Intraoperative transesophageal echocardiography (TEE) has found a valuable role as a cardiovascular diagnostic tool, and it has literally transformed the practice of cardiac anesthesiology. As a method to assess left atrial thrombus, identify vegetations indicative of infective endocarditis, diagnose aortic dissection in unstable patients, and myriad other applications, it has firmly found its place as a minimally invasive assessment technology. Anesthesiologists, particularly cardiac anesthesiologists and intensive care physicians, have become skilled and highly qualified perioperative transesophageal echocardiographers, applying their skills in the care of cardiac surgical patients.

But TEE is NOT the New PAC.

TEE complements pulmonary artery catheter (PAC) monitoring during cardiac surgery and arguably, could replace PAC monitoring in many patients for intraoperative monitoring. But at best, TEE is an intermittent diagnostic tool rather than a continual monitoring technique. Continual TEE monitoring in the intensive care unit (ICU) for 24 hours or longer, predominantly to assess a single transgastric short axis view of the left ventricle, has found little enthusiasm and is not widely practiced.¹

In the mid 1990’s PAC monitoring in the ICU came under renewed attack. A highly publicized prospective cohort trial published in JAMA concluded that critically ill medical and surgical patients monitored with PACs incurred greater hospital costs, had longer hospital stays, and most notably, had a 24% greater 30-day mortality.² Over the next number of years, randomized controlled trials refuted the suggestion that PAC monitoring had an adverse effect on major outcomes, but generally supported the conclusion that mortality was not improved by PAC monitoring in patients with heart
failure,\textsuperscript{3} acute lung injury,\textsuperscript{4} or high risk surgical and critically ill patients.\textsuperscript{5,6} Meta-analyses supported the general lack of benefit for PAC monitoring in ICU patients.\textsuperscript{7,8}

As a result, PAC monitoring of critically ill patients has seen a considerable decline over the past 20 years.\textsuperscript{9-11} However, these practice patterns have varied considerably across units, with a persistently higher use of PAC catheters in surgical units as compared to medical ICUs.\textsuperscript{10} And as it pertains to monitoring of cardiac surgical patients, PACs remain the most common hemodynamic monitoring technique.\textsuperscript{12} And there may be good reasons for current practice.

In general, most of the randomized trials have excluded or failed to recruit the highest risk patients. For example, a registry of patients with heart failure who were eligible but not enrolled in a randomized trial of PAC monitoring were determined to be sicker than the enrolled cohort and not surprisingly, had a much higher mortality than patients in the study. The authors noted, “the perceived need for hemodynamic measurement itself identified a high risk population.”\textsuperscript{13} Other published studies have also generally excluded the highest risk cardiac surgical patients, including those requiring mechanical cardiac support.\textsuperscript{14,15}

Despite the more than 40-year journey with PAC monitoring in the ICU and cardiac surgery, we are still refining the role for this technique. TEE monitoring developed with well-structured goals for competency and certification, with the advent of the National Board of Echocardiography in 1996. PAC monitoring never benefitted from such standards, and questionable competence in the use of this technique has plagued its more successful application for decades.\textsuperscript{16} Just as in the case of intraoperative TEE monitoring, perioperative use of the PAC requires the requisite knowledge, training, and experience to bring its diagnostic value to fruition.\textsuperscript{17}

For the perioperative care of the most high risk cardiac surgical patients, PACs remains both indicated and without rival as a continual monitoring technique.\textsuperscript{18}

References


