

Delayed Presentation of Traumatic Diaphragmatic Rupture

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ABSTRACT

We present a case of traumatic diaphragmatic rupture that presented two years after the initial thoracic injury. The patient presented with intestinal obstruction and colonic perforations. Through laparotomy, the diaphragmatic defect was repaired and the colonic perforations were closed. The patient had an uneventful post-operative recovery.

Key words : Trauma, Diaphragmatic rupture.

[Indian J Chest Dis Allied Sci 2002; 44 : 121-124]

INTRODUCTION

Traumatic diaphragmatic rupture is uncommon, an often missed injury and a challenging problem. The diagnosis may be elusive and can often be made only during exploration. Delayed recognition may be fatal. We report a 52-year-old man who presented two years after sustaining a blunt trauma to the left hemithorax. He had herniation of the splenic flexure and the greater omentum through a traumatic defect in the left side of diaphragm and multiple perforations of the transverse colon proximal to the herniation. Through laparotomy, the herniated greater omentum and splenic flexure were reduced, the rent was closed and the multiple perforations were closed in two layers and covered with omentum. The patient had an uneventful post-operative recovery and was discharged from the hospital in a good condition.

CASE REPORT

A 52-year-old patient presented to the emergency department complaining of abdominal pain, frequent vomiting and constipation of one week duration. The pain was colicky and periumbilical. There was no fever or weight loss. His appetite was normal. He was not a known diabetic or hypertensive and was a non-smoker. There was no family history of colorectal malignancies. Two years earlier, he had a blunt injury to the lower part of the left thorax posteriorly for which he was treated by thoracostomy drainage. Systemic review was unremarkable.

On examination, the patient was dehydrated but afebrile and not pale or jaundiced. Chest examination showed a scar of the previous thoracostomy tube on the left side. Air entry was equal on the two sides with vesicular breathing. Abdominal examination revealed a

mild distension with tenderness and guarding involving the whole of left side of the abdomen. Bowel sounds were exaggerated. Per rectal examination showed an empty rectum.

The basic laboratory investigations (blood counts, BUN, creatinine, electrolytes, liver function tests and clotting profile) were within normal limits. Chest radiograph showed an opaque shadow at the left lower base, elevation of left cupola of diaphragm and air under diaphragm (Figure 1). Abdominal radiograph showed evidence of large bowel obstruction. A diagnosis of large bowel obstruction with visceral perforation, most likely due to old diaphragmatic disruption, was made. The patient was managed initially with I.V. fluids, I.V. antibiotics and heparanization.

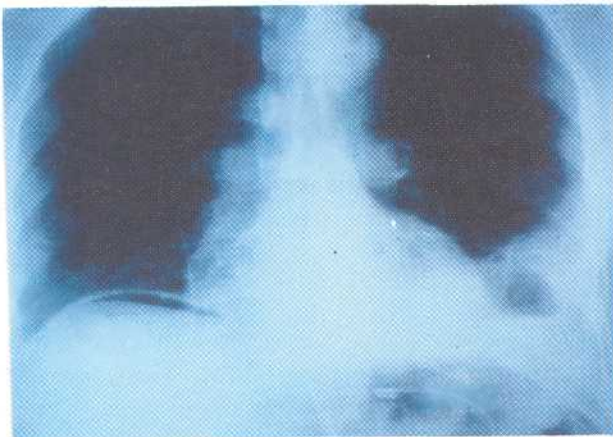


Figure 1. Chest roentgenogram showing free air under right copula of diaphragm, elevated left copula of diaphragm and left basal pneumatic changes.

At laparotomy, a 4 cm defect was found in the peripheral part of the left diaphragm (Figure 2) through which the splenic flexure and greater omentum were herniated into the left thoracic cavity. The descending colon was collapsed while the proximal transverse and ascending colon and small bowels were dilated. There were multiple 1mm perforations of the transverse colon proximal to the herniation. A little amount of pus was encountered in the peritoneal cavity from which a swab was taken for culture and sensitivity.

The diaphragmatic defect was fibrosed. So it was enlarged and the splenic flexure and greater

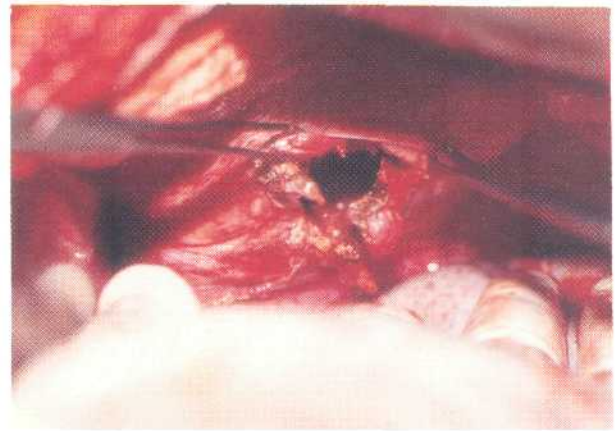


Figure 2. A 4 cm rent in the peripheral muscular part of the left hemidiaphragm.

omentum were mobilized and reduced into the abdomen. The rent in the left diaphragm was closed by multiple interrupted horizontal mattress sutures using prolene 2. The multiple perforations were invaginated in two layers and covered by omentum. Thorough abdominal irrigation was done. A left chest tube was inserted. A feeding jejunostomy was fixed. Because of the oedematous walls of the large and small bowels, the abdomen was left open



Figure 3. Bogota bag covering the abdominal defect with left thoracostomy tube and a feeding jejunostomy tube.

and covered by Bogota bag (Figure 3). After five days the abdomen was closed. The patient had an uneventful post-operative recovery with the chest radiograph showing no residual abnormality.

DISCUSSION

The diaphragm is a strong partition consisting of a central tendinous part and a peripheral muscular part. It separates the thoracic cavity from the abdominal cavity. Injuries to the diaphragm may follow blunt or penetrating thoraco-abdominal trauma. Blunt trauma accounts for 75-81% of cases^{1,2}. Road traffic accident is the most common cause³. It occurs in 5-25% of thoracic and abdominal blunt injuries^{4,5}. The liver, stomach, colon, spleen and greater omentum are the most commonly herniated organs. Diagnosis represents a challenge to the surgeon and is often difficult due to lack of specific clinical and plain radiological features, the frequent presence of associated injuries of other organs, the difficulty to identify the injury and the potential for delayed presentation. Most reports indicate that the injuries occur most commonly on the left side (57-87.5 per cent)^{2,6}. The right side is protected by the liver but with sufficient force significant tears in the right hemidiaphragm may occur. The incidence of injury to the right side is 24-36 per cent^{6,7}. Chest roentgenogram was found to be the best diagnostic aid and may show unilateral elevation of the diaphragm, supradiaphragmatic densities and displacement of abdominal organs. The diagnosis should always be suspected in any polytrauma patient and should be confirmed by complimentary investigations including barium meal, barium enema, fluoroscopy, diaphragmatic ultrasound, cardiac ultrasound, CT-scan and MRI and nuclear medicine^{8,9}. More than 93% of traumatic diaphragmatic ruptures are identified within 24 hours¹⁰. A pre-operative radiological diagnosis is possible in 62.5 per cent². In delayed cases, the time interval between trauma and presentations ranges between two weeks to 40 years¹¹. Vague chest pain, shortness of breath, and bowel obstruction are the most common presentations.

Isolated blunt injuries are rare and are frequently accompanied by other injuries. Associated injuries occur in 75-94% of cases^{3,12} with a high mortality of 10-33 per cent^{6,13}. This high mortality is not due to the diaphragmatic rupture itself, but is related to the magnitude of the associated injuries. The associated injuries include laceration of spleen and liver, fractured pelvis and cranio-cerebral trauma. A high index of suspicion of traumatic diaphragmatic rupture is important to reduce the morbidity and the mortality due to delay of surgical intervention.

There are two types of traumatic diaphragmatic rupture : tension type (indirect) due to distortion of the bony thorax; and, impact type (direct) that results from blunt force on the bony thorax¹⁴.

All acute injuries must be repaired surgically either conventionally or by minimal access surgery in order to avoid the long term consequences of herniation including intestinal obstruction, perforation, strangulation or even thoracic complications. Classically, delayed cases are approached through the thorax because of the presence of adhesions between abdominal viscera and thoracic structures. In our case, laparotomy was done because of the associated peritonitis. A simple hole may be repaired with interrupted horizontal mattress sutures but larger lacerations or actual defects may have to be repaired with a prosthetic mesh.

In conclusion, traumatic diaphragmatic rupture is a serious surgical problem with high mortality due to the associated injury. A high index of suspicion is essential. All acute cases whether diagnosed pre-operatively or intra-operatively must be repaired surgically either by laparotomy, thoracotomy, thoraco-abdominal approach or by minimal access surgery, in order to avoid the long-term sequelae. During laparotomy in a polytrauma patient the diaphragm must be carefully inspected because minor defects can be overlooked. Complementary investigations such as G.I. contrast studies, fluoroscopy, ultrasound, CT-scan, MRI and scintigraphic studies are helpful to confirm the diagnosis.

ACKNOWLEDGEMENTS

We appreciate the review of the manuscript by Prof. A. Aina before submitting the paper for publication. We also thank Mrs Joy A. De Silva for her secretarial help.

REFERENCES

1. Shah R, Sabanathan S, Mearns AJ, Choudhury AK. Traumatic rupture of diaphragm. *Ann Thorac Surg* 1995; **60** : 1444-49.
2. Simpson J, Lobo DN, Shah AB, Rowlands BJ. Traumatic diaphragmatic rupture : Associated injuries and outcome. *Ann R Coll Surg Engl* 2000; **82** : 97-100.
3. Broos PL, Rommens PM, Carlier H, van Leeuwen JN, Gruwez JA. Rupture of the diaphragm caused by blunt trauma : Review of 54 successive cases. *Unfall Chirurg* 1989; **92** : 419-23.
4. Radenovski D, Zlatarski G. Diaphragmatic injuries in thoraco-abdominal trauma. *Khirurgiia (Sofia)* 1997; **50** : 26-27.
5. Mehdi A, Closset J, el Nakadi I, Houben JJ, Veys I, Labilliotte JP. Hernia of the diaphragm : A clinical case and review of the literature. *Acta Chir Belg* 1995; **95** : 281-83.
6. Holm A, Bessey PQ, Aldrete JS. Diaphragmatic rupture due to blunt trauma : Morbidity and mortality in 42 cases. *South Med J* 1988; **81** : 956-62.
7. Luiting MG, Den Otter G. Rupture of the diaphragm due to blunt trauma. *Neth J Surg* 1982; **34** : 13-17.
8. Shackleton KL, Stewart ET, Taylor AJ. Traumatic diaphragmatic injuries : Spectrum of radiographic findings. *Radiographics* 1998; **18** : 49-59.
9. Ikeda E, Kawakami S, Otsuka K, Ono K, Yamada M, Onishi Y. A case of traumatic diaphragmatic hernia accompanied with rupture of pericardium. *Nippon Kyobu Geka Gakkai Zasshi* 1995; **43** : 1234-38.
10. Troop B, Myers RM, Agarwal NN. Early recognition of diaphragmatic injuries from blunt trauma. *Ann Emerg Med* 1985; **14** : 97-101.
11. Lin YK, Huang BS, Shih CS, Hsu WH, Huang MH, Lee CH. Traumatic diaphragmatic hernia with delayed presentation. *Chung Hua 1 Hsueh Tsa Chih (Taipei)* 1999; **62** : 223-29.
12. Athanassiadi K, Kalavrouziotis G, Athanassiou M, et al. Blunt diaphragmatic rupture. *Eur J Cardiothorac Surg* 1999; **15** : 469-74.
13. Reber PU, Schmied B, Seiler CA, Baer HU, Patel AG, Buchler MW. Missed diaphragmatic injuries and their long-term sequelae. *J Trauma* 1998; **44** : 183-88.
14. Tsukioka K, Tokuhara T, Koizumi H, et al. Traumatic diaphragmatic hernia. *Kyobu Geka* 1989; **42** : 286-91.