

3D TEE

Basic Views

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Basic TEE Views Introduction

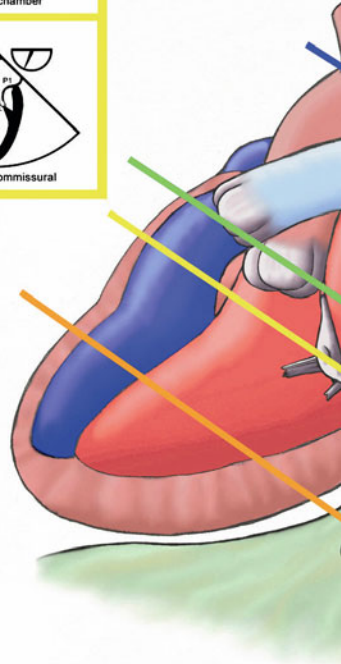
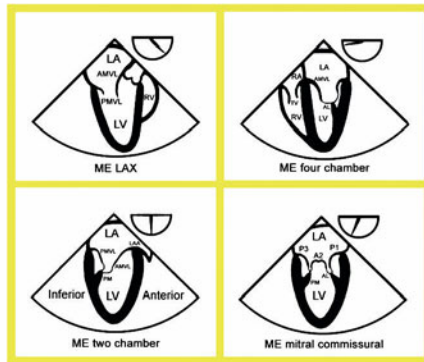
The 20 basic TEE views as described by the SCA and ASE are diagrammed here. Conveniently the views are grouped together by the structures being interrogated:

Yellow: Mid-esophageal (ME) views image the LV and MV

Green: ME views image the AV, RVOT, and bicaval

Blue: ME and upper esophageal (UE) views image different regions of the aorta

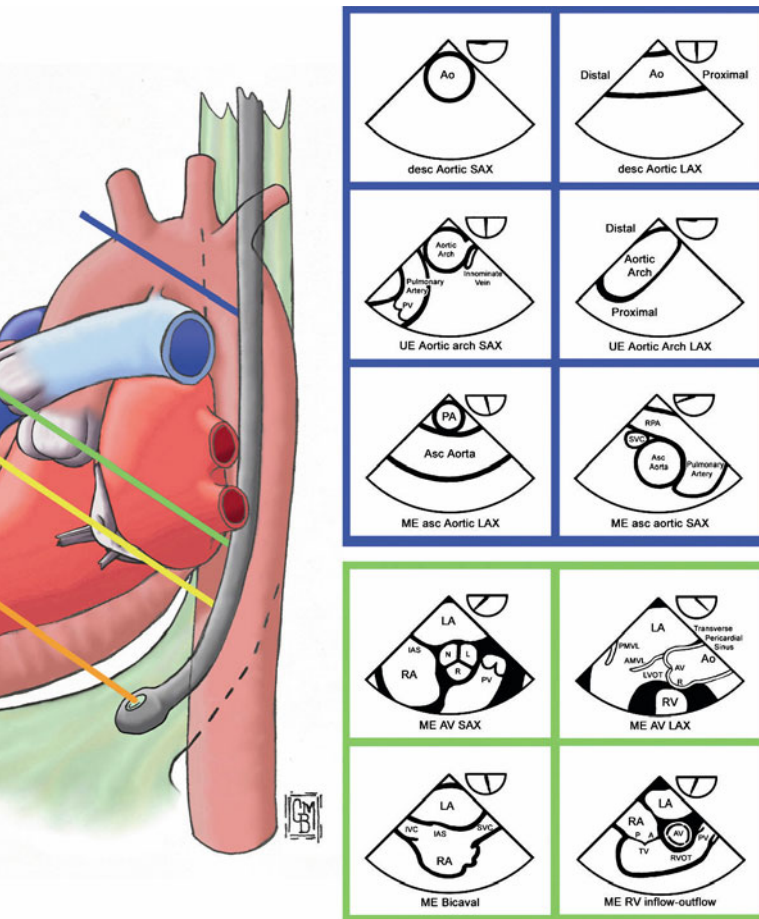
Orange: Transgastric (TG) views image the LV, RV, and AV for function and spectral Doppler alignment



Basic TEE Views Introduction

Sources

- **Shanewise JS, Cheung AT, Aronson S, et al.** ASE/SCA Guidelines for performing a comprehensive intraoperative multiplane transesophageal echocardiography examination. *Anesth Analg* 1999; 89:870-84.
- **Flachskampf FA, Decoodt P, Fraser AG, et al.** Guideline from the Working Group: Recommendations for Performing Transesophageal Echocardiography. *Eur J Echocardiograph* 2001; 2:8-21.



Basic TEE Views Probe Manipulation

TEE Probe Manipulation

Probe movements (entire probe moves)

1. Advance or withdraw
2. Turn right or left

Knob movements (only probe tip moves)

3. Flex right or left
4. Anteflex or retroflex

Transducer movements (probe stays still)

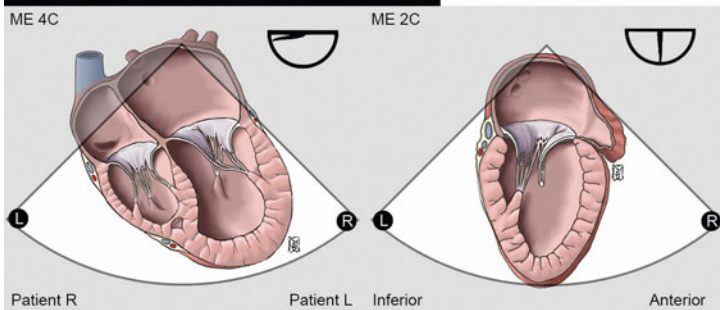
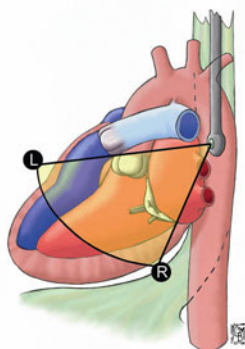
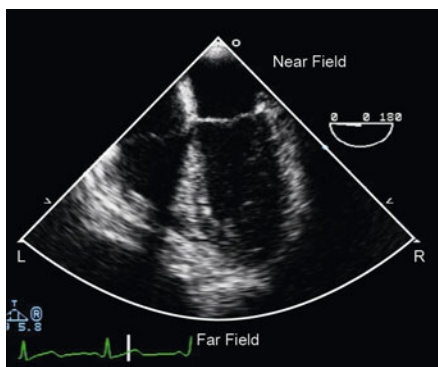
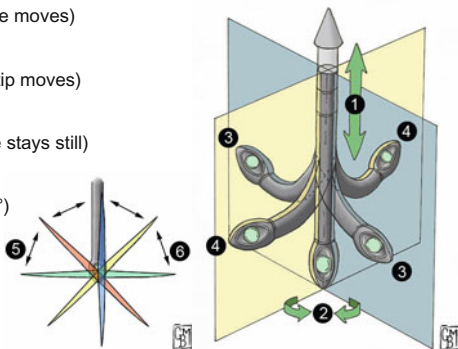
5. Rotate angle forward (0–180°)
6. Rotate angle back (180–0°)

Transducer Planes

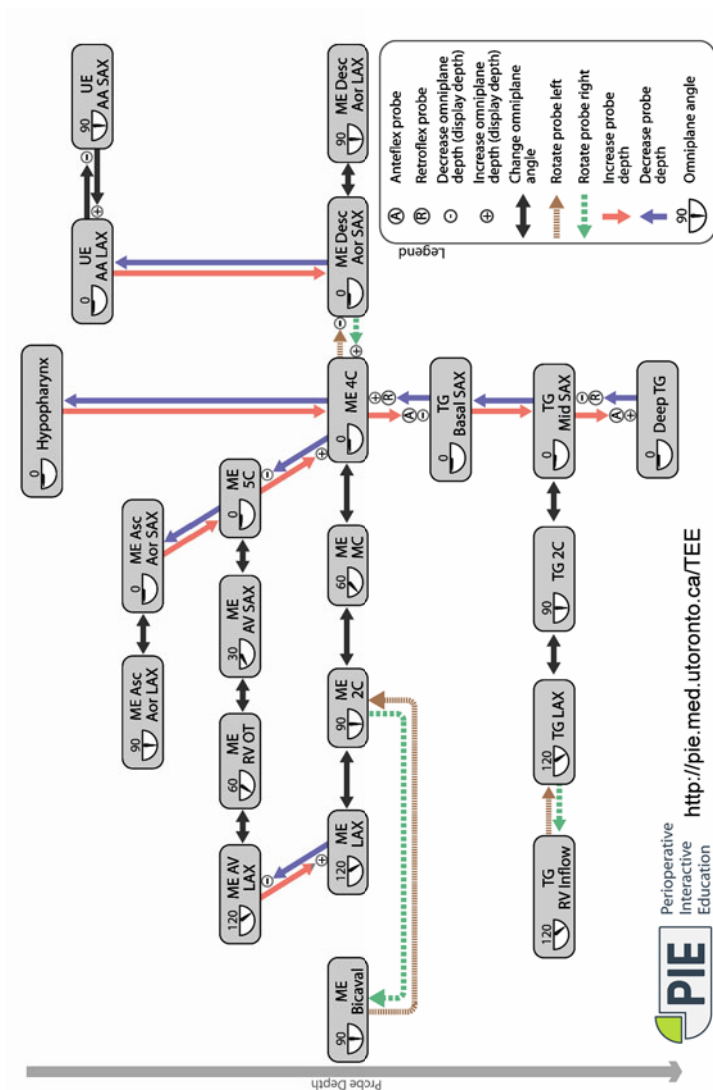
- Transverse (0°)
- Longitudinal (90°)
- Omniplane (0–180°)

Image display

- Pie-shaped sector
- Display right (R), left (L)
- Near field (closest to probe)

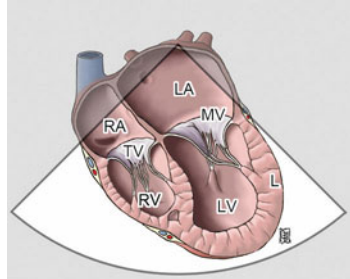


Basic TEE Views TEE Template



Basic TEE Views ME 4 Chamber

The ME 4C view is obtained by positioning the probe in the mid-esophagus behind the left atrium (LA). The imaging plane is directed through the LA, center of the mitral valve (MV) and left ventricular (LV) apex. A snapshot of the heart shows all four chambers (LA, right atrium RA, LV, right ventricle RV), two valves (MV, tricuspid valve TV), the septa (inter-atrial septum IAS, interventricular septum IVS) and the inferoseptal (IS) and lateral (L) LV walls.

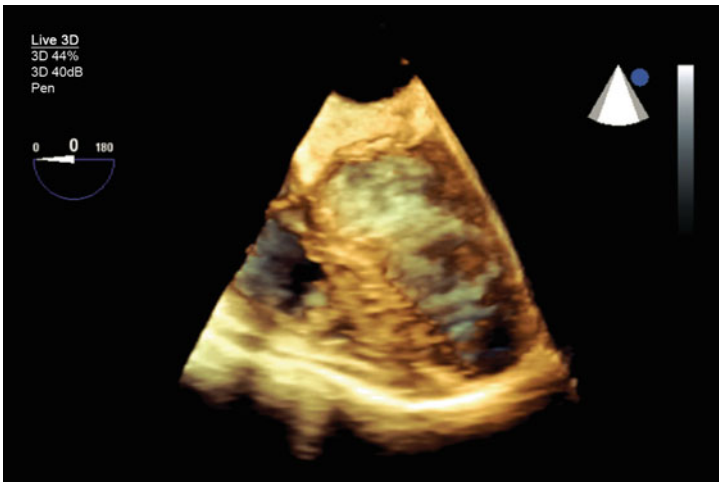
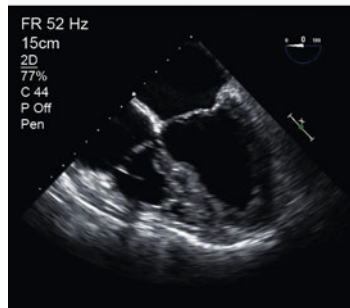


3D Live mode has a reduced sector size that limits imaging of the entire 4C view. Use lateral steer to visualize right and left heart structures (see pg. 9).

3D Full Volume mode (see pg. 135) has a wider sector and is a better choice to image the entire heart.

Diagnostic Issues

- Chamber enlargement and function
- LV systolic function
- MV pathology
- TV pathology
- Atrial septal defect (ASD Primum)
- Pericardial effusion



Basic TEE Views ME Mitral Commissural

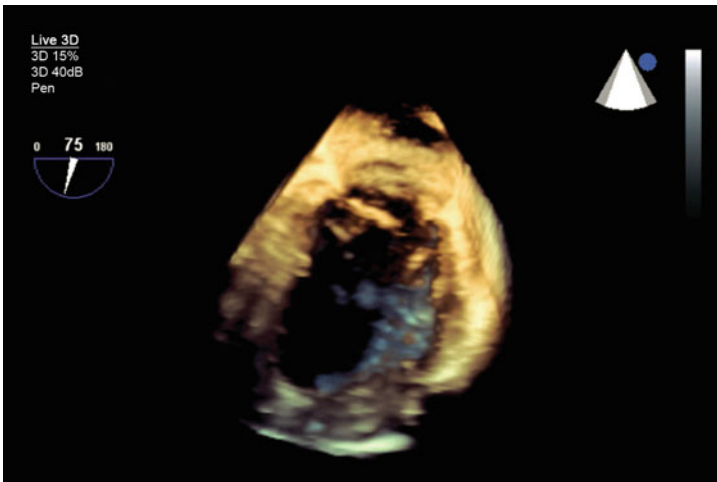
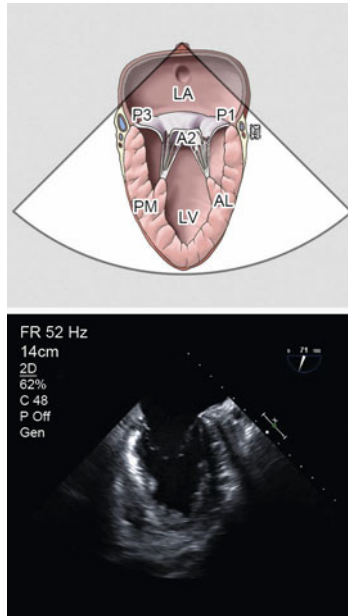
In the ME mitral commissural (MC) view, the scanning plane is now orientated at 45°–70° imaging through the left atrium (LA), center of the mitral valve (MV) and left ventricular (LV) apex. The P3 scallop (left), P1 scallop (right) and AMVL (usually A2) is in the middle forming the intermittently seen "trap door." The probe is carefully manipulated to image both the posteromedial (PM) and anterolateral (AL) papillary muscles and LV apex.

3D Live mode and lateral steer help image the MV, LV walls, and LV apex.

3D Full Volume mode has a wider sector and is a better choice to image the entire heart.

Diagnostic Issues

LA: mass, thrombus
LV systolic function
MV pathology
Coronary sinus flow



Basic TEE Views ME 2 Chamber

The ME 2 chamber view is obtained by increasing the omniplane angle to 90° from the ME 4C (0°) or ME mitral commissural (45–60°) views. The right atrium (RA) and right ventricle (RV) are eliminated from the display. This view is orthogonal to the ME 4C view. The image is displayed with the cephalad part (anterior wall) below the left atrial appendage (LAA) to the right and the caudad part (inferior wall) to the left.

3D Live mode and lateral steer help image the MV, LV walls and LV apex. Tilting the image slightly down allows better visualization of the MV.

3D Full Volume mode has a wider sector and is a better choice to image the entire heart.

Diagnostic Issues

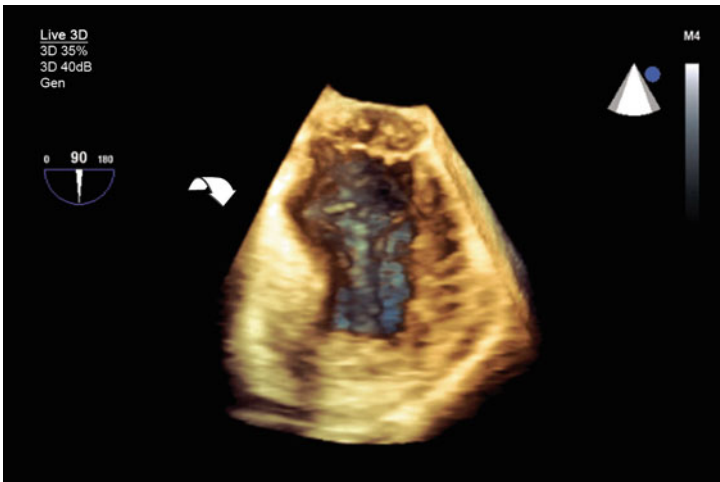
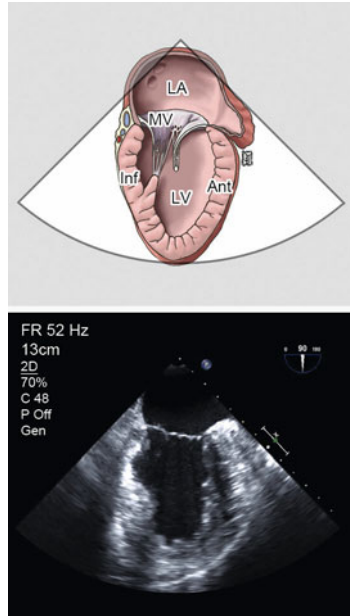
LAA: mass, thrombus

LV systolic function (inferior and anterior)

LV apex pathology

MV pathology

Coronary sinus flow



Basic TEE Views ME LAX

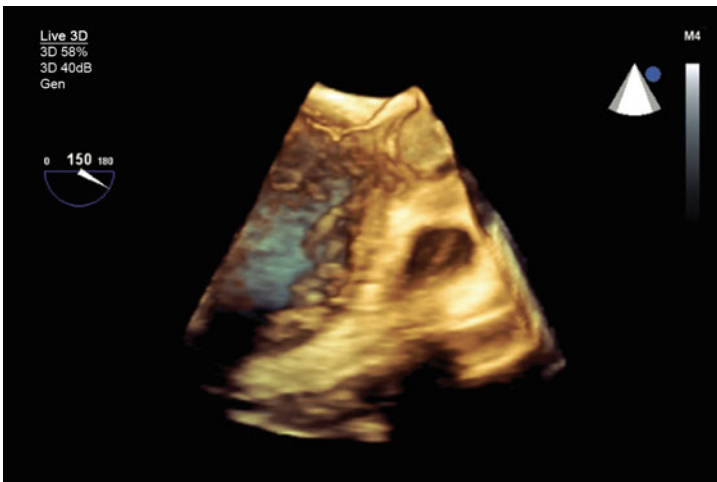
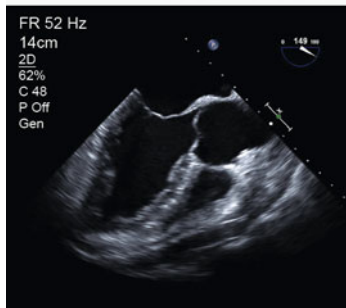
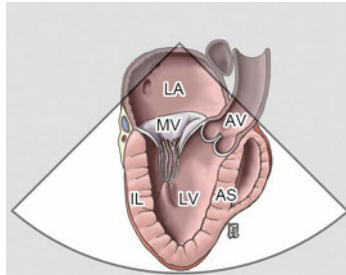
The ME long axis (LAX) view is obtained by increasing the omniplane angle to 120° from the ME 4C (0°) or ME MC (45-60°) or ME 2C (90°) views. The more cephalad structures including the left ventricular outflow tract (LVOT), aortic valve (AV) and the proximal ascending aorta are lined up on the display right. The apex of the left ventricle (LV) and inferolateral (IL) and anteroseptal (AS) walls are seen.

3D Live mode and lateral steer help image the MV, AV, LV walls and LV apex.

3D Full Volume mode has a wider sector and is a better choice to image the aortic root and entire LV.

Diagnostic Issues

- MV pathology
- LV systolic function
- IVS pathology (VSD)
- LVOT pathology
- AV pathology
- Aortic root pathology



Basic TEE Views ME AV LAX

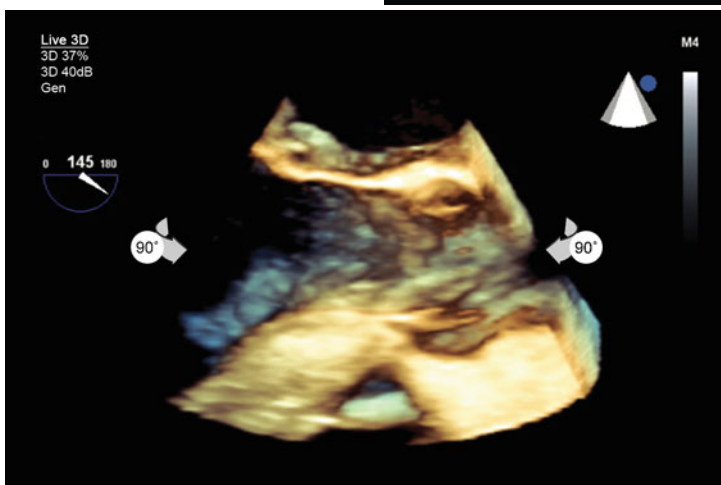
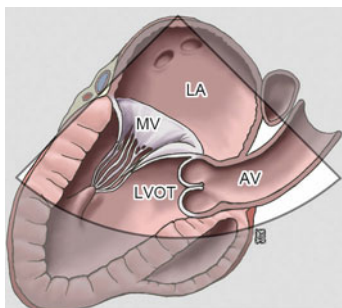
The ME aortic valve (AV) LAX view is obtained by decreasing the display depth from the ME LAX view (120°). The left ventricular outflow tract (LVOT), AV and the proximal ascending aorta are lined up on the display right and the remainder of the mitral valve (MV) and left ventricle (LV) are eliminated from the image.

3D Live mode and lateral steer help center the AV in the image display. Rotating the image 90° (arrows) allows visualization from either the LVOT or aorta. The limited sector size shows only half of these perspectives.

3D Full Volume (see pg. 85) or **3D Zoom modes** have a wider sector and are better choices to image the aortic root or LVOT.

Diagnostic Issues

AV pathology
Aortic root dimensions
Aortic root pathology
LVOT pathology
MV anterior leaflet
Ventricular septal defect (VSD)



Basic TEE Views ME AV SAX

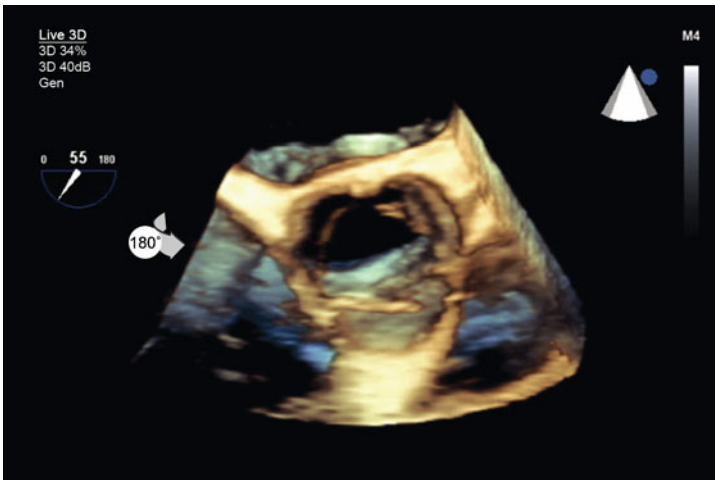
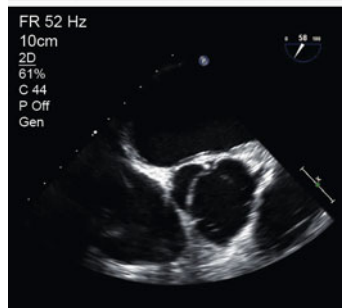
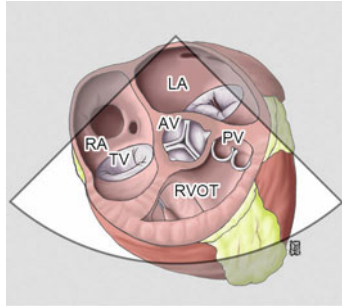
From the ME 4C view, the probe is withdrawn until the aortic valve (AV) is positioned centrally. To obtain the ME AV SAX view, increase the omniplane angle to 30°–45° with slight antelexion to align the imaging plane parallel to the AV annulus. All three aortic cusps appear symmetrical. Withdraw the probe to image the orifices of the left main and right coronary arteries.

3D Live mode is suboptimal to image the thin AV cusps as significant dropout is present unless the gain is increased.

3D Full Volume (see pg. 84) or **3D Zoom modes** improve cusp definition and visualization of the coronary artery orifices. Rotating the image 180° (arrow) shows the AV from the LVOT.

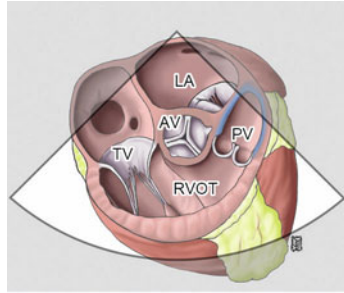
Diagnostic Issues

- AV morphology
- AV planimetry
- AI location
- ASD secundum
- LA size (anterior–posterior diameter)



Basic TEE Views ME RV Inflow–Outflow

Aptly named, this view images the right ventricular (RV) inflow from the tricuspid valve (TV) on the display left and RV outflow tract (RVOT) through the pulmonic valve (PV) on the display right in a single view. This view is obtained from the ME AV SAX view (30°) by increasing the omniplane angle to 60–75°. An off axis image of the aortic valve (AV) is displayed centrally.

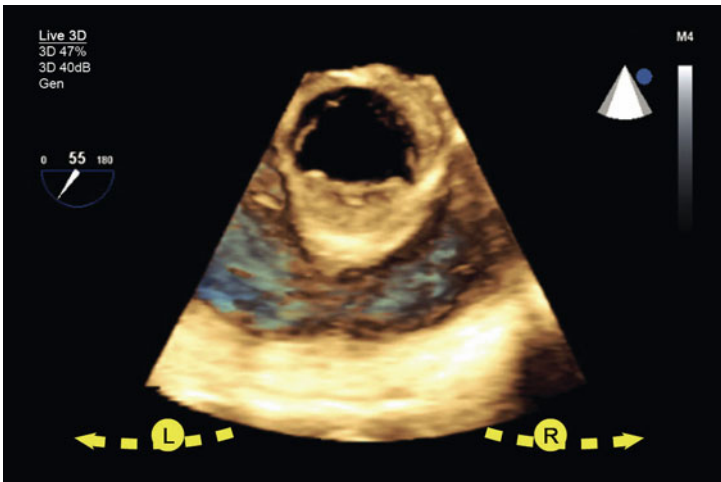
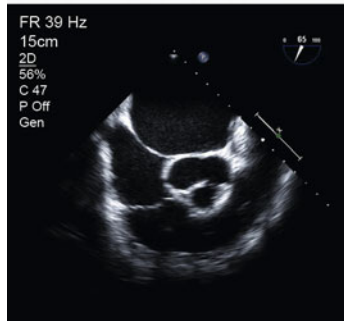


3D Live mode narrow sector only images the RVOT. Lateral steer (arrows, see pg. 9) helps to better image the TV to the left and PV to the right.

3D Full Volume (see pg. 12) or **3D Zoom modes** have a wider sector and are better choices to image the entire RVOT.

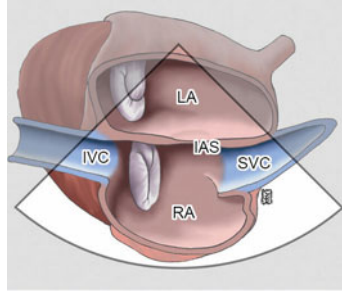
Diagnostic Issues

- Pulmonic valve pathology
- Pulmonary artery pathology
- RVOT pathology
- TV pathology
- TV Doppler
- Atrial septal defect (ASD secundum)
- Ventricular septal defect (VSD)



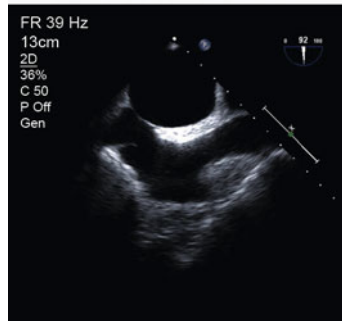
Basic TEE Views ME Bicaval

The view is obtained from the ME 2C view (90°) by turning the entire probe to the patient's right towards the superior vena cava (SVC) and inferior vena cava (IVC). The transducer plane cuts through the left atrium (LA), right atrium (RA), and IAS of the IVC and SVC. The structures are displayed with the LA at the sector apex (closest to probe), RA in the far field and caudad IVC (left) and cephalad SVC (right).



3D Live mode narrow sector images the inter-atrial septum (IAS) through the LA. Lateral steer helps to better image the SVC (right) and IVC (left). Tilting the image down slightly shows the IAS from the LA perspective. A catheter is seen in the SVC.

3D Full Volume (see pgs. 204, 205) or **3D Zoom modes** have a wider sector and are better choices to image the entire IAS.



Diagnostic Issues

IAS: Atrial septal defect (ASD)

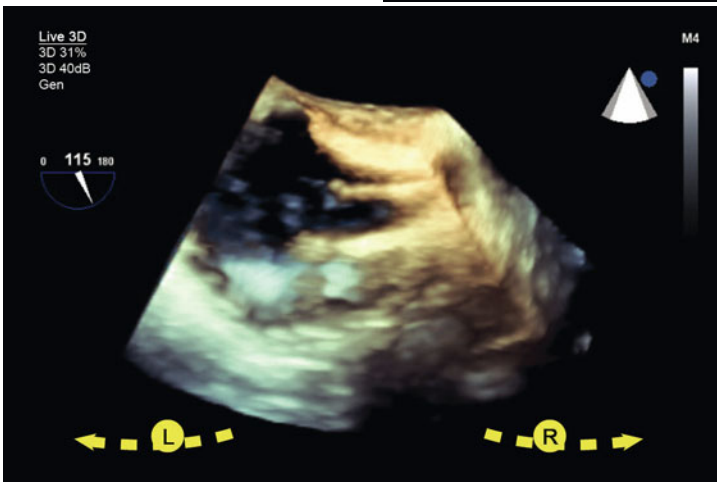
Mass

SVC/IVC flow

Venous catheters

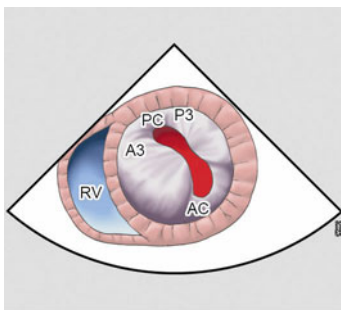
Pacemaker wires

Venous cannula position (SVC/IVC)



Basic TEE Views TG Basal SAX

The TG basal SAX view is obtained by withdrawing the probe from the TG mid-papillary SAX view or as the probe is advanced into the stomach at 0°. This permits a TG view of the mitral valve (MV) that is parallel to the MV annulus with the posterior mitral valve leaflet (PMVL) on the display right and the anterior mitral valve leaflet (AMVL) to the left. The posterior commissure (PC) is closest to the probe as are P3 and A3; the anterior commissure (AC) is in the far field.



3D Live mode the narrow sector poorly images the thin MV leaflets and provides little additional information. The left ventricular (LV) walls are also incompletely imaged.

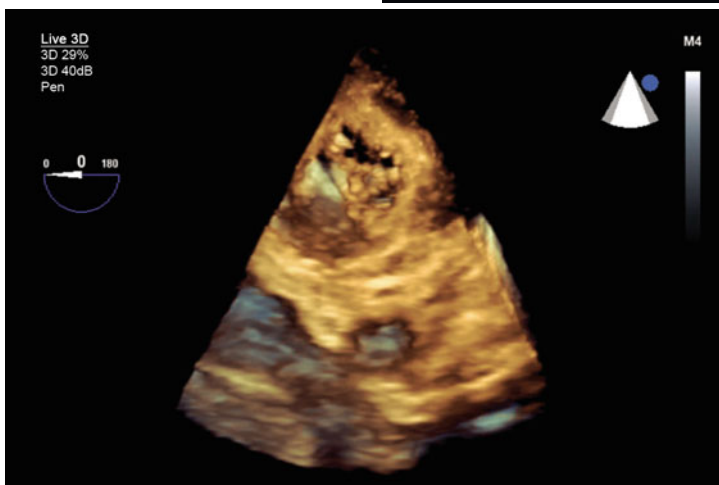
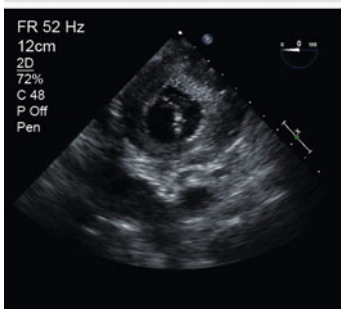
3D Full Volume or 3D Zoom modes are not often used to image the MV from this view as ME views provide better MV 3D images.

Diagnostic Issues

MV: pathology, origin MR

LV: basal segment function

Ventricular septal defect (VSD)



Basic TEE Views TG mid SAX

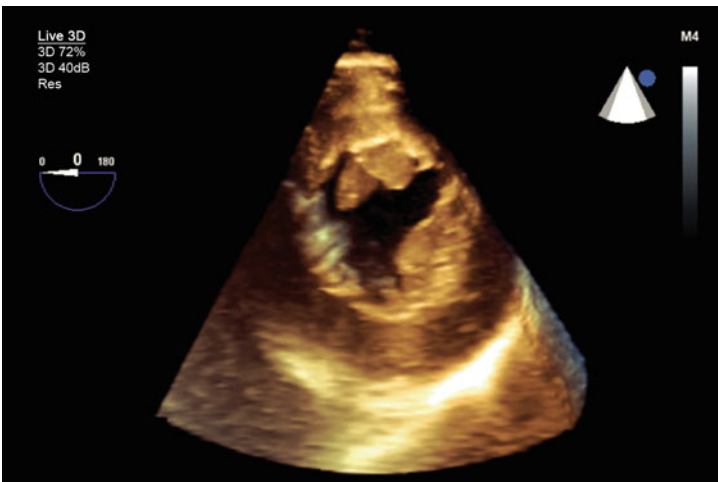
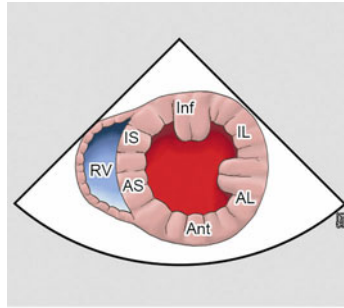
The TG views are obtained by advancing the probe in a neutral position into the stomach and applying varying degrees of antelexion. In the TG mid-papillary SAX view (0°), the left ventricle (LV) is imaged in SAX with 6 LV segments (ASE/SCA 17 segment model; see pg. 140) viewed at once. Manipulate the probe to center the LV cavity and slightly increase the transducer angle to obtain a symmetrical circular LV.

3D Live mode the narrow sector cannot image all the LV walls simultaneously.

3D Full Volume from the ME views is the preferred method to assess LV function (see pgs. 138, 139).

Diagnostic Issues

- LV cavity size
- LV wall thickness
- LV systolic function
- Hemodynamic instability
- IVS motion
- Ventricular septal defect (VSD)



Basic TEE Views TG 2 Chamber

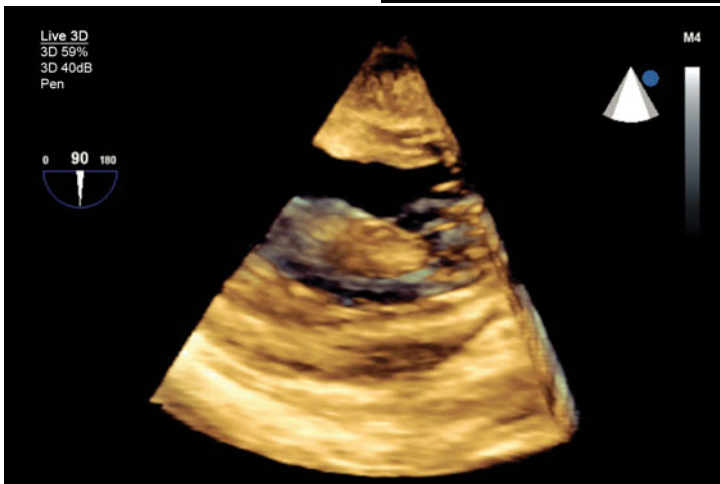
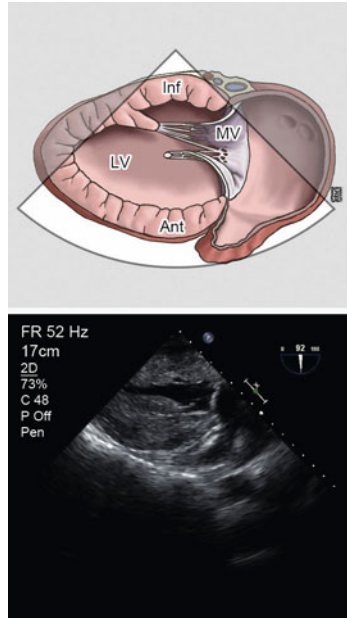
The TG 2C view is obtained from the TG mid-papillary SAX view (0°) by increasing the transducer angle to 75°–90°. This images the left ventricle (LV) in LAX and the subvalvular structures of the mitral valve (MV). This view is similar to the ME 2C view now turned 90° with the probe closest to the inferior (Inf) wall of the LV (apex of sector).

3D Live mode images the LV walls, papillary muscles and MV. The narrow sector cuts off the MV and may require lateral steer.

3D Full Volume mode has a wider sector but is not often used in this view.

Diagnostic Issues

LV systolic function
MV subvalvular apparatus
MV pathology



Basic TEE Views TG LAX

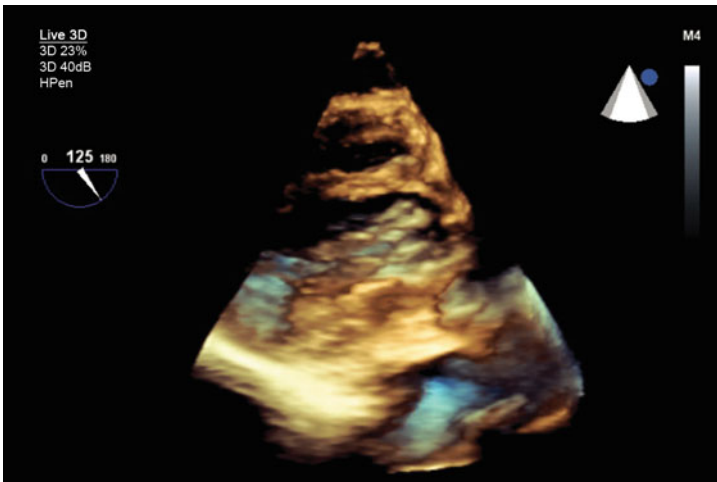
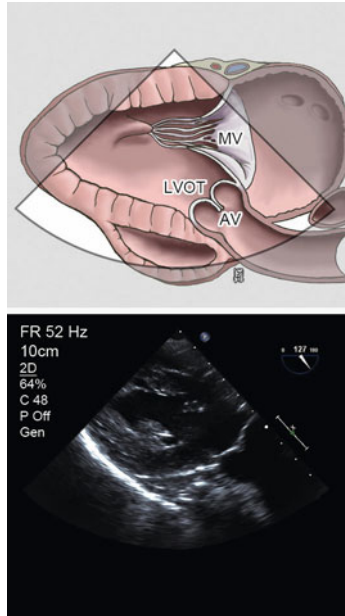
The TG LAX view is developed from the TG 2C view (90°) by increasing the transducer angle to 120°. The left ventricular outflow tract (LVOT) and aortic valve (AV) appear on the display right, depending on the depth settings. This view is similar to the ME AV LAX view and permits better Doppler alignment of the LVOT and AV. The mitral valve and subvalvular structures are also seen.

3D Live mode the narrow sector and thin AV cusps result in poor imaging of the AV. Lateral steer and increasing gain may improve imaging of the AV.

3D Full Volume color mode may be used to assess flow through the AV.

Diagnostic Issues

MV: leaflets, subvalvular
LV systolic function
AV Doppler gradient
LVOT Doppler gradient
Ventricular septal defect (VSD)
Prosthetic AV function



Basic TEE Views TG Deep LAX

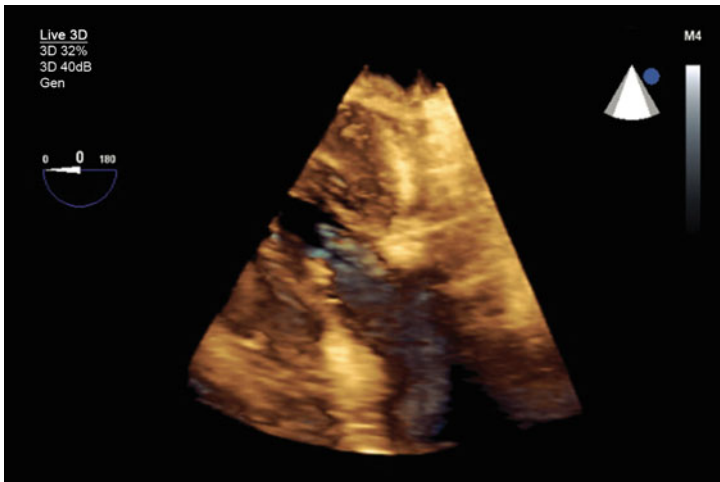
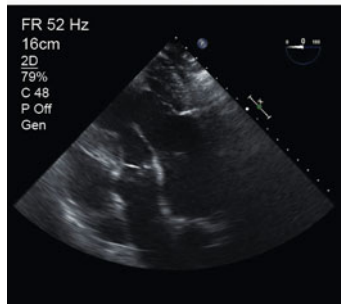
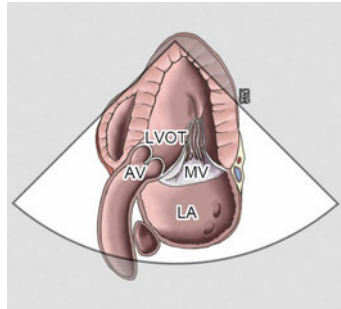
To obtain the deep TG LAX view (0°), the probe is advanced deep into the stomach and anteфлекed. Leftward flexion may be necessary to place the left ventricular outflow tract (LVOT) and aortic valve (AV) in the center of the screen. This image may be utilized in measuring the Doppler velocity of flow across the LVOT and the AV.

3D Live mode the narrow sector, thin AV cusps and far field position result in poor imaging of the AV.

3D Full Volume color mode may be used to assess flow through the AV.

Diagnostic Issues

- AV pathology
- AV spectral Doppler
- Prosthetic AV function
- LVOT spectral Doppler
- LVOT pathology
- Ventricular septal defect (VSD)



Basic TEE Views TG RV Inflow

The TG RV inflow view (120°) reveals a long axis view of the right ventricle (RV), with the apex of the RV to the left and the anterior (Ant) free wall in the far field. It is obtained from the TG basal SAX view (0°), by turning the probe to the right to center the tricuspid valve (TV) and increasing the omniplane angle to 120°. The subvalvular structures of the TV are well seen.

3D Live mode the narrow sector and thin TV cusps result in poor imaging of the RV and TV. Lateral steer to the left may image more of the RV.

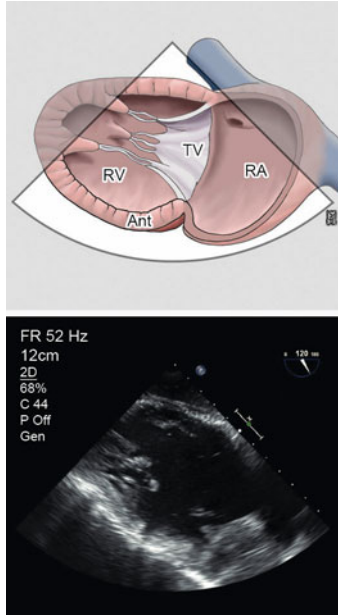
3D Full Volume mode has a wider sector but is not often used in this view.

Diagnostic Issues

TV pathology

RV systolic function

Right atrial (RA) mass



Basic TEE Views ME Descending Aorta SAX

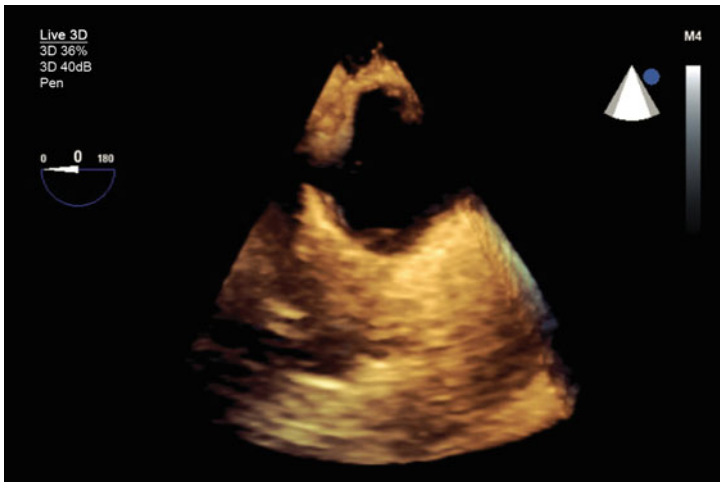
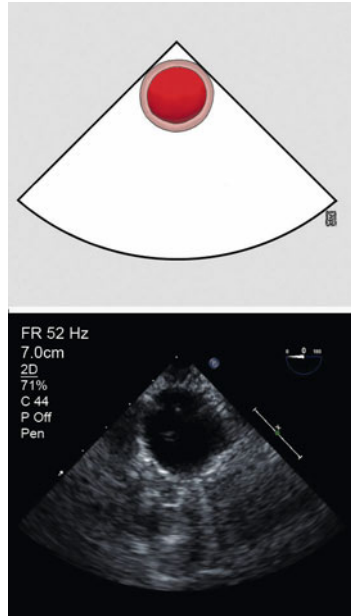
The descending thoracic aorta is visualized in SAX (0°) by turning the probe to the left from the ME 4C view (0°). The near field image of the circular aorta represents the right anterior wall of the aorta. Advance and withdraw the probe to image the entire descending aorta. Decrease the display depth.

3D Live mode with a slight tilt down better images a SAX section of the aorta intimal surface. The near field aortic wall is, however, poorly visualized.

3D Full Volume mode (see pg. 175) is a better choice to image a wider sector of the aorta and the thin wall of a dissection flap (see pg. 179).

Diagnostic Issues

- Aorta atherosclerosis
- Aorta dissection
- Aorta aneurysm
- Left pleural effusion
- AI severity PW Doppler
- IABP position



Basic TEE Views ME Descending Aorta LAX

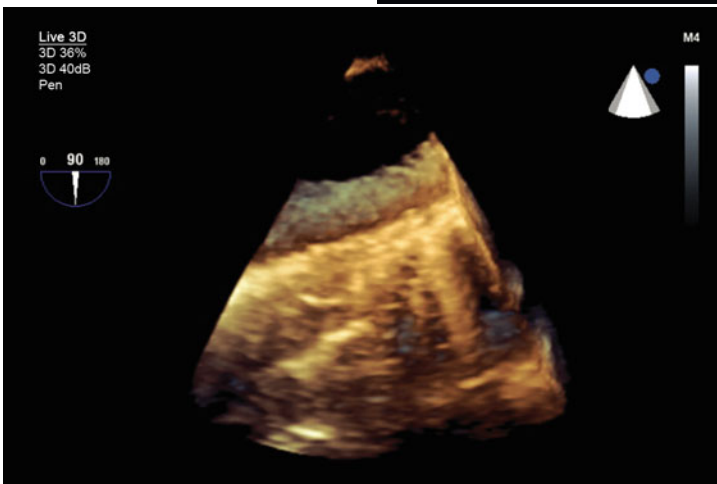
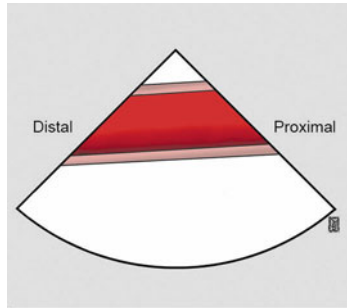
From the descending thoracic aorta SAX view (0°) the transducer angle is increased to 90° to obtain the descending aortic LAX view. The distal aorta is to the display left and the proximal aorta to the display right.

3D Live mode with a slight tilt down better images a section of the aorta intimal surface. The near field aortic wall is, however, poorly visualized.

3D Full Volume mode (see pg. 173) is a better choice to image a wider sector of the aorta and the thin wall of a dissection flap (see pg. 179).

Diagnostic Issues

- Aorta atherosclerosis
- Aorta dissection
- Aorta aneurysm
- AI severity PW Doppler
- IABP position



Basic TEE Views UE Aortic Arch LAX

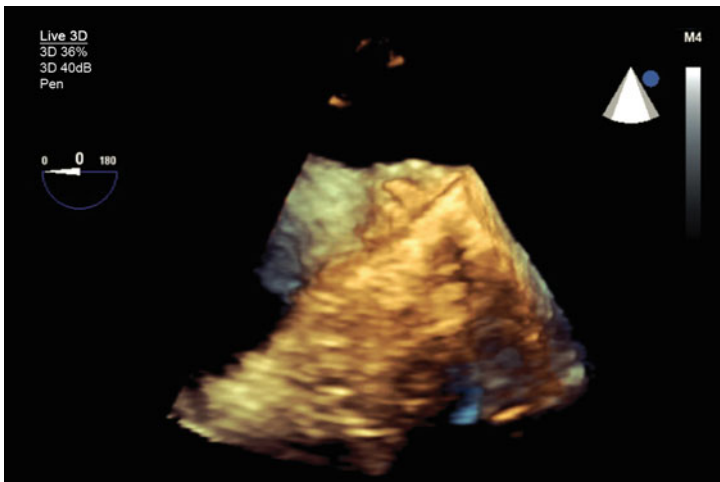
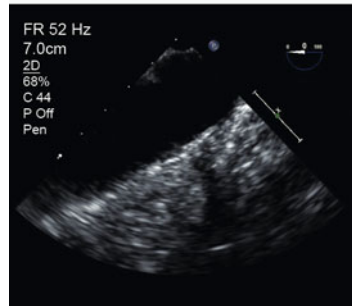
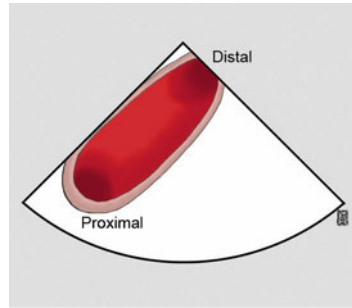
From the descending thoracic aorta SAX view (0°), the probe is withdrawn cephalad to the upper esophagus (UE). The circular shape of the descending thoracic aorta changes to an oblong shape of the transverse aortic arch (0°). The proximal aortic arch is to the display left and the distal arch to the right. Further probe withdrawal may image the great vessels of the head and neck.

3D Live mode with a slight tilt better images a section of the aorta intimal surface. The near field aortic wall is, however, poorly visualized.

3D Full Volume mode (see pg. 173) is a better choice to image a wider sector of the aorta and aortic pathology.

Diagnostic Issues

Aorta atherosclerosis
Aorta dissection
Aorta aneurysm
AI severity PW Doppler



Basic TEE Views UE Aortic Arch SAX

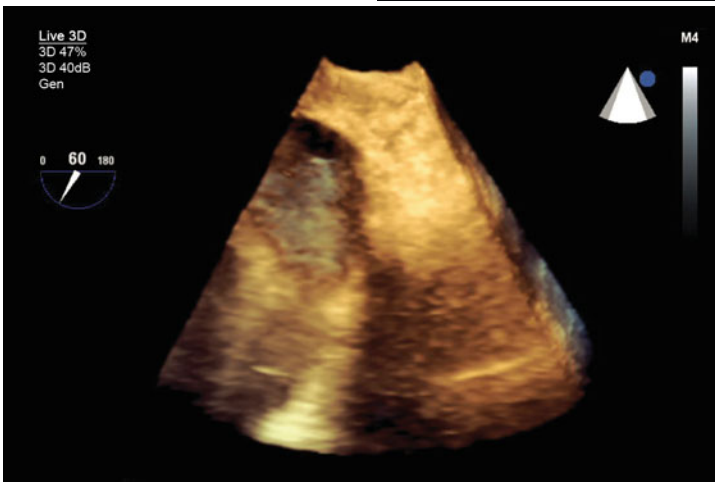
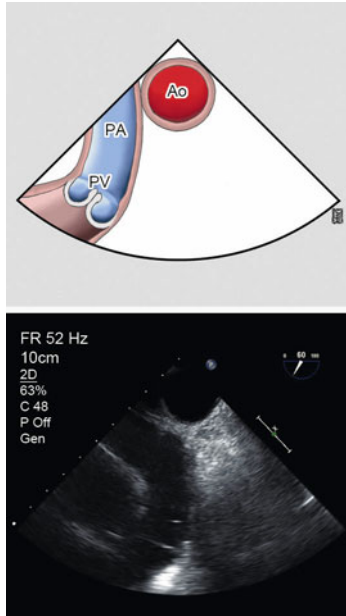
From the upper esophageal (UE) aortic arch LAX view (0°), increasing the transducer angle to 60° – 90° obtains the UE aortic arch SAX view. With probe manipulation the proximal origin of the left subclavian artery and innominate vein is seen in the upper right display. The pulmonic valve (PV) and main pulmonary artery (PA) in LAX are seen in the lower left display.

3D Live mode with a slight tilt down better images a narrow section of the PA intimal surface. The thin PV cusps are poorly seen.

3D Full Volume mode is a better choice to image a wider sector of the aorta and the thin PV cusps (see pg. 110).

Diagnostic Issues

- Aorta atherosclerosis
- Aorta dissection
- Aorta aneurysm
- Pulmonic valve pathology
- Patent ductus arteriosus (PDA)
- Swan–Ganz catheter position



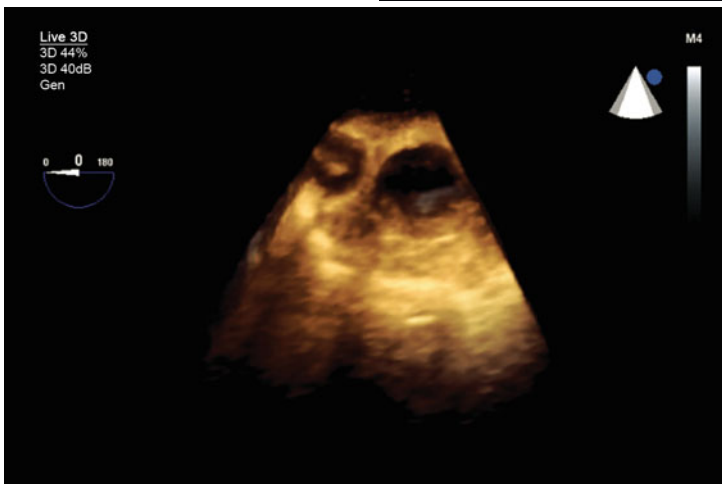
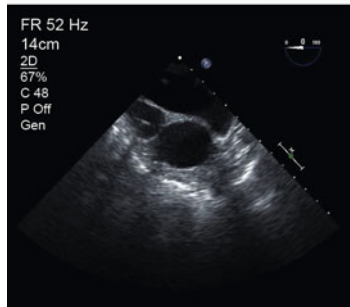
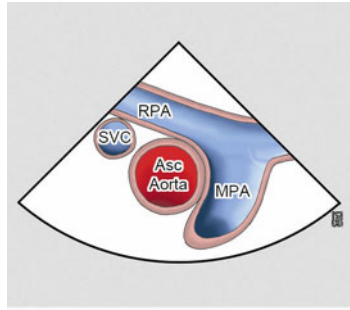
Basic TEE Views ME Ascending Aorta SAX

The ME ascending aorta SAX view (0–10°) is obtained by withdrawing the probe from the ME aortic valve SAX view (30°) and rotating the omniplane angle back to 0°. This view is also obtained from the mid-ascending aorta LAX (120°) by decreasing the omniplane angle to 0–10° to image superior vena cava (SVC) in SAX, ascending aorta (Asc. Aorta) in SAX and the right pulmonary artery (RPA) in LAX.

3D Live, Zoom, Full Volume modes even with a slight tilt down provide little additional information in 3D for this view.

Diagnostic Issues

- Aorta atherosclerosis
- Aorta dissection
- Aorta aneurysm
- Pulmonary embolism
- Swan–Ganz catheter position



Basic TEE Views ME Ascending Aorta LAX

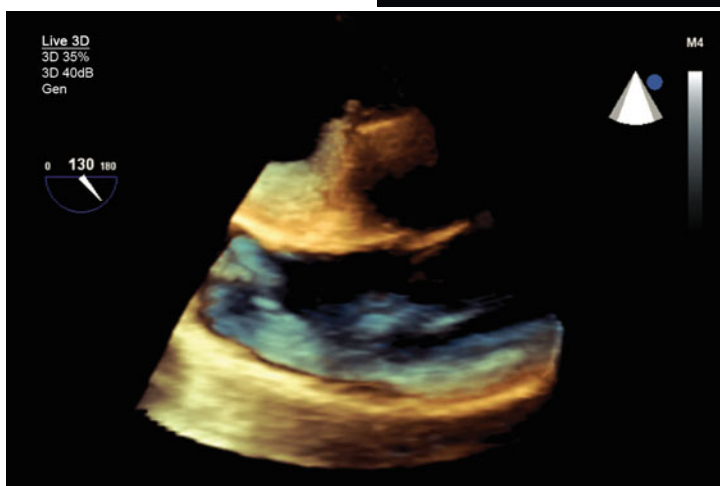
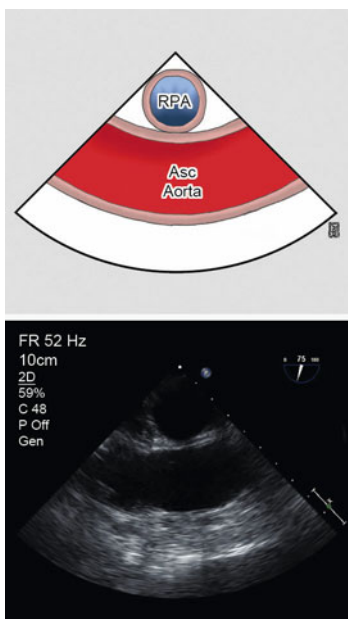
The mid-ascending aorta (Asc. Aorta) in LAX may be visualized from the ME AV LAX (120°), by withdrawing the probe to image the right pulmonary artery (RPA) in SAX.

3D Live mode with a slight tilt down images a section of the aorta intimal surface. The image quality is frequently poor as this is a difficult 2D image to obtain.

3D Full Volume or Zoom modes may provide better images for the ascending aorta in LAX.

Diagnostic Issues

- Aorta atherosclerosis
- Aorta dissection
- Aorta aneurysm
- AI flow
- Aortic stenosis flow
- Swan-Ganz catheter in RPA
- Pericardial effusion in transverse sinus



Basic TEE Views ME Left Atrial Appendage

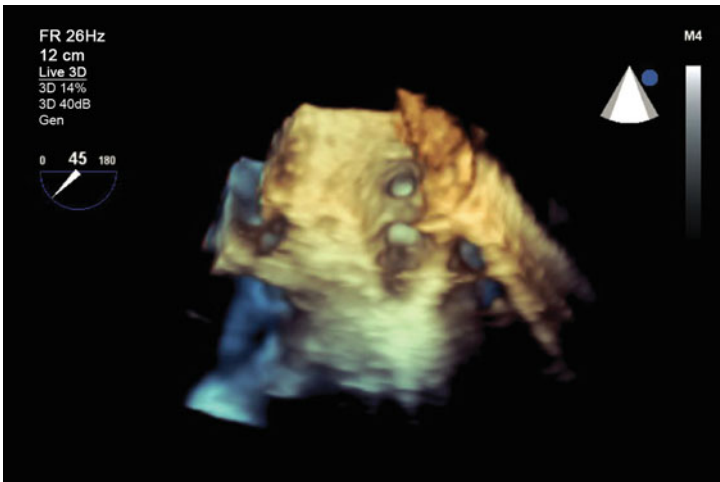
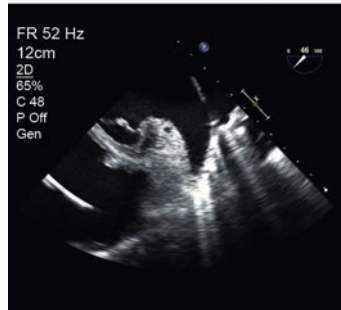
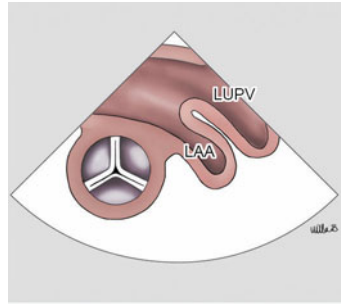
The left atrial appendage (LAA) view is obtained by reducing the image depth from the ME RVOT view and adjusting the omniplane angle between 60° and 80°. The LAA is seen above the mitral valve (MV) and aortic valve (AV). The left upper pulmonary vein (LUPV) is above, more posterior and closer to the probe.

3D Live mode shows only half of the LAA.

3D Full Volume and Zoom modes image the entire LAA. The orifice of the LAA can be seen from a rotated surgical orientation (see pg. 219).

Diagnostic Issues

LAA pathology
LUPV flow



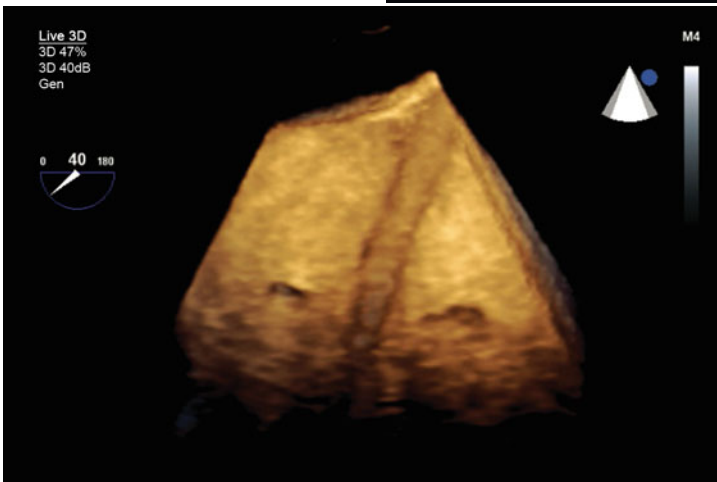
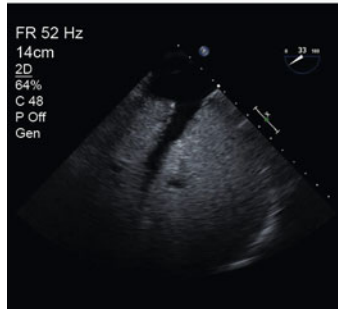
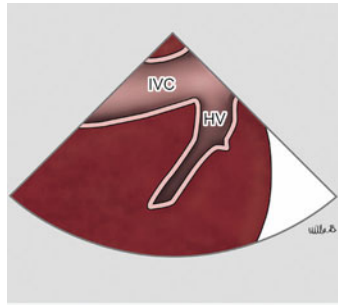
Basic TEE Views TG Inferior Vena Cava

The transgastric (TG) inferior vena cava (IVC) LAX view is obtained by advancing the probe to image the TG mid-SAX view (0°). Turn the probe right to find the liver, withdraw to find the IVC as it enters the right atrium (RA). Adjust the probe and omniplane angle to identify the hepatic vein (HV) as it enters the IVC.

3D Live mode images the hepatic vein well. The lumen of the IVC is difficult to visualize due to dropout of the wall closest to the probe.

Diagnostic Issues

Tricuspid regurgitation
Mass (tumor, thrombus)
IVC cannula position
IVC respiratory variation



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