

# Delayed Presentation of Diaphragmatic Rupture due to Penetrating Trauma: Acute Mechanical Intestinal Obstruction

Uğur Topal , Ahmet Gökhan Sarıtaş , Orçun Yalav 

Department General Surgery, Çukurova University School of Medicine, Adana, Turkey

ORCID IDs of the authors: U.T. 0000-0003-1305-2056; A.G.S. 0000-0002-2039-3994; O.Y. 0000-0001-9239-4163.

Cite this article as: Topal U, Sarıtaş AG, Yalav O. Delayed Presentation of Diaphragmatic Rupture due to Penetrating Trauma: Acute Mechanical Intestinal Obstruction. *Cyprus J Med Sci* 2019; 4(2): 154-6.

## ABSTRACT

Although traumatic diaphragmatic ruptures are rare, it is a critical condition that can cause life-threatening complications. Traumatic diaphragmatic rupture may be discovered years after the presentation of the injury, with gastrointestinal or pulmonary symptoms due to a diaphragmatic hernia. Intestinal obstruction due to an isolated diaphragmatic rupture that emerges after a penetrating trauma is highly rare. The present study presents the case of a male patient who underwent laparotomy for intestinal obstruction due to a diaphragmatic hernia caused by a sharp object-induced injury to the thorax 1 year prior to his presentation. We believe that diaphragmatic ruptures are one of the reasons of mechanical intestinal obstruction and that they require urgent surgery.

**Keywords:** Diaphragmatic rupture; ileus; penetrating trauma

## INTRODUCTION

Diaphragmatic ruptures were first defined by Sennertius in 1541, and the first successful diaphragmatic repair was performed by Walker in 1889 (1). Penetrating injuries, such as sharp object-induced injuries and costal fractures, can cause diaphragmatic ruptures. A retrospective study of trauma patients has shown that the incidence of traumatic diaphragmatic rupture is approximately 0.4%–1.2% (2). Overall, 12%–60% of patients with thoracoabdominal trauma who do not require operation cannot be diagnosed in the acute phase. Diaphragmatic ruptures can be diagnosed in the latent phase or by strangulation of the intestinal loop in the diaphragmatic hernia that occurs secondary to the rupture (3). A small diaphragmatic rupture due to sharp objects may not be symptomatic at an early stage. With delay in diagnosis and treatment, progressive abdominal herniation develops because of the pressure difference between the abdominal and thoracic cavities. When abdominal organ herniation develops, respiratory complaints or mechanical obstruction symptoms of the gastrointestinal tract, strangulated or not, are noted. Diaphragmatic ruptures can be diagnosed by chest X-ray, computerized tomography (CT), or diagnostic laparoscopy. In delayed cases, CT is more useful in the diagnosis.

## CASE PRESENTATION

A 25-year-old male patient was admitted to Emergency Clinic for complaints of abdominal pain and no flatulence and defecation for 4 days. There was no history of a previous abdominal surgery. The patient was found to have experienced a sharp object-induced injury to his thorax 1 year prior and had undergone a nonoperative follow-up. Physical examination revealed abdominal distension and widespread tenderness. His blood pressure was 110/80 mmHg, pulse was 74/min, and respiratory rate was 22/min. Hemogram and biochemical examinations revealed no pathology. Abdominal X-ray in an erect standing position revealed an air–fluid level. Posteroanterior (PA) chest X-ray revealed an elevation in the diaphragm, whereas CT revealed that the left diaphragm contours were obscure. Mesenteric fatty tissue and splenic flexure appeared to be herniated into the thorax (Figure 1). The patient was scheduled for surgery with an initial diagnosis of intestinal obstruction. Abdominal exploration revealed a small amount of reactive free fluid in the abdomen. The omentum and splenic flexure were herniated through the 3×2-cm rupture area in the left diaphragm into the thorax. The blood flow of the herniated colonic loop was not impaired; however, the lumen was blocked because of edema. The omentum and splenic flexure were retracted into the abdomen, and the defect was repaired in two lay-

ers with U stitches using number "0" silk sutures (Silk; *Dogsan Medical Supplies Industry*, Trabzon, Turkey) (Figure 2). A 28-F chest tube was placed in 5. Intercostals spaces and removed on postoperative day 3. The patient was discharged on postoperative day 6 with complete recovery. Informed consent form was obtained from the patient.

## DISCUSSION

Carter and Giuseffi have described the clinical course of diaphragmatic ruptures in the 1950s in three stages: acute phase, latent phase, and obstructive phase (1, 4). The average incidence of diaphragmatic injury was reported to be 3% (0.8%–5.2%) in patients with multiple trauma (5). Overall, 75% of diaphragmatic ruptures occur due to blunt traumas, whereas the remaining 25% occur due to penetrating traumas (6). The left posteromedial tendinomuscular area is the weakest region of the diaphragm during embryological development. Therefore, ruptures on the left side are more frequent, and left-sided diaphragmatic ruptures are relatively more complicated. These complications are due to the intraabdominal organ herniation (5). In particular, stomach and spleen herniation is more frequent, whereas colon herniation is rare. Mechanical intestinal obstruction may be de-

veloped as a result of herniation of the lower intestinal system. Diaphragmatic ruptures are organ injuries that are difficult to diagnose. Because diaphragmatic ruptures due to penetrating injuries are small in size, they may not be detected by imaging methods in the absence of herniation. Traumatic diaphragmatic ruptures do not have specific signs and symptoms. Even in cases of normal posttraumatic findings, suspicion and diagnosis of ruptures must be considered to reduce early-stage mortality and morbidity by aiding early diagnosis. In the present study, a definite diagnosis was made and supported by CT of the thorax and upper abdomen. When diaphragmatic ruptures are electively operated, repair through the thorax is possible. However, this approach requires an intraabdominal pathology. For this reason, a transthoracic approach is not preferred in emergency operations. A transabdominal approach should be preferred in emergency operations to ensure adequate exploration of the intraabdominal organs and to have easier access to the diaphragm. Primary diaphragmatic repair with nonabsorbable sutures is generally the preferred method. If the defect is large and primary closure is not possible, it is recommended to close the defect using an appropriate graft (7, 8). Transabdominal surgery was performed in our patient because we detected colon obstruction.

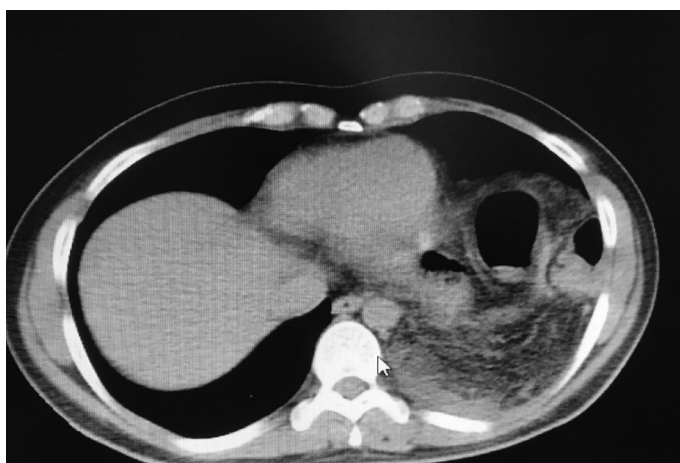
In conclusion, in patients with a blunt or penetrating trauma history, regardless of the time of injury, mechanical intestinal obstruction due to diaphragmatic ruptures should be considered in differential diagnosis.

**Informed Consent:** Informed consent was obtained from the patients who participated in this study.

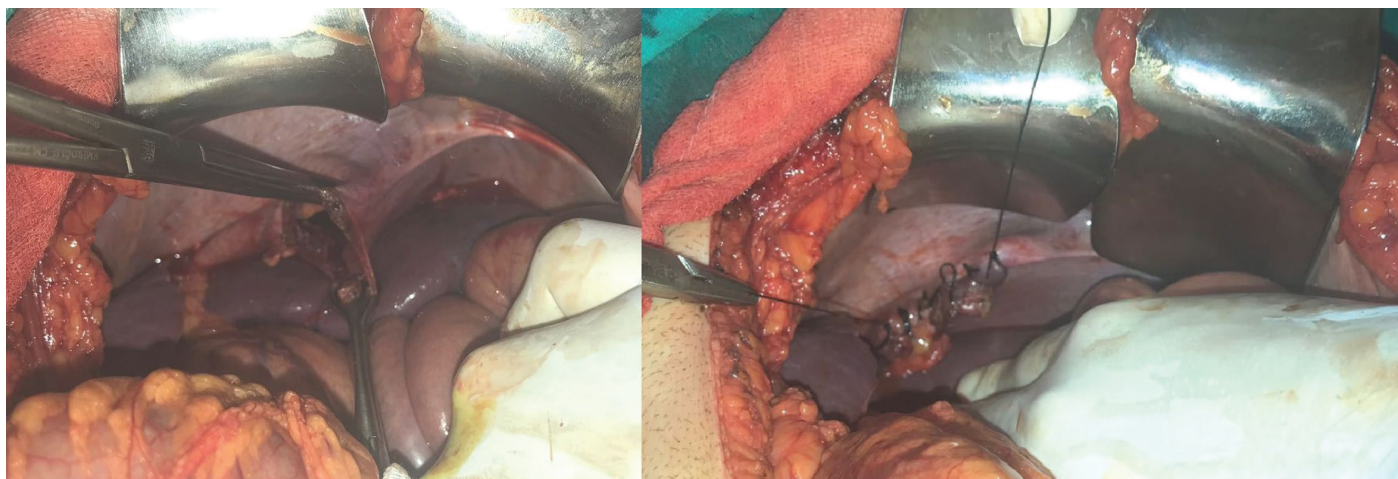
**Peer-review:** Externally peer-reviewed.

**Author contributions:** Concept - U.T., O.Y., A.G.S.; Design - U.T.; Supervision - O.Y., A.G.S.; Resource - U.T.; Materials - U.T.; Data Collection and/or Processing - U.T.; Analysis and/or Interpretation - U.T., O.Y., A.G.S.; Literature Search - U.T., O.Y., A.G.S.; Writing - U.T.; Critical Reviews - A.G.S.

**Conflict of Interest:** The authors have no conflicts of interest to declare.



**FIGURE 1.** The left diaphragm contours were not clearly observed on computed tomography. Mesenteric fat tissue and splenic flexure appear to be herniated into the thorax



**FIGURE 2.** Left diaphragm defect: 3 cm in diameter. The state of the diaphragmatic defect after being repaired with U stitches using number "0" silk sutures

**Financial Disclosure:** The authors declared that this study has received no financial support.

## REFERENCES

1. Arrendrup CH, Arrendrup D. Traumatic diaphragmatic hernia. In: Nyhus L, Condon ER, editors. *Hernia*, 3th ed. Lippincott, Philadelphia, 1989: 708-16.
2. Özgüç H, Akköse Ş, Şen G, Bulut M, Kaya E. Factors affecting mortality and morbidity after traumatic diaphragmatic injury. *Surg today* 2007; 37: 1042-6. [\[CrossRef\]](#)
3. Guth AA, Pachter HL, Kim U. Pitfalls in the diagnoses of blunt diaphragmatic injury. *Am J Surg* 1995; 170: 5-9. [\[CrossRef\]](#)
4. Gezen CF. Intestinal obstruction secondary to misdiagnosed traumatic diaphragma rupture: case report. *Kartal eğitim araştırma hastane tıp dergisi* 2004; 15: 3.
5. Ocak T, Kuşaslan R, Baştürk M, Yiğitbaş H, Oral NH. Simple Blunt Trauma and Diaphragmatic Rupture Showing Delayed Clinical Signs. *JAEMCR* 2012; 3: 9-II. [\[CrossRef\]](#)
6. Carter BN, Giuseffi J, Felson B. Traumatic diaphragmatic hernia. *Am J Roentgenol* 1951; 65: 56-727
7. Shah RSS, Mearns AJ, Choudhury AK. Traumatic rupture of diaphragm. *Ann Thorac Surg* 1995; 60: 1444-9. [\[CrossRef\]](#)
8. Orsi P, Rollo S, Montanari M, Rossi G. Rupture of the diaphragma caused by closed thoraco-abdominal trauma. Case contribution and anatomic-clinical considerations. *G Chir* 1998; 19: 13-7.