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Review Article

Clinical and radiological features of incarcerated hernia

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ABSTRACT

Many complications were reported secondary to herniation, including strangulation and incarceration, leading to intestinal obstruction and related clinical manifestations. Treating such cases is largely dependent on appropriately diagnosing and evaluating them to enhance the prognosis and prevent a recurrence. In the present literature review, we have discussed incarcerated hernias' clinical and radiological features. Physical examination is very important in establishing the diagnosis of these events and obtaining a thorough history from the patient. Most patients present with abdominal pain, tenderness, and erythematous changes. Signs of intestinal obstruction might also be reported when this complication develops. Signs include acute abdominal pain, nausea, and vomiting. Radiological findings might show the presence of air to fluid appearance. Clinicians should be aware of these clinical manifestations and perform an adequate physical examination to establish a proper diagnosis and manage these cases. The process of decision-making is important before deciding the most appropriate management approach. Therefore, it is important to assess patients before moving to the next steps.

Keywords: Herniation, Hernia, Inguinal hernia, Femoral hernia, Incarceration, Strangulation, Clinical manifestations, Radiography

INTRODUCTION

Various types of hernias have been reported in the literature, and the epidemiology of each type differs based on different factors of the affected patients. Most patients are usually asymptomatic. However, some patients might present secondary to a bulge in the abdominal wall concerning the type and location of the herniation.[1] Besides, some patients might present to the emergency department on top of acute complications to a pre-existing herniation. Many complications were reported, including strangulation and incarceration, leading to intestinal obstruction and related clinical manifestations. Treating such cases is largely dependent on appropriately diagnosing and evaluating them to enhance the prognosis and prevent a recurrence.[2]

Incarcerated hernias might represent a medical emergency secondary to the associated complications. The physical examination is usually the most specific diagnostic approach to these cases. Therefore, clinicians should be aware of the clinical manifestations of these cases to differentiate them from other similar conditions. Radiological studies might also help diagnose certain conditions and should be considered by clinicians in these settings.[3] Hernia management can be challenging, and some clinicians might find it difficult to decide the most appropriate management modality. Accordingly, we conducted this review to discuss the clinical and radiological features of incarcerated hernia based on findings from relevant studies in the literature.

METHODS

This literature review is based on an extensive literature search in Medline, Cochrane, and EMBASE databases which was performed on 27 December 2021 using the medical subject headings (MeSH) or a combination of all possible related terms, according to the database. To avoid missing potential studies, a further manual search for papers was done through Google Scholar while the reference lists of the initially included papers. Papers discussing clinical and radiological features of incarcerated hernia were screened for useful information. No limitations were posed on date, language, age of participants, or publication type.

DISCUSSION

Physical examination and history taking, in addition to radiographic findings, are the most important diagnostic approaches for patients suffering from incarcerated herniations. Special attention should also be offered to the history of a previous surgical procedure, the presence of comorbid disorders, and the severity and duration of symptoms. Identifying potentially modifiable risk factors, enhancing the prognosis, and reducing the risk of recurrence are all potential benefits from obtaining a thorough physical examination and history from the patient.[4] Evidence also shows that identifying and reducing the modifiable risk factors is of great importance for patients presenting with incarcerated herniations. In addition, the presence of gastrointestinal symptoms, the severity of pain, duration, location, and the interval between the time when hernia was noted and when it became irreducible are all important factors that should also be assessed during history taking from the presenting patients to evaluate strangulation and incarceration adequately.

Based on the physical examination of presenting patients, incarceration can be diagnosed. Accordingly, the attending clinician should specify all of the clinical presentations of these patients that might be suggestive of incarceration. Many pertinent findings were reported for incarcerated hernias, which are usually persistent during the supine and erect positions. These include a non-reducible mass or a palpable bulge within the scrotum, inguinal region, abdominal wall, and medial thigh in relation to the inguinal ligament. It has been furtherly shown that these symptoms are significantly dependant on the amounts of contents within the incarcerated sac and the location of the herniation defect. Localized pain and tenderness are also frequently encountered among patients presenting with acute cases of strangulation and incarceration.[5-8] Pain disproportionate to the physical examination might also be a specific manifestation for patients presenting with incarcerated hernias. Other manifestations might also include hyperesthesia and cutaneous erythematous changes over the skin of the area of herniation and wound drainage, indicating the prompt need to perform urgent investigations. Other laboratories and clinical manifestations were also reported in the literature. These include evidence of systemic inflammatory response syndrome, lactic acidosis, leukocytosis, alkalosis, and dehydration. These are the general manifestations for most patients presenting with incarceration. The present section will discuss the clinical and radiological findings based on herniation types and location.

Radiographic evaluation is important in these situations because it can help physicians assess the defect's shape, size, and location. Moreover, it can also assess the viability and type of contents within the incarcerated sac. Different imaging approaches were reported in the literature to perform these purposes. These include herniograms, MRI, plain X-ray, and abdominal ultrasonography. However, it should be noted that conducting computed tomography is the most common approach for evaluating and detecting incarcerated hernias. In this context, it has been previously suggested that these modalities should be routinely conducted before making a final diagnosis and deciding the definite management approach.[9]

Evidence shows that incarcerated hernias can develop secondary to various types of hernias, and the most common one is an inguinal hernia, especially among children. Evidence shows that the risk of developing incarcerated hernias from indirect inguinal hernia might be up to 16%.[10-12] Further estimates show that the risk is even higher in premature infants and can be up to 31% early during their first years in life. Male patients are at increased risk of developing this type of hernia more than female patients. On the other hand, a bilateral inguinal hernia is more common among females. It has been further demonstrated that incarceration risk is similar between both genders.[13,14] The clinical presentation for patients with indirect inguinal hernias is variable, and most patients are usually asymptomatic and are detected during a routine evaluation. A physician can detect the lesion as an intermittent bulging through the labia, scrotum, and groin, and is usually exacerbated with straining. If incarceration occurs, patients will suffer from a nonfluctuant, irreducible bulge that can furtherly be erythematous and tender. There might also be other associated manifestations suggestive of intestinal obstruction. These include abdominal distension, reduced bowel functions, and nausea and vomiting.

Evidence shows that affected children might be inconsolable during the presentation and initial evaluation. Other complications might also be reported secondary to the development of strangulation. These include hemodynamic instability, bloody stool, and peritonitis. Conducting a differential diagnosis is also critical because many conditions might mimic an incarcerated indirect inguinal hernia. These include hydrocele, lymphadenopathy, and retractile testis. Physical examination is usually the diagnostic approach in these settings.[15-17] However, it has been shown that conducting ultrasonography might be helpful in these events.[18] For instance, it has been shown that if the physician's finger can directly feel the upper edge of the bulge within the scrotum, the case should be considered a case of hydrocele. This is because indirect inguinal hernias usually have a loop of the bowel that extends through the inguinal canal. Moreover, it should also be noted that tenderness is not usually associated with hydrocele. Radiographic findings might also be indicative of incarcerated hernia that is associated with intestinal obstruction. For example, abdominal radiographs might indicate the presence of air/fluid levels and dilated bowel loops (Figure 1).

Figure 1: Upright abdominal X-ray showing a gas shadow and air/fluid levels, indicating intestinal obstruction.[19]

Testicular infarction might be a potential complication in neglected cases. It usually develops secondary to the effect of the incarcerated bowel segment over the gonadal vessels, which compresses them against the internal ring. In another context, a previous study also reported that female patients with inguinal hernia sacs are at increased risk of developing uterine adnexa, with an estimated prevalence of 15-31% in these patients.[20] In this context, it has been estimated that 4-15% of patients will suffer from incarceration. Moreover, among patients with incarcerated ovaries, 2-33% of them will suffer from strangulation.[14,20-22] In this context, it has been reported that some patients might suffer from ovarian infarction and associated complications. However, ovarian torsion is usually the primary etiology for developing ovarian infarction.[22-24] The angle between the ovarian ligament and the suspensory ligament of the ovaries is usually narrowed, leading to the development of a bell-clapper-like deformity. Evidence shows that this is the main reason for ovarian torsion, which results from reduced ovarian support by the weakened ligaments.[22] In this context, some previous studies reported that such cases should be considered a medical emergency that needs emergent or urgent surgical interventions to treat or intervene against the development of ovarian torsion. There is also an increased risk of developing incarcerated hernia among the female population that involves the urinary bladder, fallopian tubes, ovaries, and uterus.[25]

Previous studies also demonstrated that incarceration might be observed on top of a pre-existing umbilical hernia. However, it should be noted that the incarceration rate with this type of hernia is very low. Even among children with a high rate of umbilical hernia, estimates show that the incarceration rate ranges between 0.07% and 0.3% only.[26-31] On the other hand, previous studies reported that certain populations might have a higher incidence of incarceration, which might be up to 40%.[32-34] In addition, patients with incarcerated umbilical hernias usually present with symptoms suggestive of intestinal obstruction, including nausea and vomiting, and abdominal pain. Physical examination might also indicate the presence of abdominal tenderness, abdominal distension, and umbilical hernia. Various skin changes were also reported as associated manifestations. These include erythematous changes around the umbilicus.[29,35-38] These symptoms, together with incarceration, are the usually reported symptoms among patients with acute umbilical hernias. On the other hand, it has been shown that many patients might suffer from umbilical hernia-related symptomatic incarceration that is usually spontaneously reduced.[32] In these settings, conducting radiographs might also be diagnostic in detecting signs of abdominal obstruction, as previously discussed.[35,39]

Incarceration was also described with other types of hernias. For instance, it has been shown that incarceration might occur with lumbar hernias. However, the incidence of these hernias is rare, and the incarceration rate is even rarer.[40,41] Direct inguinal hernia occurs secondary to herniating through the Hesselbach triangle. It has been shown that incarceration is also a rare presentation in the affected population.[42] However, the clinical and radiological manifestations are usually similar to those occurring with indirect inguinal hernia. Torsion of the greater omentum was reported secondary to a recurrent inguinal hernia, which was also associated with intestinal obstruction (Figure 2).[43]

Epigastric hernias were also reported in the literature, mostly as solitary lesions within the midline above the level of the umbilicus. However, it has been furtherly reported that these lesions can also be multiple. The rate of incarceration is very rare with these types of hernias. This has been attributed to the presence of the falciform ligament, which covers the visceral part of the fascial abnormality.[44] On the other hand, previous investigations reported that preperitoneal fat might be incarcerated and cause relevant complications.[44,45] Despite being rare,

evidence shows that incarceration might occur with lateral ventral or Spigelian hernias. These types of hernias occur between the linea semilunaris laterally and the rectus abdominis muscle medially, secondary to defects in the aponeurosis of the transverse abdominis. Presenting patients usually complain of abdominal pain and a history of trauma. Physical examination also shows abdominal tenderness at the site of herniation. Abdominal radiographs might indicate the presence of relevant complications.[46,47]

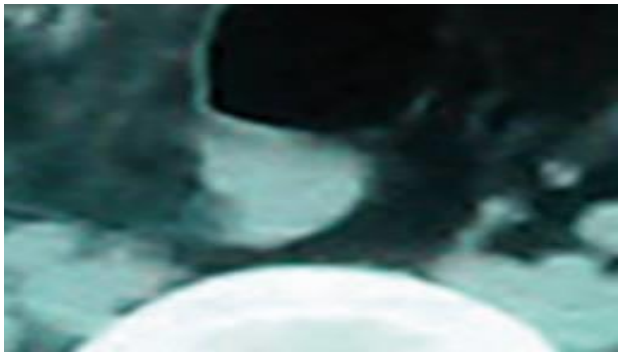

Figure 2: CT images showing greater omental torsion (red arrow) following inguinal hernia.[43]

Femoral hernias usually develop secondary to a protrusion into the femoral canal through the femoral ring. Epidemiological data show that these hernias are more common in females, and it has been shown that they are not very common in children. Further estimates show that incarceration is a rare presentation among patients suffering from these herniations. Bulging and groin pain are usually the routinely reported clinical manifestations. Therefore, it might be difficult to differentiate these hernias from inguinal hernias due to similar clinical manifestations. Therefore, it has been shown that the diagnosis needs intensive work-up and a thorough physical examination.[48-50]

CONCLUSION

Physical examination is very important in establishing the diagnosis of these events and obtaining a thorough history from the patient. Most patients present with abdominal pain, tenderness, and erythematous changes. Signs of intestinal obstruction might also be reported when this complication develops. Signs include acute abdominal pain, nausea, and vomiting. Radiological findings might show the presence of air to fluid appearance. Clinicians should be aware of these clinical manifestations and perform an adequate physical examination to establish a proper diagnosis and manage these cases. The process of decision-making is important before deciding the most appropriate management approach. Therefore, it is important to assess patients before moving to the next steps.

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