Management of chylopericardium: A novel indocyanine green fluorescence-guided approach to a rare case of cardiac tamponade

Maciej Rachwalik[1]*, Kaung Sithu Sett[2]*, Justyna M Sokolska[3], Ewa Mroczek[4], Jan Biegus[5], Maciej Bochenek[6], Roman Przybylski[7]

[1]Clinic of Cardiac Surgery, Department of Cardiac Surgery and Heart Transplantation, Institute of Heart Diseases, Faculty of Medicine, Wroclaw Medical University, Wrocław, Poland

[2]Faculty of Medicine, Wroclaw Medical University, Wrocław, Poland

[3]Department of Cardiovascular Imaging, Institute of Heart Diseases, Faculty of Medicine, Wroclaw Medical University, Wrocław, Poland

[4]Department of Cardiology, Institute of Heart Diseases, University Clinic Hospital, Wrocław, Poland

[5]Clinic of Intensive Cardiac Therapy, Department of Cardiology, Institute of Heart Diseases, Faculty of Medicine, Wroclaw Medical University, Wrocław, Poland

[6]Clinic of Heart Transplantation and Mechanical Circulatory Support, Department of Cardiac Surgery and Heart Transplantation, Institute of Heart Diseases, Faculty of Medicine, Wroclaw Medical University, Wrocław, Poland

[7]Department of Cardiac Surgery and Heart Transplantation, Institute of Heart Diseases, Faculty of Medicine, Wroclaw Medical University, Wrocław, Poland

*Both authors equally contributed to the study.

Correspondence to:
Maciej Rachwalik, MD, Department of Cardiac Surgery and Heart Transplantation, Institute of Heart Diseases, Borowska 213, 50–556, Wrocław, Poland,
phone: +48 71 736 41 00,
e-mail: maciej.rachwalik@umw.edu.pl

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Chylopericardium, i.e., chylous pericardial effusion, is a highly atypical complication in adult cardiac surgery, with only 98 adult cases of all-cause chylopericardium having been reported in the English literature between 1946 and 2021 [1]. Cardiac tamponade due to chylopericardium is even rarer and has been described in 17%–38% of cases reported in the literature [1–3]. In these patients, the risk of acute hemodynamic collapse is an ever-present threat. However, identification of the site of leakage remains a challenge [4].

A 52-year-old male with a history of asymptomatic coronary artery disease and junctional tachycardia underwent elective aortic valve replacement (On-X 25 mm) at our center. The surgery was uneventful, and the pericardium was left partially open. On postoperative day 7, the patient developed hemodynamic signs of cardiac tamponade: 1000 ml of turbid fluid was drained by pericardiocentesis. Laboratory findings of high triglyceride content, presence of chylomicrons, and sterile cultures confirmed the diagnosis of chylopericardium, likely from surgical injury of a lymphatic vessel. On postoperative day 12, due to clinical deterioration, the patient had to be reoperated for surgical drainage.

The patient continued to lose up to 500 ml/day of chyle for a further 17 days despite ongoing supportive and medical therapy that included a strict fat-free diet and anti-inflammatory drugs. Magnetic resonance imaging (MRI) identified extravasation of contrast below the brachiocephalic vein (Figure 1A). The continuity of the thoracic duct was preserved and without leakage (Figure 1B). Leakage was, therefore, presumed to be from a tributary of the terminal thoracic duct, draining into fistulae formed after surgical dissection of potential spaces in the anterior mediastinum, filling into the pericardium through the pericardiotomy that was left partially open, and finally reaching the pleural cavities (Figure 1B).

For definitive treatment, he was again reoperated for surgical ligation under fluorescence guidance. A 20 mg bolus of indocyanine green (ICG) dye was injected intraoperatively into the inguinal lymph nodes, and under fluorescence imaging of the surgical cavity, a focal point of increasing fluorescence intensity was seen in real-time (Figure 1C). Meticulous exploration of this site revealed leakage from a tributary of the terminal thoracic duct, which was consistent with MRI findings. This vessel was carefully ligated, and no further fluorescence leakage was observed. Follow-up echocardiography confirmed the regression of effusion; the patient's recovery was unremarkable.

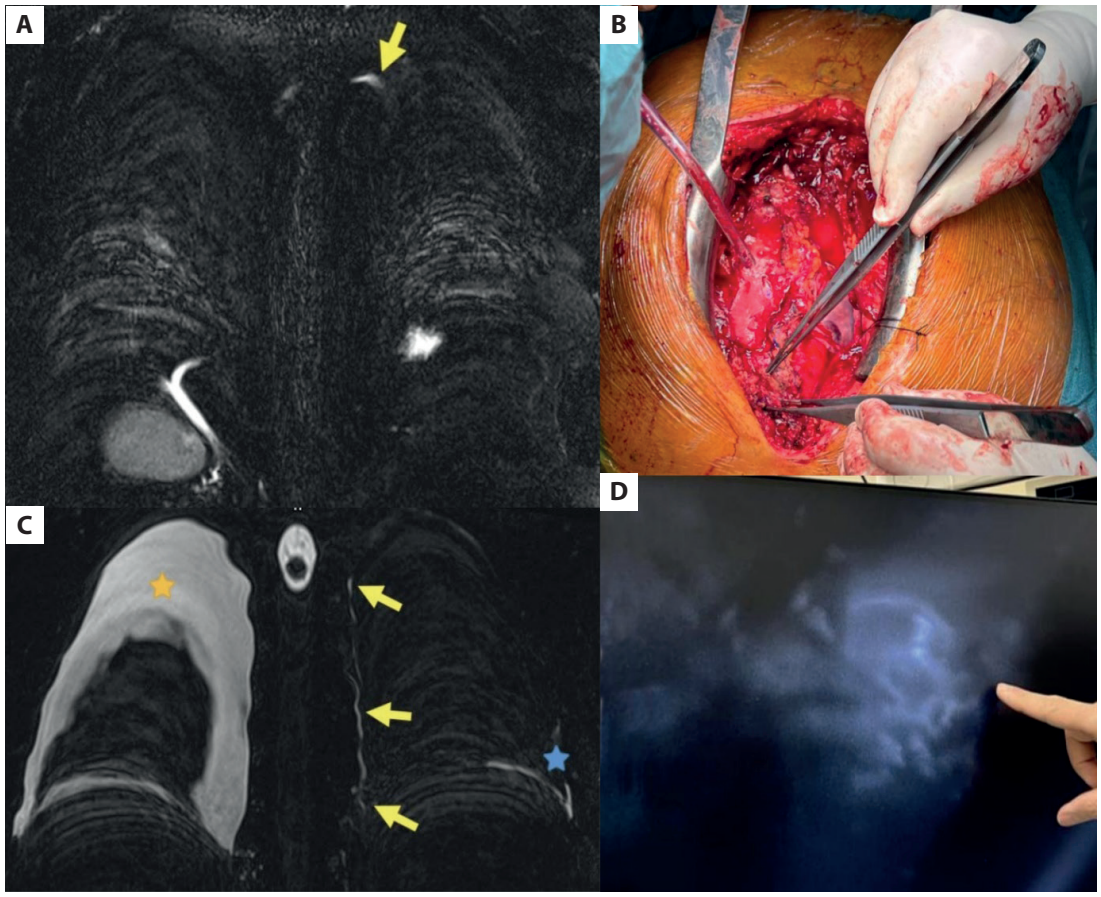

Figure 1. A. Magnetic resonance imaging of the thorax, heavy T2-weighted image, coronal view: lymphatic leakage visible from a lymph reservoir or node connecting with the opening of the thoracic duct into the left subclavian vein, located below the brachiocephalic vein (arrow). **B.** Magnetic resonance imaging of the thorax, heavy T2-weighted image, coronal view: thoracic duct visible above the diaphragm, reaching the left venous angle; continuity of the thoracic duct is preserved and without leakage; blue and yellow stars indicate left and right pleural effusions, respectively. **C.** Intraoperative fluorescence imaging of the surgical cavity showing mediastinal lymphatics and dynamic images of active lymphatic leakage. **D.** Forceps indicate the precise site of leakage as seen on fluorescence imaging: a lymphatic tributary close to the left brachiocephalic angle

Conventional imaging techniques often lack sensitivity to visualize the pericardium [5] or precisely trace back lymphatic leakage to a single vessel [2, 3]. ICG fluorescence imaging, with its ability to provide intraoperative guidance to the precise site of leakage, simplified the search and played a central role in an expedited repair of the otherwise unidentified lesion.

While the use of ICG fluorescence imaging in the management of chylothorax is increasingly being described in the literature, to our knowledge, our case appears to be its first reported use in chylopericardium. Considering the high failure rates of conservative treatment [1–3] and the inherent risk of acute cardiac tamponade that is specific to chylopericardium, the role of ICG fluorescence imaging becomes ever more important.

Article information

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