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GI IMAGE

Gastric Intrapleural Herniation Following Pericardio-Peritoneal Window

Ignacio Fuente[1] · Fernando Wright[1] · Demetrio Cavadas[1]

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Case Presentation

A 69 years old female patient with past medical history of arthritis and severe chronic obstructive pulmonary disease (COPD) was admitted to the emergency department for dyspnea. After clinical evaluation, an echocardiogram was carried out revealing a severe pericardial effusion with partial diastolic collapse of the left atrium. The posterior location of the effusion presented an obstacle for pericardiocentesis. Therefore, the patient underwent an open pericardio-peritoneal window (PPW) through a median subxiphoid incision obtaining 500 cc of citrine fluid. The cytological examination of the pericardial fluid and the pericardial biopsy were negative for neoplastic cells.

During the second postoperative day, she developed 2 episodes of vomiting despite anti-emetic medication and started complaining of epigastric pain. Physical examination revealed a distended abdomen without peritoneal signs. A chest X-ray showed an air-fluid level in the lower portion of the right hemithorax (Fig. 1). A computed tomography (CT) showed the intrathoracic location of the stomach associated with considerable gastric distention (Fig. 2). A nasogastric tube was inserted obtaining 1500 cc of bilious fluid.

Based on the presumptive diagnosis of acute diaphragmatic gastric herniation and having in mind the potential risk of strangulation, the patient underwent an immediate laparoscopic exploration. The pneumoperitoneum pressure was kept below 8 mmHg to minimize cardiopulmonary complications. During the procedure, we found the stomach protruding through the pericardial window (Fig. 3a). The herniated stomach was easily reduced into the abdominal cavity, evidencing an 8 × 6 cm diaphragmatic defect that communicated the peritoneal cavity with the right pleural space and the pericardial cavity. (Fig. 3b). No signs of ischemia were noted on the gastric wall. Once the gastric reduction was completed, a right pleural drainage was inserted in order to achieve pulmonary expansion. Primary closure of the defect was not attempted due to its large size and rigidity of the diaphragmatic borders. Therefore, we covered the defect with a polypropylene mesh with a tension free fixation with interrupted non-absorbable sutures (Fig. 3c). In order to avoid adhesions to the abdominal viscera, the mesh was covered with a falciform ligament flap (FLF) (Fig. 3d). The patient did not present arrhythmia or hypotension during the procedure and was extubated immediately after surgery. The postoperative course was uneventful and the patient was discharged on the third postoperative day.

Discussion

Latrogenic diaphragmatic defects following pericardial window are extremely rare, with only a few cases reported.[1] The very low incidence of abdominal herniation following PPW

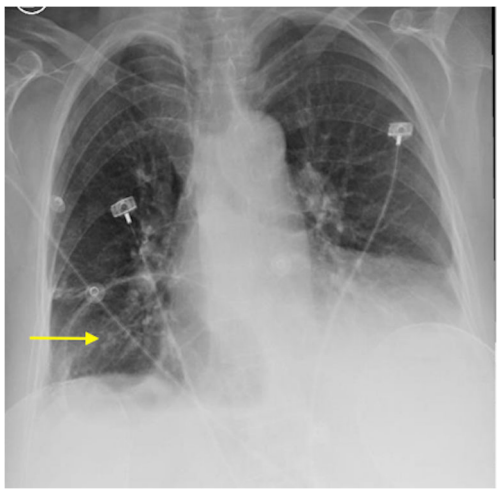

Fig. 1 Chest X-Ray evidencing an air-fluid level located in the lower portion of the right hemithorax corresponding to the slipped stomach (yellow arrow)

✉ Ignacio Fuente
ignacio.fuente@hospitalitaliano.org.ar

[1] Hospital Italiano de Buenos Aires, Buenos Aires, Argentina

Fig. 2 CT scan (**a** Coronal view; **b** Saggital view) showing a distended stomach sliding through the PPW into the right pleural space (yellow arrow)

can be partially explained by the presence of the left hepatic lobe that acts as a barrier preventing gastrointestinal herniation. Specifically, to our knowledge, gastric intrapleural hernia following pericardio-peritoneal window has not been described in the literature. We believe that the accidental opening of the right pleura during PPW was the cause of this unusual presentation in the present case.

Clinical presentation depends on the content of the hernia and the most frequent content in pericardial herniation is small bowel followed by transverse colon and stomach.[1] Once the diagnosis of acute diaphragmatic hernia is established, immediate surgery is strongly recommended to prevent life-threatening complications such as strangulation and perforation.[1] The advantages of the laparoscopic approach

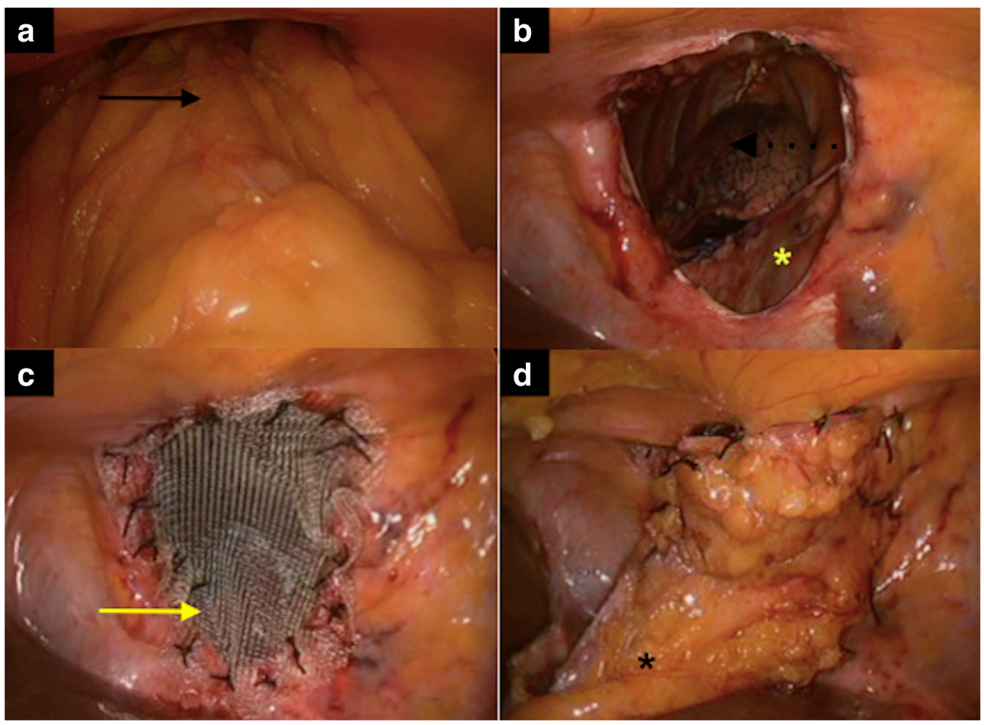

Fig. 3 Laparoscopic image evidencing the slipped stomach (black arrow) through the pericardio-peritoneal window (**a**). Once the gastric reduction was completed, the diaphragmatic defect is noted evidencing the right lung (discontinuous black arrow) and heart (yellow asterisk) (**b**). A polypropylene mesh was fixed with interrupted silk sutures (yellow arrow, **c**) and covered with a falciform ligament flap (black asterisk, **d**)

have been well demonstrated in diaphragmatic hernias.[1] Nevertheless, in cases of communication between the peritoneal and pleural and/or pericardial cavities, serious complications such as cardiac tamponade and hypoxemia can develop. In the present case, we had the precaution to perform the surgery with low-pressure pneumoperitoneum in addition to pleural drainage insertion once the stomach was reduced in order to prevent these complications.

The use of polypropylene mesh in the diaphragm has been widely discussed and discourage for hiatal defects due to the possibility of esophageal erosion and penetration.[2] However, for non-hiatal diaphragmatic defects, such as the location described in the present case, we believe that polypropylene mesh has the advantage of long-term support and potential complications like internal adhesions and erosion of hollow viscera are extremely rare, especially when the mesh is covered by epiploplasty or FLF. In order to perform the fixation of the mesh, we opted for intracorporeal suturing instead of tackers due to the proximity to the pericardium and heart.

In summary, gastric intrapleural herniation following pericardio-peritoneal window is an extremely rare complication, and given that the delay on its treatment may develop into serious complications, we must emphasize the importance of early diagnosis and treatment. Laparoscopic approach is feasible taking the precaution of using low-pressure pneumoperitoneum and strict monitoring of cardiopulmonary function.

Author's Contribution All authors have contributed to the design of the work, data acquisition and analysis data, revision for important intellectual content, and final approval of the version to be published.

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