

# Diaphragmatic Rupture With Left Colon and Spleen Herniation and Small Intestine Injury After Blunt Trauma



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## ABSTRACT

Traumatic Diaphragmatic Rupture (TDR) is a rare type of trauma. Small intestine injuries are the third most common type of injury resulting from blunt trauma to abdominal organs. The immediate diagnosis of TDR and bowel injuries is a daunting task. We reported a 53-year-old male patient who was transferred to the hospital by EMS because of a car accident. The chest X-ray showed the left diaphragm elevation. Also, a computed tomography scan revealed that the greater omentum, a portion of the colon, spleen, and stomach were transposed in the hemithorax through a diaphragm rupture. The patient underwent laparotomy and the incidental findings in laparotomy showed bowel injuries. This case was a common cause of traumatic left-sided diaphragmatic rupture and intestinal injury. The suspicion of diaphragmatic rupture and intestinal injury in a patient with multiple traumas contributes to early diagnosis. Surgical repair remains the only treatment for diaphragmatic rupture. The severe injury in a part of the intestine may result in the resection of that part.

## Introduction

**A** traumatic rupture of the diaphragm is an uncommon position. It occurs in 1 to 5% of patients with thoracoabdominal trauma. The cause factors are blunt trauma

and penetrating trauma [1]. The organs involved in left-sided diaphragmatic hernia are the colon, omentum, small intestine, stomach and spleen. Chest radiography and Computerized Tomography (CT) is the most effective technique for identification of traumatic diaphragmatic rupture [2].

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## Case Presentation

53-year-old male patient with a car-to-car accident, in which his chest struck the steering wheel was admitted to our emergency department. On arrival, his Glasgow Coma Scale was 15, respiration rate was 30 breaths/min, pulse rate was 75 beats/min, blood pressure was 120/75 mmHg, and O<sub>2</sub> saturation was 87%. Physical examination revealed decreased breathing sound over the left lung, short breathing, and pain in deep breathing with generalized tenderness at the epigastric site. The chest X-ray showed the elevated left hemidiaphragm and the level of air-fluid within the left hemithorax (Figure 1). Computed Tomography (CT) scan (Figure 2) revealed that the intrathoracic herniation of the stomach and spleen is in contact with the posterior thoracic wall. The patient underwent urgent laparotomy and incidental findings in laparotomy showed small intestinal injuries (Figure 3 & 4). Moreover, the herniation of the left colon, omentum, and spleen was seen. There were no ischemic changes or perforations; however, the colon was slightly edematous.

Resection of the intestinal tract was unnecessary. At emergency laparotomy, a 10-cm linear left diaphragmatic rupture with intrathoracic stomach, spleen, and left colon was found. After we repositioned the intra-abdominal organs, the diaphragmatic repair was performed using a non-absorbable interrupted suture. Then, a chest drain was inserted in the left chest. The patient was transferred to the Intensive Care Unit (ICU) and extubated. After 5 days, the patient was transferred to the ward. The thoracic drain was removed on the

fifth postoperative day and the patient was discharged on the tenth postoperative day.

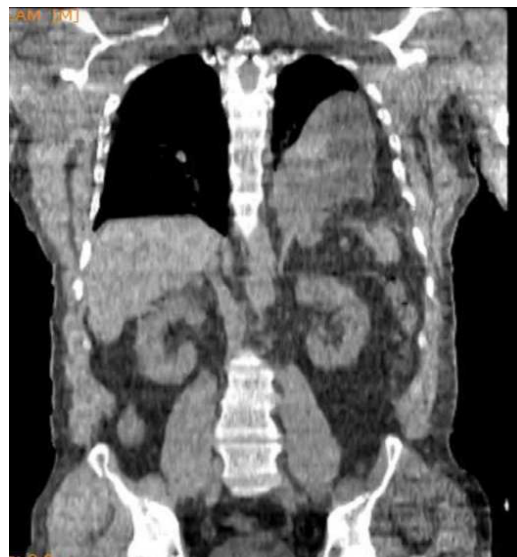
## Discussion

The incidence of Traumatic Diaphragmatic Rupture (TDR) is high in trauma patients. In recent 20 years, the rate of blunt TDR has increased as a result of the increased motor vehicle collisions [3, 4]. Motor vehicle collisions account for 90% of all diaphragmatic injuries resulting from blunt trauma. They account for 1-6% of major thoracic injuries and 3%-8% of patients undergoing emergency colectomy after trauma. TDR affects predominantly males (male:female = 4:1) in the third decade of their lives [5]. It occurs on the left side in 65-85% of patients, on the right side in 15%-35%, and bilaterally in 1%-12% of patients. This is because of the protective effect of the liver, which is located below the most parts of the right diaphragm, and there is an anatomic weak point in the left posterior lateral diaphragm. Blunt trauma causes large radial tears usually about 10 to 15 cm [6].

The abdominal viscera herniation could occur through these large ruptures and organs, such as the stomach, spleen, colon, small intestine, and liver may enter the chest. The most important factors in the early and correct diagnosis of DR are a high index of suspicion and careful scrutiny of diagnostic studies [7]. The commonly presented symptoms are dyspnea, chest pain, abdominal pain, and vomiting. On auscultation, decreased respiratory sound and bowel sound in the thorax may be



**Figure 1.** The elevated left hemidiaphragm in chest X-ray



**Figure 2.** Computed Tomography (CT) scan of the stomach

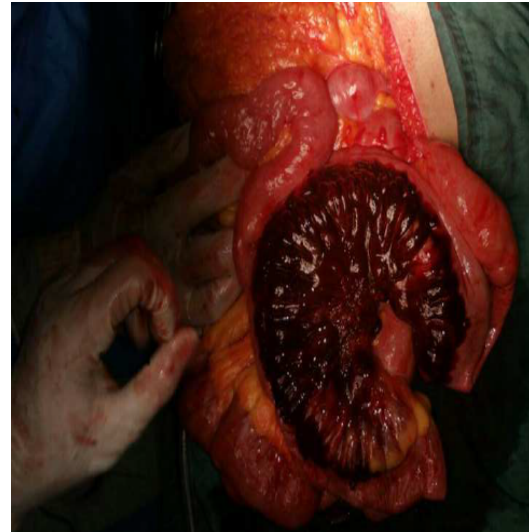


**Figure 3.** The elevated left hemidiaphragm in Computed Tomography

found. Besides, cardiovascular insufficiency and respiratory dysfunction may occur.

There are various methods for diagnosing DR. Radiography, fluoroscopy, abdominal sonography, and CT imaging are effective and easy to perform methods in the emergency room [8]. Chest radiography usually is the first technique with a sensitivity of 46% for left-sided ruptures and 17% for right-sided ruptures. The radiological signs suggesting diaphragmatic disruption include the abnormally elevated diaphragm, unclear diaphragmatic borders, and abnormal gas patterns in the lung [9]. In our case, the chest radiograph taken at the emergency room revealed all the aforementioned radiographic signs. Besides, a hernia sac containing visceral gas was recognized in the left thorax. The CT imaging performed after the chest plain film also revealed the traits of DR, such as diaphragm discontinuity, segmental nonrecognition of the diaphragm, intrathoracic herniation of stomach and spleen, waist-like constriction of the stomach (collar sign), thickening of the diaphragm (curled diaphragm sign), fracture of the left 3rd rib, and left hemithorax [10].

The incidence of blunt intestinal injury sustained in vehicle accidents is 84.7%, whereas the incidence of and blunt intestinal injury sustained in non-vehicular accidents is 15.3%. Vehicular trauma, especially due to car accidents, is a well-recognized cause of intestinal injuries. Injury to the intra-abdominal structures is caused by two main mechanisms: density forces and deceleration forces. Diagnostic tests can be used to evaluate patients with blunt thoracoabdominal trauma, including Ultrasoundography (US), Diagnostic Peritoneal Lavage (DPL), CT



**Figure 4.** Small intestinal injuries incidental findings in laparotomy

scan, and Diagnostic Laparoscopy (DL). Intestinal injury-related morbidity occurs in 13% of patients with blunt thoracoabdominal trauma and the rate of blunt intestinal trauma-related mortality is 10%-30% [11-13].

## Ethical Considerations

### Compliance with ethical guidelines

All ethical principles are considered in this article. The participants were informed about the purpose of the research and its implementation stages.

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### Conflict of interest

The authors declared no conflict of interest.

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