

# Miniaturized hemodynamic transesophageal echocardiogram (hTEE) can accurately diagnose pericardial tamponade after open-heart surgery

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## Introduction

Postoperative tamponade after cardiac surgery can be difficult to diagnose using conventional cardiac monitoring parameters, and its diagnosis is critical because negative exploration is not always benign and requires substantial resources. In this population, transesophageal echocardiography (TEE) is the gold standard for diagnosis, but it is not always available due to limited resources and transthoracic echocardiography is not always diagnostic due to body habitus and surgical effects. ImaCor has developed a 5.5 mm disposable hemodynamic transesophageal echocardiography (hTEE) probe as a point of care device to be inserted at bedside in the intensive care unit. We hypothesized the hTEE might provide appropriate information of cardiac tamponade.

## Methods

From May 2011 to July 2013, 129 patients (305 studies) underwent IRB approved ImaCor hTEE imaging. Among these studies, 26 of them were performed to rule out post-open heart surgery cardiac tamponade for clinical suspicion of tamponade. The hTEE images were reviewed retrospectively and the patient outcomes were analyzed.

## Results

Out of the 26 hTEE studies, 13 studies showed

no evidence of tamponade and did not require re-exploration. Twelve studies were positive for pericardial tamponade and 8 of these cases went emergently to the operating room for evacuation of the hematoma. Of the 4 studies which did not require re-operation, one study was positive for a large pericardial effusion, which was successfully drained by manipulation of the chest tubes, confirmatory study was negative. One patient with tamponade by hTEE was not initially explored due to coagulopathy. However, several hours later, a repeat hTEE redemonstrated tamponade, and the patient was sent back to the operating room for positive exploration. One patient was diagnosed with a small hematoma, which was later confirmed by a formal TEE to have no tamponade physiology. Another patient showing a small hematoma in hTEE was stabilized medically without surgical exploration.

## Conclusions

This disposable hTEE probe allowed us to predict pericardial tamponade with 100% accuracy and is a valuable tool in hemodynamic management in the intensive care unit. Since hTEE can be available in the intensive care unit 24/7 and performed by intensivists, it allows rapid evaluations and reduces resource utilization.

Number of studies	26
Number of patients	21
Mean age +/- standard deviation	61 +/- 14.5 years
Sex	Male = 17 Female = 4
Primary surgery	Coronary bypass / valve = 9 Heart transplant = 3 Type A dissection = 6 Ventricular assist device = 2 Others = 1
Trigger event	Hemodynamic instability, shock = 23 Unexplainable high chest tube drainage = 3
Tamponade diagnosed by hTEE	Positive = 12 (8 patients went to surgery) Negative = 13 (all patients did not require surgery) Confirmatory = 1