Case Report

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Trauma-Induced Delayed Presentation of Diaphragmatic Hernia with Gastric Volvulus: A Rare Presentation

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ABSTRACT

A 19-year-old male presented with a three-day history of worsening epigastric pain, persistent vomiting, abdominal distension, and obstipation. His medical history included high-fall trauma in 2022, resulting in a parietal bone fracture, scalp swelling, and an epidural hematoma. Physical examination revealed epigastric tenderness, abdominal distension, and diminished bowel sounds. Imaging revealed a 7 cm left diaphragmatic defect with herniation of the stomach, colon, and mesentery into the thoracic cavity, confirming a diagnosis of gastric volvulus with a diaphragmatic hernia. An exploratory laparotomy confirmed herniation of the stomach, transverse colon, spleen, and pancreas. The procedure involved derotation of the gastric volvulus, reduction of the herniated organs, and repair of the diaphragmatic tear; a fundoplication was also performed to prevent recurrence. The patient's recovery was uneventful, and he was discharged on the fifth postoperative day. He remained asymptomatic at the six-month follow-up. This case underscored the importance of considering gastric volvulus and diaphragmatic hernia in trauma patients presenting with gastrointestinal symptoms, highlighting the necessity of early diagnosis and prompt surgical intervention.

Keywords: Hernia, Diaphragmatic, Traumatic, Delayed, Diagnosis, Gastric volvulus.

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Introduction

Diaphragmatic hernia can be congenital or acquired. The acquired type results primarily from trauma [1]. It is commonly reported after penetrating injuries and in victims of vehicle crashes, with an incidence of up to 5% in trauma patients, depending on the injury severity and mechanism [2, 3]. A diaphragmatic hernia involves a defect through which abdominal organs, including the stomach, intestine, pancreas, and spleen, may herniate into the chest. Gastric volvulus occurs when the stomach rotates at least 180 degrees around its transverse or longitudinal axis [4]. It may be primary, due to weakness in the ligamentous attachments, or secondary, when an underlying anatomical defect is the cause [5, 6]. Although gastric volvulus and diaphragmatic hernia are rare and potentially life-

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threatening conditions that typically arise from trauma (though they can also occur spontaneously), they should be considered in trauma patients presenting with gastrointestinal symptoms. This is particularly important when clinical signs suggest a progressive abdominal or thoracic issue. Trauma-induced diaphragmatic hernias are often associated with high-impact injuries, such as motor vehicle accidents or falls, and may remain asymptomatic for extended periods before manifesting with symptoms, such as epigastric pain, vomiting, and bowel obstruction. Gastric volvulus in such cases is even more unusual and can complicate diagnosis due to symptoms overlap with other abdominal pathologies. Timely recognition and surgical intervention are critical to prevent severe complications, including gastric necrosis, respiratory compromise, and shock.

This case report presented a rare occurrence of concurrent diaphragmatic hernia and gastric volvulus in a young trauma patient, highlighting the critical importance of prompt diagnosis and surgical intervention for a successful outcome.

Case Presentation

A 19-year-old male presented to the emergency department with a one-month history of progressively worsening epigastric pain. The pain had an insidious onset, was exacerbated by lying supine and by meals, and radiated to the epigastric region. He also reported persistent vomiting 2-3 times per day, with vomitus containing food particles. Over the past three days, he had developed abdominal distension and generalized discomfort accompanied by the cessation of both flatus and stool.

The patient had a significant history of trauma, having sustained a fall from a height of 30 feet in 2022. Initial evaluation in the emergency department revealed a linear parietal bone fracture, scalp swelling, and an epidural hematoma (EDH) in the occipital region, along with multiple hemorrhagic contusions. He was managed conservatively, discharged in stable condition with a Glasgow Coma Scale (GCS) score of E4V5M6, and had no further complaints.

Upon admission, physical examination revealed an afebrile patient with abdominal distension and epigastric tenderness, guarding, and diminished bowel sounds. Chest roentgenography revealed left diaphragmatic eventration and a dilated gastric shadow (Figure 1). An abdominal contrast-enhanced CT (CECT) scan showed a 7 cm defect in the left dome of the diaphragm, with herniation of the stomach, hepatic flexure of the colon, and mesentery into the left thoracic cavity.

The patient underwent an exploratory laparotomy through a midline incision extending from the subxiphoid region to the infraumbilical area. Intraoperative exploration revealed herniation of the stomach (Figure 2), which was twisted and exhibited black discolouration, confirming a diagnosis of gastric volvulus with evidence of ischemia (Figure 3). Derotation was performed to untwist the stomach. Following reduction, the distended organ was visualized (Figure 4). Additionally, the herniated small bowel and pancreas were also reduced (Figure 5).

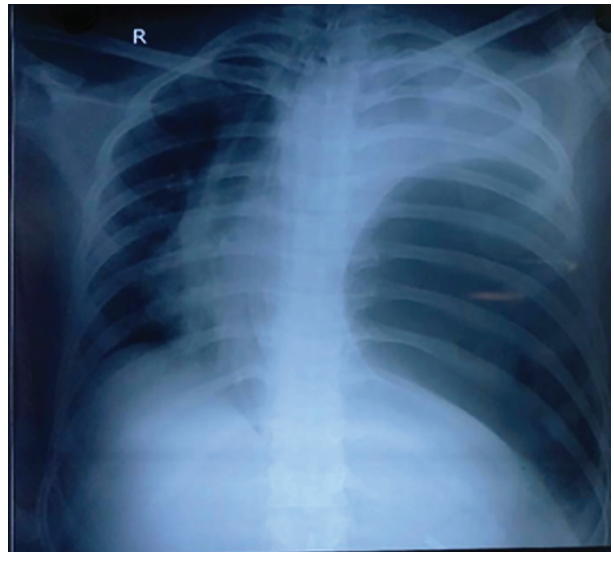

Fig. 1. Eventration of the diaphragm and gastric shadow in the left hemithorax

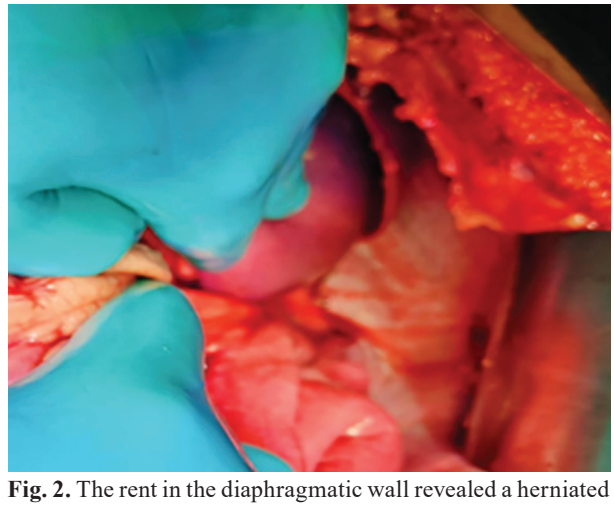

Fig. 2. The rent in the diaphragmatic wall revealed a herniated stomach.

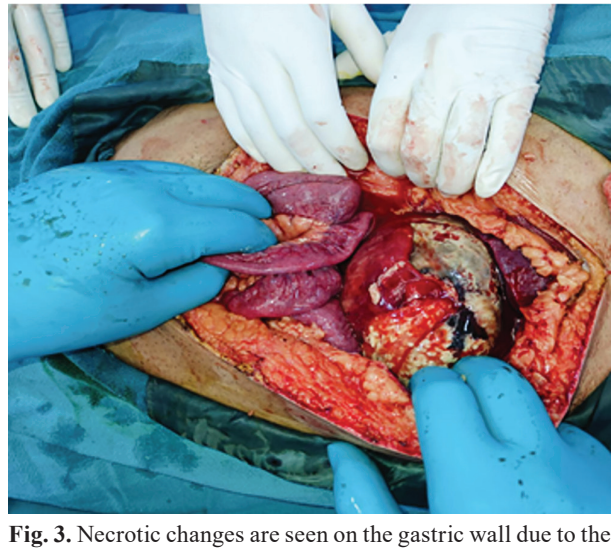

Fig. 3. Necrotic changes are seen on the gastric wall due to the organo-axial torsion.

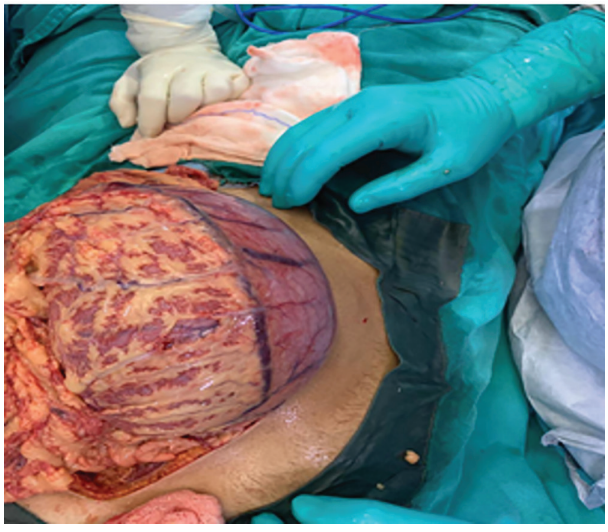

Fig. 4. Following the reduction, gastric volvulus was observed, presenting as a distended stomach.

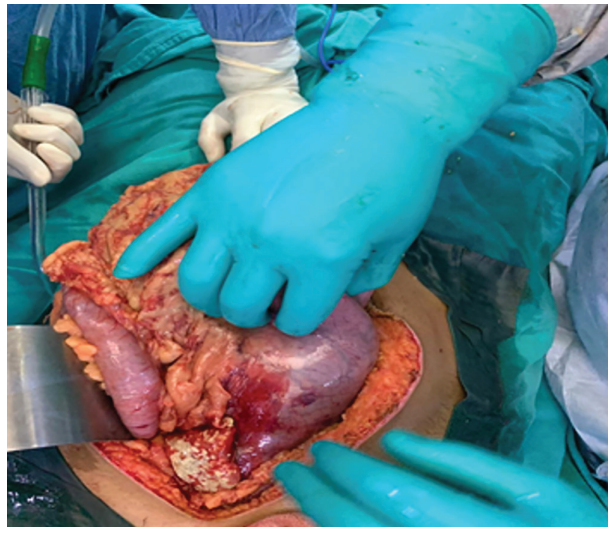

Fig. 5. The pancreas and small bowel loops are being reduced.

All herniated contents were carefully reduced into the abdominal cavity. The diaphragmatic defect was repaired with non-absorbable sutures to prevent recurrence. Finally, a fundoplication procedure was performed to mitigate the risk of future herniation, and a nasogastric tube was placed for decompression.

The postoperative course was uneventful, and the patient was discharged on the fifth postoperative day. At the six-month follow-up, the patient remained asymptomatic with no recurrence of his previous symptoms.

Discussion

A diaphragmatic hernia is characterized by the herniation of abdominal contents into the thoracic cavity through a diaphragmatic defect. While congenital forms are well-documented, acquired diaphragmatic hernias (ADH) are rare. They typically result from blunt thoracoabdominal trauma and are reported in less than 1% of all trauma cases [7, 8]. Such injuries are frequently missed during the initial assessment and may present months or even years post-trauma [1, 3, 9]. Less commonly, iatrogenic causes, dependent on the surgical procedure, closure techniques, and patient-related factors, have also been described [10]. Consistent with prior literature, the present case involved a left-sided diaphragmatic defect, which is more frequent due to the protective effect of the liver on the right side [11]. The underlying mechanism typically involves a sudden rise in intra-abdominal pressure, causing a rupture at the diaphragm's embryologically weak points [3].

Several previously reported cases have documented the delayed presentations of traumatic diaphragmatic hernias. For instance, Yadav *et al.,* described a case of trauma-induced diaphragmatic hernia that presented late with bowel obstruction in the absence of gastric volvulus [12]. In contrast, our patient's case was complicated by gastric volvulus, a rare but potentially life-threatening condition when associated with diaphragmatic defects. Although this combination has been reported more frequently in elderly patients or those with paraesophageal hernias, it remains uncommon in young trauma patients.

Borchardt's triad, which includes epigastric pain and distension, unproductive retching, and the inability to pass a nasogastric tube, is considered pathognomonic for acute gastric volvulus [13]. Our patient exhibited all three signs, which made the clinical diagnosis more straightforward. Radiologically, Carter *et al.,* emphasized the importance of findings such as a large gas-filled viscus in the thorax and an absence of significant abdominal gas [14]. These findings were also evident in our case; specifically, a thoracic gas shadow and diaphragmatic eventration on chest X-ray, aiding early diagnosis and decision-making. In terms of classification, Singleton's system categorized gastric volvulus by the axis of rotation [15]. Our case was identified as organo-axial (OA) volvulus, the most common variant, which represented 59% of cases. This accurate classification played a key role in surgical planning.

Surgical intervention is the cornerstone of management. We proceeded with emergency laparotomy, which included derotation, reduction of herniated organs, primary diaphragmatic repair, and fundoplication. This approach aligned with the recommendations of Shah *et al.,* who emphasized early surgical correction to prevent gastric strangulation and recurrence [16]. Unlike some complex cases that require a thoracotomy, our patient underwent successful repair through a laparotomy due to the nature and accessibility of the defect.

Cases of delayed diaphragmatic hernia with gastric involvement have also been reported. For instance, Al-Naami reported a case of organo-axial volvulus that presented nearly one year after a penetrating gunshot wound and required surgical repair [17]. While that case shared the delayed timeline, the present patient was younger, had a history of blunt trauma, and exhibited multivisceral herniation

rather than isolated stomach involvement. Melek *et al.,* reported a more severe case that required total gastrectomy and thoracic drainage due to intrathoracic gastric perforation and tension empyema, underscoring the devastating potential consequences of a missed or delayed diagnosis [18]. Fortunately, our patient presented before the onset of perforation, enabling organ-preserving intervention.

In summary, this case is noteworthy due to the rare combination of a delayed traumatic diaphragmatic hernia and gastric volvulus in a young adult. Although the individual components of this presentation were described, such a constellation was infrequently reported. This case highlighted the need for a high index of suspicion in trauma patients who later present with vague gastrointestinal symptoms. Prompt imaging and timely surgical intervention are essential to prevent life-threatening complications and ensure optimal patient outcomes.

However, several significant challenges impede early diagnosis:

• Diaphragmatic tears can be radiologically occult during the acute phase [14, 15].

• Clinical symptoms in delayed presentations are often nonspecific and easily misattributed to other conditions [13].

• Many trauma patients do not receive adequate long-term follow-up, particularly in low-resource settings [13, 16].

Recommendations to address these challenges include:

• Performing routine CT imaging with coronal/sagittal reconstructions for all high-energy thoracoabdominal trauma cases [2, 4, 14].

• Development of radiology checklists to prompt diaphragm inspection during trauma CT scans.

• Establishing structured trauma follow-up programs and registries for high-risk patients [13].

• Considering MRI or diagnostic laparoscopy in equivocal cases, particularly in stable patients with unexplained symptoms and a history of trauma [1, 5].

This case report had certain limitations that must be acknowledged. First, as a single-patient case, its findings lack generalizability. The conclusions might not be applicable to all cases of delayed traumatic diaphragmatic hernia or gastric volvulus, given the variability in patient presentations, trauma mechanisms, and institutional protocols.

Secondly, despite a detailed clinical, radiological, and surgical account, long-term follow-up data were limited. Extended postoperative surveillance would provide greater insight into recurrence risks and long-term functional outcomes, particularly for younger patients undergoing complex repairs.

Thirdly, while our discussion references established literature, we acknowledged the absence of standardized international guidelines for the screening, diagnosis, and follow-up of trauma-induced diaphragmatic injuries. This absence made it difficult to benchmark the timing of diagnosis and interventions, particularly in delayed cases.

Finally, diagnostic imaging was restricted to conventional modalities due to institutional resource constraints. In stable patients with ambiguous symptoms, advanced imaging techniques, such as MRI or video-assisted thoracoscopic assessment, could have provided more comprehensive preoperative details.

Despite these limitations, this case offered valuable clinical insights regarding the recognition and management of delayed diaphragmatic hernia with gastric volvulus. This is particularly relevant for young trauma patients—a scenario that remains seldom reported in the literature.

This case emphasized the critical importance of considering diaphragmatic hernia and gastric volvulus in trauma patients presenting with progressive gastrointestinal symptoms. Given the potential for delayed diagnosis, maintaining a high index of suspicion is essential. Early identification through appropriate imaging and prompt surgical intervention is paramount to achieving favourable outcomes in these rare and complex cases.

Declaration

Ethics approval and consent to participate: The study was approved by the Institutional Ethics Committee of AIIMS Patna (Ref. No. AIIMS/Pat/2025/IEC/1456), dated 13th May 2025. Written informed consent form was obtained from the patient.

Consent for publication: The consent for publication was obtained and could be provided upon request.

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