

# Bochdalek Hernia in an Adult Presenting as Hydropneumothorax due to Gastric Volvulus Perforation: A Case Report

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## ABSTRACT

Congenital Diaphragmatic Hernia (CDH) occurs due to herniation of abdominal contents into the thorax through a defect in the diaphragm caused by incompletely fused pleuro-peritoneal folds. It is classified into three types, of which Bochdalek hernia is the most common type. Here the authors report a case of a 24-year-old male patient who presented with sudden onset of abdominal and chest pain with multiple episodes of non bilious vomiting since two days. Computerised Tomography (CT) suggested the possibility of a Bochdalek hernia with mesenteroaxial gastric volvulus and intrathoracic gastric perforation causing hydropneumothorax which was confirmed on surgery. The gastric perforation was closed and the herniated abdominal contents were reduced and the diaphragmatic rent was repaired. His postoperative recovery was unremarkable. Bochdalek hernias may infrequently remain asymptomatic till adulthood, where they may manifest suddenly with serious chest or abdominal complaints. Computerised tomography is a rapid imaging tool that can provide a precise preoperative diagnosis and a road map for the operating surgeon.

**Keywords:** Computed tomography, Congenital diaphragmatic hernia, Pulmonary complications, Surgical emergency

## CASE REPORT

A 24-year-old male patient with a history of chronic alcohol intake presented to the Emergency Department with severe abdominal pain for four days followed by sudden onset chest pain, progressive dyspnea at rest and high-grade fever for two days. The pain in abdomen was sudden in onset, colicky in nature, radiating to the back, with no relieving factors. It was associated with multiple episodes of non bilious and non projectile vomiting. The dyspnoea and chest pain were mild at first, with sudden progression and worsening since two days. There was no history of recent or remote trauma.

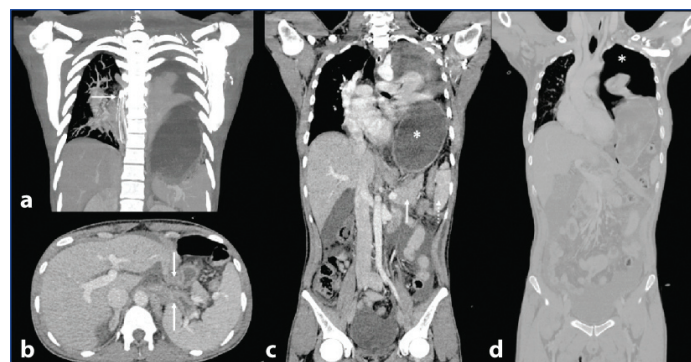
At admission, he had tachycardia with a pulse rate of 115 beats per minute, normal blood pressure of 110/70 mm Hg and oxygen saturation of 90% on room air. He was febrile with a temperature of 101°F and tachypnoeic with a respiratory rate of 25 per minute.

Auscultation of the chest revealed absent breath sounds on the left side. Percussion showed shifting hyper-resonant notes over the left upper and mid zones. Per abdominal examination revealed diffuse abdominal tenderness, guarding and rigidity. Auscultation revealed no bowel sounds. Based on these clinical features and examination, the patient was suspected to have gastric outlet obstruction or pancreatitis with hydropneumothorax.

Haematological values at admission were haemoglobin 10.6 gm/dL (13-17 gm/dL), White Blood Cells (WBCs)  $11.6 \times 10^3$  cells/mm<sup>3</sup> (4-10 cells/mm<sup>3</sup>), Platelet count  $230 \times 10^3$ /L (200-450  $\times 10^3$ /L). Liver parameters and pancreatic enzymes were within normal limits.

Contrast-Enhanced Computed Tomography (CECT) of the chest and abdomen was performed immediately. CECT [Table/Fig-1] showed that the nasogastric tube had coiled within the oesophagus. There was an 8 cm defect in the left hemidiaphragm through which the stomach, spleen, tail of pancreas and the splenic flexure of colon had herniated into the left hemithorax. The stomach was over distended, fluid-filled and rotated along an axis perpendicular to its greater and lesser curvature. The gastroesophageal junction and antropyloric junction were located at the same level with the pylorus facing upwards, indicating a mesentero-axial gastric volvulus. No defect could be identified in the gastric wall, however

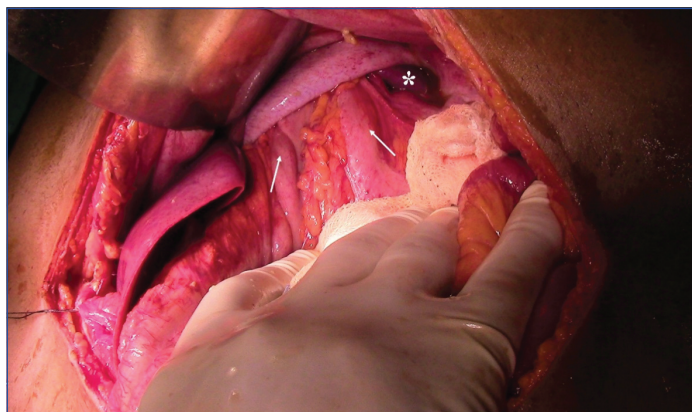
there was moderate left hydropneumothorax causing a collapse of the left lung and mediastinal shift to the right. Based on these findings, the possibility of a Bochdalek hernia with mesenteroaxial gastric volvulus, sealed off gastric perforation, resulting in left hydropneumothorax was considered.



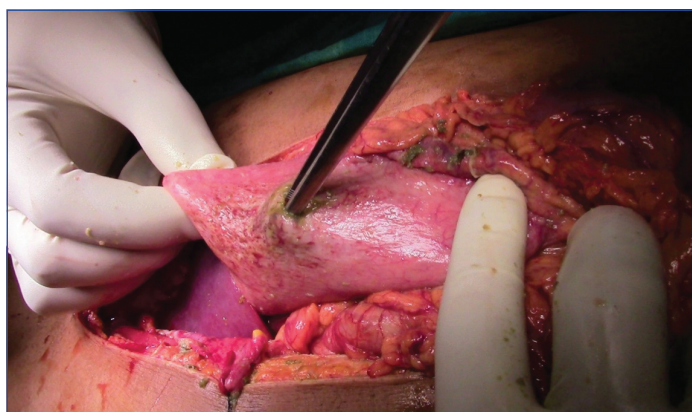
**[Table/Fig-1]:** Contrast Enhanced Computed Tomography (CECT) Chest and Abdomen showing Bochdalek hernia with mesenteroaxial gastric volvulus with perforation causing hydropneumothorax. (a) Coronal maximum intensity projection image of chest showing nasogastric tube coiled in oesophagus (white arrow); (b) Axial image of upper abdomen showing the gastroesophageal and antropyloric junction lying at the same level (white arrows); (c) Coronal image of chest and abdomen showing the diaphragmatic defect with herniation of pancreatic tail (white arrow), spleen (dashed arrow) and stomach (white asterisk) through the defect; (d) Coronal image of chest and abdomen, in lung window showing the hydropneumothorax (white asterisk) with collapsed lung.

Patient was immediately taken up for surgery. Abdomen was opened via a midline vertical supraumbilical incision extending from xiphisternum to umbilicus. Intraoperative findings [Table/Fig-2] confirmed the presence of a 10 cm defect in the posterior aspect of left hemidiaphragm, with herniation of stomach, splenic flexure of colon and spleen into the left hemithorax. There was a mesenteroaxial gastric volvulus with perforation. The wall around the site of perforation appeared unhealthy [Table/Fig-3]. The stomach was detorted, the unhealthy wall was cut and repaired with primary closure. The herniated abdominal contents were reduced, gastropexy was done by fixing the fundus to the left hemidiaphragm and the diaphragmatic rent was closed with prolene 1-0 sutures. Approximately, 2 litres of purulent fluid was

drained from the left hemithorax and an intercostal drain was placed in the left hemithorax. Abdominal lavage was done and abdomen was closed. The patient was then shifted to surgical Intensive Care Unit (ICU) for three days. The patient's clinical course was uneventful during his hospital stay and he was discharged on the 10<sup>th</sup> postoperative day.



**[Table/Fig-2]:** Photograph showing herniated omentum and stomach (white arrows) and spleen (white asterisk) through the diaphragmatic defect.



**[Table/Fig-3]:** Photograph showing perforation in the wall of stomach with greenish purulent material around the site of perforation.

## DISCUSSION

The CDH occurs due to herniation of abdominal contents into the thorax through an incompletely fused pleuro-peritoneal fold in the diaphragm [1,2]. CDH are broadly classified into three types, the Bochdalek hernia which occurs posterolaterally, the Morgagni hernia which occurs anteriorly and the hiatus hernia, which occurs through the oesophageal hiatus [3]. Of the three types, the Bochdalek hernia is the most common type, with a frequency of 1 per 2000-5000 live births [2]. It occurs most commonly on the left side (80-90%) [2-4]. Most of the Bochdalek hernias are diagnosed on antenatal ultrasonography or immediately after birth as they manifest with respiratory distress. However, in about 11% of the patients, they may remain asymptomatic till adulthood [2,5]. When they become symptomatic in adults, they can present with severe chest or abdominal pain, respiratory distress or symptoms of bowel obstruction or ileus [3,5]. The mortality in adults is often high due to the acute nature of the events and the severe complications. Chest radiographs may show air filled bowel loops herniated into the hemithorax with mediastinal shift. Computed Tomography (CT) with its multiplanar reformation capability can demonstrate the defect in hemidiaphragm with herniation of omental fat and abdominal viscera through the defect into the hemithorax [2].

Gastric volvulus is a rare and potentially life threatening condition which occurs due to rotation of stomach by 180° in any one of its axis. It is a surgical emergency and requires a high index of clinical suspicion for an early diagnosis. The association of secondary gastric volvulus with CDH has been described in few reports. This has been attributed to the absence or hypoplasia of

the supporting gastrosplenic or the gastrophrenic ligaments [1,6,7]. Based on the axis of rotation, the gastric volvulus can be of four types, organoaxial (when the stomach rotates along the axis of the gastroesophageal and antropyloric junctions), mesenteroaxial (when the axis of rotation bisects the greater and lesser curvature of stomach), combined type or an unclassified type [8]. Organoaxial volvulus is the most common type (59%) and is often associated with CDH. The association of mesenteroaxial type of volvulus with diaphragmatic defects is rare with very few reported cases [7,8]. It is also thought that mesenteroaxial type is associated with increased risk of ischemia and perforation [1]. Case of the present report, had this rare association of mesenteroaxial type of volvulus with Bochdalek hernia and gastric perforation.

Clinically about 70% of patients present with the classic Borchardts triad constituted by severe epigastric pain and distension, vomiting and inability to pass the nasogastric tube into the stomach [1,6,8]. However, many of the patients may present with non specific symptoms, like epigastric fullness, early satiety, hiccups abdominal distension and tenderness which are mimicked by many common conditions, which may delay the diagnosis [7,9]. The clinical presentation may be even more confusing with the intrathoracic location of the stomach, where the manifesting symptoms might be respiratory in addition to abdominal, as was seen in the present case [1,10].

Imaging not only confirms the diagnosis but also aids in the management by identifying associated complications. Plain chest and abdominal radiographs and upper gastrointestinal contrast studies may demonstrate a nasogastric tube coiled in the oesophagus, large supradiaphragmatic gastric bubble [1,11,12]. However, findings may sometimes be confusing and non specific. CT has a very high accuracy (90%) and specificity (90-100%) for the diagnosis of gastric volvulus [9,13]. CT can also comprehensively demonstrate the complications of gastric volvulus including ischemia, pneumatosis, perforation, pneumothorax, pneumoperitoneum and pleural effusion [9]. The findings of gastric volvulus on CT depend on the type. In the organoaxial type, the greater curvature lies superior and to the right of the lesser curvature; while in the mesenteroaxial type, the antropyloric junction lies at or superior to the gastroesophageal junction [9].

## CONCLUSION(S)

Asymptomatic Bochdalek hernia may persist into adulthood, where they may present acutely with thoracic or abdominal symptoms. Mesenteroaxial type of gastric volvulus is rarely associated with Bochdalek hernia and it has a higher risk of ischemia and perforation. Plain radiographs and contrast studies may confirm the diagnosis, but the findings may sometimes be difficult to interpret. CT has a very high accuracy for the diagnosis of diaphragmatic hernia and gastric volvulus and can demonstrate the complications, thus providing a comprehensive road map for the operating surgeon.

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