**CASE REPORT**

**Laparoscopic repair of a Bochdalek hernia in an adult woman**

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**Keywords**

Adult; Bochdalek hernia; laparoscopic repair

**Abstract**

Bochdalek hernia (BH) is a congenital defect of the diaphragm that usually presents in the neonatal period with life threatening cardiorespiratory distress. It is rare for BH to remain silent until adulthood. A 51-year-old woman presented with progressive dyspnea and abdominal symptoms, but without a history of trauma. The diagnosis of BH was made based on chest X-ray and CT. The hernia was repaired by the laparoscopic technique, and the patient made an uneventful recovery. This report validates the feasibility of laparoscopic repair of BH in an adult, which should be within the capability of an advanced laparoscopic surgeon.

**Introduction**

BH is a congenital diaphragmatic hernia caused by the failure of the posterolateral diaphragmatic foramina to fuse properly; it results in the displacement of abdominal components into the thoracic cavity (1). This occurs mainly during the ninth or tenth week of fetal life (1). Bochdalek first described this anomaly in 1848 (2–4). The incidence is reportedly 1 in 2200–12 500 live births, and Bochdalek hernia (BH) usually occurs (80%–90%) on the left side (1,2,5). Right-sided hernias are rarer because the right pleuroperitoneal canal closes earlier and the liver buttresses the right diaphragm (2).

Most BH cause severe cardiorespiratory distress immediately after birth (1). In adults, the hernia is very rare. BH remain largely asymptomatic and are usually discovered as incidental findings on chest X-ray (CXR) or CT scan (4,6). Until now, only around 100 cases of occult asymptomatic BH in adults have been reported in the literature, and fewer than 50 symptomatic cases have been reported (7). Herein, we report the case of a 51-year-old woman whose left-sided BH was treated via laparoscopic surgery.

**Case Report**

A 51-year-old woman was referred to our hospital with progressive dyspnea due to left diaphragmatic hernia. Before seeking medical treatment, she had complained of left chest and abdominal discomfort for a week and progressive dyspnea for 2 days; she had no history of trauma. CXR showed bronchopneumonia and left pleural effusion. Chest and abdominal CT scan with contrast was performed and indicated a left BH (Figure 1). The patient was diagnosed with BH at another hospital and referred to us for surgery. On physical examination, there were symptoms of pneumonia, but bowel obstruction was not found. Laboratory analysis revealed severe hypokalemia, but other results were normal.

The patient underwent laparoscopic hernia repair (Figure S1). She was placed in the supine position, with general intubation anesthesia. Trocars were placed in the subumbilical region (Φ 1 cm), in the subcostal plane at the midclavicular line (Φ 1 cm), at the left axillar anterior line, 3 cm from subcostal trocar (Φ 1 cm), and at the midline, 4 cm from the xiphoid process (Φ 1 cm). An 8 × 10-cm left-sided hernia defect was found without a hernia sac (Figure 2). Adhesion was divided between the omentum and the medial part of the hernia defect. Visceral organs in the thoracic cavity were pulled out and put into the abdominal cavity. The defect was reinforced with a 15 × 20-cm flexible composite mesh (Physiomesh; Ethicon Endo-Surgery, Somerville, New Jersey, USA) (Figure 3). The mesh was fixed to the diaphragm with a continuous absorbable suture (V-Loc™ 180 polyglyconate, Covidien, Mansfield, USA) and was not closed. Atubular drain was placed in the left subdiaphragmatic area.
Postoperatively, the left lung was well expanded, and the patient was discharged and had an uneventful recovery. Fourteen days after surgery, she developed pleural effusion, which was removed by simple pleural puncture. At the postoperative follow-up at 6 months, physical and radiological examination showed no sign of recurrence, and the procedure appeared to have a good cosmetic result (Figure 4).

Discussion
BH, first described by Bochdalek in 1848, are characterized by a congenital defect on the posterolateral region of the diaphragm without a hernia sac (4). BH is a congenital anomaly in neonatal and postnatal patients that occurs in about 1 in 2200–12 500 live births, but it is rare in adults (2). BH has a female predominance (1,8), and our patient was a woman. Most hernias (80%–90%) are found on the left side (2), which was the case for our patient.

The etiology of BH is still unknown. This disease results from the failure of the pleuroperitoneal canal to close during the ninth or tenth week of gestation (4). Most BH are diagnosed in infancy with acute respiratory failure (7). Most adults present with chronic atypical symptoms, such as chronic dyspnea, chest pain, recurrent chest infections, pleural effusion, recurrent abdominal pain, postprandial fullness, and vomiting (1,2). Pleural effusion usually presents as the initial manifestation of BH because of lymphatic congestion and obstruction (9). Our patient has no symptoms for years until she presented with progressive dyspnea due to secondary pneumonia and pleural effusion with abdominal symptoms. In adults, hernia size and content vary (1). In 50%, the hernia contains colon, and in 40%, it may contain other viscera (1,2). In this case, the patient’s thoracic cavity was filled with viscera.
Posteroanterior and lateral CXR is a good diagnostic tool for finding BH (1). Many BH are identified by gas-filled bowel loops or a soft tissue mass above the dome of the diaphragm (1). Chest CT is necessary to make an accurate diagnosis because it can show a focal defect in the diaphragm, the herniated contents, and a thickening of the diaphragm (8). Findings that were present in our patient. CXR of the patient showed bronchopneumonia and left pleural effusion.

Management of a BH includes reducing the abdominal contents and repairing the defect through laparotomy or thoracotomy (2). Both laparoscopic and thoracoscopic repairs of BH have been reported (2). There have been three reports of BH presenting in adulthood repaired laparoscopically (8). The procedure of choice depends on the surgeon’s experience (3). Small defects are easier to repair, but larger defects may involve a reduction of the intra-abdominal contents (2). In our patient, an 8 × 10-cm defect in the diaphragm was detected during laparoscopy. The hernia contained a big part of the omentum, the entire transverse colon, part of the descending colon, and part of the spleen. After we completely divided the adhesion and reduced the hernia contents, the hernia defect was reinforced with a 15 × 20-cm flexible composite mesh, which was fixed with an absorbable suture. We did not use a stapler device to avoid potential injury to the intrathoracic organs (i.e., heart, pericardium, and lungs). Two weeks after surgery, the patient developed a pleural effusion, which was removed by simple pleural puncture. Her recovery was uneventful. The fluid might be accumulated and fill the pleural space after removal of the herniated viscera because, if the ipsilateral lung does not fully expand or there is no compensatory mediastinal shift, the air in the cavity is absorbed (9). Minimally invasive techniques may result in reduced morbidity and improve the ease of hernia reduction, hemostasis, and adhesiolysis (5,8). These techniques also offer the advantages of a shorter hospital stay, shorter recovery time, faster return to normal diet, faster return to normal activity, and better cosmesis (10). There was no evidence of recurrence at the 6-month postoperative follow-up.

BH result from a failure of the posterolateral diaphragmatic foramina to fuse. It is rare in adults. Adult BH more commonly present with pulmonary symptoms and gastrointestinal symptoms. CXR is a good screening tool, but thin-section CT scanning has higher sensitivity. Accurate diagnosis and prompt surgery are essential for a favorable outcome. This report validates the feasibility of laparoscopic repair of BH in an adult, which should be within the capability of an advanced laparoscopic surgeon. The laparoscopic procedure in the present case was performed successfully and resulted in significant clinical improvement.

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Supporting information
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Figure S1 Laparoscopic Repair of Bochdalek Hernia Video (VLC Media Player).