

Late Diaphragmatic Hernia Secondary to Pericardial Window Subxyphoid: Case Report and Review of the Literature

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ABSTRACT

A diaphragmatic hernia can have a congenital origin, thoracic trauma and iatrogenic invasive procedures where intra-abdominal pressure is increased. One of the most frequent procedures that have been related to the presence of this pathology are pericardial peritoneal windows performed to treat symptomatic pericardial effusions. There are few published cases of intra-abdominal complications such as incarcerated diaphragmatic hernia.

We report the case of a patient presenting with large bowel occlusion due to diaphragmatic hernia. The objective is to highlight this rare complication in order to encourage the physician who encounters this situation to consider the diagnostic possibility and one of the therapeutic options for its correction.

KEYWORDS: Diaphragmatic hernia, Late diaphragmatic hernia, Peritoneal pericardial window, Diaphragmatic plasty.

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INTRODUCTION

A diaphragmatic hernia is defined as the protrusion of an abdominal viscus through the central tendon of the diaphragm. They were described in the early 20th century by De Cardinal, while Keith in 1910 was the first to expose a pericardial hernia of traumatic etiology while performing autopsies.

The diaphragmatic defect through which the abdominal viscera flow can be generated by different causes, less than 1% are congenital, by thoracic trauma which is the most frequent origin (56.5%) and by iatrogenic invasive procedures (30.6%), where the intra-abdominal pressure is increased. Hernias of traumatic origin are generally seen in the left hemidiaphragm, since the liver functions as a

protective barrier. Another mechanism involved is the weakening of the central tendon of the diaphragm. The transverse colon, the stomach and the greater omentum are the most frequent viscera that protrude into the diaphragm. There are different causes in which we can find extrapulmonary extrathoracic air and according to their location they are classified in (Table 1):

Causes of extrapulmonary extrathoracic air according to its location:	
Mediastinal	Iatrogenic, trauma and spontaneous pneumodiastinum are the most frequent causes, followed by tracheal rupture, bronchial suture dehiscence in pulmonary transplante, intramucosal esophageal dissection, esophageal mucosa syndrome and Boerhavee, tracheoesophageal fistula in esophageal neoplasia, bronchial perforation, esophagorrespiratory fistula and mediastinitis.
Pericardium	Chest trauma, invasive procedures are the most frequent causes, followed by pneumopericardium in pulmonary neoplasia.
Cardiovascular	Air venous embolism due to placement of central or peripheral venous access.
Pleural	Thoracic trauma and iatrogenic causes are the most common, followed by bronchopleural fistulas, spontaneous pneumothorax in mesothelioma and primary lung neoplasia.
	Infections, hernia intercostal transdiaphragmatic hernia and subcutaneous emphysema post lung biopsy.

Varona Porres D, Persiva O, Sánchez AL, Cabanzo L, Pallisa E, Andreu J. Finding the bubble: atypical and unusual extrapulmonary air in the chest. Radiol (Engl Ed) [Internet]. 2021 [cited 2023 Dic 17];63(4):358–69. Disponible en: <https://pubmed.ncbi.nlm.nih.gov/34246426/>

One of the most frequent procedures that have been related to the presence of this pathology are pericardial peritoneal windows. These are performed surgically to treat symptomatic pericardial effusion, usually of oncologic origin and to relieve symptoms similar to cardiac tamponade.

Diagnosis is delayed, since clinical and radiographic signs are not specific and there is a high possibility of complications. In the chest X-ray we can find free air around the cardiac silhouette, limited superiorly by the lower border of the aortic arch, without extension around the trachea, bronchi and cervical region.

The Gold Standard is still Chest Computed Axial Tomography, which reveals herniation of abdominal organs within the thoracic cavity.

In the case of a diaphragmatic hernia after a pericardial window has been performed, the CT scan may show evidence of small bowel obstruction with a closed loop sign in the anterior mediastinum, also revealing an incarcerated hernia through the peritoneal pericardial window.

The best treatment for this pathology is surgical, where the abdominal contents are reduced and the diaphragmatic defect is closed. The laparoscopic approach is safe; however, cardiac tamponade due to gas insufflation is a probable complication. Another advantage of laparoscopic surgery is the shorter number of days of hospital stay compared to open surgery.

The abdominal approach is recommended for patients with acute presentation and unstable vital signs, as it provides a better view and access to the diaphragm. On the other hand,

the thoracic approach is preferred in chronic cases, as it allows easier release of pericardial adhesions.

There is evidence of patients who underwent primary closure of the diaphragmatic defect with silk suture, using vertical Sarnoff stitches, followed by placement of a sutured vertical mesh and additional reinforcement of the defect using a graft obtained from the posterior fascia of the transversus abdominis muscle. Simple stitches were placed with 3-0 nylon to fix the 8x6 cm graft.

When direct closure of the window is not possible due to tissue tension. The defect can be covered with a non-covered macroporous mesh with non-absorbable tacks to avoid recurrence.

CASE PRESENTATION

Male 71 years old, who was engaged in mining with a history of open appendectomy at 6 years of age, Chronic Obstructive Pulmonary Disease treated with Salmeterol, Fluticasone and Ipratropium Bromide, unspecified cardiomyopathy that generated a pericardial effusion requiring pericardiocentesis with histopathological report: small group of atypical cells. Therefore, he underwent subxyphoid pericardial window with pericardial biopsy with histopathological report: pericardium with edema, lithiation of lymphatic vessels and vascular congestion. Striated muscle without histological alterations, adipose tissue without histological alterations.

She presented to the emergency department one month after pericardial window surgery with intermittent dyspnea on medium exertion that attenuated with rest, she did not pass gas through the rectum and had difficulty in evacuating her bowels. During his stay in the emergency department he remained with respiratory distress, precordial pain was added and after hours of neurological deterioration.

On examination the patient was febrile, with generalized pallor, with evidence of respiratory distress, the pulmonary examination was significant for presenting decreased

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pulmonary mechanics, decreased voice transmission in both hemithorax predominantly basal left, Pulmonary clearances and vesicular murmur decreased in both hemithorax predominantly basal left and the abdominal examination was relevant for mild abdominal distension, decreased peristalsis, decreased tympanism in colic frame and thoracic region at the level of the fifth intercostal space on the left.

The initial Chest X-ray showed data compatible with pneumomediastinum (Fig. 1), which was corroborated with a Computerized Axial Tomography of the Chest and Abdomen (Fig. 2, Fig. 3).

After discussing the risks and benefits with the patient, he agrees to undergo surgery for an emergency thoracotomy and exploratory laparotomy.

Intraoperatively, left thoracotomy was performed, finding incidental fracture of the left fifth costal arch, pericardium

compressed by transverse colon, diaphragmatic defect of 5 cm which contained omentum and transverse colon with a punctate perforation, washing and placement of Endopleural Tube was performed (Fig. 4).

During the second surgical stage, an exploratory laparotomy was performed, performing a diaphragmatic hernia plasty with tension technique with 3 simple stitches with Vycril 1, resection and colostomy of the transverse colon (Fig. 5).

The patient was admitted to the Intensive Care Unit with an in-hospital stay of 3 days with adequate post-surgical evolution, then continued his post-surgical evolution on the general surgery floor and discharged after 10 days with a favorable evolution; being reoperated 8 months after a bowel transit restitution surgery.

Currently in outpatient follow-up of General Surgery continuing with a good evolution.

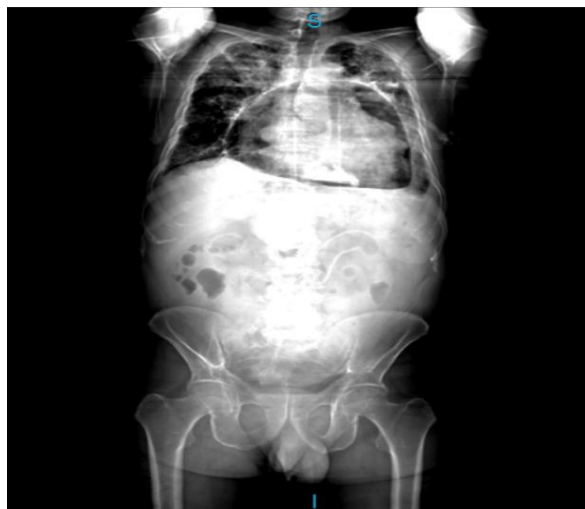
Figure 1.

Chest X-ray showing cardiac silhouette completely surrounded by gas, pericardium clearly delimited by gas density on both sides.



Figure 2.

Thoracic and Abdominal Computed Axial Tomography with cardiac silhouette completely surrounded by gas, pericardium clearly delimited by gas density on both sides.



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Figure 3.

Thoracic and Abdominal Computed Axial Tomography with cardiac silhouette completely surrounded by gas, pericardium clearly delimited by gas density on both sides.

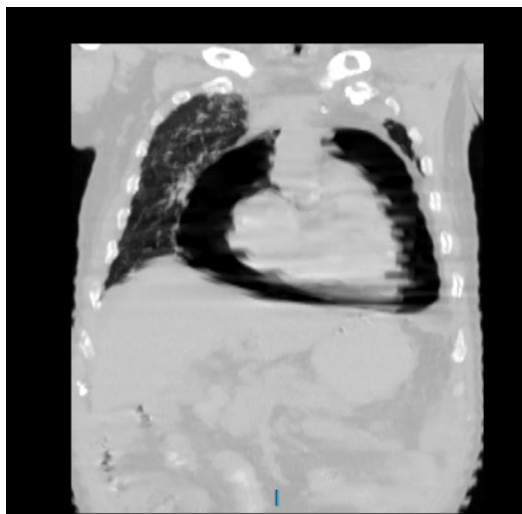


Figure 4.

Diaphragmatic defect of 5 cm which contained omentum and transverse colon



Figure 5.

Closure of the diaphragmatic defect with three stitches with Vycril 1.



DISCUSSION

Pericardial effusion is a common finding with a wide spectrum of etiologies, its drainage can be performed percutaneously or surgically. Of the surgical approaches there is the pericardial window: transpleural (by thoracotomy or thoracoscopy) and the peritoneal subxyphoid window, currently it is not known which technique is better. The most common complications are infection, lack of fluid drainage and arrhythmias. Herniation of abdominal contents through the window is a rare but described complication, and even rarer is the entrapment of intestinal segments leading to intestinal occlusion.

Regarding diaphragmatic hernias, there is a large documented association between risk factors and the appearance of a diaphragmatic hernia. This pathology has been widely documented due to its high incidence when there is thoracic trauma, which is the main risk factor for diaphragmatic hernia associated with this pathology, however there is a strong association between the genesis of a diaphragmatic hernia and the peritoneal pericardial window procedure as was the case in our patient.

As for the diagnosis of a diaphragmatic hernia, in most cases it is usually an incidental finding when it is not a post-traumatic diaphragmatic hernia, being the Computed Axial Tomography the Gold Standard due to the suggestive changes that can be revealed in it.

The currently accepted treatment of diaphragmatic hernias is controversial on the one hand, to perform diaphragmatic plasty with meshes to avoid tension, recommending prosthetic meshes in defects of more than 20-30 cm² or even in all adult cases. On the other hand, to correct the defect by means of tension techniques with a high risk of recurrence; in our Institution we do not have meshes suitable for closing the defect and due to the conditions in which the patient was, it was decided to perform a plasty with tension and bypass the segment of large intestine affected by means of a colostomy to later and with the clinical improvement, think about a second reintervention to restore intestinal transit, which was carried out and the patient currently has a good quality of life.

Conclusions.

Diaphragmatic hernias generated after peritoneal pericardial window surgery are rare entities, however there has been an increase in their incidence after these interventions. The clinical picture is not very clear, since respiratory symptoms of respiratory distress and gastrointestinal symptoms of intestinal occlusion may be present and even synchronous. In the presence of clinical suspicion it is imperative to perform a thoraco-abdominal computed axial tomography. to evaluate the integrity of both cavities, the size of the defect, its content and possible complications. As for its treatment, there is a need for revisions regarding the closure of the defect using tension or mesh techniques, depending on the clinical characteristics of the patient as well as the experience of the surgeon to perform the diaphragmatic plasty.

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