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EC MICROBIOLOGY
Review Article

Abdominal Wall Hernia in Adults

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Received: December 18, 2019; **Published:** December 27, 2019

Abstract

Introduction: Hernias are a protrusion, bulge, or projection of an organ or part of an organ through the body wall that normally contains it. Approximately 5 million Americans have a type of abdominal wall hernia, groin hernias are the most commonly encountered. In the United States (US), care of abdominal wall hernia cause significant expenditure that was estimated to be 2.5 - 3 billion dollars annually.

Aim of Work: In this review we will shed the light on the anatomy, classification, clinical presentation, and treatment options for most abdominal wall hernias. Discussions for specific types of hernia should be discussed separately.

Methodology: A comprehensive and systematic search was conducted regarding abdominal wall hernias in adults, epidemiology, clinical picture and managements. PubMed search engine and Google Scholar search were the mainly used database for search process. All relevant available and accessible articles of all types were reviewed and included.

Conclusion: The most commonly used method of classification of abdominal hernia is according to their location. Ventral hernias refers to anteriorly located hernia; groin hernia are located at the groin; pelvic hernias protrude usually through pelvic foramina; flank hernias protrude through weakened areas of back musculature. Abdominal wall hernias can also be classified by etiology as Congenital or Acquired hernia.

The presentation differs by hernia location, size, and the presence of complication. Patient with small hernias may be asymptomatic. Abdominal wall hernia can also present with acute complications due to incarceration of hernia contents. Most ventral and groin hernias could be easily diagnosed clinically in thin and non-obese patients. However, very small hernias, hernias in obese patients, and certain types of hernias as pelvic or lumbar hernias usually require imaging modalities.

Keywords: *Short Stature; Children and Adolescents; Management of Short Stature*

Introduction

Hernias are a protrusion, bulge, or projection of an organ or part of an organ through the body wall that normally contains it. They are among the oldest-known condition affecting the humankind. Approximately 5 million Americans have a type of abdominal wall hernia, groin hernias are the most commonly encountered. By one estimate, ventral hernia repairs comprise about one-third of all hernia repairs in the US, and of all the ventral hernias that are repaired, about one-third are incisional, and two-thirds are primary ventral hernias [1]. In the US, care of abdominal wall hernia cause significant expenditure that was estimated to be 2.5 - 3 billion dollars annually [2].

Abdominal wall hernias are usually classified according to their location or etiology. The condition is often evaluated by general surgeon. Management of hernia varies according to the site, size, patient preferences and facility resources.

In this review we will shed the light on the anatomy, classification, clinical presentation, and treatment options for most abdominal wall hernias. Discussions for specific types of hernia should be discussed separately.

Methodology

A comprehensive and systematic search was conducted regarding abdominal wall hernias in adults, epidemiology, classification and types, clinical picture, and managements. PubMed search engine and Google Scholar search were the mainly used database for search process. All relevant available and accessible articles of all types were reviewed and included. We did not analyze studied regarding hernia repair in children. In depth detail for specific type of hernia was not conducted as well. Instead, a general overview was performed to encapsulate most types in brief. The term used in search were abdominal wall hernia, adults, presentation, and classification operation, observation.

Anatomy of the abdominal wall

The abdominal wall is consist of fusion of several layers of skin, muscles, and connective tissues. Abdominal wall contains and protects the intra-abdominal organs while facilitating movement and breathing [2]. The muscles of abdominal wall form a roughly cylindrical cavity that is bound by the xiphoid process and costal margins from above, and the pubic symphysis and iliac crests from below. The rectus abdominis muscles fuse centrally at the midline to form the linea alba; laterally, they connect with a triple layer of flat muscles of external oblique, internal oblique, and transversus abdominis [3]. Both rectus muscles are enveloped by rectus sheath comprised of ipsilateral fibers from the aponeurosis of the lateral flat muscles, the composition of which changes with location.

The muscles of the abdominal wall are supplied by intercostal, lumbar, deep circumflex branch of the iliac arteries. Innervation of abdominal wall muscles comes by intercostal and lumbar nerves entering the abdominal wall between the transversus abdominis and internal oblique muscles.

Classification

To facilitate direct comparison, The European Hernia Society has attempted to develop a classification systems for ventral hernias [4] and groin hernias [5] based on the location and size of the defect. The most commonly used method of classification of abdominal hernia is according to their location. Ventral hernias refers to anteriorly located hernia and include primary ventral hernias (epigastric, umbilical, Spigelian), parastatal hernias, and most incisional hernias (ventral incisional hernias. Whereas groin hernia are located at the groin; the region at the lower margin of the abdomen where the thigh meets the hip. These hernia are furtherly sub-classified into inguinal and femoral hernias. Pelvic hernias protrude usually through pelvic foramina (sciatic and obturator hernia) or the pelvic floor as perineal hernias. Flank hernias protrude through weakened areas of back musculature and include the superior and inferior lumbar triangle hernias.

Abdominal wall hernias can also be classified by etiology as Congenital and Acquired hernia. In the former, the defect in the abdominal wall is present from birth. The most common congenital abdominal wall defects are omphalocele and gastroschisis. On the other hand, acquired hernia usually occur through defect caused by weakening or disruption of the fibromuscular tissues of the abdominal wall. Hernias that develop without a prior surgical incision are called primary hernias; those that develop after a surgical incision are named incisional hernias.

Clinical features

Patients with hernia varies in clinical presentation. The presentation differs by hernia location, size, and the presence of complication. Patient with small hernias may be asymptomatic; some degrees of pain and discomfort may occur as the hernia contents protrude through the defect. Generally, the patient will complain of a bulge (swelling) somewhere in the abdominal wall. Patient may report that the swelling is increasing in size with coughing or straining with associated pain or discomfort. Larger hernias can exert excessive pressure to the overlying skin leading to areas of erythema, ischemia, or ulceration. Patient's history may identify associated risk factors with hernia formation. Risk factors differ from one type of hernia to another. Chronic cough that increase the intra-abdominal pressure is incriminated in many types of abdominal wall hernia.

Abdominal wall hernia can also present with acute complications due to incarceration of intestinal contents in the defect. Certain types of hernia as femoral, obturator, and sciatic hernias are often unrecognized until they present with as bowel obstruction due to incarceration.

If the hernia is suspected, the patient's abdominal was should be carefully examined while the patient is standing and lying down. On examination of thin patients, surgeon could easily identify the hernia; the edges of the fascial defect can often be palpated. Examining the patient in supine position may allow determining the size of the abdominal wall defect; this is due to reduction in the hernia content. The entire abdominal wall, particularly along the length of any incisions, should be palpated carefully to identify other coexistent hernia sites.

Diagnosis

Most ventral and groin hernias could be easily diagnosed clinically in thin and non-obese patients. However, very small hernias, hernias in obese patients, and certain types of hernias as pelvic or lumbar hernias usually require diagnostic modalities; imaging studies are diagnostic. Abdominopelvic computed tomography (CT) is considered the best imaging modality to establish the diagnosis and identify the abdominal contents contained within the hernia [6].

Hernia should be differentiated from other abnormalities of the abdominal wall that mimic hernia [7]. Rectus abdominis diastasis (RAD) is a condition of the abdominal wall where a wide distance separates the two rectus muscles. When a patients with RAD raises their head while supine (as they begin to sit up), the increase in intra-abdominal pressure can result in a diffuse fusiform bulge between the rectus muscles. RAD has no fascial defect and, therefore, should not be considered as a hernia. Patients with RAD are typically middle-aged and older men with central obesity, or small and fit women with a history of large fetus or twins pregnancy. Rectus sheath hematoma (RSH) is another rarely encountered condition that may mimic hernia. In this condition, an accumulation of blood within the rectus sheath occurs usually due to trauma, muscular strain, or in the setting of anticoagulation. RSH most often presents acutely with abdominal pain and a palpable abdominal mass. Due to the pattern of arterial blood supply to the rectus muscles, most RSH occurs in the lower abdomen. RSH can be distinguished from ventral hernia by CT imaging, and by the lack of a palpable fascial defect.

Lipomas are mostly benign swelling that could be found anywhere in the body. They may develop within the soft tissue or muscles of the abdominal wall. Superficial or subcutaneous lipomas can be easily palpated clinically; the swelling is usually soft, painless, with variable size and shape (round, oval, or multilobulated). They typically occur at off-midline locations. Deep subcutaneous or intramuscular lipomas may be difficult to distinguish from abdominal wall hernia or other abdominal wall lesions without imaging studies. Other condi-

tions that mimic hernia include neurofibromas, desmoid tumors, and the residual of any previous surgery as well any intra-abdominal pathology that could cause abdominal pain and discomfort. Most non-hernia pathologies are accompanied by additional symptoms and signs.

Specific types of hernia: consideration and management

Primary ventral hernias include three types. The first two types are common (umbilical and epigastric hernia) while the third type (Spigelian hernias) is rare. It is estimated that in the United State alone, there is more than 350 thousand ventral hernias repairs annually; three-quarter of these are umbilical or epigastric hernias [8]. Recently, a meta-analysis has suggested that mesh hernia repair was associated with a small reduction in recurrence rates compared with suture repairs, but also an increased risk of seroma and surgical site infection [8]. Experts repeatedly recommend mesh repair of ventral hernia when the defect size is larger than 1 cm. Epigastric hernias are midline hernia where the defect is between the umbilicus and the xiphoid process. They represent less than 4 percent of all abdominal wall hernia and about 0.5 - 5 percent of all operated hernia [9]. The pathogenesis of epigastric hernia has been suggested to be related to congenital weakness in linea alba from a lack of decussating fibers, forceful diaphragmatic contraction, and perforation of the linea alba by vascular lacunae [10]. Risk factors include obesity, male gender (2 - 3 fold compared to women), old age, smoking, chronic steroid use, conditions such as diabetes and chronic lung disease with cough [10]. Epigastric hernia can be asymptomatic. Most complain is small lump in the midline between the umbilicus and the xiphoid. The defects are often 1 cm in diameter or less [9]. Up to 20 percent of epigastric hernias are multiple.

Surgical repair of epigastric hernia is reserved for symptomatic patients prefer the operation. It is an easy operation that could be performed as a day surgery under local anesthesia. For open repair, a small vertical (at midline) or transverse incision is made overlying the hernia. The hernia contents are either reduced or resected, and the defect is closed with interrupted sutures or mesh [3]. Mesh reinforcement is recommended for epigastric and all other ventral hernia- hernia larger than 1 cm. Recurrence after epigastric hernia repair is rare.

Umbilical hernia (or periumbilical hernia) is a ventral hernia located at or near the umbilicus. It is directly associated with increased intra-abdominal pressure brought on by obesity, chronic cough, ascites, or pregnancy. Anatomically speaking, certain configurations of the umbilical ring may also predispose to umbilical hernia formation [11]. Umbilical hernias are common, approximately 20 - 50 percent of physical or ultrasound exam will reveal the presence of umbilical hernia [12]. In contrast to epigastric hernia, umbilical hernias are more common in females than in males with a 3:1 ratio. In men, umbilical hernias most often present with complication; normally weighted female usually have an easily reducible mass. The diagnosis could be established clinically in most cases by palpation of a soft mass either at, slightly above, slightly below, or to one side or another of the umbilicus. Tenderness can be elicited with pressure but is often absent without provocation. If the patient is asymptomatic, not complaining, or unaware of the presence of umbilical hernias, no repair is required. In symptomatic patient or patient's preferences, umbilical hernia could be repaired by open or laparoscopic surgery. For open repair, Incision is made overlying the hernia or adjacent to it to identify and dissected the hernia sac. Once the fascia has been cleared, the hernia sac can either be inverted or excised and the fascia subsequently closed with a non-absorbable suture. Mesh should be used for large defect that is difficult to close by tension-free suture. The mesh can be placed deep to or over the fascia. A variety of meshes have been designed especially for umbilical hernia [13]. Recurrence rates was estimated to range between 0 - 3 percent after a mesh repair compared with up to 14 percent after a sutured repair [13,14]. Laparoscopic repair of small, readily identifiable primary ventral hernias in thin patients is not necessary and could be more invasive than the simple one-day open repair. However, laparoscopic repair could be advantageous for hernia defect larger than 4 cm, suspicion of multiple defects, and in obese patient [3]. Laparoscopic repair could be advised in case of complication for the ability to assess the viability of the loop of intestine.

The vast majority of pregnant women have umbilical hernias. This is mostly asymptomatic and only observation is needed until the postpartum period. Symptomatic patients and those with an incarcerated hernia require individualized treatment.

Groin hernias include inguinal and femoral hernias. These are the most common type of abdominal wall hernias. Inguinal hernia is more common than femoral hernia, however, femoral hernias are more prone to present with complications [15]. It is estimated that more than 20 million surgical repairs occur annually worldwide for groin hernia [16] of these, about 700,000 operation in the United States alone [17]. An inguinal or femoral hernia repair is performed urgently in patients who develop complications such as acute incarceration or strangulation. For uncomplicated case, could be managed by observation of by early repair. Open and laparoscopic repairs could be acceptable option for groin hernia.

Pelvic hernias include obturator, perineal, and sciatic hernias. These are rare and difficult to diagnose abdominal wall hernias due to their deep nature that is usually not accessible by physical examination. Pelvic hernia. Abdominopelvic CT should be performed in patients who have suggestive symptoms. Symptomatic patient require surgical intervention and repair. Obturator hernias are the protrusion of the abdominal contents through the obturator foramen. The defect of obturator hernia is located at obturator foramen on the anterolateral aspect of the pelvic wall. The foramen is oval in shape and formed by the rami of the ischium and pubis. It is mostly covered by a fibro-osseous membrane except for a small anterosuperior opening for the obturator nerve, artery, and vein. Weakness of the obturator membrane may result in enlargement of the obturator opening with a defect that is usually anterior and medial to the obturator neurovascular bundle [18]. Obturator hernia usually occurs in the setting of excessive weight loss for any reason (BMI less than 19 kg/m^2) [19]. This could be explained by the loss of preperitoneal fat that normally form a cushion in obturator canal preventing herniation. Other risk factors include distorted pelvic stance caused by hip or spinal arthritis, mal-united femoral neck fracture, and spinal. This type is very rare constituting less than 1 percent of all abdominal wall hernia. It occurs predominantly in thin, elderly female patients between the ages of 70 and 90 and is more prevalent in Asian countries than Western ones. Right-sided obturator hernias are twice as common as left-sided ones as the left obturator foramen may be covered by the sigmoid colon [20].

The patient may present clinically with patients with groin pain radiating to the knee (groin neuralgia) due to compression of the obturator nerve. Obturator neuralgia is classically diagnosed by Howship-Romberg sign, Hannington-Kiff sign, or both [20]. Howship-Romberg sign is characterized by pain, hyper/hypoesthesia, or cramps extending from the inguinal crease to the anteromedial aspect of the thigh down to the knee. The pain increases with coughing, extension, adduction, and medial rotation of the thigh and relieved by flexion. It is believed to be caused by compression of the cutaneous branch of the obturator nerve by a hernia in the obturator canal. Hannington-Kiff sign is characterized by the loss of the thigh adductor reflex in the presence of a positive patellar reflex. It is caused by obturator nerve compression leading to adductor muscle weakness. Obturator hernia can also present as a palpable proximal thigh mass between pectineus and adductor longus muscles, or ecchymosis of the thigh if it is associated with complication. Obturator hernias could be easily confused with femoral hernias. Imaging studies as CT, ultrasound, or magnetic resonance imaging (MRI) can be used to establish or confirm the diagnosis.

The treatment of obturator hernia is surgical repair for all cases. Urgent repair is crucial in obturator hernia presented with complication to prevent small bowel gangrene. Non-strangulated obturator hernias should also be repaired to prevent future complications. The repair could be achieved through transperitoneal open or laparoscopic operation, through obturator, or inguinal approaches. The best approach is not know because the condition is too rare to be extensively studied. Expert opinion based on clinical experience prefer the transperitoneal method for complicated cases. For patients without a bowel obstruction, some favor a posterior preperitoneal approach, which provides direct access to the hernia while avoiding intra-abdominal adhesions. Reduction of the hernia may require incision of the obturator membrane. The incision should be performed at the lower margin of the canal downward and medially to avoid the injury of obturator neuro-vasculature. The nerve and the blood vessels are located lateral t the hernia in 50 percent of patients; medially, anterior, or posterior in the rest [19]. If the hernia orifice is smaller than 1 cm in diameter, suture repair with non-absorbable material should be attempted. For a larger defect, reinforcement with prosthetic materials or an omental patch should be used [20]. Surgeon should examine the other obturator canal and reinforce it to prevent future hernia on the other side. Surgical repair of obturator hernia is associated with

high rate of morbidity (38 percent) and mortality (12 - 70 percent) [20]. Obturator hernias have a recurrence rate of 10 percent after simple suture repair.

Conclusion

Hernias are a protrusion, bulge, or projection of an organ or part of an organ through the body wall that normally contains it. Approximately 5 million Americans have a type of abdominal wall hernia, groin hernias are the most commonly encountered. The most commonly used method of classification of abdominal hernia is according to their location. Ventral hernias refers to anteriorly located hernia; groin hernia are located at the groin; pelvic hernias protrude usually through pelvic foramina; flank hernias protrude through weakened areas of back musculature. Abdominal wall hernias can also be classified by etiology as Congenital or Acquired hernia.

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Volume 16 Issue 1 January 2020