

TRAUMATIC DIAPHRAGMATIC RUPTURES: A retrospective study of 35 cases

Travmatik Diyafragma Rüptürleri: 35 olgunun retrospektif değerlendirilmesi

Leyla Hasdıraz¹, Ali Kahraman¹, Fahri Oğuzkaya¹**Abstract:**

Purpose: Traumatic rupture of the diaphragm is caused by blunt or penetrating trauma. Early diagnosis is difficult, and complications such as visceral herniation may arise. The aim of this study was to evaluate our diagnostic and therapeutic approaches for traumatic diaphragmatic ruptures in the last ten-year period.

Patients and Methods: Thirty-five patients who were diagnosed with traumatic diaphragmatic ruptures in the last ten-year period were retrospectively reviewed. Of the patients, 24 were male and 11 female. The mean age of the patients was 30 yrs (range 14–66 yrs). The mechanism of injuries, associated injuries, diagnostic and surgical approaches, and the morbidity and mortality rate were evaluated.

Results: Blunt injuries were common (71.4%). Chest x-ray, thorax CT, and video assisted thoracoscopic surgery were used for the diagnosis with a diagnostic rate of 22.8%, 22.7% and 58.8%, respectively. Interrupted and running techniques with nonabsorbable sutures were used to repair the diaphragm via thoracotomy in all patients. Pleural empyema was seen in two patients. The mortality rate was 2.9%.

Conclusion: Video assisted thoracoscopy is a valuable diagnostic procedure in suspected traumatic diaphragmatic rupture with radio diagnostic procedures. Thoracotomy and primary repairing may be adequate, especially in the late period, for traumatic diaphragmatic ruptures.

Key Words: Diaphragmatic hernia, traumatic; Rupture; Thoracoscopy.

Özet

Amaç: Travmatik diyafragma rüptürleri künt veya penetran yaralanmalarla olur. Erken tanı zordur ve viseral herniasyonlar gibi komplikasyonlar görülebilir. Bu çalışmanın amacı, son on yıllık periyotta travmatik diyafragma rüptürlerindeki tanı ve tedavi yaklaşımlarımızı değerlendirmektir.

Hastalar ve Yöntem: Son on yıllık periyotta travmatik diyafragma rüptürü tanısı alan 35 hastayı retrospektif olarak inceledik. Olguların 24'ü erkek, 11'i kadındı. Hastaların yaşları 14-66yıl arasında değişmekte olup ortalama yaş 30'du. Yaralanma mekanizması, eşlik eden yaralanmalar, tanı ve tedavi yaklaşımları, morbidite ve mortalite oranları değerlendirildi.

Sonuçlar: En sık sebep künt travmalardı (%71,4). Tanı için göğüs röntgenogramı, toraks CT, videotorakoskopi sırasıyla %22,8; %22,7; %58,8 doğruluk oranıyla kullanıldı. Tüm hastalarda torakotomi yoluyla tek tek ve devamlı emilmeyen sütürler onarım için kullanıldı. İki hastada pleval ampiyem görüldü. Mortalite %2,9'du.

Tartışma: Radyodiyagnostik yöntemlerle travmatik diyafragma şüphesi olanlarda videotorakoskopi değerli bir tanı yöntemidir. Özellikle geç periyottaki hastalarda torakotomi ve primer onarım yeterli olabilir.

Anahtar Kelimeler: Travmatik diyafragma hernisi; Rüptür; Torakoskopi.

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Introduction

Traumatic rupture of the diaphragm is caused by blunt or penetrating trauma with an incidence varying from 1 to 7% depending on the series (1,2). Diagnosis remains difficult and requires a high index of suspicion. Delayed diagnosis of traumatic diaphragmatic rupture (TDR) may cause increased morbidity and mortality. Diaphragmatic rupture is rarely fatal but associated thoracic and abdominal injuries may increase the mortality rate. The aim of this study was to evaluate the clinical and radiological diagnostic difficulties, and the therapeutic approach in our cases with TDR.

Material and Methods

Thirty-five patients who were diagnosed with TDR in the last ten-year period were retrospectively reviewed. Of the patients, 24 (68%) were male and 11 (32%) female. The mean age of the patients was 30 years (range 14-66 yrs). The data studied were the mechanism of injury, TDR side, performed imaging studies, associated injuries, diagnostic rate of videothoracoscopy in suspected TDR, and the morbidity and mortality rate.

Results

Blunt injuries were common, 25 patients (71.4 %). The causes of blunt trauma were motor vehicle accidents (including pedestrians hit by cars) in 24 cases (96%) and a fall in one case (4%). Penetrating thoracic injuries were detected in 10 patients (28.6%). The penetrating injuries included six stab wounds and four gunshot wounds. The anatomic distribution of injury to the diaphragm consisted of seven right-sided (20%) injuries and 28 left-sided (80%) injuries. Plain chest X-rays were performed in all patients and the findings are summarized in Table I. Herniation of intestinal organs on chest x-ray accepted as TDR were observed in 8 patients (22.8%). In one patient, herniation of the stomach led to a mediastinal shift. (Picture 1) Five of the patients had massive haemothorax, although none had intra abdominal bleeding findings. In such patients, diaphragmatic rupture and intrabdominal bleeding were determined during thoracotomies, but no other intrathoracic

bleeding sources were detected. Twenty-two patients who had suspected TDR after plain chest x-ray underwent computerized tomography and gastrografin study of upper gastrointestinal tract, following nasogastric tube insertion. Thoracoabdominal computed tomography (CT), performed in 22 of the patients, and led to the diagnosis of TDR in 5 patients and unspecific findings in 17. Of these 17 patients, a diagnosis of TDR could not be definitely confirmed with CT or gastrografin studies. These patients underwent video assisted thoracoscopic surgery (VATS) for evaluation of diaphragm and probable clotted haemothorax. In 7 patients, VATS was not adequate because of pleural adhesions. The diagnostic rate of VATS was 58.8% in such cases. Thoracotomies were confirmed by TDR in the remaining seven patients. Associated organ injuries are shown in Table II. All patients underwent thoracotomies. Four required additional laparotomy because of intra abdominal injuries. TDR was repaired with sutures: both interrupted and running techniques with nonabsorbable sutures were used. None of the patients required graft implantation. Two patients had empyema postoperatively. One had intestinal perforation. The patients with empyema were treated using drainage and antibiotic administration. One patient died because of multi organ failure on the 7th day postoperatively.

Discussion

Acute diaphragmatic rupture occurs in 1–7% of major blunt trauma victims and in 10–15% of patients with penetrating trauma to the lower chest (1). The diagnosis of a diaphragmatic injury may be difficult, requiring a high index of suspicion. Subtle findings on chest x-ray that suggest the diagnosis include an elevated hemidiaphragm, lower lobe atelectasis and pleural effusion. The diagnosis may be obvious if the chest x-ray demonstrates abdominal viscera within the left thoracic cavity. We determined such findings in 8 of the 35 cases (22.8%). One had a mediastinal shift. Sensitivity and specificity for CT scan ranges between 33–83 and 76–100%, respectively. Helical CT scanning with axial, sagittal and coronal reformations is reported to reach a sensitivity of 50% and 78% in diagnosing

right- and left-sided diaphragmatic injuries, respectively (3). Thoracoabdominal computed tomography (CT), performed on 22 of the patients, led to the diagnosis of TDR in 5 patients (22.7%) in our series. Videothoracoscopy is recommended in the literature (4,5,6) in thoracic trauma for the diagnosis and treatment of TDR. Videothoracoscopy was effective for diagnosis of TDR in ten cases of 17 (58.8%) in our series. The other seven patients had pleural adhesions because of late presentation, and videothoracoscopy was unsuccessful. Delayed diagnosis of TDR is associated with increased morbidity and mortality, and laparotomy is suggested for all penetrating injuries of the lower thorax and upper abdomen (7).

The surgical approach for the repair of TDR is dictated by whether the injury is acute or chronic. The repair of acute injuries should be performed by laparotomy because of probable associated intra abdominal injuries. On the other hand, adhesions between the herniated viscera and lung or mediastinum may be most effectively controlled through the chest. In our series only five of the patients had acute trauma, and the others were in the chronic period (7th day – 2nd years.) Thoracotomies were performed in five such acute cases. Because blood had penetrated the TDR from the abdomen to thorax, there were no signs of intra abdominal bleeding. These patients presented with massive haemothorax and unstable haemodynamic conditions. Additional phrenothomies and laparotomies were required in these patients.

The most frequent morbidity is infection in the treatment of TDR (8). We encountered two empyemas during postoperative period, one with intestinal perforation.

Various mortality rates are stated in the literature (8). Williams M et al. (8) suggested that the prompt identification of associated injuries with rapid control of bleeding is paramount to survival. The mortality rate in the present series was 2.9%.

In conclusion, videothoracoscopy has a higher diagnostic rate than those of non-invasive diagnostic procedures. Therefore, videothoracoscopy may be suggested in chest trauma patients, especially in cases with abnormalities in the lower chest area on chest x-ray and thorax CT. Blood originating in the abdomen could pass to the thoracic cavity through TDR because of negative pressure in the pleural space. The physician should consider this carefully in order to avoid unnecessary thoracotomy.



Picture 1. Chest x-ray showing mediastinal shift in a patient with traumatic diaphragmatic rupture

Table I. Chest x-ray findings on traumatic diaphragmatic injury.

Pleural effusion	10 (28.6%)
Herniation of intestinal organs	8 (22.9%)
Elevated hemidiaphragma	8 (22.9%)
Abnormal diaphragmatic silhouette	6 (17.1%)
Abnormal lower lung field	6 (17.1%)

Table II. Associated organ injuries

Lung injury	17 (48.6%)
Spleen injury	5 (14.3%)
Liver injury	3 (8.6%)
Gastric perforation	1 (2.9%)
Intestinal perforation	1 (2.9%)

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