TEE Safety

Jack Shanewise, MD
Director, Division of Cardiothoracic Anesthesiology
Columbia University College of Physicians & Surgeons, New York, NY

Anesthesiologists need to be aware of the potential complications of TEE and their prevention. An excellent review of this topic was published in 2010. Most complications due to TEE are minor and related to trauma to the oropharynx during probe insertion, but more serious problems such as pharyngeal perforation, esophageal perforation and GI bleeding do on rare occasions occur. A complication of TEE unique to the OR is laryngeal injury with vocal cord dysfunction in patients having TEE monitoring during sitting craniotomy with prolonged periods of extreme neck flexion. TEE probe placement and manipulation can compress the bronchi or cause displacement of the endotracheal tube, especially in small children. Buckling of the tip of the TEE probe back on itself in the esophagus can occur and may make removal of the probe difficult and hazardous. Although esophageal burns due to transducer heat formation are theoretically possible, this complication has not been reported, and most TEE systems automatically shut down when the probe temperature exceeds a safe level. On a different note, TEE monitoring may distract the anesthesiologist from more acute and important changes in vital signs. Also, without proper training and knowledge, TEE monitoring may result in erroneous echo interpretation leading to inappropriate management decisions. Although rare, fatal complications from TEE can occur. As with all medical procedures, a balance of risk versus benefit must be made before proceeding with a TEE examination. I believe it is very important to inform the patient that a TEE will be performed during surgery and your assessment of the risks and benefits AND to document that interaction in the medical record prior to proceeding, as complications can occur, even in patients without risk factors and TEEs that are properly performed.

The two cornerstones for prevention of TEE complications are 1) preprocedure assessment for esophageal disease and 2) careful and gentle probe insertion and manipulation. When possible, all patients should be asked about esophageal symptoms and diseases prior to insertion of the TEE probe. Three questions to ask are: 1) Have you ever had any trouble with your esophagus? 2) Do you have any difficulty with swallowing your food? 3) Have you ever vomited any blood? If the patient answers no to these three questions, it is safe to proceed. In situations where the patient cannot be interviewed directly, a family member should be questioned, or at the very least, the medical record reviewed for esophageal problems. I believe that the following factors may increase the risk of intraoperative TEE: advanced age, small stature, previous esophageal or gastric surgery, previous mediastinal radiation, esophageal diverticuli, esophageal tumors, esophageal strictures. If these are present, I proceed with caution (i.e. minimize probe manipulation) or forego the TEE altogether. In cases where TEE may provide important information, but a history of esophageal disease is present, a preprocedure gastroenterologic evaluation with fiberoptic esophagoscopy is an option to keep in mind.
I routinely insert an orogastic tube and empty the stomach before attempting to insert the TEE probe. The mouth should be inspected prior to probe insertion looking for loose teeth and pre-existing injuries. It is better to have the neck neutral or flexed forward rather than extended back. Anterior displacement of the mandible to lift the glottis off the posterior pharynx is the most important part of inserting a TEE probe in an intubated patient. This can be done with a jaw thrust, grasping the mandible with the thumb through the mouth, or with a laryoscope. The probe is inserted through the mouth into the hypopharynx in the midline. Excessive force should NEVER be used to pass an apparent obstruction to probe advancement. The probe should not be locked into a flexed position for prolonged periods and never advanced or withdrawn when the wheel locks are engaged. Patients with gastric pathology may be safely examined with TEE by simply not advancing the probe beyond the esophagus avoiding the potential problems in the stomach. After the probe is inserted, the lips and tongue should be checked to be sure they are not being crushed between the TEE probe and the endotracheal tube.

Trauma to the oropharynx may be seen directly or manifest with bleeding from the mouth. GI hemorrhage may be occult and present with hypovolemic shock and/or unexplained anemia. Insertion of a gastric tube should confirm the diagnosis. Perforation of the esophagus may be apparent to the surgeons as it occurs by direct visualization, but may be occult and present with sepsis or with severe chest pain in the conscious patient. The diagnosis of perforation of the esophagus after heart surgery is often delayed, increasing the likelihood of a poor outcome.

Bleeding from the mouth after TEE should prompt a careful direct inspection of the mouth and pharynx in order to identify the location and extent of the injury. Minor trauma to the oropharynx usually requires no specific treatment, but antibiotics may be indicated in more extensive injuries. Significant, persistent GI bleeding after TEE should be evaluated with endoscopy, which may not only provide the diagnosis, but offer treatment, such as electrocautery or clipping of a bleeding vessel. Perforation of the esophagus, if suspected, may be diagnosed by fluoroscopy with water soluble contrast swallow, and if present, is usually treated as a surgical emergency. Pharyngeal perforation may be diagnosed by direct inspection and if significant, warrant emergency ENT consultation for surgical drainage. Airway problems always take precedence over TEE monitoring and should prompt immediate removal of the probe when they occur.