

TEE for haemodynamic instability

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- **Fellowships:**
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 - Freeman Hospital, UK









Vietnam Anaesthesia Conference 19-Jun-16

Disclosure

- No conflict of interest

? Occasional user

- Occasional Cardiac Anaesthetists
- Occasional Non-Cardiac / General Anaesthetists
- Intensivists
- For regular Cardiac Anaesthetists

Objective

- Cardiac Anaesthetists

- Perioperative cardiac surgery

- Non-cardiac Anaesthetists

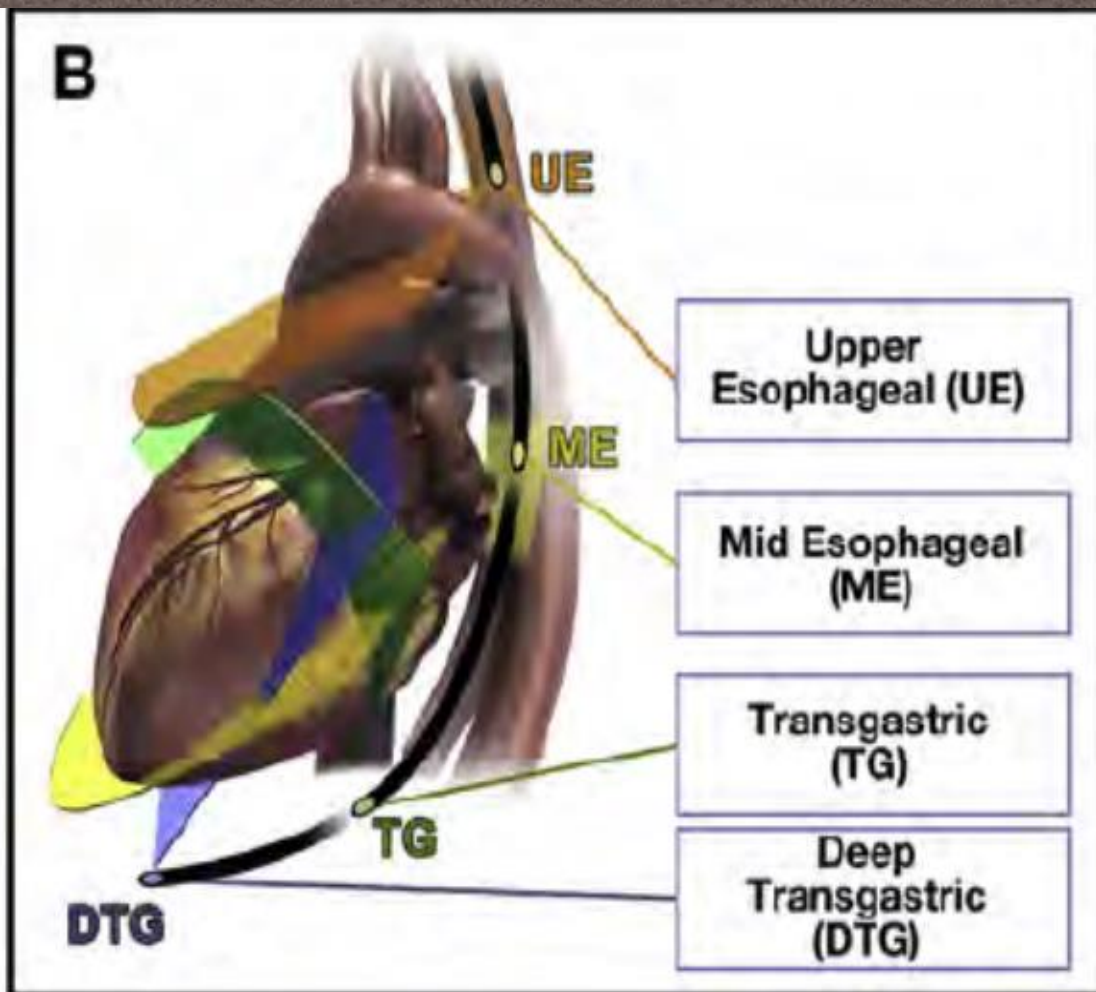
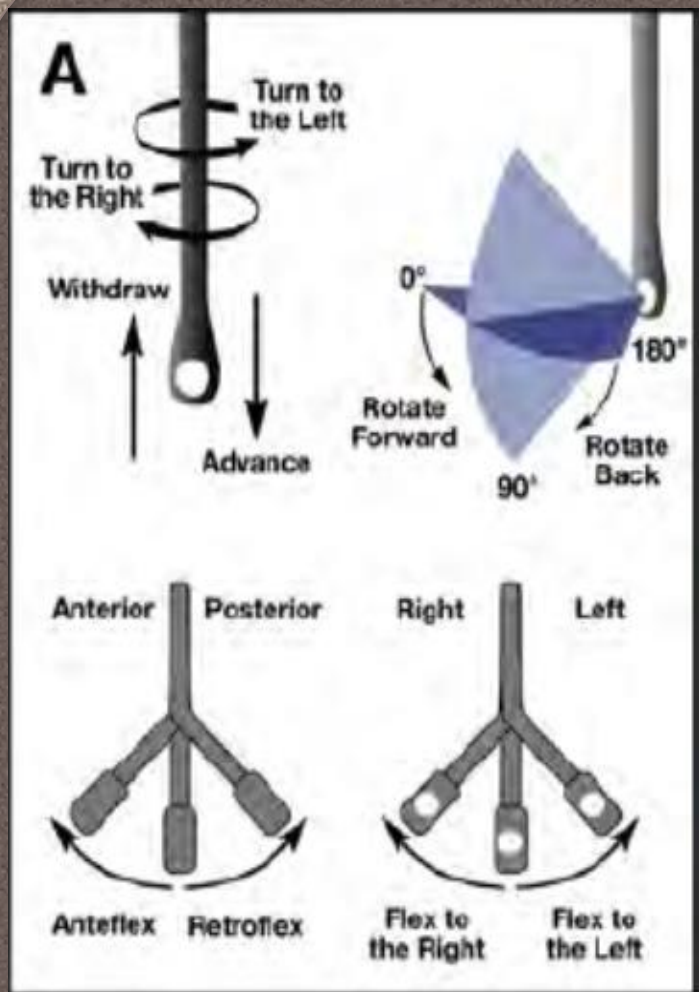
- Acute haemodynamic instability: in OR or in ICU

Outline

- TEE probe manipulations
- Normal heart
 - Guidelines / views
- Pathologies: haemodynamic instability

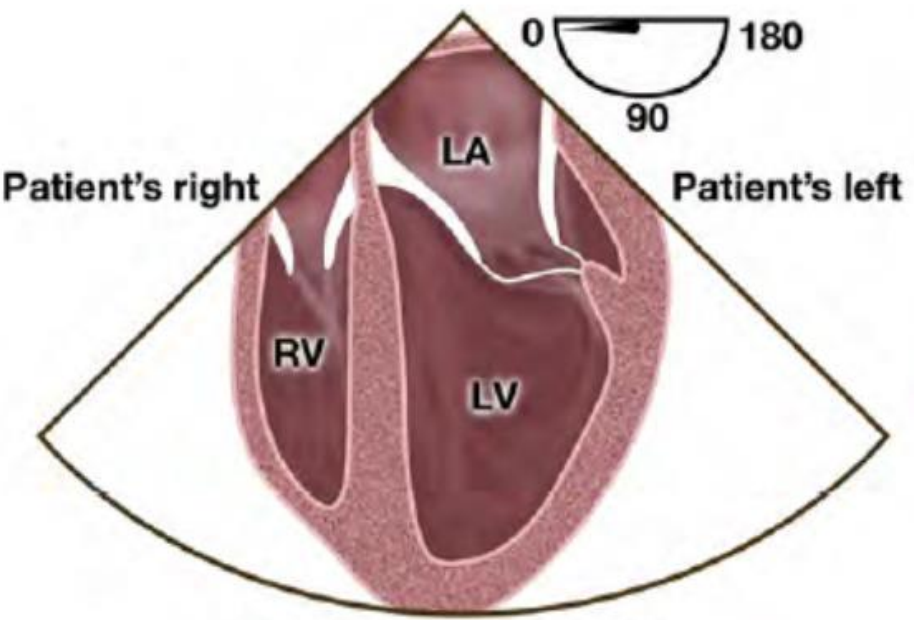
Instrument manipulation

- 4 ways
- Supine anatomical position
- Imaging plane anteriorly from oesophagus to heart
- Superior: towards head
- Inferior: towards feet
- Anterior: towards sternum
- Posterior: towards spine
- Right & Left: patients right and left

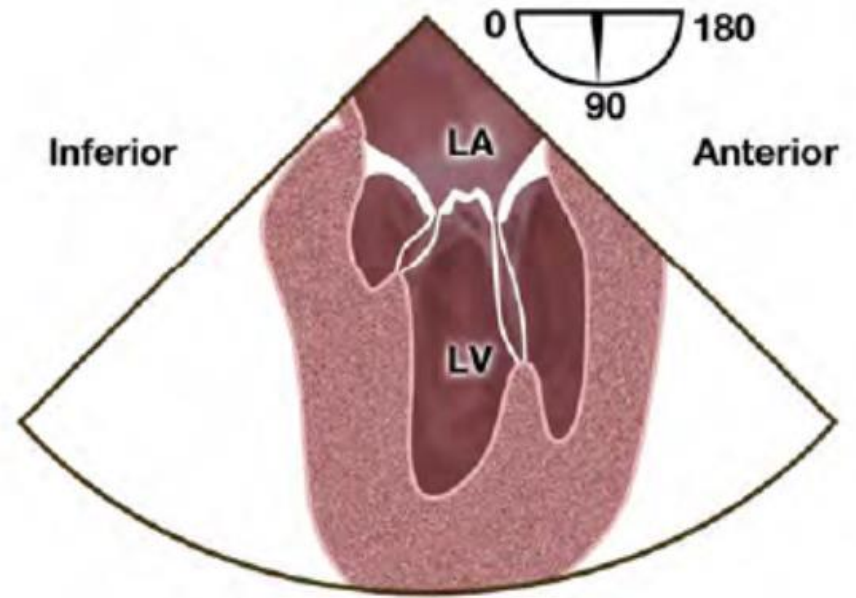


A: Terminologies

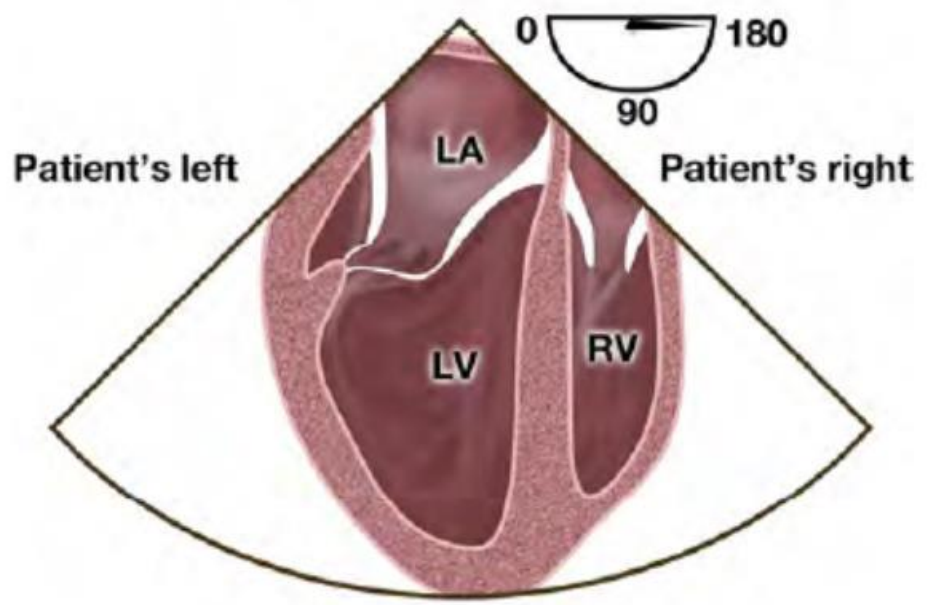
B: 4-standard positions



A. Multiplane angle 0



B. Multiplane angle 90



C. Multiplane angle 180

Evolution of TEE guidelines

Year	Citation	Society	Title	Purpose	Comments
1996	Anesthesiology 1996;84:986-1006	ASA/SCA	Practice Guidelines for Perioperative Transesophageal Echocardiography	Distinguish basic from advanced PTE skills	Cognitive and technical skills for basic and advanced PTE echocardiography are described; monitoring aspect of basic TEE is described; full diagnostic potential of advanced PTE echocardiography
1999	Anesth Analg 1999;89:870-884; J Am Soc Echocardiogr 1999;12:884-900	ASE/SCA	ASE/SCA Guidelines for Performing a Comprehensive Intraoperative Multiplane Transesophageal Echocardiography Examination	Describes 20 views making up a comprehensive transesophageal echocardiographic examination	
2002	Anesth Analg 2002;94:1384-1388	ASE/SCA	American Society of Echocardiography and Society of Cardiovascular Anesthesiologists Task Force Guidelines for Training in Perioperative Echocardiography	Training objectives and number of required transesophageal echocardiographic examinations are set	
2006	J Am Soc Echocardiogr 2006;19:1303-1313	ASE/SCA	American Society of Echocardiography/ Society of Cardiovascular Anesthesiologists Recommendations and Guidelines for Continuous Quality Improvement in Perioperative Echocardiography	Establish recommendations and guidelines for a continuous quality improvement program specific to the perioperative environment	
2010	Anesthesiology 2010;112:1084 - 1096	ASA/SCA	Practice Guidelines for Perioperative Transesophageal Echocardiography	Update of 1996 document	

New updated guidelines

- In 2013: ASE and SCA

- Basic Perioperative TEE Examination
- Performing Comprehensive TEE Examination

EXPERT CONSENSUS STATEMENT

Basic Perioperative Transesophageal Echocardiography Examination: A Consensus Statement of the American Society of Echocardiography and the Society of Cardiovascular Anesthesiologists

Scott T. Reeves, MD, FASE, Alan C. Finley, MD, Nikolaos J. Skubas, MD, FASE, Madhav Swaminathan, MD, FASE, William S. Whiteley, MD, Kathryn E. Glas, MD, FASE, Rebecca T. Hahn, MD, FASE, Jack S. Shanewise, MD, FASE, Mark S. Adams, BS, RDCS, FASE, and Stanton K. Sherman, MD, FASE, for the Council on Perioperative Echocardiography of the American Society of Echocardiography and the Society of Cardiovascular Anesthesiologists, *Charleston, South Carolina; New York, New York; Durham, North Carolina; Atlanta, Georgia; Boston, Massachusetts*

(J Am Soc Echocardiogr 2013;26:443-56.)

Basic PTE examination content outline

1. Patient safety considerations
2. Echocardiographic imaging: acquisition and optimization
3. Normal cardiac anatomy and imaging plane correlation
4. Global ventricular function
5. Regional ventricular systolic function and recognition of pathology
6. Basic recognition of cardiac valve abnormalities
7. Identification of intracardiac masses in noncardiac surgery
8. Basic perioperative hemodynamic assessment
9. Related diagnostic modalities
10. Basic recognition of congenital heart disease in adults
11. Surface ultrasound for vascular access

ASE GUIDELINES AND STANDARDS

Guidelines for Performing a Comprehensive Transesophageal Echocardiographic Examination: Recommendations from the American Society of Echocardiography and the Society of Cardiovascular Anesthesiologists

Rebecca T. Hahn, MD, FASE, Chair, Theodore Abraham, MD, FASE, Mark S. Adams, RDCS, FASE, Charles J. Bruce, MD, FASE, Kathryn E. Glas, MD, MBA, FASE, Roberto M. Lang, MD, FASE, Scott T. Reeves, MD, MBA, FASE, Jack S. Shanewise, MD, FASE, Samuel C. Siu, MD, FASE, William Stewart, MD, FASE, and Michael H. Picard, MD, FASE, *New York, New York; Baltimore, Maryland; Boston, Massachusetts; Rochester, Minnesota; Atlanta, Georgia; Chicago, Illinois; Charleston, South Carolina; London, Ontario, Canada; Cleveland, Ohio*

(J Am Soc Echocardiogr 2013;26:921-64.)

Indications

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

Appropriate Use Criteria (AUC)

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

Table 6 List of absolute and relative contraindications to transesophageal echocardiography

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

Complications

Table 7 List of complications reported with TEE and the incidence of these complications during diagnostic TEE and intraoperative TEE^{7,24-31}

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)

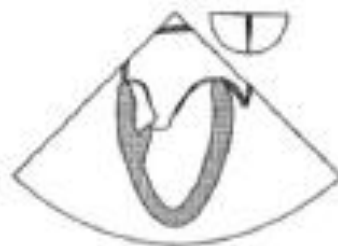
Comprehensive examination

- 20 views (previous guidelines)
- 2013: Basic TEE: 11 views
- 2013: Comprehensive: 28 views

Basic TEE examination: 11 views



A. ME Four Chamber



B. ME Two Chamber



C. ME LAX



D. ME Asc Aortic LAX



E. ME Asc Aortic SAX



F. ME AV SAX



G. ME RV Inflow-Outflow



H. ME Bicaval



I. TG Mid SAX



F. Desc Aortic SAX



G. Desc Aortic LAX

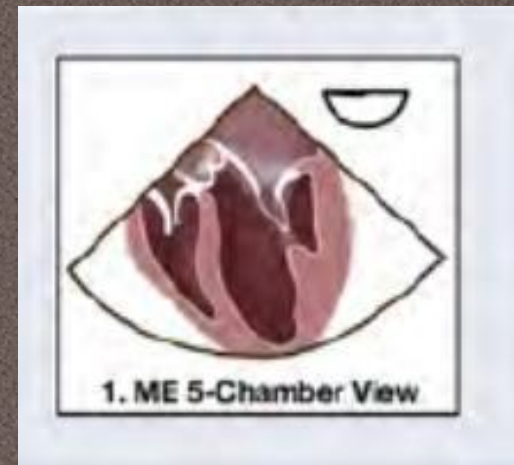
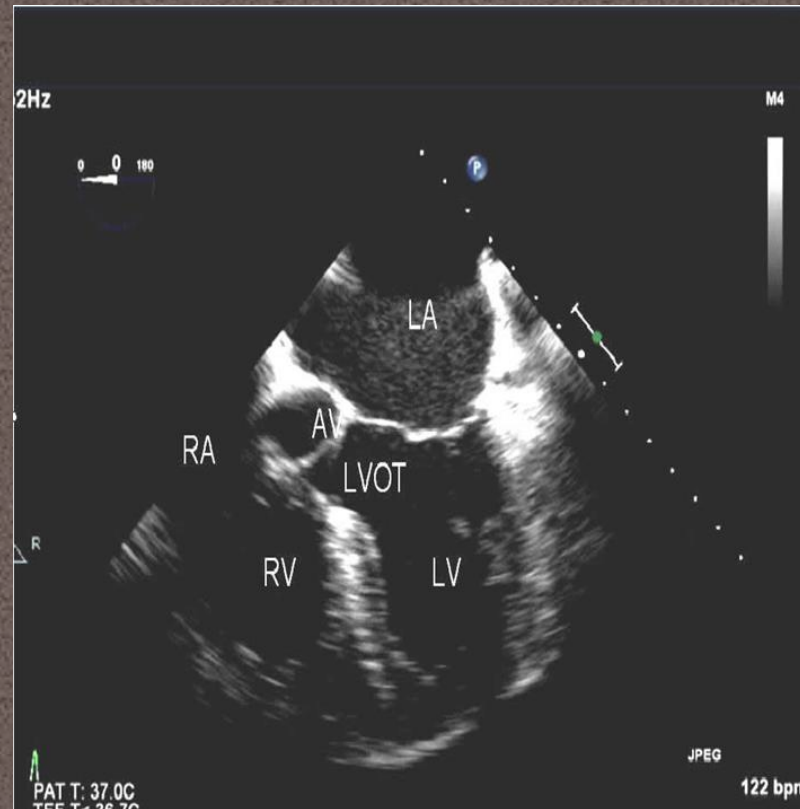
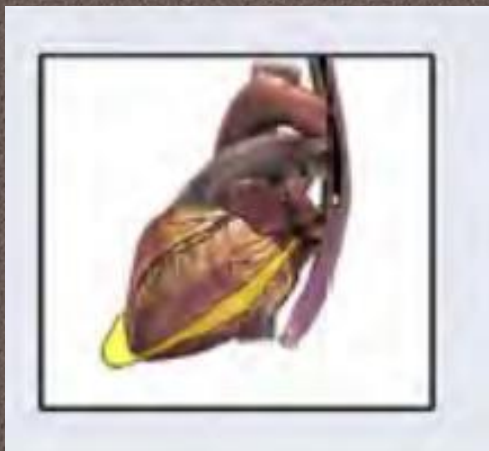
Normal Heart

- 11 basic views
- Some of the remainder from 28 views suitable for this talk

ME 5-Chamber

Angle: 0-10 degrees

St: AV, LVOT, LA/RA, LV/RV/IVS, MV(A2A1-P1), TV



ME 5-Chamber

Angle: 0-10 degrees

St: AV, LVOT, LA/RA, LV/RV/IVS, MV(A2A1-P1), TV

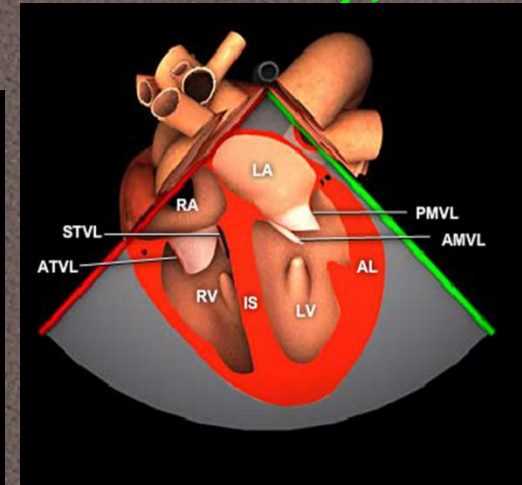
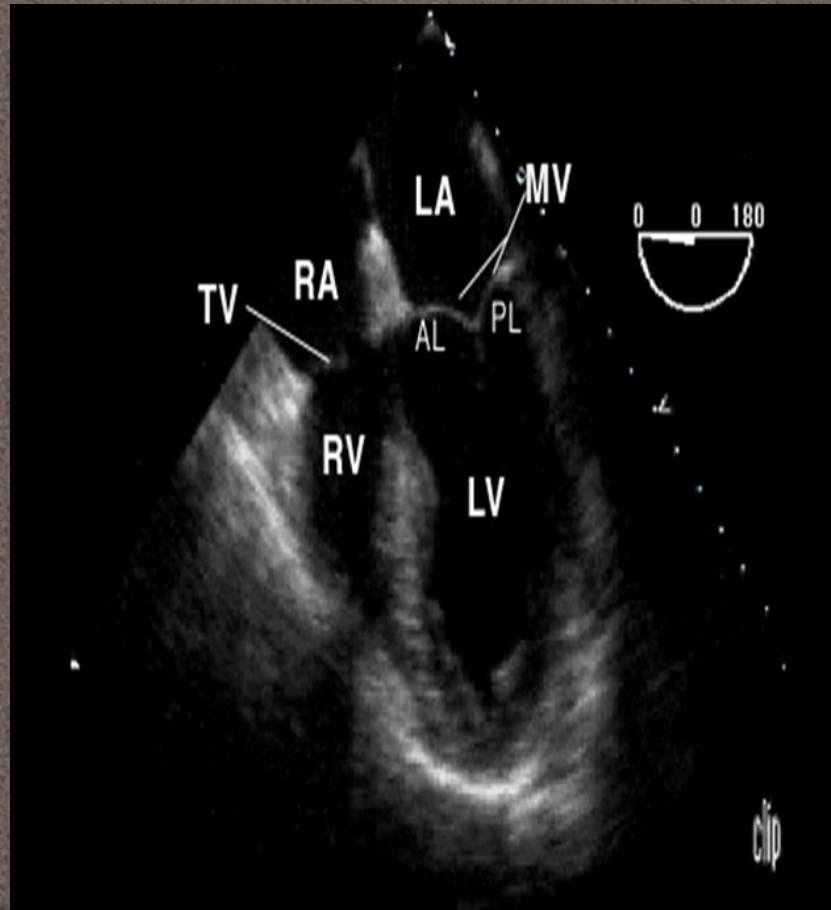
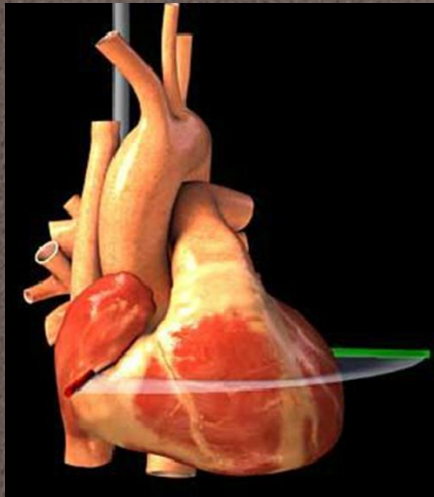


AR, MR, TR

ME 4-Chamber

Angle: 0-20 degrees

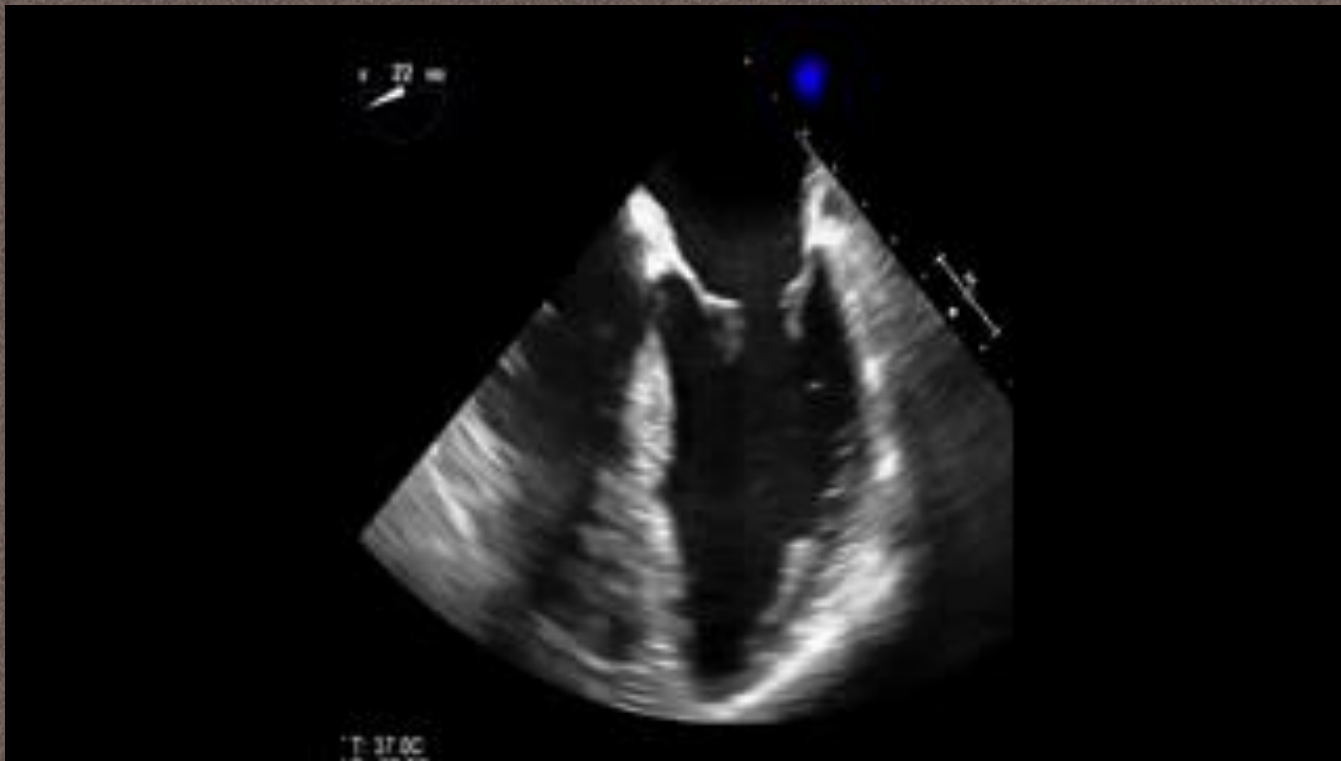
St: LA/RA/IAS, LV/RV/IVS, MV(A3A2-P2P1), TV



ME 4-Chamber

Angle: 0-20 degrees

St: LA/RA/IAS, LV/RV/IVS, MV(A3A2-P2P1), TV

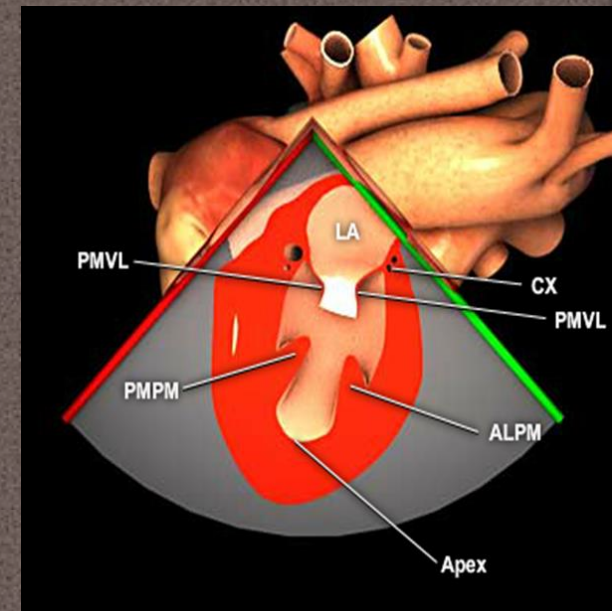
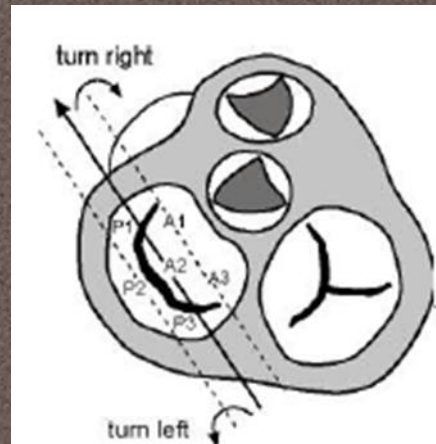
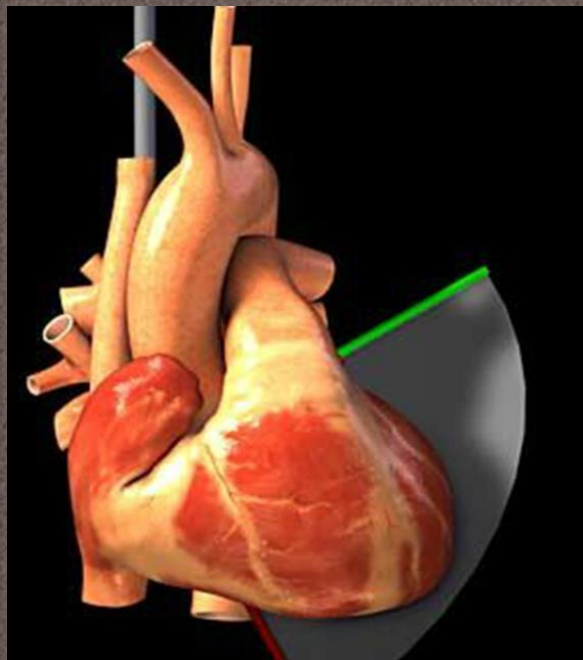


MV, TV, Regional LV (IS, AL), RV, MR, TR, ASD,
Chamber enlargement, volume/fn, PE

ME Mitral Commissural

Angle: 50-70 degrees

St: LA, Coronary sinus, LV, MV(P3A2P1), Papillary muscles, chordae tendinae



ME Mitral Commissural

Angle: 50-70 degrees

St: LA, Coronary sinus, LV, MV(P3A2P1), Papillary muscles, chordae tendinae

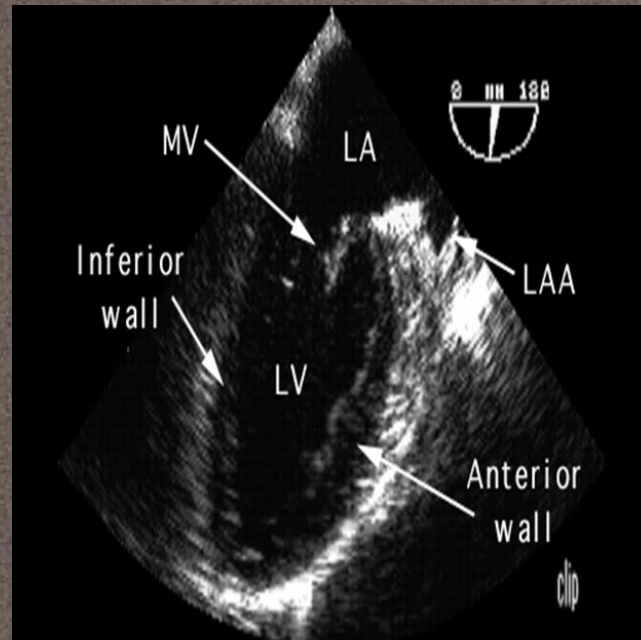
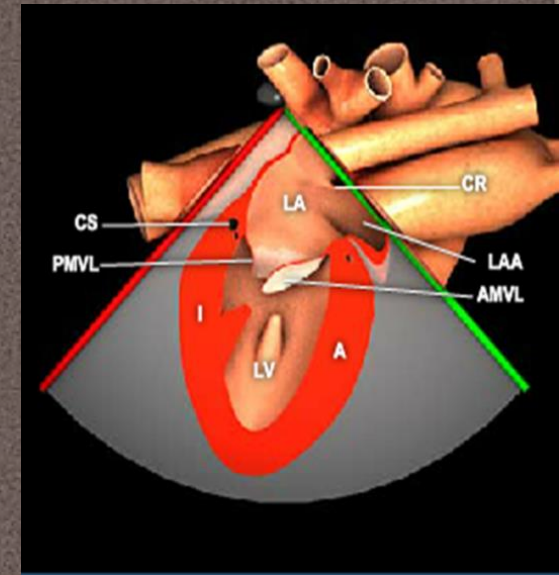
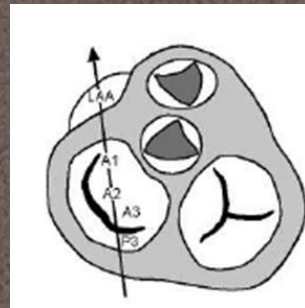
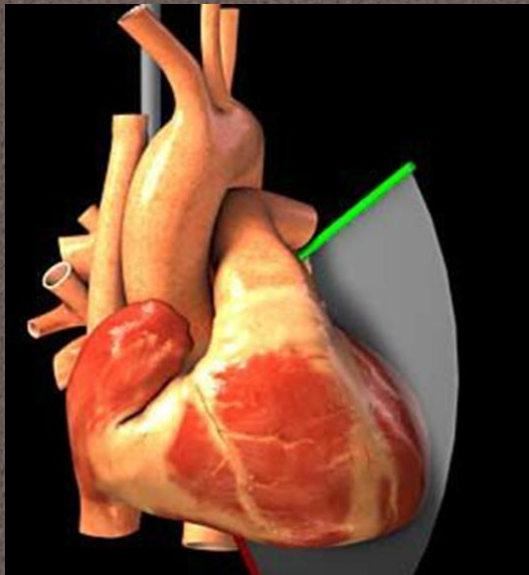


Regional LV (Ant/AL, Inf/IL), MV, localisation of MR jet, LA pathology

ME 2-Chamber

Angle: 80-100 degrees

St: LA, Coronary sinus, LAA, LV, MV (P3-A3A2P1)



ME 2-Chamber

Angle: 80-100 degrees

St: LA, Coronary sinus, LAA, LV, MV (P3-A3A2P1)

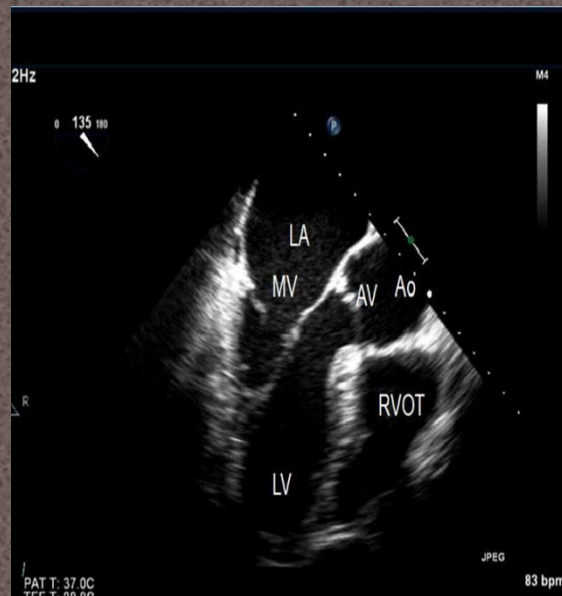
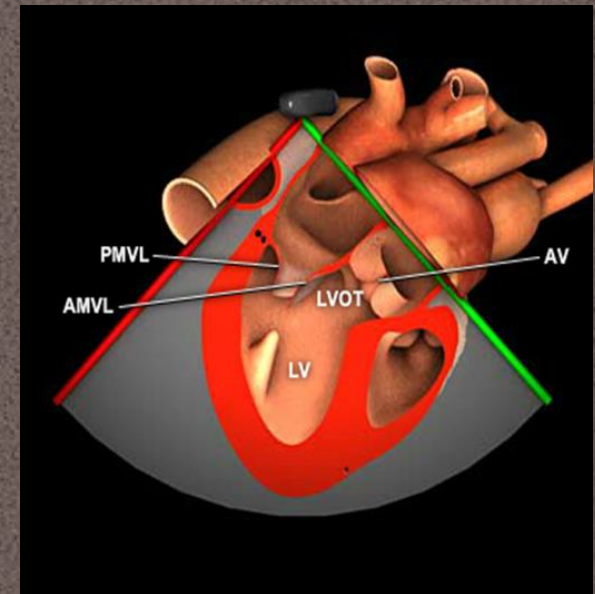
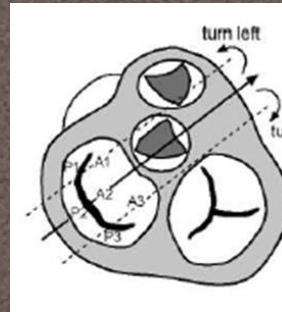
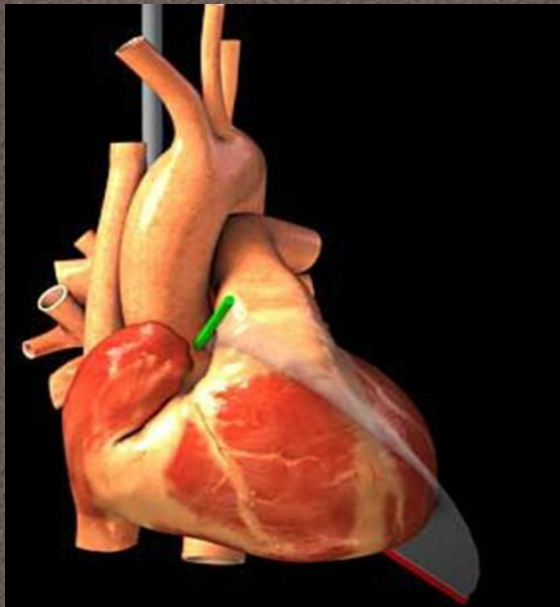


Regional LV (Ant/Inf), LV apex, MR, MS, LAA
mass/thrombus

ME LAX view

Angle: 120-140 degrees

St: LA, LV, LVOT, RVOT, MV (P2-A2), AV, prox Asc Aorta



ME LAX view

Angle: 120-140 degrees

St: LA, LV, LVOT, RVOT, MV (P2-A2), AV, prox Asc Aorta

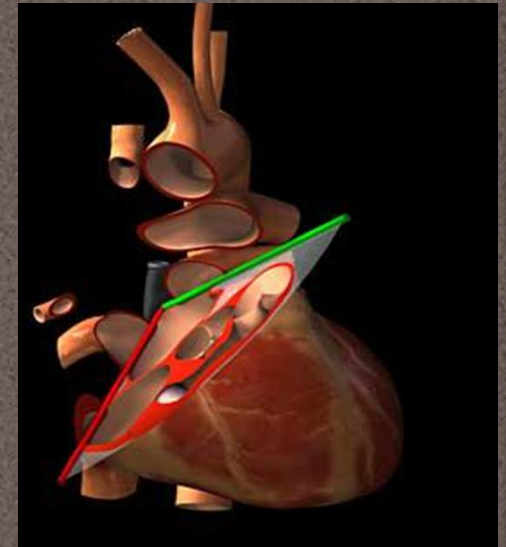
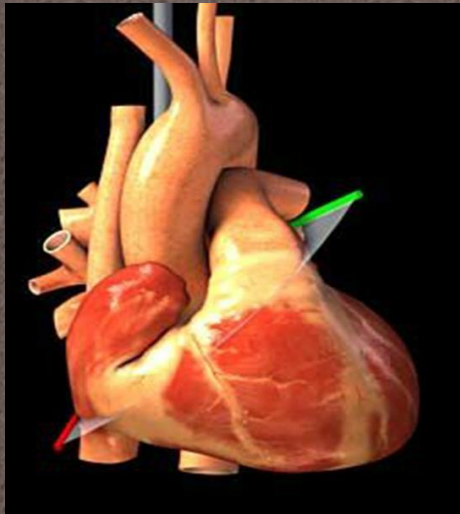


Regional LV (IL/AS), MV, AV, Aortic Root, IVS, LVOT

ME AV SAX view

Angle: 25-45 degrees

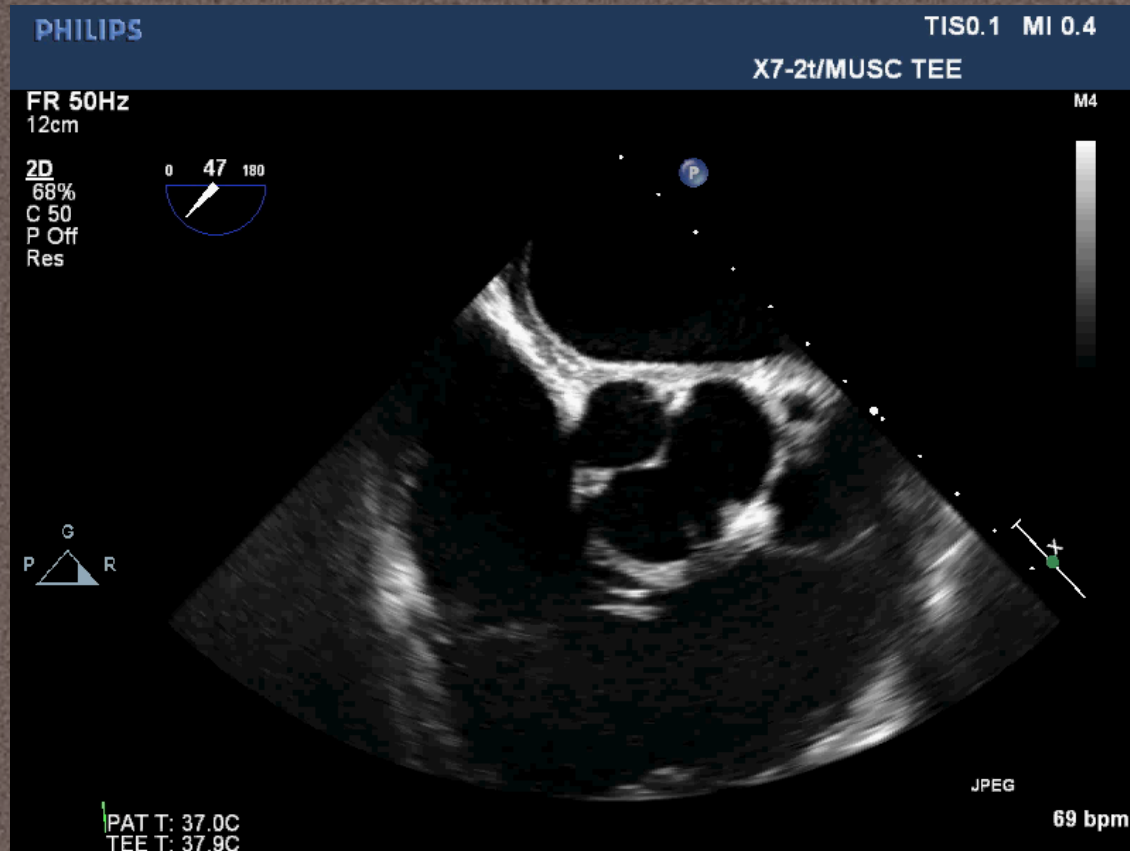
St: AV, RA, LA, Sup IAS, RVOT, Pulmonary Valve



ME AV SAX view

Angle: 25-45 degrees

St: AV, RA, LA, Sup IAS, RVOT, Pulmonary Valve

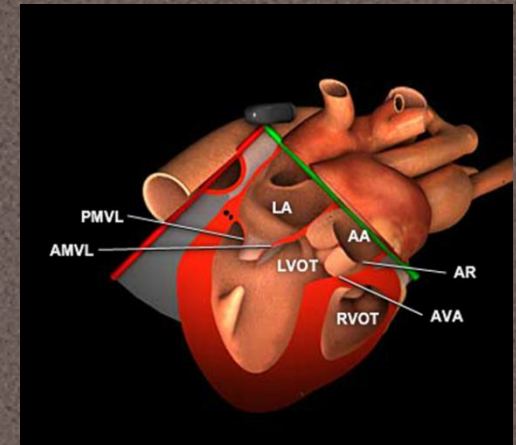
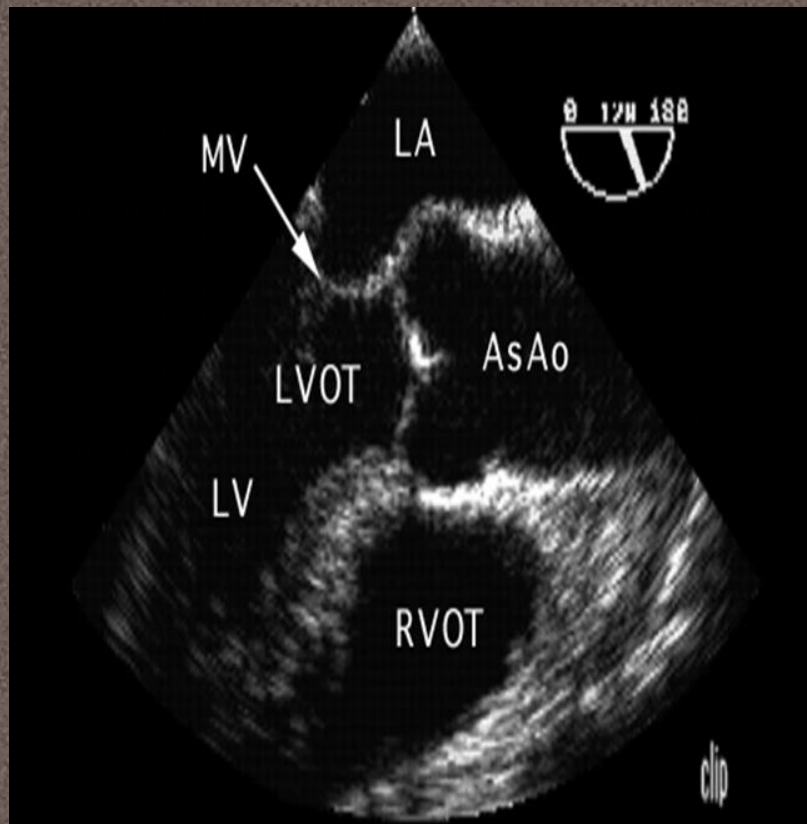
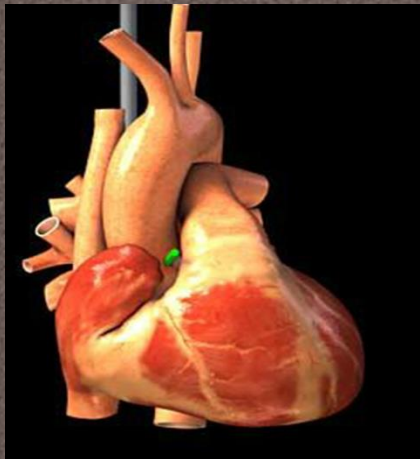


AV, LCA, RCA, sup LA, IAS, RA, PFO, RVOT, PV,

ME AV LAX view

Angle: 120-140 degrees

St: LA, LVOT, RVOT, MV (P2-A2), AV, prox Asc Aorta



ME AV LAX view

Angle: 120-140 degrees

St: LA, LVOT, RVOT, MV (P2-A2), AV, prox Asc Aorta

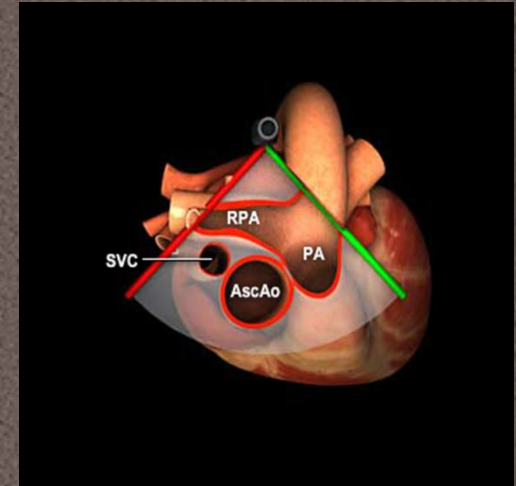
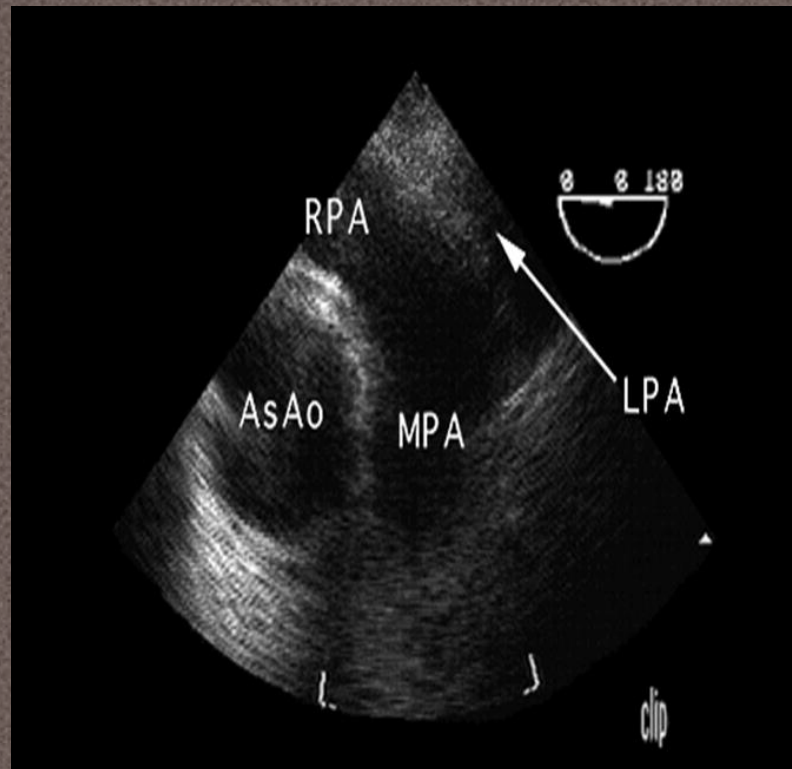
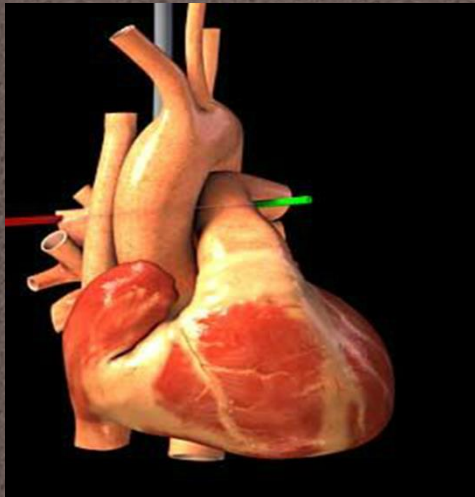


AV pathology, Aortic root dimensions, Aorta, LVOT,
Rt coronary ostium, VSD

ME Ascending Aorta SAX view

Angle: 0-30 degrees

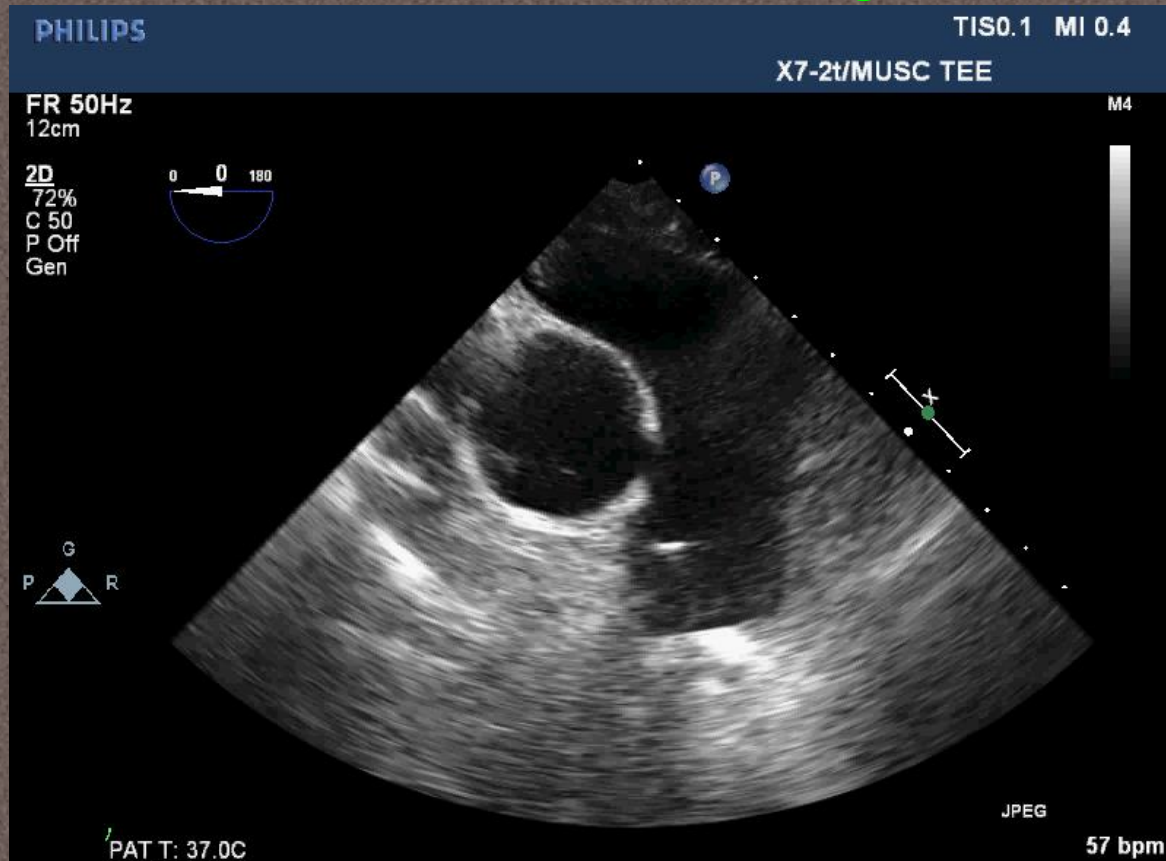
St: Mid ascending aorta, MPA, SVC



ME Ascending Aorta SAX view

Angle: 0-30 degrees

St: Mid ascending aorta, MPA, SVC

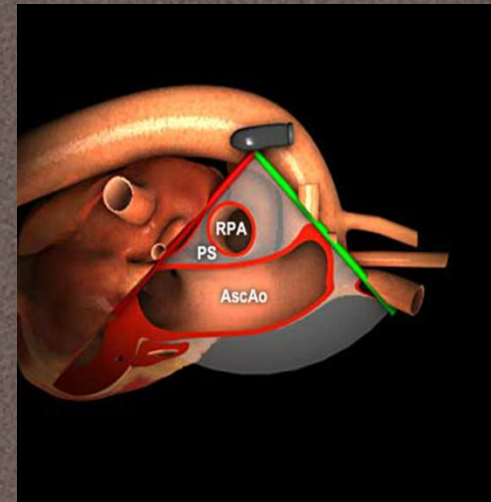
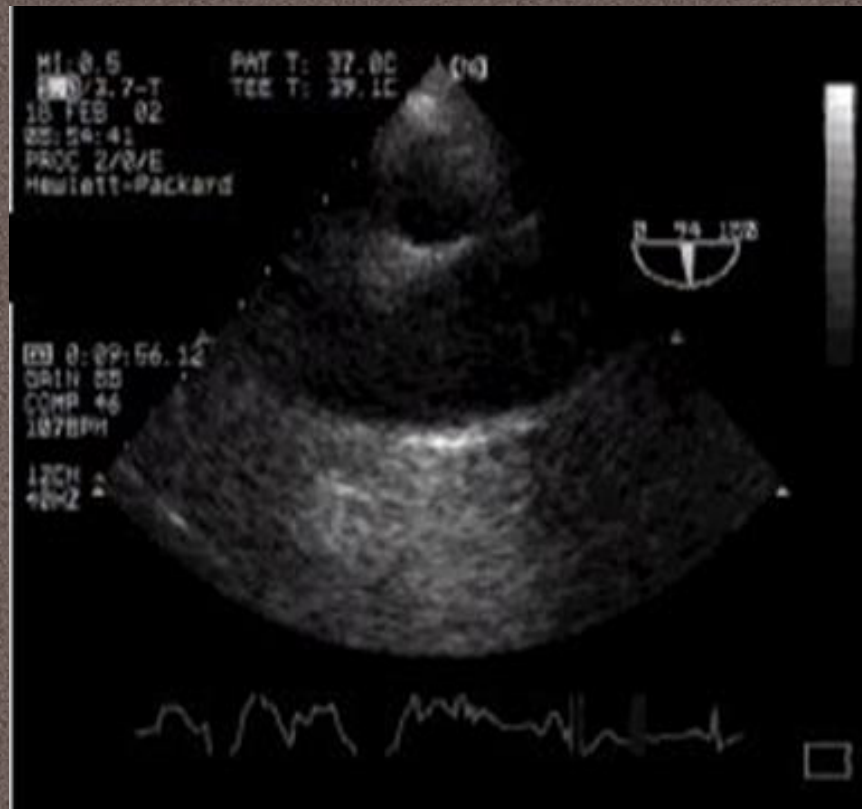
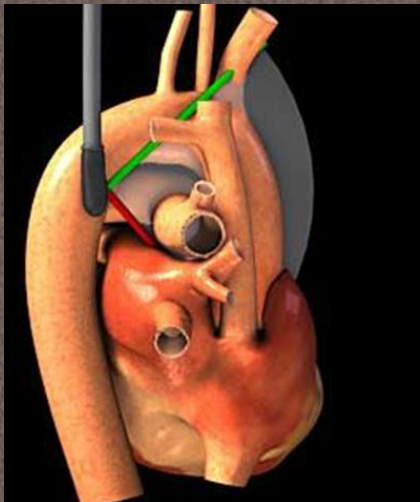


PWD/CWD PV, Asc aorta, dissection, dilatation,
atherosclerosis, PE, PDA, PAC

ME Ascending Aorta LAX view

Angle: 90-110 degrees

St: Mid ascending aorta, Right PA



ME Ascending Aorta LAX view

Angle: 90-110 degrees

St: Mid ascending aorta, Right PA

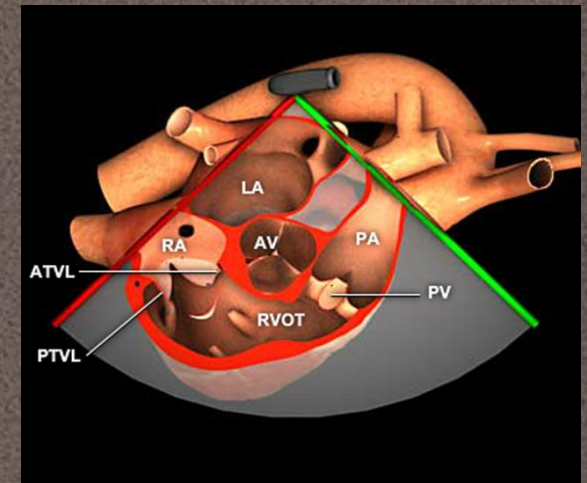
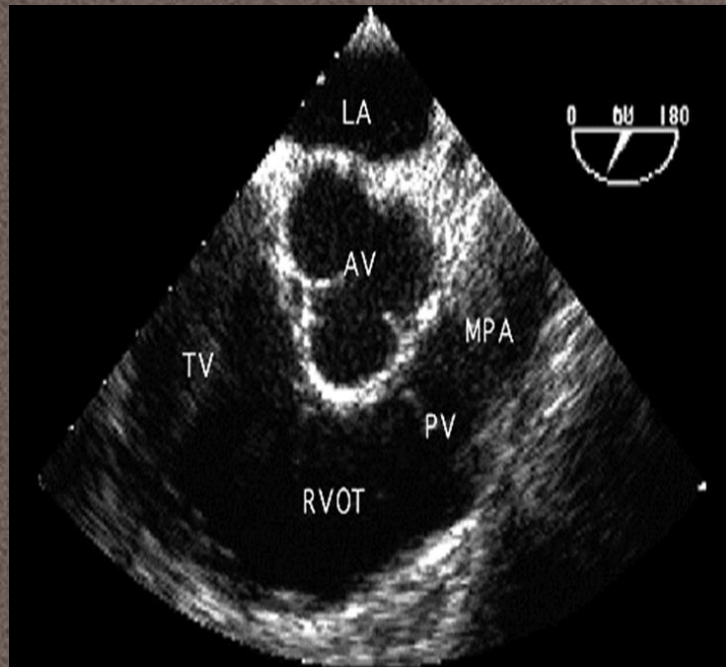
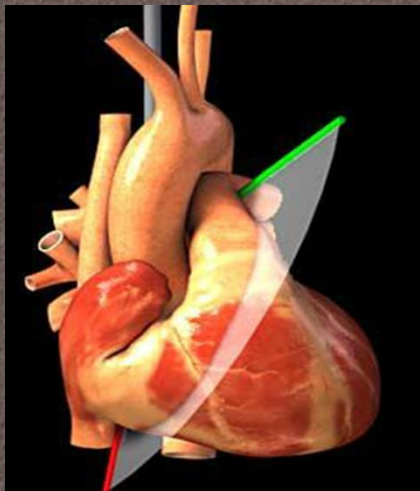


Proximal Asc Aorta, aortic dissection, dilatation,
atherosclerosis, RPA, PE

ME RV Inflow Outflow view

— Angle: 50-70 degrees

St: AV, RA, LA, Sup IAS, TV, RVOT, Pulmonary Valve, prox MPA



ME RV Inflow Outflow view

— Angle: 50-70 degrees

St: AV, RA, LA, Sup IAS, TV, RVOT, Pulmonary Valve,
prox MPA

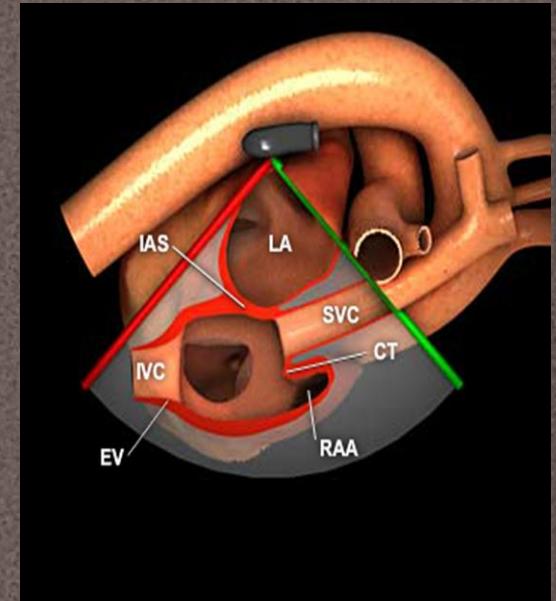
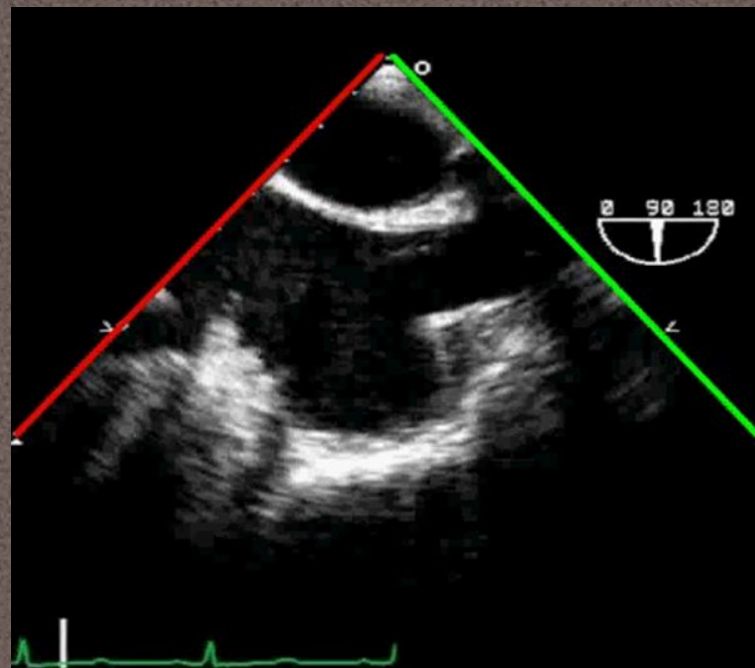
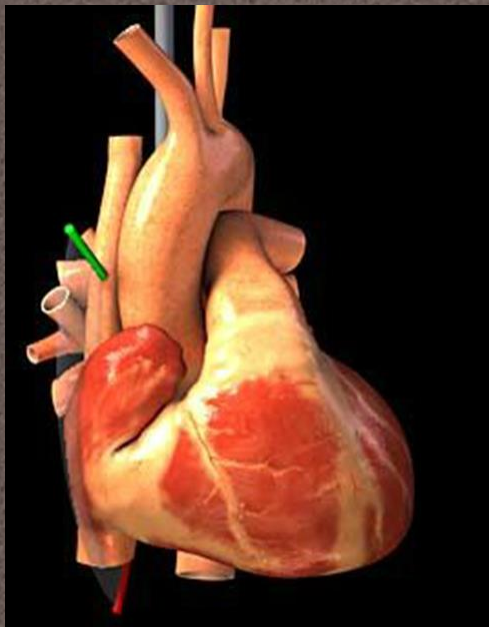


RV size & fn, TV & PV: morphology & fn, CFD,
spectral Doppler: Estimate RVSP, VSD

ME bicaval view

Angle: 90-110 degrees

St: RA, LA, RAA, Mid IAS, SVC, IVC



ME bicaval view

Angle: 90-110 degrees

St: RA, LA, RAA, Mid IAS, SVC, IVC

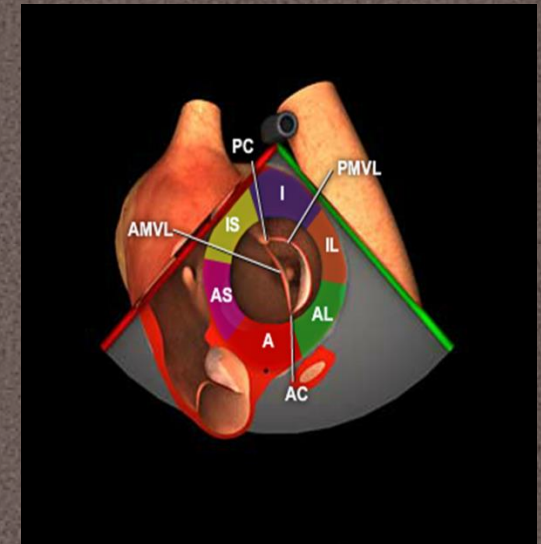
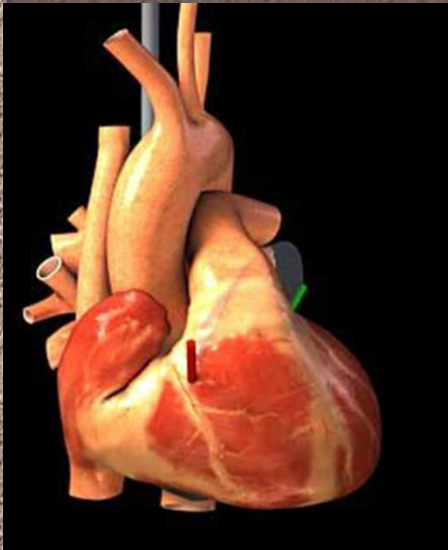


IAS morphology, LA shunts, SVC and IVC inflow,
Lines, Wires

TG Basal SAX view

Angle: 0-20 degrees

St: LV, RV, MV, (SAX), TV (SAX)



TG Basal SAX view

Angle: 0-20 degrees

St: LV, RV, MV, (SAX), TV (SAX)

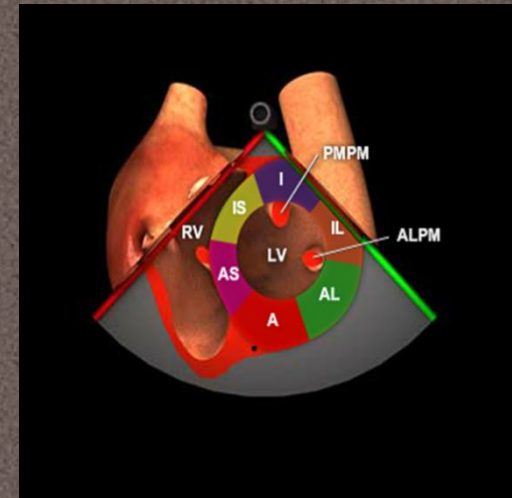
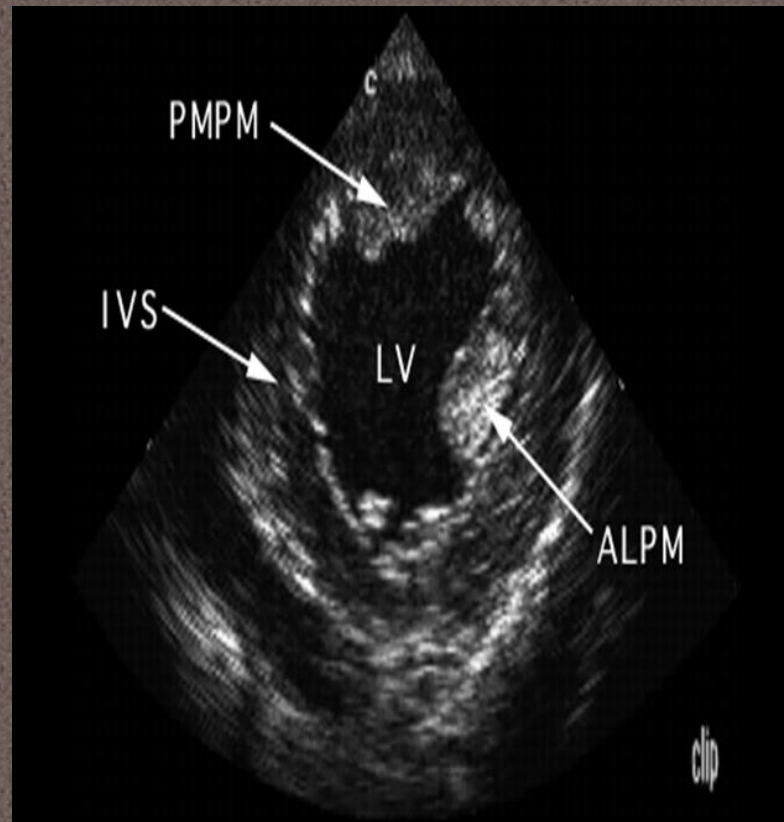
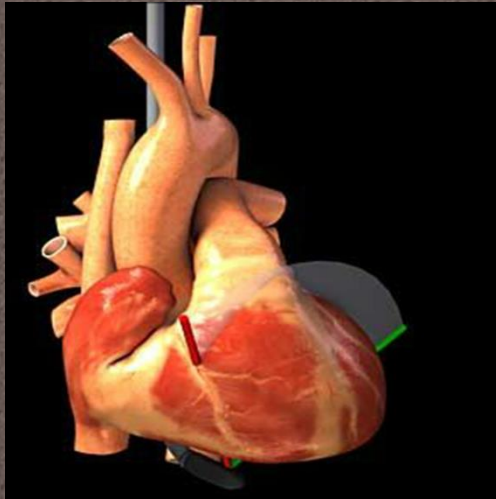


MV morphology & fn, MR orifice, MV planimetry,
LV size & fn, VSD, PE

TG Mid Papillary SAX view

Angle: 0-20 degrees

St: LV (mid), Papillary muscles, RV (mid)



TG Mid Papillary SAX view

Angle: 0-20 degrees

St: LV (mid), Papillary muscles, RV (mid)



LV dilatation, hypertrophy, volume, global & regional
Fn, Haemodynamic instability, IVS motion, VDS, PE

TG Apical SAX view

Angle: 0-20 degrees

St: LV (Apex), RV (Apex)



TG Apical SAX view

Angle: 0-20 degrees
St: LV (Apex), RV (Apex)

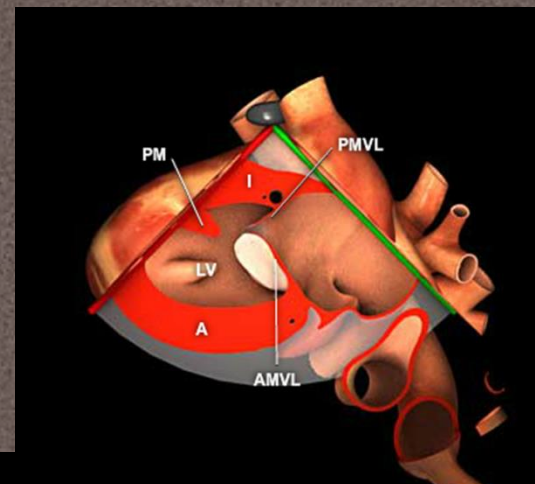
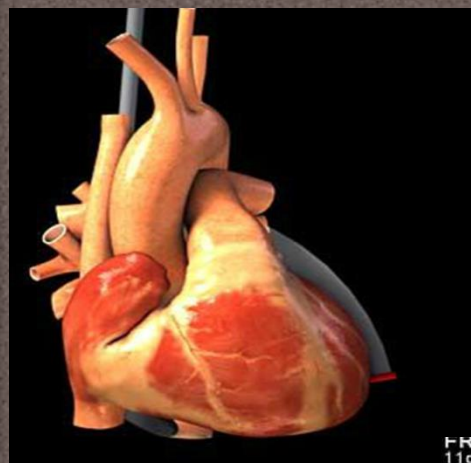


LV & RV Apical segments

TG 2-Chamber view

Angle: 90-110 degrees

St: LV, LA/LAA, MV, PM, chordae

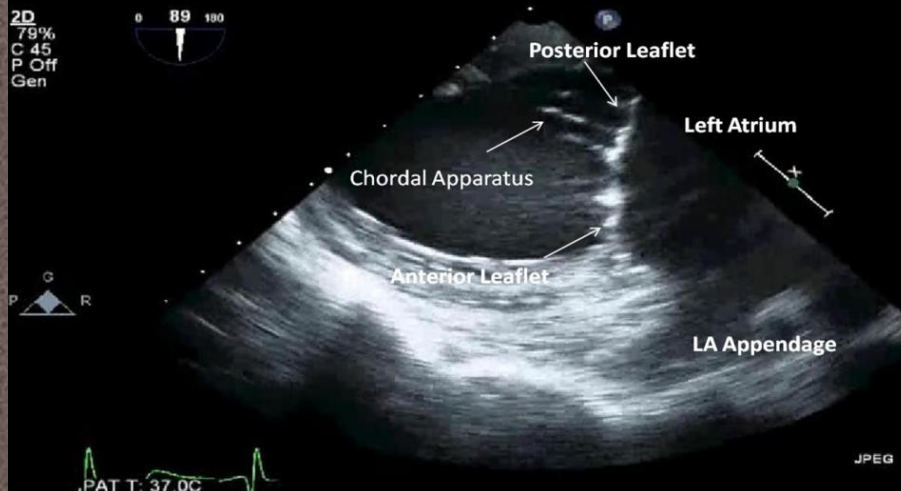


FR 35HZ
11cm

2D
79%
C 45
P Off
Gen

0 89 180

G
P R



PAT T: 37.0C

JPEG

TG 2-Chamber view

Angle: 90-110 degrees

St: LV, LA/LAA, MV, PM, chordae

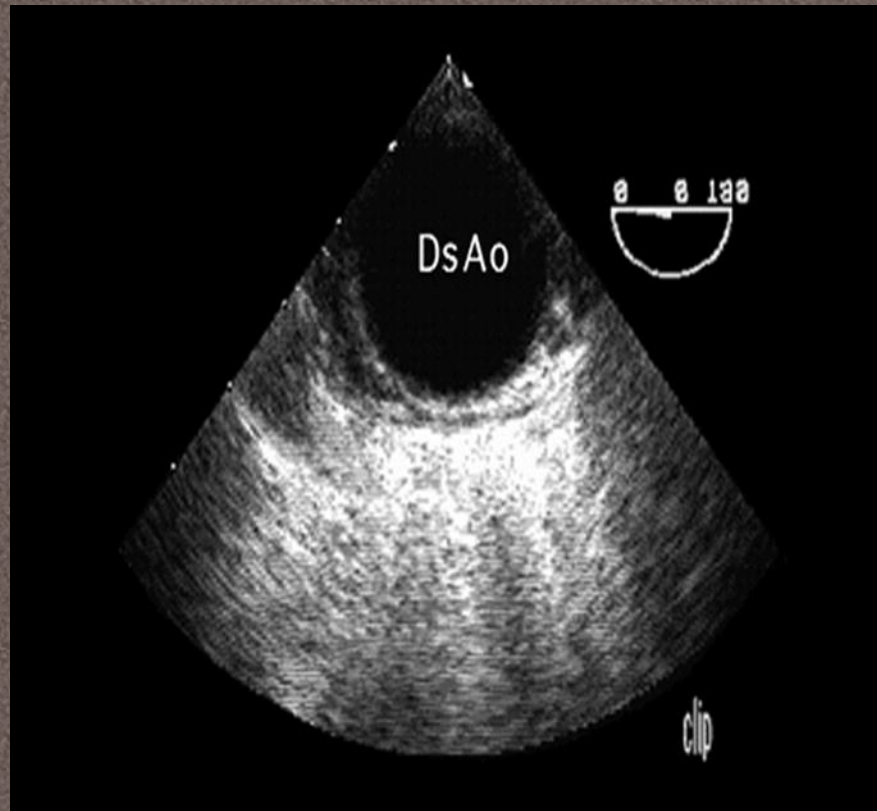


Mitral subvalvular pathology LVSF (Ant/Inf),
LA/LAA pathology

Descending Aorta SAX view

Angle: 0-10 degrees

St: DA, Left thorax, Hemiazygous and Azygous vein,
Intercostal arteries



Descending Aorta SAX view

Angle: 0-10 degrees

St: DA, Left thorax, Hemiazygous and Azygous vein,
Intercostal arteries

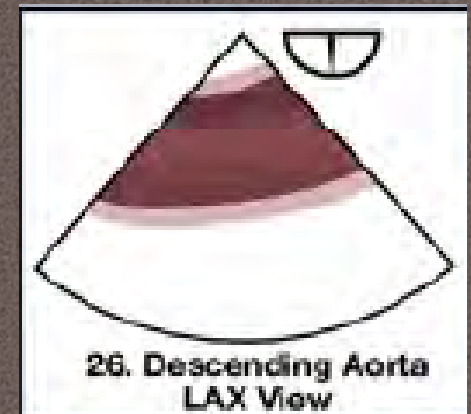


Aortic dissection, atherosclerosis, CFD: AI severity,
IABP placement, PE

Descending Aorta LAX view

Angle: 90-100 degrees

St: DA, Left thorax



Descending Aorta LAX view

Angle: 90-100 degrees
St: DA, Left thorax

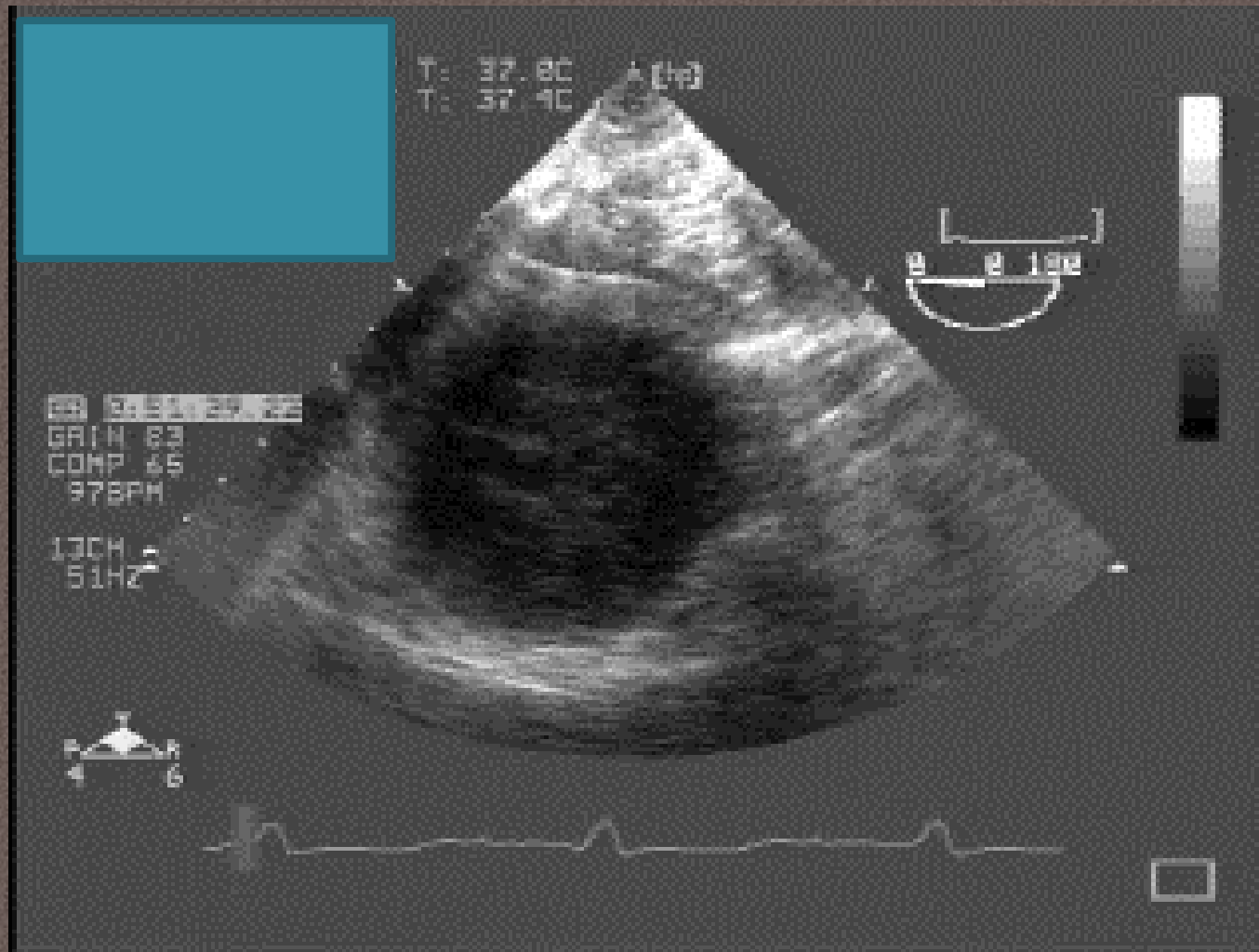


Dissection, Atherosclerosis, IABP

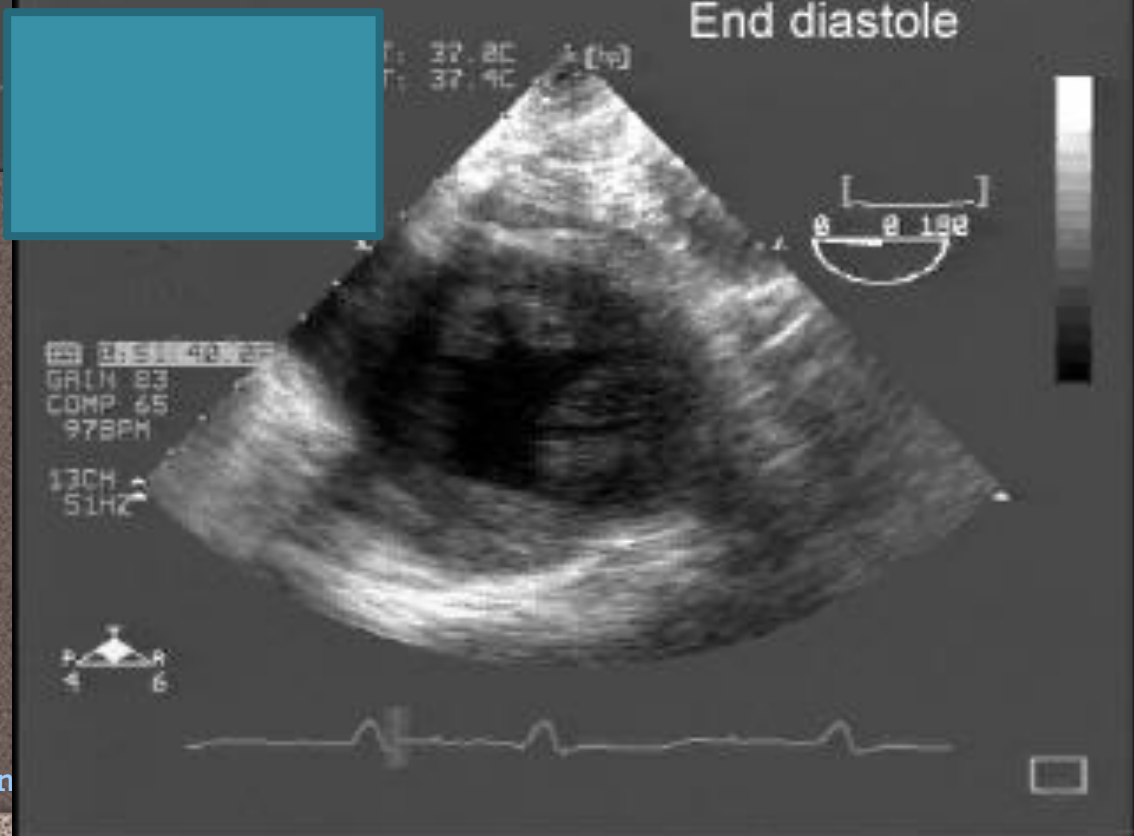
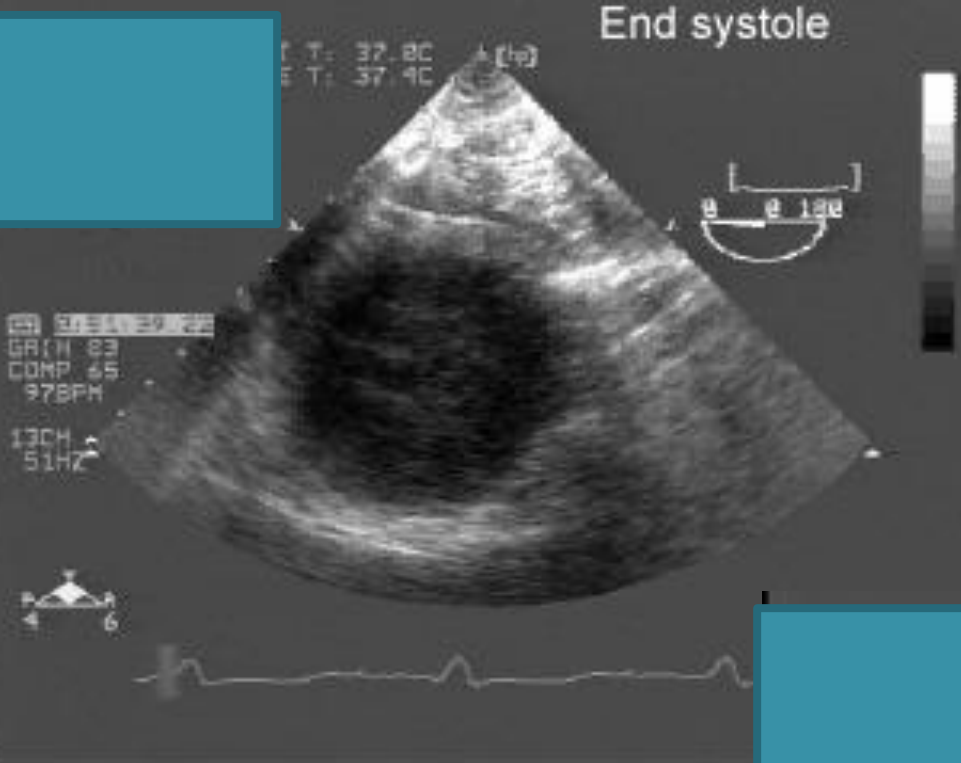
Evaluation of haemodynamic instability

- Hypovolemia
- Low SVR
- Tamponade
- LV dysfn
- RV dysfn
- Dynamic LVOTO / SAM
- Acute MR
- Pleural effusions

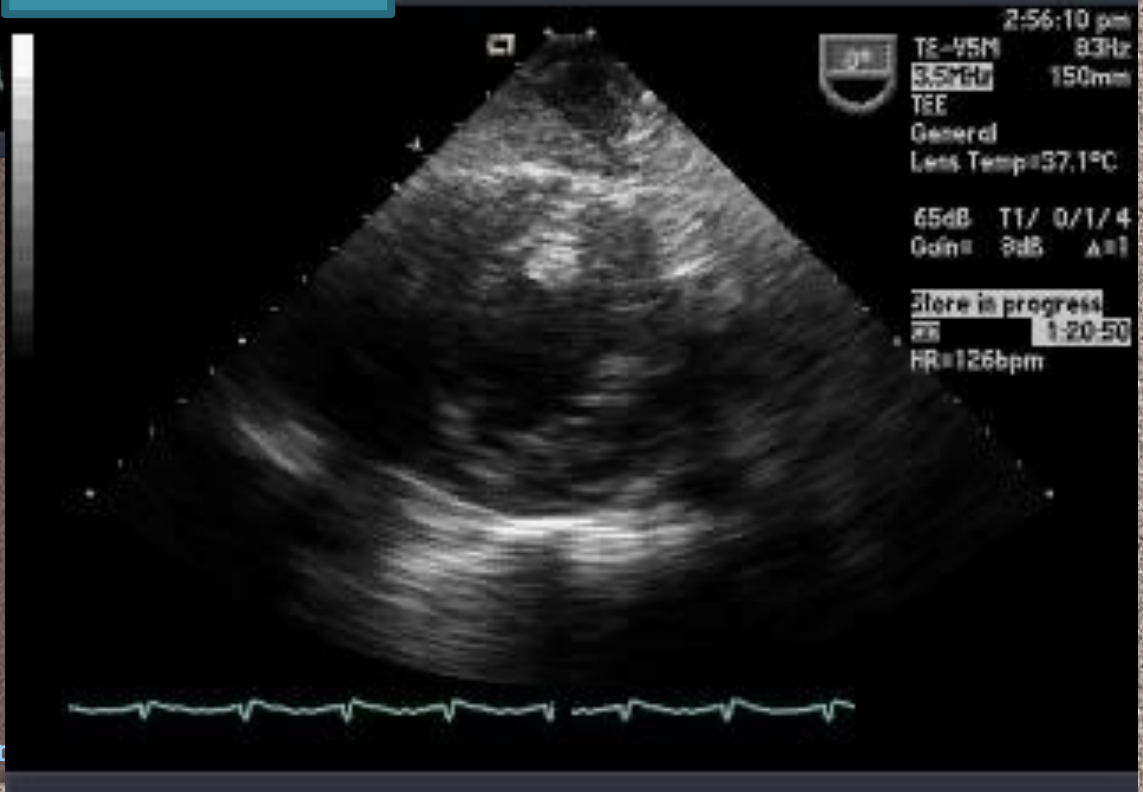
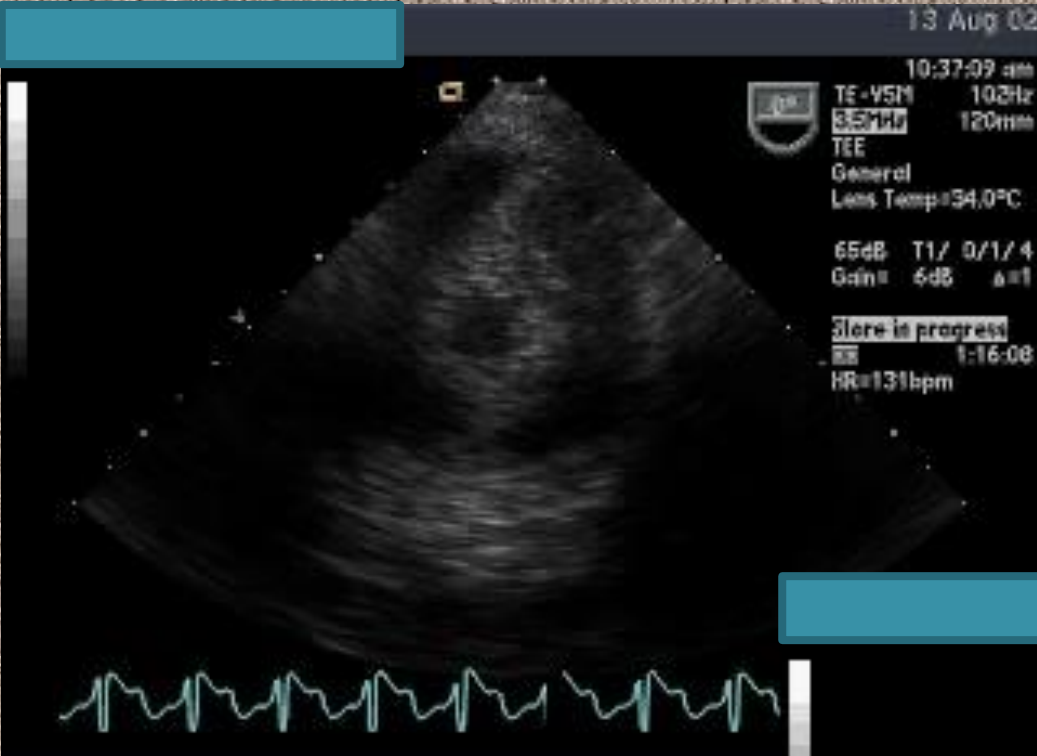
Hypovolemia



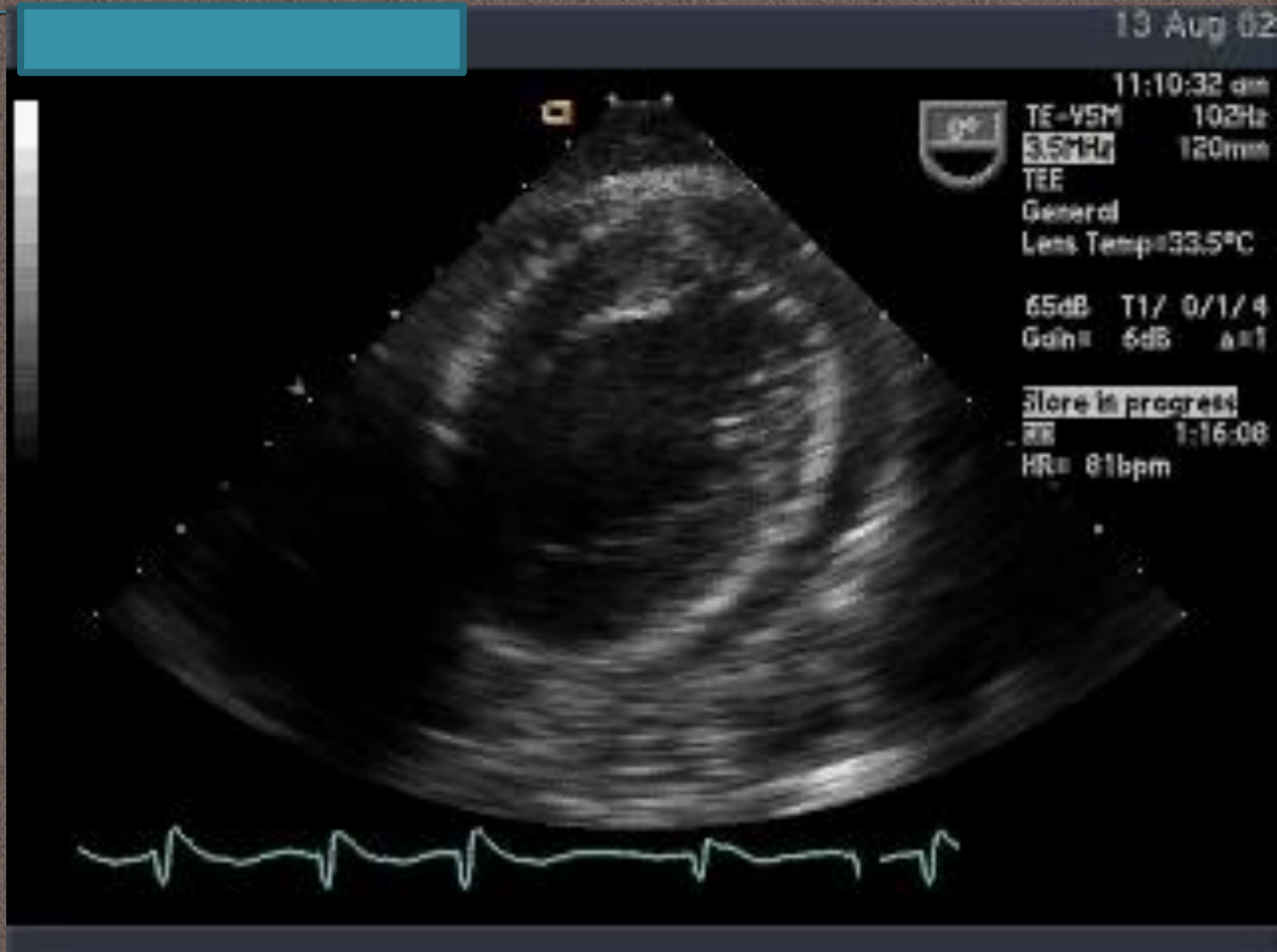
Hypovolemia



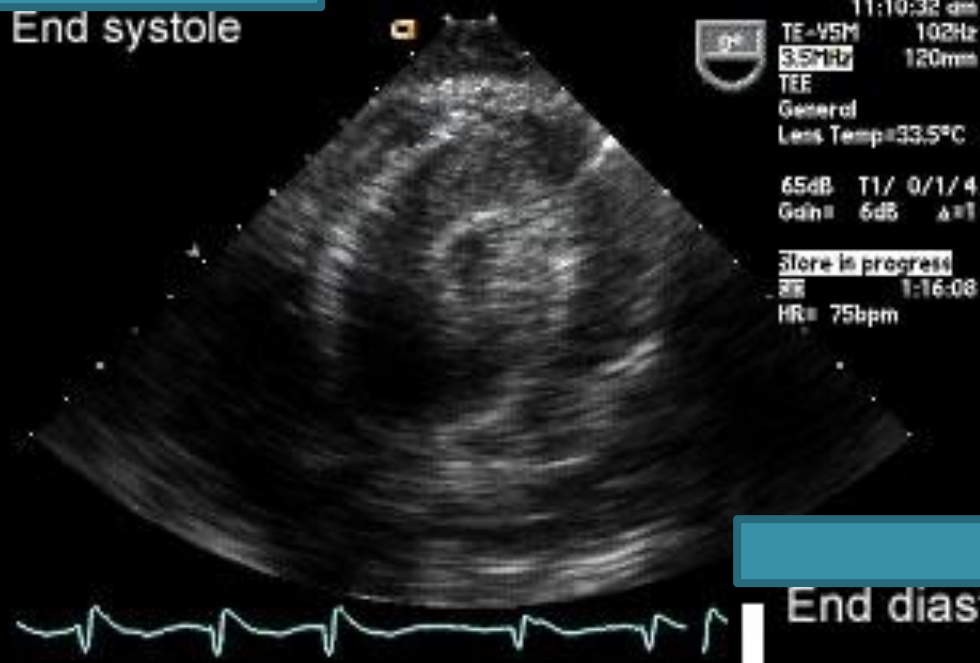
Hypovolemia



Low SVR



End systole



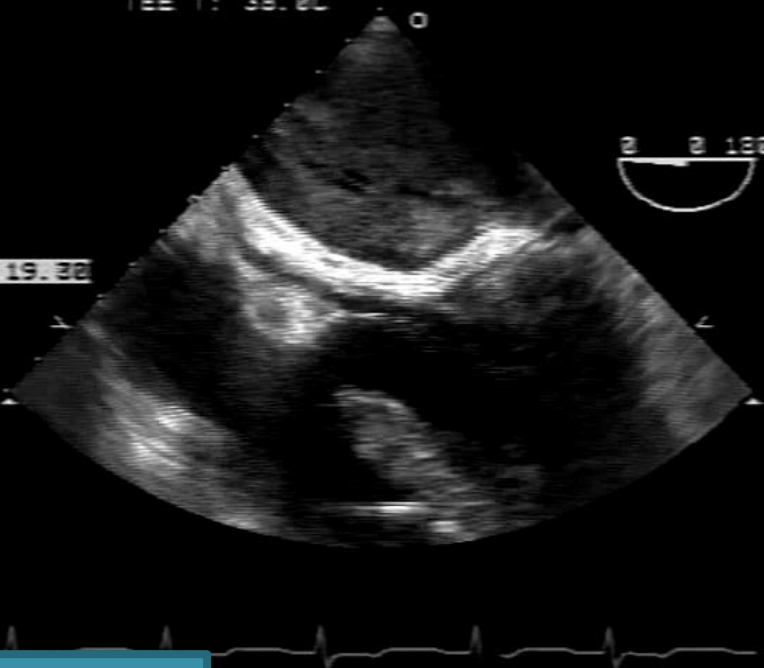
Low SVR

End diastole



PAT T: 37.0C
TEE T: 39.0C

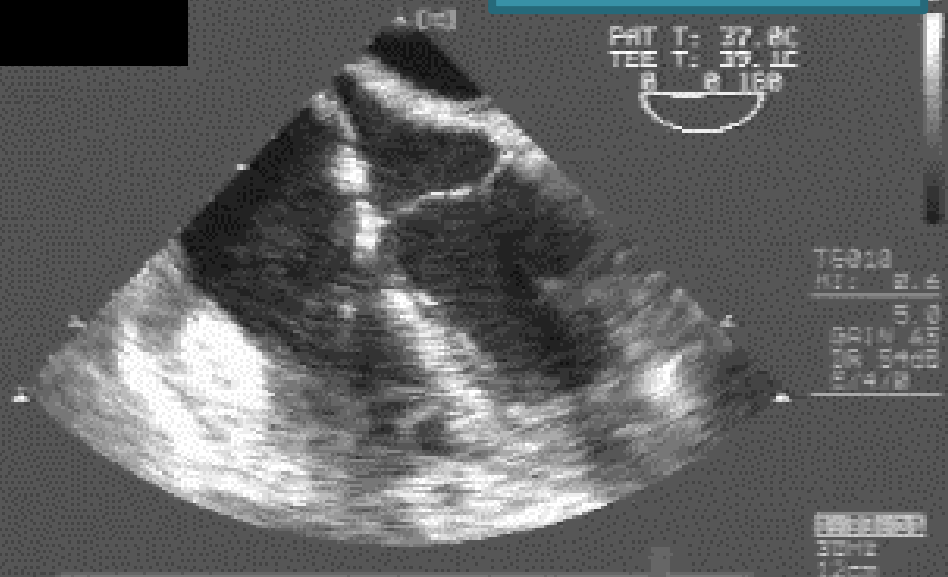
03:02:19.00
GAIN 33
COMP 60
82BPM
12CM
48HZ



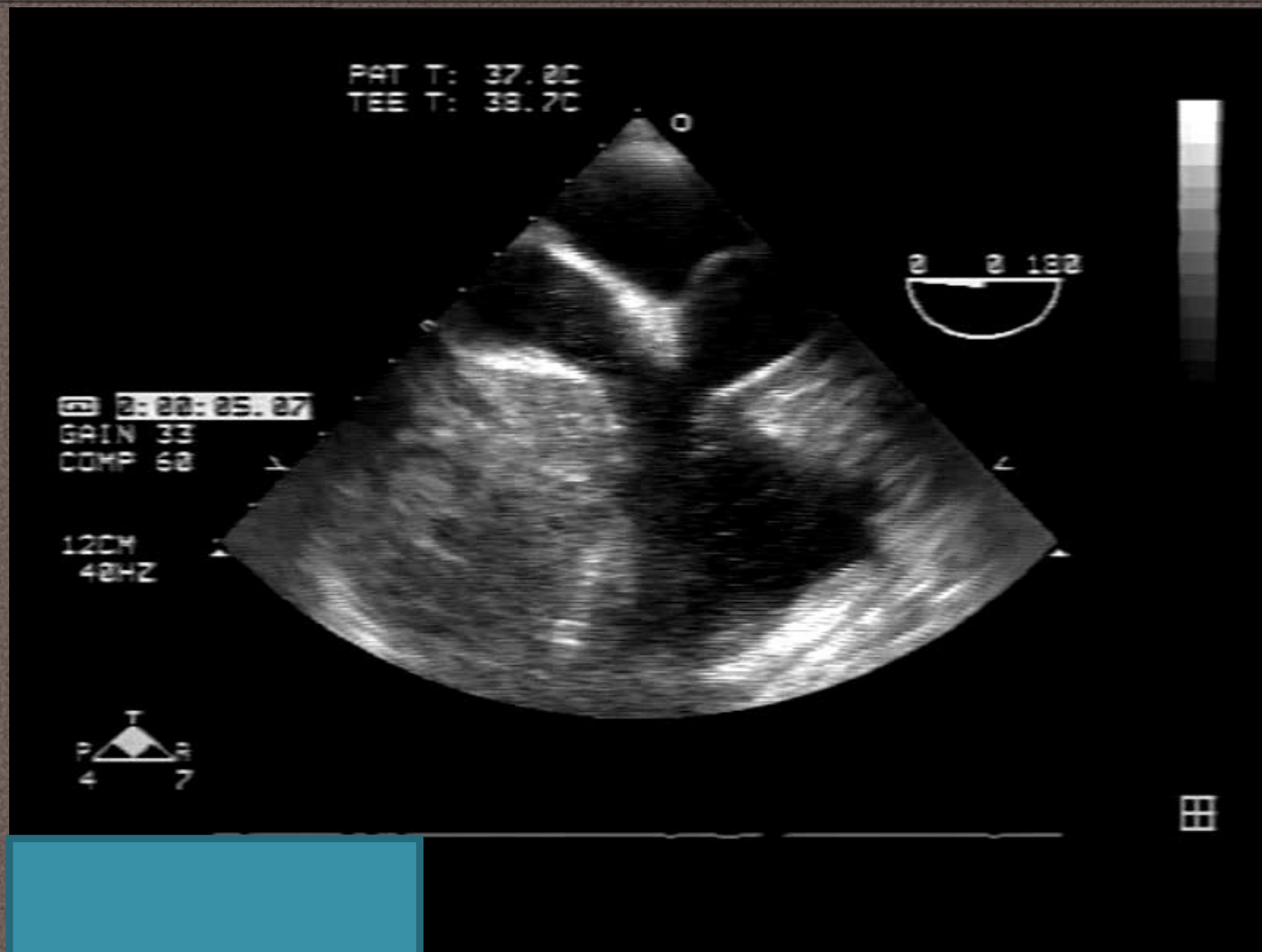
Tamponade LA

systolic collapse

PAT T: 37.0C
TEE T: 39.1C
0 90 180



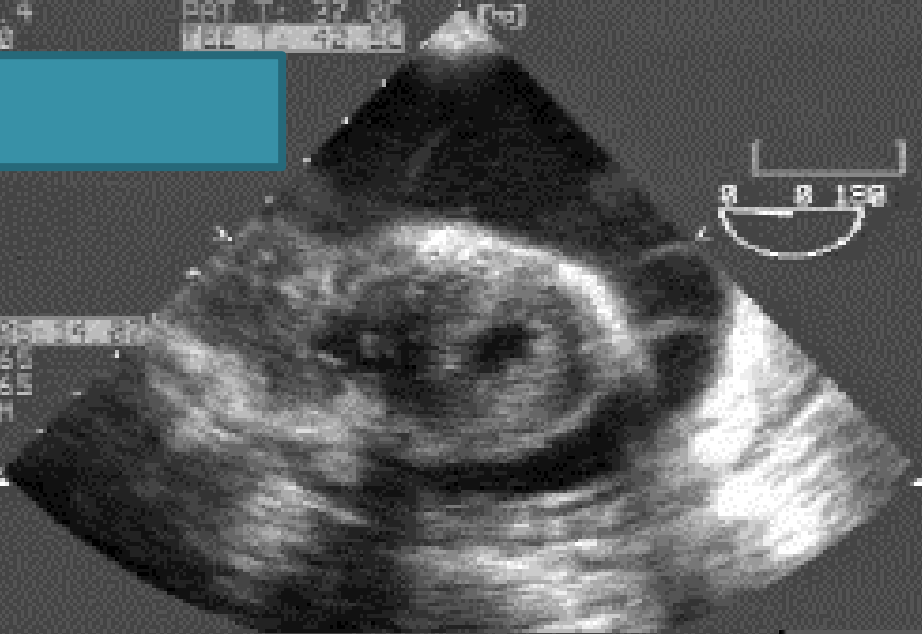
Tamponade RA collapse



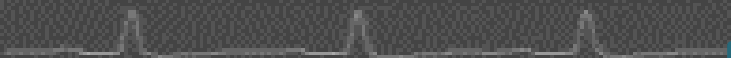
HL: 1.4
T6218

PAT T: 37.0C
03/25/2022 15:58:33

QAIN 65
COMP 65
1238PH
12CM
55HZ



P 4 R 7

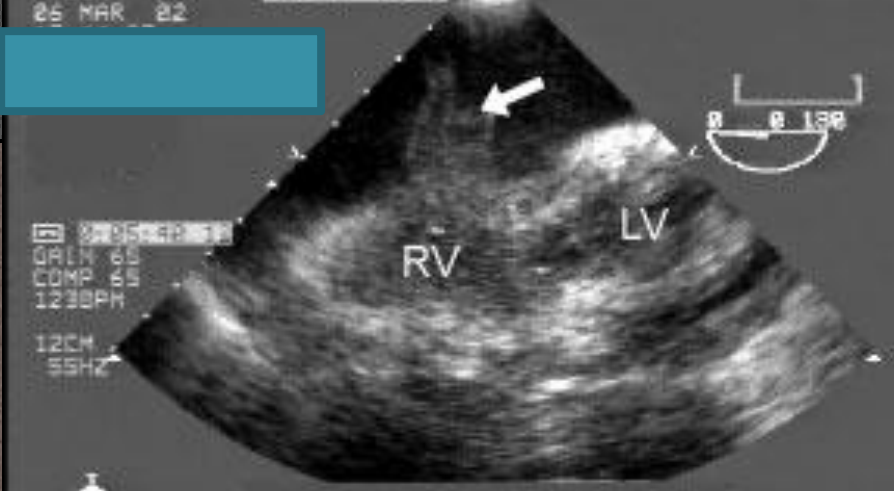


Tamponade: Profound

HL: 1.4
T6218
25 MAR 22

PAT T: 37.0C
03/25/2022 15:58:33

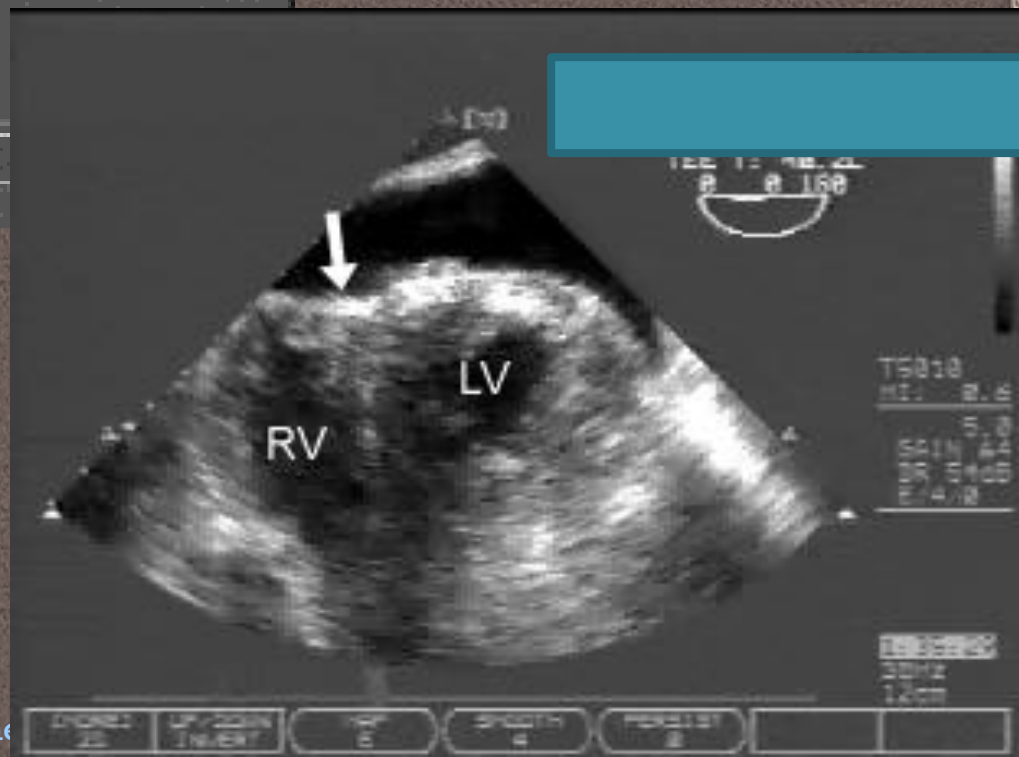
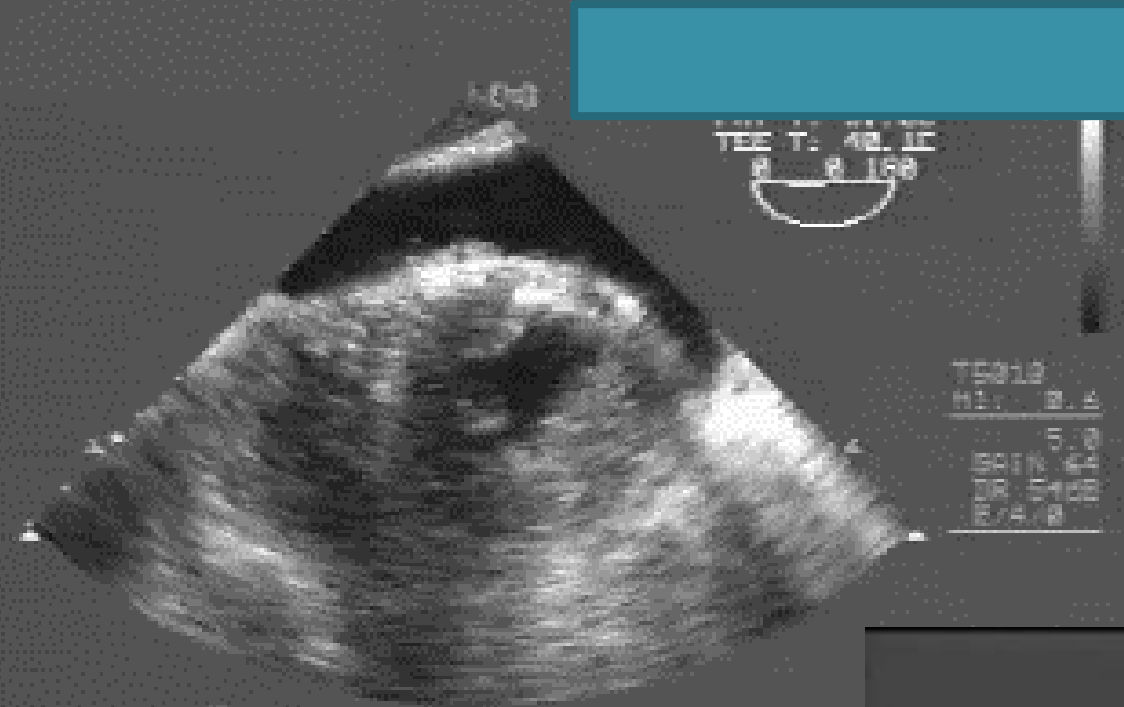
QAIN 65
COMP 65
1238PH
12CM
55HZ



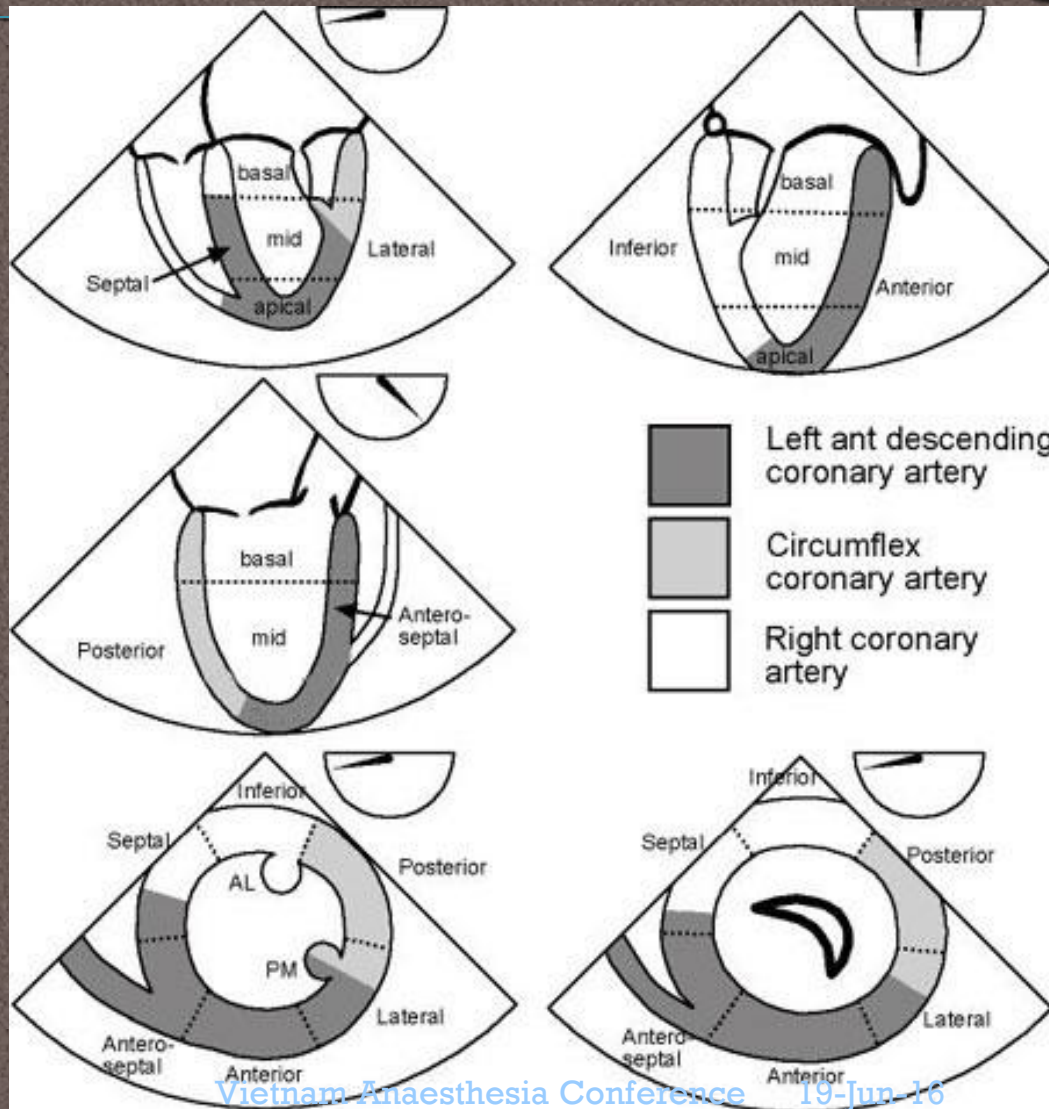
P 4 R 7



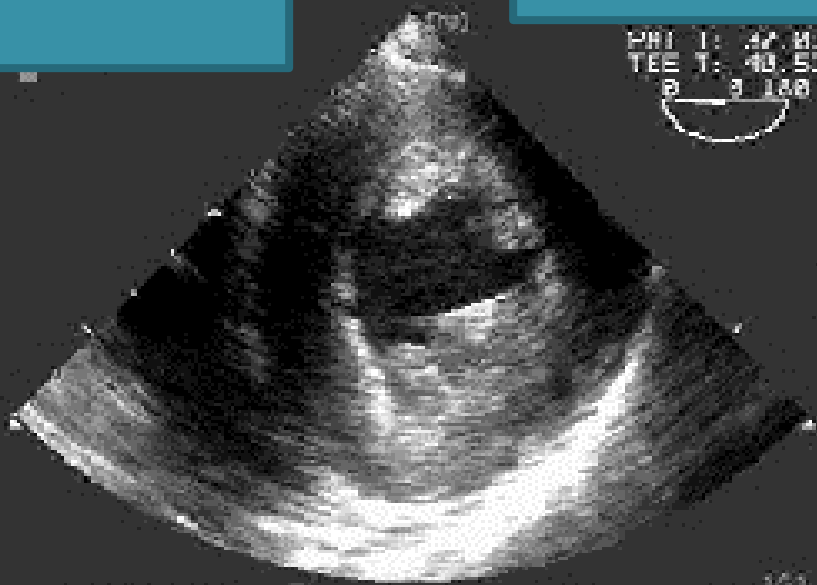
Tamponade: RV collapse



LV segments



Hypokinesia ant-sept, inf-sept



PRT T: 47.80
TEE T: 40.50
0 0 100

TS010
M: 0.6
S: 8
EARTH 45
DR 5100
E/1/0

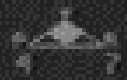
101
BPM
100

HOME SET MOVE ARROW MENU



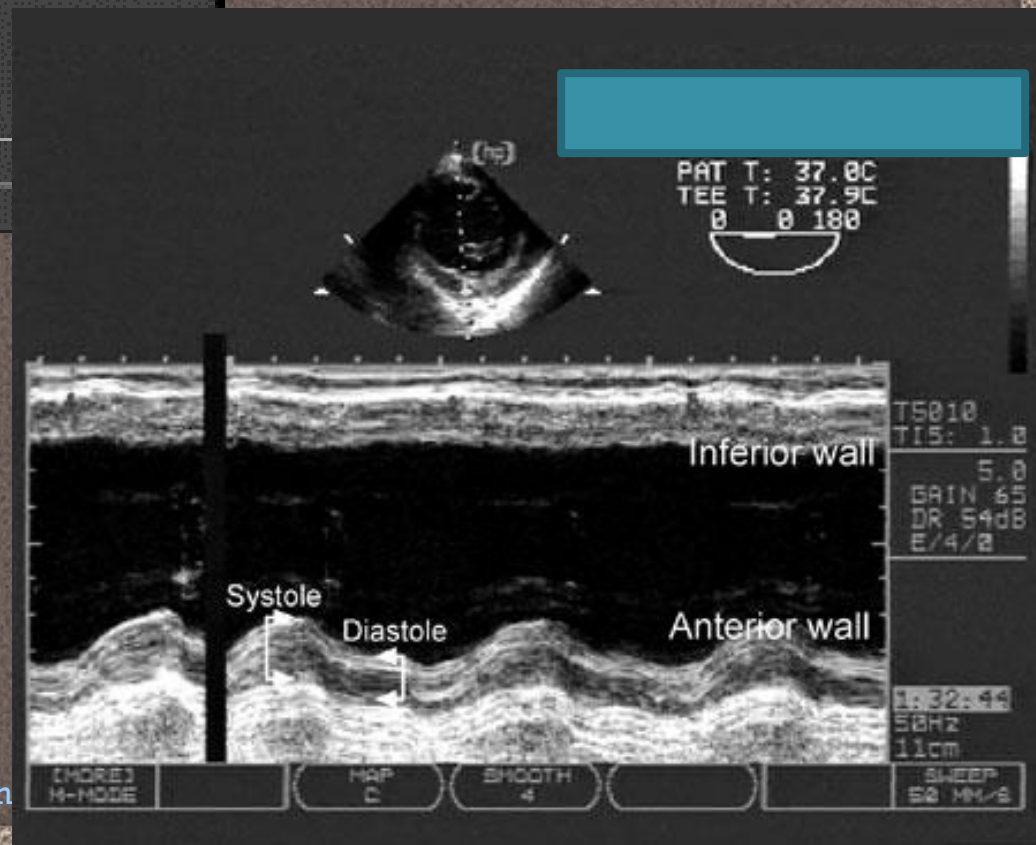
F03T DPCAS
ES 0000 28
SRIH 52
COMP 71
710PM

100H
25HZ

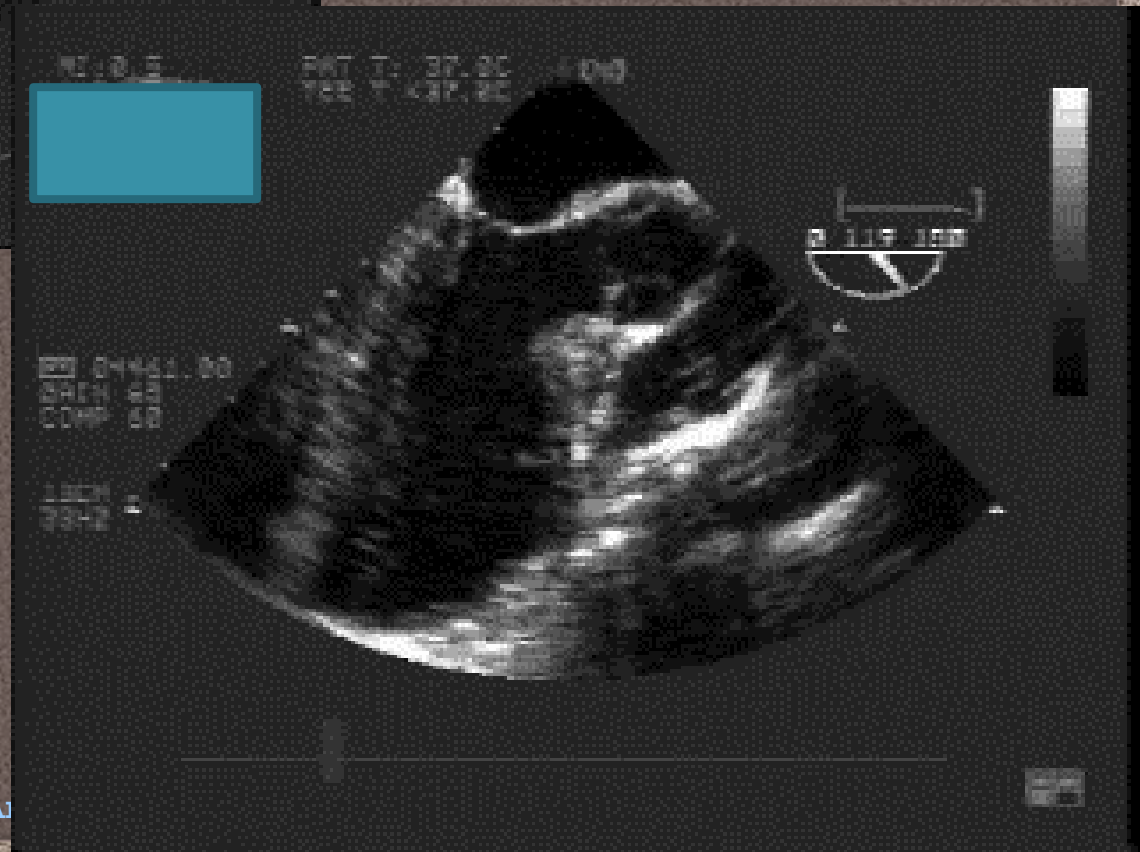
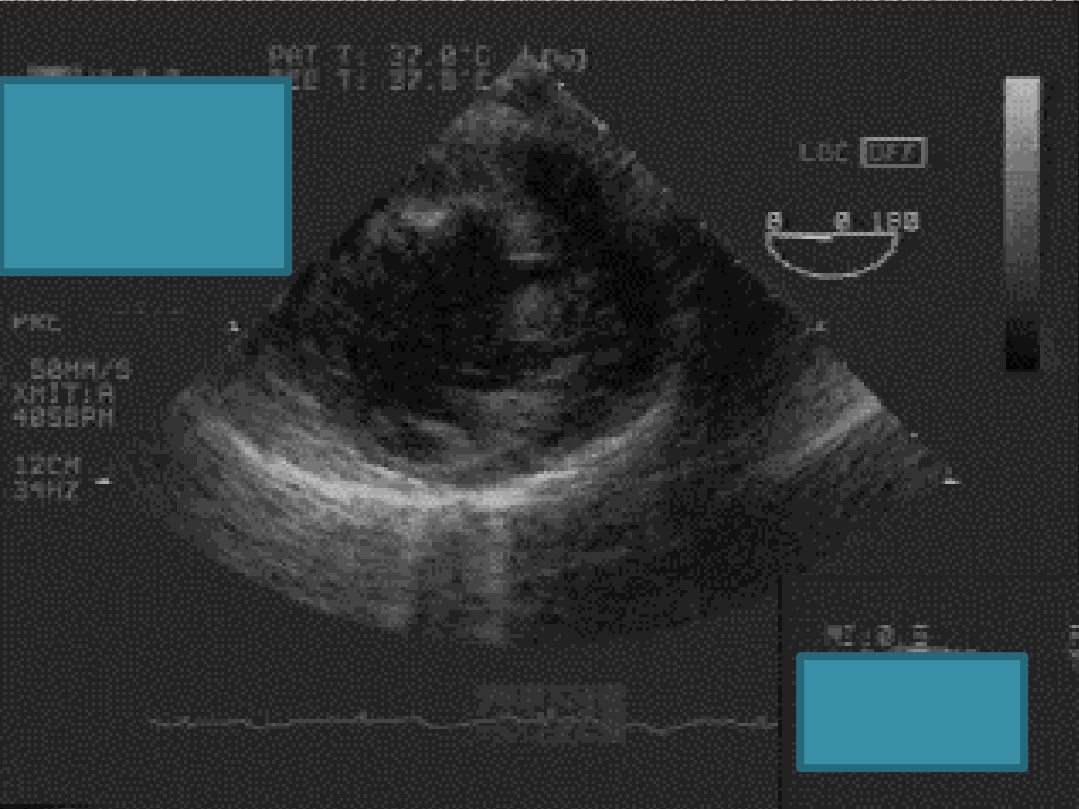


PRT T: 57.80
TEE T: 39.30

Akinesia: inf wall



Akinesia ant-sept



PAT T: 37.0°C
TEE T: 37.0°C

LEG OFF

8 96 100

15234.15
50MM/S
XMIT: 0
958PH
14CH
34HZ

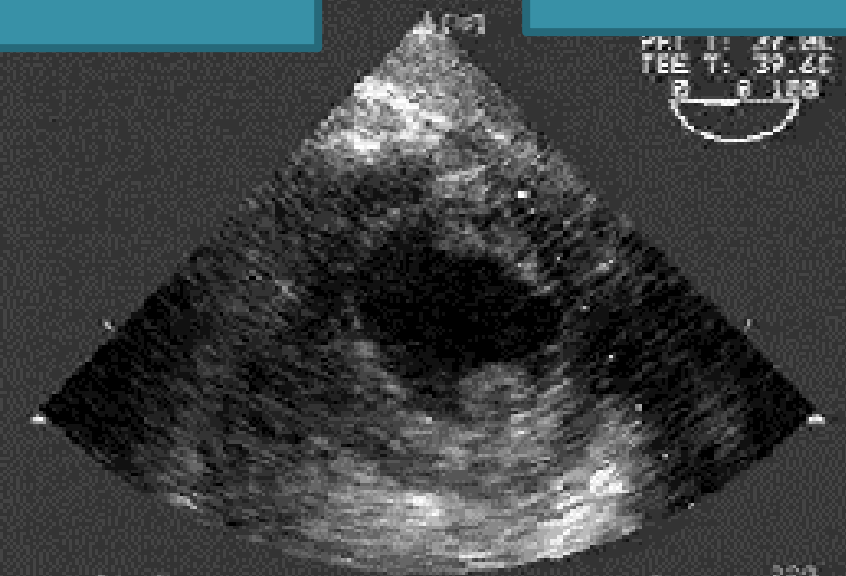
Akinesis: Apical, Post-Lat



PAT T: 37.0°C
TEE T: 37.0°C

8 96 100

15212
HL: 0.6
5.0
GAIN 72
SQ 5140
BY 1/20



200
500
40Hz
14CH

ONLINE 200 500 40Hz 14CH
UP/DOWN 100 500 40Hz 14CH
MAP 100 500 40Hz 14CH
SHOOT 100 500 40Hz 14CH
FREEZE 100 500 40Hz 14CH

PAT T: 37.0C
TEE T: <37.0C

0:48:00
GAIN 59
COMP 55
94BPM
16CM
40HZ



Ant: Akinesia
Inf: Dys / Hypo

T
P R
4 7
1.17

PAT T: 37.0C
TEE T: 40.6C

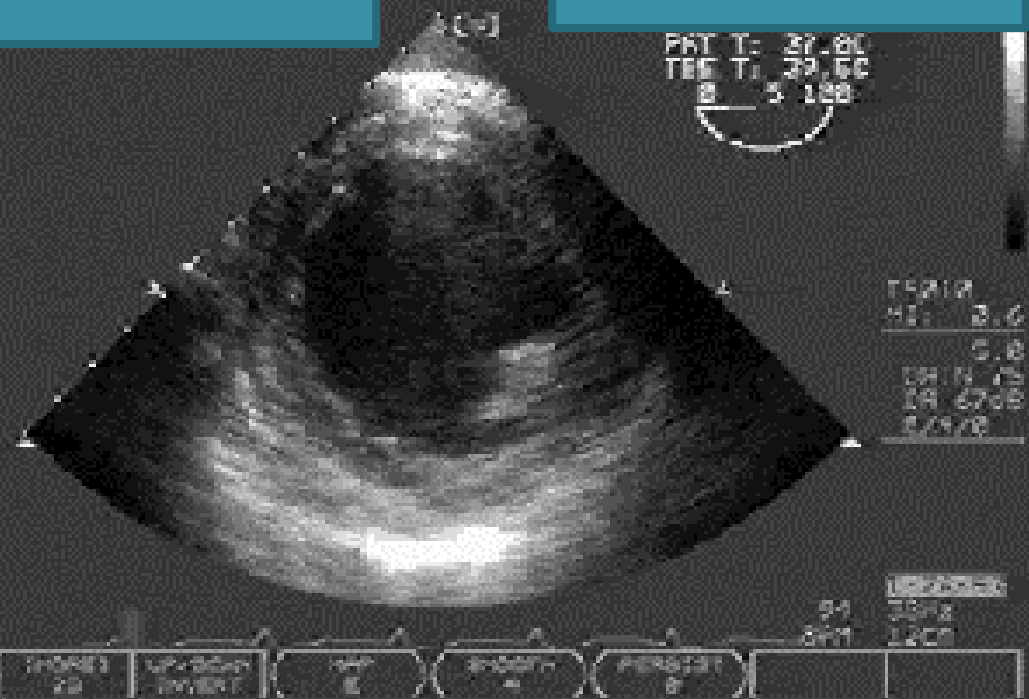
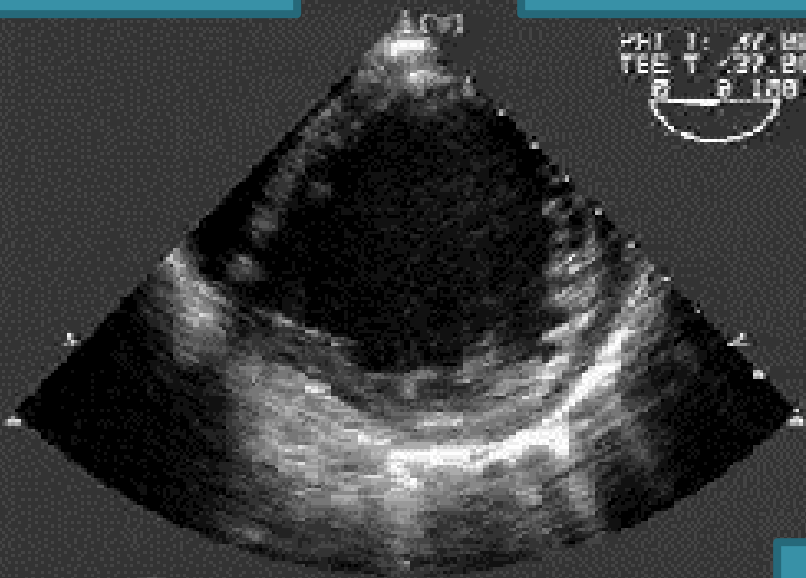
1:51:21.12
GAIN 78
COMP 60
67BPM

12CM
40HZ

T
P R
4 7

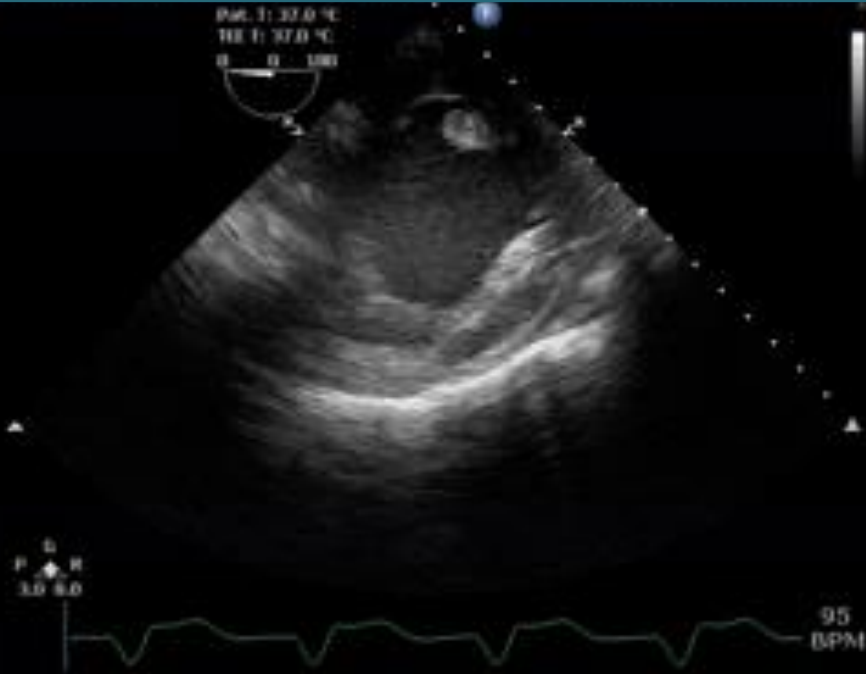


Global dysfn



BV
X7-2t
44Hz
16cm

2D
Gen
Gn 34
C 50
4/2/0
75 mm/s



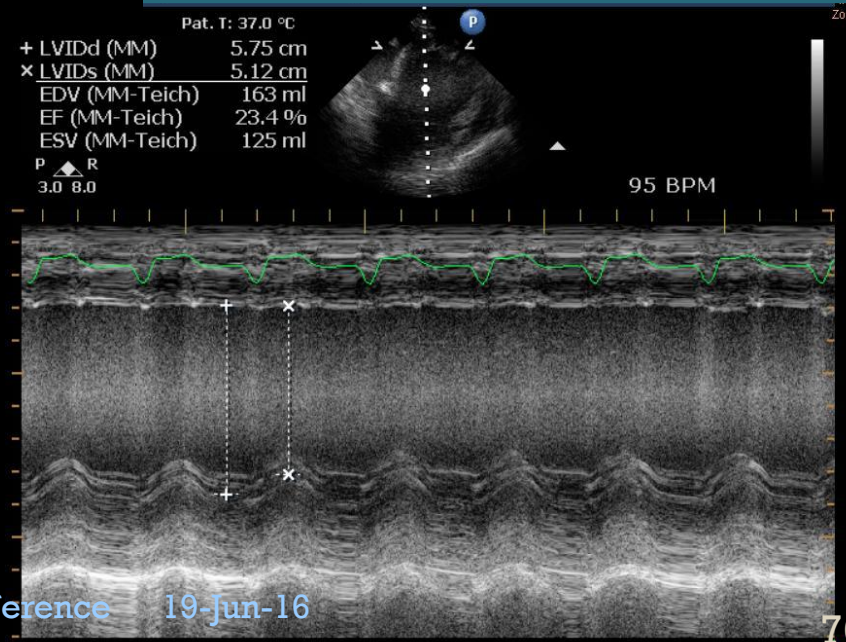
LV dysfn

BV
X7-2t
38Hz
13cm

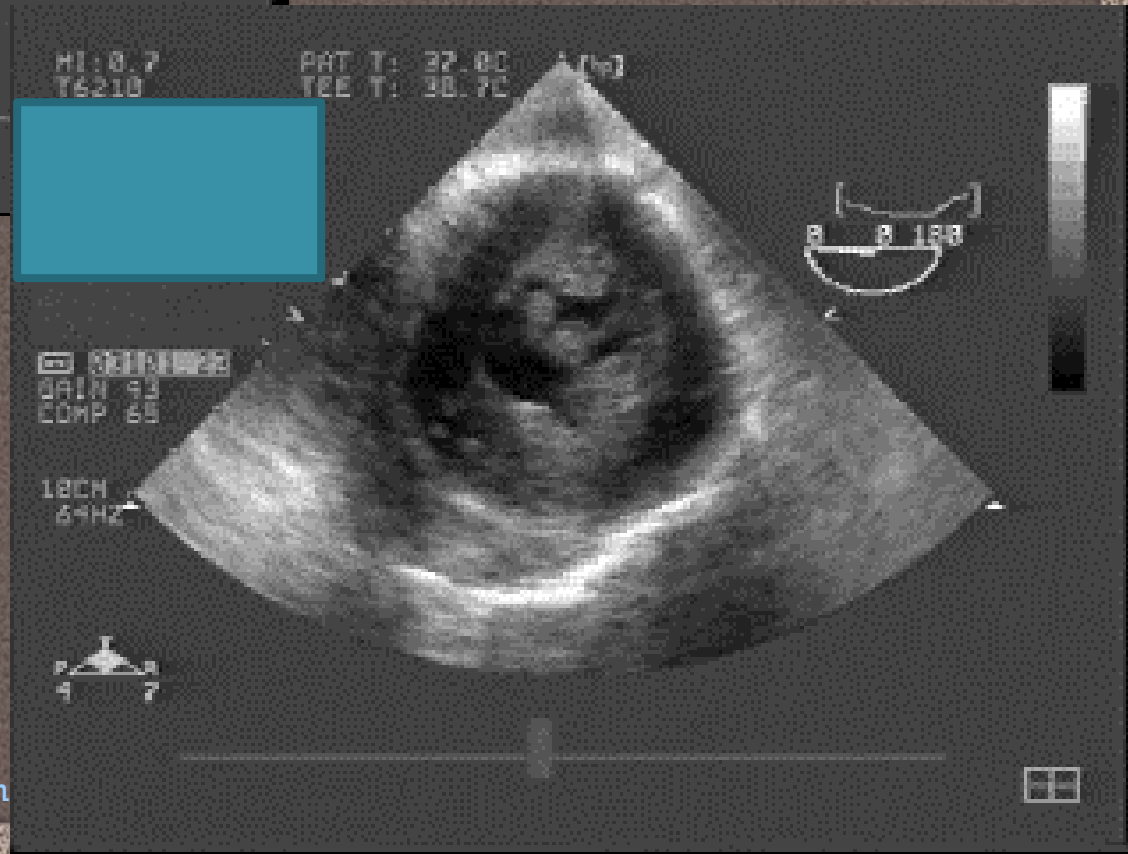
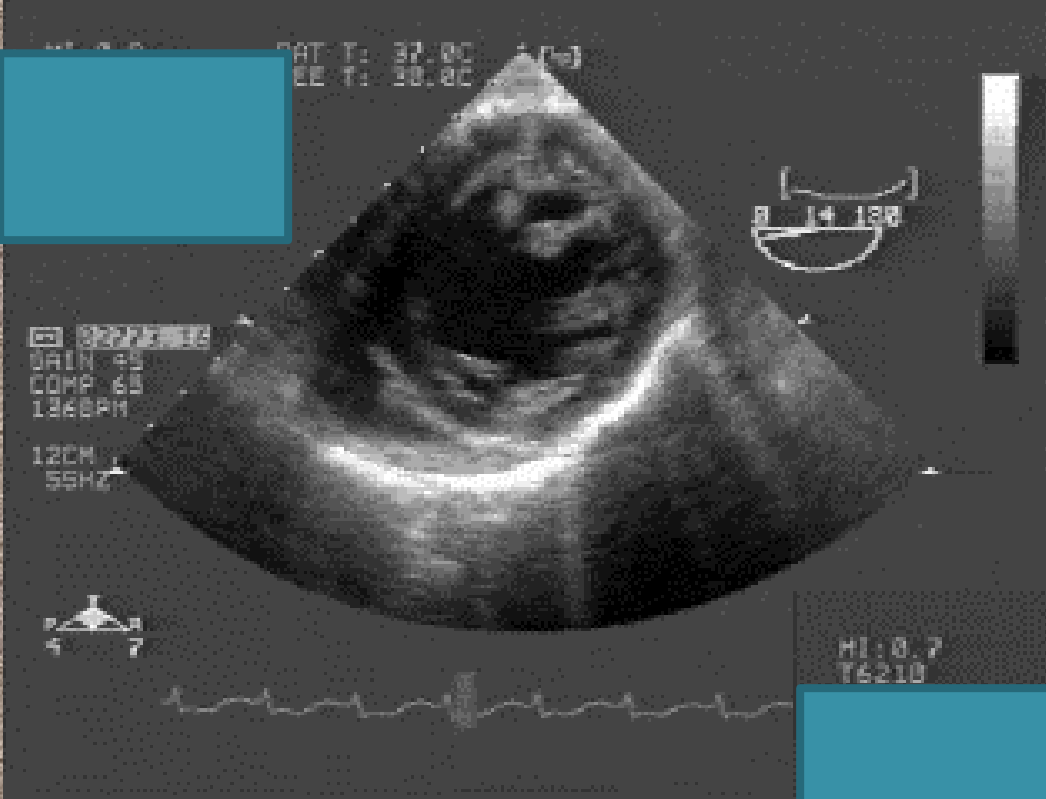
2D
Gen
Gn 34
C 50
4/2/0

Pat. T: 37.0 °C
+ LVIDd (MM) 5.75 cm
x LVIDs (MM) 5.12 cm
EDV (MM-Teich) 163 ml
EF (MM-Teich) 23.4 %
ESV (MM-Teich) 125 ml

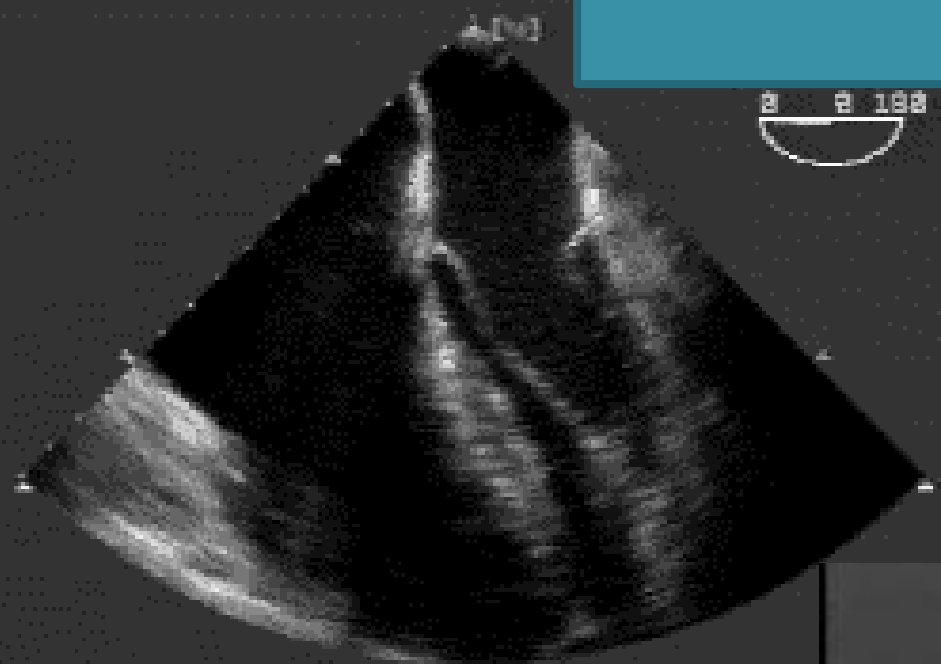
M-mode
3/4
50 mm/s



LCA post AVR



RV dysfn



TSB10
MI: 0.6
5.0
GAIN 45
DR 5400
E/4/0

ENCORE 2D UP-DOWN INVERT HOP 2 SMOOTH 4 PERSIST 0

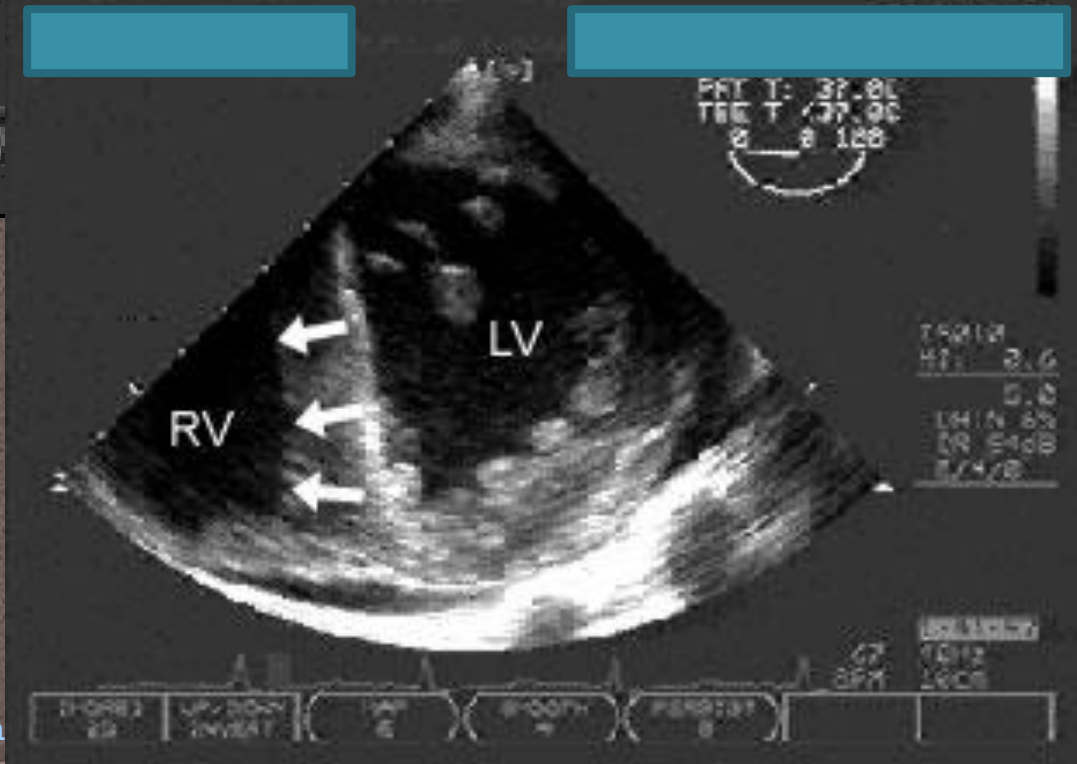
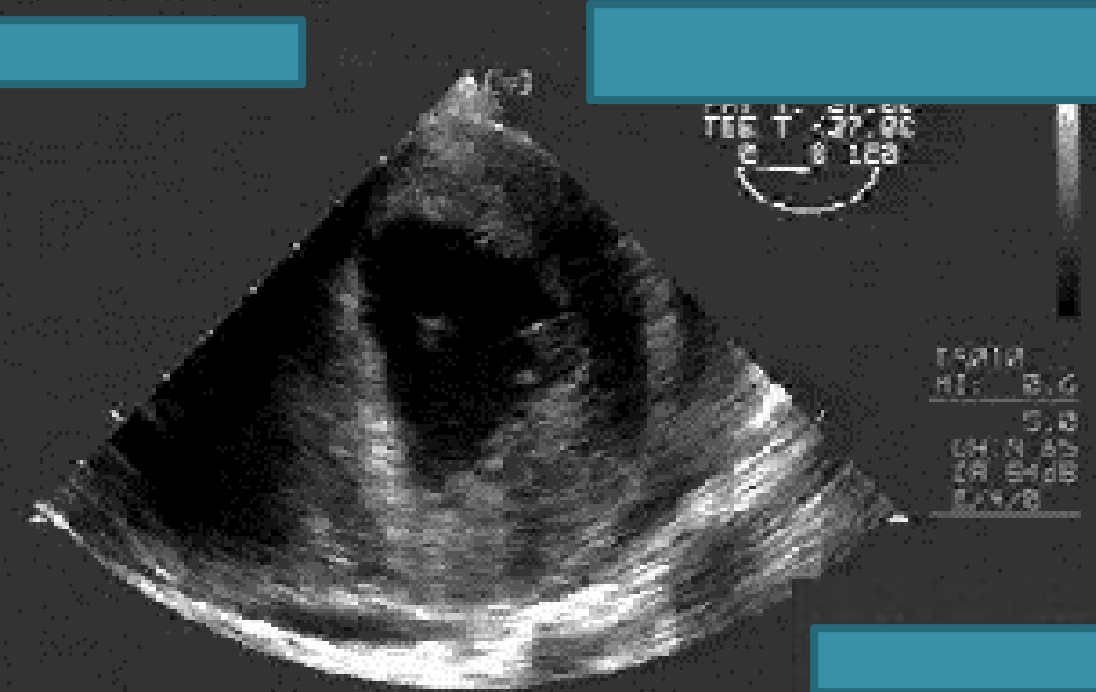


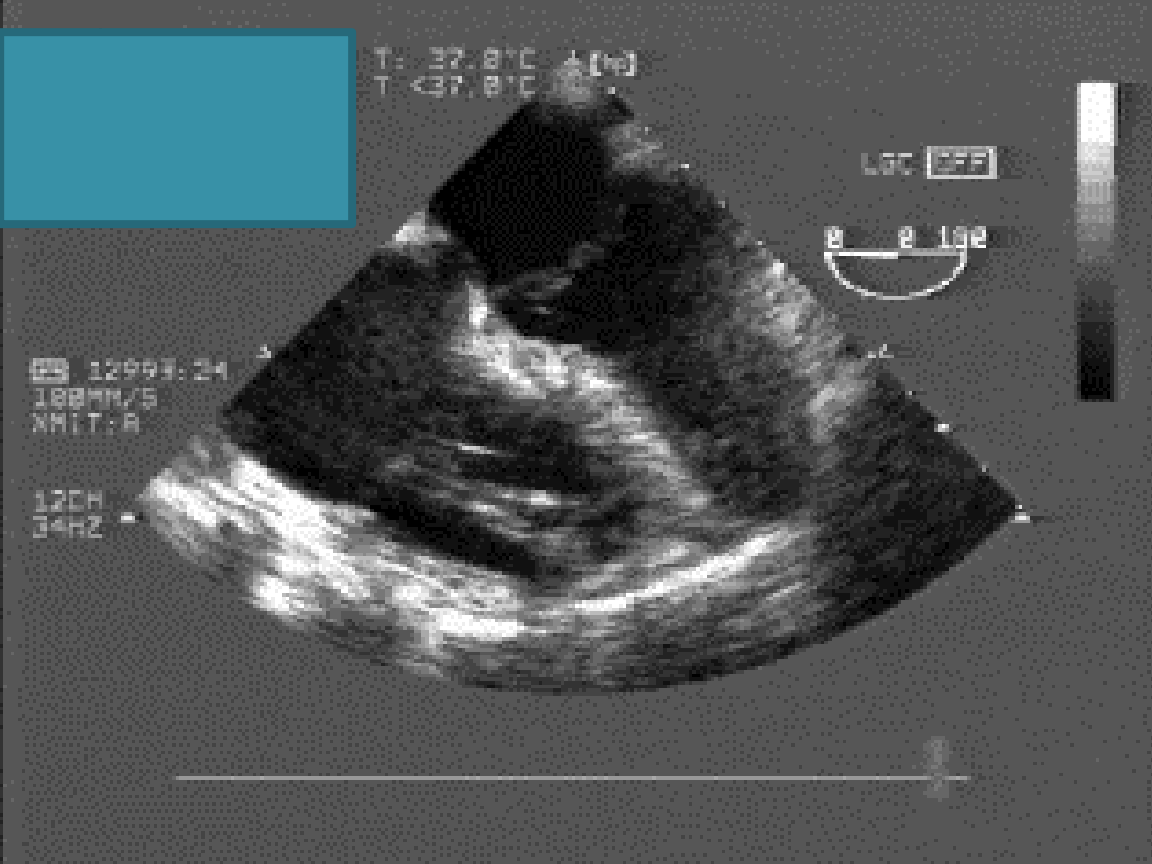
PAT T: 37.0C
TEE T: 38.3C
0 0 100

TSB10
MI: 0.6
5.0
GAIN 45
DR 5400
E/4/0

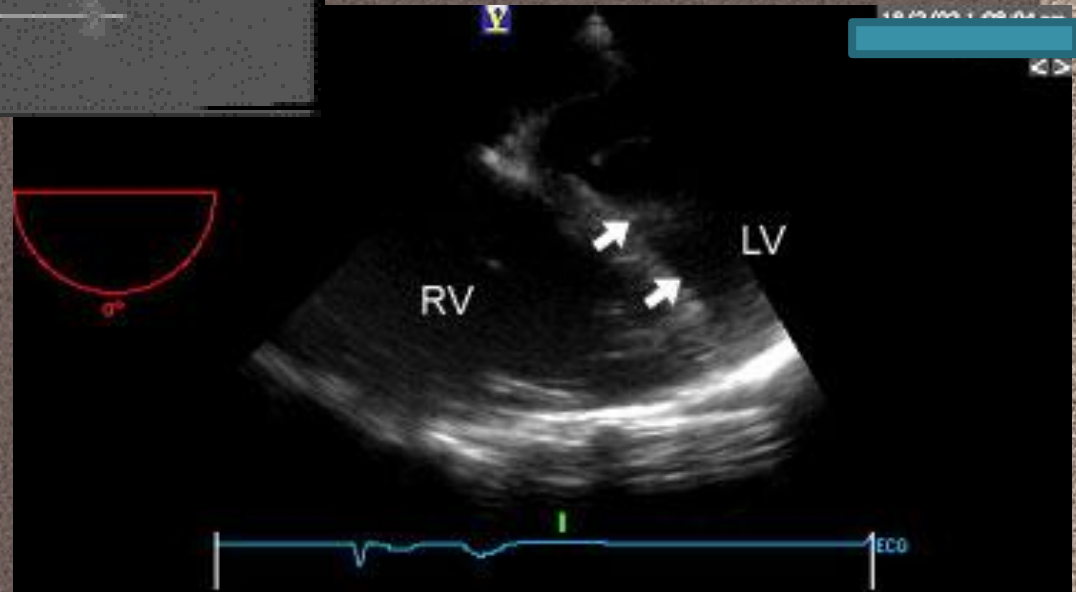
ENCORE 2D UP-DOWN INVERT HOP 2 SMOOTH 4 PERSIST 0

RV pressure overload

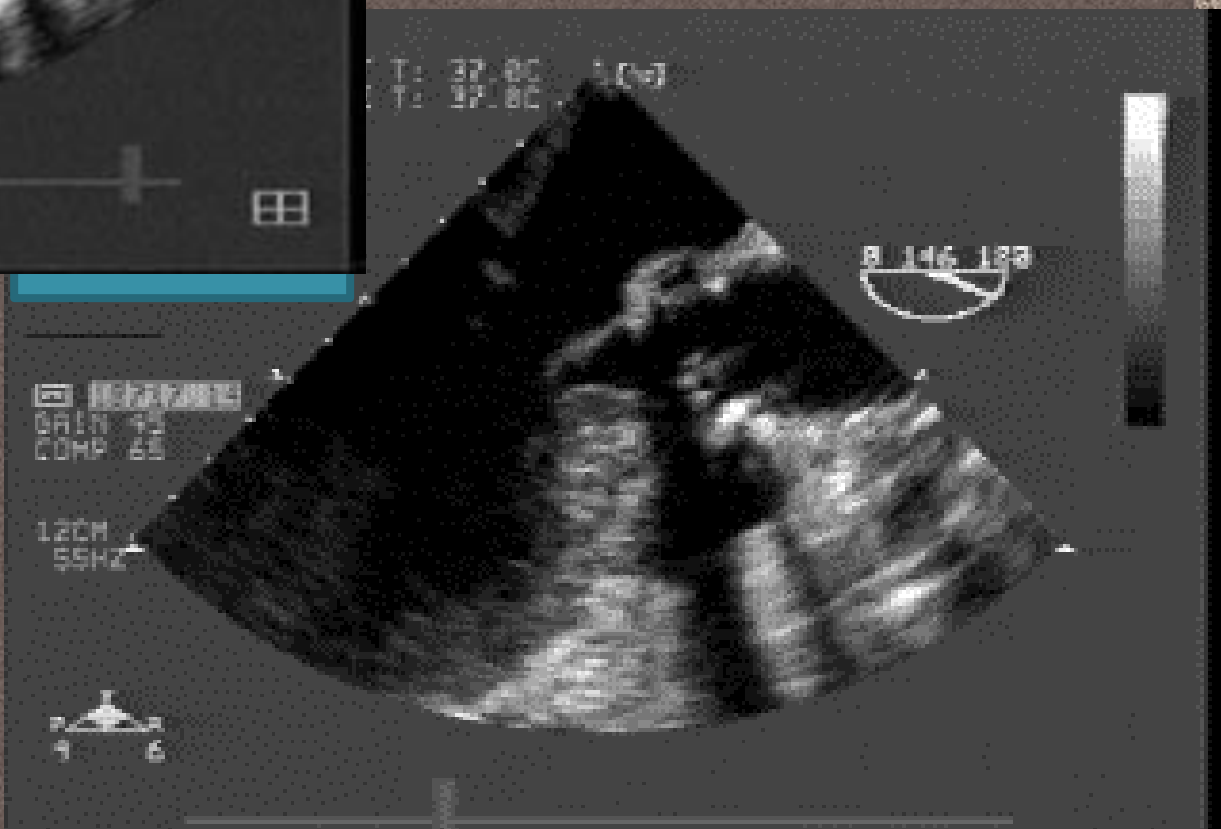
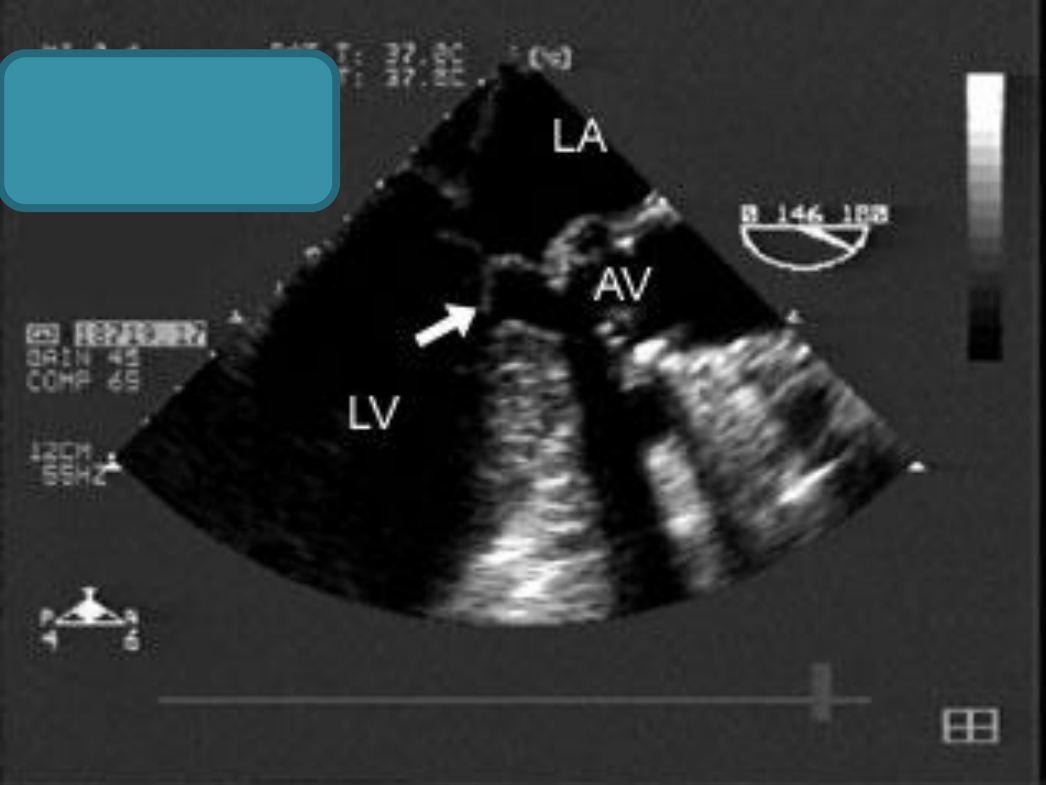




RV volume overload



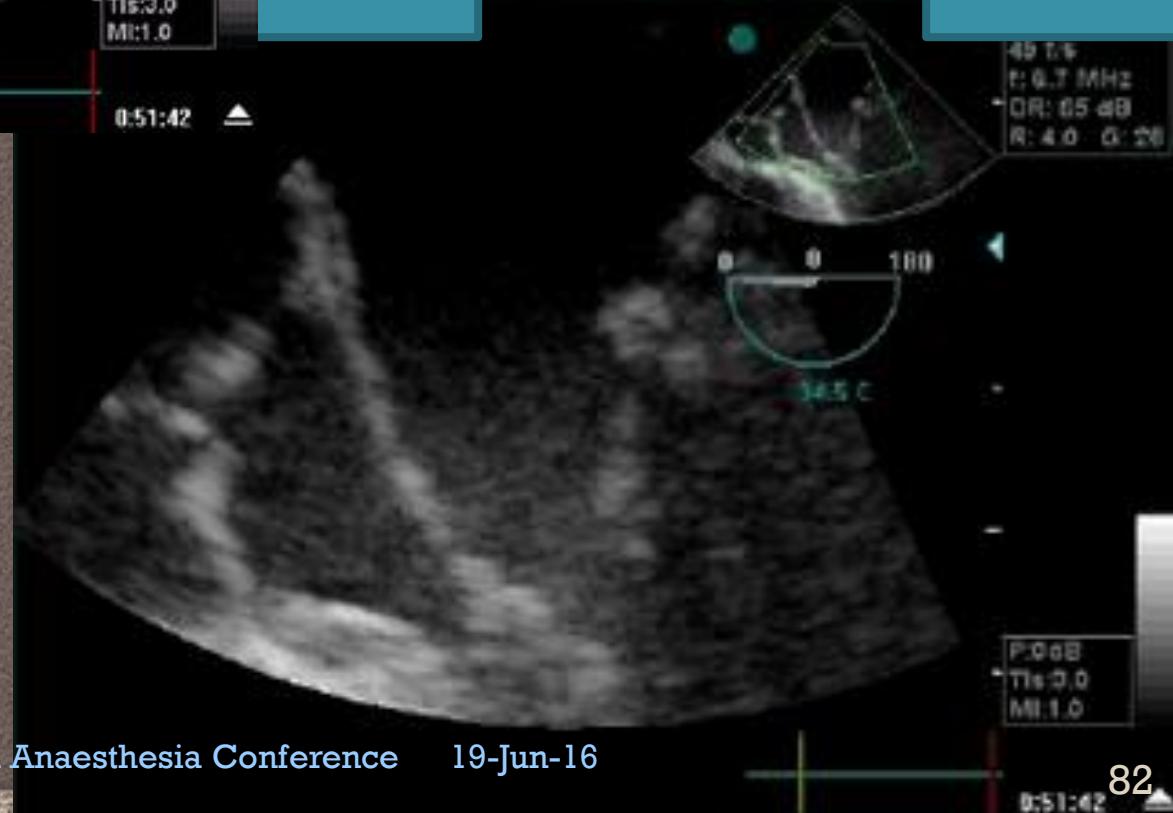
LVOTO / SAM post AVR





LVOTO / SAMI post MV repair

ID: 62 Cardiac 5T

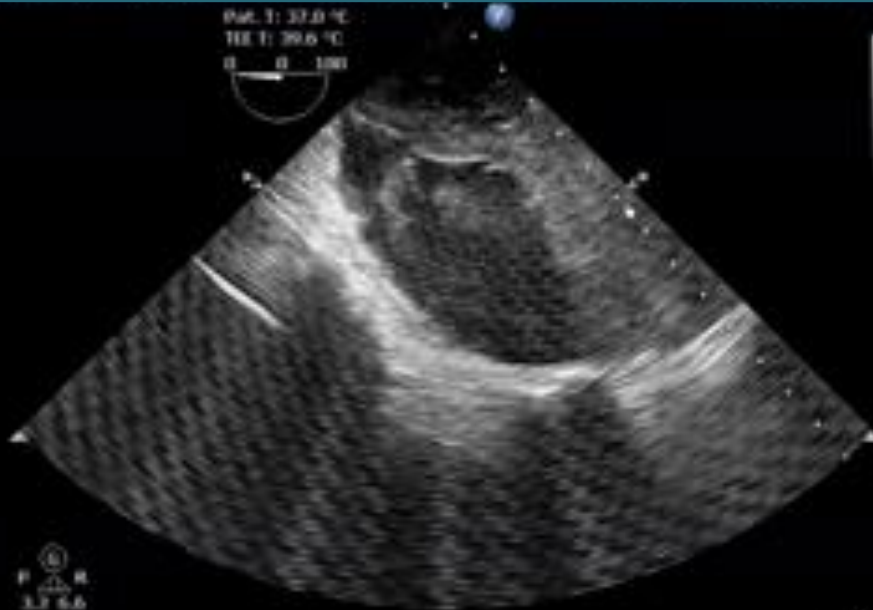


Pleural Effusion

RVH
X7-2t
44Hz
14cm

Pat. T: 37.0 °C
HE T: 39.6 °C
0 0 100

2D
HGen
Gn 24
C 50
4/2/0
75 mm/s



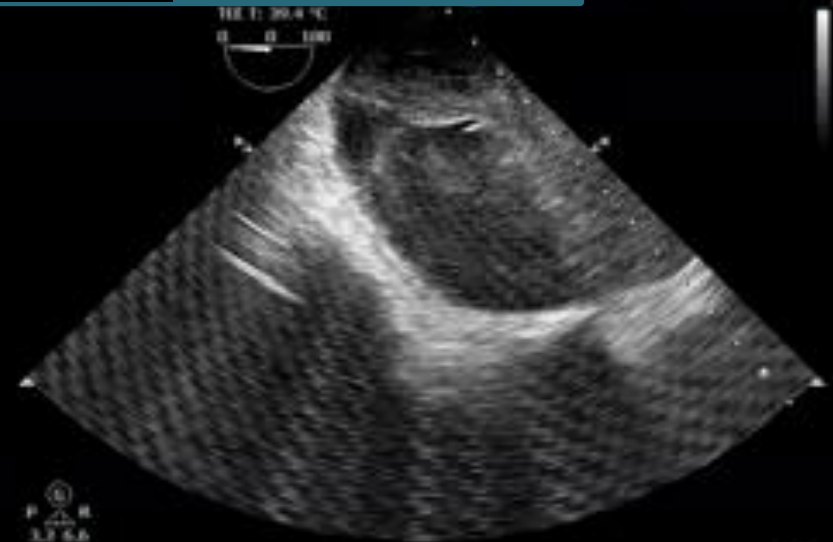
71
BPM

10.4 11/07/2015
S 0.0 12:02:52

X7-2t
44Hz
14cm

Pat. T: 39.4 °C
HE T: 39.4 °C
0 0 100

2D
HGen
Gn 24
C 50
4/2/0
75 mm/s



67
BPM

Pleural effusion

TEE
X7-2t
44Hz
12cm

+ Length 4.89 cm

Pat. T: 37.0 °C

TEE T: 38.2 °C

0 4 180

2D

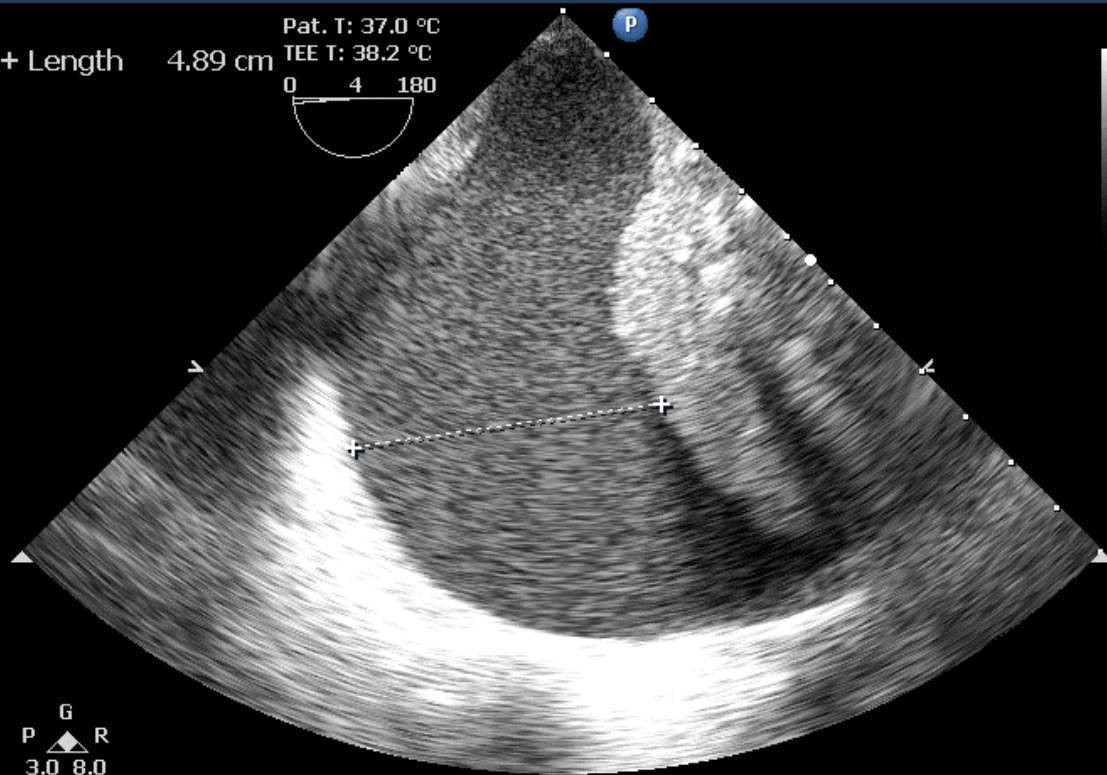
Gen

Gn 52

C 50

4/2/0

75 mm/s



M 07/13/03

RVH
X7-2t
12Hz
19cm

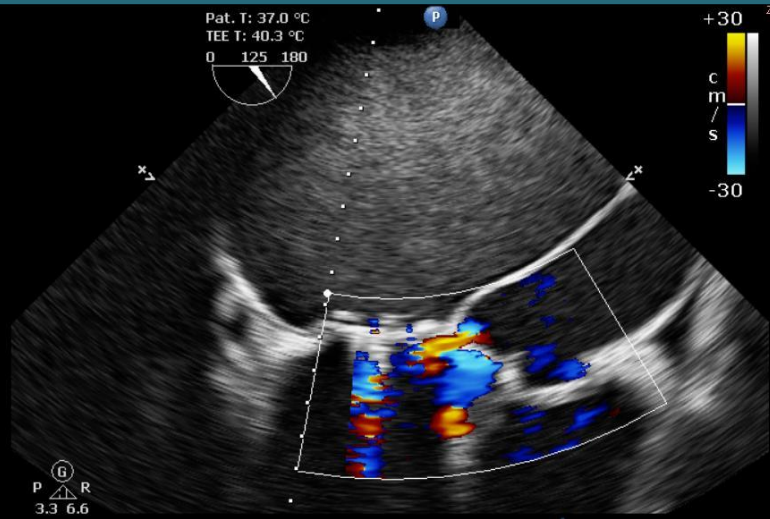
Pat. T: 37.0 °C
TEE T: 40.3 °C

+30
0 125 180
c
m
/
s
-30

Zoom 125%

2D
HGen
Gn 24
C 50
4/2/0
75 mm/s

Color
4.0 MHz
Gn 60
4/4/0
Fltr Med



⑥
P R
3.3 6.6

59
BPM

Post MVR: AV perf

X7-2t
44Hz
19cm

Pat. T: 37.0 °C
TEE T: 39.5 °C

2D
HGen
Gn 24
C 50
4/2/0
75 mm/s

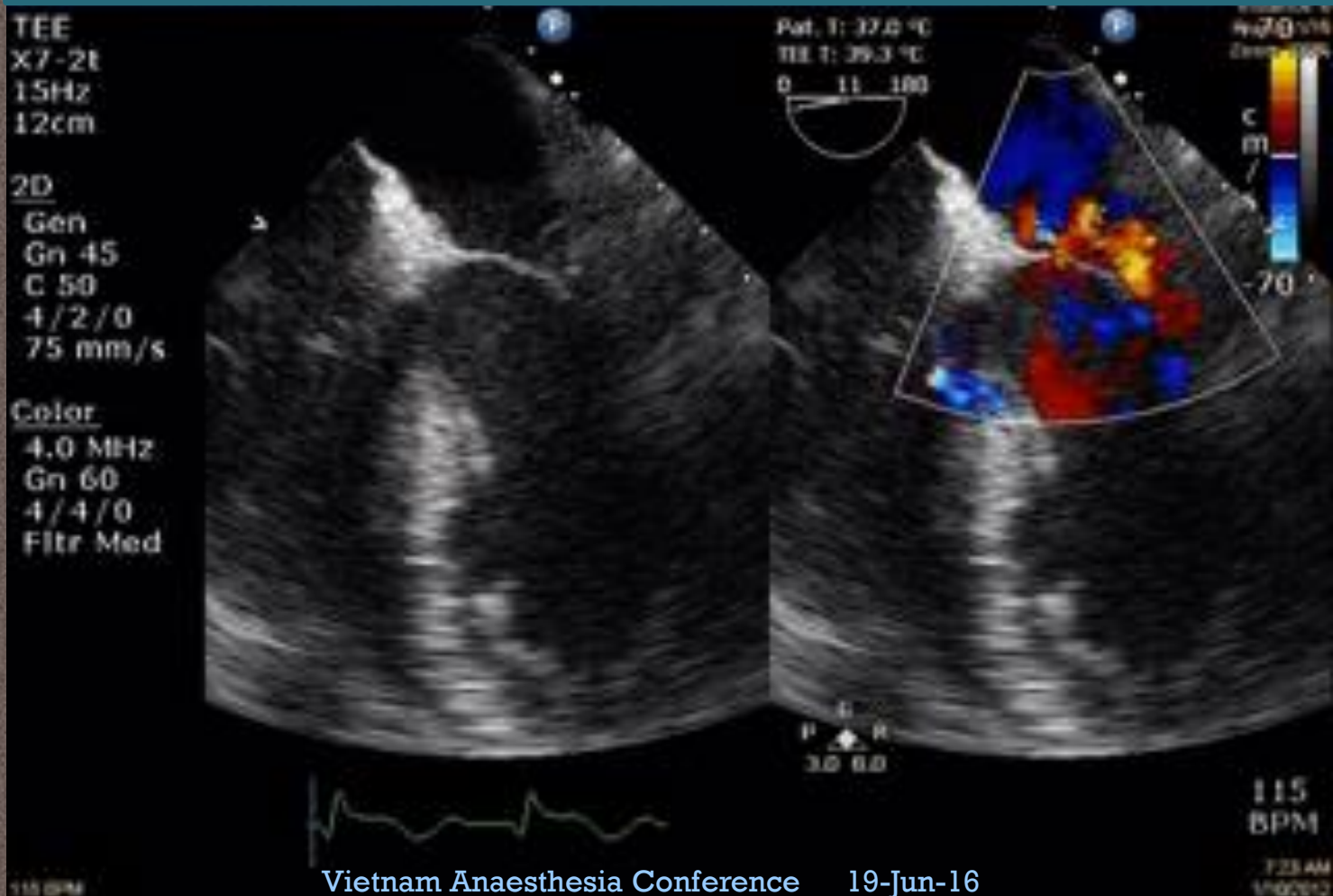
Zoom 125%



⑥
P R
3.3 6.6

72
BPM

Acute MR post PM rupture



Acute MR post PM rupture



Take home messages

- Haemodynamic instability is multifactorial
- TEE is ideally suited to the assessment
- TEE has benefits over other tools like PAC
- Few pathologies are difficult to diagnose without TEE
- Few situations may warrant use of multiple monitoring

- Cardiac Anaesthetists: Watching the patient/heart (CPB weaning) is the golden monitor. On TEE, Heart may look 'fine' but patient may look terrible

Thank you
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