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Post-Traumatic Revelation of a Congenital Bochdalek Hernia in an Adult: A Differential Diagnosis of Diaphragmatic Rupture

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ABSTRACT
Introduction: Bochdalek hernia is a rare congenital malformation resulting from incomplete closure of the posterolateral pleuroperitoneal canal. Typically diagnosed in the neonatal period, it may exceptionally remain asymptomatic until adulthood and be revealed by thoracoabdominal trauma [1,2]. The differential diagnosis with traumatic diaphragmatic rupture can be challenging, particularly in the setting of polytrauma [3].
Case Presentation: We report the case of a 50-year-old woman admitted for polytrauma following a road traffic accident. The patient had a long-standing history of gastroesophageal reflux disease and chronic epigastric heaviness. Thoracoabdominal computed tomography revealed a left diaphragmatic hernia with intrathoracic migration of the stomach. Exploratory laparotomy confirmed the hernia and allowed reduction of the herniated viscera, diaphragmatic repair, resection of a necrotic gastric segment with gastric suturing, placement of a thoracic drain, and creation of a feeding jejunostomy. The postoperative course was uneventful.
Conclusion: Bochdalek hernia in adults is a rare entity that may be revealed by trauma. Diagnosis relies on imaging and intraoperative findings. Surgical management is the treatment of choice, and prognosis depends on the promptness of intervention [1–4].

KEYWORDS: Bochdalek hernia; congenital diaphragmatic hernia; post-traumatic revelation; intrathoracic stomach; laparotomy.

INTRODUCTION

Congenital diaphragmatic hernias result from an embryological defect in the development of the diaphragm. Bochdalek hernia arises from failure of closure of the posterolateral pleuroperitoneal canal and represents the most common form of congenital diaphragmatic hernia [1,2]. It is typically diagnosed in the neonatal period due to severe respiratory distress but may rarely remain asymptomatic until adulthood.

In adults, this condition is uncommon and often discovered incidentally or during the investigation of digestive or respiratory complications. Clinical manifestations may include abdominal pain, dyspnea, chronic digestive symptoms, or gastroesophageal reflux disease [2,4]. In certain cases, a triggering event such as thoracoabdominal trauma may increase intra-abdominal pressure, leading to visceral herniation and revealing a previously compensated congenital defect [3].

The main differential diagnosis is post-traumatic diaphragmatic rupture. Careful evaluation of the patient's history, imaging findings, and intraoperative observations helps establish the congenital origin, particularly in the presence of a characteristic left posterolateral defect and long-standing suggestive symptoms [1,3].

We report the case of a congenital Bochdalek diaphragmatic hernia revealed following thoracoabdominal trauma in an adult patient with a history of gastroesophageal reflux and chronic epigastric heaviness.

CASE PRESENTATION

A 50-year-old woman was admitted for management of polytrauma following a road traffic accident. The medical history revealed long-standing gastroesophageal reflux disease and chronic epigastric heaviness that had persisted for several years.

The accident had occurred approximately one week prior to admission and involved a high-energy cranio-cervico-thoraco-abdominal impact, with a fatality reported in the same incident.

Upon admission, the patient presented with respiratory distress characterized by tachypnea and severe oxygen desaturation of 60%, associated with spontaneous vomiting. This occurred in the context of general deterioration, including asthenia and anorexia, without fever.

Clinical examination revealed a conscious patient with a Glasgow Coma Scale score of 15/15, wearing a cervical collar due to known cervical fractures. Vital signs were as follows: blood pressure of 110/60 mmHg, heart rate of 152 beats per minute, respiratory rate of 24 breaths per minute, oxygen saturation of 65%, and temperature of 37.2°C.

Abdominal examination showed a soft, non-tender abdomen without guarding or rigidity. No palpable masses or hepatosplenomegaly were noted. The hernial orifices were normal. Proctological examination revealed a normal anal margin with preserved sphincter tone.

RADIOLOGICAL ASSESSMENT

Initial thoracoabdominal computed tomography performed after the trauma revealed a left diaphragmatic hernia with intrathoracic herniation of the stomach. This was associated with pulmonary contusions, left pneumothorax and hemothorax, as well as multiple rib and pelvic fractures.



Figure 1: Axial thoracoabdominal CT images demonstrating left-sided intrathoracic herniation of the stomach (withe arrows) through a diaphragmatic defect.

Cervical computed tomography revealed fractures of C1, C2, and C7.

A repeat thoraco-abdomino-pelvic computed tomography scan performed upon admission to our institution confirmed the presence of a left diaphragmatic hernia with intrathoracic herniation of a distended stomach through a defect measuring approximately 4 cm, resulting in mediastinal shift. It also revealed a left pleural effusion, a grade IV liver laceration according to the American Association for the Surgery of Trauma (AAST), and intraperitoneal fluid.



Figure 2: Sagittal CT reconstruction illustrating intrathoracic migration of the stomach through the left diaphragmatic defect (blue arrows).

Laboratory Findings

Laboratory investigations showed a hemoglobin level of 9.3 g/dL, leukocytosis of 20,520/mm³, thrombocytosis of 516,000/mm³, and a C-reactive protein level of 337 mg/L. Electrolyte levels and renal function were within normal limits.

Surgical Management

Given the progressive intrathoracic gastric distension and the risk of visceral complications, an emergency surgical intervention was indicated following multidisciplinary consultation. A supraumbilical midline exploratory laparotomy was performed under general anesthesia, with maintenance of the cervical collar.

Intraoperative exploration revealed a left diaphragmatic defect measuring approximately 8 cm with intrathoracic herniation of the stomach. Following reduction of the hernia, an area of necrosis was identified on the anterior wall of the stomach. A moderate serohematic pleural effusion was also noted, while the spleen and the remainder of the gastrointestinal tract were unremarkable.

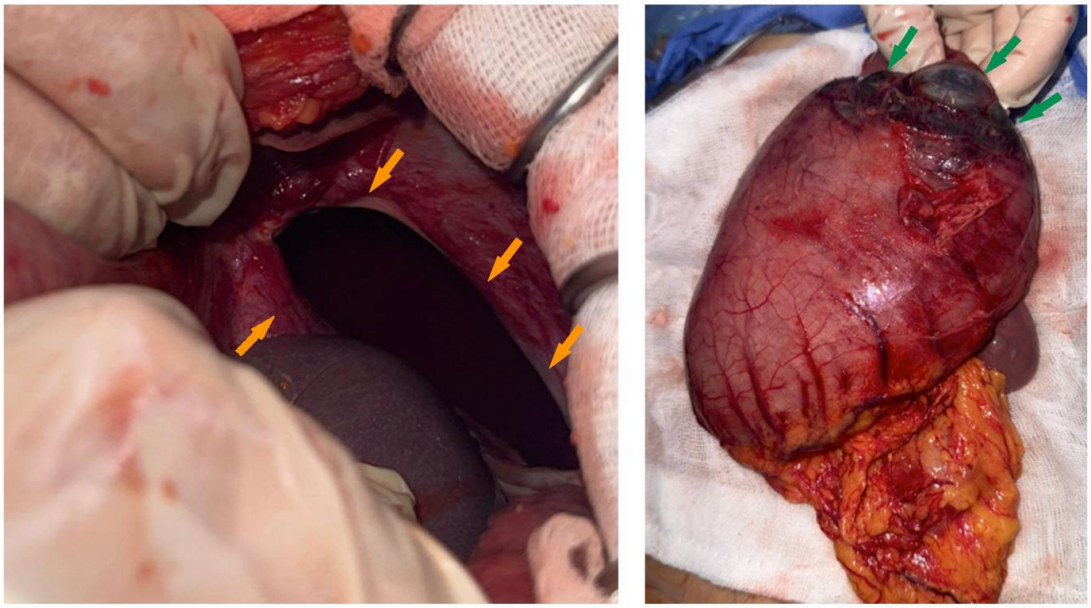


Figure 3: Intraoperative findings showing (A) the left posterolateral diaphragmatic defect measuring approximately 8 cm (orange arrows) and (B) gastric wall necrosis identified after reduction of the herniated stomach (green arrows).

The surgical procedures performed included left thoracic drainage using a CH 28 Joly drain, reduction of the intrathoracic stomach, closure of the diaphragmatic defect with interrupted X-shaped nonabsorbable silk sutures (Silk 2), resection of the necrotic gastric segment followed by gastric repair using Vicryl 2/0, creation of a Witzel feeding jejunostomy, and placement of pre-gastric and left subphrenic drains.

Postoperative Course

The postoperative course was uneventful. The patient remained in the intensive care unit for two days before being transferred to the general surgery ward. The nasogastric tube was removed on postoperative day five, and the surgical drain was removed on postoperative day six. Clinical recovery was favorable, allowing discharge on postoperative day eight. Follow-up consultation was unremarkable.

DISCUSSION

Congenital Bochdalek diaphragmatic hernia is a rare anomaly resulting from failure of closure of the posterolateral pleuroperitoneal canal during embryonic development [1,2]. It represents the most common form of congenital diaphragmatic hernia and occurs predominantly on the left side due to delayed closure of the canal and the protective effect of the liver on the right [2,3].

Typically diagnosed in the neonatal period because of severe respiratory distress, Bochdalek hernia may exceptionally remain asymptomatic until adulthood. Its discovery in adults is rare, accounting for less than 0.2% to 6% of cases, and is often incidental or revealed by digestive or respiratory complications [1,4].

Embryological and Anatomical Considerations

The diaphragm develops between the fourth and twelfth weeks of gestation from four embryological components: the septum transversum, the pleuroperitoneal membranes, the dorsal mesentery of the esophagus, and the muscular ingrowth from the body wall [2]. Failure of fusion of the pleuroperitoneal membranes results in a persistent posterolateral defect known as the foramen of Bochdalek.

This anomaly predominates in the left hemidiaphragm in 80–90% of cases, the relative protection of the liver explaining its rarity on the right side [3].

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Adult Presentation

In adults, Bochdalek hernia may remain latent for years. Clinical manifestations are polymorphic and include abdominal pain, dyspnea, gastroesophageal reflux, epigastric heaviness, vomiting, or signs of intestinal obstruction [4,5]. In our case, the patient reported long-standing gastroesophageal reflux and chronic epigastric heaviness, suggestive of an undiagnosed congenital hernia.
A triggering event such as thoracoabdominal trauma may abruptly increase intra-abdominal pressure, leading to herniation of abdominal contents into the thoracic cavity and revealing a previously asymptomatic congenital defect [6].

Diagnosis

Thoraco-abdomino-pelvic computed tomography is the gold standard for diagnosing diaphragmatic hernias. It enables visualization of the diaphragmatic defect, identification of herniated viscera, detection of associated complications, and differentiation from traumatic diaphragmatic rupture [7,8]. Characteristic CT findings include diaphragmatic discontinuity, intrathoracic visceral herniation, the “collar sign,” and the “dependent viscera sign” [8].
In our case, CT imaging demonstrated a left diaphragmatic hernia with intrathoracic herniation of the stomach, consistent with a Bochdalek hernia revealed by trauma.

Differential Diagnosis

The principal differential diagnosis is post-traumatic diaphragmatic rupture. Distinction relies on clinical history, imaging findings, and intraoperative observations. The presence of long-standing digestive symptoms, a typical left posterolateral defect, and the absence of macroscopic signs of acute traumatic rupture support a congenital origin [3,6].
Other differential diagnoses include large hiatal hernias, diaphragmatic eventration, and iatrogenic diaphragmatic hernias [9].

Therapeutic Management

The treatment of Bochdalek hernia in adults is exclusively surgical, even in asymptomatic cases, due to the risk of visceral strangulation and respiratory complications [4,10]. Surgical objectives include reduction of the herniated contents, assessment of visceral viability, and repair of the diaphragmatic defect.
The choice of surgical approach depends on the patient's clinical condition, the size of the diaphragmatic defect, and the presence of associated complications. Laparoscopy is increasingly favored as the preferred approach in stable patients with uncomplicated hernias**,** offering excellent visualization of the diaphragmatic defect, reduced postoperative pain, shorter hospital stays, and faster recovery [10,12]. However, laparotomy remains appropriate in emergency settings, particularly in patients with associated traumatic injuries, suspected visceral ischemia, or the need for gastrointestinal resection [10,11].
Diaphragmatic repair may be achieved by primary closure using interrupted or continuous nonabsorbable sutures when the defect can be approximated without excessive tension. For larger defects or when tension-free primary closure is not feasible, prosthetic reinforcement or bridging with a mesh may be required to ensure a durable repair. The choice of prosthesis should consider its proximity to abdominal viscera and the risk of adhesions. In contaminated surgical fields, particularly when visceral perforation or resection is involved, the use of synthetic mesh should be carefully evaluated, and primary suture repair may be preferable whenever technically feasible [10,12].
In our case, exploratory laparotomy allowed reduction of the intrathoracic stomach, resection of a necrotic gastric segment, diaphragmatic repair, placement of thoracic drainage, and creation of a feeding jejunostomy. This approach is consistent with recommendations reported in the literature.

Prognosis

The prognosis of Bochdalek hernias diagnosed in adulthood is generally favorable when managed promptly and appropriately [4]. In our case, the postoperative course was uneventful, with a two-day stay in the intensive care unit, removal of the nasogastric tube on postoperative day five, removal of the drain on postoperative day six, and discharge on postoperative day eight. Follow-up consultation was unremarkable.

CONCLUSION

Congenital Bochdalek diaphragmatic hernia revealed in adulthood is a rare entity that may be unmasked by thoracoabdominal trauma. The presence of long-standing digestive symptoms, such as gastroesophageal reflux or chronic epigastric heaviness, should suggest a congenital origin. Computed tomography remains the gold standard for diagnosis. Surgical repair is the treatment of choice to prevent complications. Early and appropriate management ensures an excellent prognosis.

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