

## Traumatic Diaphragmatic Hernia: An Uncommon Entity

Ellina Dangol<sup>1</sup>, Aditya Prakash Yadav<sup>1</sup>, Umesh Kumar Yadav<sup>1</sup>, Binod Kumar Rai<sup>1</sup>, Vipul Vivek Pathak<sup>2</sup>

### Abstract

Traumatic diaphragmatic hernia is secondary to penetrating injuries and blunt abdominal and thoracic trauma. It is an uncommon entity. Early diagnosis is necessary to decrease morbidity and mortality. Here we report a case of 22-year-old male with the diagnosis of traumatic diaphragmatic hernia. On abdominal examination, it was distended, tenderness was present and bowel sounds were not appreciated and on chest examination there was decreased air entry over the left side. Computed Tomography (CT) Scan showed left sided diaphragmatic defect with intrathoracic herniation of abdominal viscera. Laparotomy and exploration revealed a diaphragmatic tear of size 7.5cm X 5cm, with herniation of stomach, spleen, splenic flexure of colon, distal pancreas through the diaphragmatic tear.

**Keywords:** CT scan; Laparotomy; Traumatic diaphragmatic hernia.

#### Author affiliations:

<sup>1</sup>Department of Surgery, National Medical College and Teaching Hospital Birgunj, Nepal.

<sup>2</sup>Department of Anaesthesia, National Medical College and Teaching Hospital Birgunj, Nepal.

#### Correspondence:

Dr. Ellina Dangol,  
Department of Surgery, National Medical College and Teaching Hospital, Birgunj, Nepal.

**Email:** dangol.lna@gmail.com

#### Copyright information:



#### How to cite this article:

Dangol E, Yadav AP, Yadav UK, Rai BK, Pathak VV. Traumatic diaphragmatic hernia: an uncommon entity. J Soc Surg Nep. 2022; 25(2):71-3.

#### DOI:

<https://doi.org/10.3126/jssn.v25i2.50816>

### Introduction

Traumatic diaphragmatic injury is an uncommon and rare injury. It occurs as a result of high velocity blunt trauma to abdomen, penetrating injury to chest or abdomen, with prevalence of approximately 0.8-15%. The presentation varies, as it may be asymptomatic or may have acute presentation with features of breathlessness or may present late with complications like obstruction, strangulation or perforation.<sup>3</sup>

Diaphragmatic rupture is divided into five grades<sup>2,4</sup>:

Grade	Findings
I	Contusion
II	Laceration <=2cm
III	Laceration 2-10cm
IV	Laceration >10cm: tissue loss<=25cm <sup>2</sup>
V	Laceration and tissue loss>25cm <sup>2</sup>

Computed Tomography (CT) chest and abdomen should be obtained in all cases of thoraco-abdominal injuries as it is useful in ruling out rupture diaphragm in asymptomatic cases as well as visualizing solid organs injuries and hollow viscus perforation in cases of multiple injuries.<sup>5</sup>

Treatment of diaphragm rupture mainly consists of repair of diaphragm and can be performed through a thoracotomy or laparotomy. Laparotomy has an additional benefit as it can visualize all intra-abdominal injuries. The mortality is mainly related to associated injuries.<sup>6</sup>

### Case history

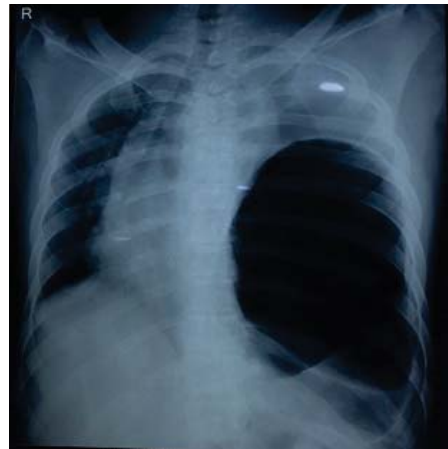
A 22-years-old male came to the emergency of National medical college and teaching hospital with a history of stab injury by sharp knife with sustained injury of abdomen and chest. On primary survey; airway was intact, breathing was

spontaneous with SpO<sub>2</sub> of 92% in room air, respiratory rate was 28bpm, with BP:100/60mm of Hg and pulse of 120bpm. On exposure, the first external injury was seen over the right lumbar region above the iliac crest with retroperitoneal fat exposure and active bleed, but no peritoneal breach. Second injury was over the right lateral subcostal region with ribs exposure and peritoneal breach with active bleed. Third one was longitudinal over L3-L4 vertebra with muscle tear and active bleed. Fourth was longitudinal over right lateral to T8-T10 vertebra with muscle tear and active bleed present. On examination abdomen was distended, diffuse tenderness and guarding were present and bowel sound was not appreciated. Respiratory examination- decreased air entry over left side with normal breath sound over right. Cardiovascular examination and neurological examination were normal.

All basic investigation was done. Chest Xray (CXR) showed hyperlucent shadow in left lower zone and was suspicious for pneumothorax but was not sure because of its diaphragmatic eventration(**Figure 1**). Ultrasonography (USG) of abdomen showed fluid in peritoneal cavity and CT scan was done which showed left sided diaphragmatic defect with intrathoracic herniation of abdominal viscera(**Figure 2**).

Exploratory laparotomy was done. Intraoperatively, tear in the left hemidiaphragm of size about 7.5cm X 5cm, with herniation of stomach, spleen, splenic flexure of colon, distal pancreas through diaphragmatic tear was found. The anterior wall of stomach, mainly the body of stomach, measuring about 8 x 8cm was gangrenous. There was grade I splenic injury of size 5x0.5x0.5 cm in upper pole. There was collection of blood about 150ml in the left pleural cavity. Primary closure of diaphragm was done with Prolene Round body (RB) 1 and gangrenous part of the stomach was excised and repaired with Vicryl RB 2-0 and silk RB 2-0. Feeding jejunostomy with foleys 18 french (fr) was fixed 20cm distal to the Duodenal-jejunal junction. Abdominal drain of size 28fr kept over pelvic region. Abdominal wall was closed with Polydioxanone double loop suture. Chest tube of 28Fr was kept over left chest.

Postoperatively patient was kept in intensive care unit (ICU) with mechanical ventilator support for 24 hours. Postoperative CXR after 24 hours operative procedure

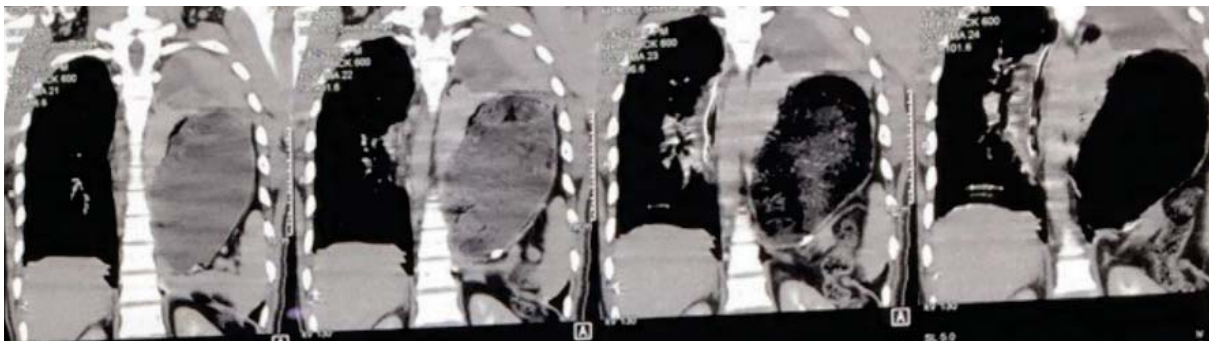


**Figure 1.** Chest X-ray at the time of admission

showed lung expansion. Patient was extubated after CXR report on 2nd post operative day and was hemodynamically stable. Normal saline flush was started from feeding jejunostomy on 5th postoperative day. On seventh postoperative day (POD), oral feeding was started. Abdominal drain was taken out on 12th POD. Secondary closure of stab wound was done on 7th postoperative day. Patient was discharged on 25th POD. Chest tube was taken out after one month.

## Discussion

About 4-6% of patients who undergo surgery for trauma have diaphragmatic injury.<sup>7</sup> It is mainly associated with multiple injuries<sup>8</sup> and are diagnosed either with respiratory distress or as in intestinal obstruction.<sup>9</sup> Mechanism of injury mainly involves the shearing of stretched diaphragm at the point of diaphragmatic attachment due to sudden force transmission through viscera in abdomen. Most common site of rupture is found to be postero-lateral aspect of hemithorax because of its origin from pleuro-peritoneal membrane which is structurally weak.<sup>10</sup> Left side rupture are more common as compared to right side because of its protective effect of liver<sup>11</sup> with incidence of about 68.5% of patient on left side and 24.2% accounts on right side, 1.5% on bilateral side, 0.9% had pericardial rupture and 4.9% were unclassified in the current reviews.<sup>12</sup> The presented case also showed left sided traumatic diaphragm injury with herniation of abdominal content.



**Figure 2:** the intra-abdominal content herniated into the thorax shown in coronal view of the thoracoabdominal computed tomography scan of the patient.

Stark and Jacobson stated that up to 70% of diaphragmatic tears can be initially missed or incorrect interpretation of radiograph is a frequent reason for incorrect diagnosis of diaphragmatic rupture.<sup>13,14</sup> An intrathoracic gas fluid level may be mistaken for hemopneumothorax, whereas it is actually due to stomach herniated into the chest. Such a mistake can lead to placement of unnecessary chest tubes and potential iatrogenic injuries. Similarly, the chest X-ray in the presented case was confused with the left sided pneumothorax as it presented with hyperlucent shadow but the suspicion of diaphragmatic eventration took the step of CECT chest and abdomen and showed diaphragmatic herniation of bowel contents.

An X-ray could be helpful in some cases for diagnosis when nasogastric tube is seen in chest but often masked by associated lung contusions, pleural effusion, atelectasis, emphysema and nonspecific elevation of diaphragm.<sup>14</sup> X-ray has low sensitivity for depicting rupture of diaphragm with only 46% sensitive for left and 17% sensitive for right side.<sup>15</sup> CT thorax has 14-82% sensitivity and 87% specificity. Minimal invasive procedure like diagnostic laparoscopy is another diagnostic method when in doubt or when other measures fail.

For diaphragmatic repair there are many approaches, the choice depends on the circumstances of each case. Laparotomy is considered by some authors as gold standard but others preferred thoracotomy. Laparotomy has additional benefit for visualizing other intra-abdominal injuries directly. Minimal invasive procedure (abdomen and thoracic) is preferred in small defects. Now a days laparoscopic repair is also becoming popular. In case of small defect simple suture is done whereas in case of large defect synthetic mesh is required.<sup>16,17</sup> As this patient had peritoneal breach in other parts along with diaphragmatic injury laparotomy was considered as better option and since defect was wide enough for the primary repair there was no need for the mesh. The important thing in using mesh is that surgical area is not infected. We think mesh should be avoided in these cases if possible as there is 80% rate of necrosis seen in emergency surgeries.<sup>18</sup>

## Conclusion

Traumatic diaphragmatic hernia is an uncommon entity that carries serious morbidity and mortality. A high degree of suspicion is warranted in cases of abdominal and thoracic trauma.

## References

- Leppäniemi A, Haapiainen R. Diagnostic laparoscopy in abdominal stab wounds: a prospective, randomized study. *Journal of Trauma and Acute Care Surgery*. 2003 Oct 1;55(4):636-45.
- Asensio JA, Petrone P. Diaphragmatic injury. In: Cameron JL ed. *Current surgical therapy*, 8th ed. Philadelphia: Elsevier Mosby Co; 2004.p.946-55.
- Kaur R, Prabhakar A, Kochhar S, Dalal U. Blunt traumatic diaphragmatic hernia: Pictorial review of CT signs. *Indian J Radiol Imaging*. 2015; 25: 226–232
- Department of Surgery/Songkhla Hospital. Diaphragmatic injury (unpublished lecture notes on the net). Available at: [http://www.slideshare.net/notenote/diaphragmatic-injury?qid=51013fbd-850d-4639-b379-b8fe1c340081&v=&b=&from\\_search=1](http://www.slideshare.net/notenote/diaphragmatic-injury?qid=51013fbd-850d-4639-b379-b8fe1c340081&v=&b=&from_search=1). [Accessed 28 August 2016]
- Hordiyuchuk A, Elston T. Traumatic diaphragmatic injury along with ruptured gastrothorax: case report. *Journal of Surgical Case Reports*. 2022 Apr;2022(4):rjac154.
- DeBarros M, Martin MJ. Penetrating traumatic diaphragm injuries. *Current Trauma Reports*. 2015 Jun;1(2):92-101.
- Graivier L, Freeark RJ. Traumatic diaphragmatic hernia. *Arch Surg*1963;86:363-73.
- Goh BK, Wong AS, Tay KH, Hoe MN. Delayed presentation of a patient with a ruptured diaphragm complicated by gastric incarceration and perforation after apparently minor blunt trauma. *Canadian Journal of Emergency Medicine*. 2004 Jul;6(4):277-80.
- Shah R, Sabanathan S, Mearns AJ, Choudhury AK. Traumatic rupture of diaphragm. *The Annals of thoracic surgery*. 1995 Nov 1;60(5):1444-9.
- Angster G, Ventura VP, Carbo A, Gates T, Garayburu J, D'Agostino H. Diaphragmatic rupture: a frequently missed injury in blunt thoracoabdominal trauma patients. *Emergency radiology*. 2007 Feb;13(5):225-30.
- Eren S, Kantarcı M, Okur A. Imaging of diaphragmatic rupture after trauma. *Clinical radiology*. 2006 Jun 1;61(6):467-77.
- Carter BN. Traumatic diaphragmatic hernia. *Am J Roentgenol Rad*. 1951;65:56-72.
- Rashid F, Chakrabarty MM, Singh R, Ifikhar SY. A review on delayed presentation of diaphragmatic rupture. *World Journal of Emergency Surgery*. 2009 Dec;4(1):1-7.
- De Blasio R, Maione P, Avallone U, Rossi M, Pigna F, Napolitano C. Late posttraumatic diaphragmatic hernia. A clinical case report. *Minerva chirurgica*. 1994 May 1;49(5):481-7.
- Reber PU, Schmied B, Seiler CA, Baer HU, Patel AG, Buchler MW. Missed diaphragmatic injuries and their long-term sequelae. *Journal of Trauma and Acute Care Surgery*. 1998 Jan 1;44(1):183-8.
- Blaivas M, Brannam L, Hawkins M, Lyon M, Sriram K. Bedside emergency ultrasonographic diagnosis of diaphragmatic rupture in blunt abdominal trauma. *The American journal of emergency medicine*. 2004 Nov 1;22(7):601-4.
- Hanna WC, Ferri LE, Fata P, Razeq T, Mulder DS. The current status of traumatic diaphragmatic injury: lessons learned from 105 patients over 13 years. *The Annals of thoracic surgery*. 2008 Mar 1;85(3):1044-8
- Jee Y. Laparoscopic diaphragmatic hernia repair using expanded polytetrafluoroethylene (ePTFE) for delayed traumatic diaphragmatic hernia. *Videosurgery and Other Miniinvasive Techniques*. 2017 Jun 2;12(2):189-93.