

ECHOCARDIOGRAPHY AND ANAESTHESIOLOGY — SUCCESS AND CHALLENGES

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Intraoperative echocardiography (IOE) has become integral to the care of many cardiac surgical patients. Most anesthesiologists do not receive formal training in echocardiography during residency but acquire the knowledge and skill necessary to apply IOE through personal initiative. The assimilation of such a complex technology into the practice of cardiac anesthesiology is a noteworthy success for the subspecialty and a testimonial to the hard work of many of its practitioners. Intraoperative echocardiography is widely used because it is perceived to provide information that significantly influences clinical management and improves patient outcome. Although there is limited scientific evidence to substantiate such perception, several recent case series have documented the usefulness of IOE in adult and pediatric cardiac surgery. While none of these reports would withstand rigorous scientific scrutiny, they confirm the clinical opinion that IOE provides new information about cardiac pathology in a significant number of patients and that the new information results in frequent management changes. Most physicians who care for cardiac surgical patients believe these benefits to be real and have adopted the technique in their clinical practice. An additional factor in favor of IOE is that its risks are low¹. Why anesthesiologists? The most obvious explanation is that the anesthesiologists are readily available in the operating room, whereas it is a significant inconvenience for many cardiologists to be called at a moment's notice into an unfamiliar environment. However, physical presence alone does not explain the dominant role of anesthesiologists. Intraoperative echocardiography requires immediate and definitive interpretation, with little room for error. It is certain that repeated misinterpretations by anesthesiologists would be challenged. Therefore, most cardiac anesthesiologists must have either acquired sufficient skill to consistently provide correct interpretations independently, have developed support systems that are adequate to assist them when in doubt, or both². In the American Society of Anesthesiologists Practice Guidelines for Perioperative Transesophageal

Echocardiography, the ability to communicate the results of a transesophageal echocardiographic examination to the patient and to other healthcare professionals and to summarize these results in the medical record was listed as an essential basic skill. The reason for considering such a skill essential is obvious. Because the IOE information is used to influence patient management, it belongs in the patient's permanent medical record. The patient and other healthcare professionals should be able to access it readily for future reference. The failure to report IOE results significantly diminishes the credibility of anesthesiologists as echocardiographers³. ASA task force is currently developing training guidelines for IOE. The guidelines will recommend specific training components and duration of training for two levels of training: basic and advanced. The task force's guiding principles are that residents in anesthesiology should be able to meet the training requirements for basic perioperative transesophageal echocardiography before completion of the Clinical Anesthesia-third year (CA-3), whereas the requirements for advanced training should be achievable during a year of fellowship in cardiothoracic anesthesiology. Physicians already in practice would be advised to acquire equivalent / supervised experience in their own practice environment⁴. Advances in technology have promoted the widespread application of echocardiography. Today, echocardiographic images have become crystal clear, and intracardiac flows can be measured with great accuracy. Real-time automated border detection and tissue Doppler imaging impart new insight into systolic and diastolic function and the temporal components of myocardial ischemia. Even more astonishing technical developments are just around the corner. Real-time four-dimensional echocardiography is almost ready for clinical trials. In this amazing technique, high-resolution three-dimensional images of cardiac structures can be viewed from any angle or through any cross-section over time (fourth dimension). For example, three-dimensional images of a mitral valve can be rotated to visualize either its atrial or ventricular surface, and

details of interest can be examined in any cross-section, all in real time. This is truly revolutionary. One technical novelty is especially noteworthy because it may markedly influence the practice of anesthesiology and peri-operative medicine⁵. During the past year, handheld echocardiography devices have become available. They usually weigh less than 3 kg and cost less than \$20,000. Their capabilities are still somewhat limited but have been found adequate in preliminary reports. These handheld devices will extend the role of echocardiography well beyond the echocardiography laboratory or cardiac operating room into many areas of peri-operative care, such as preoperative evaluation for non-cardiac surgery, and postoperative management. Their introduction into peri-operative care will require huge efforts in training and assimilation, but the practice of peri-operative medicine will be inconceivable without their use. In the near future, anesthesiologists will need to become as comfortable with the handheld echoscanner as they are with the stethoscope. This is a significant challenge, but if history is a guide, it is a challenge that anesthesiology can face with confidence.

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