



Case report

Chylopericardium and cardiac tamponade as rare complications of coronary artery bypass graft (CABG): A case report

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ABSTRACT

Introduction: Chylopericardium, a rare condition involving the accumulation of chylous fluid in the pericardial cavity, arises due to lymphatic system disruption. It is frequently linked to trauma, malignancy, or cardiothoracic surgeries. Although primarily reported in pediatric cases, its occurrence in adults, particularly following coronary artery bypass graft (CABG), is rare.

Case presentation: We present the case of a 62-year-old male who, one week after CABG, developed progressive dyspnea, weakness, and fatigue. Physical examination revealed signs of cardiac tamponade, and echocardiography confirmed severe pericardial effusion with right ventricular collapse. Pericardial fluid analysis demonstrated chylous fluid with elevated triglycerides and protein levels, diagnosing chylopericardium-induced cardiac tamponade. Despite surgical intervention, an emergency pericardiocentesis was performed to stabilize the patient, followed by a pericardial window, thoracic duct ligation, and aggressive management with total parenteral nutrition (TPN) and albumin; however, the patient's condition deteriorated, resulting in cardiac arrest and death.

Discussion: Chylopericardium following cardiac surgery is a rare but serious complication. It typically arises from inadvertent injury to the thoracic duct during the procedure, exacerbated by increased postoperative venous pressure. Diagnosis hinges on pericardiocentesis, revealing milky fluid with high triglycerides and protein levels. While conservative treatment may suffice in minor cases, severe chylopericardium often necessitates surgical intervention. This case underscores the challenge of diagnosing this rare complication and the critical need for timely intervention.

Conclusion: This case highlights the importance of early recognition and aggressive management of post-CABG chylopericardium. Rapid deterioration, despite prompt treatment, emphasizes the need for heightened clinical awareness to prevent fatal outcomes.

1. Introduction

Chylopericardium, a rare condition involving chylous fluid in the pericardial cavity, arises from lymphatic damage forming abnormal thoracic duct-pericardial connections or increased thoracic duct pressure causing chyle reflux [1,2]. Lymph leakage can lead to serious health issues, including low protein levels, malnutrition, immune system deficiencies, infections, and severe cardiac problems such as pericarditis and cardiac tamponade [3].

Chylopericardium is often associated with trauma, malignancies, or postcardiothoracic surgeries such as congenital cardiac surgery, valve

replacement, and coronary artery bypass graft (CABG) [1,3,4]. The incidence of chylopericardium after pediatric cardiac surgery is reported to be between 0.22 % and 0.5 %, but it is not quantified in adults; most cases in the literature involve children, with few reports following adult cardiac surgery [4].

Here we present a case of chylopericardium-induced cardiac tamponade in an adult post-CABG patient. This case underscores the importance for clinicians to recognize the occurrence of this rare condition following cardiothoracic surgeries.

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2. Case presentation

A 62-year-old male patient with a history of CABG (triple bypass surgery) one-week prior presented to the emergency department with complaints of weakness, fatigue, and progressively worsening shortness of breath over the past three days. The patient denied fever, cough, or chest pain. Upon admission, his vital signs showed a blood pressure of 98/85 mmHg, a heart rate of 105 beats per minute, a respiratory rate of 28 breaths per minute, oxygen saturation of 94 % on ambient air, and a temperature of 36.8 °C. During physical examination, the patient appeared ill with mild respiratory distress but no signs of toxicity. Cardiovascular examination revealed a jugular venous pressure of 11 cm of water and muffled heart sounds. Bilateral basilar crackles were detected on lung auscultation. Abdominal examination showed no abnormalities. Mild pitting edema was noted bilaterally up to the knees, with no significant asymmetry in leg size observed.

Paraclinical investigations on admission revealed normal laboratory results, including a complete blood count (CBC) with white blood cell count: $4.9 \times 10^9/L$ (normal range: $4\text{--}10 \times 10^9/L$), hemoglobin: 12.3 g/dL (normal range: 12–16 g/dL), and platelet count: $367 \times 10^9/L$ (normal range: $150\text{--}400 \times 10^9/L$); liver function tests with aspartate aminotransferase (AST): 22 IU/L (normal range: 5–40 IU/L), alanine aminotransferase (ALT): 28 IU/L (normal range: up to 40 IU/L), alkaline phosphatase (ALP): 198 IU/L (normal range: 0–206 IU/L), total bilirubin: 0.8 mg/dL (normal range: 0.2–1.1 mg/dL), and direct bilirubin: 0.2 mg/dL (normal range: 0–0.3 mg/dL); a lipid profile with triglycerides: 111 mg/dL (normal range: below 150 mg/dL) and cholesterol: 178 mg/dL (normal range: <200 mg/dL); and negative findings for creatine phosphokinase (CPK) and troponin levels. The electrocardiogram (ECG) showed sinus rhythm without signs of acute ischemia. Echocardiography revealed a 40 % ejection fraction and severe pericardial effusion measuring 3 cm around the right ventricle, 4 cm posterior to the left ventricle, and 4 cm lateral to the left ventricle, along with diastolic collapse of the right ventricle, suggestive of cardiac tamponade. Chest computed tomography (CT) demonstrated evidence of pericardial effusion and bilateral pleural effusion (See Fig. 1.). Subsequent examination revealed that the pleural fluid was transudative. Due to the severity of the patient's symptoms and the echocardiographic findings, an immediate pericardiocentesis was performed to rapidly remove the pericardial fluid and stabilize the patient. However, due to concerns about potential recurrent effusion, a cardiac surgeon was consulted, and an urgent pericardial window procedure was carried out. This resulted in the drainage of 950 mL of fluid. Simultaneously, thoracic duct ligation was performed to address the underlying cause of the chylopericardium. Analysis of the pericardial fluid showed a milky appearance with elevated levels of triglycerides (726 mg/dL) and protein (39.1 g/L), confirming chylopericardium. The patient was diagnosed with chylopericardium-induced cardiac tamponade, likely secondary to lymphatic disruption following recent CABG surgery.

Postoperatively, the patient was managed with a strict nothing by mouth (NPO) protocol, and total parenteral nutrition (TPN) was

initiated for one week, along with albumin infusion. This was followed by a medium-chain triglyceride (MCT) diet for another week. Despite these interventions, the patient's condition deteriorated within six hours. Persistent pericardial effusion and underlying chylopericardium, compounded by his medical history, resulted in profound hemodynamic instability. Unfortunately, the patient experienced cardiac arrest and, despite resuscitative efforts, passed away during admission.

3. Discussion

In this case report, we present a 62-year-old male who underwent recent CABG and presented with worsening weakness, fatigue, and dyspnea. Clinical examination revealed signs of cardiac tamponade, confirmed by echocardiography showing severe pericardial effusion with diastolic collapse of the right ventricle. Pericardial fluid analysis confirmed chylopericardium, characterized by milky fluid with elevated triglycerides (726 mg/dL) and protein (39.1 g/L). Despite prompt surgical intervention and intensive management including TPN and albumin infusion, the patient deteriorated rapidly, leading to fatal cardiac arrest.

Chylopericardium is a rare disorder that can be either primary (idiopathic), more commonly encountered than secondary forms which can arise from various factors including cardiothoracic surgeries [5–7]. The incidence of chylopericardium following cardiac surgery is exceptionally low [5,7]. Injury to the thoracic duct or its branches during surgical procedures can cause chylous to leak into the pericardial cavity. This leakage may be exacerbated by increased venous pressure and heightened lymphatic flow post-surgery, leading to further chylous accumulation. While direct injury to the thoracic duct during sternotomy is unlikely due to its anatomical position, indirect forces during heart and aorta manipulation could occasionally injure the duct [8].

Symptoms can vary depending on the severity and volume of effusion, but most patients initially present with dyspnea, which is nonspecific [5,7]. Cardiac tamponade symptoms, such as chest tightness and dyspnea, may occur with severe effusion [7]. Since most patients have nonspecific symptoms, immediate diagnosis is challenging and necessitates paraclinical investigations [9]. The diagnosis of chylopericardium primarily relies on pericardiocentesis, revealing milky white fluid with low cholesterol, high triglyceride levels (>500 mg/dL), high protein content (>35 g/L), and abundant lymphocytes. Confirmatory tests include identifying chylomicrons in the drainage fluid and obtaining a positive Sudan III stain, if necessary [7]. Lymphoscintigraphy using ^{99m}Tc -sulfur colloid can assist in diagnosing chylopericardium and identifying the site of lymphatic system damage [10]. Minor chylous accumulations can often be managed conservatively, while severe cases may require invasive surgical interventions ranging from thoracic duct ligation or pericardial window creation to more complex procedures [7,11]. Thoracic duct ligation is considered safe, carries a low mortality risk, and has no known long-term nutritional or immunological effects [1]. Surgical ligation and resection of the thoracic duct above the diaphragm are considered the most effective interventions for patients unresponsive to conservative measures, according to many surgeons [12,13].

Furthermore, several studies have suggested that octreotide or somatostatin may be effective in patients with postsurgical chylopericardium [5,14].

4. Methods

The current study has been reported in line with Scare criteria [15].

5. Conclusion

In conclusion, we present an adult case of chylopericardium-induced cardiac tamponade following CABG surgery, highlighting the critical need for clinicians to recognize this rare complication. Despite prompt

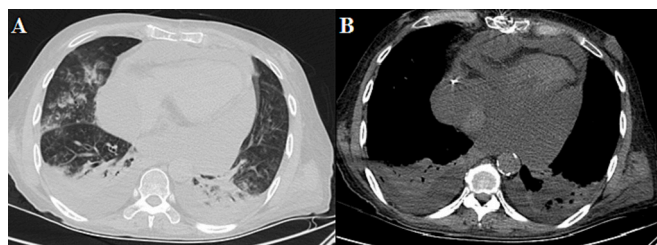


Fig. 1. Chest computed tomography (CT) shows evidence of pericardial effusion and bilateral pleural effusion. Evidence of sternal defect due to coronary artery bypass graft (CABG) surgery is obvious. A) lung window, B) mediastinal window.

surgical intervention and intensive management, including total parenteral nutrition and albumin infusion, the patient's condition rapidly deteriorated, leading to fatal cardiac arrest. This case emphasizes the importance of early detection and aggressive management of chylopericardium in post-cardiac surgery patients to prevent severe outcomes.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying image. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Ethical approval

The authors thoroughly addressed ethical considerations. Written consent was obtained from the patient prior to publication of this case report and associated images. This study adhered to the principles outlined in the World Medical Association Declaration of Helsinki. The patient provided informed consent specifically for the publication of this case report.

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Author contribution

AG: contributed to the conceptualization and design of the study.
 RK: drafted the initial version of the manuscript.
 MRZR: revised and finalized the manuscript.
 HM: revised and finalized the manuscript.
 FA: critically reviewed the manuscript for intellectual content.
 FS: served as the principal investigator and attending physician for this patient.
 All authors approved the final manuscript.

Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work the author (s) used ChatGPT in order to improve writing. After using this tool/service, the author (s) reviewed and edited the content as needed and take (s) full responsibility for the content of the study.

Conflict of interest statement

None declared.

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Data availability

The corresponding author can provide the editorial in chief with data and material upon request.

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