

# De-escalation Of Therapy Following Cardiac Surgery Using Hemodynamic Assessment With Transesophageal Echocardiography (hTEE)\*

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## INTRODUCTION

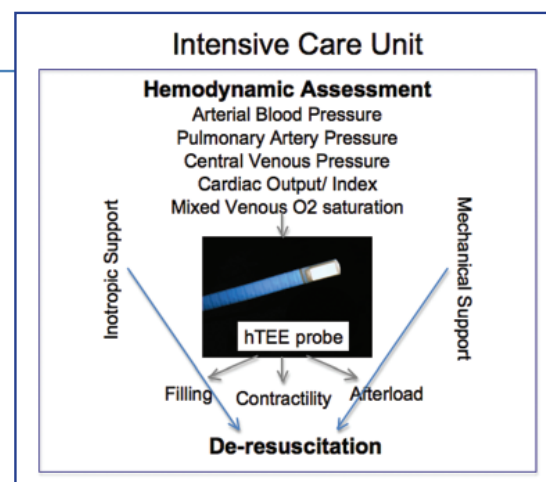
Following cardiac surgery, many patients rely on pharmacological or mechanical support for hemodynamic stability. These therapeutic modalities can have significant complications and titration can be difficult, as hemodynamic parameters of pressure, volume and flow may not follow normal physiological relationships, particularly in the immediate postoperative period. TEE can overcome some of these issues by directly visualizing cardiac size and function. Monitoring the cardiac response to therapeutic manipulations and correlating it with traditional hemodynamic parameters may provide a more complete and accurate assessment of patients' hemodynamics. We describe here TEE-guided hemodynamic assessment (hTEE) with a miniaturized probe (ImaCor ClariTEE probe, Garden City, NY) to de-escalate therapy in two patients in whom postoperative resuscitation strategies could have been deleterious.

## PURPOSE

The purpose of this study was to determine the utility of TEE-guided hemodynamic assessment (hTEE) in the post-cardiovascular surgical patient. Specifically, a miniaturized TEE probe (ImaCor ClariTEE probe) was intermittently used over several hours in two patients in whom inotropic and/ or mechanical post-operative support had deleterious effects.

## METHODS

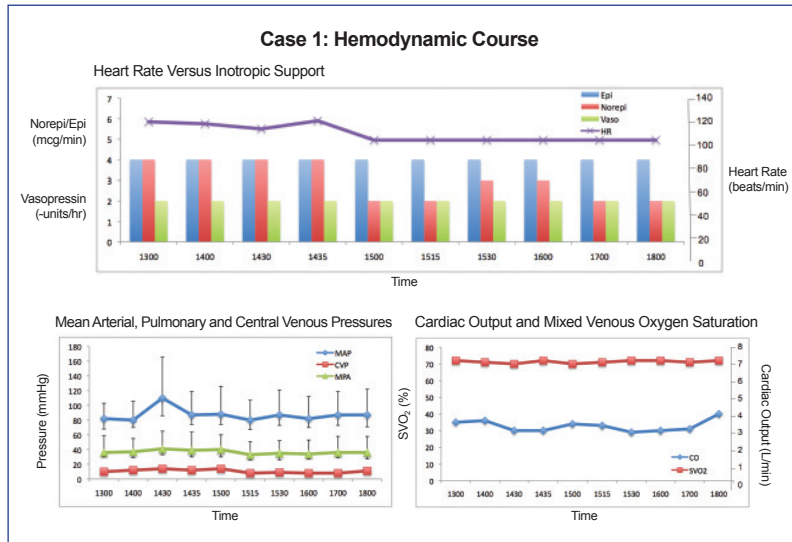
Retrospective chart review of two patients following cardiac surgery who had an ImaCor transesophageal echocardiography probe placed to guide hemodynamic management over the time period indicated. Both patients presented here were within 48 hours of surgery. Intensive care unit management included invasive arterial and pulmonary pressure monitoring as well as continuous cardiac output determination.



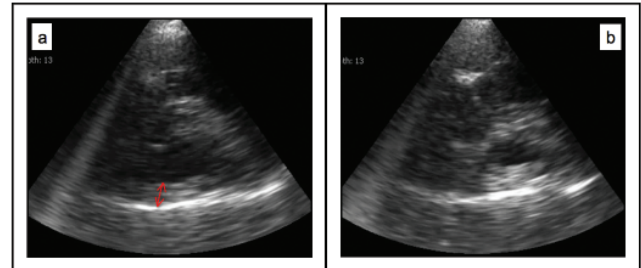
\*Reprinted from poster presented at SCCM Feb 2012

## CASE 1

A 73 yo male presented for a redo-TAAA repair. The patient had baseline moderate LVH with an EF of 55%. Postoperatively, the patient was admitted to the ICU with a spinal drain on combination high dose inotropes to maintain spinal perfusion, tachycardic with a high CVP. Using hTEE, we were able to accurately augment preload, weaning inotropic support and direct therapy to decreasing heart rate, increasing filling time and forward flow. Importantly all of these manipulations were minimally reflected in the CVP, given his requirement for higher filling pressures in a setting of ventricular hypertrophy.



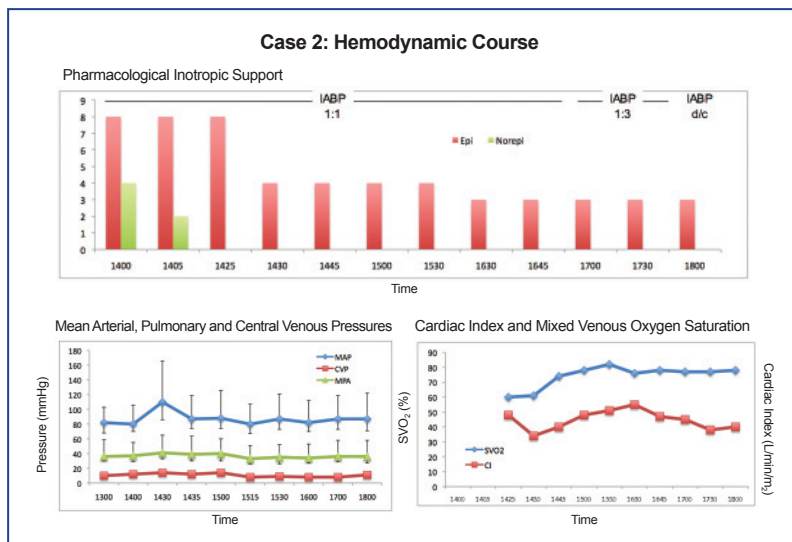
Mid-esophageal four chamber (long-axis) view during diastole<sup>a</sup> and systole<sup>b</sup>



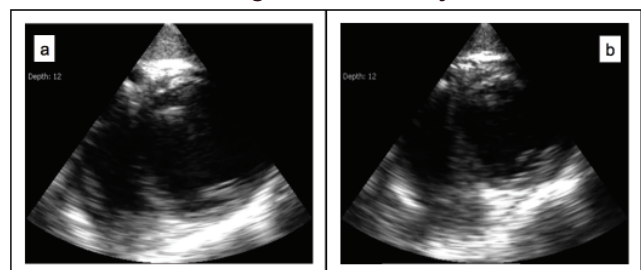
Hemodynamic assessment with hTEE. Ventricular systolic and end-diastolic cavity size and contractility were used as primary endpoints for determination of preload augmentation and weaning of inotropic support. Systole and diastole are estimated here based on chamber size for illustration. Right ventricular hypertrophy can be appreciated (red arrow). View depth 13cm.

## CASE 2

A 21 yo male with ICM (EF 15%) admitted following LVAD removal. The patient presented to the ICU with an right femoral IABP on high levels of inotropic support. Subsequently, pulses became diminished in his leg distal to the IABP, and there was a concern for limb ischemia, both secondary to the IABP and the vasoconstrictive properties of high dose epinephrine. Direct visualization of cardiac function allowed us to rapidly wean mechanical as well as pharmacological support.



Trans-gastric short-axis view at the mid-papillary level during diastole<sup>a</sup> and systole<sup>b</sup>



Hemodynamic assessment with hTEE. Systole and diastole are estimated here based on chamber size for illustration of ejection fraction. Given the low EF, right ventricular end-diastolic cavity size and contractility were used as primary endpoints for determination of weaning of inotropic and mechanical support.

## CONCLUSIONS

These two patients demonstrate how direct cardiac visualization over time with hemodynamic assessment guided by TEE can allow for confident, rapid and accurate de-escalation of therapy in the ICU in whom more aggressive pharmacologic or mechanical support is deleterious.