal cyst, inguinal lymphadenopathy and lipoma should be considered. In females, femoral hernia, cysts or hydrocele of the canal of Nuck, inguinal lymphadenopathy or lipoma may be considered.

Investigations

The estimation of the packed cell volume and a urinalysis are the routine investigations in all patients. In older men, urinary flow rate, residual urine and abdominopelvic ultrasound may be necessary. A

chest X-ray in any patient with chronic cough is important. Other investigations will depend on associated co-morbidities.

Herniography, the use of intraperitoneal contrast to outline a hernia radiologically, is not routinely done for patients as other investigations such as groin ultrasound in supine and erect position can correctly identify even subclinical hernia.

TREATMENT

The treatment of inguinal hernia is surgical repair. Elective surgery should be done soon after the diagnosis is made to minimize the risk of adverse outcome^{19,20}. Wearing a truss, once popularly used, does not cure a hernia and except in instances of associated co-morbidities, all patients with inguinal hernia should have a herniorrhaphy as soon as any underlying factors are corrected. Operation under local anaesthesia in a day surgery setting has been widely adopted in developing countries²¹⁻²³. Inguinal herniorrhaphy can be done via an open repair or by laparoscopic methods.

Methods of open herniorrhaphy include²⁴⁻²⁷:

- Bassini repair – done by suturing the conjoint tendon to the inguinal ligament. It has many modifications and is suitable for indirect inguinal hernias and small direct hernias. It is still commonly practiced in tropical countries.
- Shouldice repair – in this repair, the posterior wall is reinforced in a multilayer fashion with continuous non-absorbable sutures. Recurrence rates of less than 1% have been reported for this procedure.
- Mc Vay repair – the conjoint tendon is sutured to the Cooper ligament over the pubic tubercle medially and the inguinal ligament laterally. It may be employed in direct hernias and recurrent hernias.
- Lichtenstein (Mesh) repair: this was popularized with the assertion “*total absence of tension on the suture line is the sine-qua-non for the hernia repair*”. It involves the use of a synthetic mesh patch sutured over the posterior wall of the canal and split laterally to allow passage of the spermatic cord in males. There are various modifications.
- Open Peritoneal repair: this is done by gaining access to the internal ring through the anterior abdominal wall musculature. The peritoneum entering the inguinal canal is identified, ligated and the defect closed with a mesh.

Laparoscopic repairs:

- Transabdominal preperitoneal repair (TAPP) – with intraperitoneal trocars, a peritoneal flap over the posterior inguinal areas is created and access gained to the inguinal canal. Repair is one with a prosthetic mesh secured to the posterior inguinal wall.
- Totally extraperitoneal approach (TEPA) in which access is gained to the inguinal canal by creating an optical cavity in the preperitoneal space in the anterior abdominal wall with a balloon dissector. Repair is equally done with a prosthetic mesh.

Various modifications to the laparoscopic techniques have also been developed.

Many studies identified the benefits of laparoscopic herniorrhaphy over the open surgeries²⁸⁻³¹. However in developing countries the high cost and necessity for advanced laparoscopic skills make laparoscopic repair less common than the open methods³².

CONCLUSION

Inguinal hernias will continue to attract the attention of general surgeons all over the world. In developing countries, widespread use of newer methods such as open mesh repair and laparoscopic techniques is still an emerging trend.

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