



## Long-Lasting Intrapericardial Displacement of the Transverse Colon Following Diaphragmatic and Pericardial Rupture

Karolina Gambus<sup>1</sup>, Blazej Kuzdzal<sup>2\*</sup>, Janusz Warmus<sup>3</sup>, Konrad Moszczynski<sup>2</sup> and Piotr Kocon<sup>4</sup>

<sup>1</sup>Department of Thoracic Surgery, 5th Military Hospital, Poland

<sup>2</sup>Department of Thoracic Surgery, J. Dietl Hospital, Poland

<sup>3</sup>Department of Thoracic Surgery, John Paul II Hospital, Poland

<sup>4</sup>Department of Thoracic Surgery, Jagiellonian University Medical College, Poland

### Abstract

A sixty-nine-year old male was referred to the hospital with the diagnosis of an anterior mediastinal mass. On the chest CT a large volume of fatty tissue and bowel was seen in the anterior mediastinum. There was no history of trauma. An initial diagnosis of Larrey hernia was made and the patient was operated on. Laparotomy revealed a large defect in the tendinous centre of the diaphragm and pericardium with intrapericardial displacement of the omentum and the transverse colon. The viscera were reduced into the abdominal cavity and the defect was closed using a Teflon patch. The patient was questioned again about any trauma in the past and he remembered a car accident 20 years earlier. In the early postoperative course transient atrial fibrillation occurred and next pleural and pericardial effusion was diagnosed, requiring thoracentesis and pericardiocentesis. Further course was uneventful and the patient was discharged home. Although this condition is rare, delayed diagnosis of diaphragmatic and pericardial rupture should be taken into consideration in patients with epigastric symptoms, who sustained torso trauma in the past.

### Introduction

Traumatic Intrapericardial Diaphragmatic Hernia (TIPDH) is a rare consequence of blunt torso trauma. Most such injuries are diagnosed in the acute period because of symptoms associated with organ displacement or with concomitant injuries. Rarely, the injury is missed in the immediate period and the diagnosis may be delayed for months or years.

### Case Presentation

A sixty-nine-year old male presented with epigastric discomfort and pain. Medical history was irrelevant. A physical examination did not show any evident pathology. At the chest X-ray, widening of the lower mediastinum was present, with anterior mediastinal mass seen on the lateral view (Figure 1). Contrast-enhanced CT of the chest and abdomen revealed large volume of fatty tissue and bowel in the anterior mediastinum (Figure 2).

An initial diagnosis of Larrey hernia was made and the patient was scheduled for surgery. Transverse laparotomy ~3 cm below the xiphoid process was made. Transverse colon and almost the whole omentum were displaced upwards and through the large defect in the diaphragm. After reduction of the viscera into the peritoneal cavity (Video 1, Figure 3) the defect was exposed, involving the central tendon of the diaphragm and pericardium and penetrating to the pericardial sac (Video 2, Figure 4).

Because of the size of the defect primary repair was not attempted and a Teflon patch was used to close it. Several Ethibond No 2 sutures were put around the defect, placed through the diaphragm and pericardium (and anteriorly through the costal arches). The Teflon patch was tailored to the size of the defect and the 'parachuting' technique was used to place it in the proper position (Figure 5).

The abdomen was closed without any drains. The patient was questioned again about any trauma in the past and he remembered a car accident 20 years ago with no serious injuries diagnosed at that time. On the 2<sup>nd</sup> day after surgery atrial fibrillation occurred with symptomatic hypotonia, and was successfully treated pharmacologically. On the 7<sup>th</sup> postoperative day, a chest X-ray was performed

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#### \*Correspondence:

Blazej Kuzdzal, Department of Thoracic Surgery, J. Dietl Hospital, Cracow, Poland,

E-mail: blazej.kuzdzal@mp.pl

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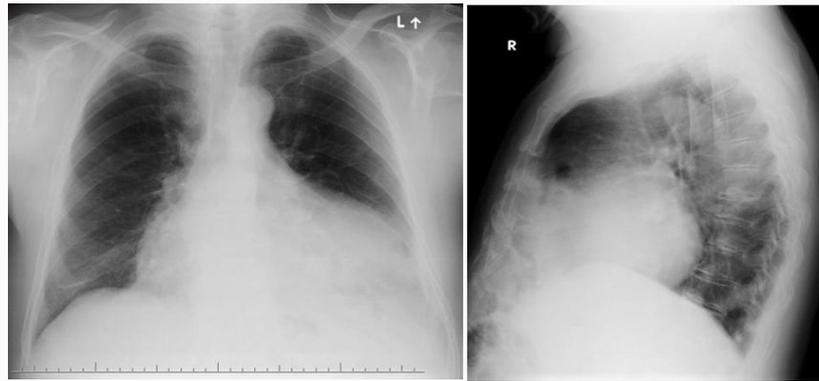
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**Figure 1:** Preoperative chest X-ray. A) Antero-posterior; B) Lateral view.



**Figure 2:** Contrast-enhanced CT of the chest and abdomen showing large volume of fatty tissue and bowel in the anterior mediastinum, A) At the level of the diaphragm; B) At the level of the ascending aorta.



**Figure 3:** Large bowel and omentum reduced from the pericardial sac.



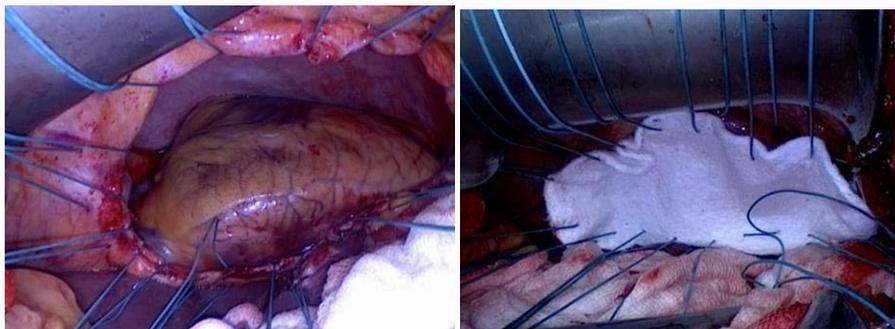
**Figure 4:** Intraoperative view of the defect in the diaphragm and the pericardium.

the outpatient follow-up no recurrence of the herniation or fluid accumulation was seen.

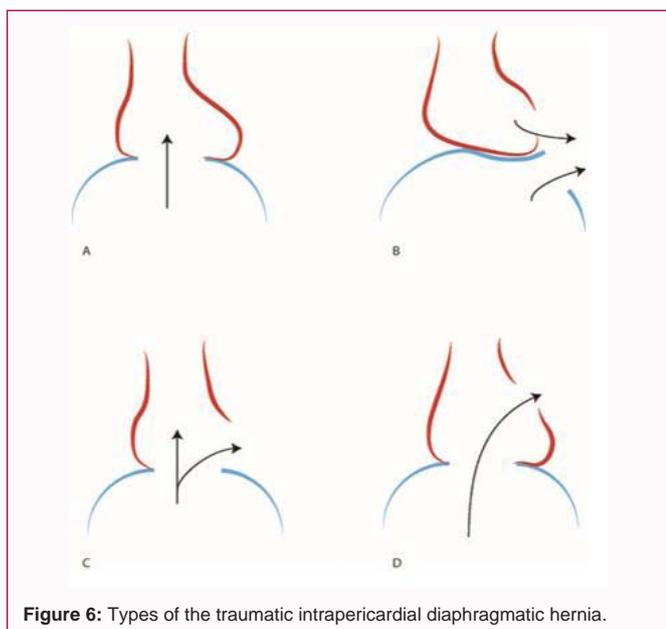
## Discussion

due to fever and revealed fluid accumulation in the left pleural cavity. Thoracentesis was performed with 300 mL serous fluid removed. On the next day the follow-up chest X-ray showed widening of the heart silhouette and ultrasound examination confirmed pericardial fluid. Under the ultrasound guidance, cannula was inserted into the pericardial sac and 500 mL of bloody-stained fluid was removed. During the next 2 days fever subsided, 50 mL serous fluid was drained from the pericardium and the cannula was removed. On the 13<sup>th</sup> postoperative day right-sided thoracentesis was performed and 300 mL of serous fluid was removed. Further course was uneventful and the patient was discharged home on the 14<sup>th</sup> day after surgery. During

Diaphragmatic rupture associated with pericardial rupture resulting from the blunt torso trauma, referred to as TIPDH is a rare condition. One hundred well documented cases were described in the literature, the first two as early as in 1910 [1]. Avast majority of these injuries are diagnosed in the acute period after trauma. On rare occasions this type of injury is missed and the diagnosis is not made until symptoms caused by displacement of viscera occur. To our best knowledge, only 45 cases of delayed presentation of TIPDH were described so far, with the delay ranging from 23 to 23 years [2]. We describe a patient who presented with epigastric pain and discomfort 20 years after torso trauma sustained in a motor vehicle accident.



**Figure 5:** A) Ethibond sutures placed through the margins of the defect; B) Teflon patch in place.



**Figure 6:** Types of the traumatic intrapericardial diaphragmatic hernia.

The reason for missing the diagnosis in the acute period may be the small size of the rupture, with no organ displacement. Surgeons focus their activity on clinical priorities, which may include different types of intra-abdominal injuries, requiring immediate repair. Also, its location deep in the upper part of the peritoneal cavity may contribute to missing it, even if laparotomy is performed. Because of constant contractions of the diaphragm a small-size rupture tends to enlarge gradually over a long time. This, together with the pressure gradient between the abdominal cavity and the chest, causes slowly progressing displacement of viscera.

The first review including 17 cases of TIPDH was published by Larrieu et al. [3], in 1980 [3], followed by 58 cases reviewed in 1986 by Van Lohenhout et al. [4], and 82 cases described in 2001 by Reina et al. [5]. The literature search has shown 18 more cases described in detail since then [2,5-19]. Traumatic intrapericardial diaphragmatic hernias constitute a heterogenic group, depending on the type and location of rupture and the route of visceral displacement. They can be categorized in 4 main types (Figure 6).

Reportedly, the most often displaced organs are colon, stomach and omentum [5], which was also seen in our patient. What was particularly rare in our patient is the very long time since the initial trauma to the presentation, being as long as 20 years, the second longest interval published to date. Despite a large volume of displaced

omentum and colon, the patient's symptoms were relatively mild, probably due to slowly increasing volume of displaced viscera, over a very long period of time. The patient did not report any complaints that might be associated with the bowel obstruction. It is likely, that the empty space inside the enlarged pericardial sac, resulting from reduction of the bowel and omentum into the abdominal cavity contributed to the accumulation of exudate in the postoperative course. Although this condition is rare, delayed diagnosis of diaphragmatic and pericardial rupture should be taken into consideration in patients with epigastric symptoms, who sustained torso trauma in the past.

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### Videos Links

Video 1: <https://youtu.be/qs3XV8wQLbw>

Video 2: <https://youtu.be/kQwR6RvBwLo>

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