Intrapericardial diaphragmatic hernia following cardiac surgery – A case report

B. Herráez Cervera, A. Moreno Flores, R. Llorens Salvador

Pediatric Radiology Department. La Fe University and Polytechnic Hospital. Valencia (Spain).

ABSTRACT

Introduction. Intrapericardial diaphragmatic hernia is an abdominal organ prolapse inside the pericardium. It is one of the less frequent instances within the diaphragmatic hernia group.

Clinical case. This is the case of a 4-month-old infant undergoing surgery for interventricular communication (IVC). Postoperatively, pulmonary auscultation detected air-fluid sounds, and thoracic radiological control showed an atypical pneumopericardium. Given clinical and radiological findings, and in the absence of additional abdominal symptoms, gastrointestinal transit (GIT) was performed, demonstrating intrapericardial herniation of the intestinal loops. The patient was discharged following abdominal surgical repair, with no further complications.

Discussion. Intrapericardial diaphragmatic hernia is an infrequent instance within the diaphragmatic hernia group, with cardiac surgery being a rare potential iatrogenic factor. Clinical suspicion and imaging findings are key to perform early diagnosis and surgical treatment.

KEY WORDS: Intrapericardial hernia; Diaphragmatic hernia; Interventricular communication; Gastrointestinal transit.

HERNIA DIAFRAGMÁTICA INTRAPERICÁRDICA TRAS CIRUGÍA CARDIACA. A PROPÓSITO DE UN CASO

RESUMEN

Introducción. La hernia diafragmática intrapericárdica consiste en un prolapso de las estructuras abdominales dentro del pericardio, representando una de las entidades menos frecuentes dentro del conjunto de las hernias diafragmáticas.

Caso clínico. Se presenta el caso de un lactante de 4 meses intervenido de comunicación interventricular (CIV) que, en el postoperatorio, la auscultación cardiopulmonar detecta ruidos hidroaéreos y el control radiológico de tórax muestra un neumopericardio atípico. Ante los hallazgos clínico-radiológicos, y sin sintomatología abdominal sobreañadida objetivable, se solicita un tránsito gastrointestinal (TGI) donde se pone de manifiesto la herniación intrapericárdica de asas intestinales. Tras la intervención quirúrgica abdominal reparadora, el paciente fue dado de alta, sin otras complicaciones.

Comentarios. Se realiza un breve recordatorio de las hernias diafragmáticas intrapericárdicas como una entidad de escasa incidencia dentro del conjunto de hernias diafragmáticas, siendo la cirugía cardiaca un posible factor iatrogénico poco frecuente. La sospecha clínica, junto con los hallazgos de imagen, son fundamentales para llegar a un diagnóstico y tratamiento quirúrgico precoz.

PALABRAS CLAVE: Hernia intrapericárdica; Hernia diafragmática; Comunicación interventricular; Tránsito gastrointestinal.

INTRODUCTION

Intrapericardial diaphragmatic hernia, defined as an abdominal organ prolapse from the peritoneal cavity towards the inside of the pericardium, is a rare instance within the diaphragmatic hernia group.

Etiology and pathogenesis can be congenital, but other potential causes secondary to trauma or surgery have been described.

Clinically, it can present with abdominal discomfort, vomit, and intestinal obstruction. If no early surgical repair is carried out, it can lead to important complications, such as organ necrosis, and even herniated content perforation.

This is a clinical case of intrapericardial diaphragmatic herniation following IVC cardiac surgery, incidentally and with no acute abdominal symptoms known.

Given its low prevalence in the literature, and especially as a complication secondary to cardiac surgery, this pathology is worth reviewing in terms of etiology, diagnosis, and early surgical treatment so as to prevent potential complications.

CLINICAL CASE

This is the case of a 4-month-old infant presenting at our healthcare facility for cardiopathy surgical repair.

Corresponding author: Dr. Brian Herráez Cervera. Pediatric Radiology Department, La Fe University and Polytechnic Hospital. Avda. de Fernando Abril Martorell, 106. 46026 Valencia (Spain).
E-mail address: Brianhc90@gmail.com

Date of submission: August 2019 *Date of acceptance:* November 2019

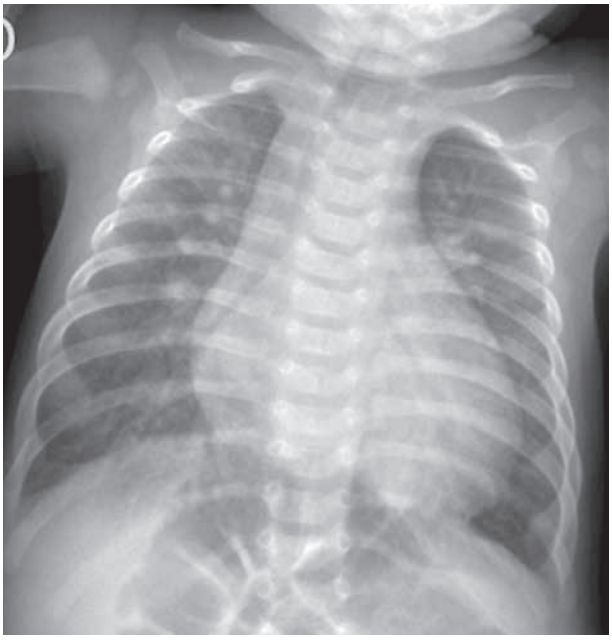

Figure 1. Preoperative thoracic x-ray. Cardiomegaly and increased pulmonary vascularization.

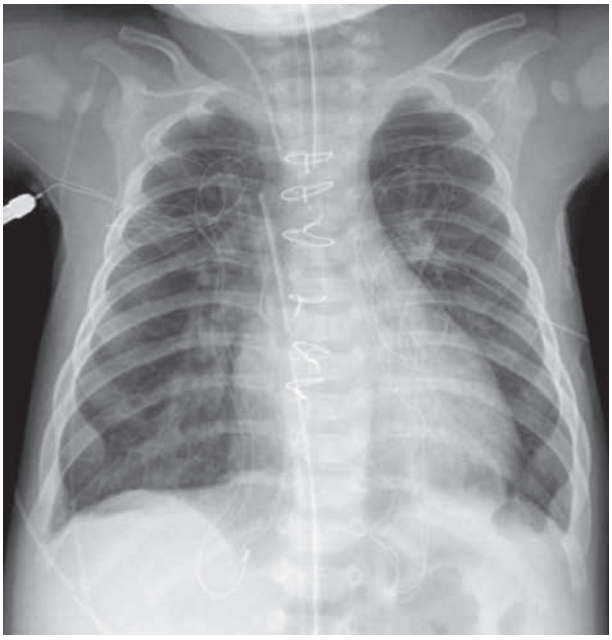

Figure 2. Immediate postoperative thoracic x-ray without additional complications.

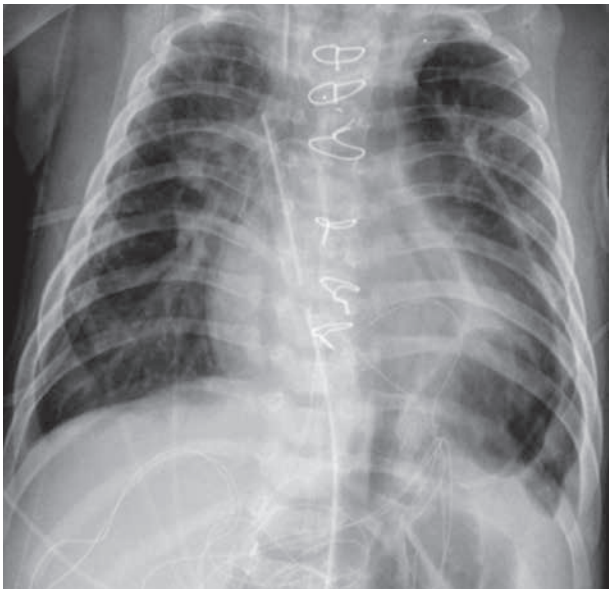

Figure 3. Air image of pericardial topography suggestive of atypical pneumopericardium.

No pathology was found perinatally. Initially, the patient received maternal feeding, but following cardiopathy diagnosis, it was changed into mixed feeding. The patient had an ascending but slow weight curve. At physical exploration, he had a good general condition, normal skin and mucosal color, resting polypnea, and subcostal retractions. Peripheral pulse was normal and symmetrical. At heart auscultation, a 2/6 systolic murmur was found in the left sternal border. He had hepatomegaly in the abdomen, with a liver palpated 2 cm below the costal margin.

Baseline echocardiogram demonstrated a double outlet right ventricle with large subaortic perimembranous IVC, infundibular extension, no pulmonary flow restriction, and pulmonary hypertension. Preoperative simple thoracic X-ray (Fig. 1) showed moderate cardiomegaly and increased pulmonary vascularization.

Three days later, IVC repair surgery with extracorporeal circulation (ECC) was carried out, without immediate incidences (Fig. 2).

At cardiopulmonary auscultation 24 hours following surgery, air-fluid sounds were detected, especially in the left hemithorax. Thoracic x-ray showed an atypical pneumopericardium (Fig. 3) surrounding the left heart border that was not present at immediate postoperative control. After assessing clinical and radiological data altogether, decision was made to complete the study with a GIT, which showed the gastric pouch filling in a normal position (Fig. 4A). However, in serial controls, a large bowel loop herniation surrounding the intrapericardial heart border was observed (Fig. 4B). As a result of this, a new surgical procedure was carried out, identifying and repairing a previous 3 cm long diaphragmatic orifice communicating with the pericardial cavity, and visualizing the transverse colon herniation, without signs of intestinal suffering.

Postoperative control x-ray demonstrated that the hernia had been fully removed, with no additional pathologies.

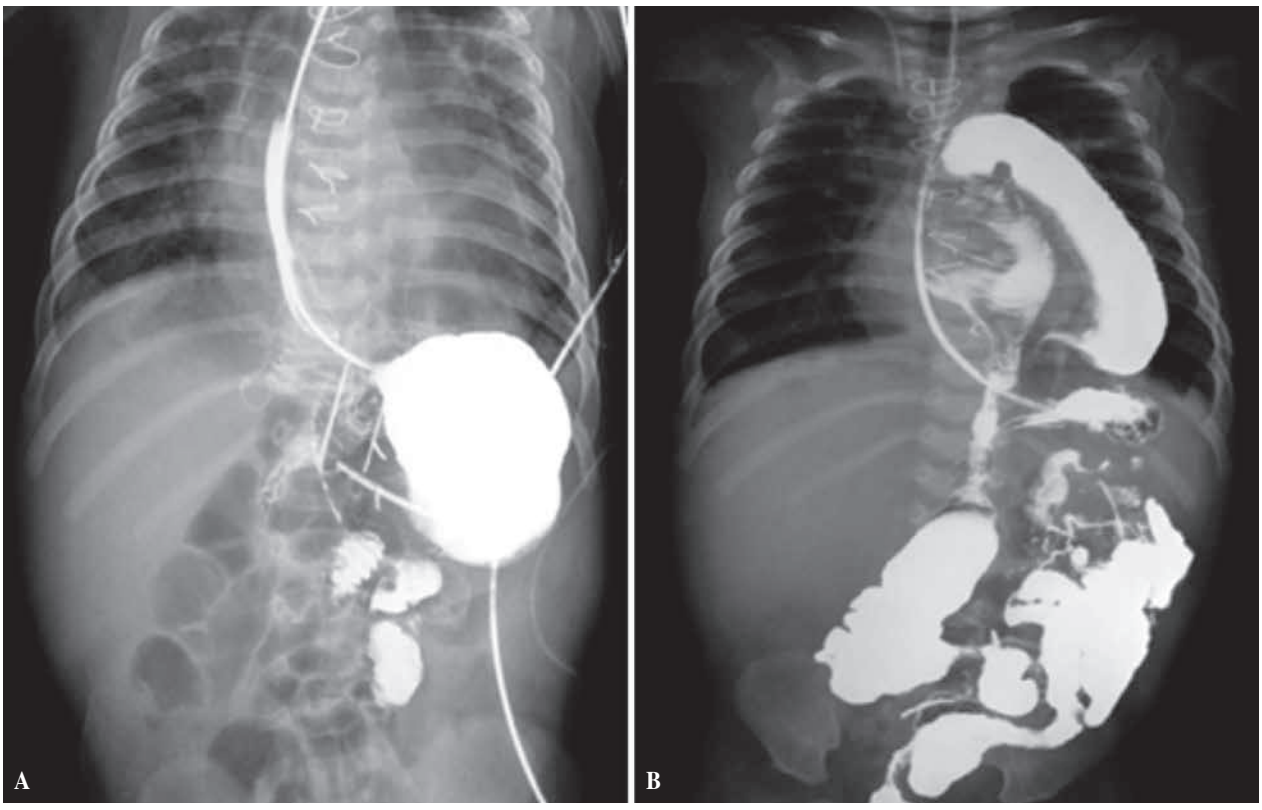

Figure 4. A) Gastric pouch filling with a normal anatomic location, up to the angle of Treitz. B) Transverse colon loop filling in the thoracic cavity suggestive of intrapericardial diaphragmatic hernia.

Postoperative echocardiogram reported a good systolic function in both ventricles, with minimum residual subaortic IVC, and without pericardial effusion.

Given the patient's clinical and hemodynamic stability, he was discharged with no further complications.

DISCUSSION

Diaphragmatic hernia is defined as an intra-abdominal structure migration to the thoracic cavity via a diaphragmatic defect. According to its origin, it can be congenital (Morgagni hernia and Bochdalek hernia) and acquired (traumatic and non-traumatic: hiatal hernia and diaphragmatic defects).

Intrapericardial diaphragmatic hernia is one of the less frequent instances of diaphragmatic hernia. It is an abdominal organ prolapse inside the pericardium which can lead to severe complications if no immediate surgical treatment is implemented.

In the literature reviewed, there are few references on this pathology in pediatric patients[1], and even less on intrapericardial diaphragmatic hernia secondary to heart surgical repair. Intrapericardial diaphragmatic hernia cases secondary to surgery have been reported in adult patients[2,3].

Generally, it presents with unspecific abdominal symptoms, and in advanced cases, it can even lead to occlusion. In our case, abdominal symptoms went unnoticed, most likely because clinical diagnosis and imaging tests were performed immediately.

Both simple thoracic x-ray and GIT were key to establish diagnosis, which was unsuspected and unexpected, since we did not know that our patient had diaphragmatic hernia before cardiopathy repair.

In light of this, preoperative simple thoracic x-ray was re-assessed. It showed a centralization and ascent of bowel loops compatible with the transverse colon, most likely associated with an anterior congenital diaphragmatic hernia (Morgagni hernia) which had gone unnoticed. This can be explained by the fact that IVC cardiac surgery and pericardial opening had moved the herniary content towards the pericardium by continuity.

Patient evolution following IVC and intrapericardial diaphragmatic hernia surgical repair was excellent, and given clinical and hemodynamic stability, he was discharged with no further complications.

In conclusion, one should bear in mind that, although intrapericardial diaphragmatic hernia is a rare pathology, it can lead to severe complications if no early diagnosis and surgical treatment are performed. Clinical knowledge,

etiology and pathogenesis, and imaging tests are key to reduce severe complications.

REFERENCES

1. Cossa Matchecane, Robinson Tyler D. Intrapericardial diaphragmatic hernia in a 6-month-old girl: a case report and review of the literature. Int J Surg Case Repor. 2019; 60: 49-52.
2. Saito T, Yasui K, Kurahashi S, Komaya K, Ishiguro S, Arikawa T, et al. Intrapericardial diaphragmatic hernia into the pericardium after esophagectomy: a case report. Surg Case Rep. 2018; 4: 94.
3. Galán Gil G, Morcillo Aixelá A, Tarrazona Hervás V, Padilla Alarcón JD, Blasco Armengod E, París Romeu F. Hernia cardiaca tras neumonectomía intrapericárdica. Arch Bronconeumol. 1997; 33: 545-7.
4. Sadoh WE, Okugbo SU. Congenital intrapericardial diaphragmatic hernia presenting radiologically as massive cardiomegaly. Afr J Paediatr Surg. 2013; 10: 43-5.
5. Heiner JD, Harper HM, McArthur TJ. Intrapericardial diaphragmatic hernia. West J Emerg Med. 2010; 11: 532-3.
6. Jain V, Roy Choudhury S, Chadha R, Puri A. Intrapericardial diaphragmatic hernia: a rare type of congenital diaphragmatic hernia. J Pediatr Surg. 2011; 46: e29-31.
7. La Greca G, Sofia M, Randazzo V, Barbagallo F, Lombardo R, Soma P, et al. Asymptomatic congenital intrapericardial diaphragmatic hernia in the adult. Ann Thorac Surg. 2007; 84: 638-40.