

Traumatic Diaphragmatic Rupture in An Elderly Patient With Polytrauma

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Abstract

Case presentation:

We report a case of an 80-year-old woman presented to our hospital 2 hours after a traffic accident with multiple injuries: blunt chest injury, rib fractures, pulmonary laceration, right pneumothorax, pleural effusion, right lower lobe atelectasis, right diaphragmatic rupture causing intrathoracic intestinal herniation, blunt abdominal trauma, grade III liver rupture, spine injury with L1, L2 transverse process fractures. An emergency surgery was performed to drain the fluid and air in the pleural cavity, evacuate the hernia organs, and repair the diaphragmatic injury. The postoperative course was uneventful and she was discharged after 20 days.

Conclusion

Early diagnosis of diaphragmatic rupture in polytrauma requires the combination of clinical examination, chest X-ray, and CT scanner. Favorable outcomes can be achieved with early surgical interventions.

Introduction

Traumatic diaphragmatic rupture is an infrequent injury, affecting 0.8–5% chest injury patients, with 10% of those having diaphragmatic hernia [1, 2]. The most common organs in diaphragmatic hernia are the large intestine, small intestine, greater omentum, stomach, and liver. The diagnosis of diaphragmatic hernia associated with chest injuries in polytraumatic patients is usually delayed due to its ambiguous clinical presentations, especially in elderly people, where the overwhelming symptoms of chest injuries may mask diaphragmatic rupture, leading to further exacerbation of patient condition [1, 3].

Case Presentation

An 80 years old female patient presented to our hospital 2 hours after trauma to her chest and abdomen in a traffic accident. Upon admission, the patient was fully awake (Glasgow's coma scale of 14), and complained of dyspnea, and pain in the chest and abdomen. Her vital signs were: heart rate 130bpm; blood pressure 150/90 mmHg; respiratory rate 28 bpm; and SpO₂ 82%. Chest examination showed bruise on the right flank, more distension, reduced lung sound, and abnormal presence of bowel sounds on the right side of the chest.

Chest x-ray showed multiple rib fractures (right 5th, 6th, 7th, 8th, 9th rib, and left 6th, 7th, 8th ribs) diffuse lung consolidation, moderate right pleural effusion, and mild left pleural effusion.

Abdominal CT Scan showed displacement of an intestine loop in the right thoracic cavity. Fractures of L1, L2 transverse processes, multiple rib fractures (right 5th – 9th, and left 6th – 8th ribs), pulmonary

laceration, right pneumothorax, right pleural effusion, and right lower lobe atelectasis were also present in chest CT scan (Fig. 1).

The patient was immediately admitted to the ICU for mechanical ventilation and resuscitation. The patient was diagnosed with multiple trauma with diaphragmatic hernia, and the decision was made to insert chest drains to the left and right pleural cavities, and perform emergency abdominal surgery. The abdominal cavity was opened and explored via a bilateral subcostal incision. Throughout examination of the abdominal cavity, two laceration lesions on the diaphragm (5cm and 2cm), and a 120cm intestinal segment herniated into the thoracic cavity through the larger one (Fig. 2). Two superficial lacerations (4cm each) in posterior segments of the liver were also noted.

Since the herniated intestine was still viable, a decision was made to place it back into the abdomen, and repair the diaphragmatic laceration using a 2-0 Ethibond suture (Fig. 2). The liver lacerations were closed with mattress sutures. A drain was placed in the abdominal cavity at the end of surgery.

The patient was discharged home 20 days after surgery and is still doing well after 22 months/years of follow-up.

Discussion

Traumatic diaphragmatic hernia is an uncommon injury, especially on the right diaphragm where the liver may prevent displacement of intestine through a sufficiently small hole in the diaphragm into the chest cavity [4, 5]. Therefore, right diaphragm hernia is occasionally associated with significant trauma and large diaphragm rupture [3]. In the present case report, the patient presented to our emergency department 2hr after a traffic accident, prominently with chest pain, dyspnoea, and only mild abdominal pain and no specific abdominal signs and symptoms. Therefore, chest X-ray and thoracoabdominal CT scan are important in early detection of right diaphragmatic hernia and timely surgical indication [6, 7]. The delay in diagnosis of diaphragmatic hernia in this patient may lead to exacerbation of the patient's condition, compression of the lung and mediastinal structures from the herniated organ, and most importantly the progression of the 120cm herniated intestine from a viable to non-viable tissue.

Since most thoracic injuries in this patient could be managed conservatively, the decision was made to address the lesion via the open abdominal approach, to evacuate and place the intestinal segment back to the abdomen. In polytraumatic settings, open surgery could be a more appropriate choice to provide early and thorough examination of herniated organs, as well as other abdominal injuries. Early diagnosis of herniated intestine, before its progression to necrosis or infection, may help avoid intestinal resection and long-term treatment [2, 5, 8]. It is very important to identify and repair the diaphragmatic rupture, especially when the herniated intestine is already released and return to the abdomen upon opening of the abdomen. Failure to identify diaphragm rupture may subsequently lead to recurrent diaphragmatic hernia due to increased pressure in the abdomen, and patients may experience chronic abdominal pain, intestinal obstruction, or chest pain, dyspnea, and pneumonia. The surgical techniques for diaphragmatic rupture may vary depending on the size and location of the lesion. Small lesions can

be closed directly with non-absorbable sutures. Another option is reconstruction of the diaphragmatic defects with a surgical mesh [3–5]. However, the application of meshes is associated with risks of infection and recurrent hernia and therefore should be avoided whenever possible. The diaphragmatic lesions in this patient were repaired with direct closure, using a non-absorbable suture, due to its small sizes. We find this approach appropriate for this patient, because it may reduce the risk of infection, recurrent hernia and treatment cost as well.

Declarations

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Conflict of interest

The authors declare no competing interests.

Ethics Approval

Ethics approval is not required for this review.

Consent to participate and publish

Patient consent was obtained to participate and publish.

Consent for publication

Consent for publication had been obtained from all authors.

References

1. Mihos P, Potaris K, Gakidis J, Paraskevopoulos J, Varvatsoulis P, Gougoutas B, Papadakis G, Lapidakis E: Traumatic rupture of the diaphragm: experience with 65 patients. *Injury* 2003, 34(3):169-172.
2. Zarour AM, El-Menyar A, Al-Thani H, Scalea TM, Chiu WC: Presentations and outcomes in patients with traumatic diaphragmatic injury: a 15-year experience. *The journal of trauma and acute care surgery* 2013, 74(6):1392-1398; quiz 1611.
3. Lim KH, Park J: Blunt traumatic diaphragmatic rupture: Single-center experience with 38 patients. *Medicine (Baltimore)* 2018, 97(41):e12849-e12849.
4. Ozpolat B, Kaya O, Yazkan R, Osmanoğlu G: Diaphragmatic injuries: a surgical challenge. Report of forty-one cases. *The Thoracic and cardiovascular surgeon* 2009, 57(6):358-362.
5. Ties JS, Peschman JR, Moreno A, Mathiason MA, Kallies KJ, Martin RF, Brasel KJ, Cogbill TH: Evolution in the management of traumatic diaphragmatic injuries: a multicenter review. *The journal*

of trauma and acute care surgery 2014, 76(4):1024-1028.

6. Kwon J, Lee JC-J, Moon J: Diagnostic significance of diaphragmatic height index in traumatic diaphragmatic rupture. *Ann Surg Treat Res* 2019, 97(1):36-40.
7. Kaur R, Prabhakar A, Kochhar S, Dalal U: Blunt traumatic diaphragmatic hernia: Pictorial review of CT signs. *The Indian journal of radiology & imaging* 2015, 25(3):226-232.
8. Kuo IM, Liao CH, Hsin MC, Kang SC, Wang SY, Ooyang CH, Fang JF: Blunt diaphragmatic rupture—a rare but challenging entity in thoracoabdominal trauma. *The American journal of emergency medicine* 2012, 30(6):919-924.

Figures

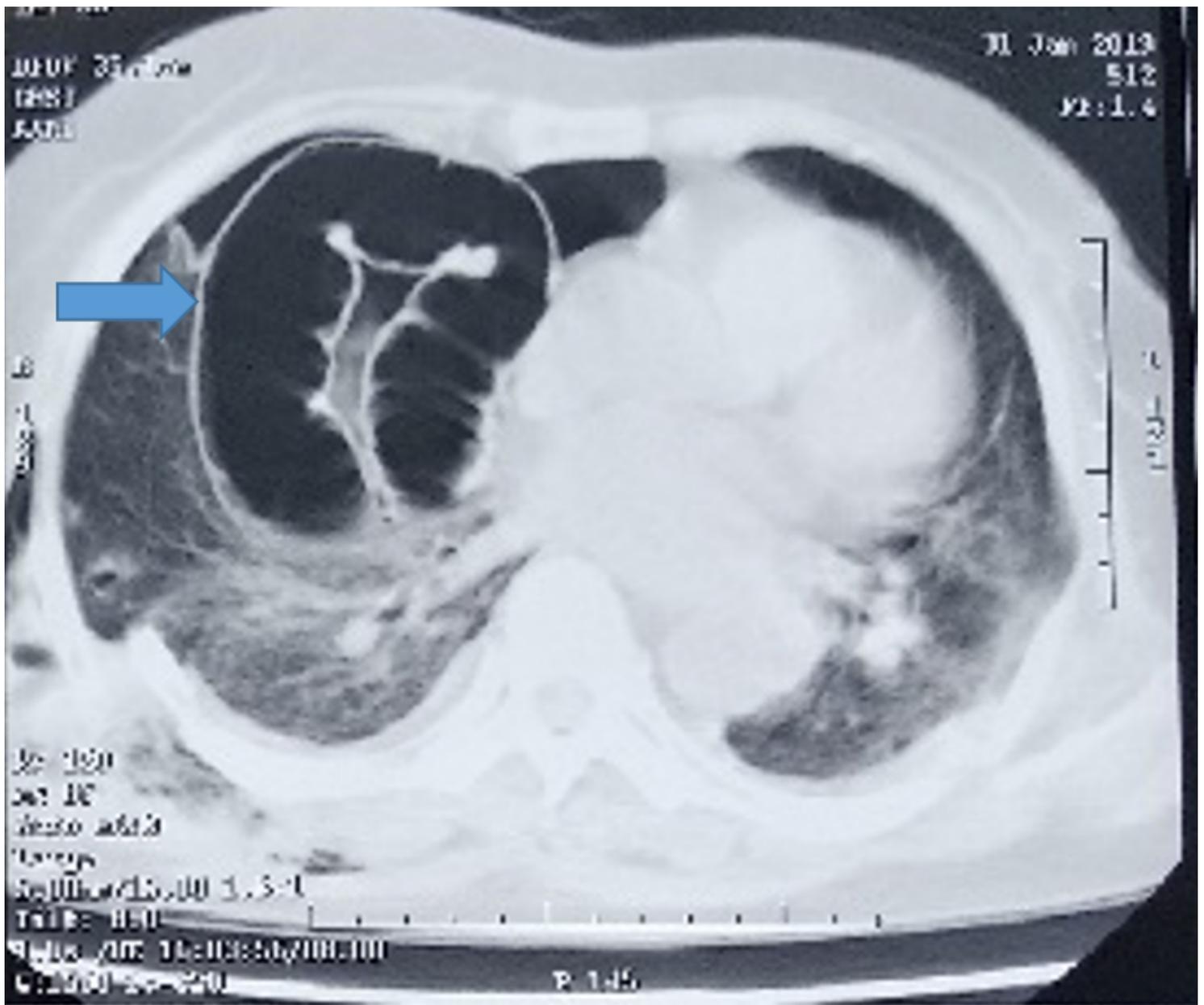


Figure 1

Diaphragmatic hernia on chest CT Scan. A loop of the small intestine (white arrows) is seen inside the right thoracic cavity, next to the right border of the heart, compressing on the right lower lobe.

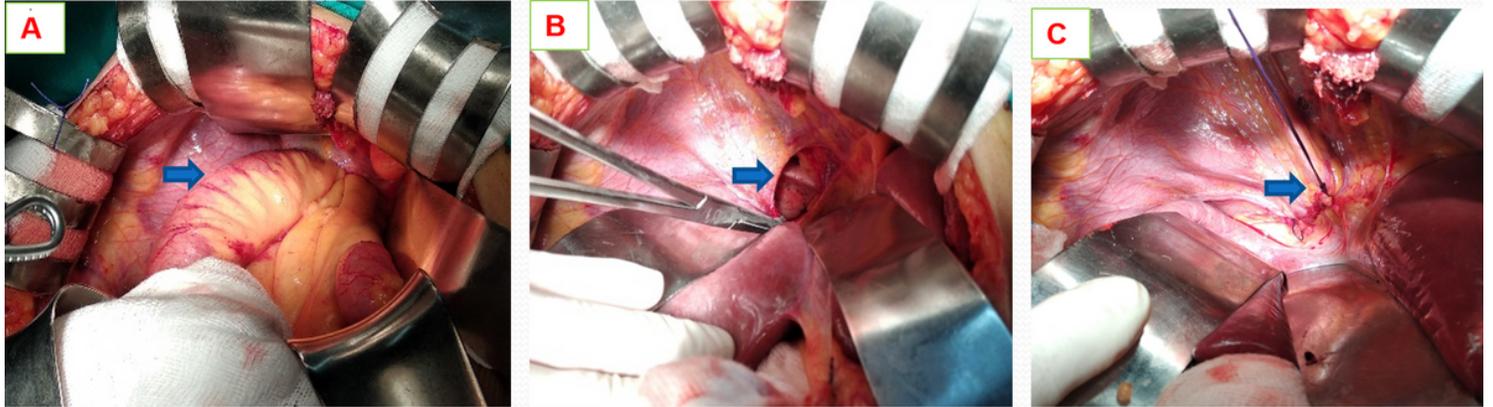


Figure 2

Right diaphragmatic hernia. (A) An 1.2m intestinal segment comes through the diaphragmatic rupture into the right thoracic cavity, with a sign of inflated efferent loop from the abdominal view . (B) The intestinal segment is evacuated out of the diaphragmatic hernia, leaving an apparent 5cm wound at the right diaphragm (black arrow). (C) Repair the diaphragmatic wound. The wound is closed (black arrow) using a running Ethibond suture.