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Anesthesiology
76:145–147, 1992

Detection of Occult Hemopericardium Using Intraoperative Transesophageal Echocardiography

MARK M. MITCHELL, M.S., M.D.*

Transesophageal echocardiography (TEE) has been shown to be useful for intraoperative evaluation and monitoring of patients who have suffered major trauma.[1,2] The following is a report of a case in which intraoperative TEE detected an otherwise occult hemopericardium.

CASE REPORT

A 35-yr-old otherwise healthy man presented with a stab wound in the left upper quadrant of the abdomen. He was alert and hemodynamically stable and had no other injuries. Supine chest x-ray showed no pneumothorax, hemothorax, or widening of the mediastinum. Transthoracic echocardiography (TTE) was not available in the trauma resuscitation area. He was brought on an emergency basis to the operating room for diagnostic peritoneal lavage and exploration of the wound. Anesthesia was induced with thiopental and the trachea intubated after administration of succinylcholine. Upon inspection of the pharynx and passage of an oral–gastric tube, no blood was found, and trauma to the stomach and esophagus was assessed as unlikely. In addition, no blood was found by peritoneal lavage, and it was decided that exploratory laparotomy was not indicated.

There was still some concern about the possibility of intrathoracic injury because of the location of the wound, but the patient remained

* Professor of Anesthesiology.

Received from the Department of Anesthesiology, University of California San Diego, San Diego, California.

Address reprint requests to Dr. Mitchell: Department of Anesthesiology, University of California San Diego Medical Center, 225 Dickinson Street, San Diego, California 92103-1990.

Key words: Heart: hemopericardium; pericardium; tamponade; trauma. Measurement techniques: Transesophageal echocardiography.

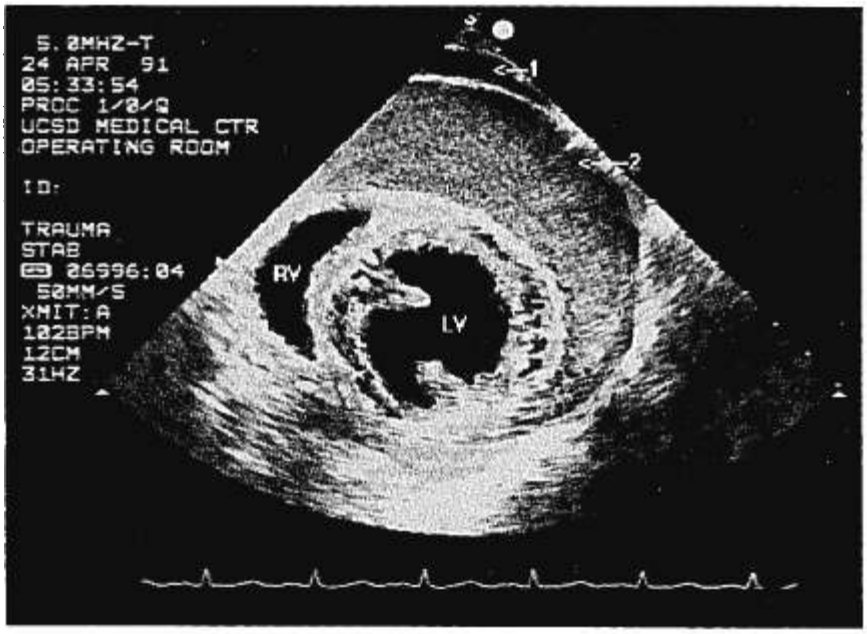

FIG. 1. Hemopericardium. A short-axis TEE view of the left ventricle (LV) and right ventricle (RV), which also shows a 150-ml hemopericardium at arrow 2 and some peritoneal fluid below the diaphragm at arrow 1.

hemodynamically stable, with a heart rate of 110 beats/min, blood pressure of 120/70 mmHg with a systolic variation of 8–12 mmHg with positive pressure ventilation, and a central venous pressure of 11–13 mmHg. The electrocardiogram showed only sinus tachycardia. If an exploratory laparotomy had been indicated, protocol would have required a transdiaphragmatic exploration of the pericardial space.[3] A subxiphoid pericardotomy was not performed because of the low expected diagnostic yield in patients with stable vital signs.[3] Plans were made to terminate the anesthetic, extubate his trachea, and return him to the intensive care unit for continued observation.

During closure of the peritoneal lavage incision a Hewlett-Packard monoplane 5.0-MHz TEE probe was placed because the location of the wound suggested the possibility of intrathoracic trauma. It was connected to a Hewlett-Packard Sonus 500L ultrasound imaging system (Hewlett-Packard, Andover, MA). A hemopericardium was seen in the transgastric short axis view, as shown in figure 1. Some fluid retained from the peritoneal lavage was also seen in the subdiaphragmatic region. Configuration and motion of the interatrial septum, interventricular septum, right atrium, and right ventricular free wall were normal and consistent with the absence of tamponade related hemodynamics. When completion of the peritoneal lavage allowed access to the precordium, the hemopericardium was confirmed by subxyphoid TTE, after which a median sternotomy was performed, and 150 ml of clotted blood was removed from the pericardium. A 10-mm-long, 1–2-mm-deep laceration of the surface of the right ventricle was oversewn.

The patient was returned to the intensive care unit. He recovered uneventfully and was discharged 4 days postoperatively.

DISCUSSION

This case suggests that intraoperative TEE can detect pericardial effusions that may be too small to cause tamponade but that might be an indication of potentially life-threatening intrapericardial trauma. Even acute pericardial accumulation of several hundred cubic centimeters may not produce clinical signs of tamponade.[3] Timely detection of hemopericardium as an indicator of intrapericardial trauma is essential in order to avoid subsequent complications such as delayed rupture of injured structures, progressive accumulation of intrapericardial fluid, and delayed onset of tamponade, or infection and abscess formation.[4]

Echocardiographic examination for suspected intrapericardial trauma not only is a sensitive detector of accumulated blood or fluid but also affords an opportunity for the assessment of ventricular filling and performance and detection of abnormal septal motion, right atrial or right ventricular free wall collapse, and reversal of diastolic blood flow in the superior vena cava indicative of significant existing or developing tamponade.[1,5] TEE examination can also detect pleural fluid accumulation indicative of pulmonary, pleural, or chest wall injury, and myocardial morphologic distortion or dysfunction indicative of cardiac or pericardiac injury.† TEE has an advantage over TTE in that it often can be accomplished intraoperatively when TTE cannot because of interference with the surgical field (as in the case that we report here); in addition, TEE image quality is usually better than is that with TTE.[6] There are as yet no reports of complications relative to the use of TEE in patients with chest and abdominal trauma.[7]

† Orihashi K, Hong YW, Chung G, Sisto D, Goldiner PL, Oka Y: New applications of two-dimensional transesophageal echocardiography in cardiac surgery. Journal of Cardiothoracic and Vascular Anesthesia 5:33–39, 1991.

Experience with this case supports the utility of TEE in the evaluation of selected patients with penetrating chest and abdominal trauma and suggests that TEE may be a sensitive detector of even hemodynamically inconsequential pericardial fluid accumulations, which in turn may be indicative of significant intrapericardial injury.

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