

Spontaneous Diaphragmatic Rupture: Case Report and Literature Review

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Rezumat

Ruptura spontană de diafragm: prezentare de caz și revista literaturii

Ruptura spontană de diafragm este o patologie extrem de rară. De regulă ruptura de diafragm este provocată de traumatism abdominal bont. Prezentăm cazul unui pacient de 18 ani, internat la 2 ore de la debut cu dureri pronunțate progresive în epigastru și hemitoracele stâng, dispnee, în lipsa unui traumatism toracic sau abdominal. Examenul radiologic al toracelui pune în evidență hernierea stomacului, colonului în hemitoracele stâng și colabarea lobului inferior al pulmonului stâng. Se intervine chirurgical pentru leziune de diafragm, intraoperator se determină detașarea hemidiafragmului stâng de la peretele toracic cu hernierea stomacului, splinei și unghiului lienal al colonului în hemitoracele stâng. Prezentăm succint revista literaturii referitor la etiologia, modalitatea de diagnostic și tratament al leziunilor spontane de diafragm.

Cuvinte cheie: leziune, diafragm, spontan

Abstract

Spontaneous diaphragm rupture is extremely rare. Usually a diaphragm rupture is trauma induced. We describe a case of

an 18-year old patient admitted 2 hours after onset, presenting severe epigastric and left sided chest pain without any trauma history. Upright chest x-ray revealed displaced stomach and colon into the left pleural cavity with a collapsed left lung. Surgery for a left-sided diaphragm rupture with stomach, spleen and colon splenic flexure herniation was undertaken. We present a brief review regarding the aetiology, diagnostic and treatment policy of spontaneous diaphragmatic rupture.

Key words: rupture, diaphragm, spontaneous

Introduction

Spontaneous diaphragmatic rupture (SDR) is considered one of the rarest surgical emergencies (1-8). The "spontaneous" diaphragmatic rupture is defined as a lesion to the diaphragm resulting from a sudden increase of intra-abdominal pressure without any evidence of trauma (1).

Up to date only 28 detailed reports of SDR were published in the English literature (1956-2009) (3-8). Median patient's age was 40 years, with a range of 3 to 74 years (3). The aetiology of SDR is attributed to physical exercises, delivery, coughing, Pilates, severe vomiting episodes and other conditions that induce sudden increase of intra-abdominal pressure (1-3,9,10).

The potential predisposing factors for SDR are quite enigmatic up to date, the following being suggested: the diaphragmatic "locus minoris resistentiae" or the absence of coordination of diaphragm muscle during physical activity (3-8).

We present an additional case of a patient with SDR and stomach, spleen and hepatic flexure of the colon into the

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thoracic cavity as a result of a violent physical effort that was managed surgically as well as the literature review regarding this subject.

Case report

An 18-year-old male patient was admitted 2 hours after onset with severe epigastric pain irradiating into the left thorax as well as respiratory distress. The patient's complaints started after a sudden physical effort in absence of any abdominal or thoracic trauma.

Physical examination revealed symmetric abdomen, painful on palpation with rebound tenderness in the epigstric area. No bruises were noted. Chest auscultation revealed reduced respiratory sound upon the left basal pulmonary area. The patient's vital signs were stable.

Further laboratory findings revealed no other pathologies except a white blood cell count of $10.5 \times 10^9/L$. Chest radiography revealed stomach and colon herniation into the left thoracic cavity and a collapsed inferior part of the left lung (Fig. 1, 2).

A diagnosis of SRD was established and the patient underwent emergency laparotomy. The operative findings included a tear of the left diaphragm from the thorax in-between mid left axillary line and the left costo-vertebral triangle with herniation of stomach, splenic flexure of the colon and spleen into the thorax. The hernia was reduced and no alteration of the blood supply of the involved organs was noted. The pleural and abdominal cavities were drained and the diaphragm defect repaired with figure-of-eight permanent sutures. The patient made an uneventful recovery and left the hospital on postoperative day 8. He was observed 6 months after surgery and had no symptoms.

Discussion

The first mention of a posttraumatic diaphragmatic rupture is attributed to Sennertus in the XVI century, while Ambroise Paré in 1578 described for the first time two cases of death due to diaphragm rupture complicated with strangulated small bowel (9,11). Only in the XXth century SDR was attributed to physical effort (9,12), landing (9,13,14), or violent coughing (9,15).

The vast majority of diaphragmatic injuries are commonly observed after a blunt or penetrating trauma to the abdomen and chest (16). Up to 75% of the diaphragmatic injuries are the consequence of blunt abdominal trauma in car accidents (2,17). The frequency of traumatic diaphragmatic lesions in patients admitted for blunt trauma varies between 0.8 and 7% (2,18,19,20). Penetrating wounds to the lower chest are associated with 25% of diaphragm injuries (2,17). The frequency of SDR is less than 1% of all diaphragm injuries, being induced by various factors such as heavy physical effort, violent vomiting, childbirth, dancing, Pilates, coughing and defecation (1,2,16).

Up to date there are two types of SDR described: type 1 rupture, in which the chest wall remains intact (3,5,6) and a



Figure 1. Chest x-ray (anterior view) stomach and colon herniation into the left thoracic cavity and a collapsed inferior part of the left lung



Figure 2. Chest x-ray (lateral view) air-fluid level "pseudo pneumo-hydrothorax" and a collapsed inferior part of the left lung

type 2 rupture, in which abdominal structures pass through the diaphragm and chest wall (3,4,8).

The absence of specific signs for SDR induce diagnostic difficulties with significant morbidities and mortalities in this group of patients (1,2,10,20,21). The most common clinical signs are abdominal and thoracic pain, nausea, vomiting and dyspnoea (2,3,10). In case of associated intercostal muscle rupture thoracic asymmetry could be observed,

while other symptoms can be explained by compression of the thoracic or mediastinal organs (2-4,8). Bisgaard C., *et al.* reported a case of SDR diagnosed 4 months after onset (19).

Diagnostic procedures for traumatic diaphragmatic ruptures include: chest x-ray, CT scan, ultrasound, Magnetic Resonance Imaging (MRI), Upper GI contrast studies, laparoscopy and thoracoscopy (20,22). The most common methods for diagnosing a diaphragmatic injury are the chest x-ray and CT scan (20). However chest x-ray has only a diagnostic accuracy for diaphragm injuries of just 25-50% (20,23,24). The imaging technique may show a diaphragmatic hernia due to gastric or other organ herniation into the thoracic cavity (3), as was our case.

Early diagnosis is essential in order to avoid complications: pleural effusions, strangulated diaphragmatic hernia, perforation of the herniated organs and pulmonary or mediastinal compression (2).

In all the previously described SDR cases the diagnosis was confirmed during surgery and in one case after autopsy (3). The diaphragm injury varied between 2 and 16 cm (3). The most frequent injury location was on the left side (68%) and 79 % were peripheral defects. (3). The hernia content included stomach (43%), colon (29%), greater omentum (29%), small intestine (25%), spleen (18%), and liver (10%) (3). Ten (36%) hernias contained a single organ, 9 (32%) contained 2 organs, 7 (25%) contained 3 organs, and the hernia contents were not specified twice (3). No SDR recurrence was described (3-8).

The management of SDR is surgical. Up to date there is no widely accepted opinion regarding the optimal surgical approach for SDR. Some authors advocate the thoracotomy approach due to a wider diaphragm exposure (9,10). Others advocate the laparotomic approach since the last one allows not only diaphragmatic repair but the management of potential complications (perforation, strangulation and necrosis of the herniated organs) as well (3). Up to date several therapeutic options are available for the management of SDR; simple suture using nonabsorbable sutures or prosthetic mesh repair, the method being elected on case-by-case basis.

Conclusions

Spontaneous diaphragmatic rupture is an uncommon entity and the diagnosis is difficult. Any air and fluid level on a chest x-ray combined with pain, nausea, vomiting and absence of any trauma requires a vigilant approach.

The management is exclusively surgical via laparotomy, thoracotomy or combined approach, while the method of diaphragm repair is decided upon case-by-case basis.

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