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CASE IMAGE

# Resuscitative TEE after open heart surgery: When POCUS fails to FOCUS

**Julien Higny** | **Yannick Berners** | **Maria-Luiza Luchian**

Department of Cardiovascular Disease, CHU UCL Namur, Yvoir, Belgium

**Correspondence**
Julien Higny, Department of Cardiovascular Disease, CHU UCL Namur, B-5530 Yvoir, Belgium.
Email: julienhigny@hotmail.com

**Key Clinical Message**

Echocardiography is key in evaluating the cause of collapse in the post-cardiac surgery patient. Transesophageal echocardiography provides a greater capability for the diagnosis of pericardial effusion in patients who arrest after cardiac surgery.

**KEYWORDS**

circulatory shock, critical care echocardiography, pericardial tamponade, POCUS, transesophageal echocardiography

## 1 | INTRODUCTION

Critical care echocardiography has become the first-line tool to assess patients in shock. Nowadays, Point-of-Care Ultrasound (POCUS) is performed by a growing number of emergency physicians because it allows rapid bedside diagnosis. In this report, we provide images of POCUS and transesophageal echocardiography (TEE) for the diagnostic challenge of a 'hidden' cardiac tamponade due to a posterior localized pericardial clot. This report illustrates the incremental value of TEE for the detection of a localized tamponade in a postoperative cardiac patient.

## 2 | CASE PRESENTATION

A 71-year-old man was admitted to our emergency department after out-of-hospital cardiac arrest (OHCA). The patient was recently diagnosed for a symptomatic severe aortic stenosis treated with bioprosthetic valve replacement. He was discharged from hospital at postoperative day ten. Five days later, he developed faintness, chest discomfort, and dyspnea. He collapsed rapidly when the Emergency Medical Services arrived. The first ECG showed pulseless electrical activity. ROSC was achieved after 13 min of cardiopulmonary resuscitation (CPR). The patient was intubated and transferred to hospital with norepinephrine infusion. Bedside POCUS revealed a severe cardiac dysfunction without evidence of circumferential pericardial effusion (Figure 1). TEE was performed for its incremental value in terms of diagnosis and hemodynamic monitoring. The transgastric long axis view confirmed a severe alteration of the left ventricular systolic function. The mid-esophageal three chamber view revealed a normal function of the bioprosthetic aortic valve (Video S1). Strikingly, the mid-esophageal bicaval view demonstrated a compression of the right atrium by a posterior pericardial clot (Figure 2) (Video S2). This pericardial fluid collection flattened the abutment of the superior vena cava into the right atrium (Video S3). Unfortunately, the patient developed circulatory failure despite fluid resuscitation, extracorporeal life support (ECLS) and re-sternotomy for pericardial drainage.

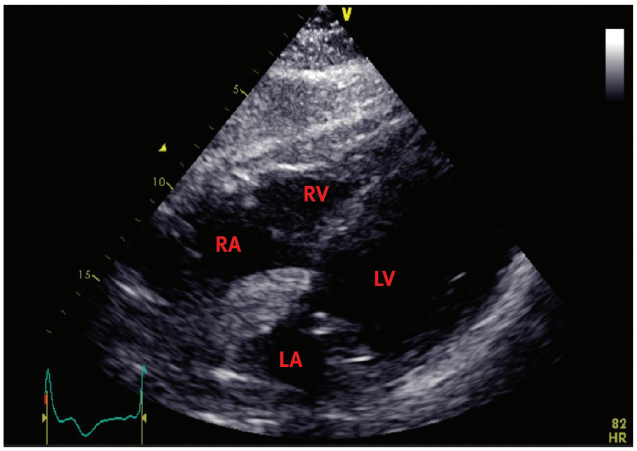


**FIGURE 1** Cardiac POCUS imaging of the apical four chamber view. This image demonstrates no evidence of circumferential pericardial effusion. LA, left atrium; LV, left ventricle; RA, right atrium; RV, right ventricle.

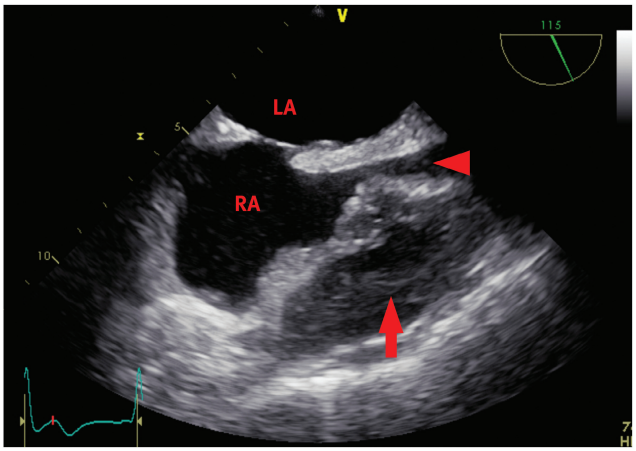


**FIGURE 2** Transesophageal ultrasound imaging of the bicaval view (115° probe rotation). This image demonstrates a compression of the right atrium (RA) and the superior vena cava (arrowhead) by a 'hidden' posterior pericardial clot (arrow).

## 3 | DISCUSSION

Consensus on circulatory shock and hemodynamic monitoring suggests that echocardiography is the preferred modality to initially evaluate the type of shock.[1] International guidelines position echocardiography as the first-line tool for the diagnosis and the management of pericardial diseases.[2] However, detection of pericardial effusion by transthoracic echocardiography is challenging after open heart surgery. Particularly, cardiac imaging may be affected by modified anatomy and mechanical ventilation. Also, the typical echo-lucent space may disappear when thrombosis develops into the pericardium. Therefore, TEE is mandatory because it provides a more reliable diagnostic value in postoperative cardiac patients with localized pericardial effusion.[3] Concerning POCUS and cardiac ultrasound, we are convinced that training experience and interpretation in appropriate contexts are fundamental for the safety of the postoperative cardiac patient in the emergency department.

In the situation of refractory cardiac arrest, emergency re-sternotomy for pericardial drainage represents a standard part of the resuscitation protocol if reversible causes of collapse are quickly excluded. Because tamponade represents a common cause of deterioration following cardiac surgery, chest re-opening is required for 20%–50% of patients who suffer cardiac arrest.[4] A recent analysis conducted by The Association of Cardiothoracic Anesthesia and Critical Care suggests that re-sternotomy after cardiac surgery is associated with significant mortality (15%), high rates of blood transfusion, prolonged intensive care stay, and renal replacement therapy.[5] Finally, regarding the results of ECLS after OHCA, studies suggest that favorable outcomes can be obtained in 15%–20% of the patients. Major determinants of survival include duration of CPR and time from collapse to cannulation. Therefore, rapid initiation of extracorporeal resuscitation may represent a reasonable option in selected patients.[6]

## 4 | CONCLUSION

POCUS has become fundamental in characterizing shock states in the emergency department. In this manuscript, we described the case of a localized pericardial clot responsible for cardiac tamponade only detected by TEE. This report is a short reminder that POCUS can be misleading to diagnose a loculated pericardial effusion in a postoperative cardiac patient. Finally, we hope that these illustrations will help emergency physicians to increase awareness for the postoperative management of the cardiac surgical patient admitted in the resuscitation room with hemodynamic instability.

### AUTHOR CONTRIBUTIONS

**Julien Higny:** Investigation; writing – original draft. **Yannick Berners:** Resources. **Maria-Luiza Luchian:** Validation; writing – review and editing.

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### CONFLICT OF INTEREST STATEMENT

The authors have no conflicts of interest to declare.

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## DATA AVAILABILITY STATEMENT

The datasets generated during the current report are available from the corresponding author on reasonable request.

## CONSENT

Written informed consent was obtained from the patient to publish this report for educational/research purposes in accordance with the journal's patient consent policy.

## ORCID

*Julien Higny* https://orcid.org/0000-0003-4096-0412

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## SUPPORTING INFORMATION

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