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Laparoscopic Repair of Delayed Traumatic Diaphragmatic Hernia with Mesh

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Abstract

Patients with traumatic diaphragmatic hernias mostly had a penetrant or blunt trauma history on the upper abdomen or lower chest, clinical symptoms may appear months or years after trauma.

Forty-two years old man was presented to the emergency service with abdominal pain, he had a history of pneumothorax secondary to a stab-penetrating trauma four years ago, left traumatic diaphragmatic hernia was diagnosed in computerized tomography and was treated with laparoscopic repair and mesh reinforcement.

Diagnosis of traumatic diaphragmatic hernia is an indication for surgery; laparoscopic surgery is a safe and effective method for the treatment.

Keywords: Traumatic diaphragmatic hernia; Laparoscopic; Mesh; Delayed; Late; Repair

Introduction

Traumatic diaphragmatic hernias (TDH) are rare but life-threatening entities. Despite the widespread use of computed tomography in trauma cases, 9-41% of patients with TDH may stay unrecognized [1], or clinical symptoms may appear months or years later after trauma.

Patients with TDH mostly have a penetrant or blunt trauma history on the upper abdomen or lower chest. TDH may be presented with respiratory distress secondary to reduced intrathoracic volume or abdominal pain due to strangulation and/or incarceration [2]. Mortality rates are reported up to 31% in some series [3]. The diagnosis of TDH is an indication for surgical treatment; the mortality rate can reach to 60% in the non-treated patients who had strangulation or incarceration [4].

In this case presentation, we aimed to share our experience in one patient, who had delayed traumatic hernia, was presented with abdominal pain and treated with laparoscopic surgery.

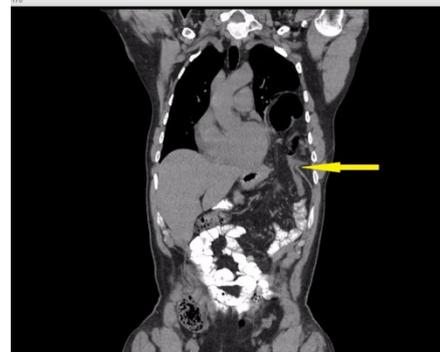


Figure 1: Omental and colonic herniation in coronal computed tomography scan, yellow arrow shows the diaphragmatic defect.

Case Presentation

42 years old man applied to the emergency service with abdominal pain, he had a history of pneumothorax secondary to a stab-penetrating trauma at the junction of left sixth intercostal space and axillary line and was treated with chest tube four years ago. In physical examination abdominal tenderness was detected on all four quadrant of abdomen and bowel sounds was noticed in left hemi-thorax during auscultation. Left diaphragmatic hernia was diagnosed in Chest X-ray and Thoracoabdominal Computed Tomography (**Figure 1**).

Urgent surgery was decided and laparoscopic method was preferred for this patient. Under general anesthesia, 11 mm trocar was placed above the umbilicus, 30 degree endo camera was inserted to abdomen and two 5 mm. trocars were inserted on right and left upper quadrant. Omental and transverse colon herniation to thorax *via* an approximately 5 cm left diaphragmatic defect was seen in laparoscopic exploration (**Figures 2 and 3**).



Figure 2: Diaphragmatic defect and herniation of colon and omentum in laparoscopic exploration.



Figure 5: Reinforcement with composite mesh.



Figure 3: Diaphragmatic defect after reduction of herniated viscera.

Herniated organs were gently reduced to abdomen; there was no ischemia sign in herniated colon segment. Diaphragmatic defect was repaired with 2.0 polypropylene stitches (**Figure 4**). 15 × 15 cm composite mesh was placed to left diaphragm and fixed with absorbable tackers (**Figure 5**). During fixation we avoid the diaphragmatic vessel injury. Patient was discharged uneventfully on postoperative third day. Patient gave informed consent about the publishing of her operation data and documents for scientific purposes.



Figure 4: Diaphragmatic defect after repair with non-absorbable sutures.

Discussion

Diaphragm rupture develops at 0.8-5% of thoraco-abdominal traumas and 30% of these cases are presented in late period [5]. Most of the diaphragm hernias (88-95%) occur in the left hemidiaphragm, because of the protective effect of the liver on the right hemidiaphragm [6]. The mechanism of delayed TDH is explained by a sudden increase in the pleuroperitoneal pressure gradient [7]. Stomach, transverse colon and liver are the most common herniated organs to the thorax [5]. Mortality is associated with ischemia of herniated organs [8]. In our patient, transverse colon was herniated to thorax, but we did not observe any ischemic signs in colon and we did not encounter any morbidity. Since the defect is usually smaller in patients with penetrating trauma compared to blunt trauma, incarceration and ischemia risk and also the mortality risk is higher in penetrant diaphragmatic hernias [9].

Surgery is the only treatment option in TDH. Transabdominal, transthoracic, laparoscopic and thoracoscopic approaches may be preferred. Open surgery provides some conveniences to surgeon; such as easy reduction and better evaluation of functional status and circulation of the organs, besides technically effortless diaphragm repair. On the other hand, laparoscopic or thoracoscopic approach is favoured for the advantages such as faster recovery, less postoperative pain and shorter hospital stay. Laparoscopy is superior than thoracoscopy in TDH, because laparoscopy allows to reduce herniated organs more easily, allows assessment of the ischemic condition of the organs and furthermore both hemidiaphragms can be evaluated during laparoscopic surgery, while thoracoscopy allows only single hemidiaphragmatic examination [1,10]. We preferred laparoscopic method in our patient because of our limited experience in thoracoscopy and high volume of herniated organs.

After the reduction of herniated organs, diaphragmatic defect must be repaired, using non-absorbable sutures recommended for this repair [2,10]. Reducing intra-abdominal pressure will provide technical convenience during laparoscopic repair [1].

There is no consensus about mesh reinforcement in TDH, but using mesh is highly recommended in large defects and mesh placement reduces the recurrence rates [1,5,10]. Biologic and synthetic mesh placements were reported in the literature

[5,10]. Mostly used meshes are synthetic meshes, since the biologic meshes are still expensive [5].

The ideal mesh for TDH should be cost effective, generate adhesion to the diaphragmatic surface, and have minimal adhesion potential to the visceral surface [11]. In our patient, we decided to use mesh for reduce to recurrence risk and we preferred to use composite mesh for avoid the mesh related complications.

Conclusion

Patients with TDH secondary to penetrant trauma should be operated urgently because of the ischemia and mortality risks. Laparoscopic approach is a safe and effective option in treatment.

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