



Successful Conservative Treatment of Chylopericardium after Open-Heart Surgery: A Case Report

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Abstract

Chylopericardium is a rare complication following cardiac surgery. The incidence of this pathological condition is very low and mainly attributed to lymphatic injuries to the thymus or anterior mediastinum, thoracic duct injuries, or extensive posterior pericardial dissection with the possible interruption of major cardiac lymph channels.

A 62-year-old man was admitted to the cardiovascular surgery department for coronary bypass surgery, and the surgical procedure was performed 3 days later. Revision surgery was performed, because of the drainage associated with bleeding. In the post-revision days, the amount of serous drainage increased, and then chylous drainage occurred. After conservative treatment, the drainage of the chylous features decreased and eventually disappeared. The patient was discharged without any problem. At 6 months' follow-up, the patient was doing well with a normal left ventricular function and without effusion.

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Introduction

Chylopericardium as a complication of cardiovascular surgery has a reported incidence rate of lower than 0.5% and is extremely rare following intrapericardial procedures.¹

Uncontrolled leakage of lymph can cause hypoproteinemia, malnutrition, immune deficiency, infection, and life-threatening cardiac complications such as pericarditis and cardiac tamponade.¹ Chylopericardium is reported to have been seen, in addition to congenital cardiac and thoracic surgery, after valve replacement and myocardial revascularization.² Its macroscopic appearance notwithstanding, chylopericardium can be easily diagnosed by biochemical and histological studies. We herein describe a patient successfully treated with conservative treatment.

Case Report

A 62-year-old man was admitted to our hospital with complaints of dyspnea and chest pain of 1 year's duration. His electrocardiogram (ECG) showed the normal sinus rhythm with T-wave abnormalities, echocardiography indicated an ejection fraction of 55% and a normal valve function, and coronary angiography revealed 4-vessel disease. Consequently, coronary artery surgery was decided.

The patient underwent 4-vessel coronary bypass surgery. After sternotomy, cardiopulmonary bypass was instituted by using ascending aortic cannulation and 2-stage venous cannulation in the right atrium. Thereafter, the aortic cross-clamp was removed and the proximal anastomosis was performed with partial clamping. There were no

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intraoperative complications. At the end of the operation, a single drain was placed in the mediastinum and thorax cavity. The patient had approximately 1500 cc hemorrhagic drainage in the first 24 hours in intensive care. Despite the absence of hemodynamic instability, there was hematoma in the left thoracic cavity and an enlarged cardiac silhouette in chest radiography on the second day (Figure 1).

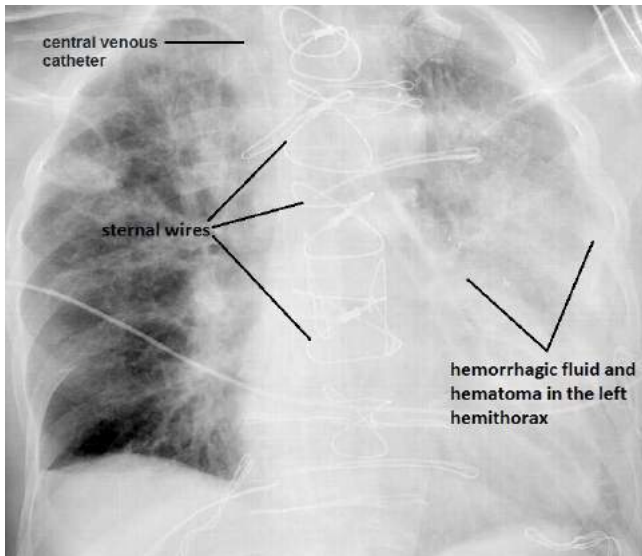


Figure 1. Telecardiogram image of the patient with hemorrhagic drainage in the intensive care unit after cardiac surgery, showing hematoma associated with hemorrhage in the left hemithorax and mediastinal enlargement (arrows)

Additionally, echocardiography illustrated considerable pericardial effusion, which was 1 cm around the left ventricle and 2 cm around the right atrium and the right ventricle (Figure 2). The decision was made to revise the patient in order to control the hemorrhage and to evacuate the hematoma on December 17, 2018. The intensely organized hematoma was evacuated from the mediastinal site and the left thoracic cavity. In addition, blood clots, which were accumulated at the back of the heart and around the superior vena cava and the innominate venous tract, were cleared. The leak in the proximal anastomosis of the aorta- saphenous vein was repaired. No significant hemorrhagic drainage was detected after the revision. The color of the liquid in the drains turned serous, and oral fluid feeding was started on the third day. On the following day, oral solid foods were passed. The serous fluid in the mediastinal drain began to increase at the end of the fifth day. On the same day, the appearance of this liquid turned milky white (Figure 3). On the seventh postoperative day, there was 1800 cc of a milky and yellowish drainage fluid. A fluid sample was taken from the mediastinal drain, and biochemical and microbiological examinations were performed. The liquid had a triglyceride level of 1916 mg/dL, a total protein level of 6.0 mg/dL, and a cholesterol level of 207 mg/dL. Neither infiltration with

microorganisms nor PNL infiltration was observed, which verified the chylous fluid. The oral feeding of the patient was discontinued, and total parenteral feeding with a low-fat and medium-chain triglyceride diet was initiated. The volume of the fluid drained decreased progressively from about 1800 mL on the day after the parenteral nutrition to 100 mL 11 days later. The drainage ceased after the 12th day, and the mediastinal drain was removed on the 14th day. Since the drainage stopped, no surgical intervention was needed. Postoperative chest radiography and echocardiography confirmed no re-accumulation of the mediastinal fluid, and the patient was discharged on the 18th day on January 2, 2019. An echocardiograph 2 weeks later showed no fluid in the mediastinal space. At follow-up in June 2019, the patient was uneventful. Furthermore, there was no pericardial effusion on the echocardiographic examination and the ventricular function was good.

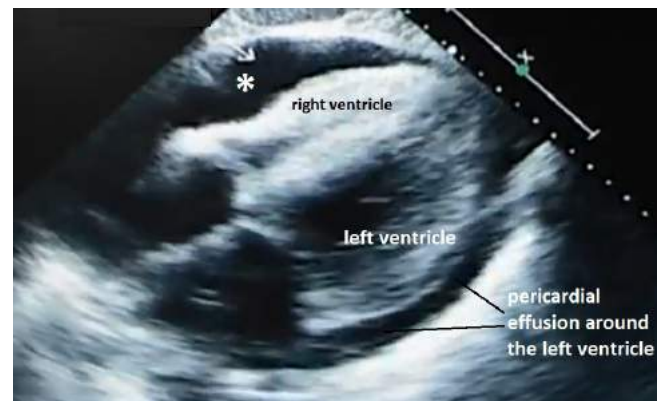


Figure 2. Echocardiogram, showing pericardial effusion-induced right ventricular collapse and 1-cm effusion around the left ventricle (arrows and asterisk)

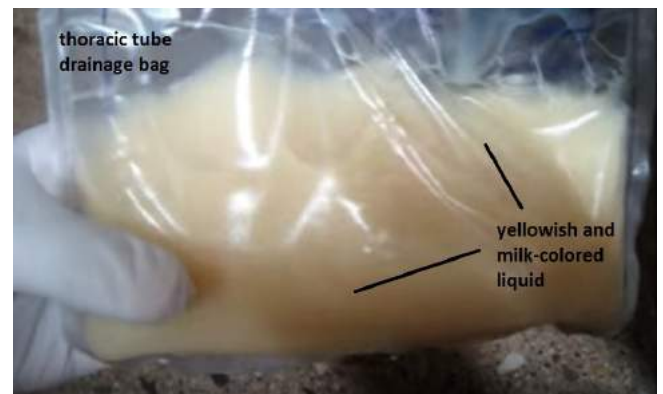


Figure 3. Chylous fluid from thorax drainage on the fifth postoperative day after surgical revision (arrows)

Discussion

Mediastinal chylous accumulation, which can occur after cardiac surgery, is seen in 0.2% to 0.5% of patients and



can be catastrophic if untreated.³ The cause is not known exactly yet; however, chylopericardium may be congenital or acquired. In addition to mediastinal lymphoma, trauma, valvular thrombosis, and cardiac operations, most cases have been associated with surgery for congenital heart diseases.⁴

The etiology of postoperative chylopericardium is still obscure. The main pathology is obstructions related to the thoracic duct and branches. The common etiology of chylous accumulation in the mediastinal space is the injury to the cardiac and pericardial small lymphatic channels during the surgical procedure. Chyle is the normal content of lacteals and the thoracic duct. The thoracic duct originates as the cisterna chyli below the diaphragm in the region of the lumbar vertebrae. It ascends in the right hemithorax between the aorta and the azygos vein. It crosses to the left, passes behind the aortic arch, and drains at the junction of the left jugular and left subclavian veins (Figure 4). Various tributaries of the lymphatic fluid from the thymic tissue, pericardial reflections, and pretracheal lymph nodes drain into the thoracic duct.^{3,4} There are also right and left bronchomediastinal lymphatic channels opening separately to the right and left brachiocephalic venules. The lymphatic channels, as a result of the extreme retraction the chest wall and the thoracic duct, may be damaged. Lymphatic leaks may also occur as a consequence of injury to the inferior caval lymphatic ducts during the cannulation of the inferior vena cava. It can be seen as a complication of exploratory procedures in preparation for surgery on the patient or during cross-clamp placement. The thymus, the pericardium, and the thyroid gland constitute the tributaries of the brachiocephalic lymph nodes, located in this region. The thymus and the lymphatic channels around it may be damaged during surgical exploration. Generally, traction on the duct from the manipulation of the heart and the great vessels; thrombosis at the junction of the left jugular and subclavian veins, which obstructs thoracic duct drainage; and the development of connections between the pericardial sac and a lymphatic leak can contribute to postoperative chylopericardium.^{4,5} Electrocautery may be an unreliable means of control as the thin lymphatic walls contain little coagulable material. This problem can be prevented with the surgical ligation of the thymic vascular structures at the time of dissection rather than the use of electrocautery. Thus, the thymus lobes should be separated by blunt dissection and ligated with sturdy sutures.^{5,6}

Chylous drainage can occur early or late following cardiac surgery. Early chylopericardium is characterized by progressive serous drainage. Following the commencement of oral feeding, the drainage fluid turns milky white. In late-onset chylopericardium, cardiac silhouette enlargement, cardiac tamponade findings, fullness in the neck veins, and palpable liver findings occur. This emergence period may occur between the first postoperative day and the post-discharge period. In our patient, after feeding was started,

serous drainage was increased first, and then the liquid's character turned into a chylous structure. Also in our patient, the mediastinal site was opened twice because of bleeding. In addition to the initial surgical trauma, bleeding control and hematoma clearing may have damaged the lymphatic structures and small channels around the thymus, innominate vein, and vena cava.

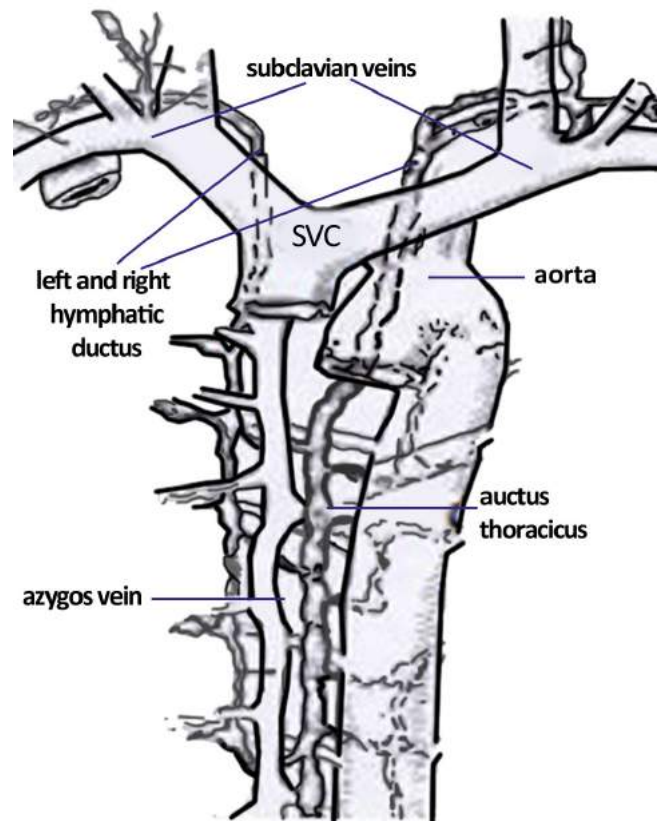


Figure 4. Anatomical image of the lymphatic flow in the mediastinal area (hand-drawn)

SVC, Superior vena cava

In addition to a macroscopically milky white odorless liquid, biochemical and microbiological tests also play an important role in diagnosis. In the pericardial fluid sample, the milky liquid has a total cholesterol level of greater than 110 mg/dL and a triglyceride level of greater than 500 mg/dL. Although the total cholesterol level in our patient was not high, the triglyceride level and the appearance of the fluid were consistent with chylopericardium. The negative fluid culture and prominent lymphocytes supported the diagnosis.^{4,6} Further, the presence of fat globules obtained by the Sudan III staining of the drainage fluid assists in the diagnosis of the chylous fluid.^{6,7} In cases of late-onset chylopericardium, if clinical, telecardiographic, and echocardiographic data indicate pericardial effusion, the differential diagnosis should be made and liquid samples should be taken via pericardiocentesis. Our patient was a case of a chylopericardium seen in the early postoperative

period. The diagnosis of chylopericardium was easily macroscopically diagnosed and biochemically and microbiologically supported.

There is some disagreement about postoperative chylopericardium treatment. The initial treatment of chylopericardium is generally conservative, consisting of pericardiocentesis, dietary manipulation, and the infusion of somatostatin.^{3,4} Although many surgeons have suggested the ligation of the thoracic duct as the first priority, conservative treatment with parenteral feeding with low-fat and medium-chain triglycerides in addition to drainage has also been shown to be effective.⁵⁻⁷ In patients who do not respond to conservative treatment, the ligation and resection of the thoracic duct just above the diaphragm have proved to be the most effective treatment.⁴⁻⁶ We did not allow oral feeding following the detection of chylous drainage in our case. We passed total parenteral nutrition (low-fat and medium-chain triglycerides) and gave the patient an albumin infusion to prevent protein loss. On the 12th postoperative day, after the drainage ceased, we passed the oral feeding again; and on the 14th day, we removed the patient's drain. The cardiac silhouette was not enlarged in the telecardiogram, and no echocardiogram was detected in the mediastinal fluid.

Conclusion

We presented a rare case of chylopericardium in a patient who underwent coronary bypass surgery with a median sternotomy in this article. Mediastinal tissues should be protected as much as possible and no damage should be caused to the lymphatic structure and channels when the patient is prepared for surgery after sternotomy. If chylous drainage is detected, oral feeding discontinuation, fluid/electrolyte replacement with intravenous parenteral nutrition, and a diet low in fat and high in medium-chain triglycerides can help to resolve the effusion. If further production of chylous effusion continues, surgical treatment is mandatory and usually curative.

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