Images in Cardiovascular Medicine

Pericardiocentesis From Back Under Echographic Guidance
An Approach for Posterior Pericardial Effusions

Emanuele Catena, MD; Chiara Addamiano, MD; Elisa Bertoli, MD; Stefano Maggiolini, MD; Andrea Farina, MD; Felice Achilli, MD

A 72-year-old man with degenerative aortic stenosis, coronary artery disease, hypertension, and chronic renal insufficiency presented with progressively worsening dyspnea, tachycardia, hypotension, and diuresis contraction 7 days after undergoing successful aortic valve replacement (stentless valve, 27 mm) and coronary artery revascularization. On presentation to the intensive care unit, the patient was found to have a notably bilateral pleural effusion. The blood sample revealed normal values of both troponin and creatine kinase. ECG displayed sinus rhythm with diffuse aspecific repolarization abnormalities. A transthoracic echocardiogram demonstrated normal left ventricular ejection fraction, concentric hypertrophy of the left ventricle, no valvular dysfunction, and preserved right ventricular function. A posterior-lateral echographic view showed a large left pleural effusion, a significant posterior pericardial effusion, and a prominent pericardial layer demarcating the 2 fluid-filled sacs (Figure and Movie I in the online-only Data Supplement).

Pleuropericardiocentesis was urgently performed. The landmark for needle insertion corresponded to the area where the largest amount of fluid could be detected. The patient was placed in the semireclining position to enhance fluid collections in the inferior part of the chest. After appropriate disinfection of the operative field, local anesthesia of the skin was administered with 2% lidocaine. The procedure was performed by 2 physicians, 1 who performed the echocardiogram and 1 who performed the puncture and drainage. Once placement and direction of the needle were chosen, the needle was connected to a syringe for constant gentle aspiration, and the needle tip was in the pleural space (Movie II in the online-only data supplement). A posterior-lateral echographic view showed a large left pleural effusion, a significant posterior pericardial effusion, and a prominent pericardial layer demarcating the 2 fluid-filled sacs (Figure and Movie I in the online-only Data Supplement).

The procedure was performed by 2 physicians, 1 who performed the echocardiogram and 1 who performed the puncture and drainage. Once placement and direction of the needle were chosen, the needle was connected to a syringe for constant gentle aspiration, and it was slowly introduced through the fourth intercostal space 4 cm medially to the left posterior axillary line until there was echographic visualization of the tip. When the pleural space was reached, agitated saline bubbles confirmed that the needle tip was in the pleural space (Movie II in the online-only data supplement). The needle was then advanced into the pericardial cavity under echocardiographic guidance and an emulsion of 5 mL of saline solution shaken with 1 mL of air was injected through the needle to verify the intrapericardial location (Movie III in the online-only data supplement). The syringe was then removed from the needle, and a curved guide wire was advanced into the pleurapericardial sac (Movie IV in the online-only data supplement). A multiple-hole, 30-cm-long catheter was subsequently introduced along the guide wire according to the Seldinger technique into the posterior pericardium. Serous-hemorrhagic fluid was drained from the pericardial cavity and, after retraction, serous fluid was aspirated from the left pleural cavity (a total of ~1400 mL), with consequent hemodynamic and respiratory improvement. After the procedure, chest radiography excluded the presence of pneumothorax, and the patient underwent noninvasive mechanical ventilation to restore aeration in atelectatic-consolidate lung. Apical 4-chamber echocardiographic view showed normal biventricular function. A light residual effusion was still present without extrinsic compression of the heart chambers (Movie V in the online-only Data Supplement). Pericardial fluid analysis showed no evidence of infection or malignancy. The postoperative evolution was progressively favorable and the patient could leave the intensive care unit 2 days later.

Discussion
Pericardial effusion (PE) remains an important cause of morbidity after cardiac surgery, and it can be life threatening when tamponade leads to hemodynamic compromise. Postoperative PE may have its origins in a retained mediastinal clot, in pharmacological interactions (overdosage of anticoagulants), or in systemic or local inflammatory reactions to operative trauma. Postoperative PEs are more likely to develop in elderly patients affected by renal failure undergoing cardiopulmonary bypass and are more frequent after valve surgery than after coronary artery bypass grafting or concomitant valve/coronary artery bypass grafting.1

Pericardiocentesis is a technique widely used for therapeutic evacuation of PE, especially when cardiac tamponade occurs. Postoperative PE is normally treated by surgery because of the difficulty in percutaneous drainage. This case reports the technique of a “back pericardiocentesis” performed under echographic guidance as a valid alternative to surgery in the peculiar situation characterized by the simultaneous presence of infection or malignancy.
of a large left pleural effusion. In the presence of a large left pleural effusion, pulmonary atelectasis and displacement of air-filled pulmonary tissue allows ultrasound transmission from a patient’s back to the heart through a liquid interface and needle insertion “from back” to reach the pericardial space. Posterior pericardiocentesis must be performed by qualified physicians under echographic guidance. Echography offers significant advantages: it can be rapidly performed at the bedside; it shows the location and entity of the effusions, helping to select the optimal pericardiocentesis entry site; and it allows the step-by-step guidance of the needle positioning in the pericardial and pleural cavities with immediate verification of procedural success. Without echo monitoring, complications associated with blind needle punctures may be cardiac wall perforation, hemopericardium, puncture of the coronary arteries, and liver and lung bleeding. Finally, echographic guidance for the posterior approach can help assess the left ventricular posterior wall and left atrium, localize the descending aorta, and differentiate PE from pleural effusion by clearly delineating the pleurapericardial border and by defining respiratory lung excursions.\(^2\,^3\) If localization of the needle tip results are uncertain, opacification of the punctured cavity by an echographic contrast method allows the nature of this cavity to be instantly determined.\(^4\)

**Disclosures**

None.

**References**


---

**Figure.** Posterior echographic view shows large left pleural effusion and pericardial fluid collection before pericardiocentesis. Moreover, the left ventricular posterior wall and thoracic descending aorta are visualized.
Pericardiocentesis From Back Under Echographic Guidance: An Approach for Posterior Pericardial Effusions
Emanuele Catena, Chiara Addamiano, Elisa Bertoli, Stefano Maggiolini, Andrea Farina and Felice Achilli

Circulation. 2011;124:e835-e836
doi: 10.1161/CIRCULATIONAHA.111.024786

Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 2011 American Heart Association, Inc. All rights reserved.
Print ISSN: 0009-7322. Online ISSN: 1524-4539

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://circ.ahajournals.org/content/124/24/e835

Data Supplement (unedited) at:
http://circ.ahajournals.org/content/suppl/2011/12/13/124.24.e835.DC1

Permissions: Requests for permissions to reproduce figures, tables, or portions of articles originally published in Circulation can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial Office. Once the online version of the published article for which permission is being requested is located, click Request Permissions in the middle column of the Web page under Services. Further information about this process is available in the Permissions and Rights Question and Answer document.

Reprints: Information about reprints can be found online at:
http://www.lww.com/reprints

Subscriptions: Information about subscribing to Circulation is online at:
http://circ.ahajournals.org//subscriptions/