



## Delayed and fortuitous diagnosis of right diaphragmatic rupture with hepatic hernia: Case report

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### ABSTRACT

Rupture of the diaphragm usually occurs after a thoracoabdominal trauma. It leads to herniation of the abdominal viscera and compression of the thoracic organs. However, rightsided rupture is rare. We report a case of diaphragmatic rupture in the right side with liver hernia discovered four years after the trauma. Surgery was performed with good results.

**Key words:** diaphragm, rupture, hernia.

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### INTRODUCTION

Diaphragmatic rupture (DR) occurs in 0.8% to 3.6% of patients after blunt thoracoabdominal trauma, and the preoperative diagnosis is difficult (1). The intra-thoracic displacement of abdominal organs through diaphragmatic rupture may lead to early or delayed complications due to compression of heart and lungs or strangulation of the abdominal viscera. Right-sided DR is rare and occurs in approximately 5% to 20% of all diaphragmatic disruptions (1). We present a case with right-sided DR and herniation of the liver, ileum, proximal transverse, and distal ascending colon, which was diagnosed at a systematic chest radiograph four years after the initial blunt trauma.

### MATERIALS AND METHOD

#### Case report

A 32-year-old man whose a systematic chest radiograph (Fig. 1) revealed an abnormally elevated right hemi diaphragm with loops of colon filling the right costophrenic angle, was admitted to our hospital surgery department. Four years ago, he was victim of a traffic accident, with blunt right trauma resulting in right ribs fractures. On his physical examination, bowel sounds were audible in the right lower thorax, and the diaphragm was determined to be higher of the right side by percussion. Thoracoabdominal CT demonstrated right-sided DR with intrathoracic protrusion of the right hepatic lobe, ileum, proximal transverse and distal ascending colon (Fig. 2 and 3). Surgical exploration was planned. At postero-lateral thoracotomy, the size of the defect was 12 × 16 cm, and

the gap was through the right hemithorax . The hernia contained the right hepatic lobe, ileum and large intestine. The defect was repaired with nonabsorbable material, placed interruptedly. Prosthetic material was needed to close the defects. Postoperative course was uneventful, and chest radiographs showed a normally aerated right lower lobe . The patient was discharged from the hospital on the fourth postoperative day.

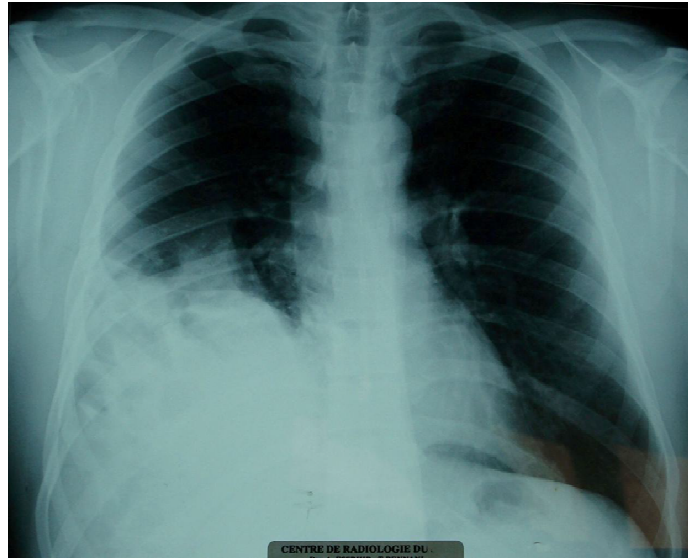
## RESULTS AND DISCUSSION

The mechanism of rupture is related to the pressure gradient between the pleural and peritoneal cavities. Lateral impact is 3 times more likely than any other type of impact to cause a rupture, since it can distort the chest wall and shear the ipsilateral diaphragm (2). Frontal impact can cause an increase in intraabdominal pressure, which results in long radial tears in the postero-lateral aspect of the diaphragm. The incidence of herniation of the intra-abdominal organs into the pleural cavity is low and observed in only about 19% of rightsided

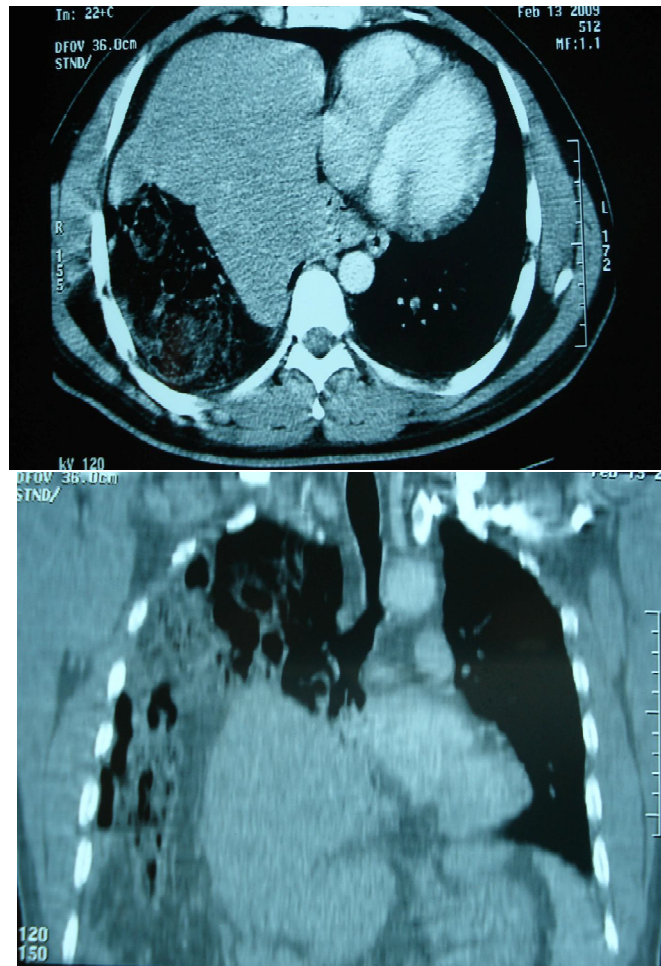
DRs. It is observed in 58% of left-sided DRs ( $p < 0, 01$ ) (3). The lower rate of transdiaphragmatic crossing of abdominal viscera in the right DR is probably due to the presence of the liver (3). Delay in diagnosis does not influence the outcome and is not influenced by the side of blunt DR location; a 40 years delay has already been reported (4). Blunt DR can easily be missed in the absence of other indications for prompt surgery, where a thorough examination of both hemidiaphragms is mandatory. A high index of suspicion combined with repeated and selective radiologic evaluation is necessary for early diagnosis (5). The use of sonography in the diagnosis of DR has been reported, but depends on the operator's skill and is often limited in the setting of acute trauma. Despite systematic computed tomography (CT) screening of thoracoabdominal injuries when sagittal and coronal reformatted images are obtained, reported diagnostic sensitivities for blunt diaphragmatic rupture are between 42 and 90% (6,7). In our case, signs of DR with right hepatic lobe were seen on the CT scan of sagittal and coronal reformatted images. Magnetic resonance presents a high sensitivity of the diaphragmatic outline and shows DR and intrathoracic herniation. However, this technique cannot be performed in emergency situations or in multitrauma patients (1). An increased morbidity and mortality are related to a delayed diagnosis of traumatic DR. However, the mortality associated with right-sided DR within the first 24 hours is reported to be 31% (1, 3, 8). Therefore, the diagnosis should be kept in mind in thoraco-abdominal trauma (8).

In delayed cases, the surgical treatment of DR should be performed through a thoracic route; thoracic adhesions are released more easily this way. The abdominal organs are replaced into the abdominal cavity. The diaphragmatic defect is sutured by unabsorbable material, placed interruptedly. Mesh or prosthetic repair is rarely needed in the acute stage but may be useful for a delayed repair. However, abdominal route ensures identification of any associated abdominal injuries, which occurs in 30% to 70% of patients (1).

Our patient was a delayed and asymptomatic case, that had a chest x-ray and a thoracoabdominal CT scan. A right diaphragm raise was shown, and the suspected DR with dislocation of the liver and other organs was confirmed. In this case, the thoracic repair was successful.



**Figure 1:** Preoperative chest x-ray showing the right diaphragm revealed higher localization with loops of colon filling.



**Figure 2 and 3:** Axial and coronal CT scan of the thorax revealing intrathoracic displacement of the liver, ileum, and colon.

## CONCLUSION

An early diagnosis of DR can easily be missed in the acute trauma setting despite the technological equipment and available diagnostic modalities.

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