



Unrecognized Diaphragm Hernia

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Introduction: Post-traumatic diaphragmatic hernia is defined as the passage of abdominal viscera into the thorax through a post-traumatic diaphragmatic breach. They are rare and may be unrecognized in 10-30% of cases at initial management.

Materials and Methods: A retrospective descriptive study including all the patients taken in charge for post-traumatic neglected diaphragmatic lesions over two years between December 2018 and January 2021 within the service of visceral emergencies of the university hospital center Ibn Rochd of Casablanca. Our work aims to define the epidemiological, clinical, and therapeutic characteristics of patients admitted for post-traumatic diaphragmatic lesions.

Results: The average age of the patients was 30 years (range 18 to 43 years). All patients were male. They were due to a closed trauma in 11 patients (32%) and a penetrating trauma in 58%. The diagnosis was guided preoperatively by the different imaging techniques, in particular chest radiography and CT scan. Treatment was mainly by laparotomy and consisted of closure of the diaphragmatic breach by simple sutures.

Conclusion: Post-traumatic diaphragmatic hernias can go unnoticed and can be life-threatening in case of associated lesions or complications.

Keywords: Post-traumatic diaphragmatic hernia; surgery; emergency.

1. INTRODUCTION

The post traumatic diaphragmatic blunt rupture and/or diaphragmatic wound are uncommon and involve the three tunics of the diaphragm (pleura, muscle, and peritoneum), leading to the passage of abdominal viscera into the thoracic cavity [1]. Diaphragmatic rupture arises in 10-15% with penetrating trauma and in 1 - 7% of blunt trauma to the lower chest [2]. Its diagnosis can quickly go unnoticed at the time of the initial management and can be revealed late by complications such as herniation and strangulation of intraabdominal organs. In contrast, the diaphragmatic injury can be diagnosed at laparotomy in the presence of simultaneous organ injury [3-4]. It is a surgical emergency, and the choice between the abdominal and thoracic approach is conditioned by the age of the rupture and the lesion assessment.

The aim of this study was to describe the epidemiological, clinical, therapeutic, and evolutionary characteristics of diaphragmatic trauma.

2. MATERIALS AND METHODS

This retrospective study was carried out on seven patients who had delayed presentation and diagnosis for diaphragmatic hernia managed in the visceral emergency department of the Ibn Rochd University Hospital in Casablanca, Morocco from December 2018 to January 2021 after approval from Institutional Ethical Committee.

We reviewed and examined all the records of the patients, to do age, gender, mechanism of injury, clinical presentation, time to diagnosis, diagnostic methods, localization of rupture, associated injuries, surgical approach and procedure, hospital stay, postoperative morbidity and mortality using data sheet pre and post-surgery. All patients and investigators were blinded through the whole duration of the study.

3. RESULTS

The study identified 07 male patients ranging in age from 18 to 43 years (mean 30 years). The mechanism of the trauma were accidents in public road traffic (14%), a fall from height (28%), and abdomino-thoracic penetrating wounds (58%) [Fig. 1]. The mean time from trauma to symptoms was 2.5 years. This delay was

variable, ranging from as early as four months of trauma to years later, even up to 4 years.

Patients were admitted to the emergency department for chest pain with respiratory distress associated with low-abundance hematemesis in 1 patient (14%), an occlusive syndrome in 4 patients (58%), and low chest pain associated with vomiting in 2 patients (28%).

Clinical examination finds abdominal distension and tympanism in 4 patients (58%), displaced heart sounds with left basal intestinal sounds in 1 patient (14%).

Thoracoabdominal computed tomography (CT) scan was performed to all patients and chest X ray was performed only in three patients (42%). For patients who were performed chest X ray, we found that the left diaphragmatic ascension was found in two patients (28%), left basal fluid and air image with mediastinal backflow in one patient (14%). The abdomen radiography without opacification was performed in 4 patients (58%) and showed left basal thoracic air-fluid levels.

For the thoracoabdominal CT scan [Fig. 3], it showed ascension of abdominal viscera in the left hemithorax: the colon in five patients (70%), the colon and omentum in one patient (15%), and the stomach in one patient (15%). Pulmonary collapse and mediastinal reflux, observed in 4 patients (58%). During the surgery we found out that all patients had the diaphragmatic lesion located in the left side [Fig. 4].

There was no right or bilateral rupture. The size of the diaphragmatic ruptures varied between 5 and 10 cm in 2 patients (29%). They were smaller than 5 cm in 5 patients (71%).

The herniated viscera were: colon and greater omentum in 2 Patients (29%), colon in 2 patients (29%), stomach with a colon in 1 patient (14%), colon, small intestine, and greater omentum in 1 patient (14%).

After the reduction of hernia, two patients were presented by necrosis of the transverse colon and one patient presented gastric necrosis due to an organism-axial volvulus through the diaphragmatic hernia [Fig. 5].

Postoperative surgery undergone well without any complications. Patients were discharged after five days of hospitalization. A follow up with a clinical examination and thoracic radiography.

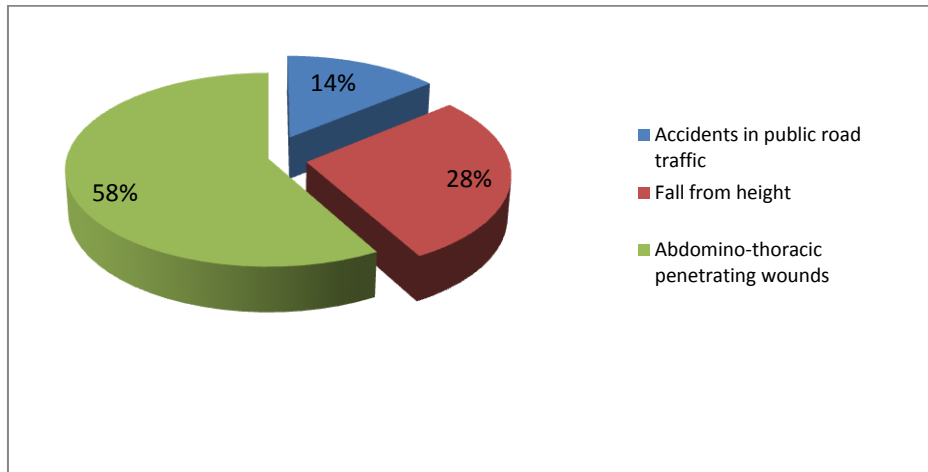


Fig. 1. Pie chart displaying the mechanism of trauma of all patients

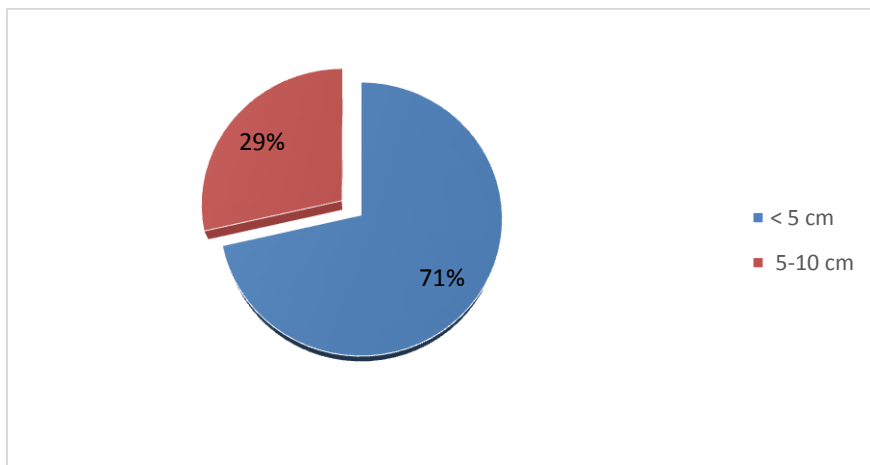


Fig. 2. Dimensions of the diaphragmatic breach



Fig. 3. Abdominal scan: left diaphragmatic hernia with colonic involvement, collapsed left lower lobe and mediastinal elements in lateral control

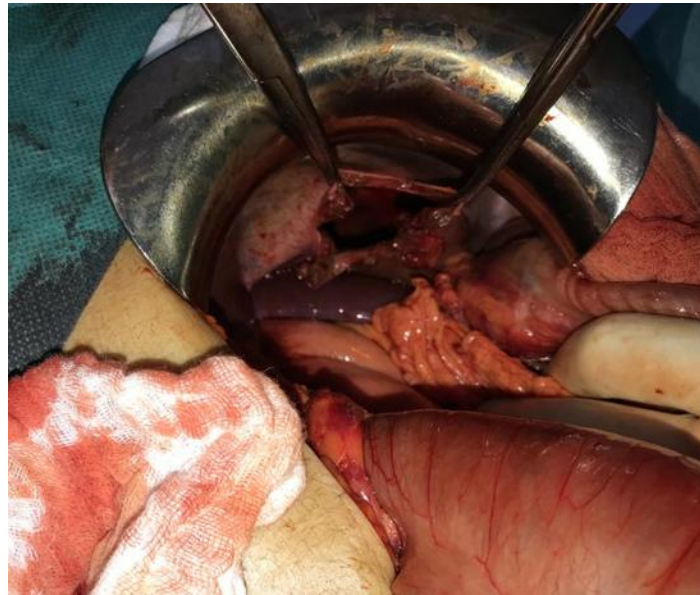


Fig. 4. Peroperative image showing the diaphragmatic rupture



Fig. 5. Peroperative image after reduction of the herniated necrotic colon

4. DISCUSSION

Post-traumatic diaphragmatic injury is a rare complication, but severe problem which can occur from penetrating or blunt thoracoabdominal injuries. It occurs in 0.8% to 8% of all traumas [5]. The diagnosis of the post-traumatic diaphragmatic injury is often difficult during the initial management of which it goes unnoticed in

10 to 30% [6]. In the long term, the evolution is marked by the herniation of the abdominal organ in the thoracic cavity and complicated by strangulation and cardiorespiratory distress by compression [7].

In diaphragm rupture, the mechanism is indirect [8]. Rupture of the diaphragm occurs when intra-abdominal pressure suddenly rises above the

tensile strength of the diaphragmatic tissue. Blunt trauma produces larger, radial tears. Unlike the wound trauma patients, the diaphragm is injured directly and the size of the lesion is small.

The majority of post-traumatic diaphragmatic hernias, approximately 80-90%, often occur in the left leaflet because it is congenitally weaker than the right leaflet and is not protected from the compressive forces transmitted by the trauma as is the right dome [7,9]. Bilateral hernias are exceptional because they are most often due to more violent trauma. In our series, the diaphragmatic rupture was located at the level of the left dome in all patients.

The use of diagnostic methods in the evaluation of diaphragmatic rupture is beneficial. Chest X-ray is requested in the first intention to look for specific images of aeric or hydroaeric type almost always on the left, evocative images such as the elevation of the diaphragmatic dome-shaped, mediastinal compression on the side opposite to the rupture and sometimes can be expected. A Chest CT scan is necessary to confirm the diagnosis.

Surgical management is the emergency treatment performed in delayed and complicated diaphragmatic trauma [10]. Laparotomy is the most commonly used approach in an emergency. It allows exploration, reduction, and treatment of the abdominal viscera [11,12]. In the case of the presence of intrathoracic adhesions of the ascended organs, the associated thoracic approach is justified. Different stitches must perform the repair of the diaphragmatic lesion with non-absorbable stitches to avoid later recurrence [1,10]. However, if a sizeable diaphragmatic tear is present, prosthetic plastic is necessary to reinforce the raphe [12,13]. Thoracic drainage on the side of the hernia is usual. The prognosis of traumatic diaphragm rupture is not dreadful in itself. The severity is related to the associated injuries, particularly in the presence of sepsis, multi-visceral failure, hemodynamic shock, severe head trauma, and respiratory distress. The presence of strangulation and gangrene worsens the prognosis; in our series, the evolution was good in all patients, except for one patient who died having undergone a total gastrectomy [10].

5. CONCLUSION

Post-traumatic diaphragmatic hernias can go unnoticed and can be life-threatening in case of

associated to lesions or complications. The diagnosis must be systematically evoked in any person admitted to emergency services with blunt or penetrating trauma, especially on the left diaphragm, must suspect a diaphragmatic injury. Laparoscopy is a new approach and should be performed whenever a diaphragmatic lesion is suspected.

CONSENT

As per international standard or university standard, patient's consent has been collected and preserved by the authors.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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