

Case Report
Open Access

Traumatic Diaphragmatic Hernia: Management and Review

Sweety kumari¹, Amresh Yadav¹, Bhardwaj Vritika¹, Bhartiya S K^{1*}

Department of General Surgery, Institute of Medical Sciences, BHU, Varanasi, UttarPradesh, India

SUMMARY

Traumatic diaphragmatic injury (TDI) is a fairly uncommon with incidence of 0.8 and 1.6 %, commonest following blunt trauma abdomen. Right-side have higher mortality rate compared to left side and penetrating injuries. It present as occult to obvious. Laparoscopy offers diagnostic and therapeutic tool of care. Lack of awareness of the condition may delay in diagnosis, results life threatening complications. Missed hernia is a known complication of blunt trauma as acute diagnosis can be difficult to ascertain. An early diagnosis and treatment lead to better outcome. In present study CECT revealed acute diaphragmatic hernia, bilateral pleural effusion and hair line fracture of right tibia on skiagram limb. Because of uncertainty in diagnosis of acute diaphragmatic hernia or rupture surgeons faces challenges for the management, high suspicion index required to diagnose the cases. An early diagnosis and treatment lead to better outcome.

*Corresponding author

Bhartiya S K, Department of General Surgery, Institute of Medical Sciences, BHU, Varanasi, UttarPradesh, India; E-mail: satyanambhartiya2@gmail.com

Received: August 22, 2021; **Accepted:** August 27, 2021; **Published:** August 31, 2021

Background

Traumatic diaphragmatic injury leading to herniation of abdominal viscera into the thoracic cavity is not a common entity with incidence of 1.6% [1, 2]. Lack of awareness of the condition may delay the diagnosis and results to life-threatening problem. Missed diagnosis of traumatic diaphragmatic hernia is a known complication of blunt trauma as acute diagnosis [2-5]. An early diagnosis and treatment is ultimately necessary for management. Pre-operative diagnosis is challenging, and till date, there is no consensus on the standard management for such condition. Open primary repair was the standard of care in case of trauma patients with few centers attempting laparoscopic repair for selected patients [6].

Blunt trauma typically results in larger diaphragmatic disruptions with a higher incidence of associated abdominal organ injury. If viscera herniated through the acute breach then the patient may present with acute diaphragmatic hernia. Missed Injuries sometimes present later as chronic diaphragmatic hernia, with obstruction or strangulation of intra-abdominal organs [7]. Patients who presented with TDI following blunt abdominal trauma are resuscitated according to ATLS principles. Emergency laparotomy executed, identify the hernia and viscera repositioned back in the abdomen and the wound in the diaphragm is closed [6, 8]. We report a case of acute diaphragmatic hernia following blunt trauma abdomen, underwent early diagnosis and management in ED.

Case Resentation

A Forty two year gentleman presented in emergency department

in subconscious state and shallow breathing pattern with alleged history of road traffic accident. On examination, GCS of the patient was E3V4M5 with multiple abrasions present over body and lower limbs, a 2x2 cm laceration present over the temporal region of head. Patient was resuscitated as per guidelines on primary survey all parameter seems normal except pallor, tachycardia, altered sensorial state and altered breathing pattern which was reverted following tube thoracostomy. On secondary survey tenderness present in left chest wall, after two units of blood transfusion (PRBC) was done during resuscitation and the he was stabilized and shifted for investigation

Investigation

CECT thorax and abdomino pelvic region, NCCT head and X-ray lower limbs, Chest X-ray were ordered.

CECT thorax and abdomino pelvic region revealed multiple ribs fractures on the left side with bilateral hydro pneumo thorax, one 3-4 cm long segmental defect in left hemi diaphragm close to aortic hiatus through which gastric fundus, loops of small bowel and omentum herniated into the ipsilateral thorax, suggestive of left sided blunt diaphragmatic rupture [BDR] with patchy areas of contusion in bilateral lung and bilateral hemo pneumo thorax [left >> right].

NCCT head was done revealed no significant abnormality. Haemogram of the patient was 7.9gm/dl of hemoglobin, hematocrit was 42% and the rest of the blood investigations were within normal limits. [Fig. 1a, b, c].

Blunt Traumatic Diaphragmatic Hernia: Management And Review

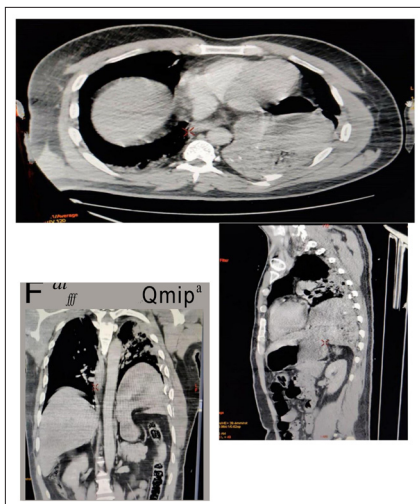


Figure 1: (a) Coronal contrast enhanced reformatted CT image shows left sided blunt traumatic diaphragmatic rupture as indicated by 3-4 cm long segmental defect (arrow) in left hemidiaphragm through which gastric fundus, loops of small bowel and omentum bulges into the thorax. The hernia is evident from the waist like constriction of the herniated contents at the level of diaphragm (collar sign). (b & c) On sagittal

and axial reformatted images, the herniated abdominal contents are positioned against the posterior wall of the thorax (dependent viscera sign) with patchy areas of consolidation in bilateral lung parenchyma (left more than right) secondary to lung contusion.

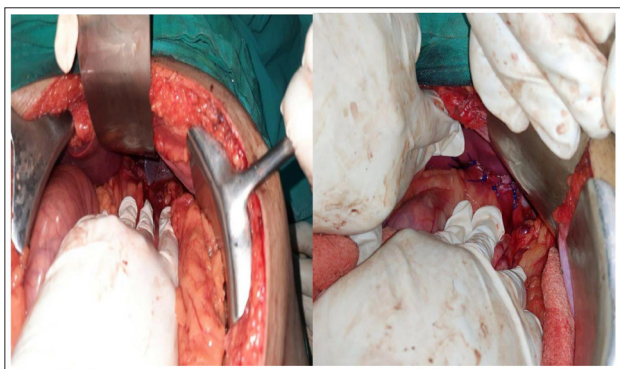


Figure 2: (a) Intraoperative image depicting diaphragmatic rent with irregular margins with acute fluid collections (b) representing the primary repair of the diaphragmatic defect.



Figure 3: Postoperative day 2 Chest X-ray AP view showing sub-optimally inflated lung on right side, minimal residual collection on left with no sign of intra-thoracic herniation. Left sided multiple rib fracture and right sided subcutaneous emphysema

Differential Diagnosis

Initially we diagnosed as a case of Head injury and Blunt trauma chest with multiple abrasion but after complete primary, secondary and tertiary survey final diagnosis was made i.e Traumatic diaphragmatic hernia and bilateral hemo pneumo thorax with left sided multiple fracture rib and surgery was planned.

Treatment

Intraoperative findings: Single 3x4cm transverse defect in the diaphragm arising at the level of aortic hiatus and extending left laterally with both crush of diaphragm intact, margin of the defect was irregular and acute fluid collection was present near the defect [Fig.2a, 2b]. No omental adhesion was seen at the defect area. The fundus of stomach and ileal loops herniating through the defect into the thoracic cavity were repositioned back to the abdomen easily. No hemoperitoneum or any other abdominal organs injury were noted. We reduced the abdominal contents and the defect was closed with prolene no 1 CRB interrupted suturing technique. Postoperative supportive care was given in ICU in the form of ventilator support, intravenous antibiotic analgesic and chest physiotherapy.

Outcome and Followup

Postoperative course was uneventful and he is alive and doing well after six month of follow up.

Discussion

Traumatic diaphragmatic hernia is uncommon entity. Injury to the diaphragm lead to immediate herniation of abdominal viscera into the chest. However it is widely accepted that hernia formation may be delayed. Males usually outnumber females [3-4]. To diagnose traumatic diaphragmatic hernia needs high index of suspicion based on history of trauma, clinical features and herniated structures seen on radiological investigations such as chest radiographs, barium meal and barium enema studies. CT scan has now been regarded as the diagnostic radiological tool of choice [9, 10]. In our case diagnosis of the entity based on finding revealed on CT thorax and abdomen.

On thoracic CT scan, the diagnosis of traumatic diaphragmatic hernia is suggested by the direct as well as indirect evidences. The direct signs include segmental diaphragmatic defect or non visualization of a part or whole of the diaphragm without demonstration of a tear in areas where it is expected to be well demonstrated as in areas outlined by fat or air. The indirect signs are the ones that are related to herniation of the contents with or without a constriction at the level of diaphragm [collar sign]. Direct contact of the herniated content with posterior chest wall without interposition of lung [dependent viscera sign] is also an indirect sign for diagnosing traumatic diaphragmatic hernia [9]. In this diaphragmatic hernia is anterior type and stomach and loop of intestine seen as content.

Once the diagnosis is made, surgery is the choice for treatment. Most authors agree that traumatic diaphragmatic hernias had delayed presentation should be approached transthoracic, since the adhesions freed easily from thoracic site [6]. The stomach and colon are the organs most commonly found within the chest due to their mobility and proximity to the diaphragm [11]. In our case the anterior type hernia diagnosed early and planned intervene through Trans abdominal approach.

Surgical repair of diaphragmatic hernias was first described as an open technique both via thoracotomy or laparotomy. Since then, laparoscopic and thoracoscopic techniques have been described,

however the incidence of conversion to an open procedure is as high as 23.5% and the utilization of laparoscopic and thoracoscopic approaches also remain low. Although drivers of this low laparoscopic uptake towards TDI repair has not been studied, technical difficulties include poor visualization, unstable condition of the patients, posterior location and technical challenges related to intracorporeal suturing [6, 8].

Open technique could provide additional advantages for surgeons tasked with repairing these difficult and rare hernia [6]. Complications following surgical repair of chronic diaphragmatic hernia reported with morbidity rate of 30% and mortality rate of 10–20%, which rose to 85% when strangulation of visceral contents was present [3-5]. In the present case, the open trans abdominal approach proved to be efficient and effective to manage left-sided traumatic diaphragmatic rupture. It resulted in a very short length of stay and minimal pain because of use of controlled analgesia device .

The use of a Robot allows the multiple degree of freedom for optimized three dimensional visualization and added suturing dexterity due to the technical superiority of instruments. This allows for suturing the mesh onto the diaphragm if delayed repair executed. Minimal manipulation and incisions promote early recovery [12].

After operation for traumatic diaphragmatic hernia, patients should be monitored intensively for development of any immediate complications and adequate oxygen support and pain management should be provided. Initial recovery in an oxygen-enriched environment can be useful. Fluid volume or perfusion support should be administered intravenously until the patient is stable and has regained sufficient oral intake [8]. An advantage of placing a thoracostomy tube routinely for 24 hours is to allow monitoring for pneumothorax or pleural effusion because postoperative pneumothorax was a significantly fatal for life..

The outcome totally depends on the time of diagnosis. If it is diagnosed early or at the time of first presentation then the patient usually recovers completely with very less complications as observed, compared if diagnosed late develops chronic diaphragmatic hernia with very high morbidity and mortality[2].

Conclusion

Traumatic diaphragmatic hernia diagnosed by high index of suspicion, careful patient assessment, effective stabilization before surgery. Success of definitive care of traumatic diaphragmatic hernia needs involvement of critical care physician in team.

Learning Points

- Traumatic diaphragmatic hernia of anterior type has ragged margins and edematous surroundings structures proven here by radiological and confirmed on intra operative findings.
- Acute traumatic hernia missed with impression of the chronic diaphragmatic hernia many times. If diagnosed early have better outcome after surgery.
- Concurrent injury should be managed simultaneously as damage control or definitive manner in trauma system.

References

1. OusmaneThiam, IbrahimaKonate, MohamadouLamineGueye, AlphaOmar Toure, et.al. (2016) Traumatic diaphragmatic injuries: epidemiological, diagnostic and therapeutic aspects 5: 1614.
2. Reber PU, Schmied B, Seiler CA, Baer HU, Patel AG (1998)

3. Missed diaphragmatic injuries and their long-term sequelae 44: 183-188.
3. Hanna WC, Ferri LE, Fata P, Razek T, Mulder DS (2008) The current status of traumatic diaphragmatic injury: lessons learned from 105 patients over 13 years. The Annals of thoracic surgery 85: 1044-1048.
4. Lewis JD, Starnes SL, Pandalai PK, Huffman LC, Bulcao CF, et al. (2009) Traumatic diaphragmatic injury: experience from a level I trauma center. Surgery 146: 578- 583.
5. Zarour AM, El-Menyar A, Al-Thani H, Scalea TM, Chiu WC (2013) Presentations and outcomes in patients with traumatic diaphragmatic injury: a 15-year experience. The journal of trauma and acute care surgery 74: 1,392-1,398.
6. McDonald A, Robinson B, Alarcon L, Bosarge P, Dorion H, et al. (2018) Evaluation and management of traumatic diaphragmatic injuries. Journal of Trauma and Acute Care Surgery 85: 198-207.
7. Hajong R, Baruah A (2012) Post-Traumatic Diaphragmatic Hernia. Indian Journal of Surgery 74: 334-335.
8. Worth AJ, Machon RG (2005) Traumatic Diaphragmatic Herniation: Pathophysiology and Management. Compendium 27 : 178-191.
9. Desir A, Ghaye B (2012) CT of Blunt Diaphragmatic Rupture. RadioGraphics 32: 477-498.
10. Kaur R, Prabhakar A, Kochhar S, Dalal U (2015) Blunt traumatic diaphragmatic hernia: Pictorial review of CT signs. Indian Journal of Radiology and Imaging 25: 226.
11. Madden MR, Paull DE, Finkelstein JL, Goodwin CW, Marzulli V, et al. (1989) Occult diaphragmatic injury from stab wounds to the lower chest and abdomen. The Journal of trauma 29: 292-298.
12. Ott K, Odell D, Stulberg J (2020) Traumatic Diaphragmatic Hernia: Safety and Efficacy of a Minimally Invasive Approach: Case Report. SN Comprehensive Clinical Medicine 2: 2500-2503.

Copyright: ©2021 Bhartiya S K, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.