

CASE REPORT

Pneumopericardium caused by gastric ulcer perforation into the pericardium. An unusual complication

*Neumopericardio secundario a perforación de una úlcera gástrica al pericardio.
Una complicación inusual*

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Abstract

Pneumopericardium is an unusual condition defined by the presence of gas into the pericardial sac. Gastric perforation into pericardium is a complication of gastric ulcer with high mortality. In this clinical case, we describe the condition of a male with a silent gastric ulcer, which penetrated into the pericardium, developing pneumopericardium and purulent pericarditis as a complication.

Keywords: Pneumopericardium. Pericarditis. Gastric ulcer.

Resumen

El neumopericardio es una condición inusual que se define por la presencia de gas dentro del saco pericárdico. La perforación gástrica al pericardio es una complicación de la úlcera gástrica con alta mortalidad. En este caso clínico describimos el padecimiento de un varón con una úlcera gástrica silente, la cual penetraba al pericardio, desarrollando neumopericardio y pericarditis purulenta como complicación.

Palabras clave: Neumopericardio. Pericarditis. Úlcera gástrica.

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Introduction

Pneumopericardium is a rare condition defined by the presence of gaseous content in the pericardial cavity, caused by the establishment of a communication between the pericardium and neighboring structures containing air, and less frequently due to infections by gas-producing microorganisms¹. Other notable factors include thoracic trauma, barotrauma, and iatrogenic factors related to surgical procedures².

Gastric perforation into the pericardium is an extremely rare and lethal complication of a benign gastric ulcer. Only a few cases of pneumopericardium due to the perforation of an intestinal organ into the pericardium have been described³.

We present the case of a 71-year-old patient with pneumopericardium secondary to a gastric ulcer penetrating into the pericardium.

Case Report

A 71-year-old male with a history of type 2 diabetes mellitus treated with metformin 850 mg/24 h denied chronic use of nonsteroidal anti-inflammatory drugs. He had a left paraumbilical hernia containing peritoneal fat. His surgical history included trauma from a car accident, with open reduction of a left hip fracture and a pedicled skin flap from the left hemiabdomen for a right hand injury.

Ten days prior to admission, he experienced progressively intense epigastric pain, non-radiating, worsened by food intake, along with moderate-effort dyspnea. He presented to the emergency department with 24 hours of melena, approximately 1500 mL. Upon admission, he reported transfixive precordial pain.

The patient presented with a blood pressure of 90/60 mmHg, a heart rate of 80 beats per minute, a low-grade fever of 37.4 °C, and an oxygen saturation of 95%. He was in a semi-Fowler's position, appeared restless, and exhibited mild pallor of the skin. His mucous membranes were semi-hydrated, heart sounds were diminished in tone, and his abdomen was distended and tender upon palpation of the epigastrium, without signs of peritoneal irritation. Bowel sounds were reduced, and a rectal exam was positive for melena.

Laboratory results: hemoglobin: 10 g/dL; mean corpuscular volume: 77.2 fL; mean hemoglobin per red

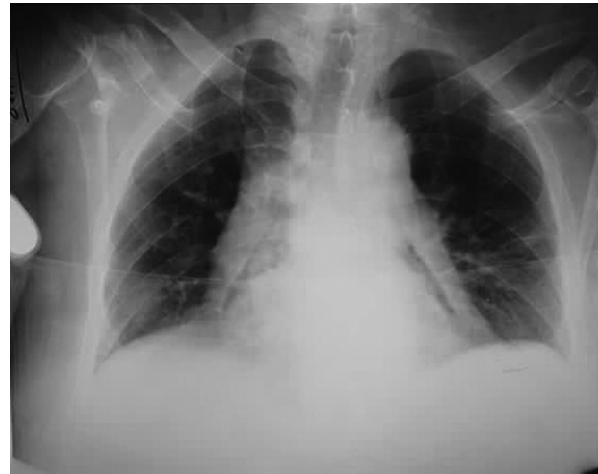


Figure 1. Chest X-ray showing mediastinal widening and a radiolucent band encircling the pericardium.

blood cell: 25.3 pg; leukocytes: 36,600 cells/mm³ (94.1% neutrophils); creatinine: 3.2 mg/dL; blood urea nitrogen: 139.77 mg/dL. Normal cardiac enzymes. An electrocardiogram showed no acute or chronic abnormalities.

Within the imaging studies, a chest X-ray revealed pneumopericardium (Fig. 1), and thoracoabdominal computed tomography (CT) demonstrated a fistulous communication from the lesser curvature of the stomach to the pericardium, with pneumopericardium but no free abdominal air (Fig. 2). A gastroduodenal endoscopy was performed, revealing a gastric ulcer on the anterior gastric body penetrating the mediastinum, with cardiac motion visible through the pericardium and no evidence of active bleeding (Fig. 3). Subsequently, an echocardiogram showed no evidence of compromised cardiac output.

An emergency exploratory laparotomy was conducted using a supra- and midumbilical incision. The stomach lesser curvature was found to have fibrotic tissue adhered to the diaphragm, corresponding to a fistulous tract caused by a gastric ulcer penetrating the pericardium. A gastric defect approximately 3 × 2 cm in size was identified (Fig. 4). The ulcer margins were resected, and the defect was repaired in 2 layers, followed by the application of a Graham patch. A diaphragmatic plasty was also performed with primary closure using Vicryl 1-0. In a second surgical act, the incision was extended to the sternum for xiphoid resection and anterior pericardial fat dissection. A pericardiotomy measuring 3 × 3 cm was performed, revealing purulent exudate, which was sampled for culture.

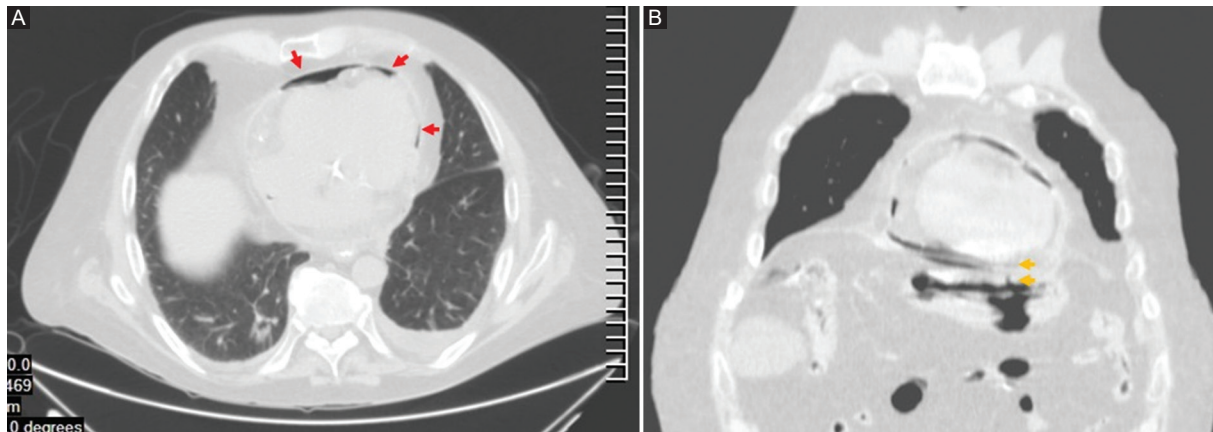


Figure 2. Non-contrast thoracoabdominal CT in lung window. (A) axial view showing pneumopericardium (arrows). (B) coronal view showing the fistulous tract connecting the gastric chamber with the pericardium (arrows).

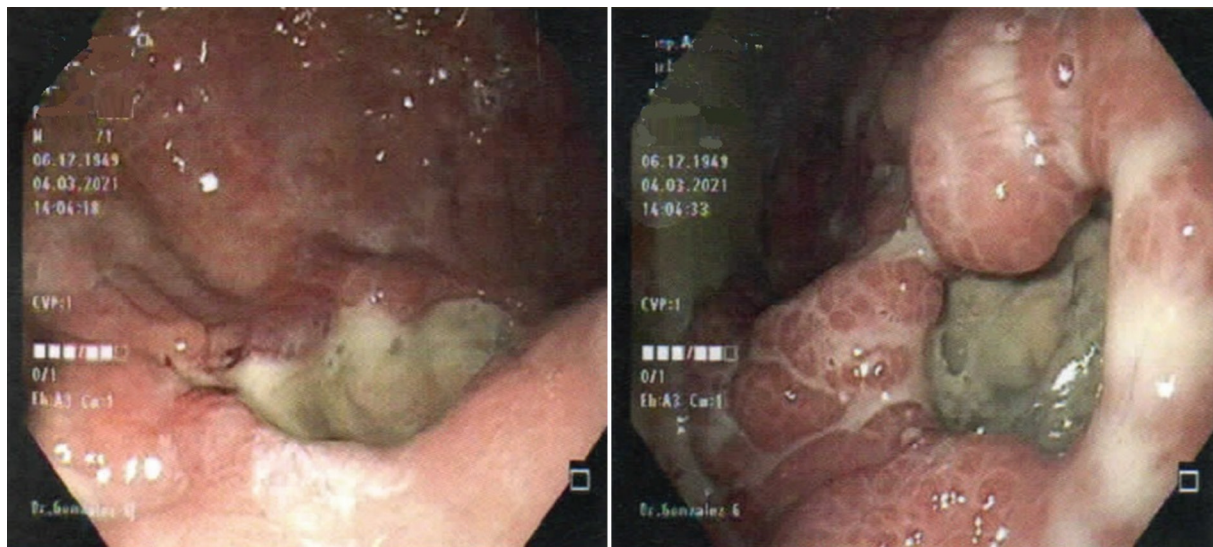


Figure 3. Gastric endoscopy showing an ulcer on the gastric body near the lesser curvature, penetrating the mediastinum with visible pericardium.

The pericardial cavity was irrigated with saline, and a 36-Fr drainage tube was placed in such cavity under direct visualization. Bilateral endopleural drains (36-Fr) were inserted, along with Penrose drains at the gastric fundus and a nasogastric tube for postoperative decompression. The abdominal wall was closed, and pleural seals were secured.

The patient was admitted to the intensive care unit, where mediastinal drainage continued to produce turbid fluid. The clinical course became complicated by multiple organ dysfunction due to sepsis, and the patient died 72 hours after the surgical procedure. Culture results identified *Candida albicans*, and the biopsy revealed a benign gastric ulcer.

Discussion

Gastric perforation into the pericardium is an extremely rare complication with high mortality rates ranging from 50% to 80%⁴. Its high fatality is linked to massive internal hemorrhage, bacterial peritonitis, or multiple organ failure due to hypovolemic, cardiogenic, or septic shock². Pericarditis resulting from perforation of intestinal organs also has severe septic repercussions⁵. Gastric mucosa is often a site of fungal colonization by *C. albicans*, observed in 54.2% of gastric ulcers and 10.3% of chronic gastritis cases⁶.

In the review of pneumopericardium cases due to fistulas secondary to surgical procedures such as

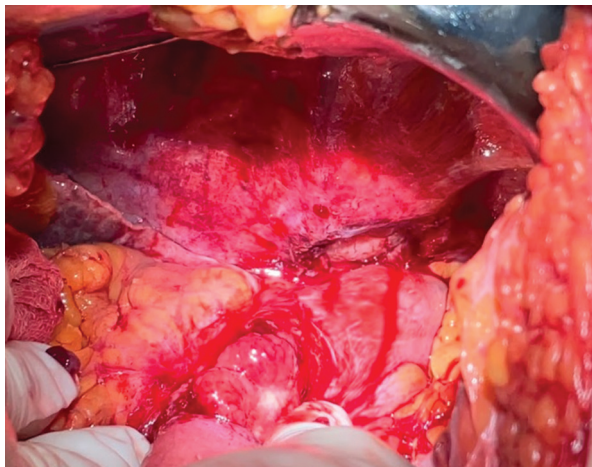


Figure 4. Intraoperative image showing resection of the fistulous tract connecting the gastric ulcer to the pericardium.

gastric funduplications, esophagectomies, bariatric surgery, or partial gastrectomies, only a minority of cases were attributed to gastric ulcers⁷.

Pneumopericardium poses a diagnostic challenge during initial evaluation due to its nonspecific symptoms, such as chest pain and dry cough⁷. Other signs can include dyspnea, epigastric pain, dysphagia, cardiac tamponade, hematemesis, and melena. A chest X-ray is the typical initial diagnostic study, revealing pneumopericardium. Oral contrast-enhanced abdominal CT can identify the disruption site, the fistulous tract, and the presence of air. Endoscopy is not recommended in some unstable patients due to the risk of hemodynamic instability caused by cardiac tamponade, which could worsen with increased air pressure in the stomach⁸. Therefore, thoracic and abdominal CT with oral contrast is suggested to prevent acute circulatory complications⁹. In this case, the patient underwent endoscopy without subsequent hemodynamic complications.

Given the high mortality rate, effective management requires a multidisciplinary approach and prompt surgical procedure. Currently, no guidelines or protocols have been published for managing such complications⁹. Early diagnosis, pericardial drainage, and tailored GI surgery are the best strategies to improve patient survival¹.

Conclusions

We report an extremely rare case of a gastric ulcer perforating into the pericardium. In cases of clinical suspicion, we emphasize the importance of early diagnostic imaging, particularly CT. Gastroduodenal

endoscopy has relatively high sensitivity and should be employed when CT findings are equivocal and in hemodynamically stable patients. However, it is not advisable due to the risk of increased gastric air passage through the fistulous tract into the pericardium. Surgery is the only feasible curative therapy, despite its inherent risks. The type of procedure should be selected based on the individual criteria of each patient.

Funding

None declared.

Conflicts of interest

None declared.

Ethical disclosures

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this study.

Confidentiality of data. The authors declare that they have followed their workplace protocols regarding the publication of patient data.

Right to privacy and informed consent. The authors have obtained informed consent from the patient referenced in the article. This document is held by the corresponding author.

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