



The 44<sup>th</sup> Annual International Congress of the  
**EGYPTIAN SOCIETY OF  
 CARDIOLOGY**  
 CardioEgyt2017




20-23  
 February 2017  
 Fairway

# TEE PRINCIPLES AND BASICS

Table 4 General indications for TEE	
General indication	Specific examples
1. Evaluation of cardiac and aortic structure and function in situations where the findings will alter management and TTE is non-diagnostic or TTE is deferred because there is a high probability that it will be non-diagnostic.	<ul style="list-style-type: none"> <li>a. Detailed evaluation of the abnormalities in structures that are typically in the far field such as the aorta and the left atrial appendage.</li> <li>b. Evaluation of prosthetic heart valves.</li> <li>c. Evaluation of paravalvular abscesses (both native and prosthetic valves).</li> <li>d. Patients on ventilators.</li> <li>e. Patients with chest wall injuries.</li> <li>f. Patients with body habitus preventing adequate TTE imaging.</li> <li>g. Patients unable to move into left lateral decubitus position.</li> </ul>
2. Intraoperative TEE.	<ul style="list-style-type: none"> <li>a. All open heart (i.e., valvular) and thoracic aortic surgical procedures.</li> <li>b. Use in some coronary artery bypass graft surgeries.</li> <li>c. Noncardiac surgery when patients have known or suspected cardiovascular pathology which may impact outcomes.</li> </ul>
3. Guidance of transcatheter procedures	<ul style="list-style-type: none"> <li>a. Guiding management of catheter-based intracardiac procedures (including septal defect closure or atrial appendage obliteration, and transcatheter valve procedures).</li> </ul>
4. Critically ill patients	<ul style="list-style-type: none"> <li>a. Patients in whom diagnostic information is not obtainable by TTE and this information is expected to alter management.</li> </ul>



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## Intraoperative indications (non- cardiac)

- Hypovolemia
- LV global and regional functions
- RV function
- Pulmonary embolism
- Air embolism in neurosurgery (>70%, sitting position, PFO --> PARADOXICAL)
- Valvular lesions
- Pericardial effusion (chest trauma, iatrogenic )
- Adult CHD



**Table 5** AUC ratings for some scenarios of TEE as initial or supplemental test

### Appropriate

- Use of TEE when there is a high likelihood of a nondiagnostic TTE due to patient characteristics or inadequate visualization of relevant structures.
- Re-evaluation of prior TEE finding for interval change (e.g., resolution of thrombus after anticoagulation, resolution of vegetation after antibiotic therapy) when a change in therapy is anticipated.
- Guidance during percutaneous noncoronary cardiac interventions including, but not limited to, closure device placement, radiofrequency ablation, and percutaneous valve procedures.
- Suspected acute aortic pathology including but not limited to dissection/transection.
- Evaluation of valvular structure and function to assess suitability for, and assist in planning of, an intervention.
- To diagnose infective endocarditis with a moderate or high pretest probability (e.g., staph bacteremia, fungemia, prosthetic heart valve, or intracardiac device).
- Evaluation for cardiovascular source of embolus with no identified noncardiac source.
- Atrial fibrillation/flutter: evaluation to facilitate clinical decision making with regard to anticoagulation, cardioversion, and/or radiofrequency ablation.





Uncertain

- Evaluation for cardiovascular source of embolus with a previously identified noncardiac source.

Inappropriate

- Routine use of TEE when a diagnostic TTE is reasonably anticipated to resolve all diagnostic and management concerns.
- Surveillance of prior TEE finding for interval change (e.g., resolution of thrombus after anticoagulation, resolution of vegetation after antibiotic therapy) when no change in therapy is anticipated.
- Routine assessment of pulmonary veins in an asymptomatic patient status post pulmonary vein isolation.
- To diagnose infective endocarditis with a low pretest probability (e.g., transient fever, known alternative source of infection, or negative blood cultures/atypical pathogen for endocarditis).
- Evaluation for cardiovascular source of embolus with a previously identified noncardiac source.
- Atrial fibrillation/flutter: evaluation when a decision has been made to anticoagulate and not to perform cardioversion.



## CONTRAINDICATIONS AND COMPLICATIONS

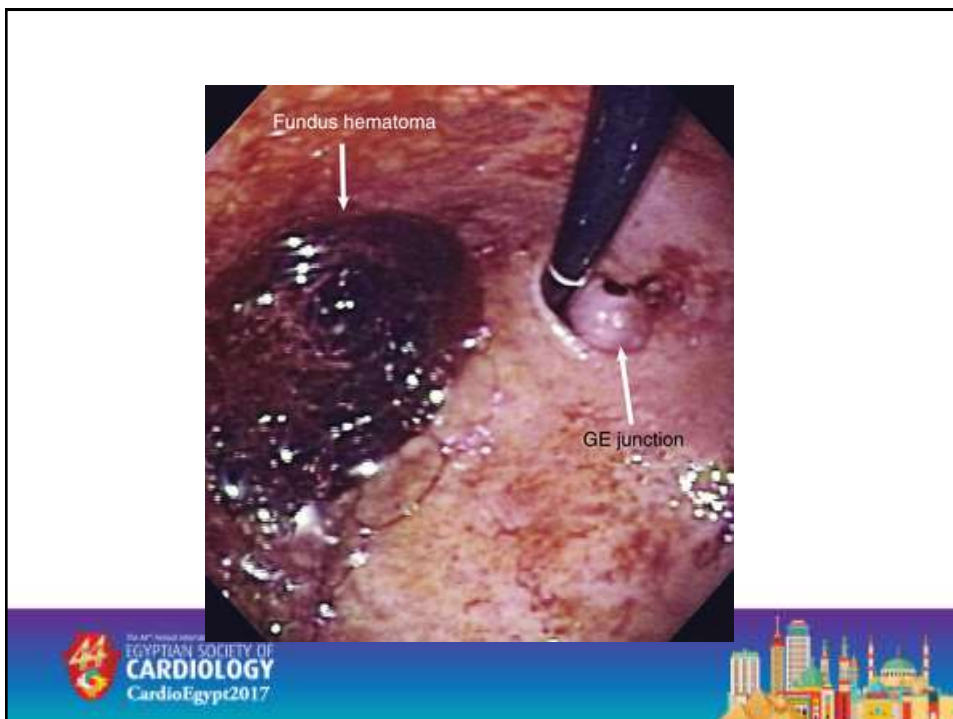
Absolute Contraindications	Relative Contraindications
<ul style="list-style-type: none"> <li>• Perforated viscus</li> <li>• Esophageal stricture</li> <li>• Esophageal tumor</li> <li>• Esophageal perforation, laceration</li> <li>• Esophageal diverticulum</li> <li>• Active upper GI bleed</li> </ul>	<ul style="list-style-type: none"> <li>• History of radiation to neck and mediastinum</li> <li>• History of GI surgery</li> <li>• Recent upper GI bleed</li> <li>• Barrett's esophagus</li> <li>• History of dysphagia</li> <li>• Restriction of neck mobility (severe cervical arthritis, atlantoaxial joint disease)</li> <li>• Symptomatic hiatal hernia</li> <li>• Esophageal varices</li> <li>• Coagulopathy, thrombocytopenia</li> <li>• Active esophagitis</li> <li>• Active peptic ulcer disease</li> </ul>




**Table 7** List of complications reported with TEE and the incidence of these complications during diagnostic TEE and intraoperative TEE<sup>7,24-31</sup>

Complication	Diagnostic TEE	Intraoperative TEE
Overall complication rate	0.18-2.8% (refs 24,25)	0.2% (ref 7)
Mortality	<0.01-0.02% (refs 24,25,27)	0% (ref 7)
Major morbidity	0.2% (ref 27)	0-1.2% (refs 7,28,29)
Major bleeding	<0.01% (ref 24)	0.03-0.8% (refs 7,28)
Esophageal perforation	<0.01 (ref 24)	0-0.3% (refs 7,28,29)
Heart failure	0.05% (ref 28)	
Arrhythmia	0.06-0.3% (refs 7,28,30)	
Tracheal intubation	0.02% (ref 30)	
Endotracheal tube malposition		0.03% (ref 7)
Laryngospasm	0.14% (ref 27)	
Bronchospasm	0.06-0.07% (refs 24,30)	
Dysphagia	1.8 % (ref 31)	
Minor pharyngeal bleeding	0.01-0.2% (refs 24,25,27)	0.01% (ref 7)
Severe odynophagia		0.1% (ref 7)
Hoarseness	12% (ref 31)	
Lip injury	13% (ref 31)	
Dental injury	0.1% (ref 31)	0.03% (ref 7)



## TOE - Inserting the probe

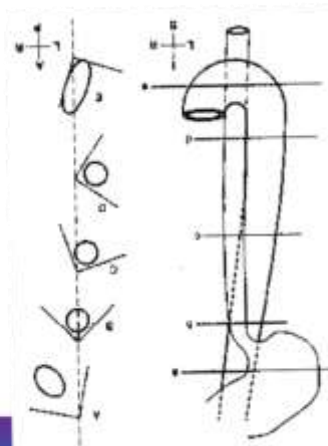
Never EVER use force when inserting the probe. You will injure the patient if you do so.

### Important points are:

- Always use a bite block (properly positioned: small end towards the tip of the probe), some experts use two sets of gloves (so that the outer pair can be discarded if they become slippery).
- Position the patient in the left lateral decubitus position.
- A disposable sheath (if one are available) will protect the probe and patient.
- The most effective sedative is to continuously tell the patient what is going on, and reassure them when things are going well.
- Flex the neck. When you insert the probe, the patient may well try and extend the neck, but ensure that the neck is flexed, to minimize the likelihood that the probe will enter the oesophagus and not remain on the trachea!
- Insert the probe centrally towards the back of the pharynx.
- Enlist patient co-operation when the head of the probe is in the back of the pharynx at the level of the oesopharynx, and reassure as met - ask them to swallow, and the probe will enter the upper oesophagus.
- Advance the probe to ~ 40cm from the incisor teeth to traverse the lower oesophageal sphincter, then work systematically through your study, video-taping everything, and making sure that you meet the objectives of the study. Withdraw and reinsert at the various levels required to complete the study.
- Do NOT let the study last longer than fifteen minutes in the anaesthetized patient, as the patient will then become irritable and uncooperative, if they are not already!
- Get two-dimensional colorimetry - do NOT develop a fixation with colorful doppler pictures.
- Treat the probe like the \$20,000,000 item it is.

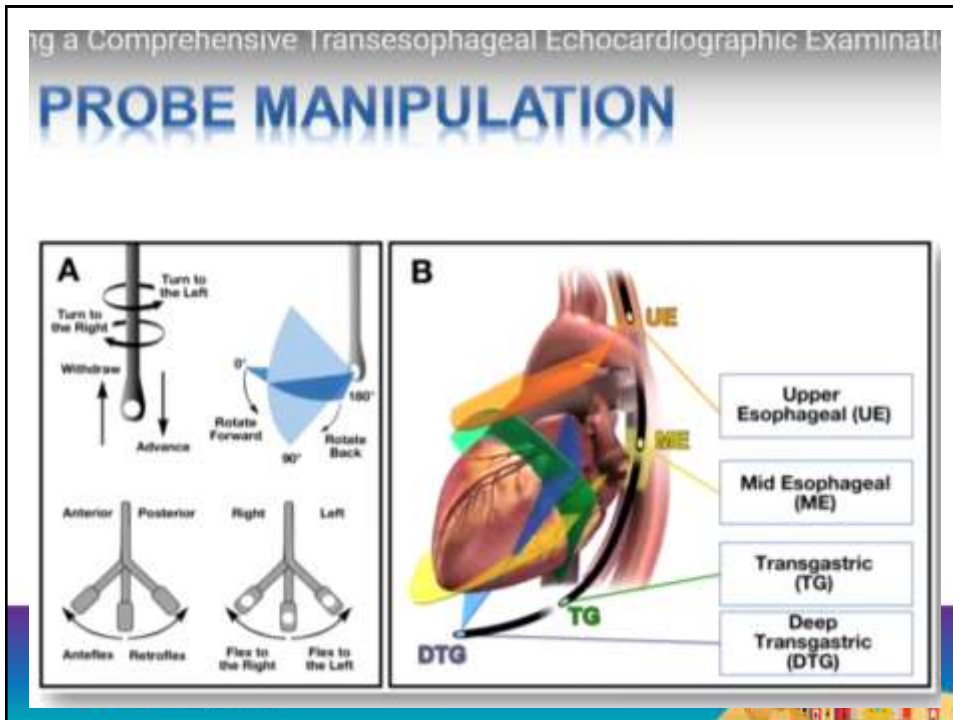


## Aorta-esophageal position



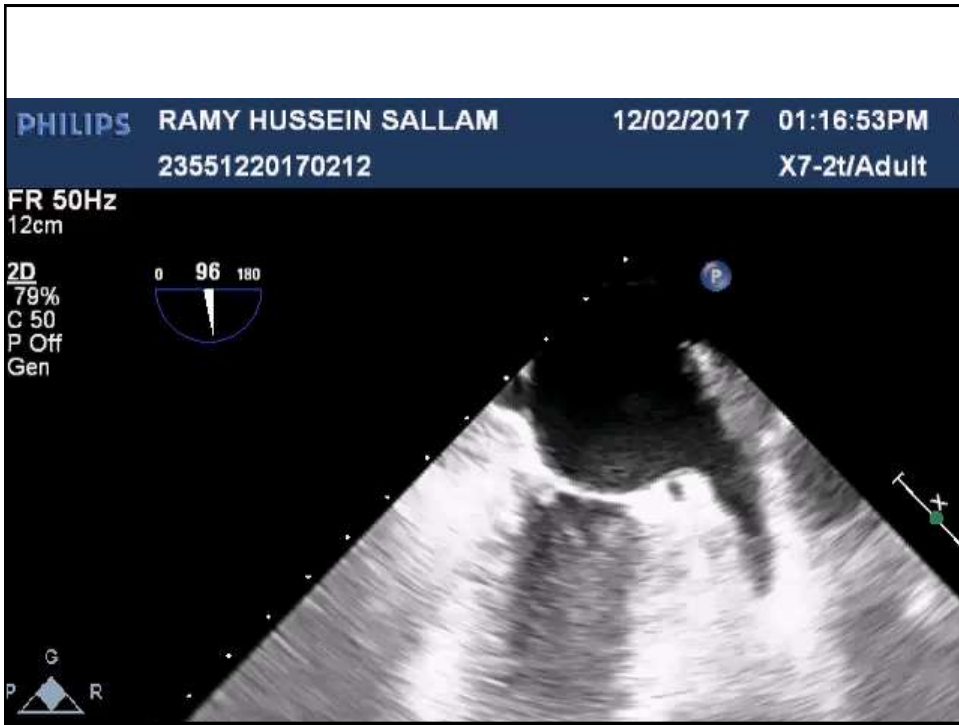
As probe withdrawn from patient, TURN probe to the LEFT to keep aorta image in the center of the video screen

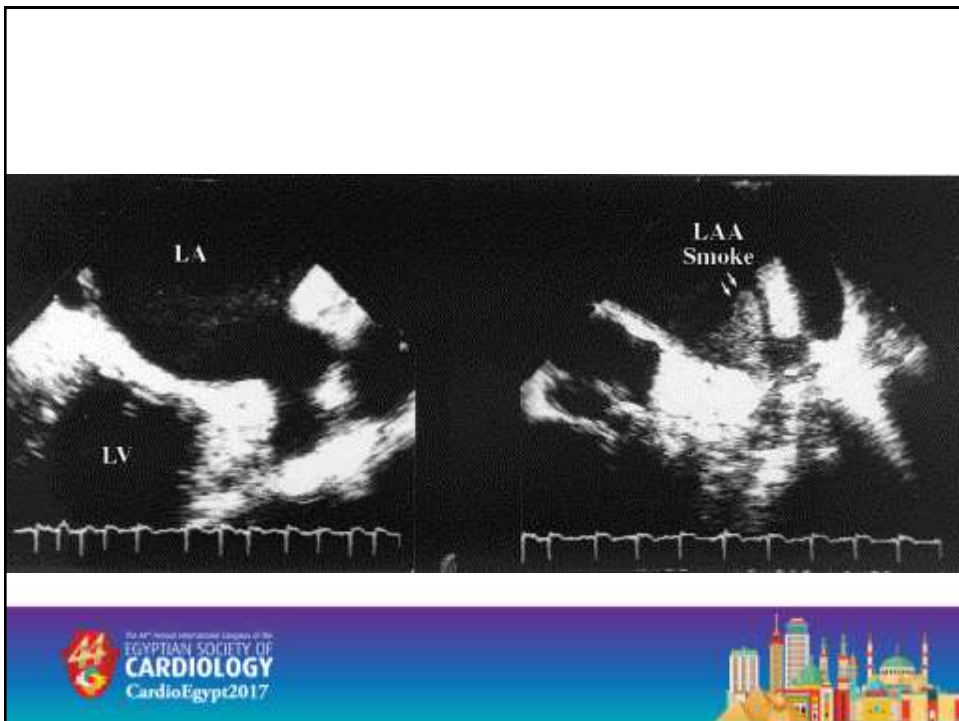
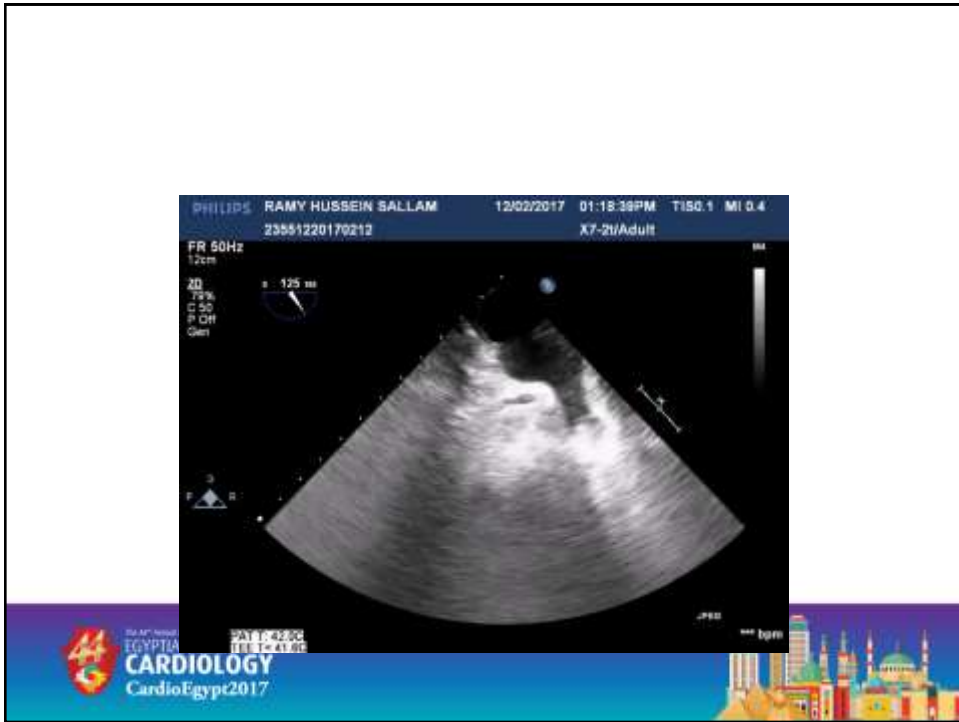




Benefits/ examples  
everyday life

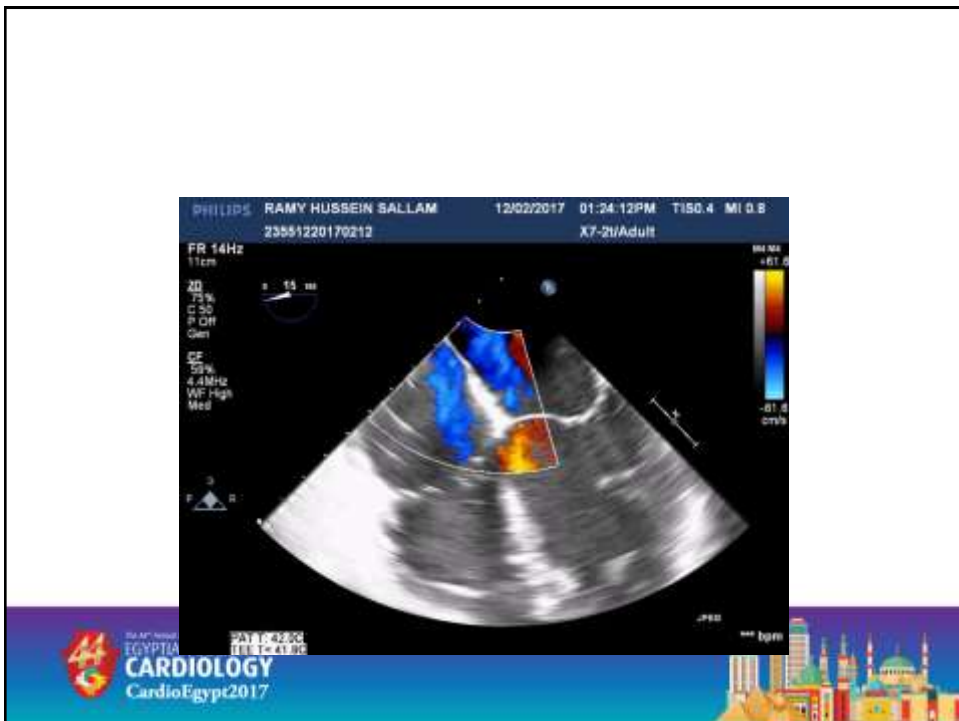
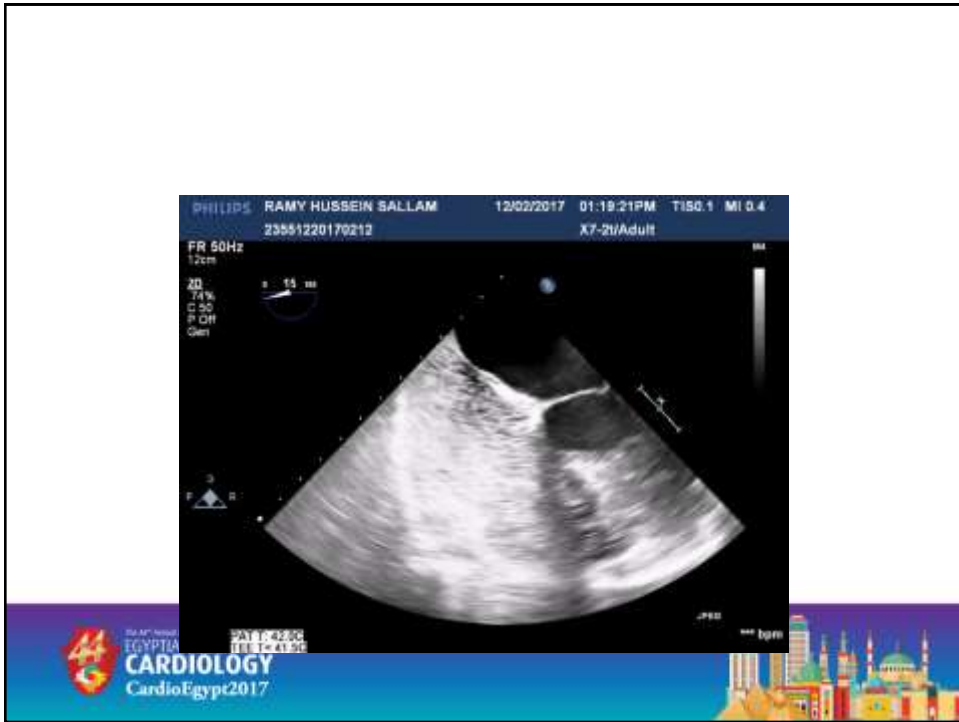


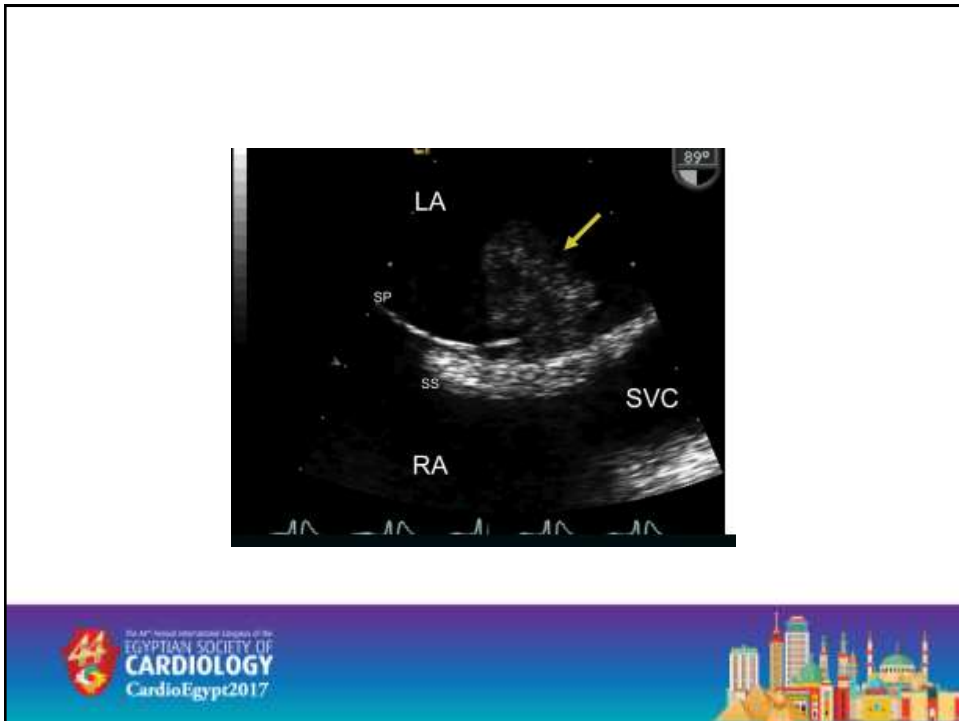


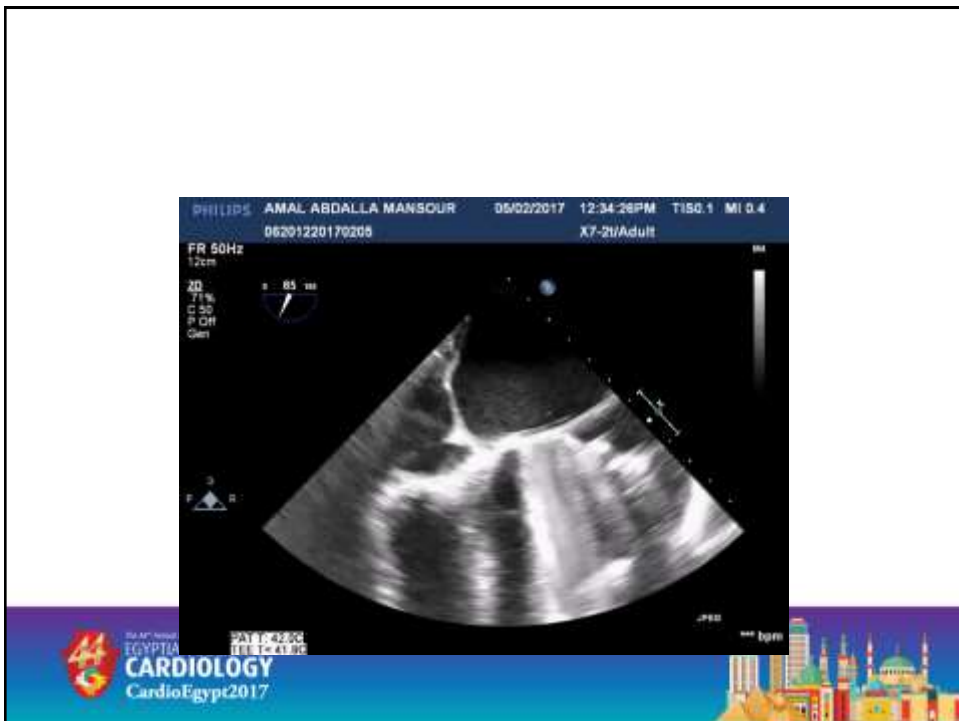
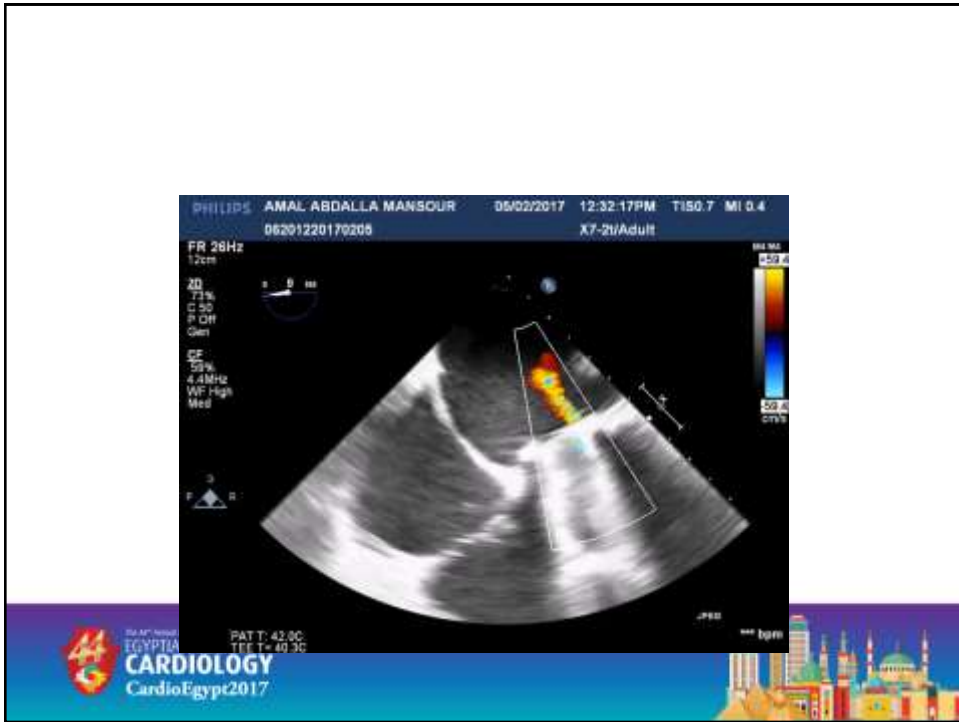






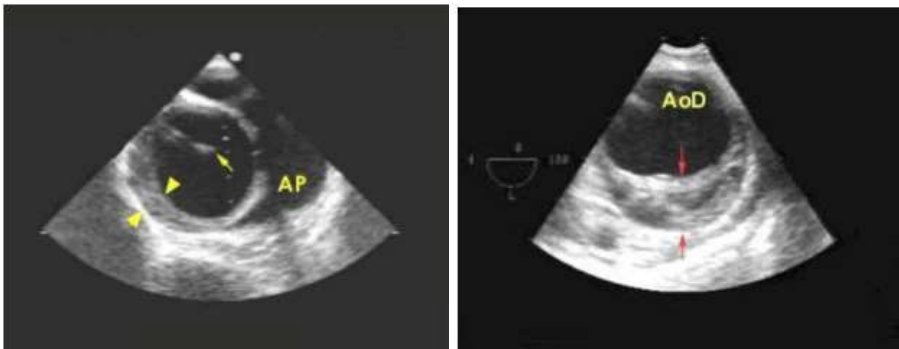




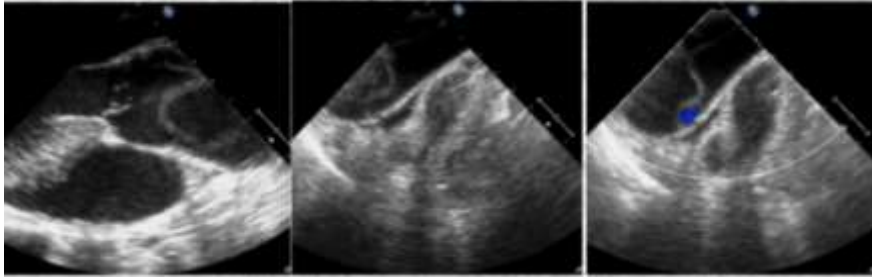




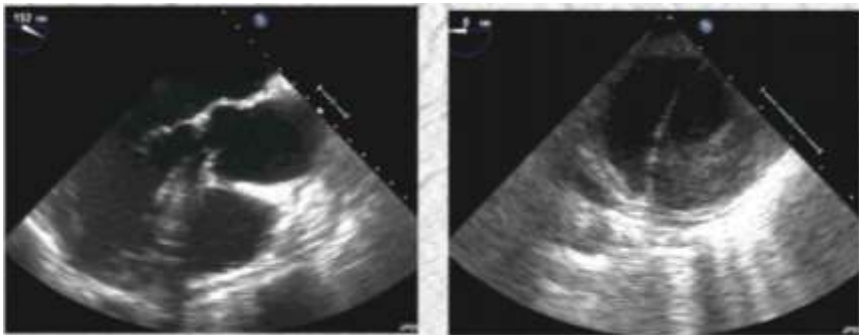
## AORTIC MURAL HEMATOMA



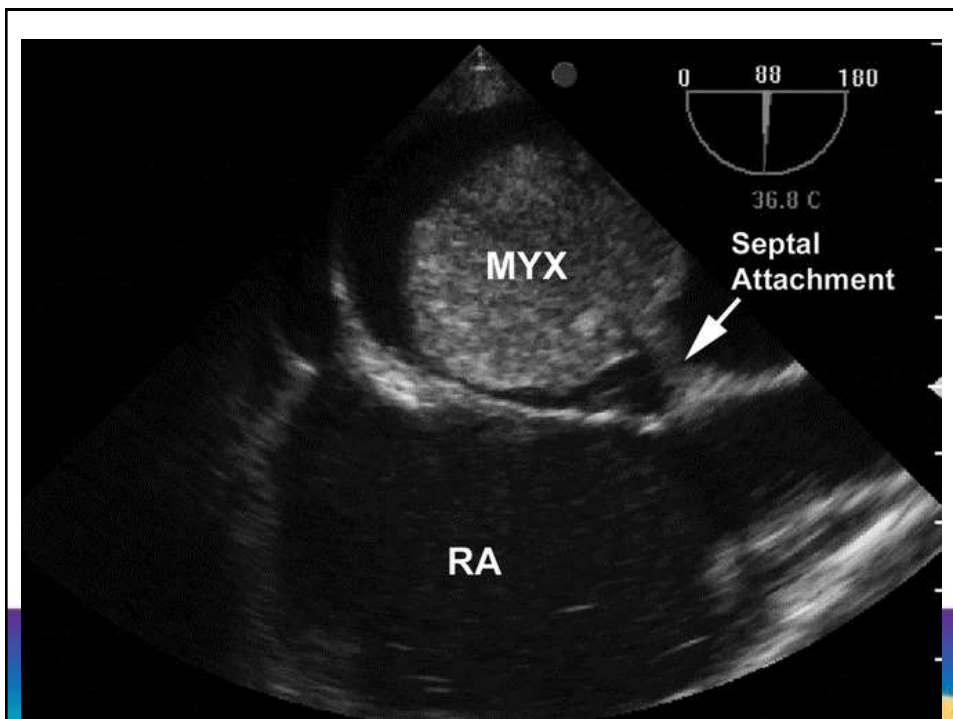
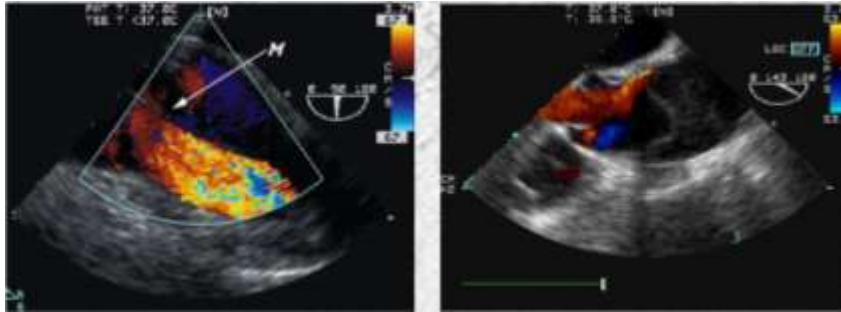
## PROXIMAL DISSECTION



## DISSECTION TL/FL



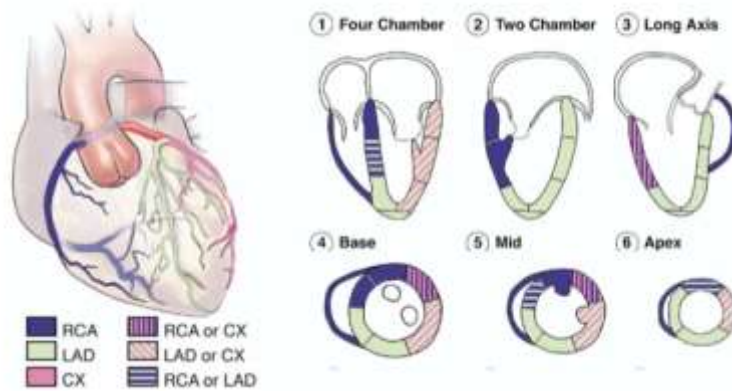
## DISSECTION INTIMAL TEARS



## ASD CLOSURE DEVICE



## CAD, RWMA, DSE





## TG basal SAX

LV walls:

- 2 Basal Anterior
- 1 Basal Anteroseptal
- 6 Basal Inferoseptal
- 5 Basal Inferior
- 4 Basal Inferolateral
- 3 Basal Anterolateral

Valve leaflets:

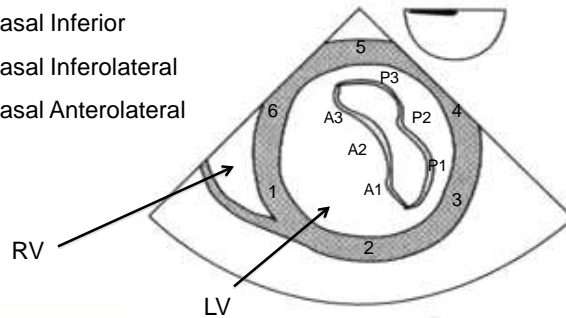
Carpentier Classification

Mitral- Anterior

A1, A2, A3

and Posterior

P1, P2, P3



## ME four chamber

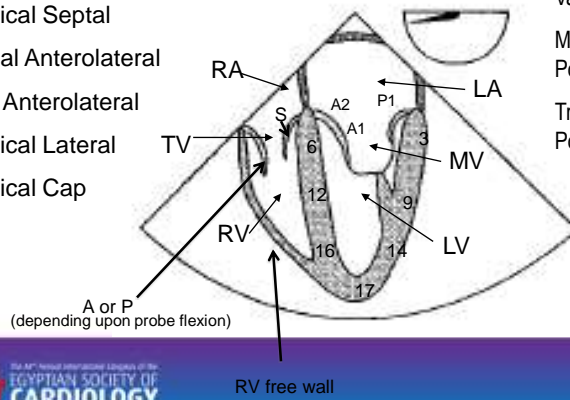
LV walls:

- 6 Basal Inferoseptal
- 12 Mid Inferoseptal
- 16 Apical Septal
- 3 Basal Anterolateral
- 9 Mid Anterolateral
- 14 Apical Lateral
- 17 Apical Cap

Valve leaflets:

Mitral- Anterior(A1, A2) and Posterior(P1)

Tricuspid- Septal(S) Anterior (A), Posterior (P)



## ME two chamber

LV walls:

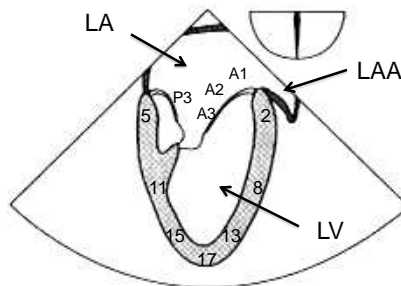
- 5 Basal Inferior
- 11 Mid Inferior
- 15 Apical Inferior
- 2 Basal Anterior
- 8 Mid Anterior
- 13 Apical Anterior
- 17 Apical Cap

Valve leaflets:

Carpentier Classification

Mitral- Anterior(A1, A2, A3)

Posterior(P3)



Left Atrial Appendage (LAA)



## ME LAX

LV walls:

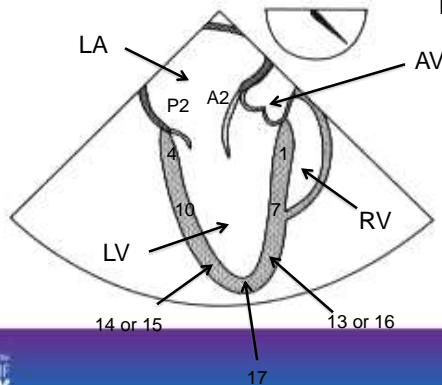
- 4 Basal Inferolateral
- 10 Mid Inferolateral
- 1 Basal Anteroseptal
- 7 Mid Anteroseptal
- 15 Apical Inferior
- 13 Apical Anterior
- 14 Apical Lateral
- 16 Apical Septal
- 17 Apical Cap

Valve leaflets:

Carpentier Classification

Mitral- Anterior(A2)

Posterior(P2)





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