

CASE REPORT

# The Value of a Systematic Transesophageal Echocardiography Examination: An Isolated Finding mimicking a Pleural Effusion

<sup>1</sup>Shakeel AM Kunju, <sup>2</sup>Ivan L Rapchuk

**ABSTRACT**

An interesting case report of presumed pleural fluid collection observed during routine intraoperative transesophageal echocardiography examination is presented here. Acquisition of an isolated image without giving due consideration to the technique used in obtaining that image may be misleading and result in avoidable patient intervention.

**Keywords:** Intraperitoneal fluid, Pleural fluid, Transesophageal echocardiography.

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**INTRODUCTION**

Transesophageal echocardiography (TEE) is a widely used imaging modality in cardiac anesthesia with potential to provide information that can lead to modifications in surgical approach and patient management.<sup>1</sup> We report a case of presumed pleural fluid (PF) collection observed during routine intraoperative TEE examination. Our case demonstrates errors that can occur if proper scanning techniques are not applied. It is imperative that practitioners, who routinely use TEE, undergo a structured training program and use a structured scanning protocol for optimal use.

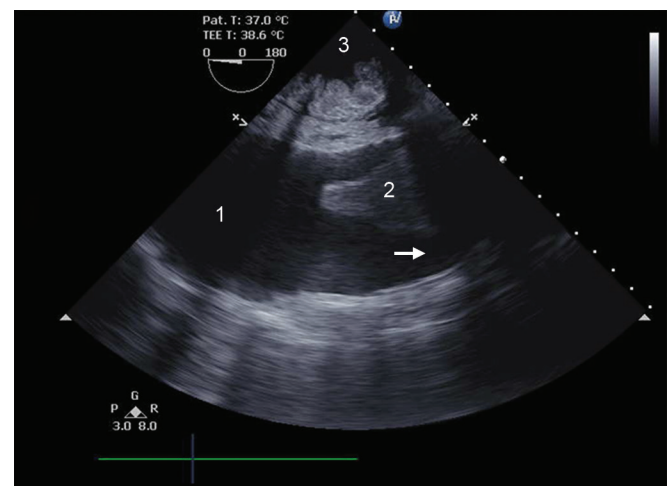
**CASE REPORT**

A 53-year-old gentleman (90 kg, 162 cm, body mass index 34 kg/m<sup>2</sup>) presented to the operating theater at a tertiary-level university hospital (The Prince Charles Hospital, Brisbane, Queensland, Australia) to undergo elective coronary artery bypass surgery (CABG) for

significant three-vessel coronary artery disease and associated moderate left ventricular dysfunction. Medical comorbidities included hypertension, type II diabetes, and end-stage renal disease for which he received regular peritoneal dialysis (PD) four times a day at home. The last session of PD was the day before the surgery.

As part of the perioperative anesthetic monitoring, a TEE was used to conduct a short focused echo examination. The intraoperative TEE images showed a suspected collection of fluid in the pleural cavity with atelectatic lung (Fig. 1 and Video 1). The classical appearance of a “Tiger’s claw” sign was also demonstrated indicating the side of lesion as right.<sup>1</sup> The finding was conveyed to the surgeon who agreed with the TEE images. Considering the patient’s comorbid conditions and the potential for postoperative respiratory dysfunction, the surgeon decided to open the right pleura and drain the PF. However, on opening the pleural space, no effusion was identified in spite of multiple attempts by the surgeon to ensure all dependent areas of pleural cavity were checked.

The TEE was then used to reidentify the previously observed collection. Reexamination with the knowledge



**Fig. 1:** Transesophageal echocardiogram showing the fluid collection (1) with suspected atelectatic lung (2). The direction of the “Tiger’s claw” sign (arrow) points toward right indicating a right-sided pleural effusion. Reexamination with additional intraoperative findings identified the fluid as intraperitoneal and (2) as spleen. (3) Gastric cavity

<sup>1</sup>Consultant, <sup>2</sup>Senior Staff Specialist

<sup>1,2</sup>Department of Anaesthesia and Perfusion Services, The Prince Charles Hospital, Brisbane, Queensland, Australia

**Corresponding Author:** Shakeel AM Kunju, Consultant Department of Anaesthesia and Perfusion Services, The Prince Charles Hospital, Brisbane, Queensland, Australia, e-mail: mail2drshak@yahoo.co.in

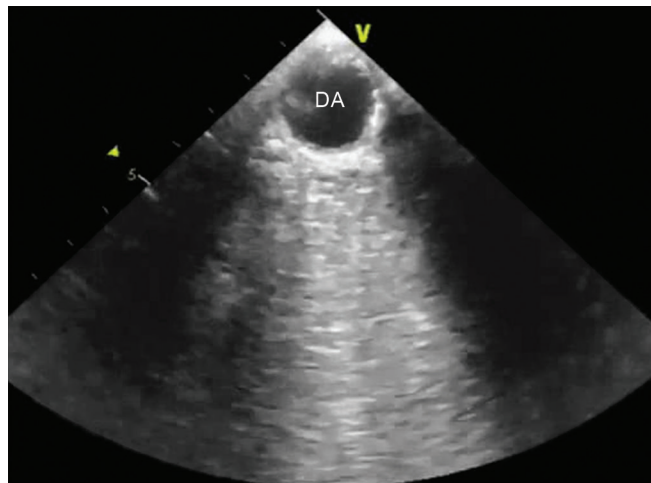
that the pleural space was empty, allowed correct recognition of the collection as subdiaphragmatic and within the peritoneal cavity. The claw sign identified was an impression caused by the spleen surrounded by fluid collected in the peritoneal cavity. Considering his history of recent PD, it was likely that fluid retained from the PD received the day before the surgery was the intraperitoneal collection seen.

## DISCUSSION

Pleural effusions have been reported in the immediate postoperative period in up to 41 to 87% of CABG patients.<sup>2</sup> These effusions are typically small, left-sided, and occur mostly due to hemorrhagic effusions resulting from internal mammary harvesting. Other contributory factors include atelectasis from diaphragmatic dysfunction and use of ice slush for hypothermia.<sup>2,3</sup> Unrecognized PF can push the lungs into the operative field and impede surgical access, compress lung parenchyma, and cause basal atelectasis resulting in impaired gas exchange and act as a potential focus for postoperative infection.<sup>1</sup> Hence, identification and removal of any pleural collection during surgery is essential to decrease perioperative complications.

The TEE is a well-established monitoring technique for patients undergoing cardiac surgery. Used primarily to provide information about cardiac function and guide surgical repair, TEE can also help to identify any PF collection.<sup>1</sup> The most commonly used level of the TEE transducer for examining the presence of bilateral PF is usually 2 to 3 cm caudal from the level of the four-chamber view and positioned just cephalad to the diaphragm.<sup>4</sup> To examine the right pleural space, the probe is rotated clockwise from the four-chamber view position. To examine the left pleural space, the probe is rotated counterclockwise to obtain the short-axis view of the descending aorta (Fig. 2). The PF appears as a crescent-shaped, echo-free space, originating in the paraaortic region and extending to the far field. This shape has been likened to a "Tiger's claw."<sup>1</sup> The direction of the "Tiger's claw" (the most distal part of the fluid in the image away from the transducer) has been shown to help identify the side of the fluid collection with the direction of the claw pointing toward the side of the chest cavity with the PF.<sup>1</sup>

Our case demonstrates one pitfall of using an improper scanning technique which can then result in misdiagnosis. Acquisition of an image with a well-described sign led the novice operator to fixate on a single finding. Fixation errors are defined as a form of disordered situation awareness in which one fails to revise one's current mental model according to the available



**Fig. 2:** Transesophageal echocardiogram of a sample patient showing an empty left pleural cavity. The apex of the image is formed by the descending aorta and the image artifacts generated by the air inside the left lung occupying the distal part of the image

information, instead distorting the latter so that it "fits."<sup>5</sup> If due consideration was given to the position of the transducer (transgastric/midesophageal level) and the direction the transducer rotation (left or right) the error could have been identified easily. This may have alerted the operator to reconfirm the findings before opening the right pleura without need. The case reiterates the importance of correlating clinical images obtained with the position and movement of the probe and its relation to other structures for optimal outcome.

## SUMMARY

Perioperative TEE is a powerful monitoring and diagnostic tool; however, misinterpretation of TEE examinations can have significant implications for the patient. With patient safety and quality of care in mind, it is imperative that physicians undergo appropriate level of training and use a systematic approach in their routine performance of examinations.<sup>6</sup> We report a case of peritoneal fluid retained after PD misinterpreted as a PF collection during TEE examination in a patient undergoing CABG surgery. Acquisition of an isolated image without giving due consideration to the technique used in obtaining that image may be misleading and result in avoidable patient intervention.

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