

LAPAROSCOPIC HAND ASSISTED MANAGEMENT OF A LARGE DIAPHRAGMATIC  
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## ABSTRACT

**Introduction:** Diaphragmatic post-traumatic injuries are frequently missed and the clinical manifestation can be delayed. **Case presentation:** We present a case of a patient with a left large diaphragmatic incarcerated hernia, 4 years after a blunt trauma, for which we performed a laparoscopic hand-assisted approach. **Discussions:** Post traumatic diaphragmatic hernias are more frequent in left diaphragm, and often concern the stomach and the colon. Clinical presentation is usually delayed, and diagnosis can be difficult. Surgical technique is controversial; it depends on surgeon skill and nature of the lesion. **Conclusion:** Diaphragmatic hernia must be suspected in front of every thoracic traumatism. Laparoscopic hand-assisted approach is a feasible technique in case of difficult hernia reduction.

**KEYWORDS:** Laparoscopic, thoracic traumatism.

## INTRODUCTION

Diaphragmatic injuries can be caused by blunt or penetrating traumas. The incidence ranges between 0.8 and 15% depending on the authors.<sup>[1]</sup> Diagnosis is often missed and symptoms frequently appear years after the trauma.<sup>[2]</sup>

We present here a case report of a 49-year-old-man with diaphragmatic hernia secondary to a blunt trauma 4 years ago that was managed by a laparoscopic hand-assisted technique.

## CASE PRÉSENTATION

A 49-year-old man was admitted to the Emergency Unit for abdominal pain and fecal vomiting in the last 2 days, with constipation and retro-sternal pain. His medical history, revealed a blunt trauma due to an accident 4 years ago, with a left traumatic hemothorax and multiple rib fractures, which was managed conservatively.

On physical examination, the pulmonary auscultation showed a decreased pulmonary sound in the left inferior thorax, with guarding of abdomen in epigastric area.

The laboratory count revealed: Hb 9.4 g/dL (normal range between 13.0 and 18.0 g/dL), CRP 83.2 mg/L (normal < 5 mg/L), LDH 228 UI/L (normal range between 135 and 225 UI/L). Arterial blood gases were: pH 7.48 (normal range between 7.35 and 7.45), pO<sub>2</sub> 39

mmHg (normal range between 75 and 104 mmHg), pCO<sub>2</sub> 53 mmHg (normal range between 32 and 45 mmHg), and Lactate 3.30 mmol/L (normal range between 0.70 and 2.00 mmol/L). A chest X-ray was performed and showed a left diaphragmatic hernia, without tracheal deviation. An abdominal CT-scan was performed and showed a left diaphragmatic hernia with stomach and transverse colon content. An exploratory laparoscopy in emergency was performed. Colic reduction was performed without difficulty using the graspers, but the stomach reduction was difficult and with high risk of perforation during the reduction because of intrasaccular chronic adhesences and gastric dilatation. A right infra-costal left laparotomy for the hand assisted port was used to reduce the stomach. Size of the diaphragmatic defect was 5 cm. The defect was closed using separate non-absorbable sutures. A non-absorbable prosthesis was placed and fixed with separate non absorbable stitches. A thoracic left drain was placed. The postoperative course was uneventful. The thoracic drain was removed on the seventh day following surgery. A soft diet was allowed on the third postoperative day, and the patient was discharged eleven days after.

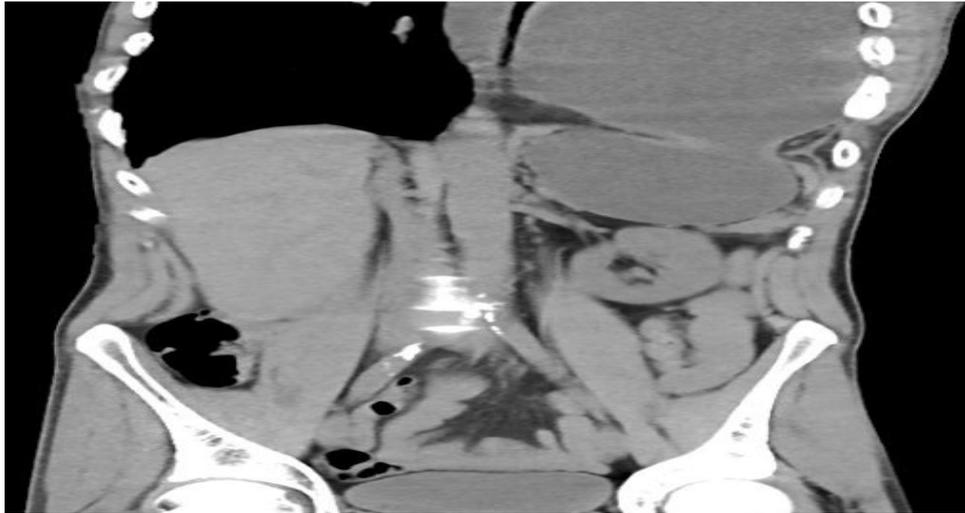


Figure 1: Abdominal CTscan revealing the diaphragmatic hernia.

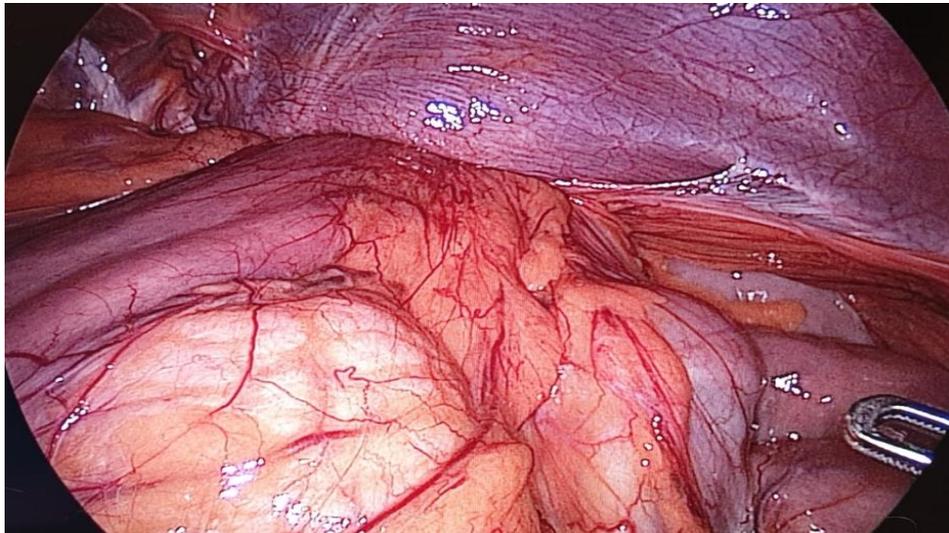


Figure 2: Intraoperative image - stomach and colon migration on the thorax through the diaphragmatic defect.

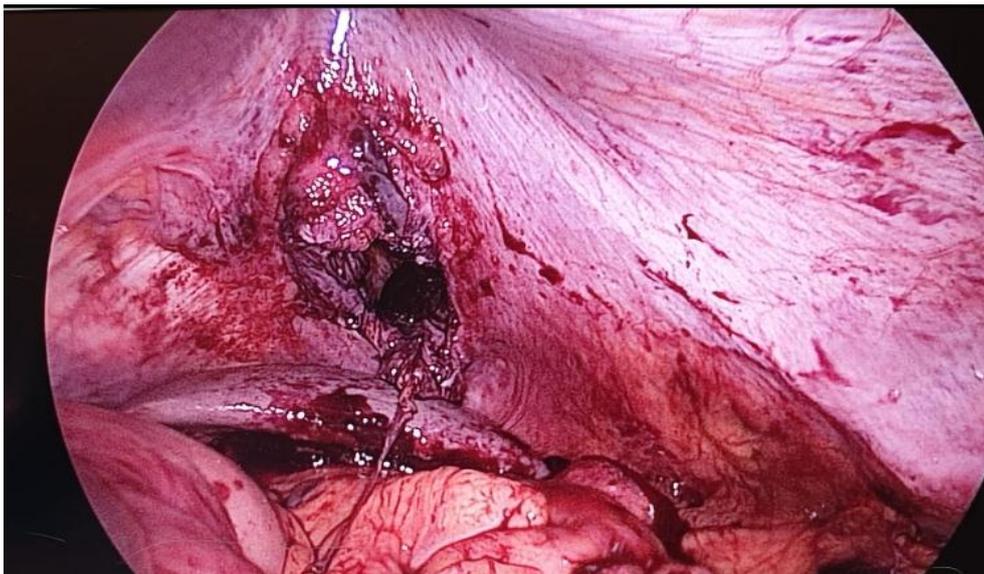


Figure 3: Intraoperative image- diaphragmatic defect.



**Figure 4: Intraoperative image- mesh fixation after the defect closure.**

## DISCUSSIONS

The diaphragmatic injuries seem more frequently to be caused by penetrating trauma than by blunt trauma (10-15% and 1-7% respectively) but incidence varies across studies in literature.<sup>[3]</sup> In penetrating traumas, the defect is smaller and that lead usually more to obstruction and strangulation of the content reason for what are more dangerous than blunt trauma.<sup>[4]</sup> In the right side of the diaphragm the liver and the omentum are often herniated, whereas in the left side, it's mostly stomach, spleen, liver or colon.<sup>[5]</sup> In our case, the patient attended at emergency room with herniation and obstruction of stomach and colon, which required rapid transfer to the operating room.

Clinical presentation can be separated in three phases: acute, latent and obstructive. The clinical diagnosis is more frequent in obstructive phase. In acute phase, the patient remains asymptomatic until the defect enlarges and abdominal viscera go into the thorax. Strangulation usually happens within three years after the trauma.<sup>[6]</sup> The delay is explained by the hypothesis of Grimes: respiration leads to recurrent stress for diaphragm and enlarges gradually the defect.<sup>[5]</sup> Post-traumatic diaphragmatic hernias are challenging to diagnose. Unfortunately, literature shows that no diagnosis method is efficient enough to identify diaphragmatic injury if no abdominals viscera are herniated.<sup>[7]</sup>

Diagnosis can be suspected with chest X ray but it doesn't shows specific signs. Gold standard is computed tomography, with sensitivity of 82% and specificity of 87%. CT scan makes it possible to see precisely the size and the localization of the defect.<sup>[8]</sup> According with that, our definitive diagnosis was obtained with an abdominal CT-scan.

The laparotomy is often preferred to laparoscopy due the instable hemodynamic status of the patient, or as the preference of the surgeon. The approach depends also by the surgeon's experience and his laparoscopic skills, because to the technical difficulty of the intervention. On the other hand, laparoscopy led to less invasiveness,

reduces postoperative morbi-mortality,<sup>[9]</sup> and usually allows inspection of the intrathoracic organs through the defect.<sup>[10]</sup> Two approaches, abdominal or thoracic, can be used in diaphragmatic hernia repair. According to the literature, thoracotomy or thoracoscopy is preferred if there's thoracic lesion. The abdominal approach is better if we suspect intra-abdominal lesion, or if it's an old hernia with suspicion of incarceration.<sup>[11]</sup>

In our case, we performed an abdominal approach, first with laparoscopy, but the stomach was well fixes inside the thorax, so an infra-costal mini-incision for the hand assisted port was performed. Some authors highlighted the need of small incisions, for example to reduce spleen and make a direct open suture on diaphragm.<sup>[12]</sup>

Concerning the surgical technique, the use of a mesh is controversial. Some authors reported that the direct suture of the defect if it's smaller than three centimeters. If the defect is larger, it's better to use the mesh to avoid tension on the suture.<sup>[13]</sup> We used a mesh because the defect was around five centimeters and we fixed the mesh to the diaphragm with separate points of resorbable suture.

## CONCLUSION

Post-traumatic diaphragmatic hernias are usually diagnosed years after the trauma and they have to be suspected in front of every thoraco-abdominal traumatism.

The laparoscopy is feasible but isn't use frequently and often needs mini-laparotomy to reduce the herniated organs when due to the adherences the reduction is difficult.

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