Diaphragmatic Hernia Repair- A Tailored Approach

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Abstract
Diaphragmatic hernia can be congenital or acquired. Clinical presentation may range from asymptomatic cases to serious respiratory or gastrointestinal symptoms. Various treatment options: open, laparoscopic & tailored laparoscopic approaches are available for this condition. A 64yr female visited to Department of Surgery on 12th June 2017 with mild pain over left chest with history of blunt trauma to the chest due to road traffic accident 4 days back. Chest x-ray and CT-scan chest were performed along with baseline blood investigations. There was a defect of approximately 6cm x 4cm in left hemidiaphragm through which stomach, part of transverse colon with splenic flexure and spleen were protruding into left thoracic cavity. Initially laparoscopic approach was tried but due to difficulty in reducing the content a mini thoracotomy incision was made and contents were reduced. Following this, mesh repair done laparoscopically. The post-operative recovery was rapid and uneventful.

The overlapping of laparoscopic approach and mini thoracotomy (hybrid technique) leads to repair of even large diaphragmatic hernia with less morbidity postoperatively.

Keywords
Diaphragmatic Hernia; Tailored Laparoscopic Approach; Mesh; Mini Thoracotomy

Abbreviations
CDH: Congenital Diaphragmatic Hernia
CT: Computed Tomography
DR: Diaphragmatic Rupture

Introduction
Diaphragmatic hernia can be congenital (1 in 2500 newborns) [1] or acquired (5% of trauma) [2]. Clinical presentation may range from asymptomatic cases to serious respiratory or gastrointestinal symptoms, and sometimes haemodynamic instability.

Diagnosis is early in case of congenital diaphragmatic hernia with severity depending of the degree of pulmonary hypoplasia and pulmonary hypertension while diagnosis is relatively delayed in case of diaphragmatic rupture, even for years following trauma.

There is no consensus on the absolute indications to surgery and about the timing. The onset of complications carries highest mortality and morbidity rates; therefore, it makes emergency surgery mandatory, especially if there is concomitant intra-abdominal injury after initial...
resuscitation is accomplished. Traumatic rupture of the diaphragm is considered an indication for surgical repair, especially in symptomatic patients [3]. Patients who present in the latent phase or long after trauma require repair because the hernia contents may become strangulated, leading to gangrenous gut, stomach, liver, spleen or other organs.

Laparotomy or thoracotomy (Primary suture repair/ Mesh repair) are the traditional treatments for patients with diaphragmatic hernia. Moreover, laparoscopic approaches for repair of hernias have recently gained in popularity [4].

This paper includes the surgical experience of hybrid technique (laparoscopy combined with mini thoracotomy) for a traumatic diaphragmatic hernia.

**Case Description**

A 64yr female visited to Department of Surgery on 12th June 2017 with mild pain over left chest and shortness of breath with history of blunt trauma to the chest due to road traffic accident 4 days back. On general physical examination, patient was tachypneic. Respiratory system examination revealed no breath sounds in the left chest area; however, bowel sounds were audible. Rest of the systemic examination were normal. Initially a Chest x-ray was done and left traumatic diaphragmatic hernia was suspected. CT-scan chest was performed to delineate the anatomical defect and the contents of the hernia (Figure 1, 2, 3). Routine blood investigations were within normal limits.

**Figure 1:** Chest X-Ray (PA view). Herniation of Bowel Contents into Left Thoracic Cavity through Diaphragm with Resultant Left Lung Collapse and Displacement Trachea towards Right

Initially laparoscopic approach was attempted. Patient was kept in right lateral position and 4 ports (10mm infra umbilical camera port, two 5mm port in left upper abdomen and one 5mm port in anterior axillary line) were made. There was a defect of approximately 6cm x 4cm in left hemidiaphragm through which stomach, part of transverse colon with splenic flexure and spleen were protruding into left thoracic cavity (Figure 4, 5, 6). Due to difficulty in reducing the contents, a left lateral mini thoracotomy incision was made and the contents were reduced. Following this, suture repair followed by composite mesh repair done laparoscopically (Figure. 7, 8). The minithoracotomy site was closed in layers after placing a chest tube.
Post operatively patient was shifted to ICU, following 2 days of admission she was extubated (Figure 9). Chest tube was removed on the 4th post-operative day. She was shifted to surgical ward from ICU on the 5th post-operative day and was discharged on the 7th post-operative day. She is on regular follow-up for last 6 months and is asymptomatic till date.

**Review of Literature**

Diaphragmatic rupture with abdominal organ herniation was first described in 1541 by Sennertus [5]. Congenital diaphragmatic hernias are prenatally or during the neonatal period diagnosed. On the contrary, CDH in adulthood are exceedingly rare and can occur through an anterior parasternal Morgagni foramen or through a posterolateral, mainly left-sided, named as Bochdalek hernia, firstly described in 1848 [6]. The aetiology is
still under study, but the disease is due to the failure of closure of the canal between the septum transversum and the oesophagus during the 8th week of gestation. Morgagni hernia is a rare disease caused by the defective development of the sternal attachments to the diaphragm. Traumatic diaphragmatic hernias are thought to be produced by a sudden increase in the pleuroperitoneal pressure gradient occurring at areas of potential weakness along embryological points of fusion [7].

DR usually results from blunt or penetrating injuries and results in entry of an abdominal hollow/solid viscus or the omentum into the pleural cavity, which may lead to incarceration and even strangulation with a fatal outcome. Traumatic diaphragmatic hernias are frequently caused by a penetrating injury (10-19%), sometimes by blunt thoracic-abdominal trauma (5%) [8]. 88-95% of diaphragmatic ruptures occurred on the left side [9], especially, blunt trauma causes large diaphragmatic defects, commonly involving (>80%) the left posterolateral diaphragm [10]. The right haemidiaphragm is stronger than the left one and the liver has a protective effect too in the right side. For this reason, rupture in the right side is very rare and if occurs, is associated with high mortality and morbidity rate [11].

Surgical repair typically involves primary or patch closure of the diaphragm through an open or endoscopic abdominal or thoracic approach. When the diaphragmatic rupture is of long duration, due to suspicions of adhesions between viscera and chest, thoracotomy or combined thoracic-abdominal approach is preferred.

Conclusion
The overlapping of laparoscopic approach and mini thoracotomy (hybrid technique) leads to repair of even large diaphragmatic hernia.

References