

Case of post traumatic diaphragmatic hernia with complementary injuries.

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ABSTRACT

Traumatic diaphragmatic rupture is uncommon, life threatening and remains a diagnostic and radiographic challenge. Diagnosis is frequently delayed, which may result in a late intervention with a potential catastrophic outcome. We report a case of an acute diaphragmatic laceration in a 17-year-old boy, with a history of self fall from tractor .The boy presented to emergency OPD with difficulty breathing and pain abdomen .During initial evaluation, chest compression test was positive and tenderness at left hypochondriac region.Vitals recorded were normal,then plain chest radiograph showed rib fractures with left pneumothorax. It also showed an elevated left diaphragm with a suspicious gastric shadow in the left hemithorax. With Computed tomography came to the provisional diagnosis of a left-sided diaphragmatic laceration, with herniating stomach,transverse colon, splenic flexure, descending colon with splenic laceration,rib fractures with minimal pneumothorax and Grade 3 splenic injury ,median hepatic vein laceration and decided surgical intervention. During exploratory laparotomy a 10 cm rupture of the left hemi-diaphragm with herniation of the stomach and transverse colon was identified. Splenic lacerations noted and proceeded with splenectomy.The median hepatic vein wall repaired.The hernia was reduced and the defect repaired with interrupted, non-absorbable, sutures. Liver laceration with no active bleeding noted.Left side ICD tube placed.Vaccination given as per schedule.The patient had an uneventful recovery and remained well at a 1-month follow-up visit. Here we highlighting use of THOMPSON'S retractor,need of splenectomy,diaphragm repair,median hepatic vein repair and finally sequence we followed. Outcomes of acute diaphragmatic hernia repair are largely dictated by the severity of concomitant injuries, with the Injury Severity Score being the most widely recognized predictor of mortality.

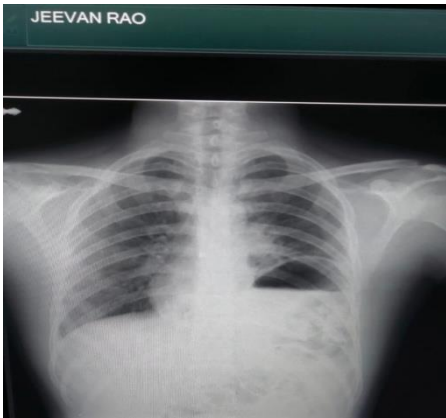
INTRODUCTION

Diaphragmatic injury is an uncommon and life-threatening complication after trauma. Diaphragmatic hernia occurs in upto 8 % of patients with major blunt trauma.The injury result due to either penetrating or blunt trauma.As the signs and symptoms of acute diaphragmatic trauma are often masked by severe concomitant injuries to other organs, a high index of suspicion is warranted for clinical diagnosis, especially in the absence of pathognomonic radiographic findings[2].Most common organ to herniate is stomach. Investigation of choice is CT Thorax.Diagnosis is usually delayed and patients may be asymptomatic after trauma, until complications occur .Once diagnosed, left-sided diaphragmatic injuries should be repaired to reduce the risk of subsequent complications.

CASE PRESENTATION

A 17year-old boy was presented to the emergency department after falling from a tractor.The patient complained of left chest pain and shortness of breath, pain abdomen.On initial evaluation, his vital were stable. Chest evaluation revealed mild respiratory distress , pain on palpation and decreased breath sounds on the left hemithorax. The abdomen was tender to deep palpation on left upper quadrant .

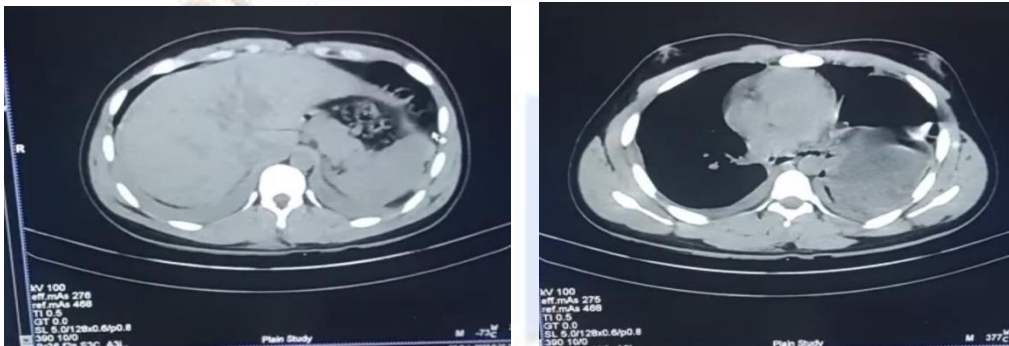
Figure 1 X-ray showing a left pneumothorax and a suspicious gastric shadow in left hemithorax



The patient was evaluated further in the emergency room. Chest radiograph showed a left pneumothorax and also elevated left diaphragm with stomach shadow in thorax (Figure 1)

The patient was evaluated and stabilized in the emergency room. Chest radiograph showed a left pneumothorax and also elevated left diaphragm with suspicious gas pattern of the stomach (Figure 1)

Figure 2 CT section showing herniation of stomach, transverse colon. Computed tomography



(CT) scan of the thorax and abdomen revealed the presence of minimal pneumohemothorax bilaterally with right side rib fractures. It also showed an acute rupture of the left hemi-diaphragm causing herniation of the stomach, distal transverse colon, splenic flexure, proximal descending colon and subsequent lung atelectasis (Figure 2)



Figure 3.
Intra operative showing splenic laceration

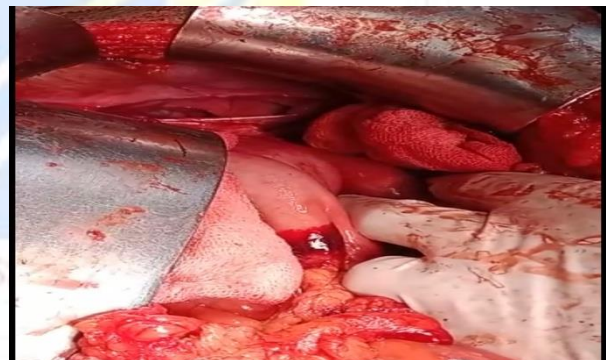
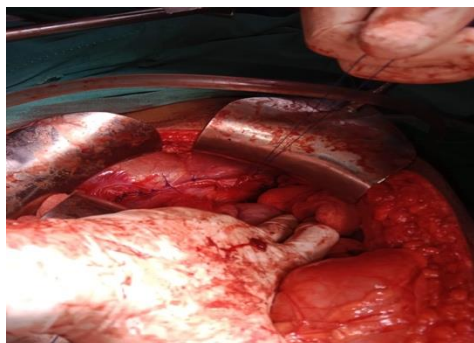


Figure 4 Shows diaphragmatic defect

A grade 3 diaphragm injury[7], grade 5 liver laceration, grade 3 splenic injury mentioned[3]. Then planned for a surgical intervention[5]. On exploration there is gush of blood then with simultaneous suction and with difficulty avulsed spleen (Figure 3) dissected out but bleeding continued in decrease manner. Further compression given on hepatic part of IVC, then with tremendous difficulty we stopped bleeding from median hepatic vein by repairing it. The stomach, transverse colon, splenic flexure were found within the left hemithorax, protruding through a ten-centimeter diaphragmatic



defect (Figure 4).

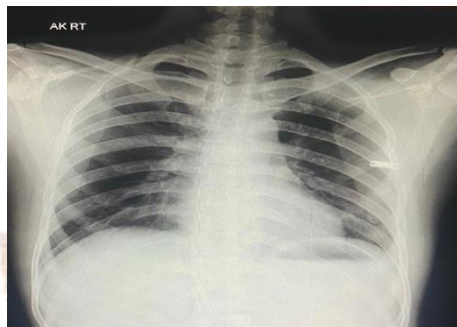


Figure 6 Post-operative x-ray

Figure 5.

Diaphragm repair with interrupt tension free suturing.

After reducing the hernia contents, ICD tube placed from inside and tension-free repair was performed with interrupted prolene suture (figure 5). For liver laceration tension free was performed. No other signs of injury were identified upon final inspection of the abdominal cavity. The patient's postoperative course was uneventful with complete expansion of the right lung. ICD removed on day 8 (Figure 6)

The patient was vaccinated for pneumococcal, meningococcal and Hib[8]. The patient was discharged on the thirteenth postoperative day. On the third month follow-up, the patient was clinically asymptomatic and no evidence of recurrence was identified on the x-ray.

DISCUSSION

Diaphragmatic hernia is a herniation of the abdominal organs or tissues into the thoracic cavity. Traumatic diaphragmatic injuries are rare and usually occur after thoracic or abdominal blunt (2.9%) or penetrating (3.4%) trauma. The incidence of blunt traumatic diaphragm hernia in patients undergoing surgical exploration ranges between 3 and 8%.[9]

Hepatic vein injury is usually associated with liver and IVC injury but compression of liver works most of the time. As here we notice median hepatic vein injury repair with blind closure of tissue surrounding it. In thoracoabdominal injury ICD can be placed from inside easily. However, the precise incidence of this injury is likely to be under-reported. Diaphragmatic injuries, in the absence of acute diaphragmatic hernias, are often missed by diagnostic imaging. The diagnosis can be difficult to make as the physical examination may be unremarkable, and imaging may initially fail to reveal the injury[4].

The possibility of a diaphragmatic injury should always be considered in the context of rapid deceleration or crush injuries. There are a lot of hypotheses about the mechanism of delayed presentation of a diaphragmatic rupture. Delayed rupture of a devitalised diaphragmatic muscle may occur several days or weeks after the initial injury.

Most of the traumatic diaphragmatic injuries (80-90%) occur in the left diaphragm because the left diaphragm is congenitally weaker than the right diaphragm which is protected by the liver. The clinical presentation is varied as patients may be asymptomatic, may have an acute presentation as shortness of breath, shoulder pain, epigastric pain or vomiting, or may manifest at a later stage, after adhesions are formed, as intestinal obstruction, strangulation or perforation.

The symptoms and signs are strongly associated with the size of the diaphragmatic defect, herniated organs and the existence of pulmonary disease. During initial assessment for trauma, most casualties will have a chest radiograph taken. The chest radiograph is an integral adjunct in the Advanced Trauma Life Support guidelines for the initial evaluation of the trauma patient, and is often the first clue to the presence of an acute diaphragmatic injury.

However, a chest radiograph may not be useful in some cases as signs are often masked by associated lung contusion, hemothorax, pneumothorax, pleural effusion, atelectasis, emphysema and non-specific elevation of diaphragm. Between 20-50% of patients who are later found to have a traumatic diaphragmatic injury have their initial trauma chest radiographs described as normal.

CT scan of the chest has become an essential tool for the evaluation of a hemodynamically stable trauma patient. In the absence of an acute hernia, CT scans offer little benefit compared with conventional plain radiographs, as the sensitivity of the CT for the diagnosis of isolated diaphragmatic injury is limited[1]. However, in the presence of herniation of abdominal organs into the thoracic cavity, the sensitivity of oral contrast-enhanced CT scan is close to 95%. It is especially helpful if the plain chest radiograph is obscured by the presence of a hemothorax or a lung contusion. Traumatic rupture of the diaphragm is considered an indication for surgical repair, especially in symptomatic patients. The onset of complications carries highest mortality and morbidity rates. This makes emergency surgery mandatory.

Two principles must be followed when repairing acute traumatic diaphragmatic hernias: complete reduction of the herniated organs back into the abdomen and watertight closure of the diaphragm to avoid recurrence. Repair with non-absorbable simple sutures is adequate in most cases and the use of a mesh should be reserved for chronic and large defects. In some series, suture with absorbable sutures are associated with a higher rate of recurrence.

In patients with giant diaphragmatic hernias, synthetic or biologic grafts can be used for a tension free repair and prevention of recurrence [6]. It should always be considered that, the use of prosthetics may be of benefit in the repair of chronic diaphragmatic injury, but it carries a high rate of infection in the acute setting, especially in the presence of hollow viscous injury in the abdomen. Laparotomy or thoracotomy are the traditional surgical approaches for patients with diaphragmatic rupture, the choice being largely dependent on the skill set of the surgeon involved.

However, given the high rate of associated injuries to intra-abdominal organs, it is generally recommended to approach the diaphragmatic injury through an abdominal approach rather than thoracic approach

CONCLUSION

Diaphragmatic injury with hernia is a rare condition and carries a significant morbidity and mortality due to associated injuries and delayed diagnosis. If treated early, has good prognosis. The diagnosis is by a high index of suspicion. Here we, narrating use of thompson's in long running surgery. It is safe and effective in repairing the diaphragm of patients following blunt abdominal trauma. Tension free suturing is recommended for acute presenters and mesh for chronic delayed conditions. ICD placement from inside can be performed. As veins are low pressure bleeders, can be stopped with compartment closure. Other injuries should be ruled out on intra abdominal examination on OT table. Hence we conclude..

REFERENCES

1. Stein DM, York GB, Boswell S, Shanmuganathan K, Haan JM, Scalea TM. Accuracy of computed tomography (CT) scan in the detection of penetrating diaphragm injury. *J Trauma*. 2007 Sep;63(3):538-43.
2. Petrone P, Asensio JA, Marini CP. Diaphragmatic injuries and post-traumatic diaphragmatic hernias. *Curr Probl Surg*. 2017 Jan;54(1):11-32.
3. Shri Sathya Sai Medical College and Research Institute Chennai, Tamilnadu Chennai, India *Journal of Trauma and Acute Care Surgery*.
4. Acute traumatic diaphragmatic injury. Hanna WC, Ferri LE. *Thorac Surg Clin*. 2009 Nov;19:485–489.
5. Martin MJ, Brown CVR, Shatz DV, Alam HB, Brasel KJ, Hauser CJ, de Moya M, Moore EE, Rowell SE, Vercruysse GA, Baron BJ, Inaba K. Evaluation and management of abdominal stab wounds: A Western Trauma Association critical decisions algorithm. *J Trauma Acute Care Surg*. 2018 Nov;85(5):1007-1015.
6. Dual mesh repair for a large diaphragmatic hernia defect: an unusual case report. Ercan M, Aziret M, Karaman K, Bostancı B, Akoğlu M. *Int J Surg Case Rep*. 2016;28:266–269.

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8. Castagnola E, Fioredda F. Prevention of life-threatening infections due to encapsulated bacteria in children with hyposplenia or asplenia: a brief review of current recommendations for practical purposes. Eur J Haematol 2003; 71:319-26; PMID:14667194; <http://dx.doi.org/10.1034/j.1600-0609.2003.00158>.
9. Panda A, Kumar A, Gamanagatti S, Patil A, Kumar S, Gupta A. Traumatic diaphragmatic injury: A review of CT signs and the difference between blunt and penetrating injury. Diagn Interv Radiol. 2014;20:121–8
10. Miller KS, Sahn SA. Chest tubes. Indications, technique, management and complications. Chest. 1987;91:258–64. [PubMed (<https://pubmed.ncbi.nlm.nih.gov/3542404>)
11. Feldman EA. Injury to the hepatic vein. Am J Surg. 1966 Feb;111(2):244–246. [PubMed (<https://pubmed.ncbi.nlm.nih.gov/590369>)

