Chylopericardium after Cardiac Surgery: Successful Conservative Approach

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ABSTRACT
A 41-year-old man underwent an aortic valve replacement associated with ascending aorta’s replacement for aortic valve disease and aorta’s aneurysm. On the tenth postoperative day he developed a chylopericardium responsible for tamponade. After drainage and medium chain triglyceride diet, he clinically recovered and was discharged 2 weeks later. Herein are reviewed aetiology and therapeutics of this rare complication following intrapericardial cardiac surgery.

RéSUMÉ
Un homme de 41 ans, opéré d’un remplacement valvulaire aortique associé à un remplacement de l’aorte ascendante, a présenté dans les suites un chylopéricarde compliqué d’une tamponnade. Cette complication a été traitée par un simple drainage péricardique associé au traitement médical, avec succès. Nous revoyons ici les étiologies et différentes modalités thérapeutiques de cette rare complication de la chirurgie cardiaque.

1. INTRODUCTION
Chylopericardium is a rare but potentially serious complication after cardiac surgery. To remember anatomic interrelationships between thoracic duct and heart lymphatic vessels may help to understand etiopathologic consequences of their possible surgical injury.

2. CASE REPORT
A 41-year-old man was admitted for a recent symptomatic dyspnea (New York Heart Association Class II) related to an aortic valve disease known for 7 years. The patient had no severe medical history. Transthoracic Doppler echocardiography noticed an aortic stenosis with a surface area of 0.45 cm²/m², and a mean gradient of 90 mmHg. Ascending aorta maximal diameter was measured at 50 mm with an associated grade 3 aortic regurgitation on a bicuspid valve. Left ventricular hypertrophy was confirmed with preserved left ventricular ejection fraction of 60%. Cardiac computerized tomography coronary scan showed large calcifications of the aortic valve without any coronary lesions. Surgery consisted in an aortic valve replacement by a mechanical prosthesis Saint Jude Medical n°27 combined to an ascending aorta replacement with a supra coronary Dacron tube n°30. Neither pleural space was surgically opened, and the thymus was visually normal. Because of postoperative bleeding, the patient was reoperated on for tamponade the fifth day. No evidence of chylopericardium was observed at that time. Ten days after initial surgery the patient presented again clinical signs of tamponade and bedside echocardiography confirmed a large pericardial effusion about 25-30 mm compressing right ventricle. Surgery was performed again through a subxiphoid incision revealing 700 ml of a milky liquid under pressure. The whole cutaneous incision was reopened to check if there wasn’t any superficial infection. Two presternal, two retrosternal small drains (diameter n°14) and one pericardial drain diameter n°30 were placed. In addition, a left pleural drain was performed for pleural effusion with no argument for an associated chylothorax. Retrosternal drains were progressively removed and never gave more than 50 ml/day. Bacteriological analysis was negative in all cases. Biochemical analysis found triglycerides, and cytological examination revealed a majority of lymphocytes, compatible with chylopericardium. The pericardial drain was the only one to produce a chylous liquid; however its drainage’s flow reduced as the medium-chain triglyceride diet started (on the 8th day). Drainage’s volumes are showed in table 1. Discharge echocardiography (performed on the 14th day) noticed a pericardial effusion about 17 mm in front of right ventricle without any consequence on the filling of the right cavities. No significant pleural or pericardial effusions were noticed on a thoracic scanner at discharge. Fat free diet was continued for one month. One year after his surgery the patient is still doing well and the CT scan showed no pericardial effusion anymore.

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Chylopericardium after cardiac surgery was first reported in 1971 by Thomas and McGoon [1]. Since, very few cases after cardiac surgery have been published, and among them a majority are pediatric cases [2], with an incidence inferior to 0.5% [3]. It is difficult to quantify incidence of postoperative chylopericardium in adult population: Dib and al. found 33 cases in a systematic literature search over ten years, with a majority of idiopathic cases [4].

Chylopericardium is defined by several criteria, among them a milky yellowish appearance, a high triglyceride content more than 500 mg/dl, a cholesterol/triglyceride ratio <1, and a predominance of lymphocytes [4].

There are numerous aetiologies of chylopericardium, among them iatrogenic causes which result from direct lesions of the thoracic duct or disruption of the cardiac lymphatic channels. Lymphatic drainage of the heart connects with thoracic duct, either directly, either by mediastinal lymph node chains, and is divided in two parts [5]:

- right efferent lymph trunk ascends between aorta and the pulmonary trunk before joining the left anterior mediastinal node chain that flow into the arch of the thoracic duct.
- left trunk drains into the right paratracheal nodes behind left pulmonary artery, and joins either azygos vein, either left suprabronchial nodes and aortic arch nodes.

In our case (aortic surgery), the most likely explanation for the chylopericardium is a surgical injury of the lymphatic vessels located between the ascending aorta and the pulmonary artery, even if several other mechanisms may be considered (lymphatic injury to the thymic fat, interruption of major cardiac lymph channels). Recently, some authors suggest traction injury by indirect forces transmitted to the thoracic duct during intra operative manipulation of the heart to be responsible for chylopericardium [6]. Surgeons should be aware of this complication that might be avoided taking time for haemostasis and lymphostasis when dissecting this area.

A pericardial drainage is always necessary to diagnose a chylopericardium, rarely lymphangioscintigraphy or lymphangiography may be used to find its cause.

According to the review of the literature, we found four main objectives reported in the treatment of such disease:

- to drain: pericardiocentesis with a pericardiotomy tube;
- to reduce the chyle’s production by a low-fat, medium chain triglyceride diet; a total parenteral nutrition may be considered. The use of octreotide (a long-acting somatostatin analog) has also been described as efficient [7];
- to maintain a good nutritional status: to replace the nutrients lost in the chyle;
- to treat the cause; a iatrogenic chylopericardium that is not cured by medical treatment after 3 weeks may be surgically treated (thoracic duct ligation in the lower thorax with creation of a pericardial window, to prevent from constrictive pericardial disease) by thoracoscopic intervention or by open right thoracotomy.

It is reasonable to use non-invasive techniques before considering surgery (which must remain the last choice). One should also consider the following options:

- percutaneous transabdominal embolization of the thoracic duct, by coils [8];
- pericardial-peritoneal shunts may be used as an alternative technique for the surgical treatment of chylopericardium in children.

We decided first a conservative medical treatment for this patient, already weakened by 3 iterative operations within 10 days. A medium-chain triglyceride diet and a hydric restriction of 750 ml per day. All fats, especially burned fats, were forbidden, as alcohol. We did not need to introduce a total parenteral nutrition neither conceive a surgical approach because of the obvious reduction of the drainage’s volume. Indeed, in a canadian pediatric study, Nguyen and al. [2] reported that 84% of cases of chylothorax/chylopericardium (n=25) responded to conservative therapy; as also described in some case reports in adults after cardiac surgery [3,6].

### 3. DISCUSSION

### Table 1. Evolution of daily pericardial drainage volume.

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<tr>
<th>Days</th>
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Fat free diet

4. CONCLUSION

Even if chylopericardium is a rare complication of cardiac surgery, it has to be known because of the possible severity of initial symptoms, and because of the effectiveness of a conservative medical treatment in most of cases. Therapies described in guidelines for management of chylothorax seem to be efficient in the treatment of chylopericardium.