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Pericardioperitoneal Fenestration for Chylopericardium

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CASE REPORT

ABSTRACT

Two patients were given a pericardial-peritoneal window (PPW) using a subxiphoid approach for chylous pericardial effusion. Complete drainage without recurrence was achieved with PPW in a 22-year-old female patient who had recurrent chylopericardium associated with Klippel–Trénaunay syndrome and in an 11-year-old girl with tricuspid atresia who had undergone the Fontan procedure. PPW is a simple, easy-to-learn, safe, and effective procedure. It creates a communication between the pericardial and peritoneal cavities and is applicable in most patients with noninfectious benign pericardial effusion without serious complications and where adequate drainage can be obtained without the need for external draining systems. We describe the technique, its clinical characteristics, and the results of patients undergoing this treatment.

Keywords: Pericardioperitoneal fenestration (window), chylopericardium, effusion

INTRODUCTION

Chylopericardium, i.e., chylous accumulation in the pericardial space, occurs generally after cardiothoracic surgery, blunt or penetrating trauma, or together with tuberculosis, tumors, or lymphangiomatosis, or it can be idiopathic as a rare clinical entity. Pericardial effusions progress toward cardiac tamponade or constrictive pericarditis. Small asymptomatic chylous effusions can be treated conservatively [non per oral, medium-chain triglycerides (MCTs), central hyperalimentation, or pericardiocentesis], but recurrent and symptomatic effusions need definitive and effective treatment. Surgical treatment includes an extensive pericardiectomy, pericardiostomy, and pericardial-peritoneal window (PPW) (1). We report our experience with two patients with chylopericardium treated by PPW, together with a short literature review and etiopathogenetic, clinical, diagnostic, and therapeutic comments.

Surgical procedures

Pericardial-peritoneal window was created for permanent drainage in the patients with chylous effusion. The procedure was performed using a subxiphoid approach under general anesthesia. A 5-cm longitudinal skin incision was made from the sternal lower end and continued inferiorly. The superior linea alba was divided, and the xiphoid was resected for pericardial exposition. After the pericardial sac was exposed and the fluid was evacuated, the diaphragmatic surface of the pericardium was visualized, and an opening was created to join the pericardial and peritoneal cavities (Figure 1). The peritoneal cavity was opened, and a part of the anterior pericardium was excised. The diaphragm and inferior pericardium were incised and excised. The excised pericardial specimen was sent for a histopathological examination. The window was at least 2×2 cm (the first patient received a 4-cm-diameter PPW, while the second patient received a 3-cm-diameter PPW); the cut edges of the pericardium, diaphragm, and peritoneum were sutured together with interlocking sutures using 4-0 polypropylene to prevent closure (Figure 2). No drainage tube was inserted into the pericardial space.

CASE REPORTS

Our patients received PPW, using a subxiphoid approach, for chylous pericardial effusion associated with Klippel–Trénaunay syndrome (KTS) and tricuspid atresia. We designed two sizes of fenestration: small (3 cm diameter) and large (4 cm diameter).

Case 1

A 22-year-old female patient was hospitalized with dyspnea and edema. She was classified as NYHA functional Class III. Apparent cardiomegaly found on thoracic radiography was demonstrated as a large pericardial effusion on echocardiography. Pericardiocentesis with catheter insertion was performed and the fluid drained. The cytological exam of the fluid was negative. Pericardial effusion could not be treated by repeated pericardiocentesis

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and pericardial catheter drainage. Hence, surgical intervention was mandatory. The patient was informed about the procedure and complications and written consent was taken from her. A large PPW was performed under general anesthesia (Figure 3). Diffuse fibrosis was found in surgical specimens obtained for histological exam. Her follow-up echocardiographies did not reveal any chylous effusion during the consecutive two postoperative years.

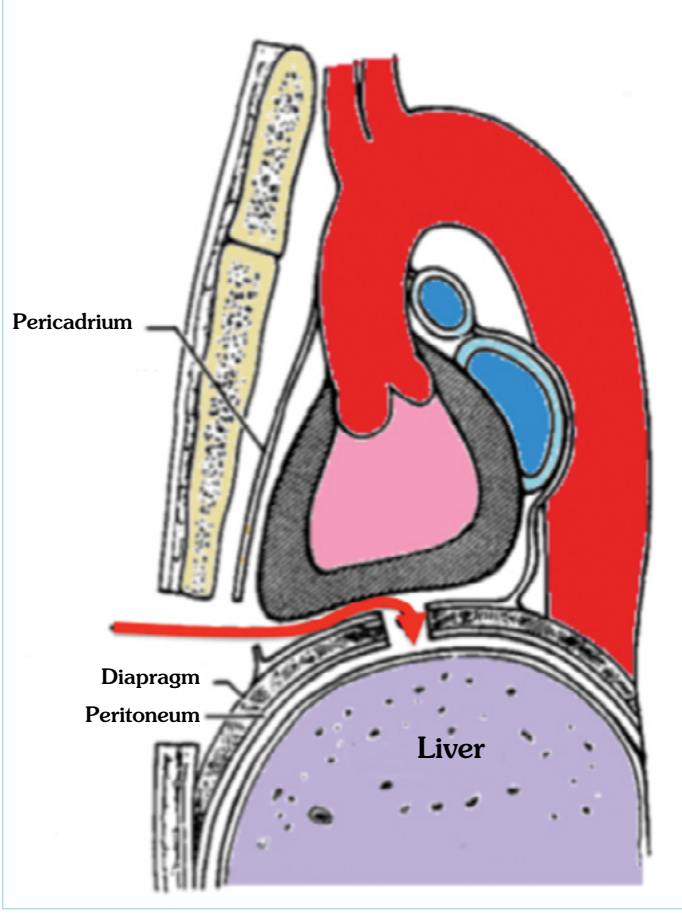

Figure 1. The juxtaposition of the pericardial and peritoneal cavities is emphasized. The pericardium is opened through a vertical incision. The dome of the liver prevents any abdominal viscera rom herniating into the pericardial cavity, and the subdiaphragmatic recess acts as a collection chamber for the pericardial fluid. No external drains are necessary, and the linea alba, subcutaneous tissues, and skin are closed in the usual manner (2).

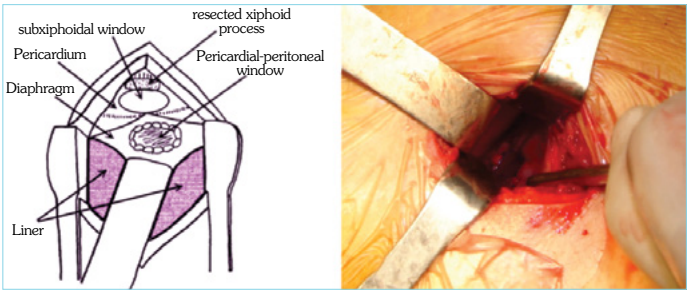

Figure 2. Close-up view of the pericardial-peritoneal window technique (3)

Case 2

An 11-years-old girl was referred to the Pediatric Cardiology Department for her complaints, which included dyspnea and edema. She had already undergone an aortopulmonary shunt operation for tricuspid atresia in 2005, and the Fontan procedure plus atrial septostomy in May 2013, before she was hospitalized with the diagnosis of ASD and pericardial effusion. During her clinical course, antibiotics were administered because of fever and an elevated CRP and ESR. The parents were informed about the procedure and its complications and written consent was taken from the parents before the procedure. Thoracentesis and tube thoracostomy were performed for chylothorax following chylopericardium. Finally, a thoracic duct ligation and apical pleurectomy through bilateral thoracotomies was made by Thoracic Surgery Department for the management of recurrent chylous pleural effusion, which persisted in spite of the con-

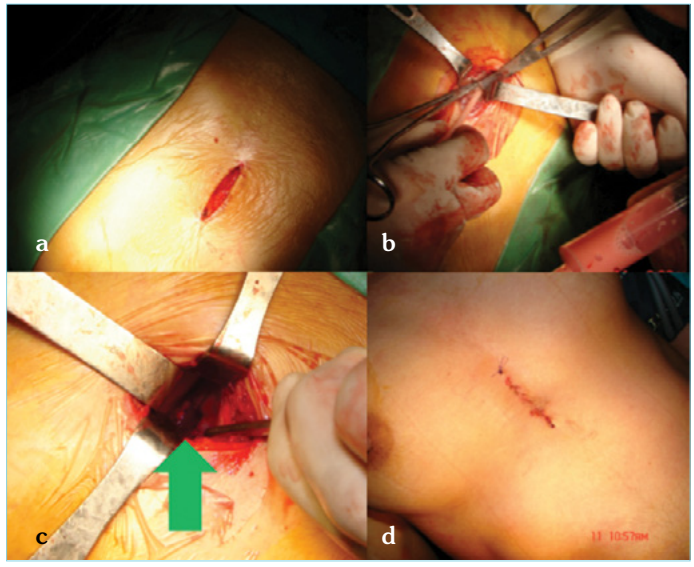

Figure 3. The vertical incision was shown (a); the evacuation of chylous fluid. The chili was seen in the syringe (b); after the pleural-peritoneal window is created with an opening of 4 cm (arrow), interrupted sutures are placed to hold all layers together and ensure patency (c); dermal closure has been completed (d). No drainage tube was inserted into the pericardial space

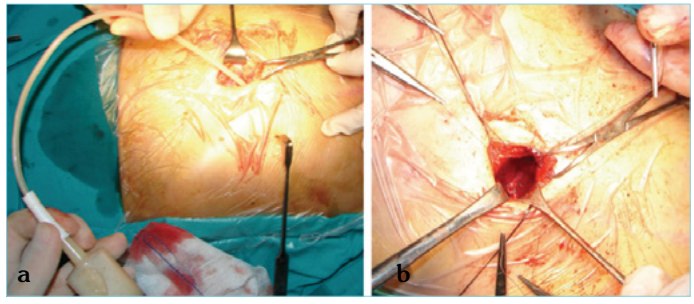

Figure 4. Chylous fluid was evacuated after a pericardial fenestration had been opened using a subxiphoid skin incision. The milky chylous fluid in the syringe (a). For the pericardioperitoneal window, the cut edges of the pericardium, diaphragm, and peritoneum were sutured together with interlocking sutures using 4-0 polypropylene to prevent closure (b)

servative medical management, such as no peroral nutrition, MCTs, hyperalimentation. She was rehospitalized with initial complaints in June 2013. Pericardiocentesis with catheter insertion and pericardial drainage was performed for chyopericardium-diagnosed echocardiographically. A small PPW (3 cm diameter) was created under general anesthesia (Figure 4). The patient was discharged without problem (bleeding, infection, pericardial effusion, etc.). However, five months afterwards, she had visceral herniation through PPW plus pericardial effusion on echocardiography and MRI (Figure 5). After the present pericardial effusion had been evacuated by thoracentesis, it was not detected in the follow-up echocardiography during five postoperative months.

The mean procedure duration was 55±20 min. The patients were discharged postoperatively in less than one week. They remained symptomless two weeks later, and there was no evidence of recurrent effusion on echocardiogram. However, the child patient developed pericardial effusion and a diaphragmatic hernia via PPW five months after the operation. They did not require pericardiectomy for constrictive disease.

DISCUSSION

Available efficient drainage techniques for pericardial effusion have different advantages and disadvantages (4-7). Drainage can be achieved with pericardiocentesis (8), a pericardial window made via a left anterior thoracotomy (9), or by either video-assisted thoracoscopic or open (thoracotomy) pericardiectomy (9, 10). It is still controversial as to which drainage procedure is more efficient in preventing recurrence. The long-term durability of the drainage opening is notably crucial in patients with chronic exudative pericarditis. It is concluded that the creation of PPW is a simple, safe, and efficient procedure, which is suitable for most patients with benign/malignant pericardial effusion (11). The efficacy and patency of PPW have been reported in many investigations (3, 4). Nonetheless, it is reported that it is not clear why fluid should drain only in one direction from the negative intrathoracic pressure zone to the positive pressure zone of the abdominal cavity and that PPW possibly closes relatively immediately due to hepatic and omental adhesions (12).

In our cases, we chose a 3- and 4-cm-diameter size for PPW. A 3-cm-diameter PPW can close relatively immediately as a result of adhesions to the liver, therefore, a 4-cm-diameter opening can be used in some patients, although an even larger opening may be needed (3). Even if PPW may close due to hepatic and omental adhesions, a 4-cm-diameter opening has a larger absorptive surface than a 3-cm-diameter one.

Although some laparoscopic techniques have recently been proposed to relieve pericardial effusions, including tamponade 13-17, PPW is performed fast and safely and with a small skin incision. Further, PPW created via a subxiphoid approach has bidirectional pericardial drainage, i.e., peritoneal and preperitoneal drainage, and treatment performed without a trocar is cheaper than laparoscopic techniques (Figure 6) (3). However, in patients with pneumopericardium, serious cardiac tamponade, pericardial retraction, or uremic pericardial effusions should be commonly avoided. In the latter condition, PPW may not be recommended to create this connection in patients undergoing peritoneal dialysis.

The efficacy of PPW for malignant pericardial effusions has been described in some reports (11, 16). In the reports, no patients developed peritoneal carcinomatosis. Therefore, PPW should be the first choice of treatment for patients with malignant pericardial effusion as well as with noninfectious benign effusions.

Because the hepatic dome prevents any abdominal viscera from herniating into the pericardial cavity, intrapericardial hernia occurring after the creation of PPW for pericardial drainage is rare (2, 18). The diagnosis should be considered in patients presenting with gastrointestinal and/or cardio-respiratory symptoms following surgical procedures comprising the diaphragm.

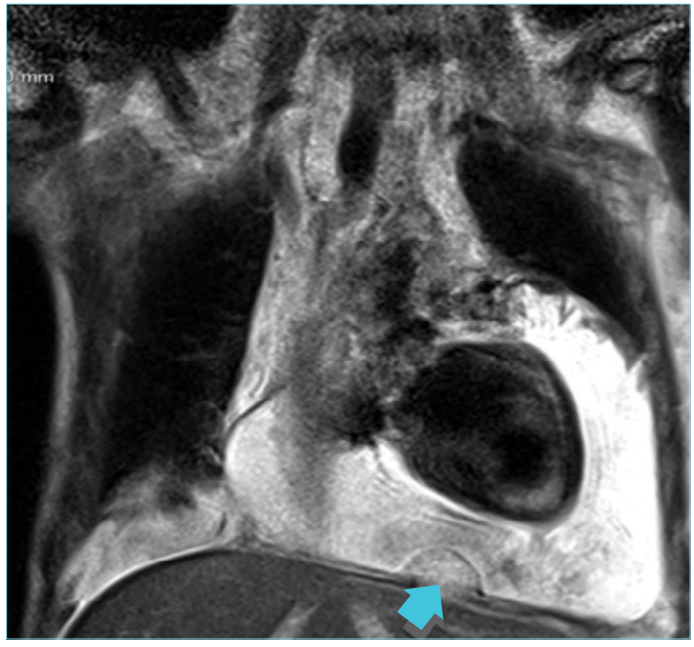

Figure 5. MRI demonstrating the herniated viscera via a pericardial-peritoneal window (PPW). Note that the integrity of PPW has been prevented (arrow)

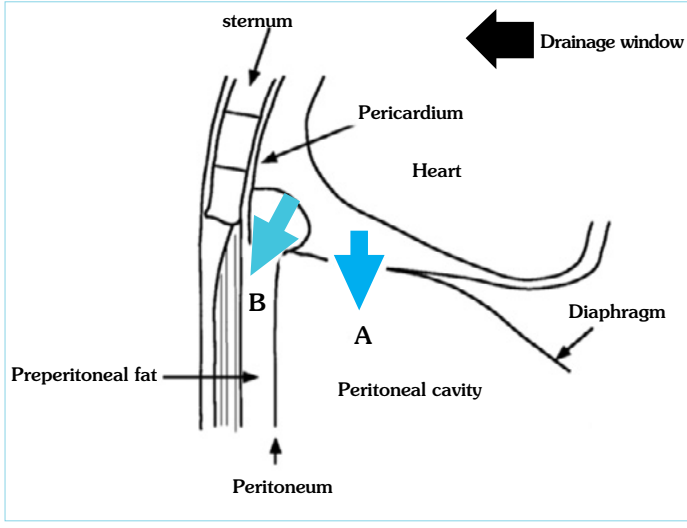

Figure 6. Position of pericardial-peritoneal window (PPW). PPW created through a subxiphoid approach has bidirectional pericardial drainage (A: peritoneal drainage; B: preperitoneal drainage) (3)

CONCLUSION

Pericardial-peritoneal window management using a subxiphoid approach, which is an easy, safe, efficient, and cheap procedure, is applicable to most patients with both noninfectious benign and malignant pericardial effusions. We conclude that PPW technique seems like a highly beneficial treatment modality; nevertheless, additional assessment is needed for infection through the abdominal cavity, a malignant tumoral extension, long-term patency, and progression to constrictive pericarditis.

Informed Consent: Written informed consent was obtained from patients.

Peer-review: Externally peer-reviewed.

Authors' Contributions: Conceived and designed the experiments or case: RÖ. Performed the experiments or case: AT. Wrote the paper: AT. All authors have read and approved the final manuscript.

Conflict of Interest: No conflict of interest was declared by the authors.

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