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Unveiling the Hidden Threat: Acquired Diaphragmatic Hernia in Adults - A Case Series and Key Insights from a Tertiary Care Center

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Abstract: ***Background: Acquired diaphragmatic hernia (ADH) is a rare but potentially life - threatening condition caused by trauma, surgical complications, or increased intra - abdominal pressure. ADH frequently goes misdiagnosed until problems occur because of its diverse clinical appearance. (1, 2). Objective: The purpose of this study is to emphasize clinical presentations, diagnostic difficulties, and treatment results for a case series of adult patients with ADH as a result of trauma, who were diagnosed at a tertiary care hospital. Results: Three patients with different presentations of ADH are included in this case series. Chest pain, gastrointestinal issues, and dyspnea were typical symptoms. Chest X - ray and CT scan were the primary diagnostic tools. Surgical repair via laparoscopy with sos open procedure were performed in all cases, with positive outcomes and no major recurrences. (3, 4). Conclusion: Early recognition of ADH is crucial for optimal management. Advancement in imaging techniques and surgical approaches contribute to improved patient outcomes. Raising physician awareness can result in lower morbidity and mortality rates and prompt intervention. (5, 6)***

Keywords: Acquired diaphragmatic hernia; Trauma; Laparoscopic repair; Diaphragmatic defect; Herniation; Thoracic cavity; Respiratory distress; Gastrointestinal symptoms.

1. Introduction

Acquired diaphragmatic hernia (ADH) develops when abdominal organs herniate into the thoracic cavity resulting from a defect in diaphragm. Unlike congenital diaphragmatic hernias, which develop due to embryological errors, ADH is usually caused by external factors such as trauma, past surgical operations, or disorders that cause elevated intra - abdominal pressure. (7, 8)

Traumatic ADH is frequently associated with blunt or penetrating trauma to the abdomen or thorax, which cause diaphragm rupture. However, iatrogenic reasons, such as problems after abdominal or thoracic surgery, are becoming increasingly common. (9) Although rare, spontaneous ADH can arise as a result of chronic illnesses such as prolonged coughing, severe vomiting, or chronic obstructive pulmonary disease (COPD), which raise intra - abdominal pressure and weaken the diaphragm over time. (10)

Clinically, ADH varies greatly, ranging from asymptomatic to life - threatening respiratory distress. Non - specific symptoms such as prolonged chest pain, dyspnea, or gastrointestinal discomfort can result in a misdiagnosis. (11, 12) If ADH is not identified, problems such as strangulation, intestinal obstruction, or cardiorespiratory impairment may arise, necessitating immediate surgical intervention. (13)

Despite advances in imaging techniques, ADH remains a diagnostic problem, especially in delayed presentations. Chest X - rays, computed tomography (CT) scans, and magnetic resonance imaging (MRI) are critical for detecting diaphragmatic abnormalities and herniated contents. (14, 5)

The purpose of this study is to provide a series of adult ADH cases seen at a tertiary care hospital, providing useful information about clinical presentations, diagnostic methods, surgical management, and patient outcomes. By analyzing these cases, we hope to add to the increasing knowledge on ADH and emphasize the importance of early detection and prompt surgical intervention in reducing morbidity and mortality.

2. Case Presentations

Case 1:

- **Patient Information**: 32 - year - old male with a history of blunt trauma chest and abdomen.
- **Symptoms**: Chest pain and difficulty in breathing.
- **Examination findings:** Chest wall examination shows tenderness on palpation and reduced air entry on left side with bowel sounds on auscultation. Abdominal tenderness was present in right hypochondrium and epigastric region.
- **Diagnosis**: CT scan revealed left - sided diaphragmatic defect (5.7 x 4.7 cm) with stomach, tall of pancreas, small bowel loops and partly large bowel loops and its mesentry into left hemithorax causing compressive atelectasis.
- **Management**: Laparoscopic diaphragmatic hernia repair.
- **Outcome**: Uneventful recovery with no recurrence at 12 - month follow - up.

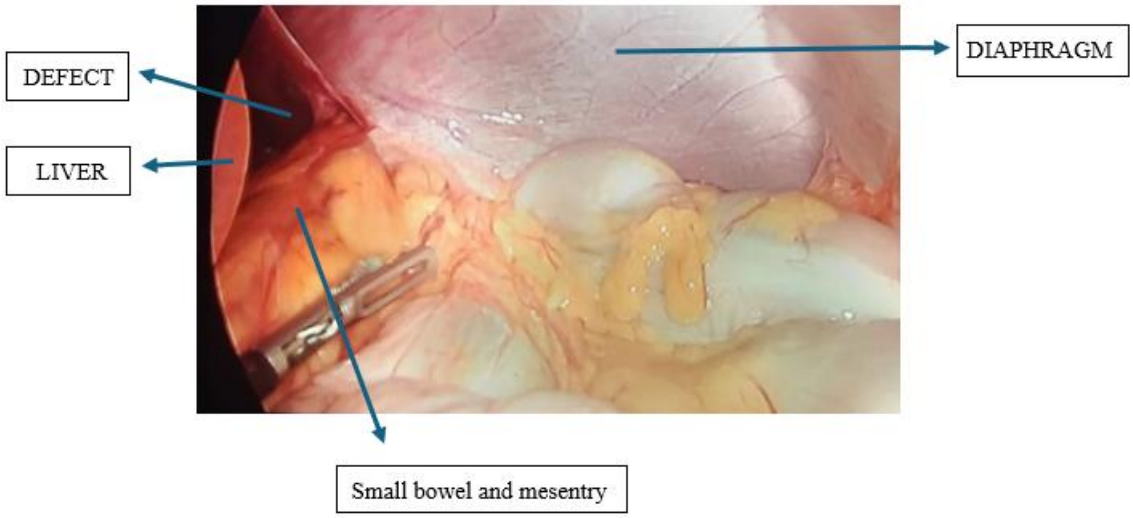


Figure 1: Intra - operative image showing diaphragmatic defect with small bowel loops and mesentry herniating in thoracic cavity.

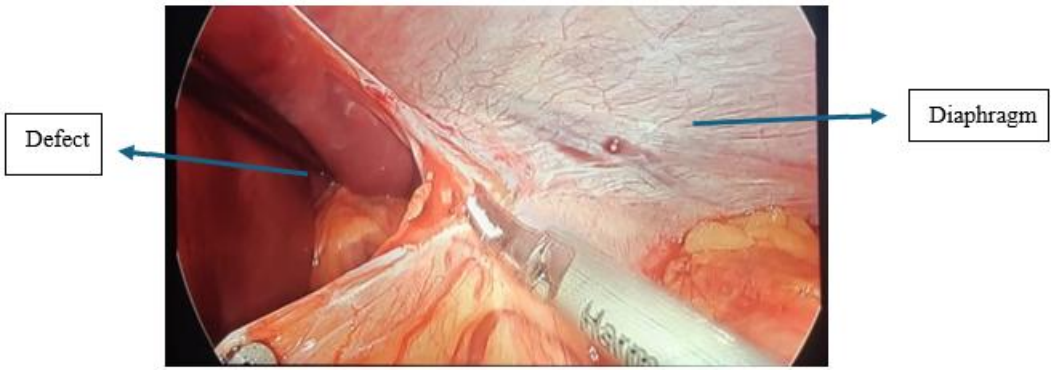


Figure 2: Image showing diaphragmatic defect with herniating content pulled back into the abdominal cavity

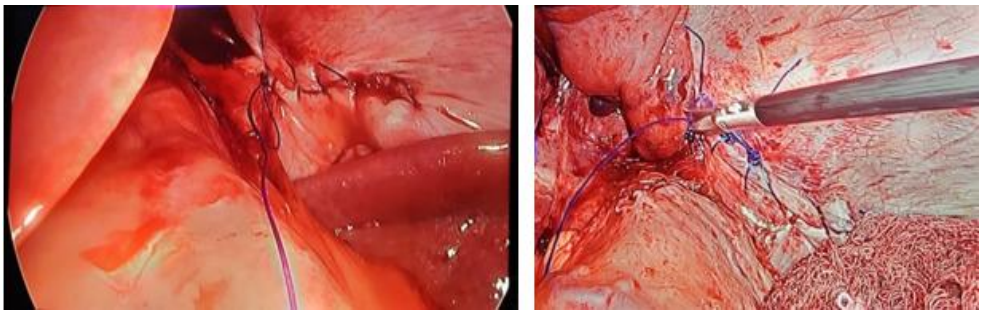
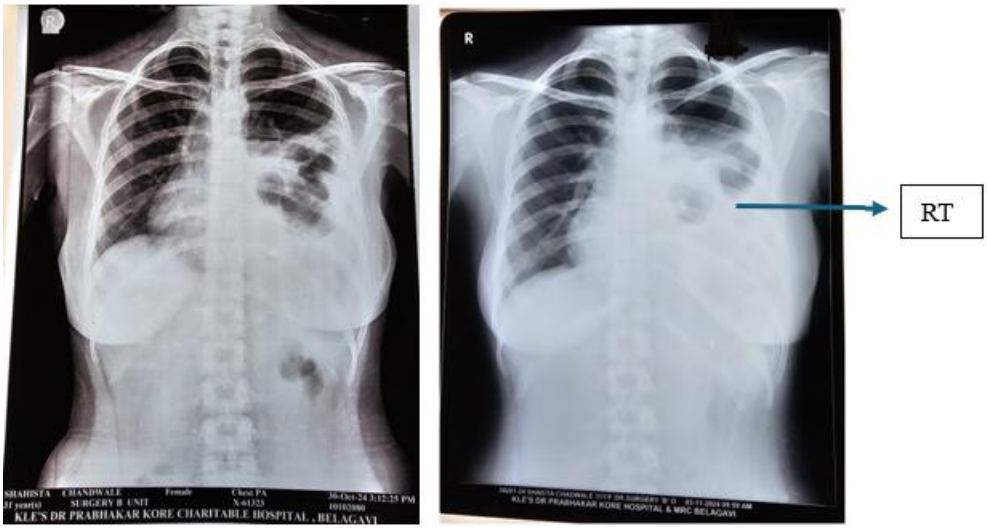


Figure 3: Primary watertight closure of defect in the diaphragm.

Case 2:

- **Patient Information**: 31 - year - old female with a prior history of Laparoscopic splenectomy.
- **Symptoms**: Pain abdomen and vomiting with mild respiratory distress.
- **Examination findings**: Rebound tenderness in the left upper quadrant of the abdomen along with bowel sounds in the left side of the chest and reduced breath sounds on the same side.
- **Diagnosis**: Chest X - ray and CT scan confirmed large defect in the posterolateral aspect of left hemidiaphragm, with a defect of 4.2 cms along with herniation of stomach, body and tail of pancreas, both small and large bowel loops along with mesentery in the thorax with collapsed left lung.
- **Management**: Laparoscopic converted to open hernia repair due to extensive adhesions.
- **Outcome**: Successful recovery; mild postoperative discomfort resolved in six weeks.



(a) (b)

Figure 4: (a) Chest x - ray shows dilated bowel loops in the left chest cavity with collapsed left lung. (b) - Ryles tube visualised in the chest cavity s/o presence of stomach in thorax.

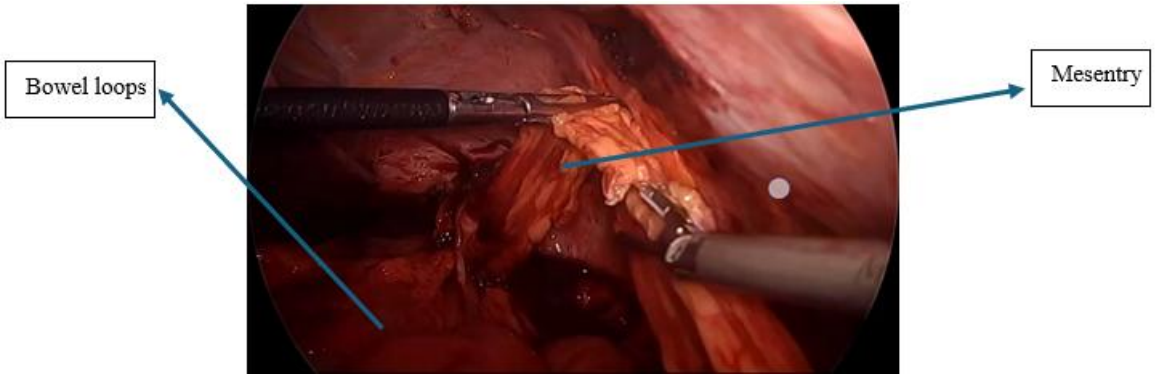


Figure 5: Intra - operative image showing mesentry and bowel loops in the thoracic cavity

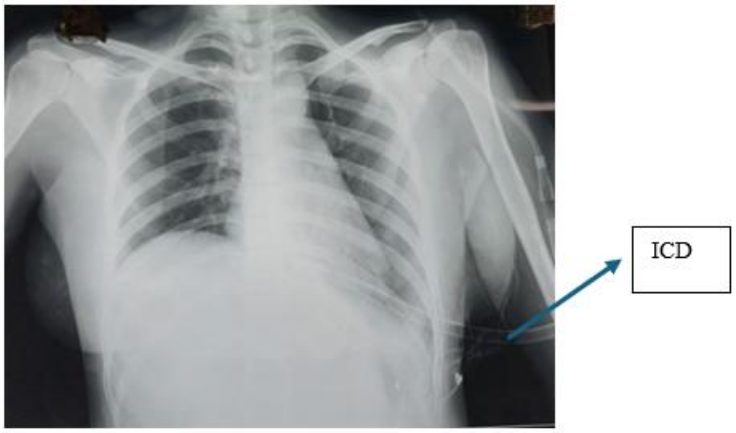


Figure 6: Post operative chest X- ray depicting expansion of left lung with ICD in situ.

Case 3:

- **Patient Information**: 70 - year - old female with a history of blunt trauma chest and abdomen.
- **Symptoms**: Pain abdomen and vomiting
- **Examination findings:** Abdomen was tense, distended with sluggish bowel sounds. Chest examination revealed bilateral breath sounds reduced (left > right).
- **Diagnosis**: CT scan revealed left diaphragmatic hernia containing portion of stomach, colon and abdominal fat (Defect – 3.4 x 5.5 cm) with organo - axial volvulous of stomach with gross dilatation of body of stomach
- **Management**: Laparoscopic diaphragmatic hernia repair with laparoscopic gastropexy
- **Outcome**: Uneventful recovery with no recurrence at 12 - month follow - up.

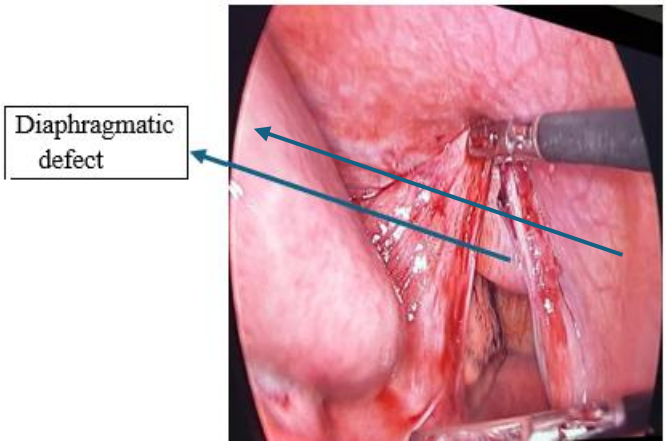


Figure 7: Intra operative image showing diaphragmatic defect with herniating structures

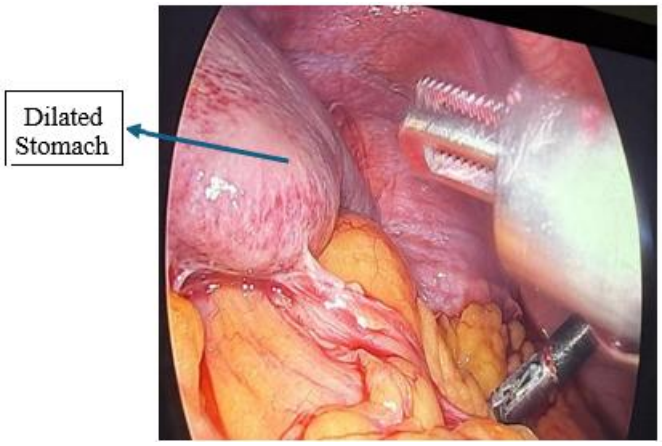


Figure 8: Image showing dilated stomach and mesentry in the thoracic cavity.

3. Discussion

Pathophysiology of ADH

ADH occurs when trauma or iatrogenic injury weakens the diaphragm, allowing abdominal contents to enter the thoracic cavity. A hernia may go unnoticed for months or years before symptoms arise. The steady enlargement of the defect might compress thoracic tissues, resulting in respiratory and gastrointestinal difficulties. (16)

Diagnostic Challenges

Diagnosing ADH is often difficult due to its diverse clinical presentation and its ability to resemble other thoracic or abdominal illnesses. The following challenges contribute to delayed or missed diagnoses:

1) **Non - Specific Symptoms:** ADH can cause ambiguous symptoms such as chronic chest pain, dyspnea, epigastric discomfort, or recurrent vomiting. These could be misinterpreted for more prevalent illnesses such gastroesophageal reflux disease (GERD), pleural effusion, or pneumonia. (17)
2) **Radiological investigations:**
   - **Chest X - ray:** Although commonly used, it may fail to detect small diaphragmatic defects, particularly if no herniated organs are present at the time of imaging. (18)
   - **CT Scan:** CT is considered as the gold standard for diagnosis. (19)
   - **MRI** (20)
3) **Delayed Diagnosis in Trauma Cases:** Many traumatic ADH instances go undetected during the initial evaluation of the injury. A patient in stable condition may not get thorough imaging until later symptoms arise, which can be months or years after the initial event. (21)
4) **Misdiagnosis in Post - Surgical Cases:** ADH caused by previous abdominal or thoracic surgery may be misinterpreted for post - operative adhesions, recurring hernias, or other surgical sequelae. (22)
5) **Spontaneous ADH and Comorbidities:** In circumstances when there is no obvious history of trauma or surgery, ADH might be misdiagnosed as chronic respiratory illnesses such as COPD, making diagnosis more difficult. (23)

A significant level of suspicion is necessary for the early diagnosis of ADH, especially in people who have had surgery or trauma in the past. These diagnostic difficulties may be resolved with the help of increased physician knowledge and developments in imaging methods, such as dynamic fluoroscopic studies and three - dimensional reconstructions. (24)

Surgical Treatment

Laparoscopic versus Open Repair:

- Laparoscopic procedure - For stable patients with very little adhesions, laparoscopy is recommended as it helps with quick healing and lowers morbidity.
- Open procedure - Larger defects, severe adhesions, or consequences like strangulated hernias are treated with open surgery.
- Mesh reinforcement is advised for significant/ large defects in order to prevent recurrence, particularly when the diaphragmatic tissue is weak.

Comparative Literature Review

According to previous researches, delaying the diagnosis of ADH elevates the risk of complications like strangulation, ischemia, and respiratory distress. The prognosis is improved by early intervention. Research compares open surgery with less invasive thoracoscopic and laparoscopic techniques. For large defects, open surgery is still the best option, but laparoscopic approach is growing in popularity because of quicker recovery and lower rates of morbidity. Literature review also show that delayed diagnosis raises the risk of mortality and morbidity. Although individuals who are diagnosed late are more likely to experience challenges. than patients who are diagnosed within the first month of symptom with a 90% positive outcome.

4. Conclusion

- Early diagnosis and prompt surgical intervention are crucial for managing acquired diaphragmatic hernia, as demonstrated in this case series. ADH frequently manifests with non - specific symptoms, causing delays in diagnosis, which might result in serious complications. (25) Imaging techniques such as chest X - rays and CT scans are critical in detecting diaphragmatic abnormalities and facilitating quick management.
- Surgical repair is the definitive treatment for ADH, with both laparoscopic and open procedures depending on the

patient's health and severity of hernia. The use of mesh reinforcement in major defects has been proven to lower recurrence rates and improve long - term outcomes. (26)

- Increasing clinical awareness among healthcare workers is crucial for early detection and management of ADH. We hope that by sharing our experience through this case series, we can contribute to the current literature and underline the importance of maintaining a high clinical suspicion level in at - risk individuals. Future research should concentrate on improving surgical procedures and developing minimally invasive approaches to improve recovery and patient outcomes. (27)

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