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Case Report

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Traumatic Diaphragmatic Hernia

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Introduction

Diaphragmatic injuries occur in 0.8–1.6%1 of the patients suffering from thoraco-abdominal trauma. Diaphragmatic rupture leads to a traumatic diaphragmatic hernia [1]. Traumatic diaphragmatic hernia occurs in less than 50% of the patients with diaphragmatic injuries.2 Diagnosis of diaphragmatic injuries is difficult and often delayed leading to increased morbidity and mortality. Traumatic diaphragmatic hernia is a rare and often under recognized complication of penetrating and blunt trauma. These injuries are often missed or there is a delay in diagnosis, which can lead to enlargement of the defect and the development of abdominal or respiratory symptoms.

Case Report

The 35-year-old male presented with complaints of dyspnoea on exertion, with mild pain in the left upper abdomen with history of Road Traffic Accident and blunt trauma chest and abdomen 10 year back. Clinical examination revealed decreased breath sounds on left hemi thorax and presence of gurgling sounds over the left hemi thorax. Rest examination was normal (Figure 1).

Figure 1: Chest X-ray showed stomach and bowel loops shadows in the Left Hemithorax with ipsilateral collapsed lung.

A Contrast Enhanced Computed Tomography (CECT) of thorax and abdomen showed herniation of the stomach, bowel loops and spleen through the left hemi diaphragm in left hemithorax with partial collapse of underlying lung.? left diaphragmatic hernia **(Figure 2)**.

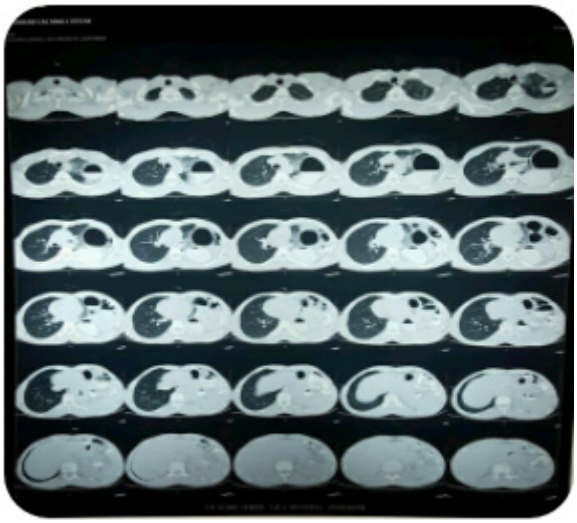

Figure 2: Upper GI Endoscopy was normal.

Patient was planned for laparoscopic Surgery. Almost whole of the left thoracic cavity was occupied by the abdominal contents with complete collapse of left lung (Figure 3).

Figure 3: Collapsed Lung.

Laparoscopic reduction of hernial contents (stomach and small bowel and spleen) was done after adhesinolysis and lots of manipulation. Spleen was densely adhere to the antero- lateral thoracic cavity. It was released from all sides and replaced back in abdominal cavity along with the stomach. Hernial sac was completely excised and the diaphragmatic defect was closed and reinforced with the composite mesh. Chest drain was placed in left thoracic cavity. In follow, up patient is asymptomatic with some inflation of lung field. Chest tube removed after two weeks after consultation of CTVS surgeon (Figure 4,5).

Figure 4: Post Op Port Positions. Figure 5: Post Op Chest X-ray.

Discussion

Incidence

Diaphragmatic injury accounts for about 0.8-1.6% of blunt trauma abdomen. Nearly about 4-6% of patients who undergo surgery for trauma have a diaphragmatic injury [2,3].

Etiology

The major cause of diaphragmatic injury is either by penetrating or blunt injuries to the abdomen. They are mostly diagnosed as part of multi-organ injury, or later either with respiratory distress or as intestinal obstruction. Diaphragmatic injury resulting from blunt trauma usually accompanies injury to local structures including ribs and abdominal solid viscera, especially the liver and the spleen. Penetrating injury to the diaphragm is also usually accompanied by injuries to one or more nearby viscera [4-19]. Including the lungs, the liver, the stomach, the spleen, the kidneys and the colon. Bullets lead to a greater number of local visceral injuries than do knives. A high index of suspicion for a diaphragmatic injury remains the key with penetrating thoraco abdominal or high velocity deceleration mechanisms [20]. Shearing of a stretched membrane, the sudden force transmission through viscera acting as viscous fluid and avulsion at the point of diaphragmatic attachment is considered as possible mechanism in blunt injury.

The most common injuries occur on left side, of about 68.5% of the patients and right-side injuries accounts for 24.2%, and 1.5% had bilateral rupture, 0.9% had pericardial rupture, and 4.9% were unclassified in the present collective review [1]. Many autopsy studies have revealed that incidence of rupture is almost equal on bilateral sides, but the greater force needed for the right rupture is associated with more grave injuries. A positive pressure gradient of 7-20 cm of H2O between the intraperitoneal and the intrapleural cavities forces the contents into the thorax. With severe blunt trauma, the pressures may rise to as high as 100 cm of water.

Clinical Features

The patient with a diaphragmatic rupture often presents to surgeon with symptoms of breathlessness, which is been mistaken as bronchopneumonia. Abdominal signs due to obstruction may be another mode of presentation. The grading of severity has been proposed by Grimes who discussed diaphragmatic rupture in phases- Acute, Latent and the Obstructive phase. The Acute presentation is in the patient with poly trauma associated with multiple intra-abdominal and chest injuries. The Latent phase is when herniation occurs through undetected diaphragmatic ruptures and rents. The Obstructive phase is when the loop of herniated bowel obstructs, and the patient develops distension and strangulation [8].

Table 1 AAST Organ Injury Scale—Diaphragm[a]

Grade	Injury description
I	Contusion
II	Laceration ≤2 cm
III	Laceration between 2 and 10 cm
IV	Laceration >10 cm with tissue loss ≤25 cm^2
V	Laceration with tissue loss >25 cm^2

[a]Advance one grade for bilateral injuries.

Table 1: The American Association for the Surgery of Trauma (AAST) organ injury scale for the diaphragm is depicted.

Investigations

Imaging: A chest radiograph is commonly performed but rarely diagnostic. This is especially true for penetrating trauma where diaphragm injuries are smaller and plain films are seldom helpful. A chest X-ray more commonly will make the diagnosis following a blunt mechanism and in these circumstances, may appear dramatic. Examples of such radiographic evidence include air or an air-fluid level within a hollow viscous overlying the thorax or with the additional classic finding of the coiling supra-diaphragmatic nasogastric tube, findings include abnormality in the contour shape or elevation of the hemi-diaphragm. Pleural effusion or atelectasis and mediastinal shift to the side contralateral to the injury [21,22].

A CT thorax: has a sensitivity of 14-82% and a specificity of 87% and permits direct visualization of the contents and the rupture. Suggestive findings using this modality include discontinuity of the diaphragm or a wound tract extending up to a Hemidiaphragm. while conclusive evidence includes intrapleural abdominal viscera. CT has a greater sensitivity for blunt trauma. where injuries are larger, but is less helpful following penetrating mechanisms, where injuries are small and acute herniation rare [22].

CT scan: is far from perfect and certainly may miss a small injury. Advances in imaging technology including 16-slice and 64- slice multidetector row CT with reformatted sagittal and coronal images should improve sensitivity [10].

Magnetic Resonance Imaging (MRI): has superior soft tissue resolution compared to CT. However; it currently has a limited role, as it is a more difficult and costly modality to perform in the acute setting. MRI is absolutely contraindicated in hemodynamical1y unstable patients.

Focussed Abdominal Sonography(FAST): for trauma is now a good aid in diagnosing diaphragmatic hernia [11].

Management

The treatment for an injured diaphragm is operative whether an injury is acute or chronic. Regardless of mechanism, acute injuries can usually be repaired primarily. Repair may be achieved via laparoscopy or laparotomy, depending on a patient's hemodynamic stability and associated injuries. In patients with chronic diaphragmatic hernias related to trauma, a proper history and physical examination may be suggestive.

'These missed injuries often present with alimentary tract obstruction. incarceration. or sometimes strangulation.

They are almost always found on the left and the diagnosis can usually be made with plain radiography, although CT scan is frequently used to better delineate visceral involvement. When a diagnosis of diaphragmatic rupture is suspected in a patient with polytrauma, military anti-shock trousers are contra-indicated as it could cause severe cardiopulmonary deterioration. The patient is stabilized and taken up for emergent surgery. While controversies exist between laparotomy and thoracotomy, laparotomy is preferred as this is often associated with other abdominal injuries. Minimally invasive procedures (abdominal and thoracic) are now-a-days preferred in small defects detected early [18]. Laparotomy remains the gold standard in acute cases. While Laparoscopy is a very good modality for the latent cases. simple suture is sufficient in the small defect, larger defects need a synthetic mesh.

Conclusion

Chronic diaphragmatic hernias are usually missed, and patient present only when symptomatic or incidentally when he is evaluated for other disease. Laparoscopic surgery is a very good modality as it can access both abdomen and chest at the same time. Because of trauma usually lots of adhesions are present between content and chest wall in case of traumatic diaphragmatic hernia and adhesinolysis even in the chest can be done very safely under the vision which is not possible through only laparotomy. Mesh reinforcement of the defect can also be done very meticulously

under the vision. Patient is spared of a long laparotomy invasion and side effect.

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