

Adult Comprehensive Transesophageal Echocardiography (TEE) Protocol

Content Applies To: All Mayo Clinic Echocardiography Laboratories

Scope

This protocol is to be used as a guideline for Echo Lab Staff performing TEE procedures in all Mayo Clinic Echocardiography Laboratories.

Purpose

This protocol is intended to provide the minimum standard for a complete transesophageal echocardiogram.

Protocol

Indications	<p>Routine transesophageal echocardiography (inpatient or outpatient)</p> <ul style="list-style-type: none">• Inadequate transthoracic echo• Source of embolism• Hypoxia• Valve assessment, native and mechanical• Congenital abnormality (including shunt assessment in adults)• Assessment for cardiac mass/thrombus• Assessment of ventricular systolic and/or diastolic function• Aortic disease or dissection• Pre-cardioversion• Pre and Post radiofrequency ablation or other electrophysiologic study• Echocardiographic guidance of cardiac interventional procedures• Evaluation of cardiac devices (VADs) <p>In some instances “limited” TEEs are performed (i.e., in the intraoperative or interventional settings with time constraints or when a follow up examination is performed to evaluate specific pathology)</p>
Medications	<ul style="list-style-type: none">• Topical anesthetic<ul style="list-style-type: none">• 1 inch 5% lidocaine paste, 4% lidocaine hydrochloride topical solution and/or viscous lidocaine (2%) gargle• Benzocaine or other anesthetic spray• Oxygen via nasal cannula• IV Fentanyl®; usual dose 25-100 mcg• Versed® (midazolam); usual dose 2-10 mg• If desired, Robinul® (glycopyrrolate); usual dose 0.2 mg• If needed, Romazicon® (flumazenil); usual dose 0.2 mg• If needed, Narcan® (naloxone HCL); usual dose 0.4 – 2 mg• Occasionally general anesthesia with Propofol is used under supervision of an anesthesiologist

	<ul style="list-style-type: none"> • Methylene Blue 1% solution 1 mg/kg IV once over 5 minutes for treatment of methemoglobinemia. • Intraoperative transesophageal echocardiograms are routinely performed after induction of general anesthesia, which is managed by the anesthesia team.
Pre-Procedure	<ul style="list-style-type: none"> • Pre-procedure assessment must be performed according to the Mayo Clinic Adult Moderate Sedation Procedure. • Venous access should be obtained prior to intravenous (IV) sedation and maintained during sedation until discharge criteria are met. • Topical anesthesia of the oral pharynx may be administered by giving lidocaine paste or topical solution, viscous lidocaine gargle, or anesthetic spray. • A final verification process must be completed prior to the start of the procedure. Verify the patient's identity using 2 identifiers.
Intra-Procedure	<ul style="list-style-type: none"> • An airway assessment must be performed prior to administration of initial sedation medications and documented in the medical record. • Immediate pre-sedation reassessment must be completed within 10 minutes preceding administration of initial sedation medications. This should include: <ul style="list-style-type: none"> • Measurement of blood pressure • Heart rate • Oxygen saturation • ECG monitoring • CO2 monitoring when available or with deep sedation • Refer to Mayo Clinic Moderate Sedation Drugs and Dosing for medication dosages and rates of administration. General principles which apply to all medication administration: <ul style="list-style-type: none"> • Give medication in small incremental doses to desired effect. • Assess therapeutic effect before determining the next incremental dose and observe patient for: <ul style="list-style-type: none"> • A decrease in oxygen saturation via pulse oximetry • Ability to ventilate and maintain a patent airway • An appropriate response to physical stimulation and/or verbal command • The patient must be continually monitored by direct observation and by indirect physiologic measurements. <ul style="list-style-type: none"> • Oxygen saturation should be monitored by continuous pulse oximetry. • Heart rate, respiratory rate, and blood pressure should be monitored and documented at 5 min intervals during procedure. • Airway patency and ventilatory status should be continually assessed by verifying air movement with breathing. • Continuous ECG monitoring should be used on all patients who are receiving moderate or deep sedation. Document

	<p>initial heart rhythm and any significant changes.</p> <ul style="list-style-type: none"> • Level of consciousness (RASS) and pain assessment should be monitored as appropriate for sedation medication administration and/or procedure. Minimum documentation of every 15-20 minutes. • Supplemental oxygen should be used for patients undergoing moderate and deep sedation unless medically contraindicated, or if it would place the patient at risk of fire when electrocautery or other ignition sources are used • The esophageal probe is lubricated. • Esophageal intubation is performed. • Images are obtained as listed below.
Standard Views/Guidelines	<p>The images do not need to be obtained in the order listed below. The examination should be performed in a methodical fashion although the order of imaging plane acquisitions and Doppler may vary so as to answer the question at hand in an expeditious fashion.</p> <p>It is also recognized that imaging characteristics of individual patients may preclude certain views and measurements.</p> <p>If 3D echocardiography or an echo enhancement agent is indicated, appropriate documentation must be included in the report.</p> <p>If any required view or Doppler signal cannot be adequately obtained, it should be recorded and labeled in order to demonstrate that it was attempted.</p> <p>A limited, goal-directed study may be performed at the discretion of the referring physician or the physician performing the procedure, particularly if the patient has had a recent TTE or TEE.</p> <p>The standard views obtained (in any order) include:</p> <ul style="list-style-type: none"> • Gastric short axis and long axis views • Standard 2 and 4 chamber views • Short and long axis views of the aortic valve with appropriate Doppler • Multiple imaging planes of the mitral valve with appropriate Doppler • Multiple imaging planes of the tricuspid valve with appropriate Doppler • Longitudinal view of the pulmonic valve with appropriate Doppler • Multiple imaging planes of the right atrium, left atrium and left atrial appendage with appropriate Doppler • In cases of suspected cardiac source of emboli, when no obvious intracardiac shunt is identified with color Doppler, injection of agitated saline is required unless contraindicated.

	<ul style="list-style-type: none"> • Multiple imaging planes of the atrial septum and foramen ovale with appropriate Doppler • Imaging of the pulmonary veins with appropriate Doppler (when mitral regurgitation is present) • Multiple imaging planes of the ascending, descending and transverse arch of the aorta • Long axis views of the main pulmonary artery and proximal portions of the right and left pulmonary arteries • Images of the proximal inferior and superior vena cava • Imaging of the pericardial space and pericardium
Post-Procedure	<ul style="list-style-type: none"> • After all images are obtained, the TEE probe is withdrawn. • Document a post-procedural note after the procedure. Specific procedural information (echo findings), pertinent sedation information, and/or patient dismissal instructions must be documented. • Assess the patient's status post-procedure <ul style="list-style-type: none"> • Vital signs • Oxygen Saturation • Level of consciousness (RASS) • Pain Assessment • Mayo Modified Discharge Score • Assess and document discharge criteria (see Mayo Modified Discharge Scoring tool): <ul style="list-style-type: none"> • Cardiovascular function and airway patency are stable relative to the pre-procedure status. • The patient is easily arousable and protective reflexes are intact. • If the patient has met discharge criteria but is being transferred to an inpatient unit, notice from the post-sedation area to the next care area should occur. • If reversal agents are administered (e.g. naloxone, flumazenil, etc.), observation should continue until discharge criteria are clearly met and the potential for patient re-sedation has passed. • Dismissal <ul style="list-style-type: none"> • Observe patients who received moderate sedation until post sedation discharge criteria are met using the Mayo Modified Discharge Scoring tool and document in the medical record. • Discharge patients who have received moderate sedation from the area in the company of a responsible adult. • Discharged patients should be accompanied by a responsible adult.

Related Documents

[Mayo Clinic Sedation Home](#)

[Adult Moderate Sedation Procedure](#)

References

[Mayo Clinic Echo Lab Website](#)

[IAC-Echocardiography Standards](#)

[ASE Guidelines](#)

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