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GAVIN PUBLISHERS

Journal of Surgery

Agrawal MM, et al. J Surg: JSUR-1133.

Case Report

DOI: 10.29011/2575-9760. 001133

Laparoscopic Repair of Diaphragmatic Hernia in the Adult: A Case Report & Review of Literature

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Citation: Agrawal MM, Bhagwat S, Sali P, Rao P (2018) Laparoscopic Repair of Diaphragmatic Hernia in the Adult: A Case Report & Review of Literature. J Surg: JSUR-1133. DOI: 10.29011/2575-9760. 001133

Received Date: 09 May, 2018; **Accepted Date:** 16 May, 2018; **Published Date:** 23 May, 2018

Abstract

Congenital Diaphragmatic Hernia (CDH) is rare, occurring in 1 of 3000 live births. Bochdalek hernia is the most common type of congenital diaphragmatic hernia. It appears frequently in infants but rarely in adults. We report a case of a 41 years old female who presented with the only complaint of pain in abdomen for 2 days. There was no history of vomiting, distension, constipation or breathlessness. X-ray and CT scan of the chest and the abdomen showed a diaphragmatic hernia on the left side which was operated laparoscopically. This case report and literature review emphasizes the rare presentation of Bochdalek hernia in adults and the feasibility of laparoscopic repair in such cases.

Keywords: Adult Diaphragmatic Hernia; Bochdalek Hernia; Congenital Diaphragmatic Hernia; Laparoscopic Hernia Repair

Introduction

Congenital diaphragmatic hernia is defined by the presence of an orifice in the diaphragm, more often to the left and posterolateral that permits the herniation of abdominal contents into the thorax [1]. It is rare, occurring in 1 of 3000 live births [2]. The most common type of CDH is a posterolateral defect in the diaphragm the incidence of which has been estimated to be 1:12,500 to 1:2200 live births [3]. The true prevalence of CDH in the adult population remains unknown. Autopsy studies estimated the prevalence in adults to be 1:7000 to 1:2000, whereas reviews of Computed Tomography (CT) scans estimated the prevalence to be as high as 6% [4,5]. CDH occurs when there is a developmental failure of the posterolateral foramina to fuse properly resulting in a defect of the diaphragm's muscular components [6]. The diaphragmatic defect may allow displacement of abdominal viscera into the thorax during fetal development. 70% - 90% of cases occur on the left side [7]. The detection of diaphragmatic hernia is made with pre-natal ultrasonography in 50 to 90 percent of cases [8,9]. CDH was first described in 1848 by the Czechoslovakian anatomist, Victor Alexander Bochdalek among neonates presenting with signs and symptoms of respiratory distress [10]. The diagnosis of Bochdalek hernia in adults is extremely rare and less than 200 patients have been reported. Adults most commonly present with complaints of abdominal pain rather than respiratory symptoms [11]. CDH should be included in the differential diagnosis with pneumonia and other respiratory or gastrointestinal diseases [12,13]. In adults, right-sided Bochdalek hernia occurs more frequently, although the left side still predominates. A second type of CDH known as Morgagni hernia which is less common than Bochdalek hernia, is often diagnosed incidentally in adults [14]. They are anterior and usually right-sided. Congenital heart anomalies and neurological anomalies may coexist in 40% to 50% of patients [15]. In adults, foramen of Morgagni hernia is also associated with obesity, trauma, weight lifting, or other causes of increased intra-abdominal pressure.

Case Report

Case

We report a case of a 41 years old female who presented with the only complaint of abdominal pain since 2 days. There was no history of vomiting, abdominal distension, constipation, chest pain or breathlessness. There was no history of trauma or any previous surgery. Physical examination was unremarkable however bowel sounds were audible in the left hemithorax whereas breath sounds were decreased. A Contrast Enhanced Computed Tomography (CECT) of the abdomen and chest along with reconstructions showed gross herniation of the intra-abdominal contents into the left thoracic cavity. A large defect was seen in the left hemidiaphragm measuring 7.5 cms in width along with thinning of the postero

lateral aspect of the diaphragm. Herniation of the left sided colon, small bowel loops and its mesentry, peritoneal fat, spleen and the pancreatic tail was noted. Entire fundus and body of the stomach was intra-thoracic in location and upturned. However no intestinal obstruction was noted (Figure 1).

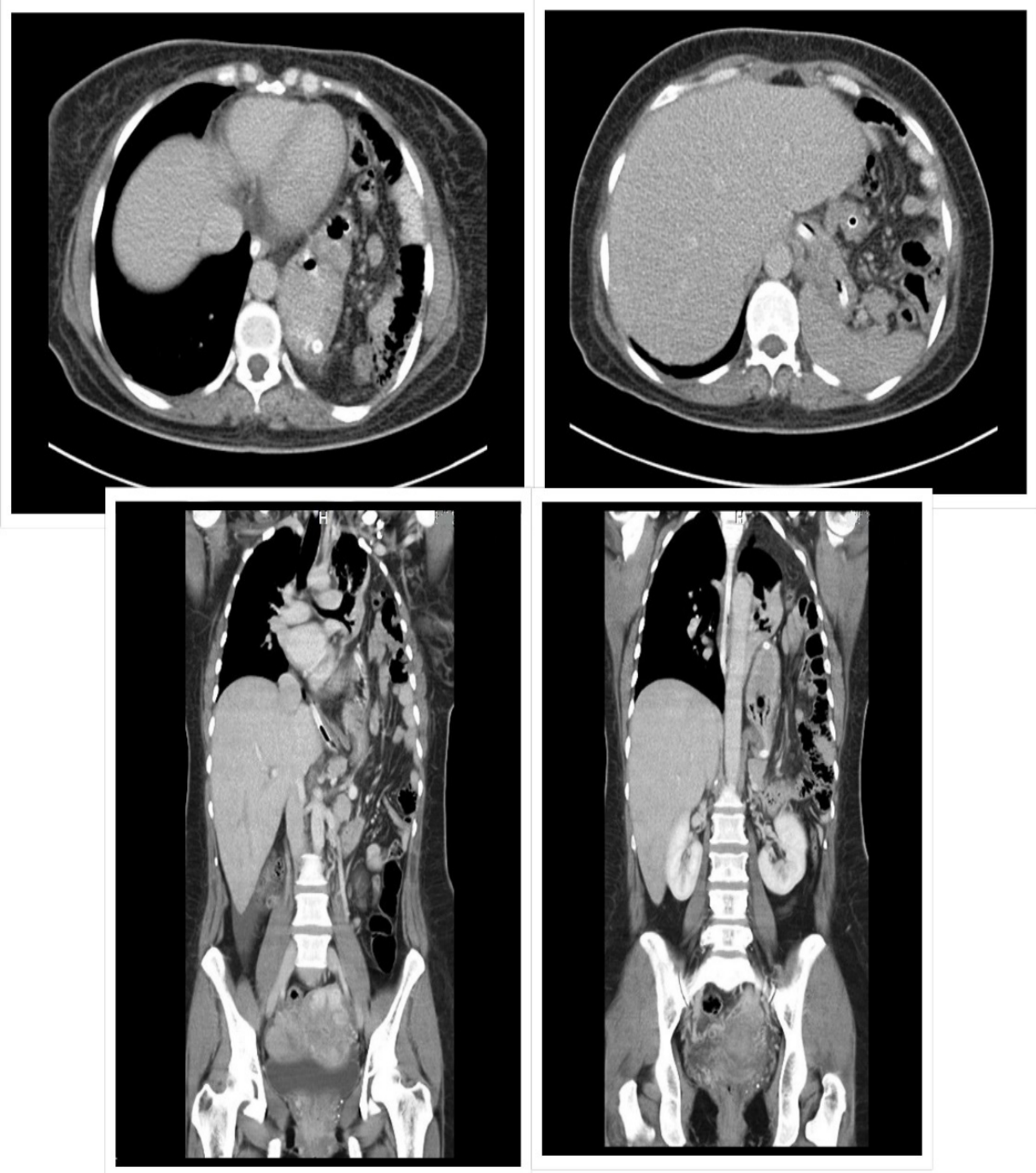

Figure 1: CT scan of the abdomen and chest showing gross herniation of the intra-abdominal contents into the left thoracic cavity.

Significant collapse of the left lung predominantly involving the middle and lower lobes was seen along with subpleural atelectasis and mild midline shift of the mediastinal structures to the right side (Figure 2).

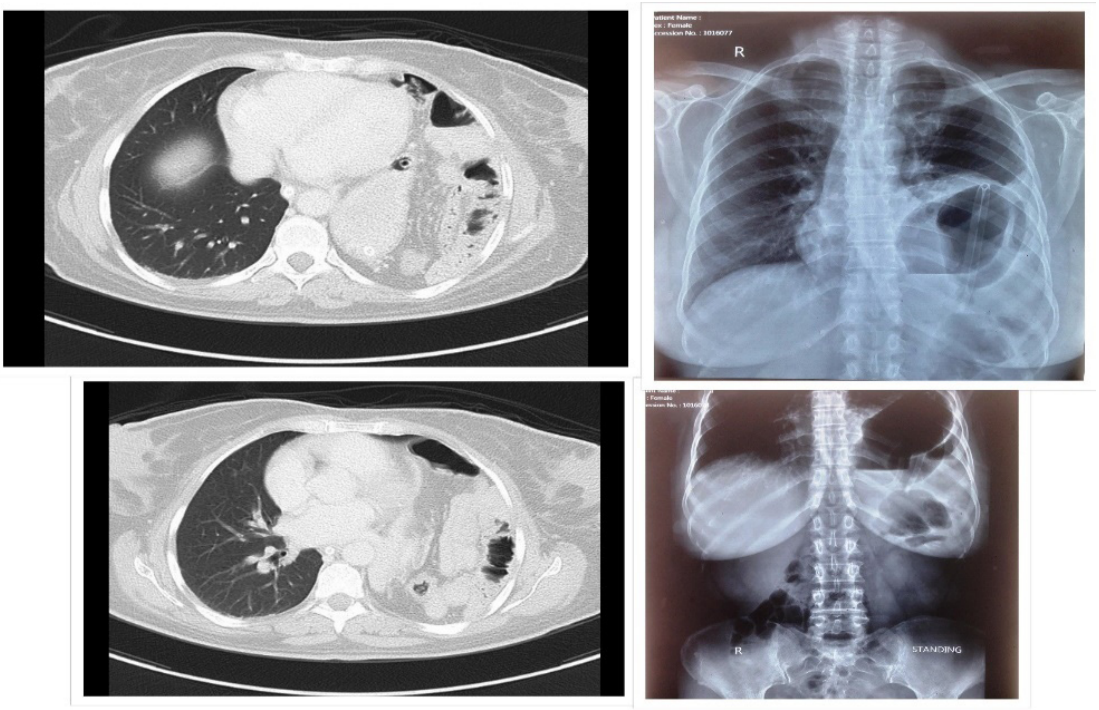

Figure 2: CT chest & X-Ray chest showing collapse of the left lung along with subpleural atelectasis and shift of the mediastinal structures to the right side.

Therapeutic Intervention

With a preoperative diagnosis of a left sided diaphragmatic hernia, the patient was taken up for laparoscopic surgery. Under general anesthesia, with the patient in modified lithotomy position, pneumo peritoneum was created using veress needle and a standard 10mm trocar was placed 2 cms above the umbilicus and to the left of midline. Four 5mm trocars were subsequently placed, one in the epigastric, one each in the right and left upper quadrants and one in the left lower quadrant lateral to the rectus muscle. Under direct vision, it was found that most of the left thoracic cavity was filled with abdominal organs reaching up to the apex of the pleural cavity. With further exploration we found the stomach, small bowel loops, omentum, partial transverse colon and the left colon, spleen and the pancreatic tail herniating into the left thorax. There was no remarkable adhesion except around the apex. There were no ischemic changes of the bowel and omentum. Structures entering into hemidiaphragm were carefully pulled back into the peritoneal cavity. After reducing the abdominal viscera, a defect was located on the left postero lateral side of the hemidiaphragm measuring approximately 10 x 8 cms. Also, the middle and lower lobes of left lung were atelectatic. The defect was closed using 2-0 polypropylene sutures in an interrupted fashion. A dual mesh was used to reconstruct the left hemi-diaphragm in a sterile field and it was fixed to the intact rim and to the other available tissues around the defect using sutures and absorbable tacks (Figure 3).

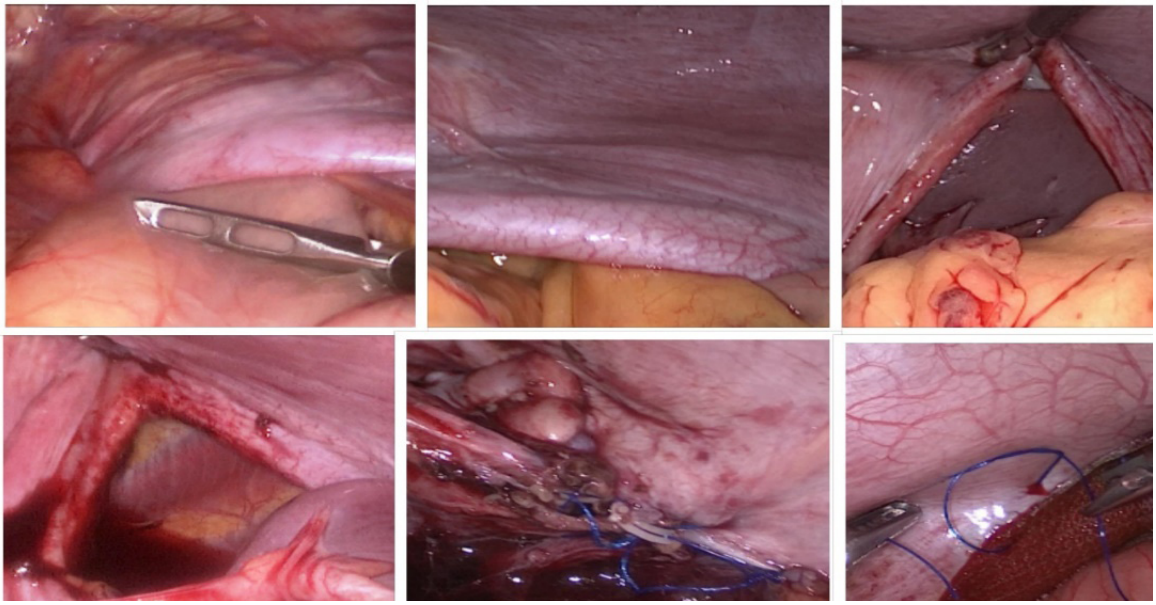

Figure 3: Intra operative images depicting the diaphragmatic defect and gross herniation of abdominal contents into the left thoracic cavity. A dual mesh was used for reconstruction and it was fixed using sutures and absorbable tacks.

There were no significant events during the procedure. The procedure ended with the left thoracic cavity drained by a single intercostal drain (28 F).

Follow up

In the post-op period, the patient had an uneventful and smooth recovery. There was no pneumothorax and lung fields were clear. A repeat chest radiograph after 4 days of surgery revealed that the re-expansion of the left lung was very well. She was discharged home on the 5th day without any respiratory or gastrointestinal symptoms. At 3-month follow-up, patient was well and asymptomatic. No signs of recurrence were found during 6 months of follow-up (Figure 4).

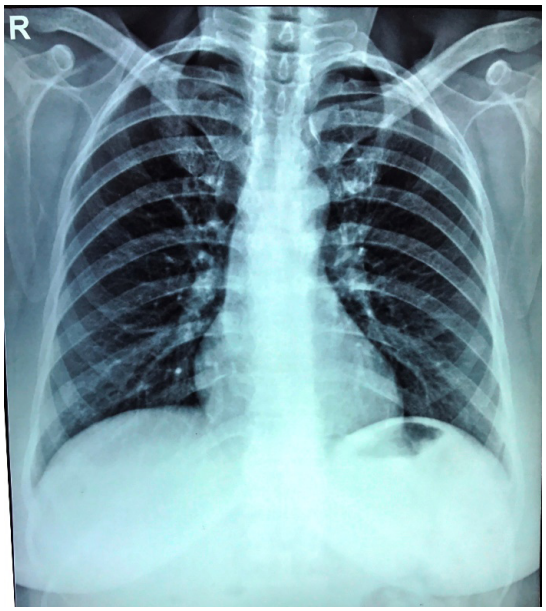

Figure 4: A 3-month follow-up X-Ray showing well expanded left lung & no signs of recurrence.

Discussion

Bochdalek hernias are characterized by a congenital defect on the postero lateral region of the diaphragm. They are generally seen in neonates, but rarely reported in adults. There is a male preponderance of 2:1 among the newborns. In adults, it is due to a delayed presentation of the congenital type or it may occur secondary to a trauma. The incidence of delayed presentation in adults varies from 0.17-6% [16]. The etiology is unknown, but the occurrence of this disease is due to failure of closure of the pleuroperitoneal canal during the eighth to tenth week of gestation [17]. The causes of precipitating viscera herniation may be related to mechanical or pressure changes in the thoracoabdominal cavities. Since our patient had asymptomatic or poorly symptomatic diaphragmatic hernia, we did not refer the herniation to any traumatic event. So, the defect was presumably, congenital. According to literatures, Bochdalek hernias are associated with other congenital anomalies in 25-57% of cases and with chromosomal disorders in 10-20% of cases [18]. It is commonly misdiagnosed in the adults. Unlike infants who present with respiratory distress, the most frequent symptom in adults is mild abdominal discomfort, while 25% of adult patients are asymptomatic [19]. Consequently, many patients are treated according to their symptoms. Further diagnostic investigation is not pursued due to the lack of awareness of this disease. Late presenting CDH is often difficult to diagnose and delays in treatment are common. Delay in the diagnosis of CDH can result in significant morbidity [20].

Patients may present with chronic symptoms like recurrent chest pain or abdominal pain, postprandial fullness, vomiting or dysphagia [21]. A literature review by Brown SR et al yielded 141 articles containing 173 cases from 31 countries [22]. Only 14% of the patients were symptomatic at the time of presentation. When there is a clinical suspicion of Bochdalek hernia, multiple imaging modalities are available. X-rays are the most general imaging study performed to evaluate the thoracic cavity and diaphragm. Radiological images show intra-thoracic gas-filled loops of the bowel with a contralateral shift of the mediastinum. In cases of obstruction or volvulus the herniated bowel loops may be complicated and the fluid-filled bowel loops appear as an opacity mimicking a lung consolidation. In some cases, the gas filled bowel loops may simulate a pneumothorax [23,24]. When X-rays are doubtful, a CT scan is a performed which offers more information [16]. In a contrast study, the diaphragm of a patient with Bochdalek hernia is interrupted and has a defect on it. In right-sided hernias, the contents are predominantly the liver, the kidney and fat, whereas left-sided hernias contain the GIT, the spleen, the tail of pancreas, the kidney or fat [25]. Colon containing hernias are rare and usually occur through left-sided defects, as was seen in our case. A study by Killeen et al found that 78% of CT scan showed left-sided hernias and 50% showed right-sided hernias [26]. A peritoneal sac may or may not be present around the contents. If absent, it leads to bowel adhesion onto the intrathoracic organs. Its incidence varies from 10 to 38% [16].

The size of the defect in the diaphragm may vary. Small defects are primarily closed with interrupted non-absorbable sutures. A larger defect, in addition to suturing, is covered with a prosthetic mesh. Complete or near complete defects pose a surgical challenge, as the entire tissue has to be replaced by a prosthetic mesh. A dual-mesh provides a good alternative in dealing with such situations. The decreased tendency for adhesion formation of Polytetrafluoroethylene (PTFE) and other dual prostheses makes them more desirable [27]. Abdominal wall or dorsi muscle flaps have also been used for CDH repair [28]. In this case, apart from the usual surgical complications of a large diaphragmatic hernia, the difficult task was to approximate the two lips of the diaphragm as the posterior lip was very narrow and thin. Mesh fixation can be a challenge and surgeons should take great care during the fixation of mesh with a laparoscopic tacker, especially where the diaphragm is relatively thin [27]. This includes tacking near the pericardium. Suturing of mesh may be required in certain cases. However, for diaphragmatic hernias, surgical intervention should be performed as soon as the diagnosis is confirmed in order to avoid serious complications. The principal management includes reducing the abdominal organs and repairing the defect. It is controversial as to which approach is the best. Both laparoscopic and thoracoscopic repairs have been reported [29]. Proponents of thoracotomy praise the convenience of separating adhesions between thoracic contents and the hernial sac, although most Bochdalek hernias do not have hernial sac. Those who advocate a laparotomy claim the advantage of abdominal approach in dealing with possible complications such as obstruction, strangulation, malrotation and perforation of abdominal viscera [30]. Right-sided defects are usually dealt with by a thoracic or thoracoabdominal approach because of the presence of the liver [31].

Abdominal compartment syndrome should be kept in mind during the early postoperative period in cases where large hernias have been reduced. Good lung ventilation, either mechanical, if indicated or through chest physiotherapy, may provide the necessary support to prevent a respiratory compromise. The appropriate choice of prosthetic material and the method of repair of the defect prevent the likelihood of a recurrence. Minimally invasive techniques including thoracoscopic repair and laparoscopic repair of Bochdalek hernia have been successfully reported [32]. Laparoscopic repair can be performed with a low complication rate of 7% and shorter hospital stay of around 4 days [22].

Conclusion

Congenital diaphragmatic hernias are an uncommon diagnosis among adult population because they are mainly recognized in infancy. For Bochdalek hernias, correct diagnosis and early treatment is significant to avoid the occurrence of serious complications. The knowledge of this anatomic defect presenting among adults is crucial for the identification and management, as it should be surgically corrected to avoid complications or to correct them if they are already present. A CT scan is the investigation that has the highest accuracy for a correct diagnosis providing a precise assessment of the anatomical relationships between the viscera, and congenital malformations, as in our case. It is recommended that all adult CDH patients undergo surgical repair to prevent incarceration and strangulation of abdominal viscera. Currently, many reports have demonstrated the safety and efficacy of using minimally invasive repair techniques, with or without mesh reinforcement. Regardless of the approach selected, surgical repair has been associated with low morbidity and mortality and excellent long term outcomes with low rates of recurrence.

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