



ORIGINAL RESEARCH PAPER

General Surgery

BOCHDALEK HERNIA IN ADULTS: A CASE SERIES OF A RARE DEFECT

KEY WORDS: Bochdalek, Hernia, Left-Sided, Midline Incision, Mesh Repair

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ABSTRACT

Diaphragmatic hernias are more common among neonates and infants. Smaller defects may remain asymptomatic in childhood and present later in adult life. Congenital diaphragmatic hernias in adults are usually asymptomatic or may present with symptoms arising due to mass effect on the lungs and/or due to dysfunction of herniated organs. The omentum and transverse colon commonly appear in the herniated sac. However, larger defects in the diaphragm may also cause other parts of the intestine, spleen, and kidney (of either side) to herniate into the thoracic cavity. We present a case series of three adults with left-sided Bochdalek hernia, which was noted as an incidental finding. The size of the defects in the left hemidiaphragm in all the cases were large enough, 74.0mm, 57.0mm and 62.0mm respectively, to cause significant herniation of abdominal structures. During the operative treatment, we preferred the abdominal approach in all the cases: in case one and three for better reduction of organs and repair of the large defect; and in case two as obstruction of the bowel was suspected. The defect in case one and three was repaired by mesh reinforcement while in case two, a primary repair of the defect was done with sutures followed by fixation of mesh over it. Congenital diaphragmatic hernia in adults almost always necessitates surgical repair of the defect to avoid complications like strangulation or incarceration of the herniated structures.

INTRODUCTION

Diaphragmatic hernia refers to the protrusion of abdominal contents into the thoracic cavity through an abnormality in the diaphragm [1]. Delayed fusion of the oesophagus and the transverse septum during development can predispose to diaphragmatic hernias. Although, they constitute about 80-90% of the total congenital hernias, they are a rare primary finding in adults [2, 3]. Diaphragmatic hernias in adults are mainly seen because of blunt or penetrating injuries to the diaphragm. According to Bochdalek, 90% of congenital diaphragmatic hernias (CDHs) are found in the posterolateral aspect of the diaphragm, and these are termed as Bochdalek hernias (Bhs). These are rare, with an incidence of 0.17%, and usually asymptomatic among adults [4]. Consequences like strangulation and/or ischemia of the herniated organs are anticipated in majority of the adults with CDH, if left untreated. With accuracy of imaging modalities and advent of newer treatments, it has become possible to minimise morbidity and mortality rates. We present a case series of three adults with left-sided BH.

Case 1

A 50-year-old gentleman visited our hospital's internal medicine clinic with complaints of dry cough for the past one year and dull aching pain in his upper abdomen for the past six months. These symptoms were persistent and their severity remained unchanged for most of the year, despite the patient's compliance with the previous treatments. The patient did not report any associated difficulty in breathing, paroxysmal nocturnal dyspnoea, dysphagia, and bowel disturbance. Past history was negative for any trauma or blunt injury. He had no significant past medical and/or surgical history. The patient did not consume alcohol and had been a non-smoker.

Clinical examination revealed tenderness in the left hypogastric region and decreased breath sounds over the left

lower chest. Blood investigations were within normal limits. A chest X-ray was ordered, which revealed marked eventration of the left hemidiaphragm with significant tracheal and mediastinal shift towards the right, suggesting a possibility of a diaphragmatic hernia. This was associated with reduced left lung volume. Computed tomography (CT) scans of the chest and abdomen showed a large defect measuring 74.0 mm in the postero-lateral part of the left hemidiaphragm. Based on the imaging studies, a diagnosis of left Bochdalek diaphragmatic hernia was made, with possible herniation of omentum, parts of transverse and descending colon, and left kidney.

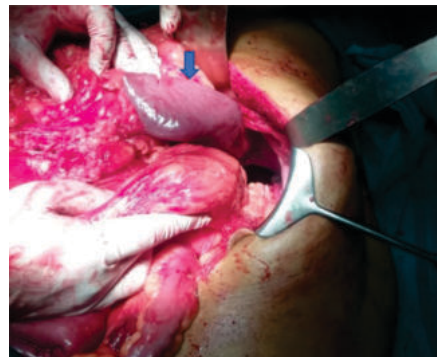


Figure 1: Intraoperative picture revealing large diaphragmatic defect with left-kidney (blue-arrow) and transverse and splenic flexure of colon as the content.

Diagnostic laparoscopy was done which revealed a frank left-sided diaphragmatic hernia. As high abdominal pressure during laparoscopic surgery did not favor a good repair of the hernia, a midline incision laparotomy was planned. Intraoperatively, contents of the hernial sac revealed omentum, parts of transverse and descending colon, and left kidney [Figure 1]. Adhesiolysis was done between the left

kidney and parts of colon, and between the herniated structures and wall of the thoracic cavity. These structures were pulled down into the abdominal cavity and the defect was reinforced by placing a 15x15 cm dual composite mesh and fixed. An abdominal drain was placed in the sub-diaphragmatic space and a chest tube was inserted on the left side. The postoperative period was managed with prophylactic antibiotics: IV ceftriaxone (1 gm), IV metronidazole (400mg), and IV amikacin (500mg) for five days. Chest physiotherapy and spirometry were advocated in postoperative care. The patient was started on liquid diet on day two and soft diet on day three. The abdominal drain and chest tube were removed on day six. The patient was discharged on day eight with no recurrence seen in a three-month and six-month follow-up. The patient continued to stay in regular follow-up, which has been uneventful so far.

Case 2

A 32-year-old gentleman presented with complaints of chest pain, recurrent episodes of vomiting for the past five days, and constipation for the last two days. The patient mentions a history of intermittent burning sensation in the chest for five months, associated with nausea after meals. Past history was negative for any trauma or blunt injury. He had no significant past medical and/or surgical history. The patient was a chronic tobacco chewer.

On clinical examination, the patient was found to have markedly reduced breath sounds over the left chest, and the abdomen was mildly distended and tender. The vitals of the patient revealed hypotension. The chest X-ray and X-ray of abdomen (in erect position) were ordered. These reported the possibility of dilated bowel loops in the left thoracic cavity and in the abdomen, with multiple air-fluid levels. The patient later mentioned having a similar episode five months ago when an abdomino-thoracic CT scan report was ordered. It was suggestive of a defect in the left hemidiaphragm, measuring 57.0mm, leading to herniation of the abdominal viscera. Altogether, clinical and imaging evaluation concluded a diagnosis of an obstructed diaphragmatic hernia.

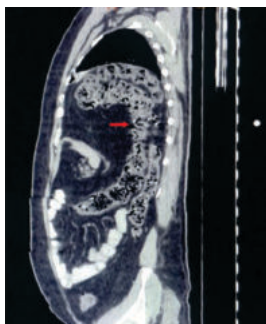


Figure 2: Sagittal view of CT- abdomen+chest showing herniation of abdominal contents into the thoracic cavity.

The patient was planned for a midline exploratory laparotomy after written informed consent. Intraoperatively, a large left BH was confirmed with the fundus of stomach, spleen, distal part of transverse colon, and splenic flexure of colon as the contents [Figure 2]. The structures were intact with no gangrene and were reduced into the abdomen. A left intercostal drain (ICD) was inserted and the diaphragm was repaired using continuous, self-retaining, non-absorbable sutures. A dual-composite mesh was placed over the repaired defect and fixed. The postoperative period was managed by IV ceftriaxone (1 gm), IV metronidazole (400mg), and IV amikacin (500mg) for five days. Chest physiotherapy and spirometry were advocated in postoperative care. The nasogastric tube was removed after 24 hours. He was started on liquid diet on day three and soft diet on day five. The ICD continued to have an output of around 130 ml per day which

was serous in nature. The patient was discharged with ICD in situ on day six. The patient was then followed up for a week. The patient made an uneventful recovery. The ICD had minimal output and no column movement; hence, it was removed. A chest X-Ray was repeated on day fourteen, which showed complete expansion of the left lung. He continued to stay in regular follow-up and continues to be well.

Case 3

A 31-year-old female presented with complaints of abdominal and chest pain, recurrent episodes of vomiting for the past seven days, and constipation for the last two days. The patient mentions a history of intermittent burning sensation in the chest for the past one month, associated with bloating. Past history was negative for any trauma or blunt injury. She had no significant past medical and/or surgical history. The patient was non-smoker and had never consumed alcohol.

On clinical examination, the patient was found to have markedly reduced breath sounds over the left chest, and the abdomen was mildly distended and tender. The vitals of the patient were within normal limits with fluctuating oxygen saturation levels between 90-94% on room air. The chest X-ray and X-ray of abdomen (in erect position) were ordered. These reported the possibility of dilated bowel loops in the left thoracic cavity and in the abdomen. An abdomino-thoracic CT scan report was ordered. It was suggestive of a defect in the left hemidiaphragm, measuring 62.0mm, leading to herniation of the abdominal viscera. The clinical and imaging evaluation concluded a diagnosis of an obstructed diaphragmatic hernia.

The patient was planned for a midline exploratory laparotomy after written informed consent. Intraoperatively, a large left-sided BH was confirmed with the fundus of stomach, splenic flexure of colon and proximal part of descending colon as the contents. The structures were intact, did not have any signs of gangrene, and were reduced into the abdomen. A left ICD was inserted and the diaphragm was repaired using continuous, self-retaining, non-absorbable sutures. A dual-composite mesh was placed over the repaired defect and fixed [Figure 3]. The postoperative period was managed by IV ceftriaxone (1 gm), IV metronidazole (400mg), and IV amikacin (500mg) for five days. Chest physiotherapy and spirometry were advocated in postoperative care. The nasogastric tube was removed after 24 hours. She was started on liquid diet on day three and soft diet on day five. The ICD continued to have an output of around 110 ml per day. The patient was discharged with ICD in situ on day seven. The patient was then followed up for a week. The patient made an uneventful recovery. The ICD had minimal output and no column movement; hence, it was removed. A chest X-Ray was repeated on day fourteen, which showed complete expansion of the left lung. She continued to stay in regular follow-up and continues to be well.



Figure 3: Mesh reinforcement

DISCUSSION

The transverse septum forms the central tendon, and the muscular part is formed by the pleuroperitoneal membranes, which eventually fuse with the transverse septum. Thus, the abdominal and thoracic cavities are separated by 8–10 weeks of life by this fusion, failure of which results in CDHs [5]. CDHs may be posterolateral (termed as Bochdalek hernias) or

anterior (termed as Morgagni hernias). BH is commonly seen in neonates and infants and occurs in approximately 1 in 2200–12,500 live births [3]. Symptomatic BHs in adults are a rare finding, as seen in this case series. The symptoms may arise either due to abdominal contents pressing over the lungs and/or due to the dysfunction of the herniated organs. These systemic symptoms pose a challenge for clinicians in diagnosing this rare condition.

A left-sided BH is the most common CDH seen in adults, as discussed in the case series by Agarwal and Meena. Three of six patients in this case series had left-sided BH, while one had right-sided BH [2]. In systematic review by Brown et al., 78% of the patients were found to have left-sided BH, similar to our cases [6]. In 80–90% of patients, BHs occur on the left side, most likely due to better support of liver on the right. Occurrence on both sides is rare [1]. Omentum and stomach are almost always seen in the hernial sac, while parts of colon may also herniate. However, with larger defects, spleen, and kidney (of the respective side) may also ascend into the thoracic cavity, as seen in our case one.

Dreaded complications like strangulation and obstruction of the structures may occur in patients with long-standing BH, which may result in gangrene of the herniated viscera. Gut gangrene was found in 50% of the patients with CDH in the case series by Agarwal and Meena [2]. One of the cases also showed gangrenous patch over spleen, for which splenectomy was performed. Torsion of the root vessels and “hernial intussusception” was seen in a case reported by Li et al. [7]. Case two of this series had an obstruction of the bowel, while no such complication(s) were seen in case one and three of this series. Approximately, 55-67% patients have a good prognosis and survival rate [1]. Mortality rate may be high in patients with underlying comorbidity [2].

The management of BH includes reduction of the herniated structures and closure of the defect by mesh reinforcement. An abdominal or thoracic approach may be preferred [8]. Most studies suggest thoracic approach for elective surgeries and abdominal approach for emergency cases. Abdominal approach may also be preferred in cases where complications are suspected. We preferred abdominal approach in all the cases: in case one and three for better reduction of organs and repair of the large defects; and in case two as obstruction of the bowel was suspected. However, with advent of the minimally invasive techniques (thoracoscopy and laparoscopy), it has become possible to shorten hospital stay and morbidity rates in operated adults.

CONCLUSION

Congenital diaphragmatic hernia in adults pose a diagnostic as well as surgical challenge for the clinicians. Adults with symptomatic Bochdalek hernia, usually present with abdominal and/ or respiratory symptoms. Thus, diagnosis of Bochdalek hernia may easily be missed by the surgeons on the initial patient encounters. However, imaging studies (X-rays and CT scans) can help in making a diagnosis. Currently, the ideal management is primary suture repair with or without mesh. It is preferred to repair Bochdalek hernia in adults at the earliest to avoid dreaded complications and possibility of bowel and/or organ resection. Further large-scale trials are required to analyse and compare the two treatment modalities.

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- Ethics approval and patient's consent to participate in this research was taken.
- All authors had access to the data and had an equal role in

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HB and NC conceived the idea of the manuscript. HB conceived of the idea. RK and NG reviewed the literature and collected the data with the help of HB. RK and HB, under guidance of NG and AA discussed the results and wrote the main draft of the manuscript.

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