

Right Post-Traumatic Diaphragmatic Hernia with Liver Dislocation

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How to cite this paper: Anas, E., Khalid, K., Loubna, B., Aziz, B., Afak, N. and Rachid, A. (2023) Right Post-Traumatic Diaphragmatic Hernia with Liver Dislocation. *Case Reports in Clinical Medicine*, 12, 102-107.

<https://doi.org/10.4236/crcm.2023.124014>

Received: January 30, 2023

Accepted: April 21, 2023

Published: April 24, 2023

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Abstract

Diaphragmatic hernia is a rare consequence of thoraco-abdominal trauma. It may be associated with high morbidity and mortality, particularly if surgical intervention is delayed. We report a case of a right diaphragmatic hernia in a 75-year-old woman. The patient was referred to our hospital with mild dyspnea. Chest radiograph showed an overtly elevated right hemi-diaphragm. Thoracic and abdominal computed tomographic scan was requested and showed a defect of the right diaphragmatic muscle wall with intrathoracic ascension of the liver. During the postoperative course, the patient was still on mechanical ventilation, hemodynamically unstable. She developed urinary peritonitis and an extensive bowel ischemia worsening. We report this case to show that the prognosis is related to associated injuries and possible complications. The possibility of a diaphragmatic rupture should be kept in mind and surgery is mandatory in order to avoid complications.

Keywords

Thoraco-Abdominal Trauma, Right Diaphragmatic Hernia, Rare Complication, Liver Dislocation

1. Introduction

Post-traumatic diaphragmatic hernia is a particular and rare consequence of thoraco-abdominal trauma that may go unnoticed [1] [2]. The abdominal organ herniation through the right diaphragm is even rarer due to the liver protective function. Only half of cases are diagnosed early and this fact may lead to progressive herniation of intra-abdominal contents into the thorax [3] [4] [5]. The case reported concerns a patient suffering from right diaphragmatic hernia with liver dislocation complicated by bowel ischemia.

2. Observation

A 75 year old female patient, with no medical history, was admitted to the emergency department following a traffic accident. She was in a car that hit an electric pylon with the notion of a death on board. At admission, the patient was conscious and hemodynamically stable, with mild dyspnea. The clinical examination showed palpebral ecchymosis; no other external injuries were apparent. Thoracic examination revealed decreased breathing sound in the right lower hemithorax. The rest of the examination was unremarkable.

A chest X-ray showed an overtly elevated right hemi-diaphragm (**Figure 1**). Thoracic and abdominal computed tomographic scan (CT scan) was requested and showed a defect of the right diaphragmatic muscle wall measuring 84 mm in diameter with intrathoracic ascension of the liver and a small peritoneal effusion (**Figure 2**). The CT scan also showed the presence of a small leakage of iodinated contrast media under the bladder with emphysema of the perineal soft tissues due to a rupture of the bladder floor and a polyfractured pelvis.

She was then admitted to the surgery department for an exploration. They found a right diaphragmatic breach of 12 cm with the presence of the hepatic dome intra-thoracically and a breach in the anterior wall of the bladder of 2 cm. The procedure consisted of a repair of the diaphragmatic wound and the bladder breach by suture.

In the intensive care unit, on the second postoperative day, the patient was still on mechanical ventilation, hemodynamically unstable, put on 3 mg/h of norepinephrine with BP = 110/60 mmhg, HR = 112 bpm, Diuresis at 0.5 ml/kg/h. Blood test results showed an acute renal failure with urea = 1.14; creat = 28.3; cytotoxicity: ALAT = 224; ASAT = 374; hyperleukocytosis: WBC = 35.290/mm³; CRP = 329; with abnormality of hemostasis PT = 46%; APTT = 38.4 seconds. On the fourth postoperative day, her hemodynamics got worse. There was also a large quantity of urine released from the redon drain. The patient was taken to the OR for surgery: there was serous effusion made of urine and extensive bowel ischemia (**Figure 3**). The prognosis was poor, the patient died on the 5th postoperative day.

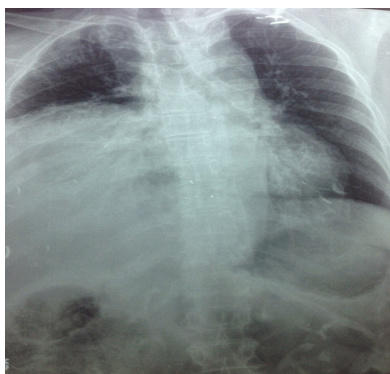


Figure 1. Chest X-ray showing elevated right hemi-diaphragm.

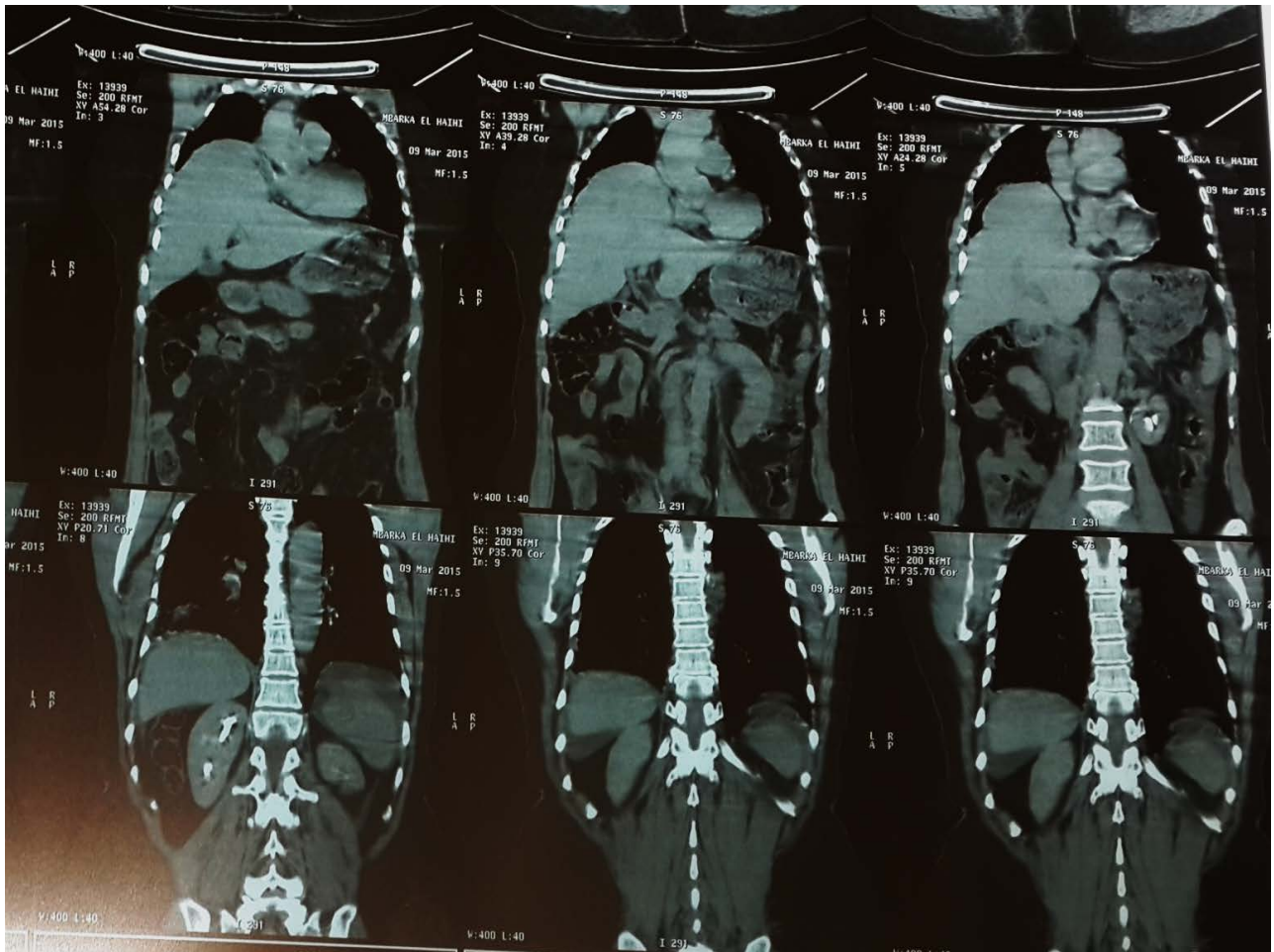


Figure 2. Thorax and abdominal CT showing the dislocation of the liver with compression of the right lung and shift of the mediastinum to the left.



Figure 3. Intraoperative view showing acute bowel ischemia.

3. Discussion

The diaphragm is a dome-shaped and thin musculoaponeurotic barrier that plays

an important role in respiratory function. Traumatic diaphragmatic rupture is a rare clinicopathological entity. It occurs in 0.8%~7% of blunt trauma patients and 10%~15% of penetrating trauma patients [1] [2]. Left hemidiaphragmatic hernia is more common because liver exerts a protective function against the herniation of the viscera. Petrone *et al.* reported a traumatic diaphragmatic hernia rate of 75% on the left versus only 25% on the right side [3]. Yet, many authors believe that the incidence of right diaphragmatic traumatic ruptures is underestimated. In fact, autopsy series demonstrated that there was an equal incidence between right and left lesions, leading some authors to wonder whether the left diaphragmatic hernias were more frequent or simply easier to diagnose [3] [4].

Clinical presentation is divided into three phases. The early phase is dominated by cardiorespiratory signs (dyspnea, orthopnea and chest pain). The intermediate period is characterized by clinical signs that may be absent or atypical such as epigastralgia, vomiting... Finally, the late phase is often noisy due intestinal obstruction [5].

X-ray and CT scan are most commonly used techniques for diaphragmatic rupture diagnosis. The chest X-ray could be normal or show marked elevation of one hemidiaphragm, especially on the right side, thus giving low sensitivity to this examination. It detects 27%~60% of left ruptures and 17% of right ruptures. On the other hand, chest CT scan detects 78% of left ruptures and 50% of right ruptures. CT scan has better sensitivity to diagnose right diaphragmatic rupture, by showing discontinuity of the hemidiaphragm, the dependent viscera sign, the collar sign, and intrathoracic herniation of abdominal contents [6] [7].

Once the diagnosis is made, surgery is mandatory in order to avoid complications. The approach could be laparotomic, thoracotomic or minimal invasive. Laparotomy is more appropriate in unstable patients when associated intra-abdominal injuries are suspected. Thoracotomy is necessary to handle late diaphragmatic hernia and isolated lesions of the right diaphragm and in case of expected chest injury [7] [8] [9].

Mortality is almost nil in isolated diaphragmatic rupture. The morbidity in right diaphragmatic rupture are often due to associated intra-abdominal or intrathoracic injuries [4] [5] [6] [7] [8]. In our case, the prognosis was clouded by urinary peritonitis and the bowel ischemia.

The acute bowel ischemia observed in our patient is likely due to an abdominal compartment syndrome. The association between abdominal compartment syndrome and intestinal ischemia is further described in animal studies, showing a significant decrease in perfusion of intestinal mucosa and mesenteric arterial blood flow [10] [11]. If the abdominal compartment syndrome is not diagnosed or treatment is delayed, the outcome is almost always fatal. The reason for the high mortality is due to the early involvement of multiple organs. Also, the higher the abdominal pressure, the higher the mortality. Other factors associated with mortality include surgery lasting more than 2 hours, developing abdominal

compartment syndrome within 48 hours of admission, and an elevated lactic acid level despite treatment. Even those who survive have significant morbidity from residual deficits like renal failure, muscle wasting, respiratory distress, and liver dysfunction [12] [13].

4. Conclusion

Post-traumatic diaphragmatic hernia is not an uncommon sequel. But lack of awareness of this condition may delay in diagnosis and result in life-threatening complications. The diagnosis is difficult and often delayed. An awareness of the condition assisted by the radiological investigations will lead to an early diagnosis and treatment which ultimately helps in managing the patients better. The management is surgical. Prognosis is related to associated injuries. The possibility of a diaphragmatic rupture should be kept in mind and sought after any trauma of the thoracoabdominal junction.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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