

Transoesophageal echocardiography in cardiac surgery: nearing the limit?

Transoesophageal echocardiography was first described as a novel tool to assess cardiac flows (Side and Gosling, 1971), and has evolved into an important adjunct to cardiac surgery. It is used as a diagnostic aid and as a monitor to guide patient management. Although undoubtedly important in selected cardiac surgical cases, its use can rarely cause serious morbidity and mortality. The American Society of Anesthesiologists and Society of Cardiovascular Anesthesiologists Task Force on Transoesophageal Echocardiography (2010) recommends use of perioperative transoesophageal echocardiography in all open heart surgery cases, and consideration during coronary bypass. However, with the demographic of cardiac patients changing to a more elderly and frail population (Nicolini et al, 2014), the risks associated with transoesophageal echocardiography in some cases may be unacceptable. To guide decision making and consent, the context in which transoesophageal echocardiography is used and the harm which can inadvertently ensue must be understood.

Case for transoesophageal echocardiography

Various aspects of transoesophageal echocardiography lend themselves to perioperative use. The probe is internal so does not affect the operative field. Ultrasound waves are transmitted through blood rather than air, which also allows a more detailed cardiac assessment than the transthoracic approach.

During valve surgery, transoesophageal echocardiography can confirm the underlying pathology and also assess valve

function following repair or replacement. Complications such as paravalvular leaks and adverse repaired leaflet motions can also be swiftly diagnosed and dealt with intraoperatively. Since valve surgery involves opening certain cardiac chambers, transoesophageal echocardiography can protect patients against air emboli by confirming adequate de-airing before cross clamp release and aortic root vent removal.

Transoesophageal echocardiography can also guide haemodynamic management as fluid responsiveness and biventricular function can be assessed once off bypass.

Outside the heart, both pleural and pericardial effusions can easily be diagnosed and managed intraoperatively. Transoesophageal echocardiography can also assess aortic pathology and guide placement of balloon pumps and femoral bypass cannulae.

Case against transoesophageal echocardiography

Direct physical harm to patients can occur during probe insertion and oesophageal manipulation and from the heat generated at the tip. The most feared complication is oesophageal perforation and if diagnosis is delayed by 48 hours, the mortality rate reaches 40–60% (Kaman et al, 2010).

Although the risk of major injury from transoesophageal echocardiography appears low (0.03%) (Min et al, 2005), the data series is not contemporary and perhaps overlooks the growing high risk patient population (elderly) currently presenting for surgery. The surgical landscape has also shifted with many patients previously deemed too frail for sternotomy now being offered less invasive transvalvular procedures, which require occasional transoesophageal echocardiography support.

Understanding the surgical approach may obviate the need and therefore risk of transoesophageal echocardiography. For instance, during operations where the cardiac chambers are not opened (isolated coronary artery bypass grafting), it is not necessary to assess for de-airing. Fluid status and cardiac

function can be monitored perioperatively by alternative and less invasive methods.

Conclusions

Transoesophageal echocardiography will always be an important adjunct to cardiac surgery, and in certain cases it is essential. However, the decision to use transoesophageal echocardiography should not be taken lightly as the most serious complication (oesophageal perforation) carries a significant mortality risk. With the advent of three-dimensional imaging and modified basic views, the echo burden, probe manipulation and potential for doing harm is likely to increase. To help future decision making and consent the results of the ongoing national transoesophageal echocardiography complication audit by the Association of Cardiothoracic Anaesthetists are eagerly awaited. **BJHM**

American Society of Anesthesiologists and Society of Cardiovascular Anesthesiologists Task Force on Transoesophageal Echocardiography (2010) Practice guidelines for perioperative transoesophageal echocardiography. An updated report by the American Society of Anesthesiologists and the Society of Cardiovascular Anesthesiologists Task Force on Transoesophageal Echocardiography. *Anesthesiology* **112**(5): 1084–1096. <https://doi.org/10.1097/ALN.0b013e3181c51e90>

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