

TEE Monitoring with a Miniaturized Disposable Probe Influences Post-Operative Management of Cardiac Surgery patients

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INTRODUCTION

- Post-operative management following cardiac surgery poses many challenges, including decisions about both re-operation and fluid management. Re-operation due to bleeding, a common complication, has been shown to increase morbidity, ventilation time, and mortality (14.2% vs 3.4%, $p = 0.001$); however, one should operate quickly when needed [1]. Goal-directed transesophageal echocardiography (TEE) by intensivists using a pediatric monoplane probe has been shown safe and effective [2], and urgent TEE in “patients with unexplained hemodynamic instability after cardiac surgery” led to medical management changes in 43.3% of patients; surgical intervention in 15.3% [3].

HYPOTHESIS

- The acknowledged limitations of the pulmonary artery catheter and other indirect methods in comparison to the known benefits of direct assessment by TEE, prompted us to explore the value of moving TEE out of the operating room, and expanding its use to recurrent and frequent real time clinical assessment. We used a miniaturized disposable monoplane TEE probe (ImaCor ClariTEE). The ImaCor probe is a 5.5 mm detachable probe, cleared by the FDA to remain indwelling for up to 72 hours. The small size of this probe allows it remain in place for reattachment of the removable handle and reassessment of the patient’s hemodynamic progress and the effect of selected interventions at any time.

METHODS

- Retrospective quality improvement review of 17 cardiac surgery patients.

RESULTS

- Fluid and vasopressor management was adjusted in 8 of 17 patients (47%) based on echo data. Re-operation was avoided in two patients (12%). In one patient (see Fig. 1 below), the CVICU team and cardiac surgeon decided to monitor pericardial effusion and filling status rather than returning to the operating room for re-exploration. Over the next ten hours episodic assessment demonstrated continued resolution of pericardial fluid collection with increased LVEDA and improved hemodynamics. Multiple imaging sessions were performed in monitoring 53% of patients. In the case of one LVAD patient, multiple assessments were performed over 24 hours to optimize pulse index by adjusting LVAD flow rate.

CONCLUSION

- Episodic TEE monitoring using a miniaturized disposable probe leads to significant changes in patient management (frequency similar to the meta-analysis of Hüttemann [4]; see also [5]), including both changes in fluid management and avoided re-operations. Thus TEE monitoring can be expected to reduce both mortality and cost. Further study is planned.

1. Ranucci, M et al, Ann Thorac Surg 2008; 86: 1557.
2. Benjamin E et al, J Cardiothoracic Vasc Anesth, 1998; 112: 10.
3. Wake, PJ et al, Canad J Anaesth 2001; 48: 778.
4. Hüttemann E, Minerva Anesthesiol 2006; 72: 891.
5. Porembka DT, Crit Care Med 2007; 35: S414.

FIGURES

- Figure 1. TEE monitoring of pericardial effusion over 16 hours in a patient with postoperative hemodynamic instability.

