

Intraoperative TEE and the Role of the Anesthesiologist

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TEE is a very valuable clinical tool for the anesthesiologist. It can provide many pieces of information that cannot be obtained by any other modality in the operating room. Though this information is easily obtained with TEE, it takes a very skilled interpreter to correctly obtain and analyze the TEE images. This talk will discuss the role of the Anesthesiologist in intraoperative TEE.

TEE was initially used for ventricular function monitoring, but it was soon recognized that TEE was useful in the detection of venous air embolism, intracardiac thrombi, myocardial ischemia, valvular dysfunction, aortic dissection, and intracardiac defects. More than just providing on-line anatomical information, TEE was providing unique physiologic information that helped to shape new physiologic constructs used by many cardiovascular anesthesiologists.

TEE has helped to elucidate the effects of myocardial ischemia and to understand the benefits and limitations of the various methods to detect myocardial ischemia. Dr. John Smith's paper clearly demonstrated the potential for TEE to detect abnormalities in wall motion, an early marker of ischemia,ⁱ and van Daele's study demonstrated the comparative weakness of PCWP monitoring for ischemia.ⁱⁱ

Before TEE, in the evaluation of ventricular filling, intraoperative management was limited to the use of indirect clinical signs, or, with invasive monitors, an end-diastolic pressure could be obtained. TEE provided much greater insight into the entire period of diastole. It is now understood that ventricular volume is a much better predictor of ventricular ejection than end-diastolic pressure. Furthermore with the use of Doppler transmitral valve flow patterns, it has been shown that diastole is a complex process that involves several important phases and the relative importance to filling of these phases has been elucidated.ⁱⁱⁱ

Assessment of the mitral valve is one of the most important applications of intraoperative TEE. This assessment is frequently performed intraoperatively because of incomplete pre-operative evaluation, the dynamic nature of mitral valve disease, and the additional information provided by transesophageal echocardiography. For example, in the evaluation of mitral regurgitation, there are several important clinical questions that need to be answered. First, how severe is the regurgitation, and is it responsible for the patient's symptoms? Second, what is the etiology of the regurgitation? For example is the etiology ischemia, and revascularization will cure it? Or is there a structural abnormality such as a flail or prolapsing leaflet? This mechanistic approach has helped to guide the medical and surgical management of the patient. Additionally, the ability to provide this information on-line in the operating room has enabled the surgeons to confidently undertake repair of the mitral valve. Consequently the complexity of the repairs and the number of mitral valves being repaired today has significantly increased.

Reducing the incidence of postoperative neurologic dysfunction is an important goal. Prior to the development of intraoperative echocardiography, little attention was paid to role of embolism of aortic atherosclerotic plaque. Additionally, the only method to detect aortic atherosclerotic plaque was the highly insensitive technique of surgical palpation. The combination of TEE and direct epiaortic echocardiography have provided simple rapid means to detect aortic plaque and are now being used to develop treatment strategies that may reduce the incidence of postoperative neurologic dysfunction.^{iv,v}

Not only has TEE helped to create new physiologic constructs and surgical plans, though more research is necessary, it appears that TEE may play a key role in outcome.^{vi,vii} The combination of altering surgical plan and outcome makes intraoperative echocardiography a tremendously rewarding endeavor. These rewards include enhanced stature in the operating room and representation of our specialty on the program at numerous multidisciplinary meetings such as the American Heart Association, the American College of Cardiology and the American Society of Echocardiography. At the same time intraoperative echocardiography places new burdens on the anesthesiologist. There is a vast array of material that must be mastered and the anesthesiologist must learn to act and think like a diagnostic imager. To help anesthesiologists adapt to these demands, the ASA and SCA sponsored the development of practice parameters in TEE,^{viii} and the SCA joined with the American Society of Echocardiography to develop a perioperative TEE certification examination.

In conclusion, TEE provides very valuable information for the anesthesiologist and the surgeon. The use of TEE by the anesthesiologist increases the responsibilities, but also provides many rewards including academic opportunity and enhanced professional status. Something new.

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