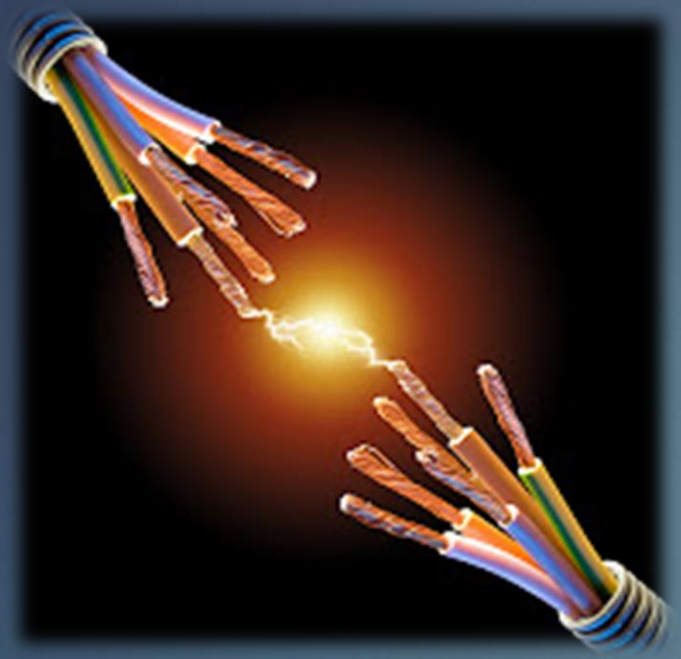


Basic views of Trans-oesophageal Echocardiography

Dr. Heba Abdelazim Labib, MD

prof. of Anesthesia and Intensive Care
Faculty of Medicine
Ain Shams University

Objectives

- Advantages
- indications.
- Contraindications.
- Complications
- Probe movement.

TEE views & anatomical correlation.

- ***Transesophageal echocardiography uses all the same technology as transthoracic imaging. 2D-echo , colour & spectral Doppler can all be performed as well as TDI & 3D reconstructions.***

ADVANTAGES

- ✓ LUNGS AND RIBS DON'T INTERFERE ONLY ESOPHAGEAL WALL AND PERICARDIUM IN BETWEEN
- ✓ WONT DISRUPT SURGERY
- ✓ TRANS THORACIC IS DIFFICULT IN:
  OBESITY/EMPHYSEMA/ABNORMAL CHEST WALL

Absolute contraindications

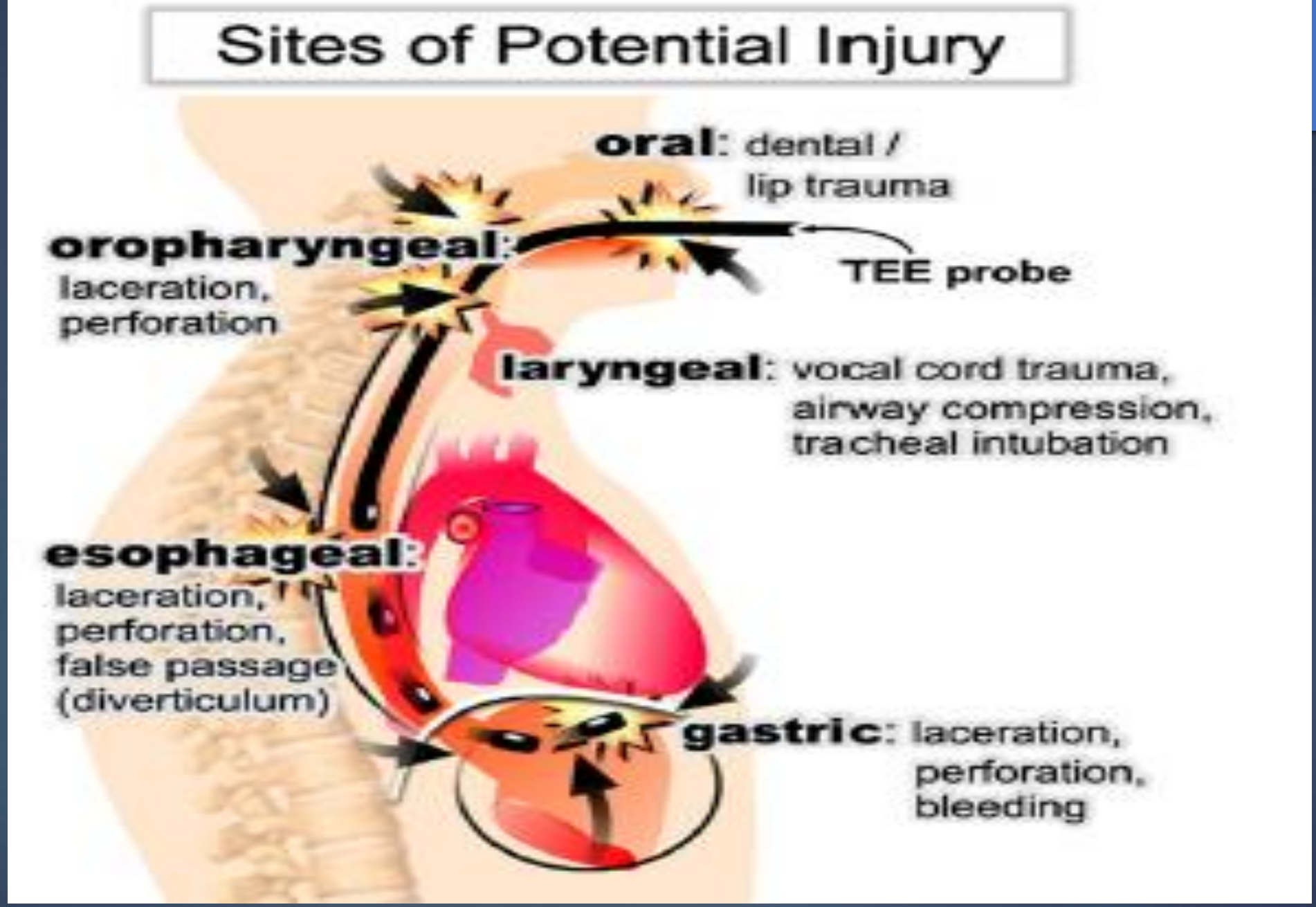
- ✓ Oesophageal tumors causing obstruction of the lumen.
- ✓ Oesophageal strictures.
- ✓ Oesophageal diverticula.
- ✓ Patient not co-operative.

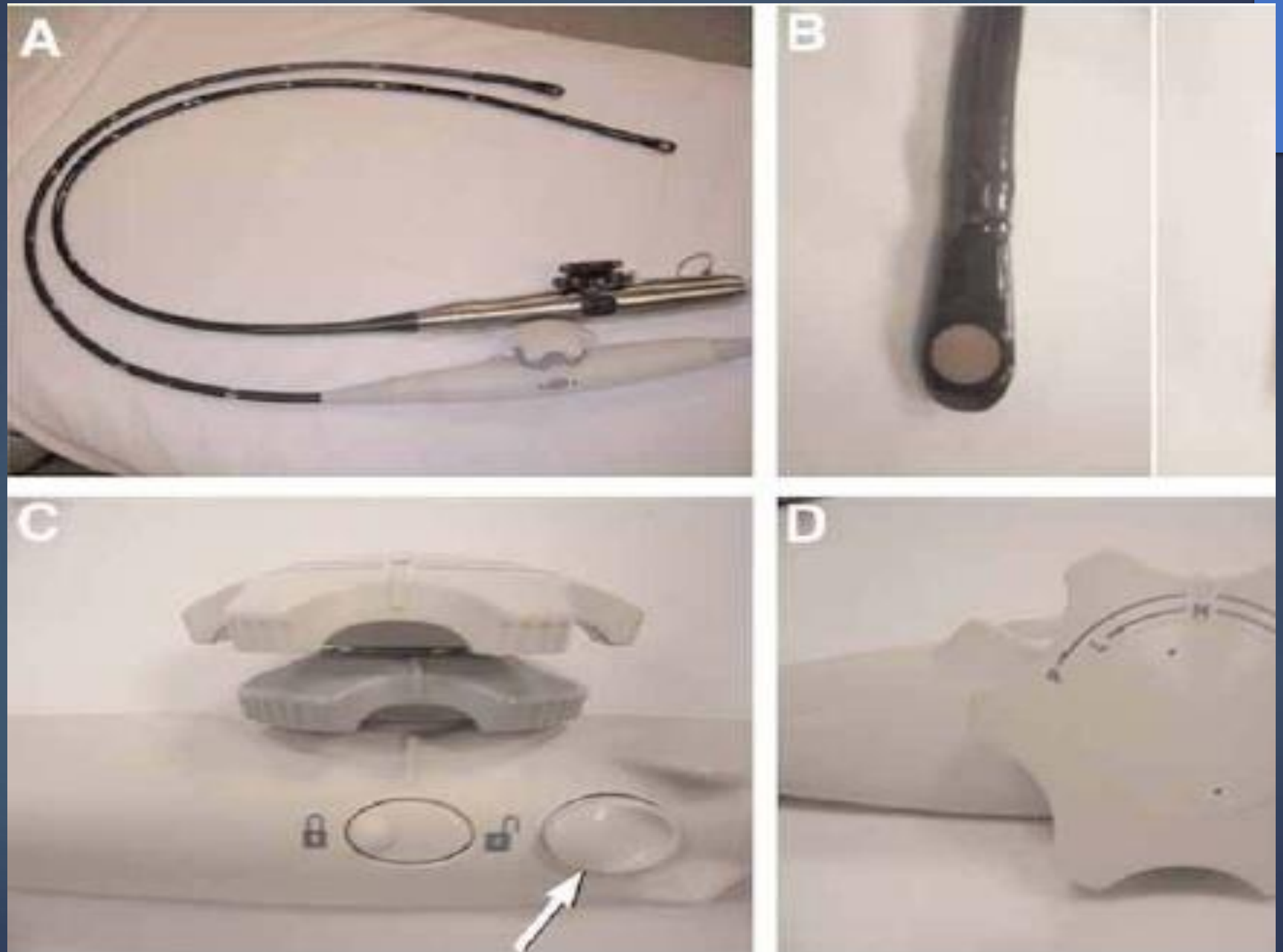
Complications

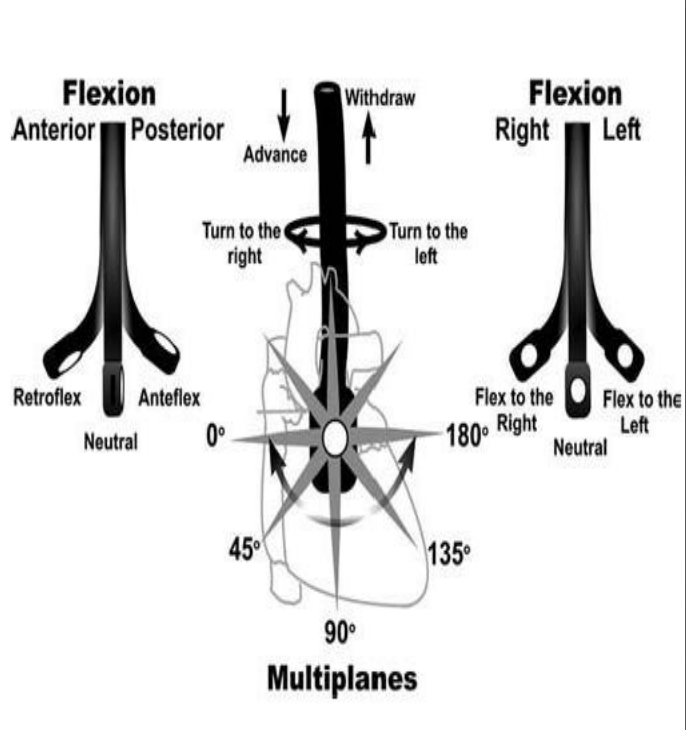
A study of complications in around 10,000 patients showed a very low incidence.

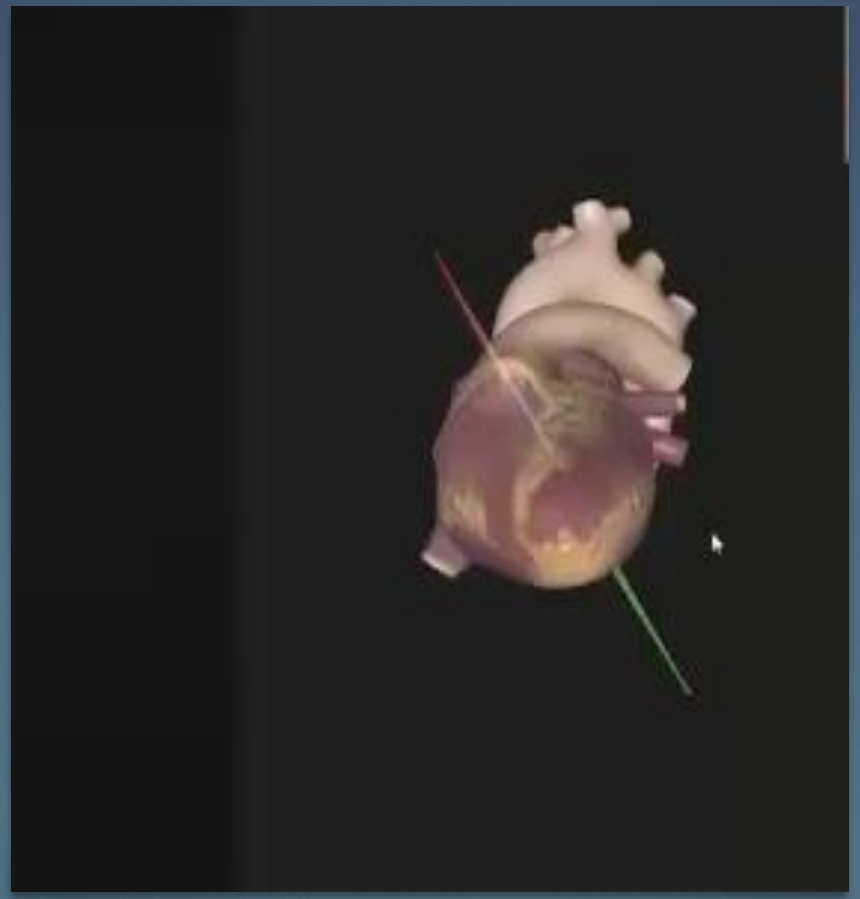
Failed intubation occurred in around 2%.

All other complications had an incidence of less than 1% .


Sites of Potential Injury
oral: dental / lip trauma
TEE probe
oropharyngeal: laceration, perforation
laryngeal: vocal cord trauma, airway compression, tracheal intubation
esophageal: laceration, perforation, false passage (diverticulum)
gastric: laceration, perforation, bleeding

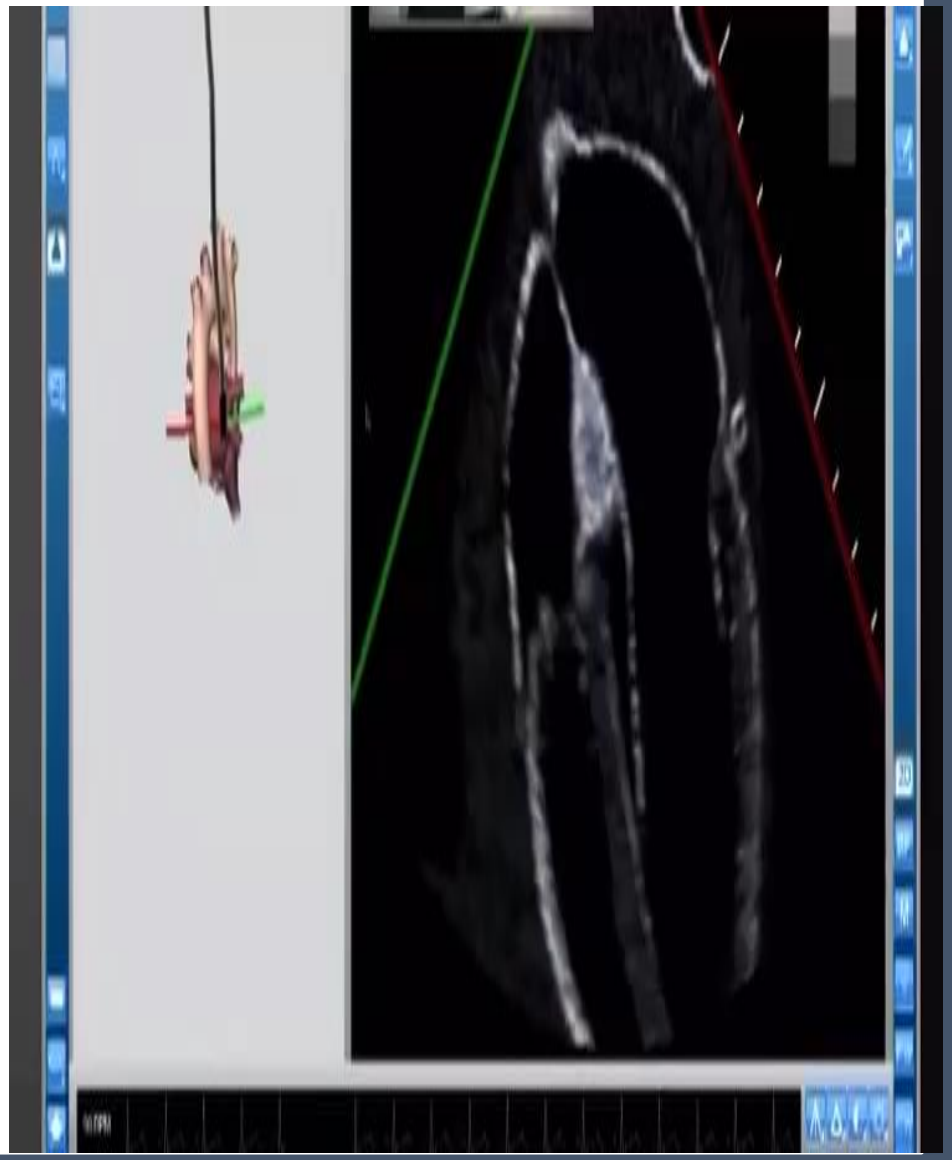

A
B
C
D



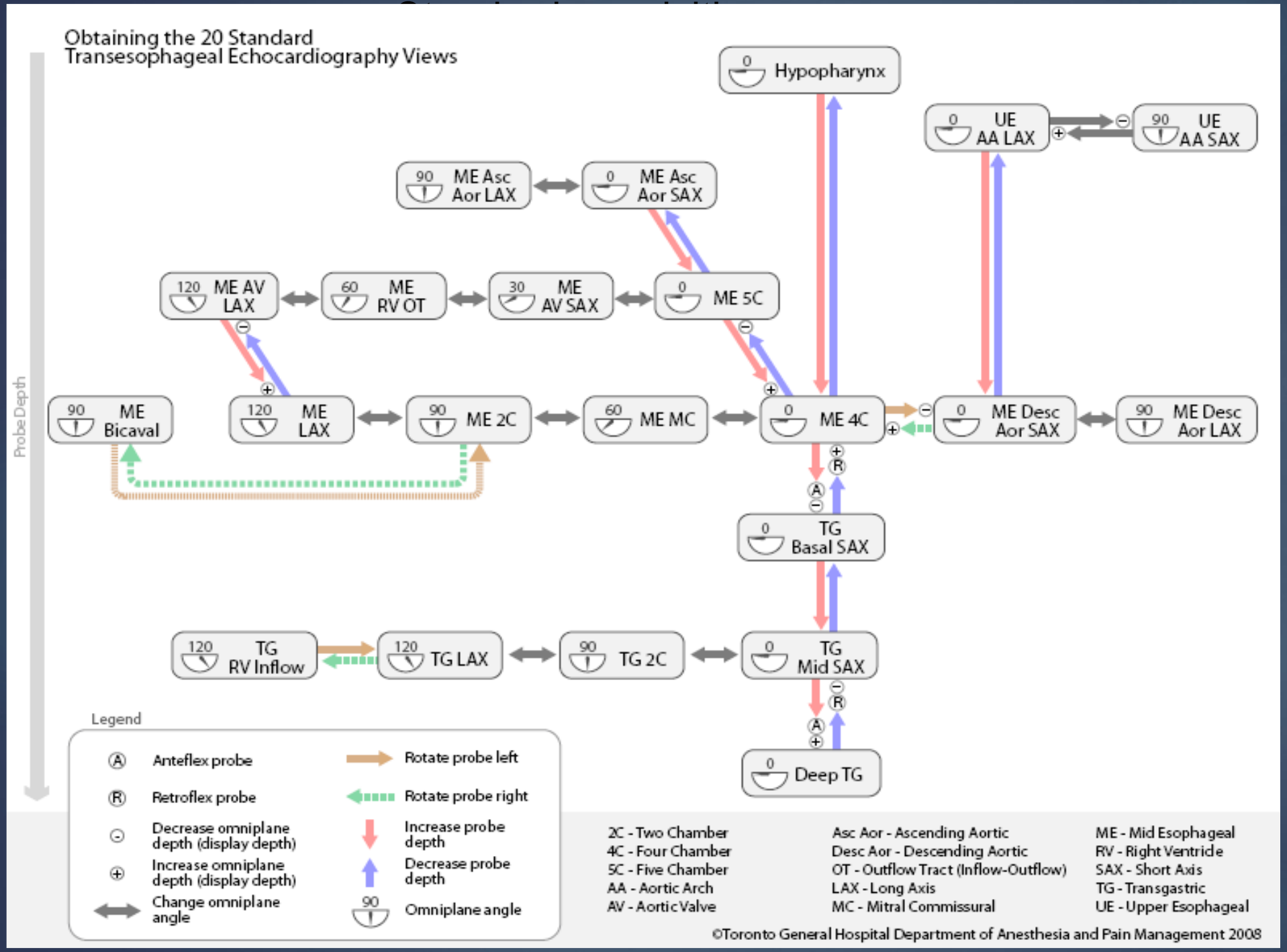


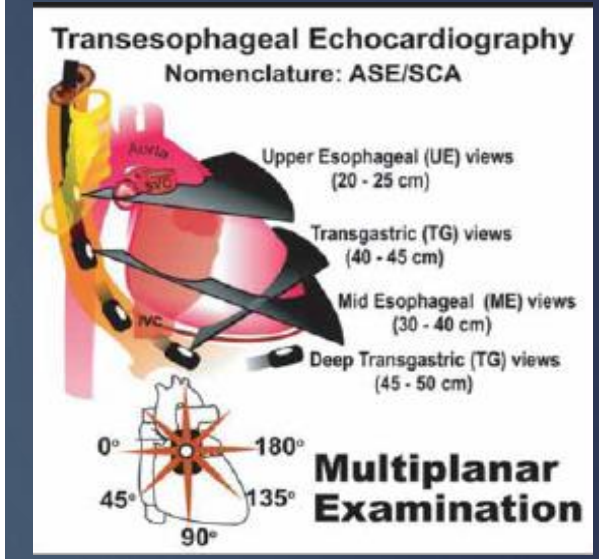
Mechanical movements of the TEE probe.


Normal
Pathology



TEE VIEWS

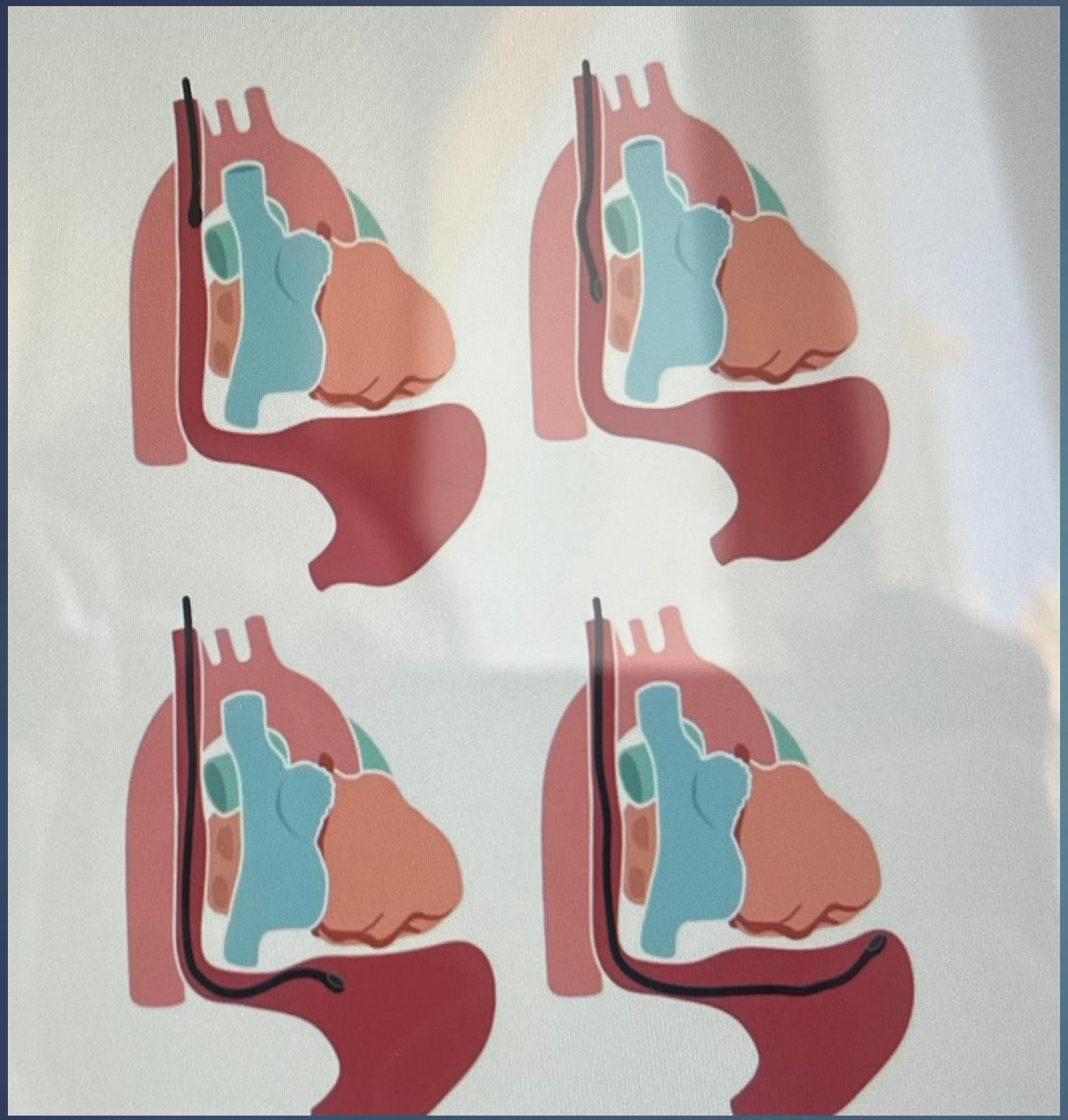


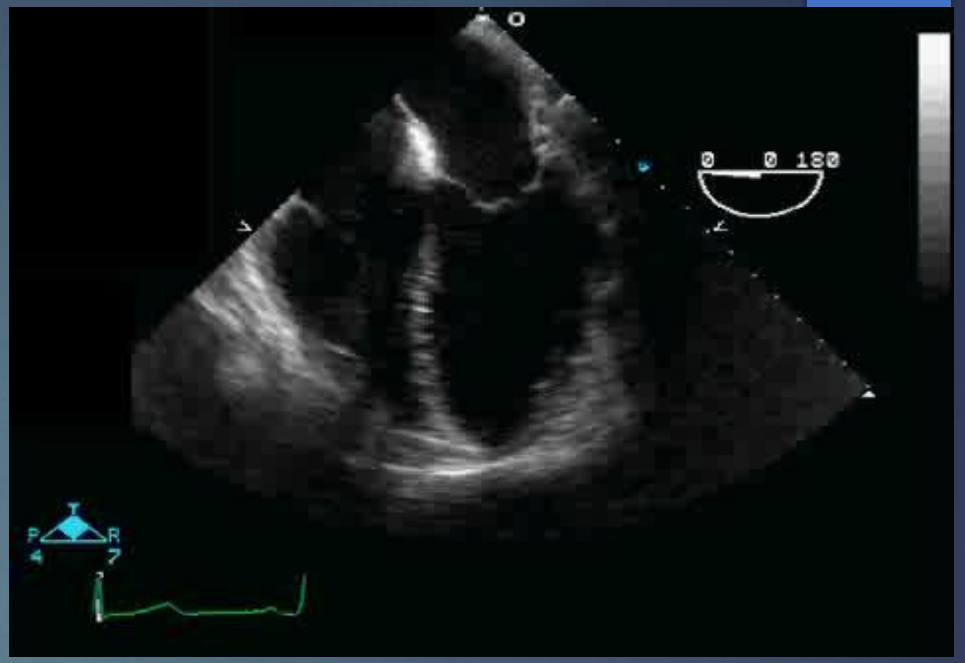


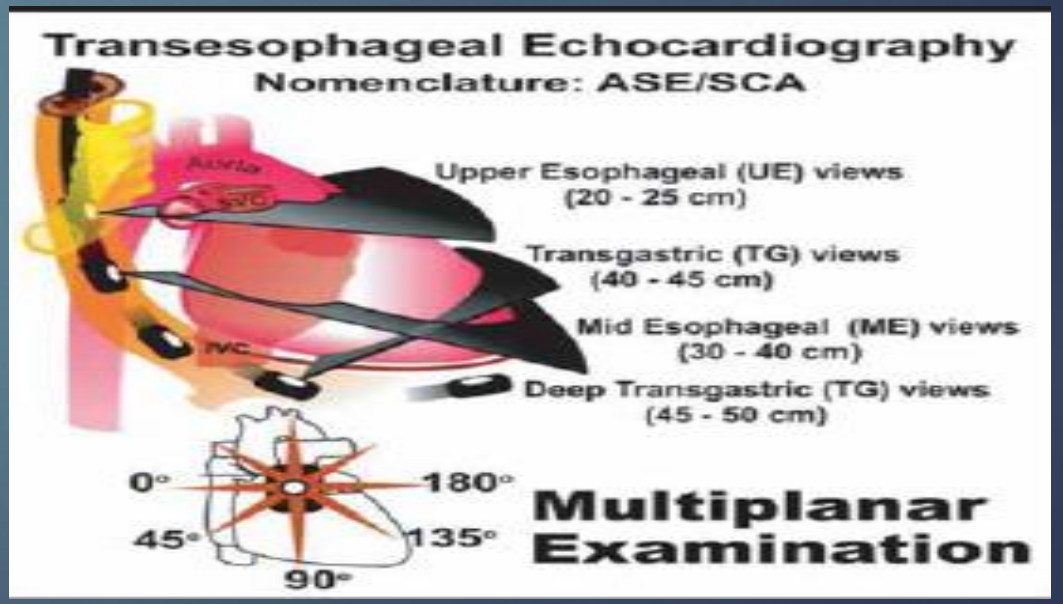
American society of echocardiography.

Society of cardiovascular anesthesiologist

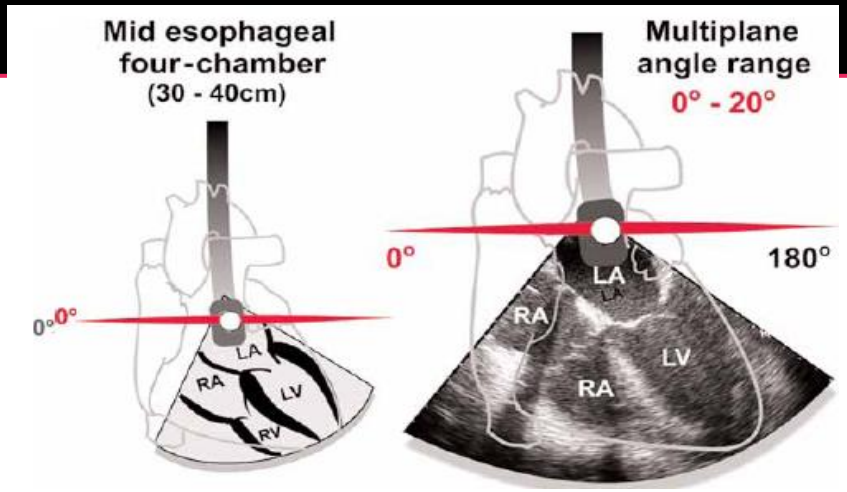
TEE examination order

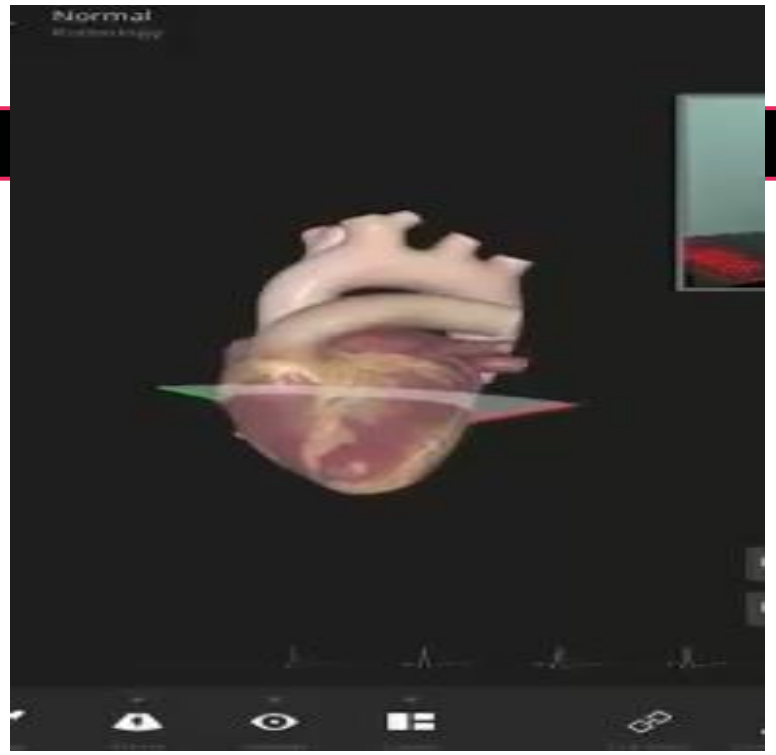


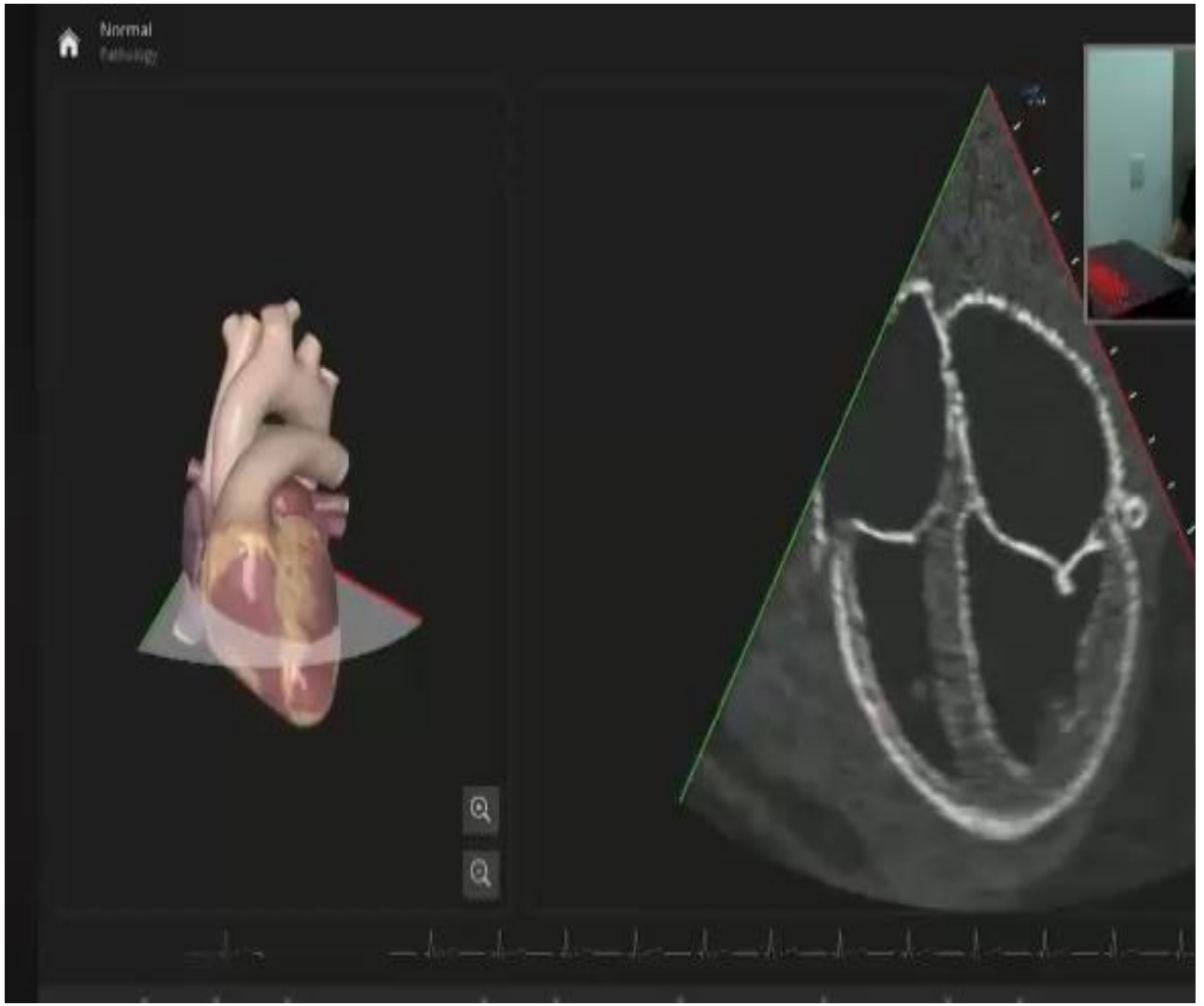


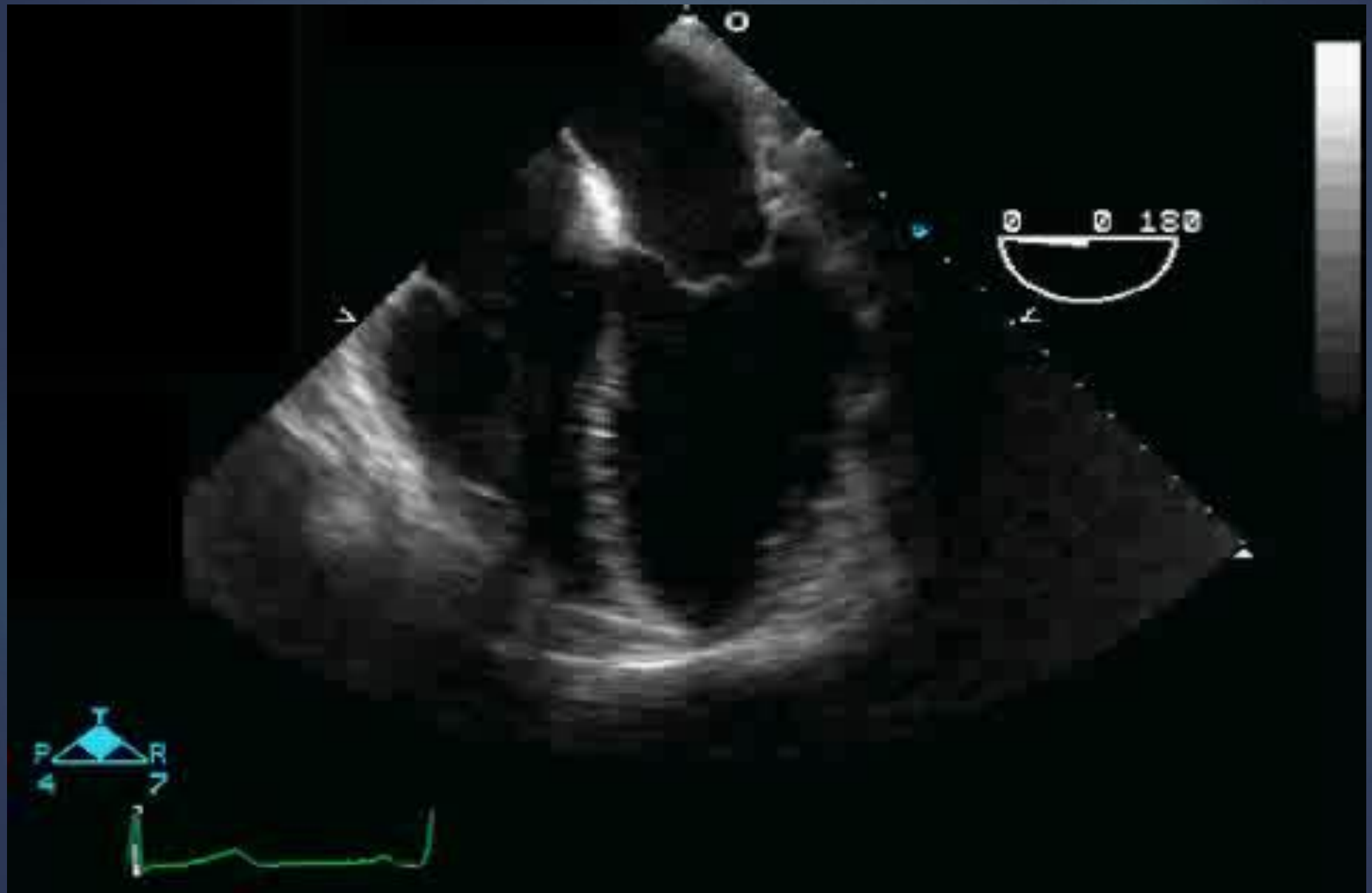


American society of echocardiography
Society of cardiovascular anesthesiologist

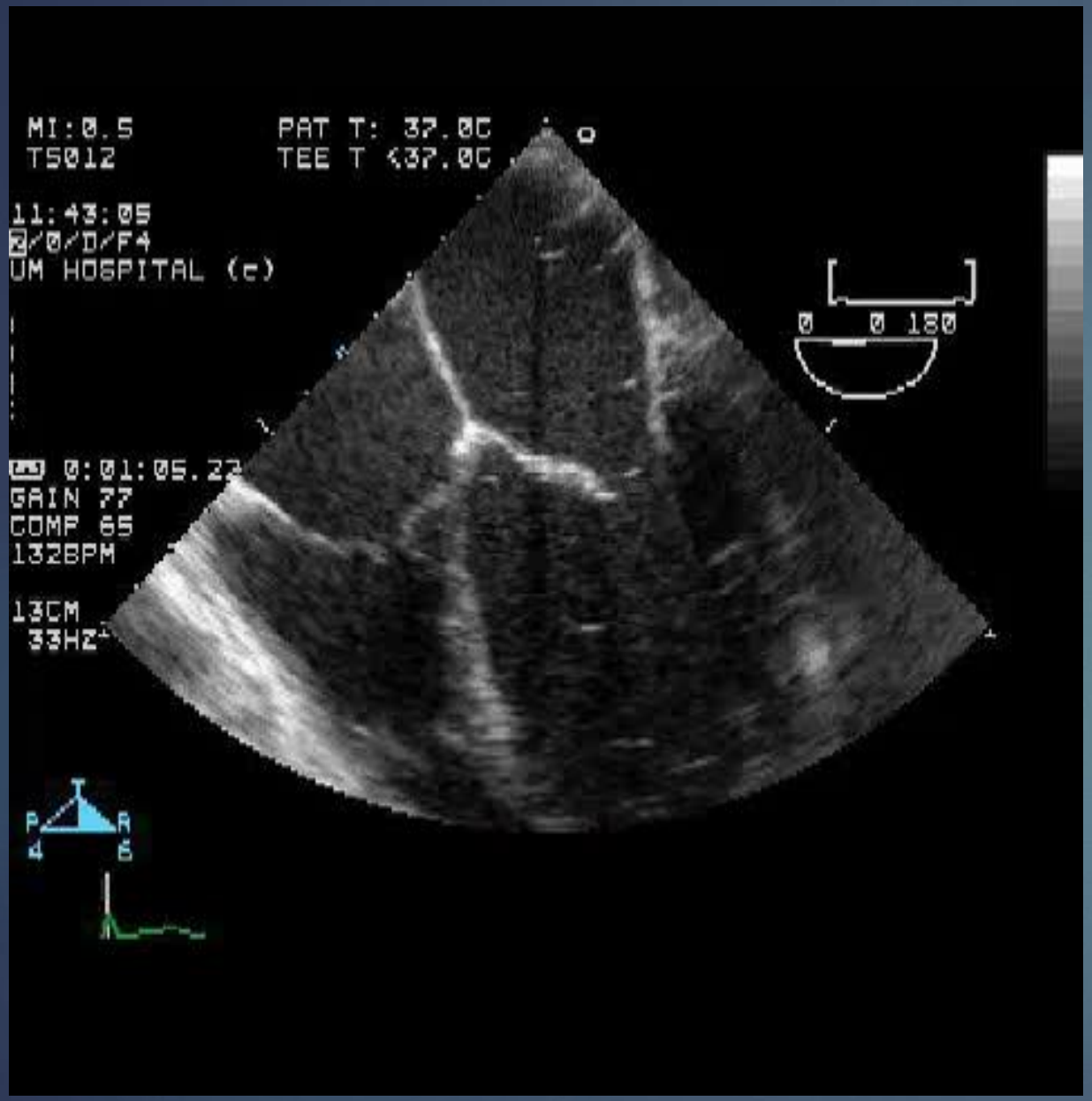

Mid esophageal
four-chamber
(30 - 40cm)
Multiplane
angle range
0° - 20°
0°
180°
0°0°
LA
RA
LV
RV
LA
RA
LV
RA

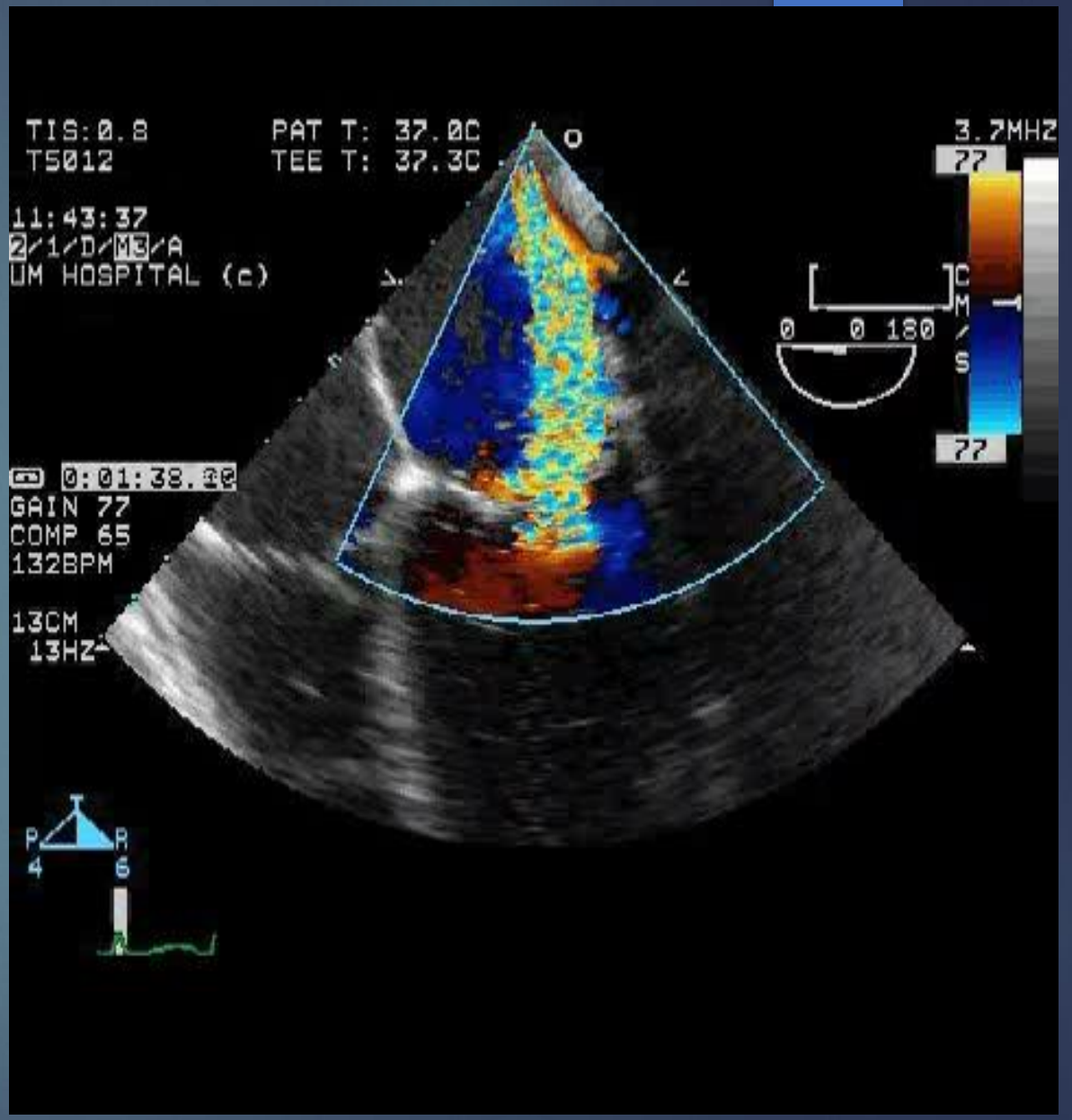

Normal


Normal

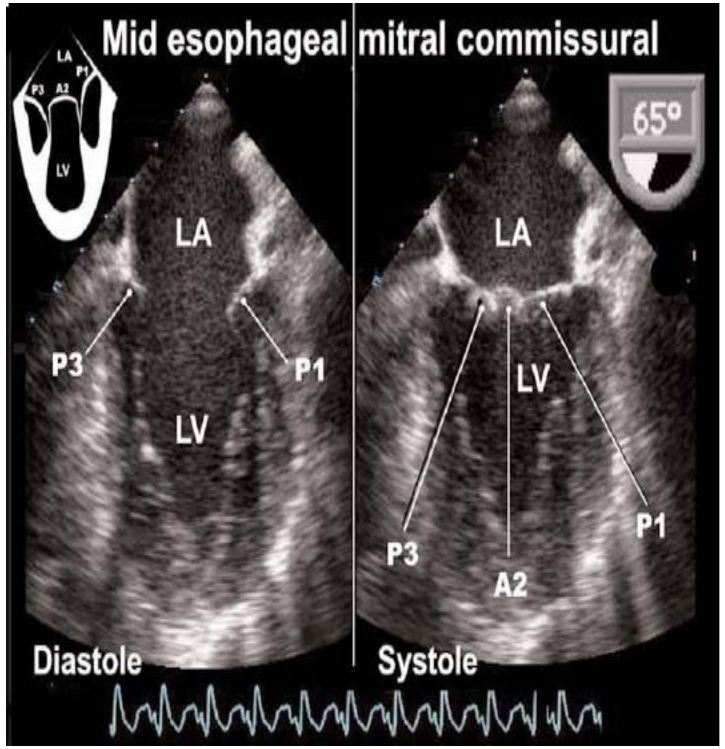


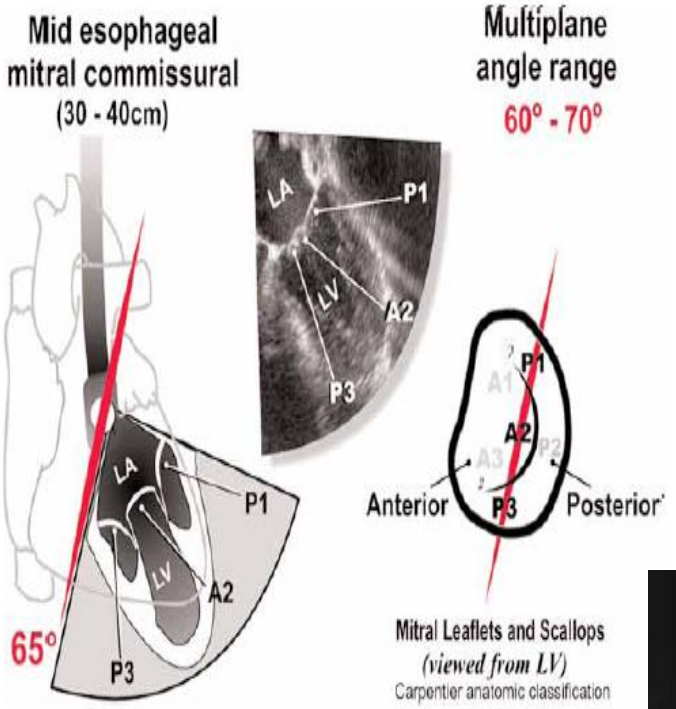
Septal and lateral

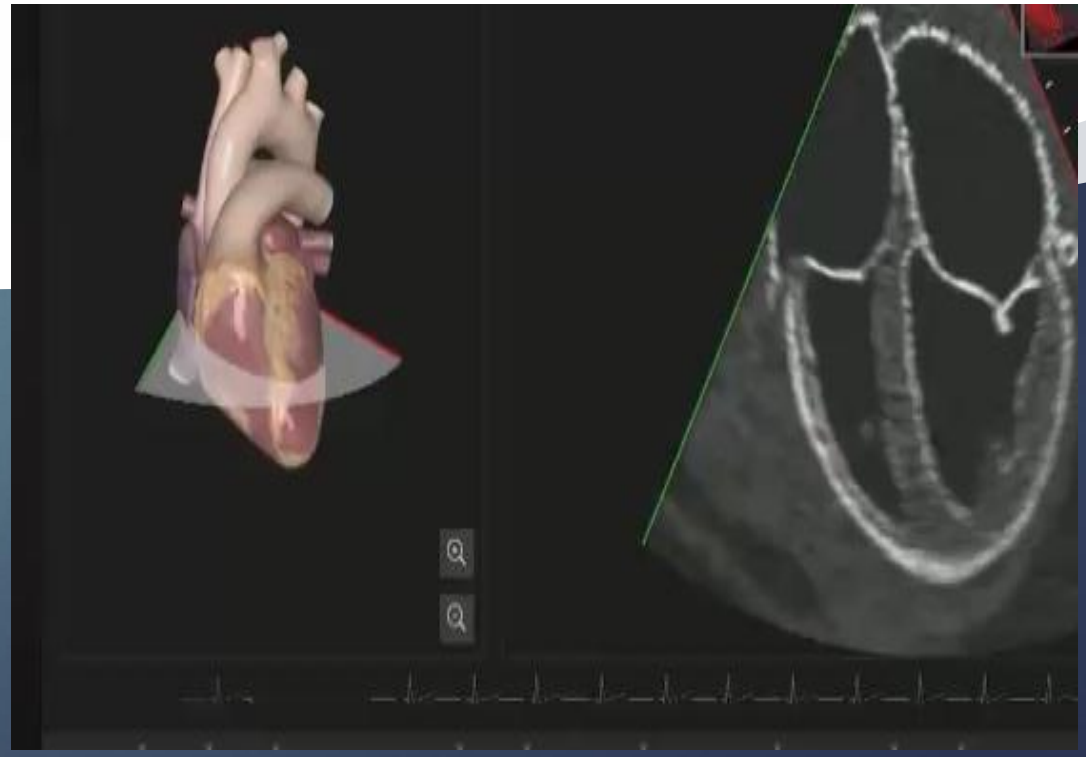

MI:0.5
T5012
PAT T: 37.0C
TEE T 37.0C
11:43:05
2/0/D/F4
UM HOSPITAL (c)
0 0 180
0:01:05.22
GAIN 77
COMP 65
132BPM
13CM
33HZ
P
A
4
6


TIS:0.8
T5012
PAT T: 37.0C
TEE T: 37.3C
3.7MHZ
77
11:43:37
2/1/D/M3/A
UM HOSPITAL (c)
0 0 180
77
0:01:38.00
GAIN 77
COMP 65
132BPM
13CM
13HZ
P
A
4
6

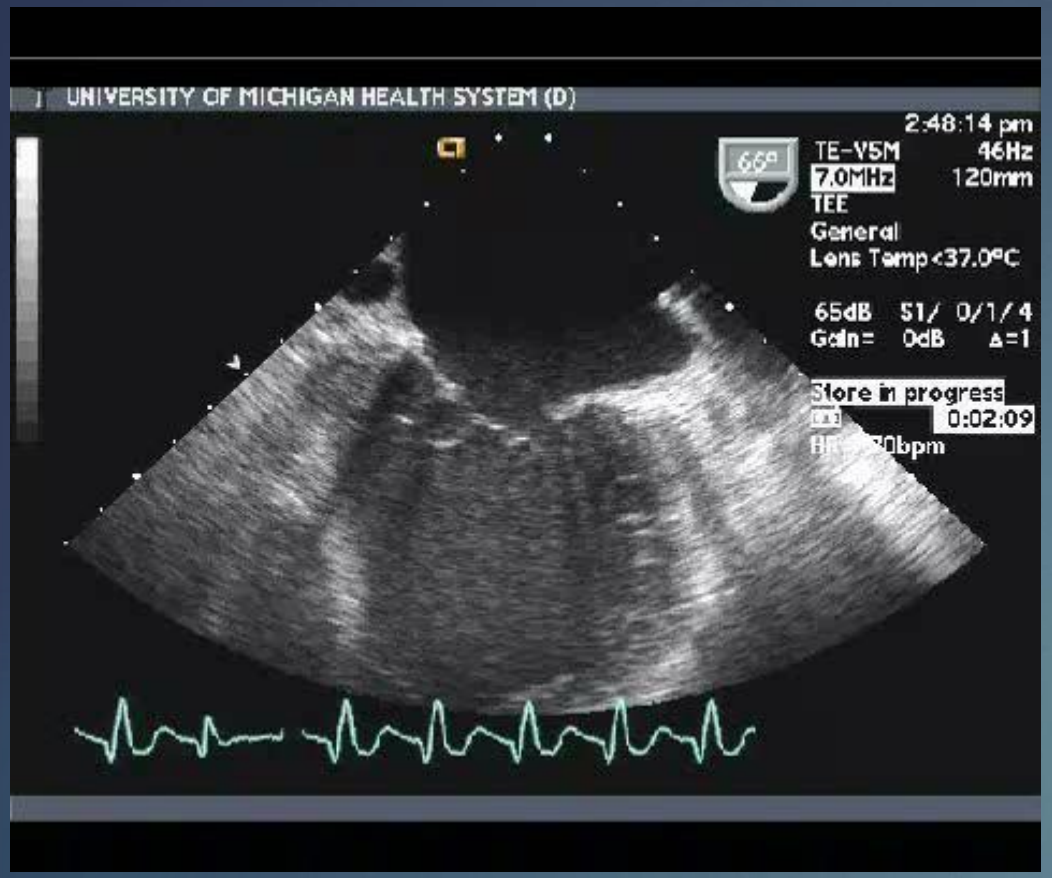

UNIVERSITY of MICHIGAN HEALTH SYSTEM - O.R.
TE-VSM
41Hz
140mm
TEE
General
Lens Temp=38.7°C
65dB 51/ 0/1/4
Gain= 15dB Δ=1
HR=117bpm

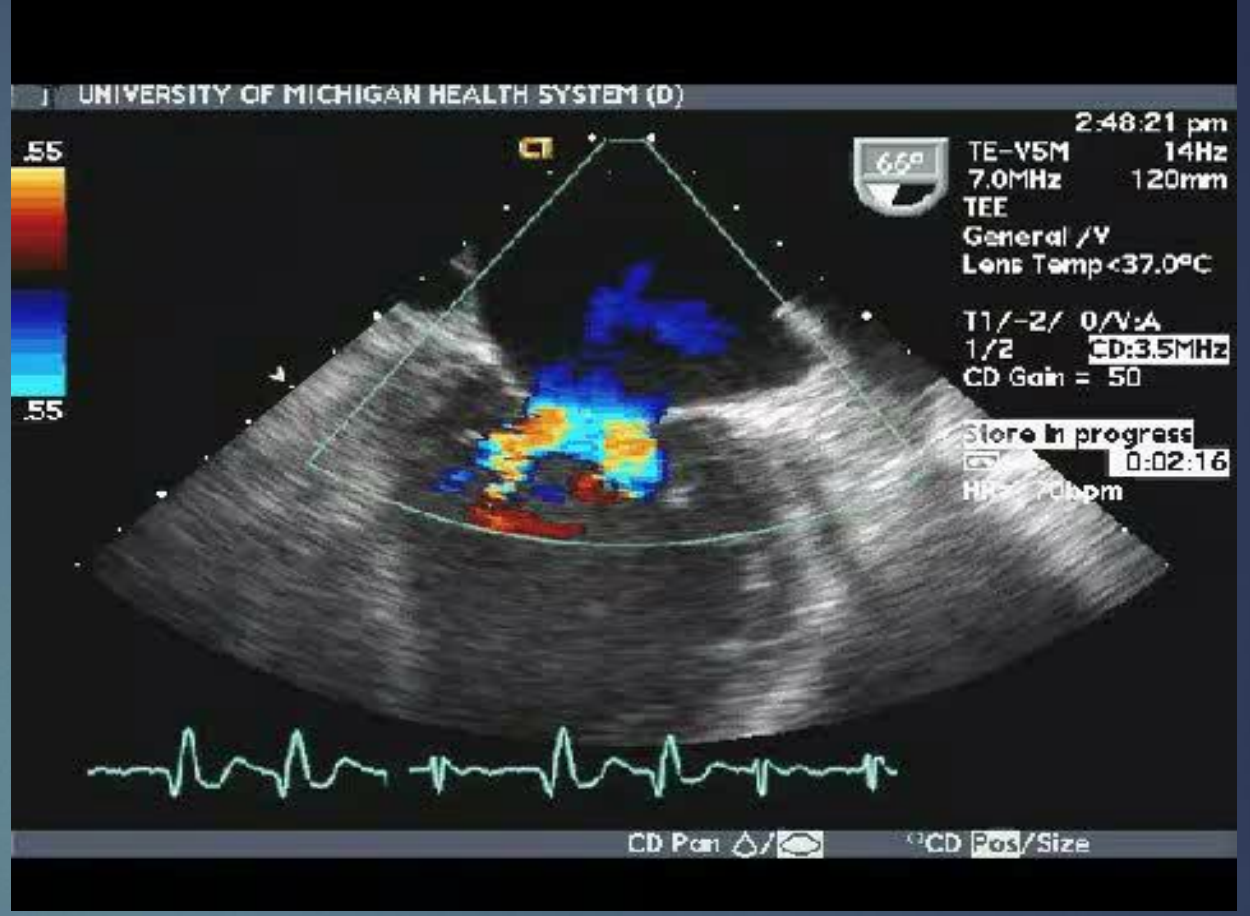


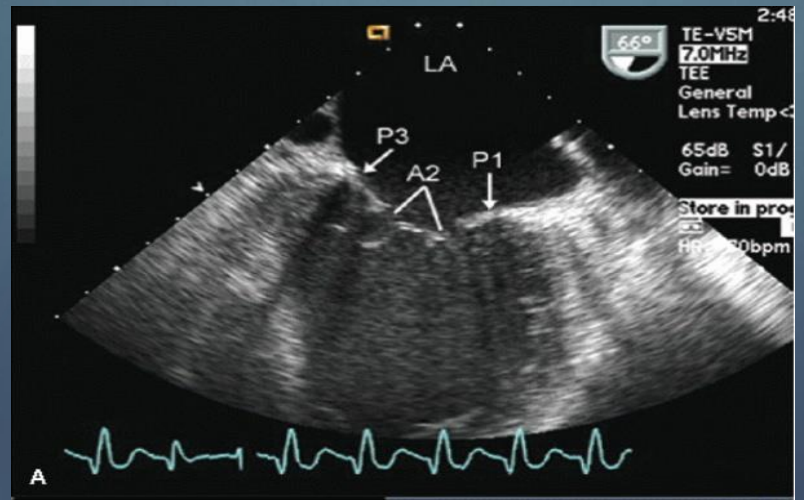


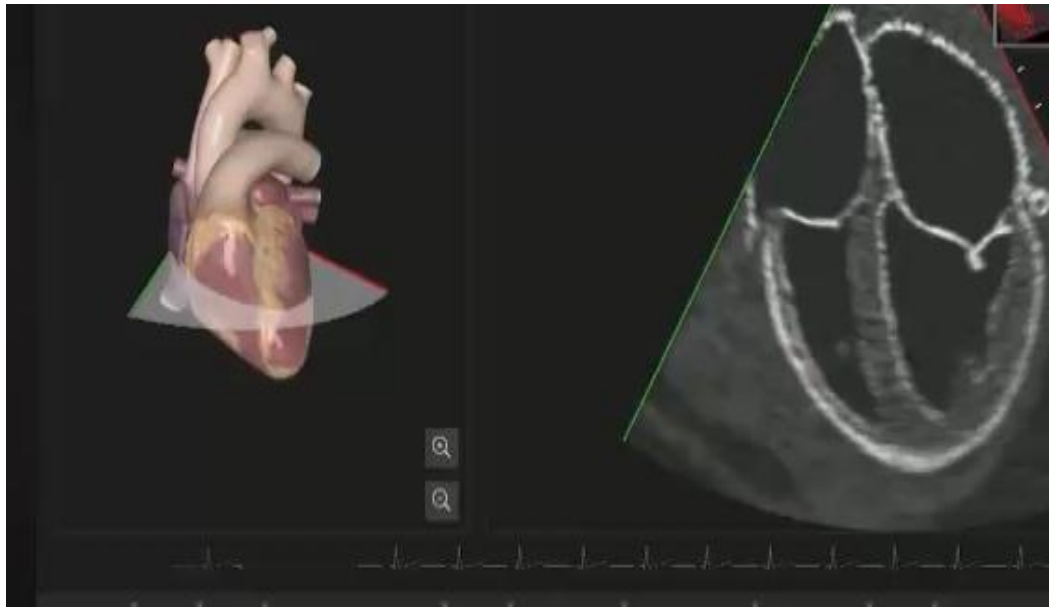


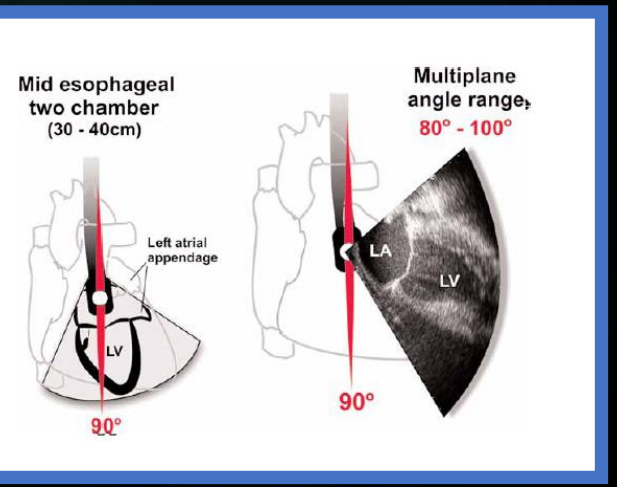
Inferior and lateral

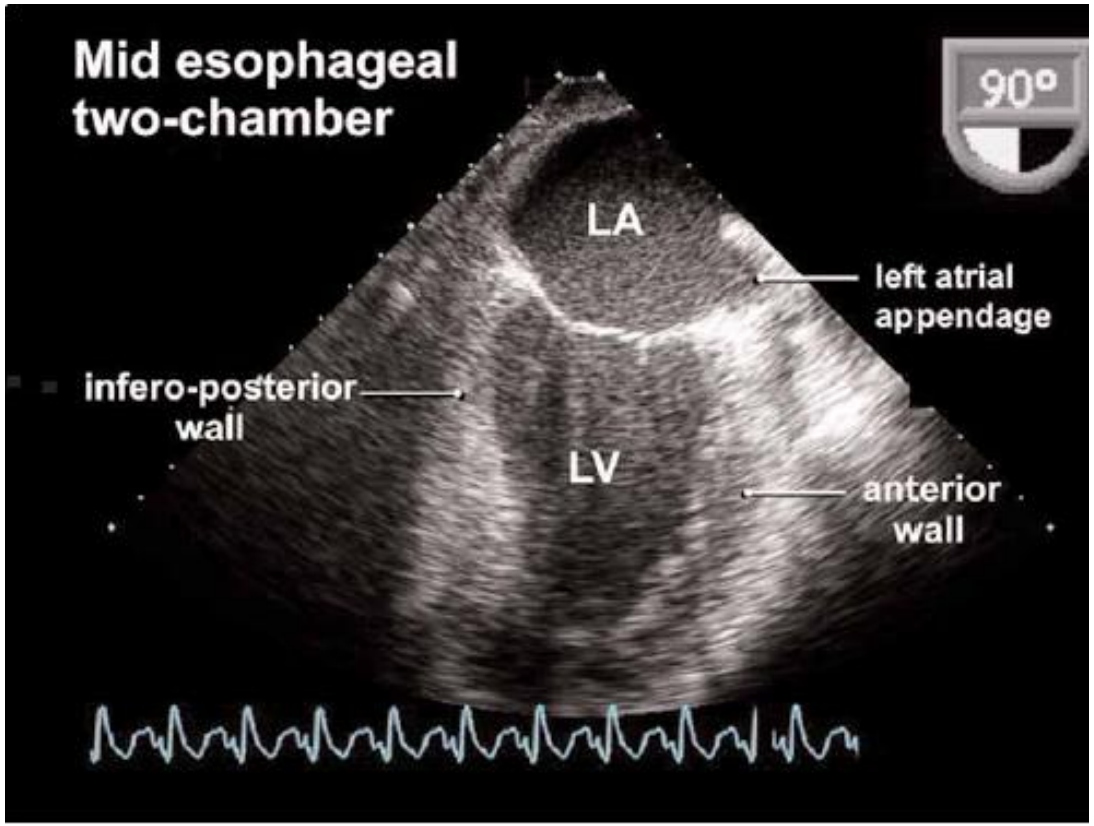

UNIVERSITY OF MICHIGAN HEALTH SYSTEM (D)
2:48:14 pm
TE-V5M 46Hz
7.0MHz 120mm
TEE
General
Lens Temp<37.0°C
65dB S1/ 0/1/4
Gain= 0dB A=1
Store in progress
0:02:09

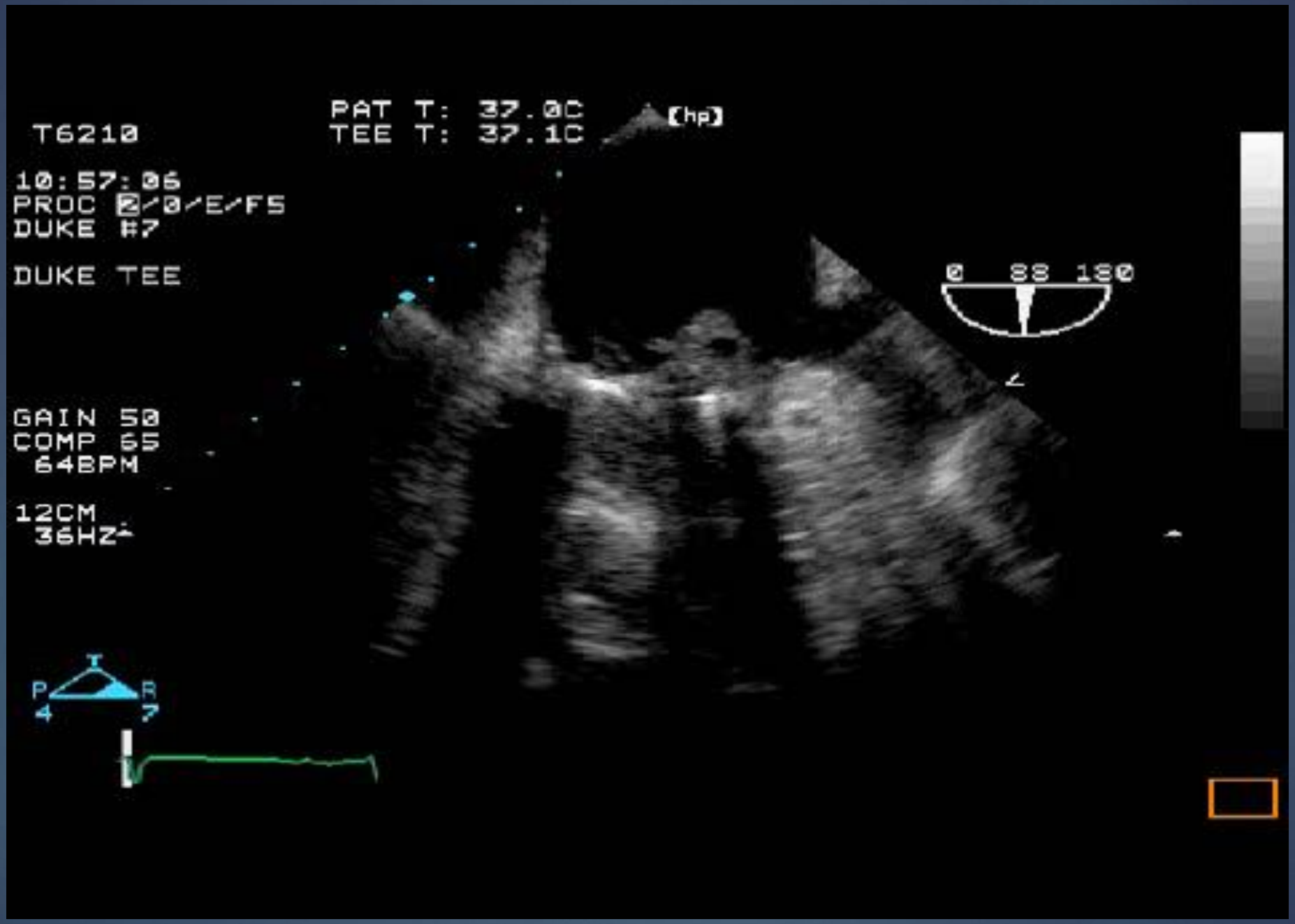

UNIVERSITY OF MICHIGAN HEALTH SYSTEM (D)
2:48:21 pm
.55
.55
TE-V5M 14Hz
7.0MHz 120mm
TEE
General /Y
Lens Temp<37.0°C
T1/-2/ 0/V:A
1/2 CD:3.5MHz
CD Gain = 50
Store in progress
0:02:16
CD Pan
CD Pos/Size

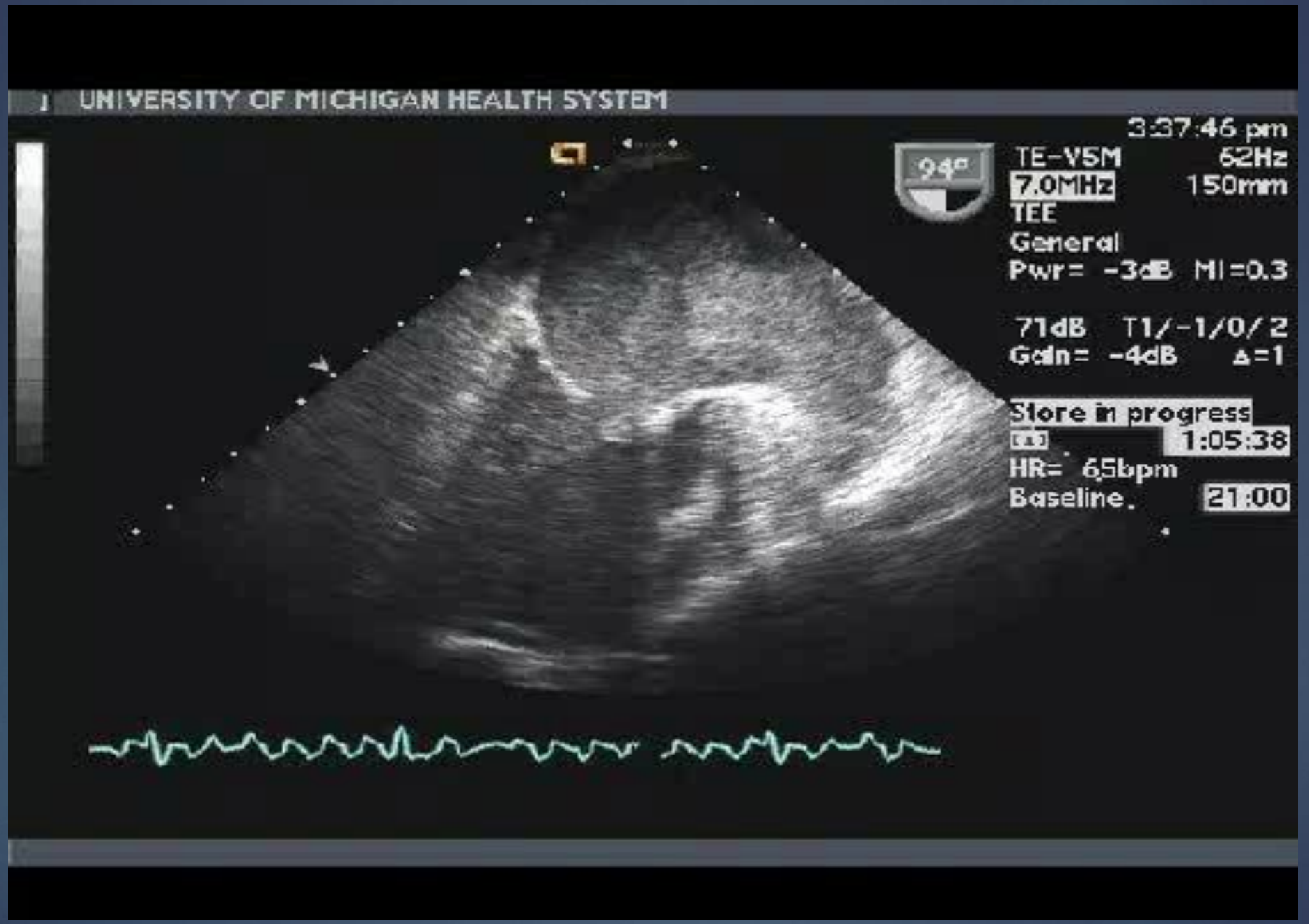

LA
P3
A2
P1
TE-V5M
7.0MHz
TEE
General
65dB S1/
Gain= 0dB
A

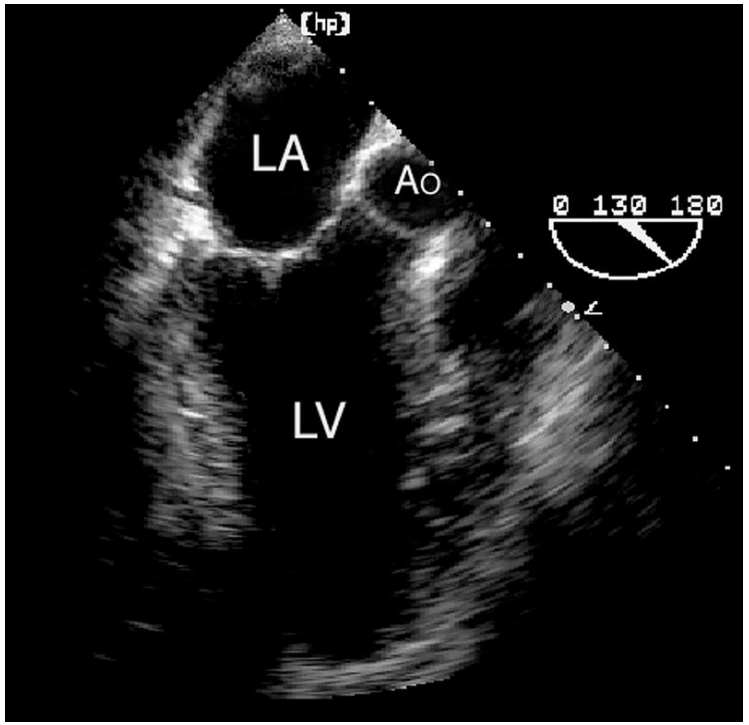


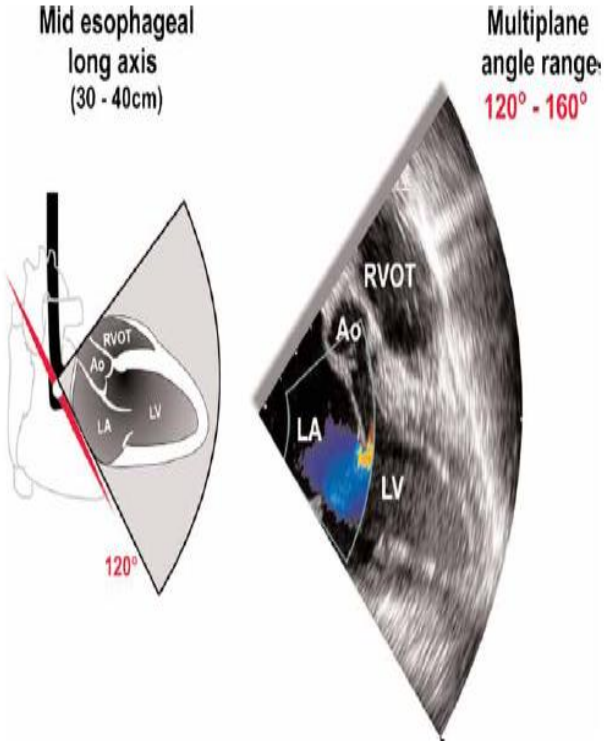

Mid esophageal
two chamber
(30 - 40cm)
Left atrial
appendage
LV
90°
Multiplane
angle range,
80° - 100°
LA
LV
90°

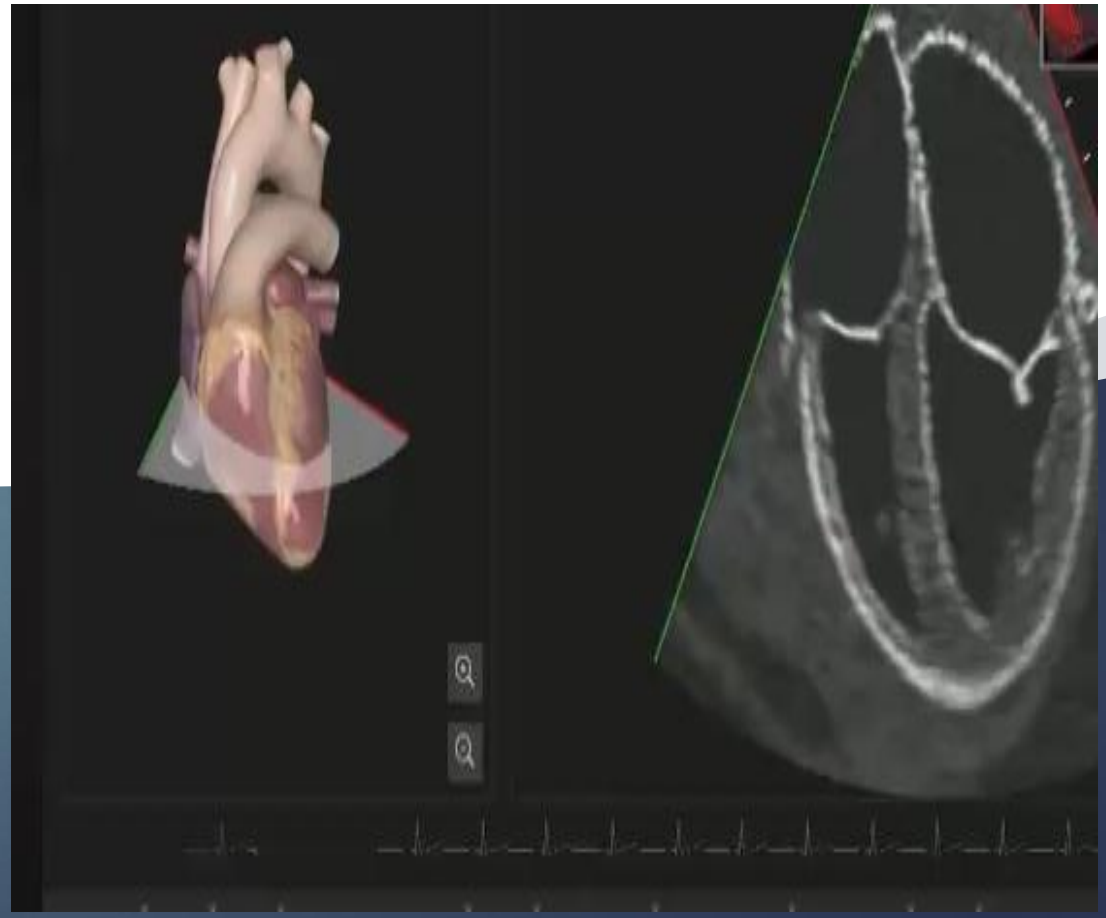

Mid esophageal
two-chamber
90°
LA
left atrial
appendage
infero-posterior
wall
LV
anterior
wall


T6210
PAT T: 37.0C
TEE T: 37.1C
(hp)
10:57:06
PROC 2/0/E/F5
DUKE #7
DUKE TEE
0 88 180
GAIN 50
COMP 65
64BPM
12CM
36HZ
P
R
4
7

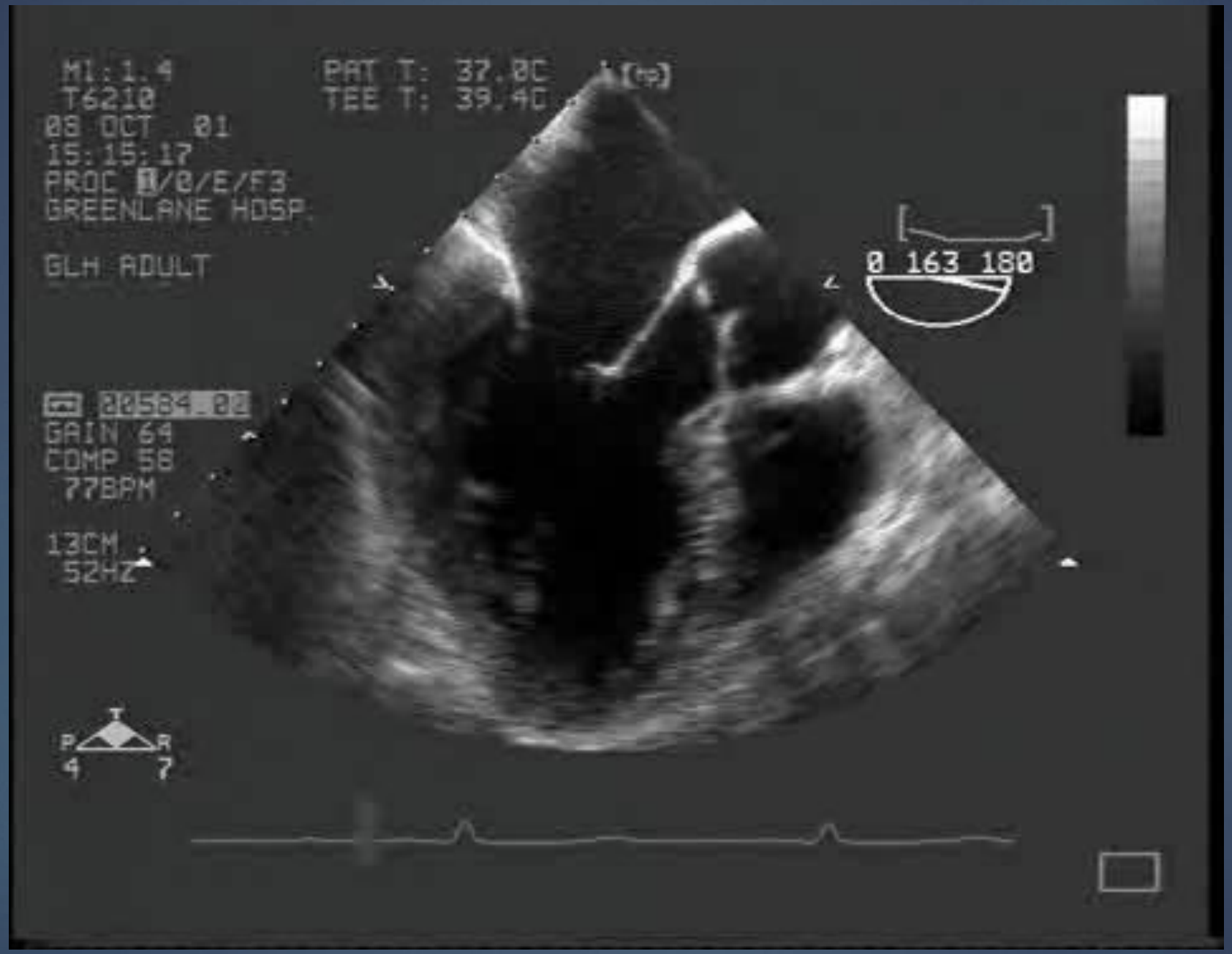

UNIVERSITY OF MICHIGAN HEALTH SYSTEM
3:37:46 pm
94°
TE-V5M
62Hz
7.0MHz
150mm
TEE
General
Pwr= -3dB MI=0.3
71dB T1/-1/0/2
Gain= -4dB Δ=1
Store in progress
1:05:38
HR= 65bpm
Baseline.
21:00

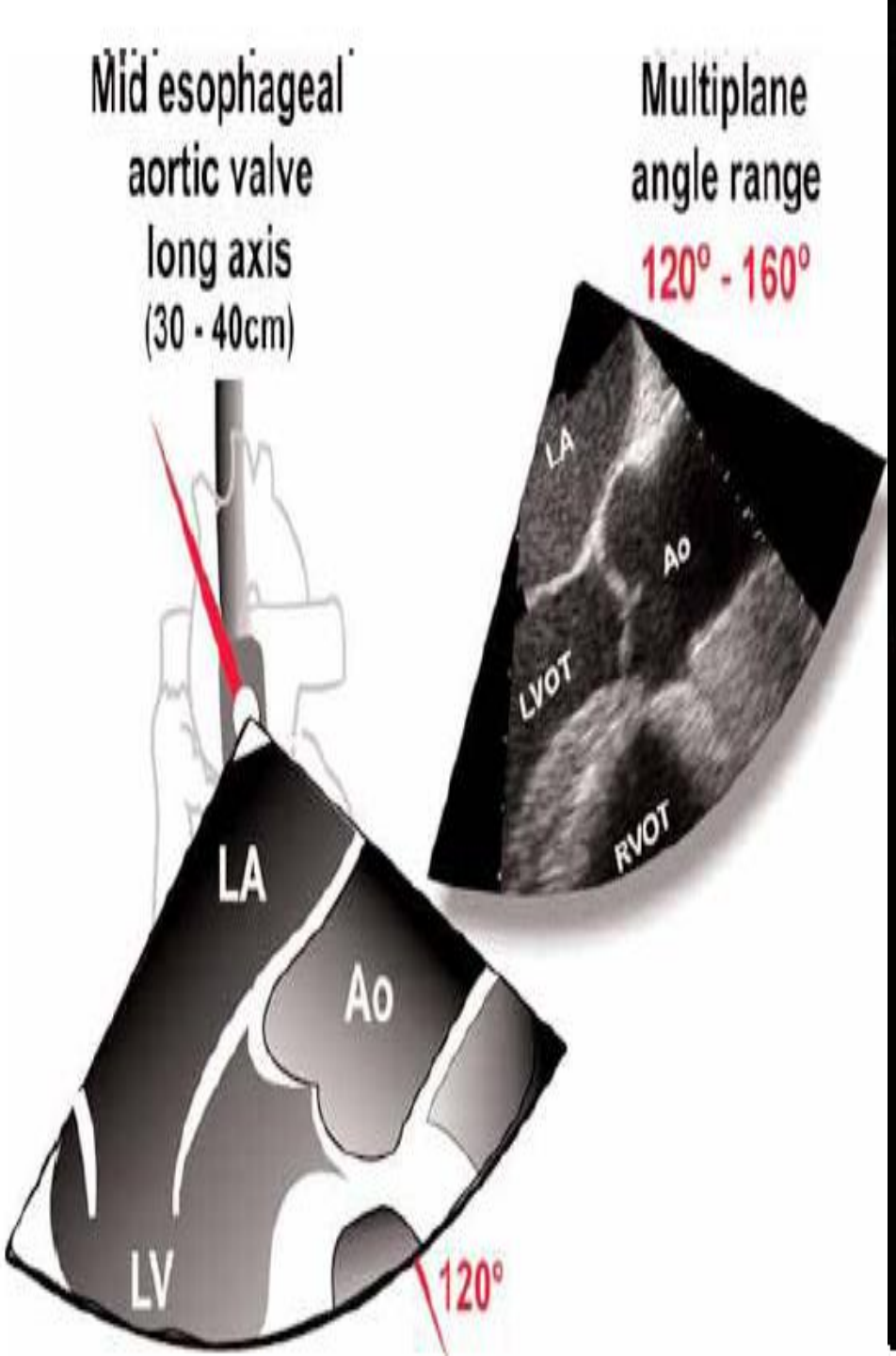




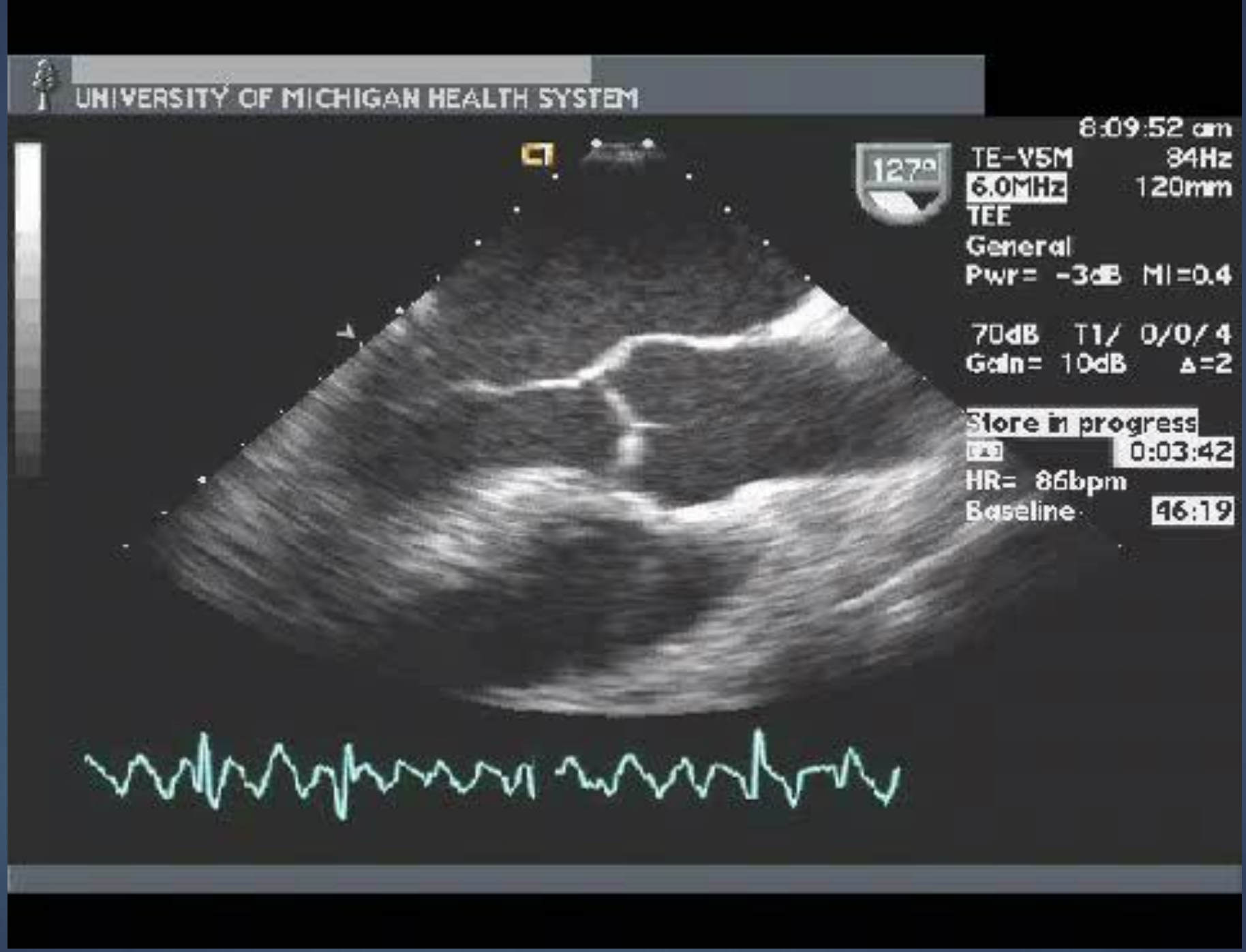


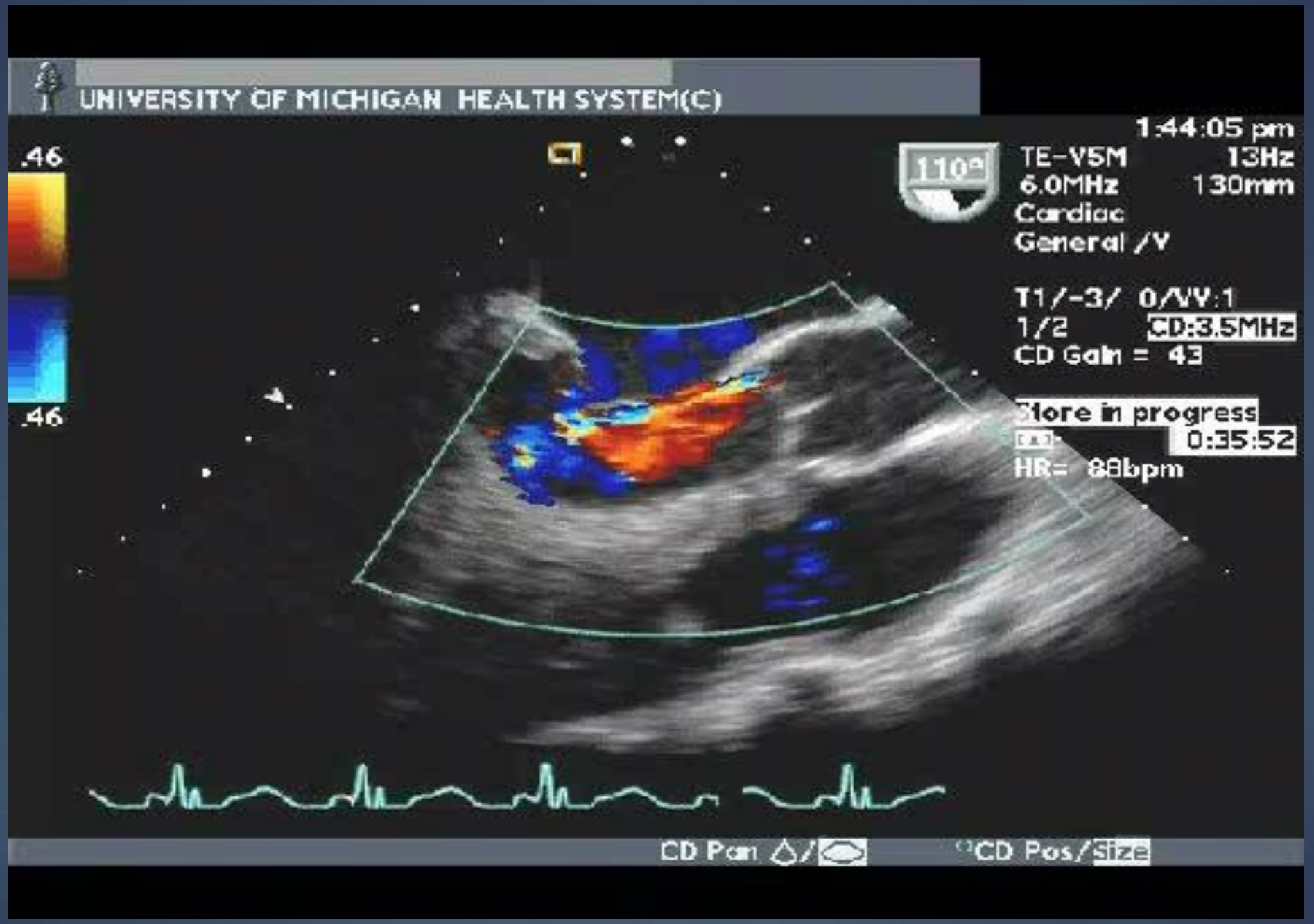
AntroSeptal
infero lateral


MI:1.4
T6210
08 OCT 01
15:15:17
PROC 1/0/E/F3
GREENLANE HOSP.
GLH ADULT
PAT T: 37.0C
TEE T: 39.4C
0 163 180
GAIN 64
COMP 56
77BPM
13CM
52HZ
P
R
4
7


Mid esophageal
aortic valve
long axis
(30 - 40cm)
Multiplane
angle range
120° - 160°
LA
Ao
LVOT
RVOT
LA
Ao
LV
120°


Mid esophageal
aortic valve
long axis
LA
120°
LVOT
Ao
RVOT


UNIVERSITY OF MICHIGAN HEALTH SYSTEM
8:09:52 am
TE-V5M
84Hz
6.0MHz
120mm
TEE
General
Pwr= -3dB MI=0.4
70dB T1/ 0/0/4
Gain= 10dB Δ=2
Store in progress
0:03:42
HR= 86bpm
Baseline
46:19

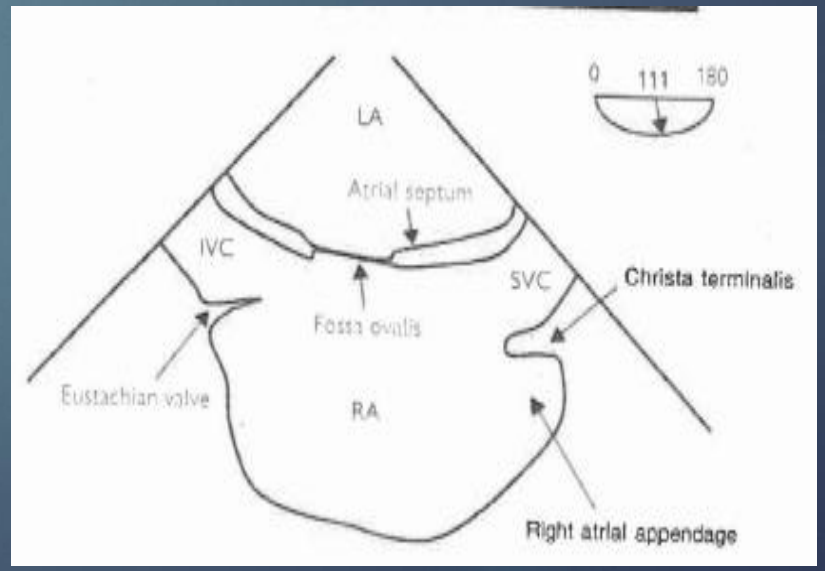

UNIVERSITY OF MICHIGAN HEALTH SYSTEM(C)
1:44:05 pm
.46
110°
TE-V5M
13Hz
6.0MHz
130mm
Cardiac
General /Y
T1/-3/ 0/VV:1
1/2
CD:3.5MHz
CD Gain = 43
.46
Store in progress
0:35:52
HR= 88bpm
CD Pan
CD Pos/Size

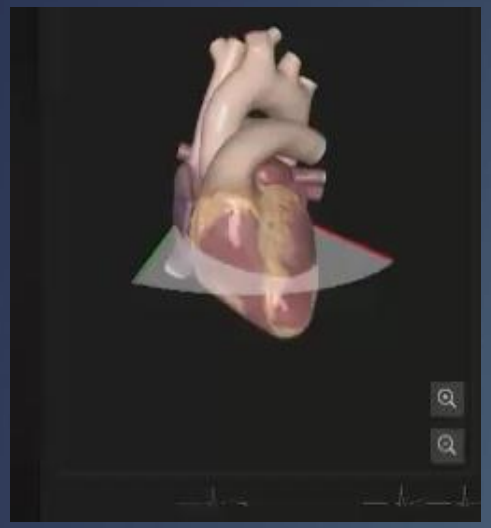
Bicaval view

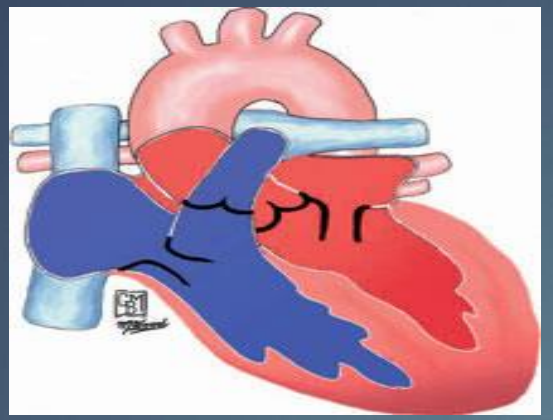
To Obtain the View
Find ME 2 C (90°) Turn the entire probe right
Change angle or rotate probe slightly to image both the IVC (left) and SVC (right) simultaneously

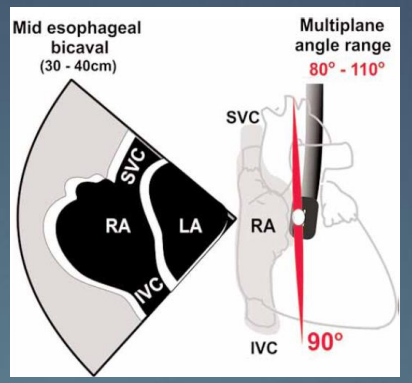
<u>Imaged structures and Diagnostic issues</u>

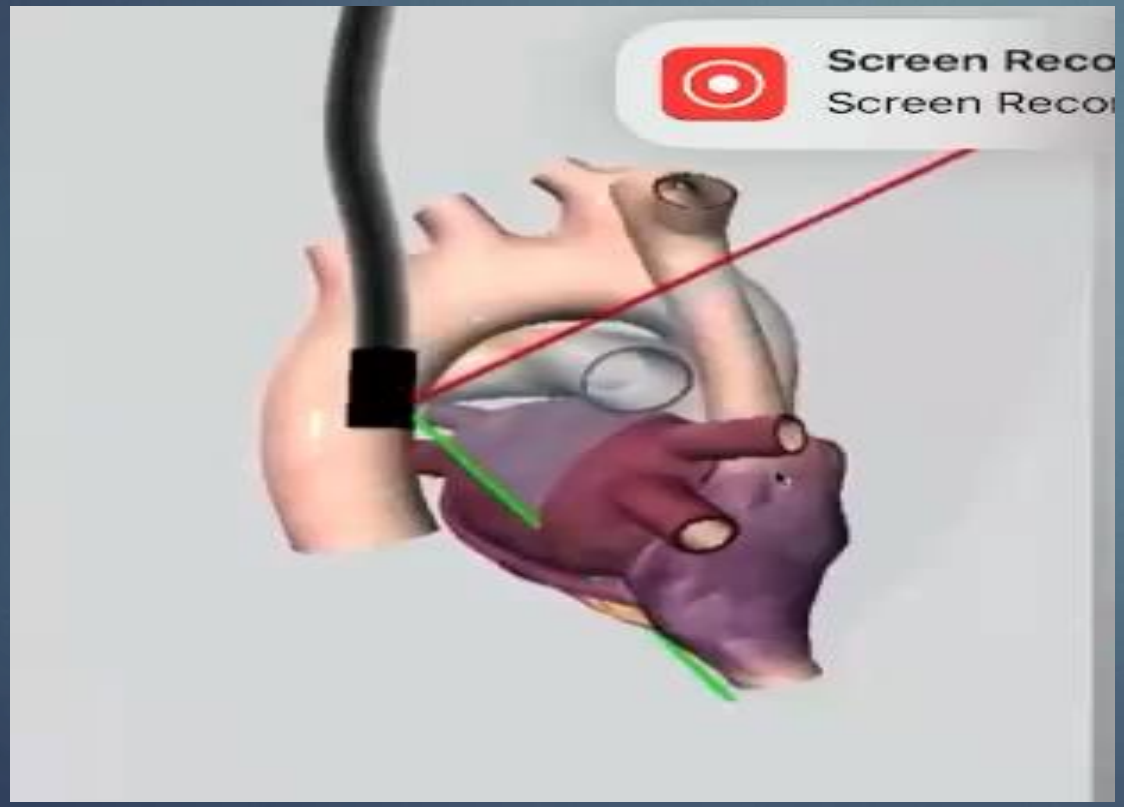
ASD
(secundum, sinus venosus)
Atrial pathology
Lines/wires and
Venous Cannula.

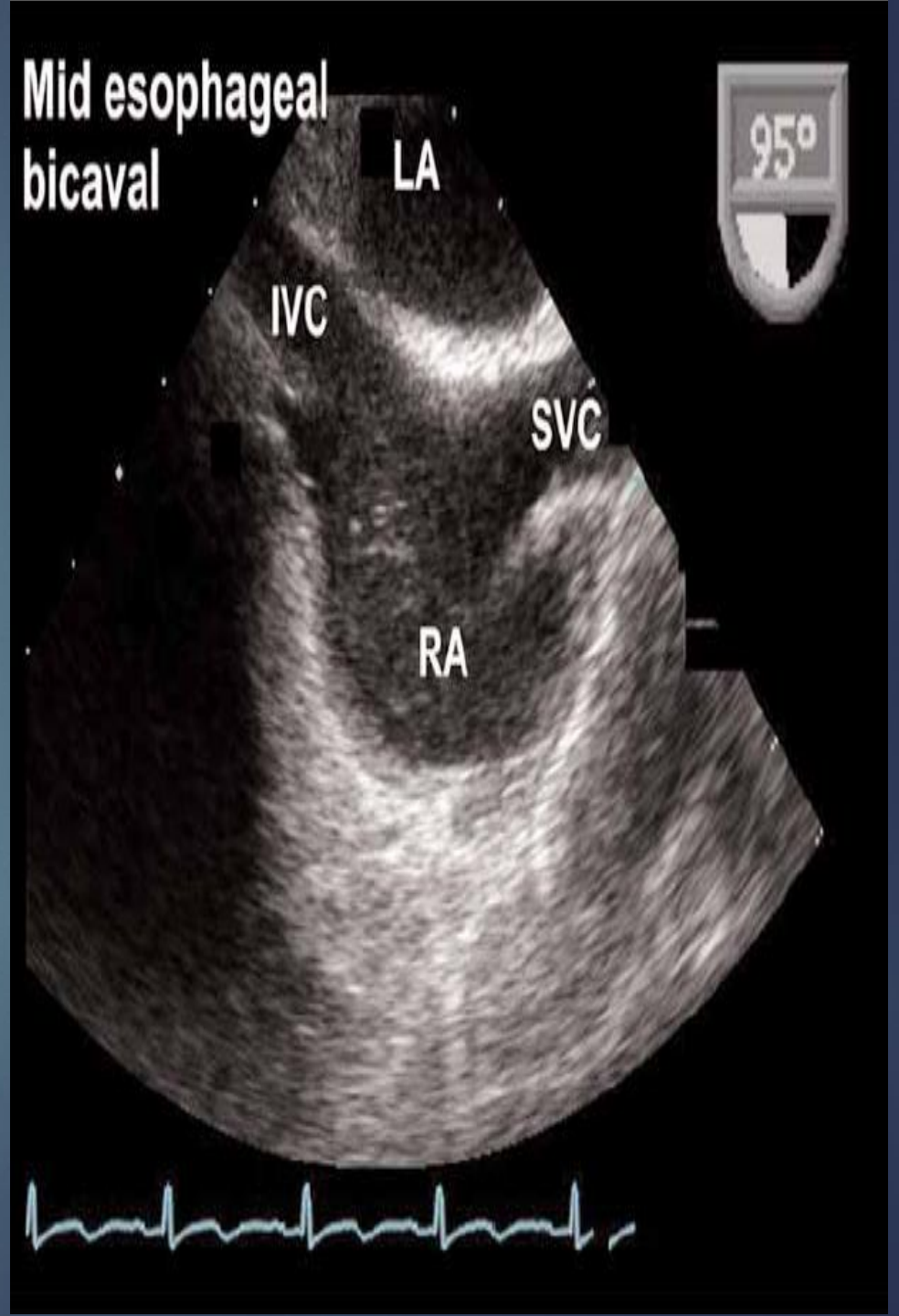


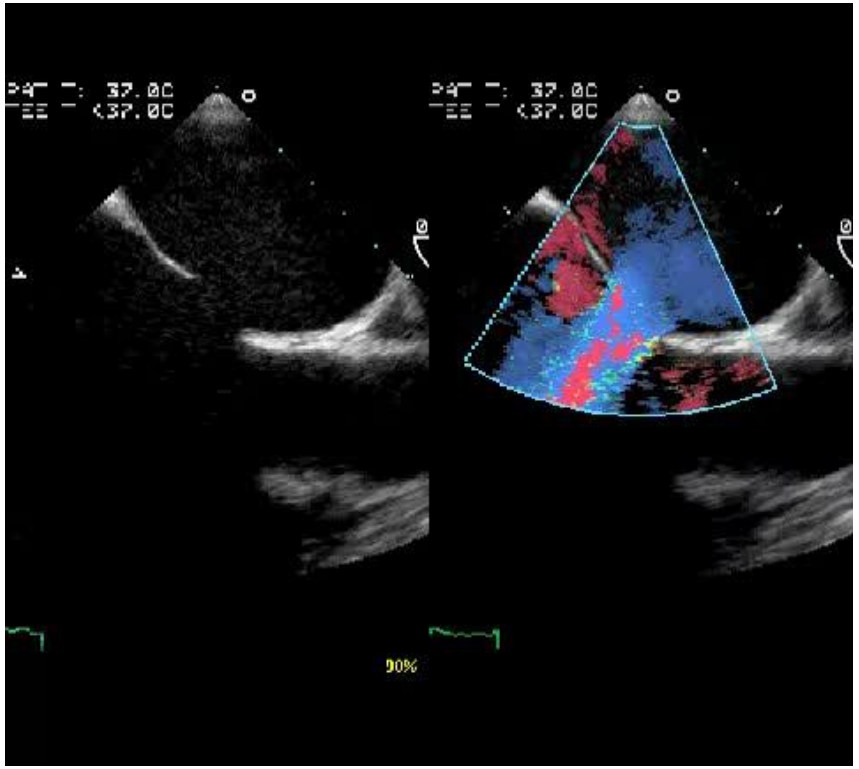




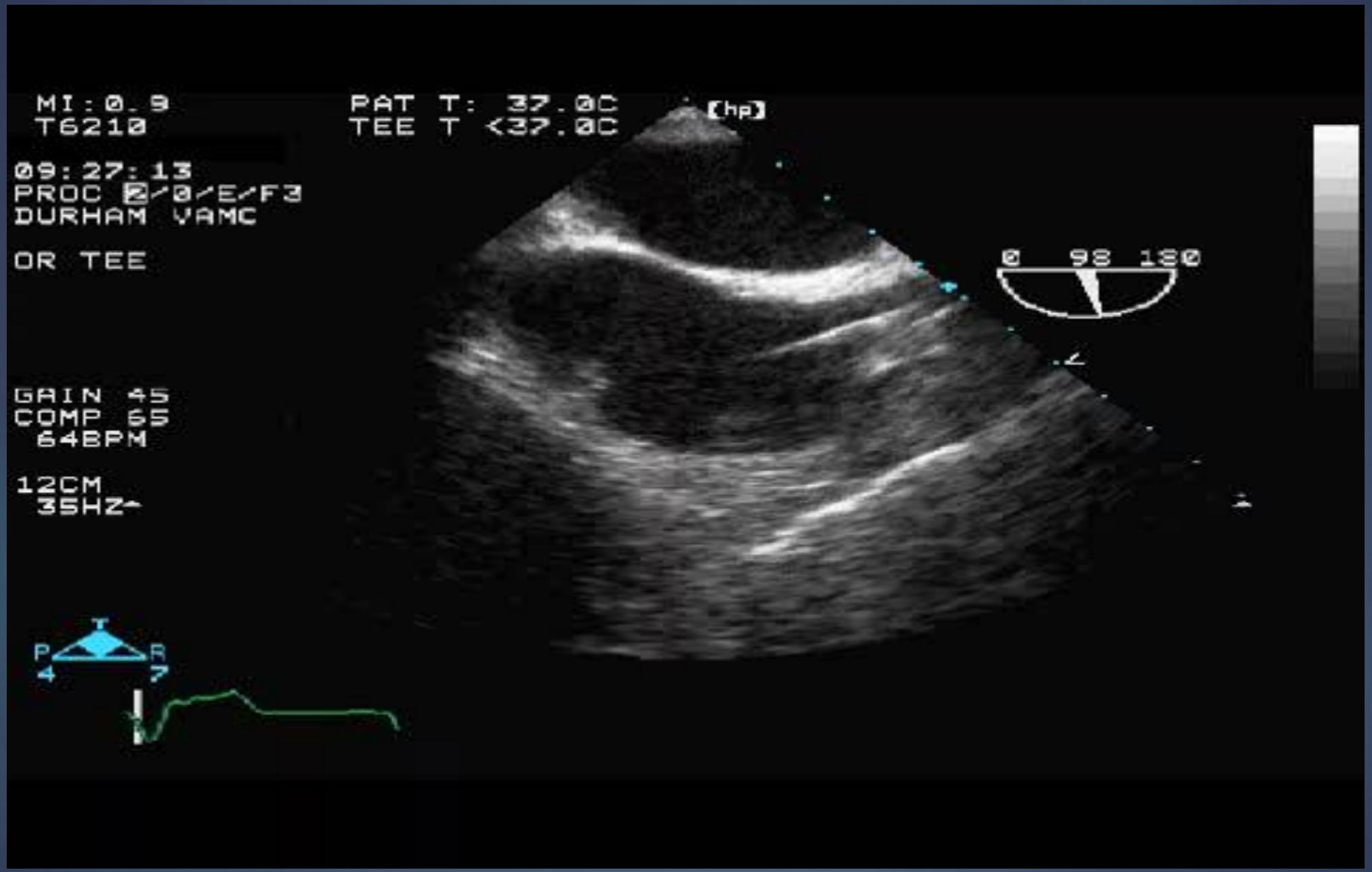

Mid esophageal
bicaval
(30 - 40cm)
Multiplane
angle range
80° - 110°
SVC
RA
LA
IVC
SVC
RA
IVC
90°

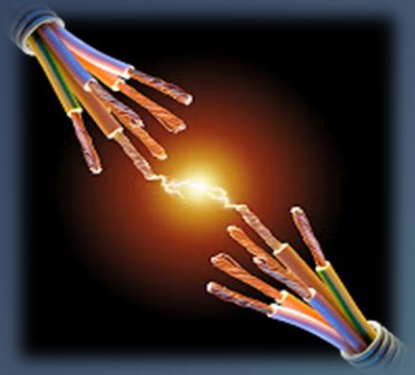

Screen Reco
Screen Reco

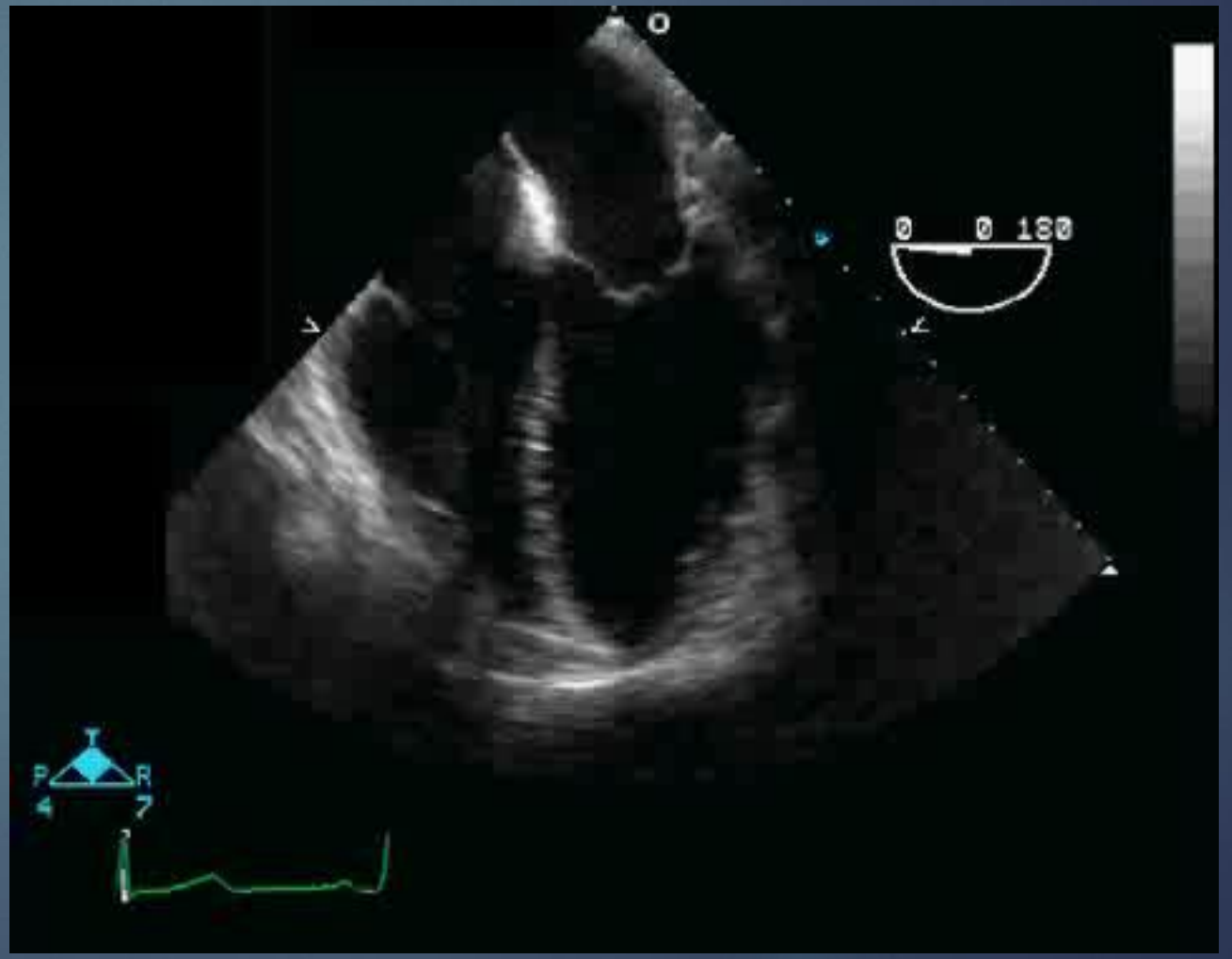

Mid esophageal
bicaval
LA
95°
IVC
SVC
RA


37.0C
<37.0C
37.0C
<37.0C
90%

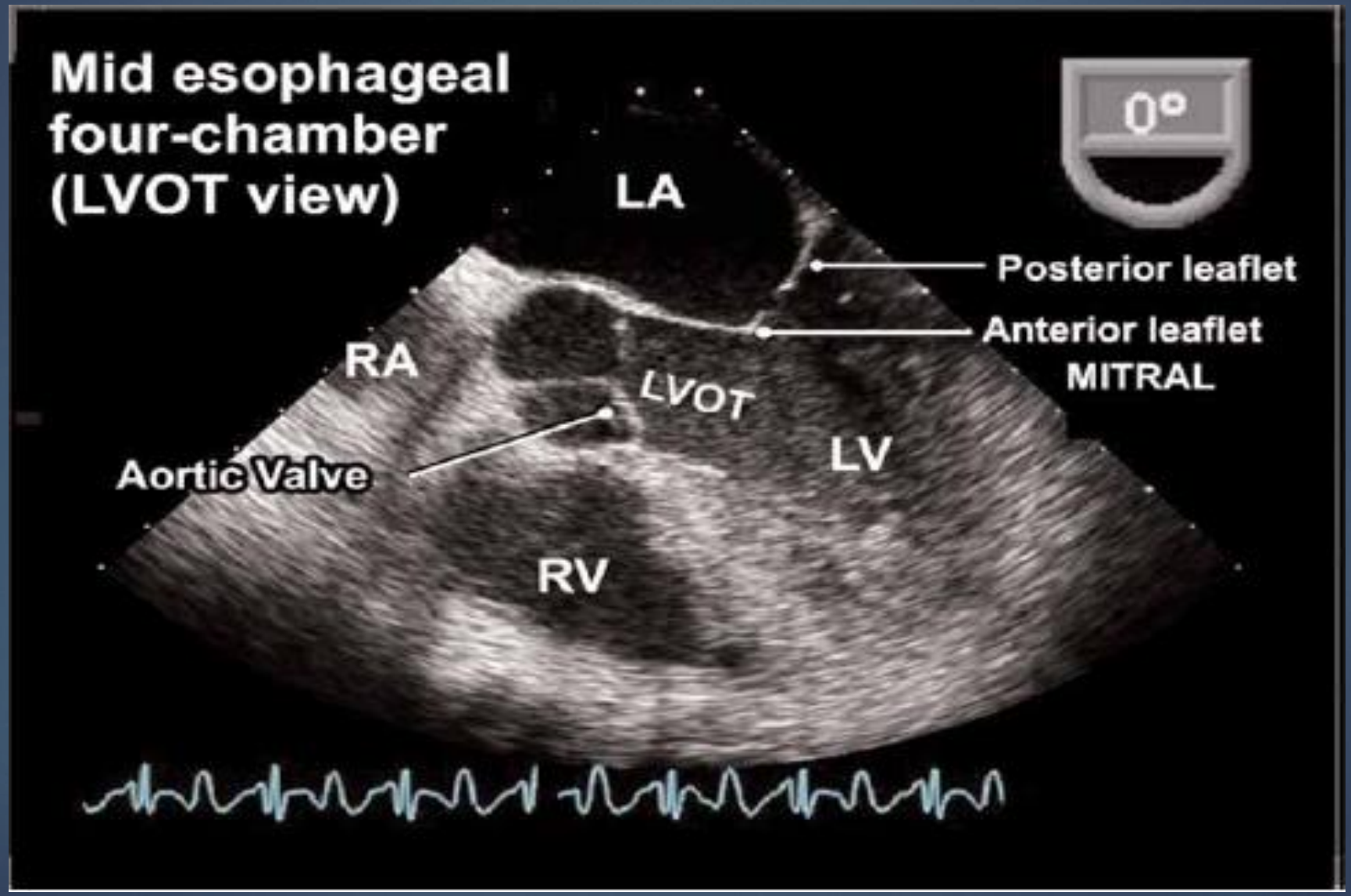

37.0C
<37.0C
37.0C
<37.0C
90%

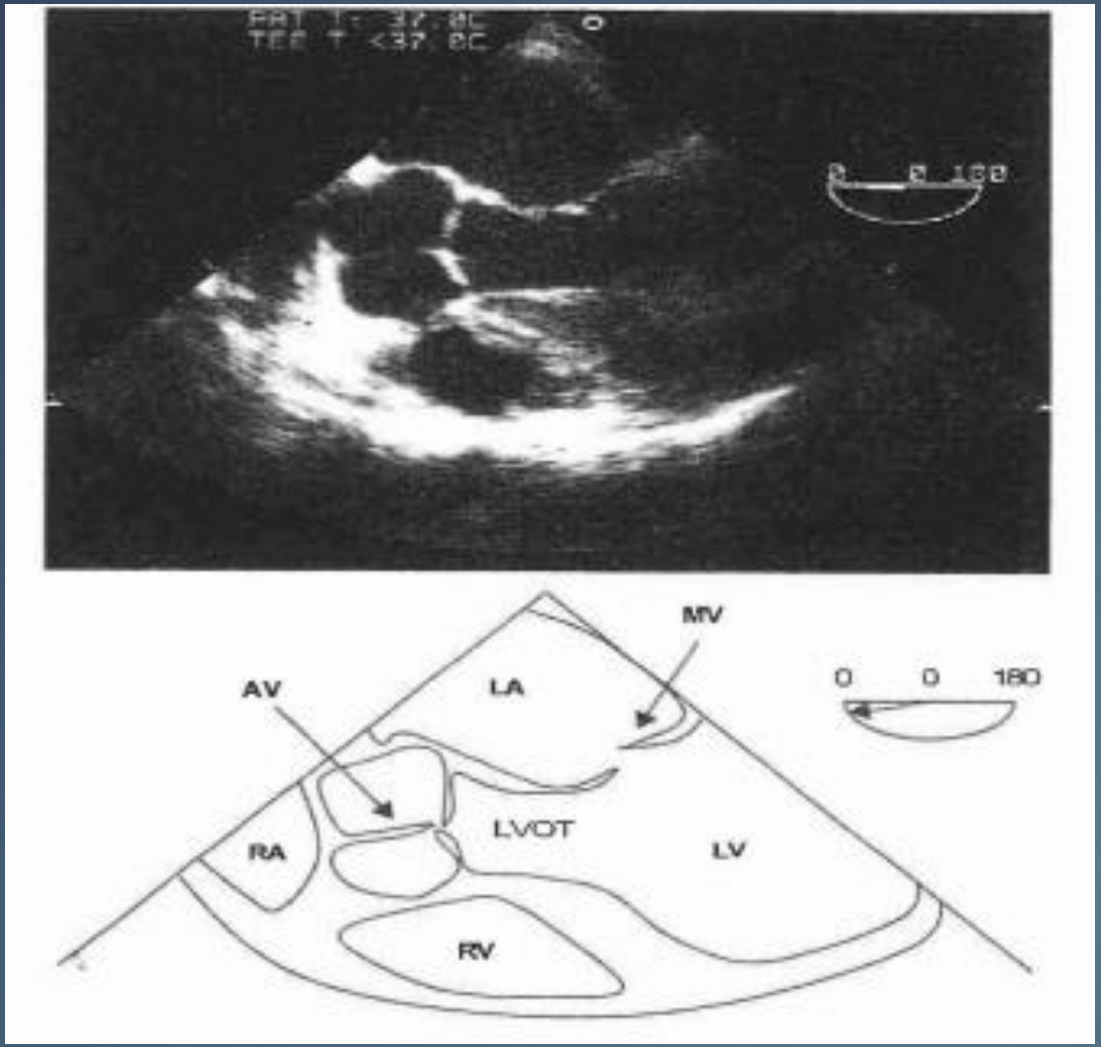

MI:0.9
T6210
PAT T: 37.0C
TEE T <37.0C
hp
09:27:13
PROC 2/0/E/F3
DURHAM VAMC
OR TEE
0 90 180
GAIN 45
COMP 65
64BPM
12CM
3.5HZ
T
P
R
4
7

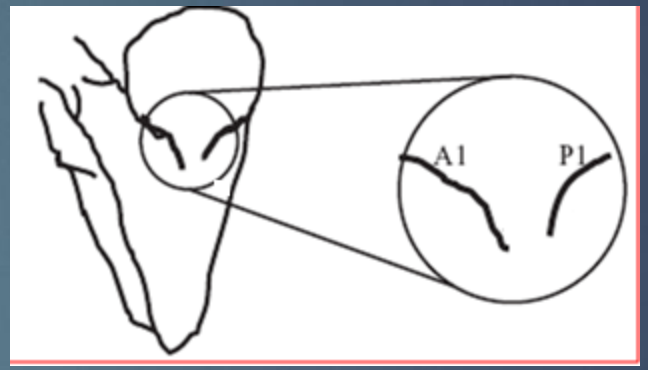



0
0 0 180
P
R
4
7

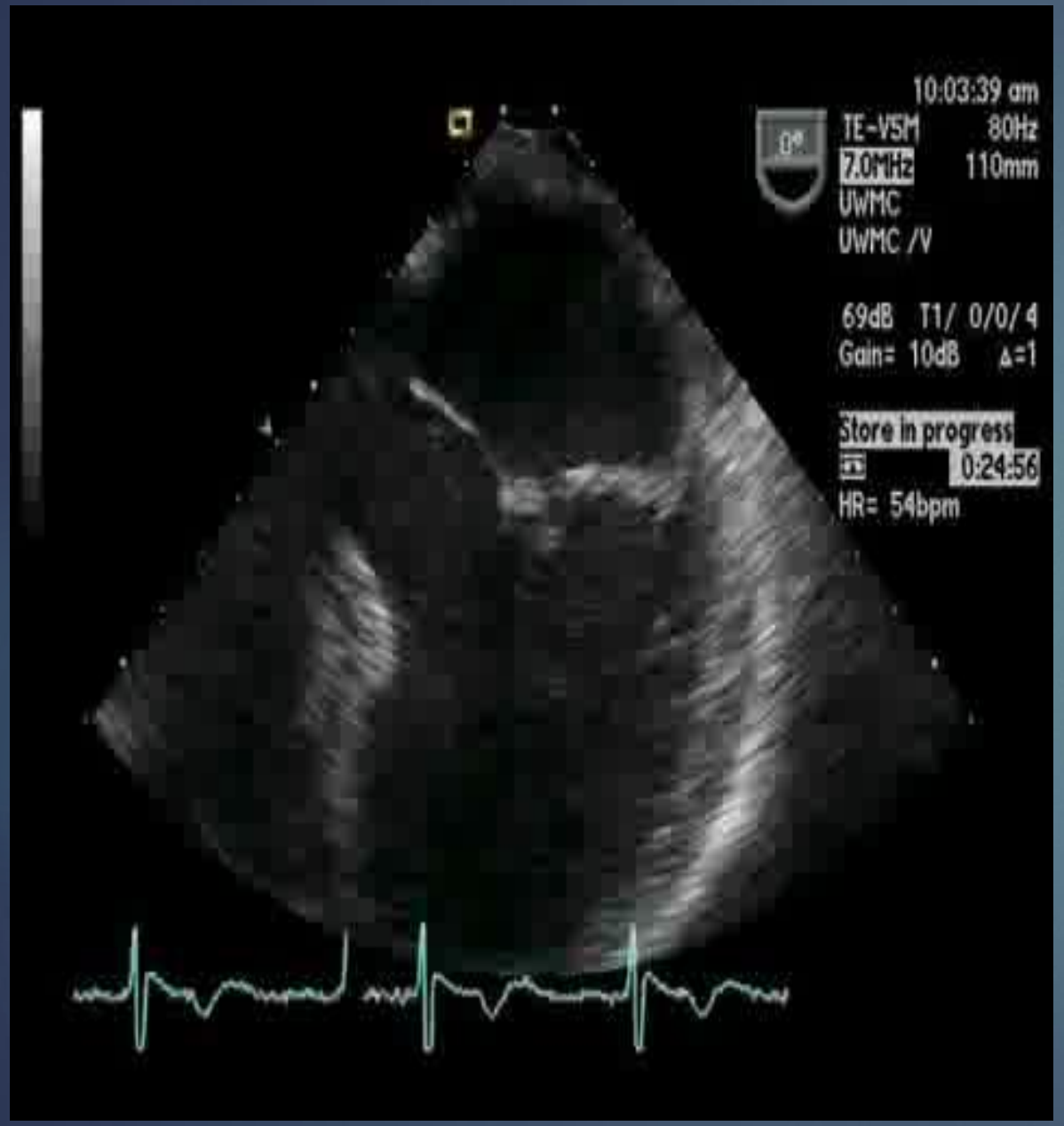
Five chamber view

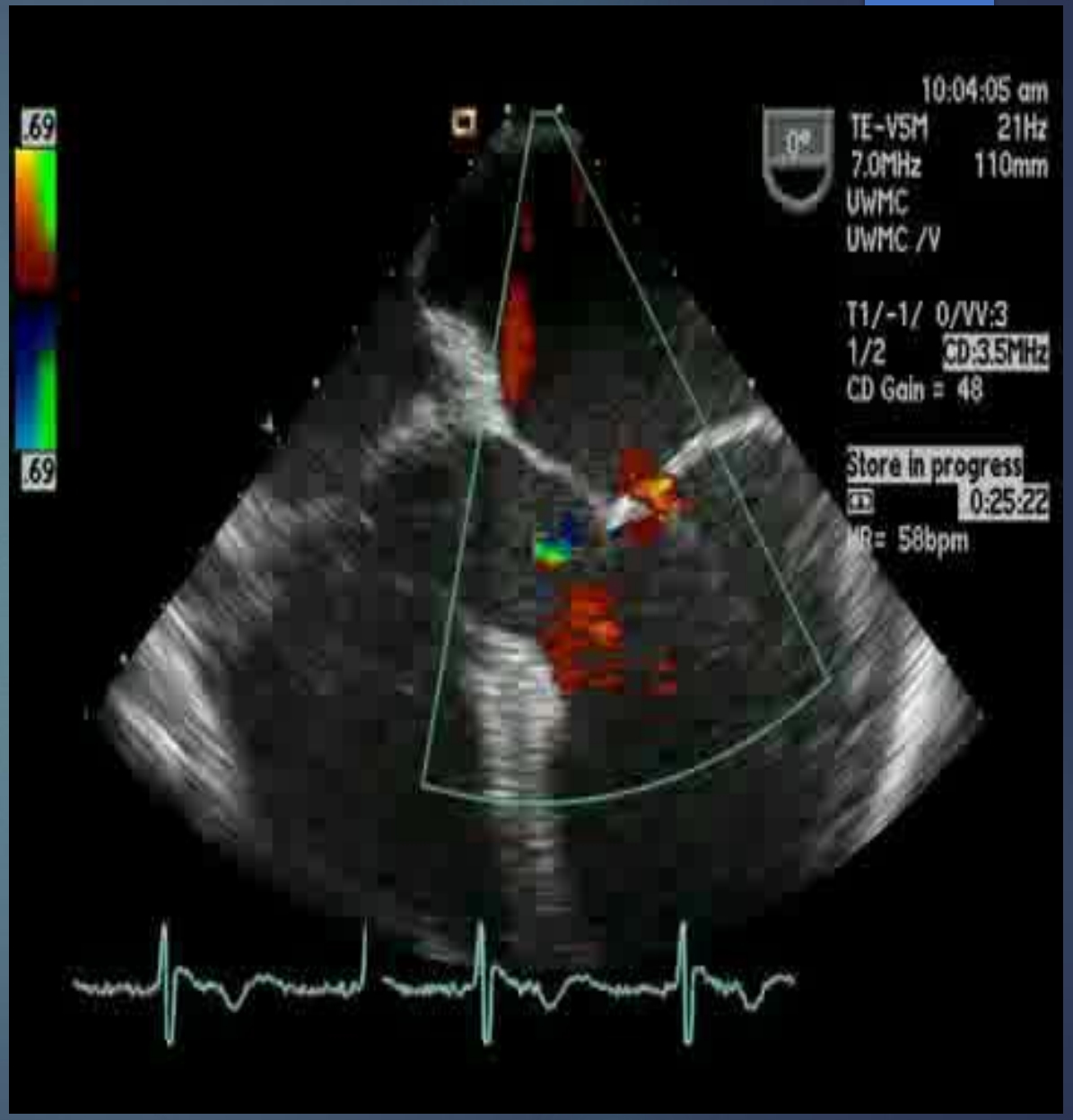






The main purpose is to get to the appropriate level for the aortic short axis view.


10:03:39 am
TE-V5M 80Hz
7.0MHz 110mm
UWMC
UWMC /V
69dB T1/ 0/0/ 4
Gain= 10dB Δ=1
Store in progress
0:24:56
HR= 54bpm


.69
.69
10:04:05 am
TE-V5M 21Hz
7.0MHz 110mm
UWMC
UWMC /V
T1/-1/ 0/VV:3
1/2 CD:3.5MHz
CD Gain = 48
Store in progress
0:25:22
HR= 58bpm

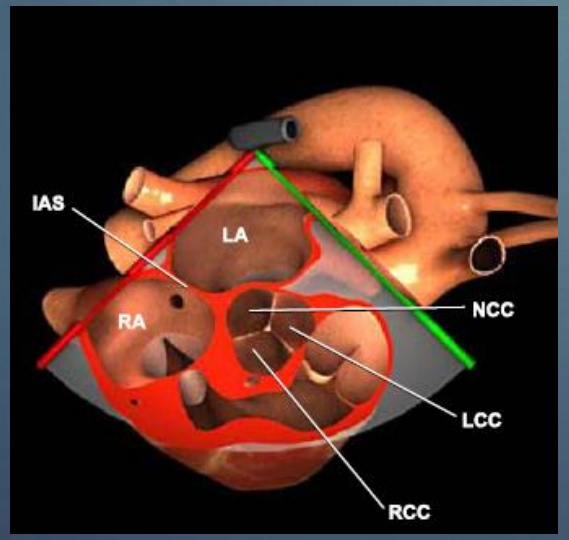
To Obtain the View

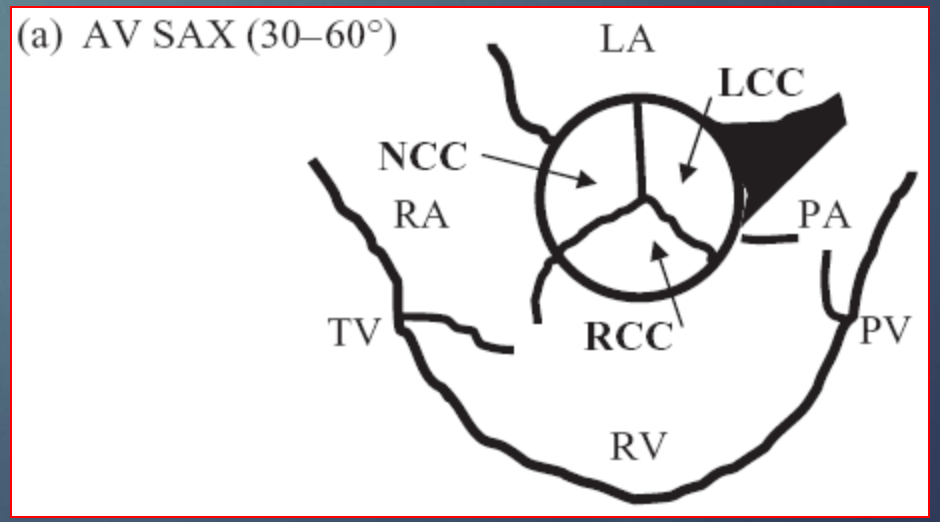
Find the ME 4C (0°) withdraw cephalad to obtain the ME 5C view (0°) that includes the LVOT and AV

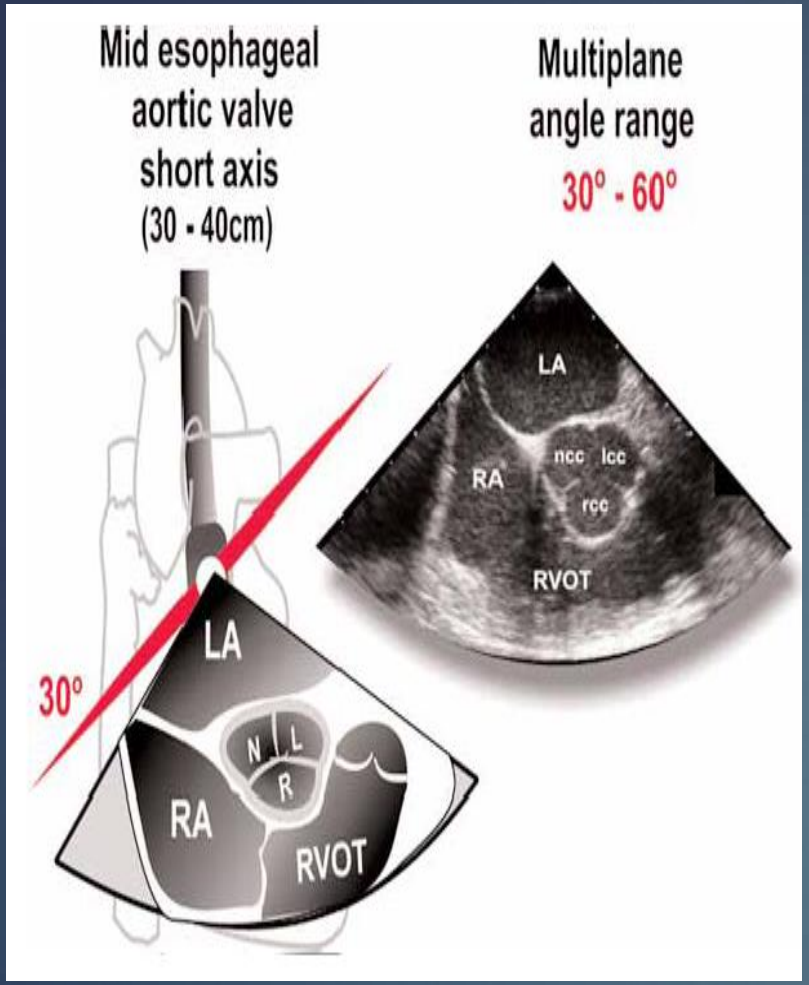
Rotate omniplane angle to 30-45°

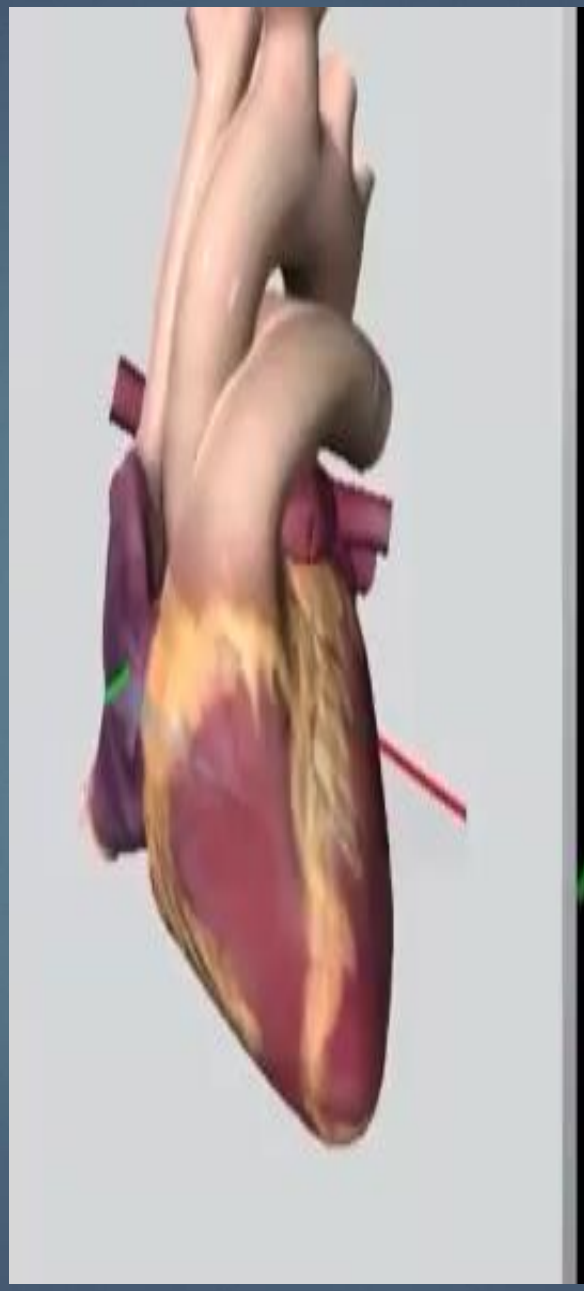
Center aortic valve and aim to make 3 aortic valve cusps symmetric

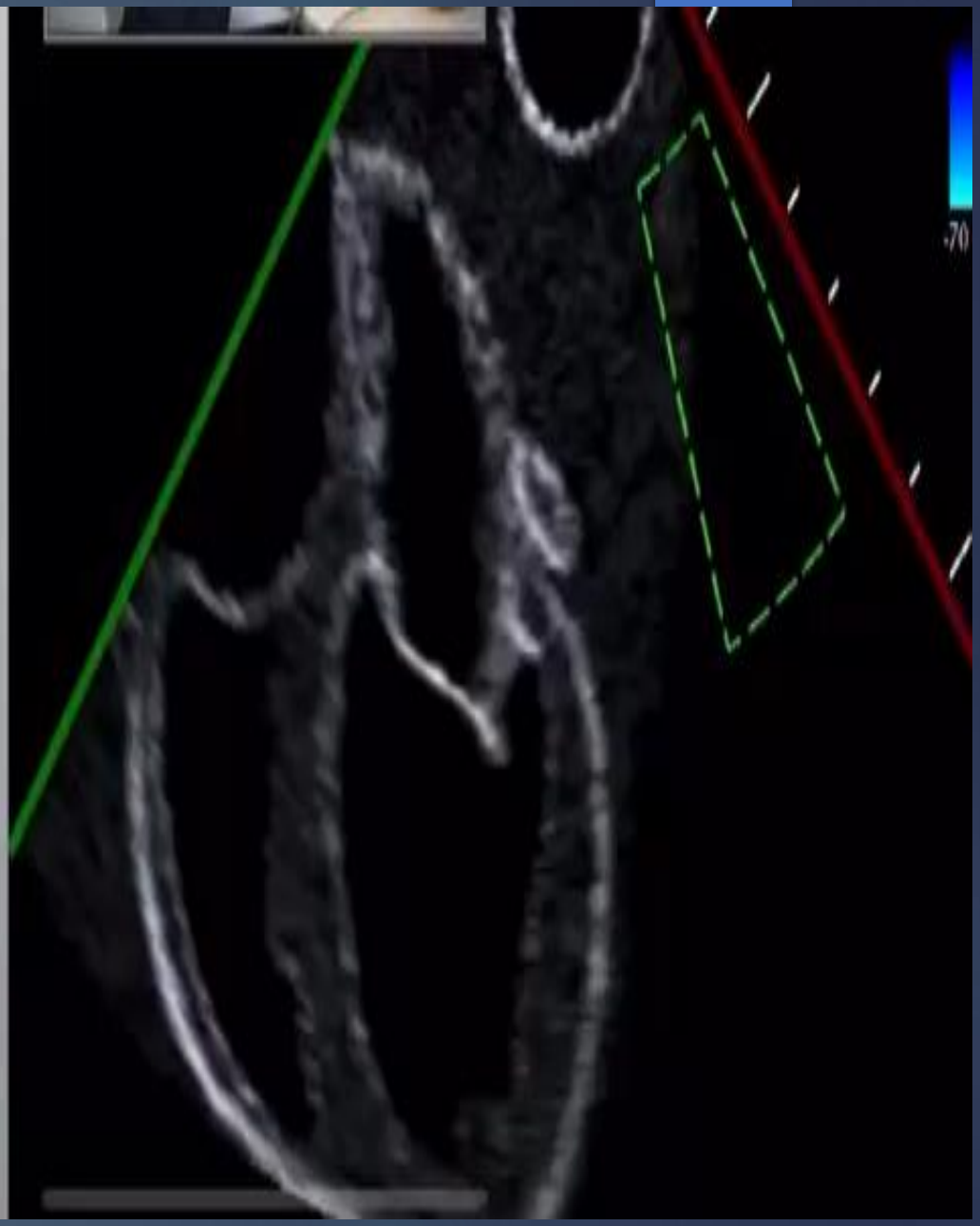
Withdraw probe for coronary ostia

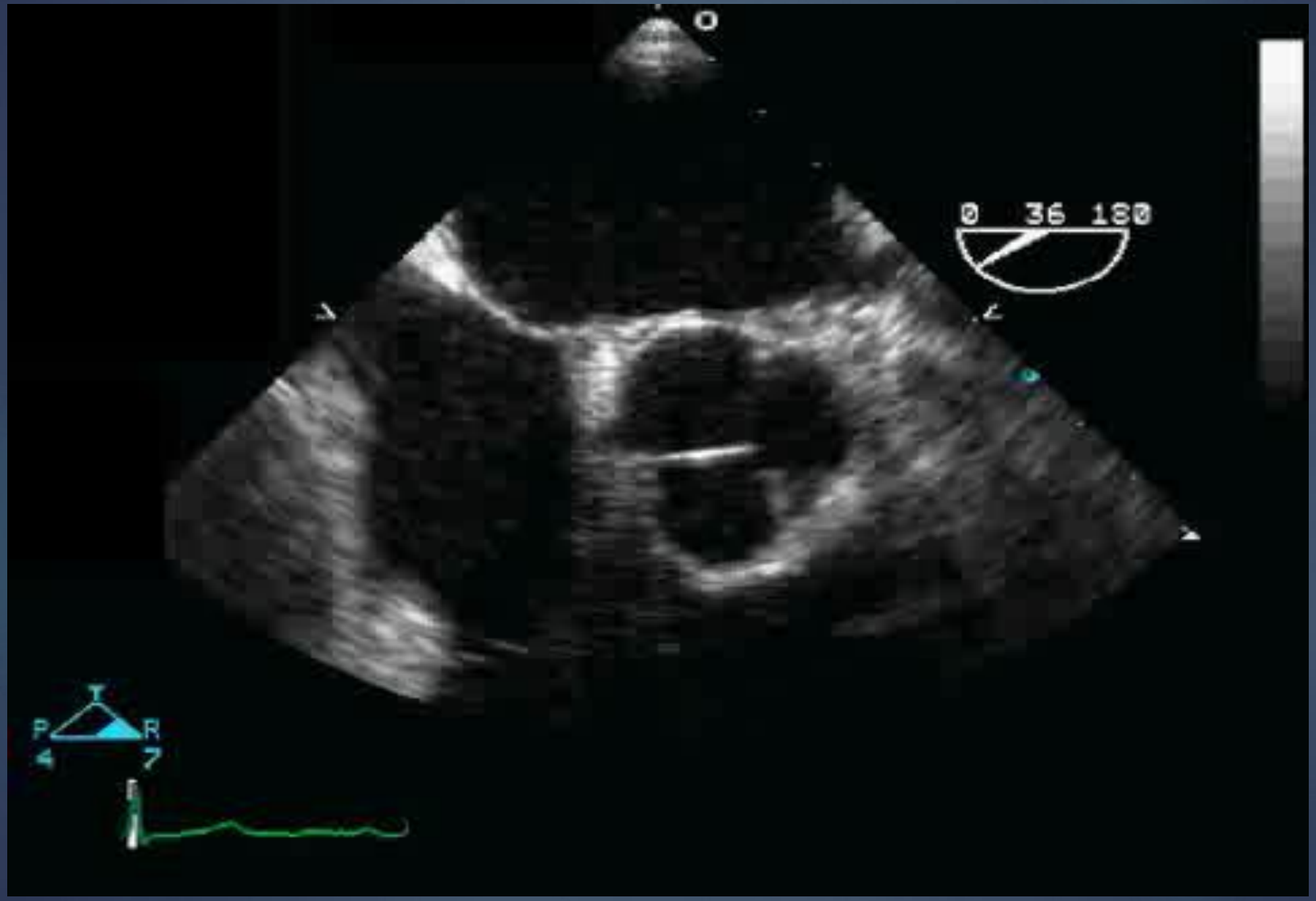





Mid esophageal
aortic valve
short axis
(30 - 40cm)
Multiplane
angle range
30° - 60°
LA
ncc
lcc
RA
rcc
RVOT
LA
30°
N
L
R
RA
RVOT

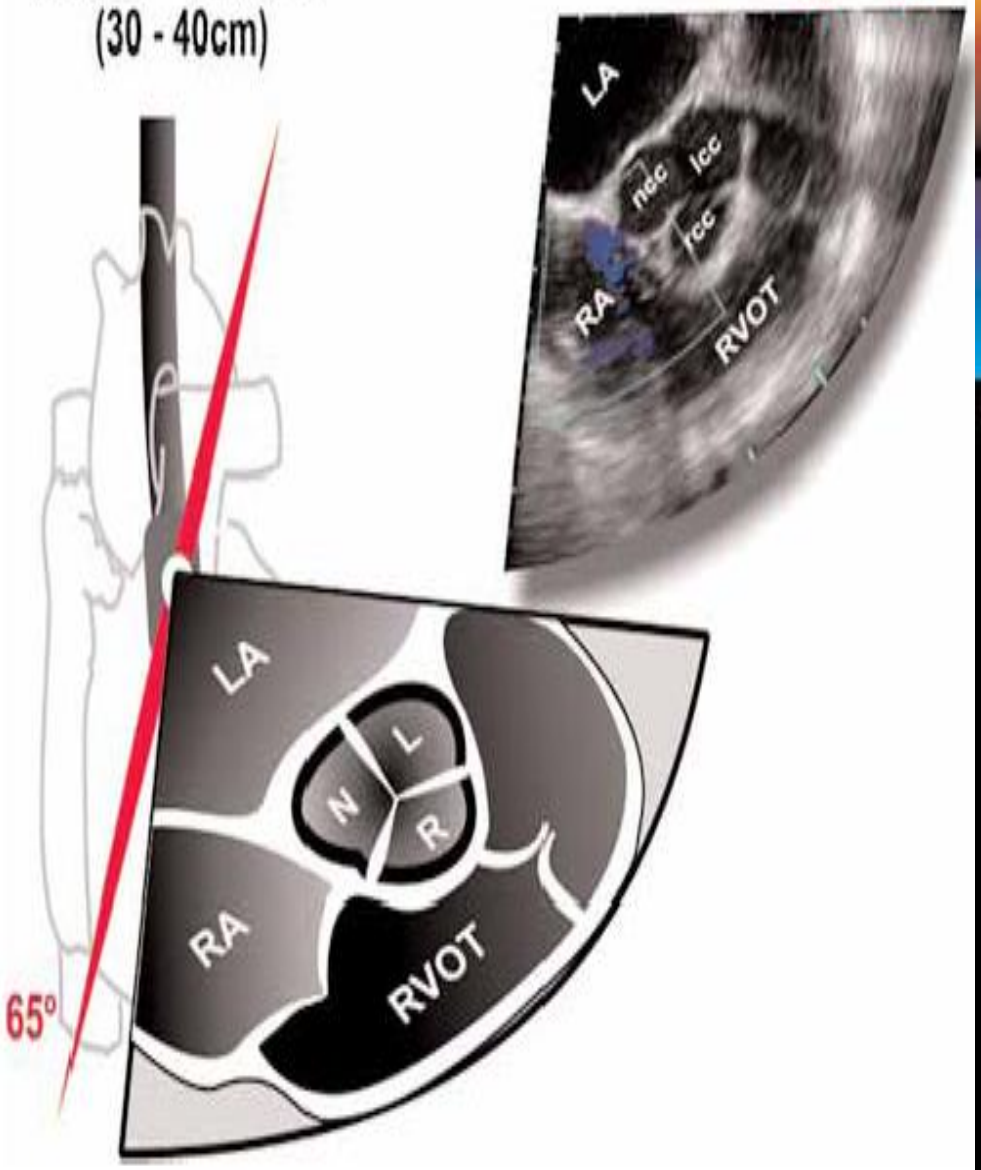


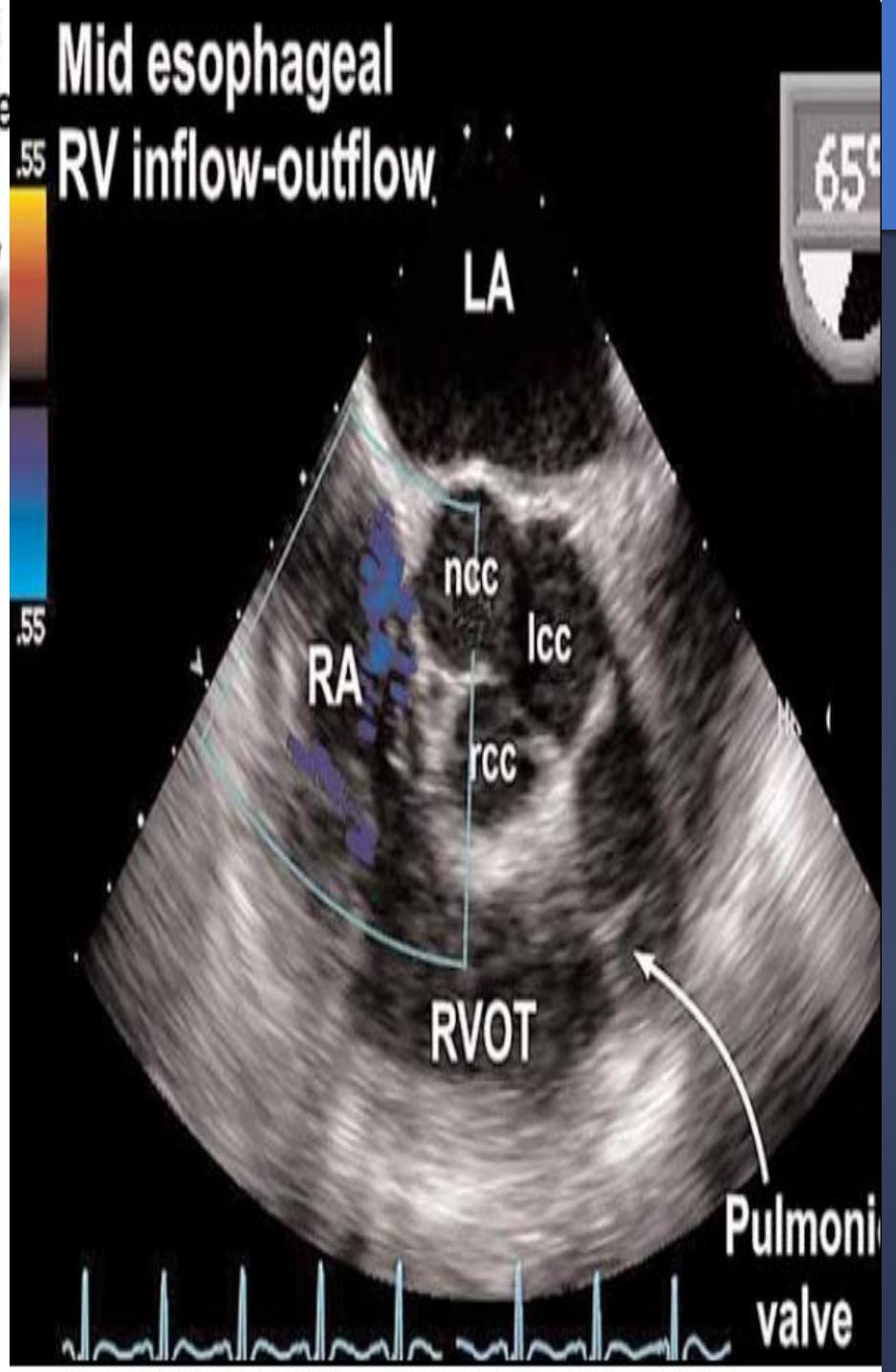


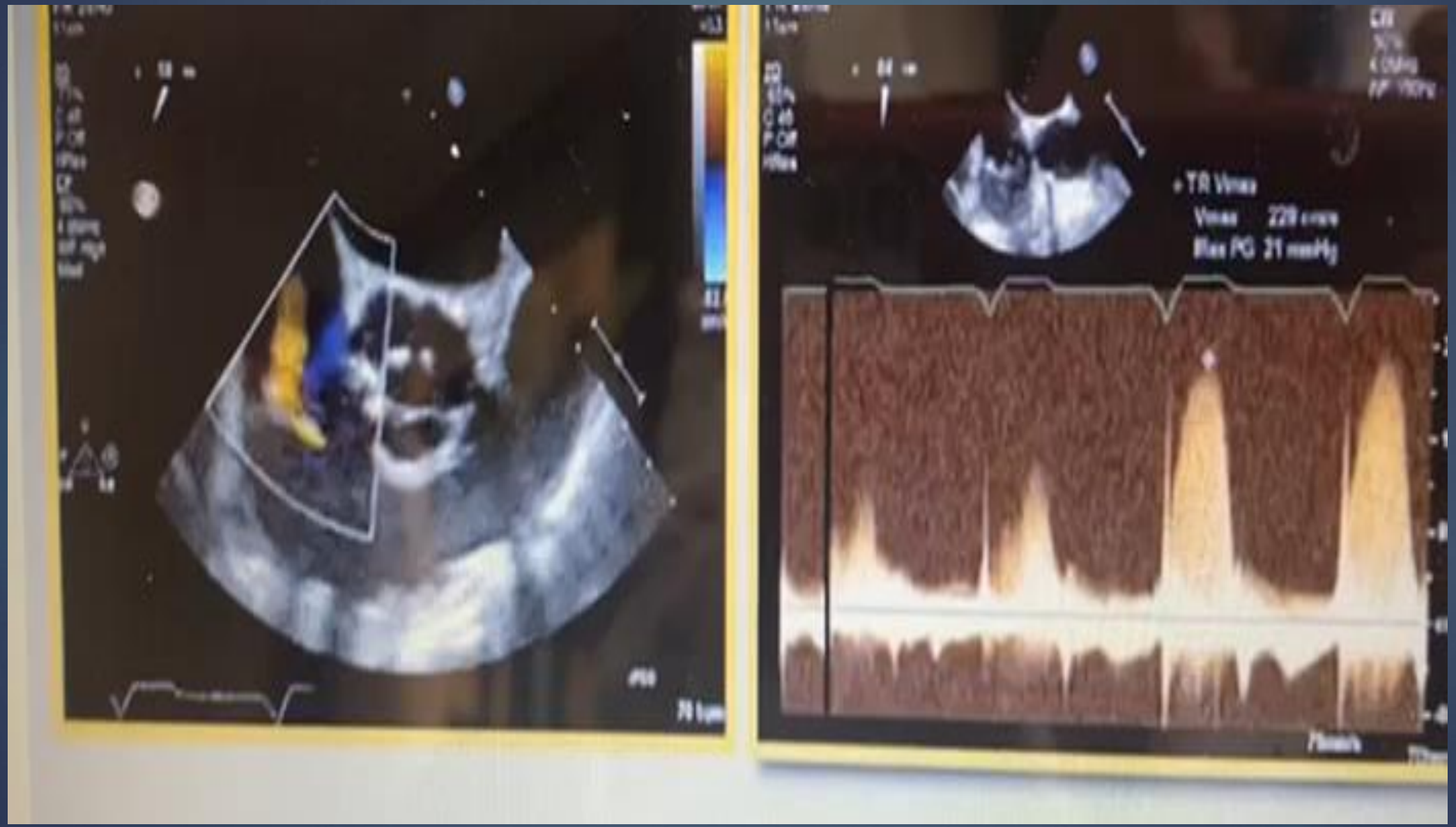

0 36 180
P
R
4
7

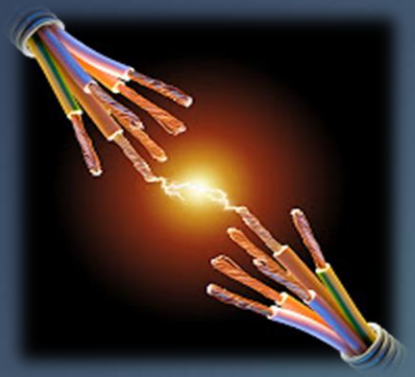
Mid esophageal
right ventricular
inflow - outflow
(30 - 40cm)

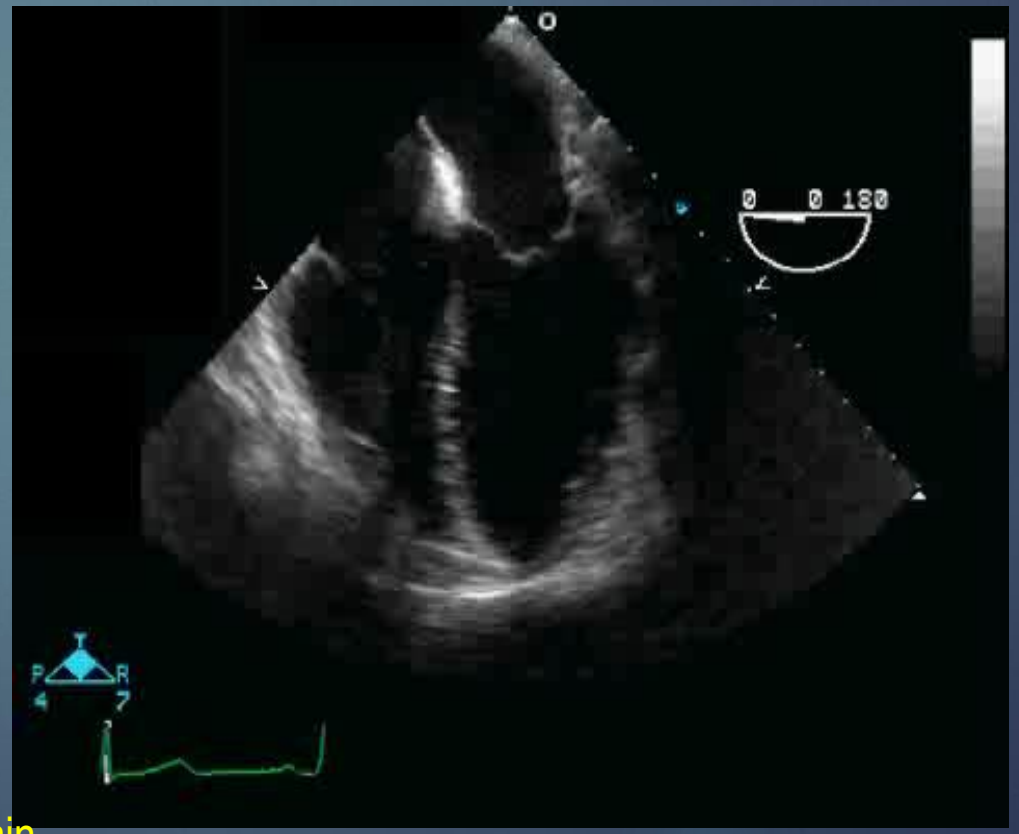
Multiplane
angle range
60° - 90°





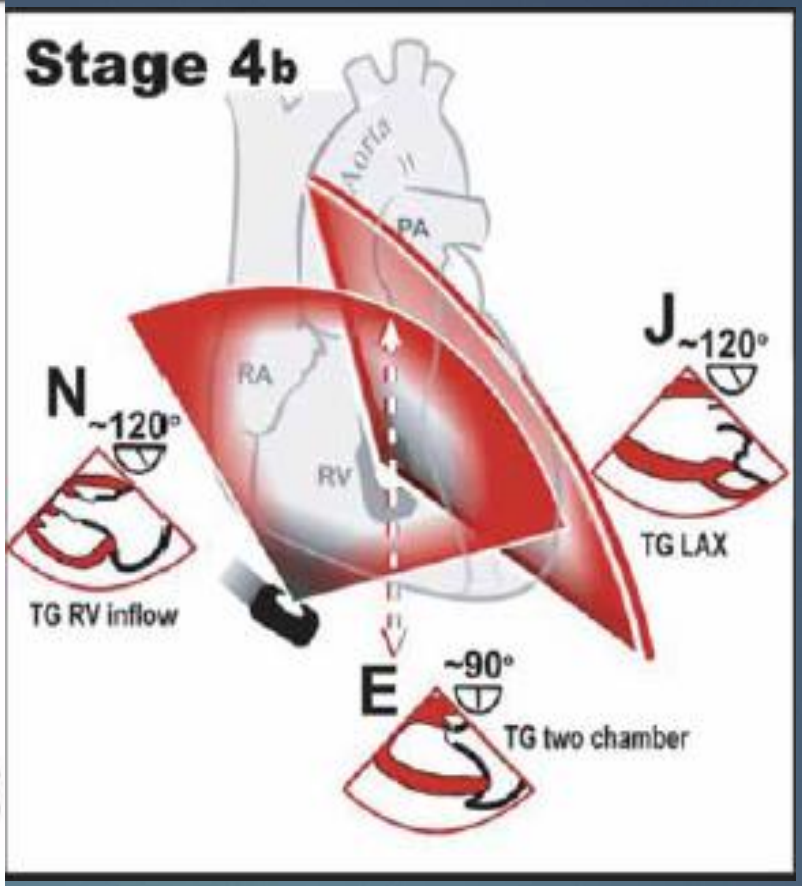

TR Vmax
Vmax 229 cm/s
Max PG 21 mmHg





If you get lost

If during a transoesophageal investigation you become disoriented find the 4-chamber view again.



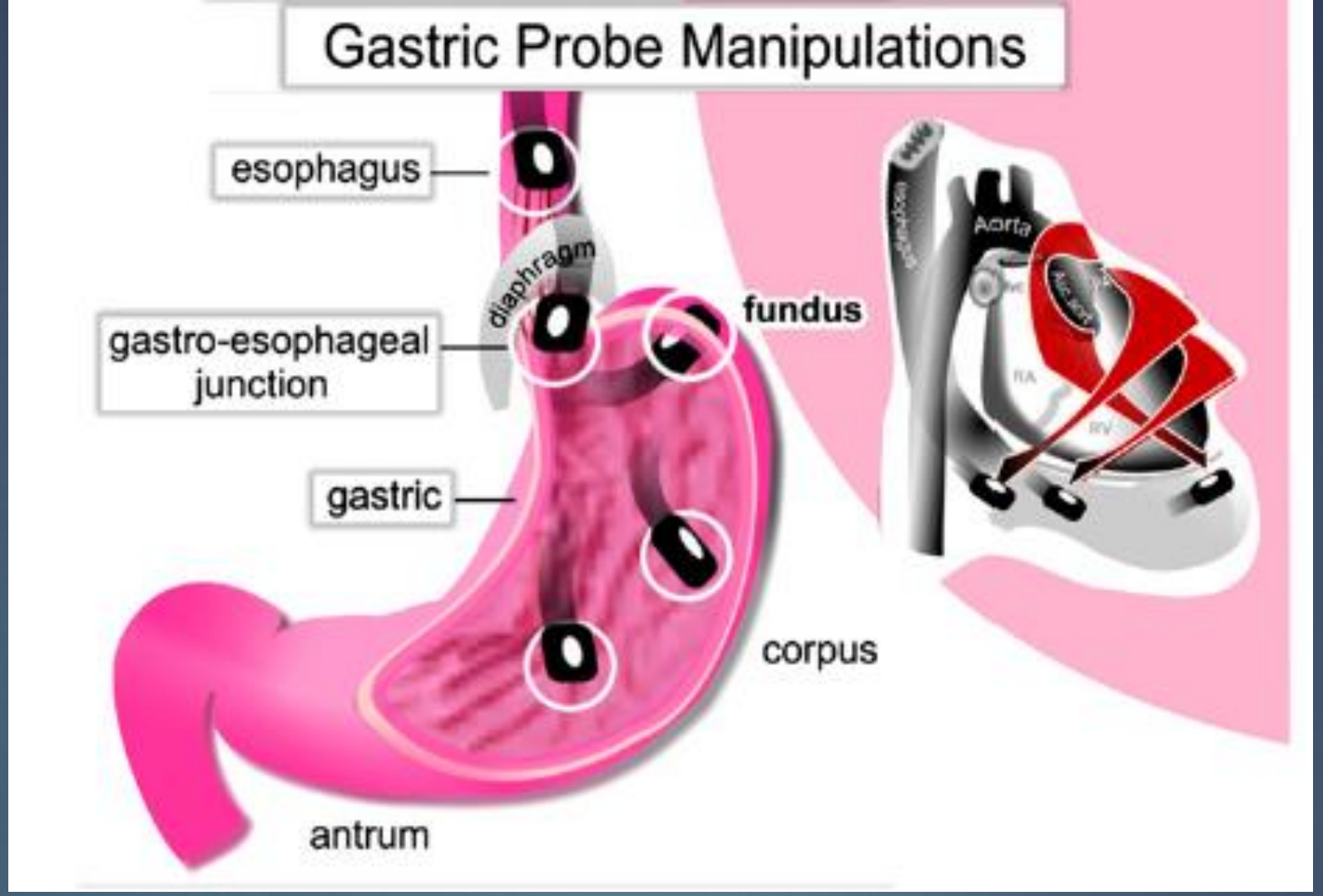
Advance to stomach, anteflex.

- ***Transgastric mid-short axis 0°.***
- ***Withdraw slightly: transgastric basal short axis 0° .***
- ***Trans-gastric two-chamber 90°.*** *from mid pap*
- ***trans-gastric long axis 120°-140.***

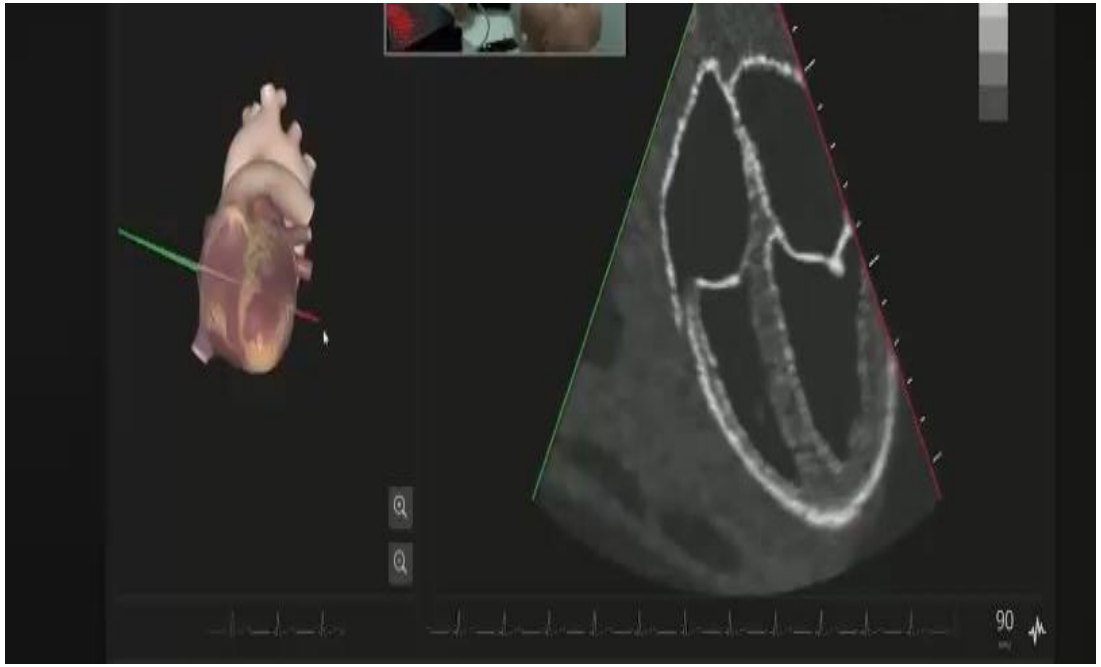
Turn right:

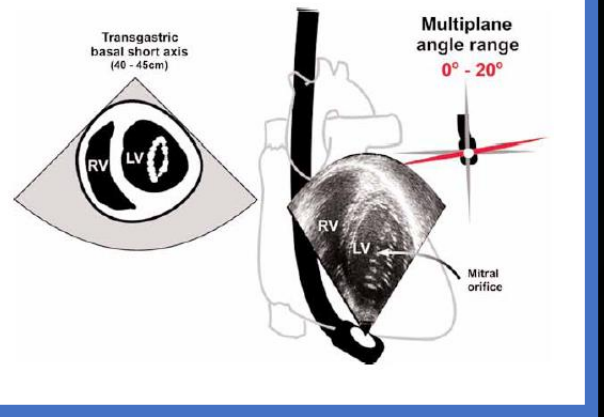
- ***trans-gastric right ventricular inflow 120°.****from transgast basal SAV*

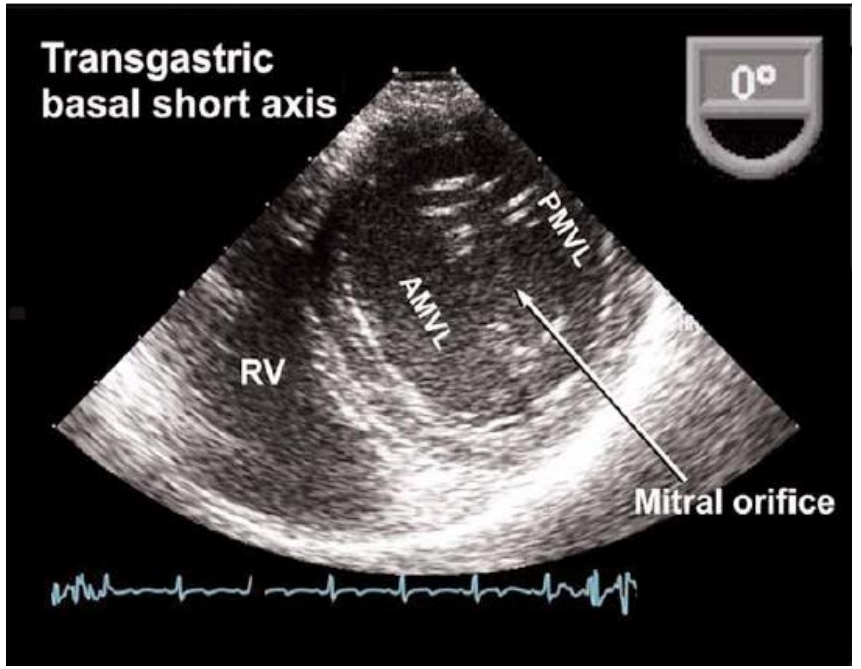
- ***Advance, anteflex , deep trans-gastric long axis 0°*** *(left flexion)*



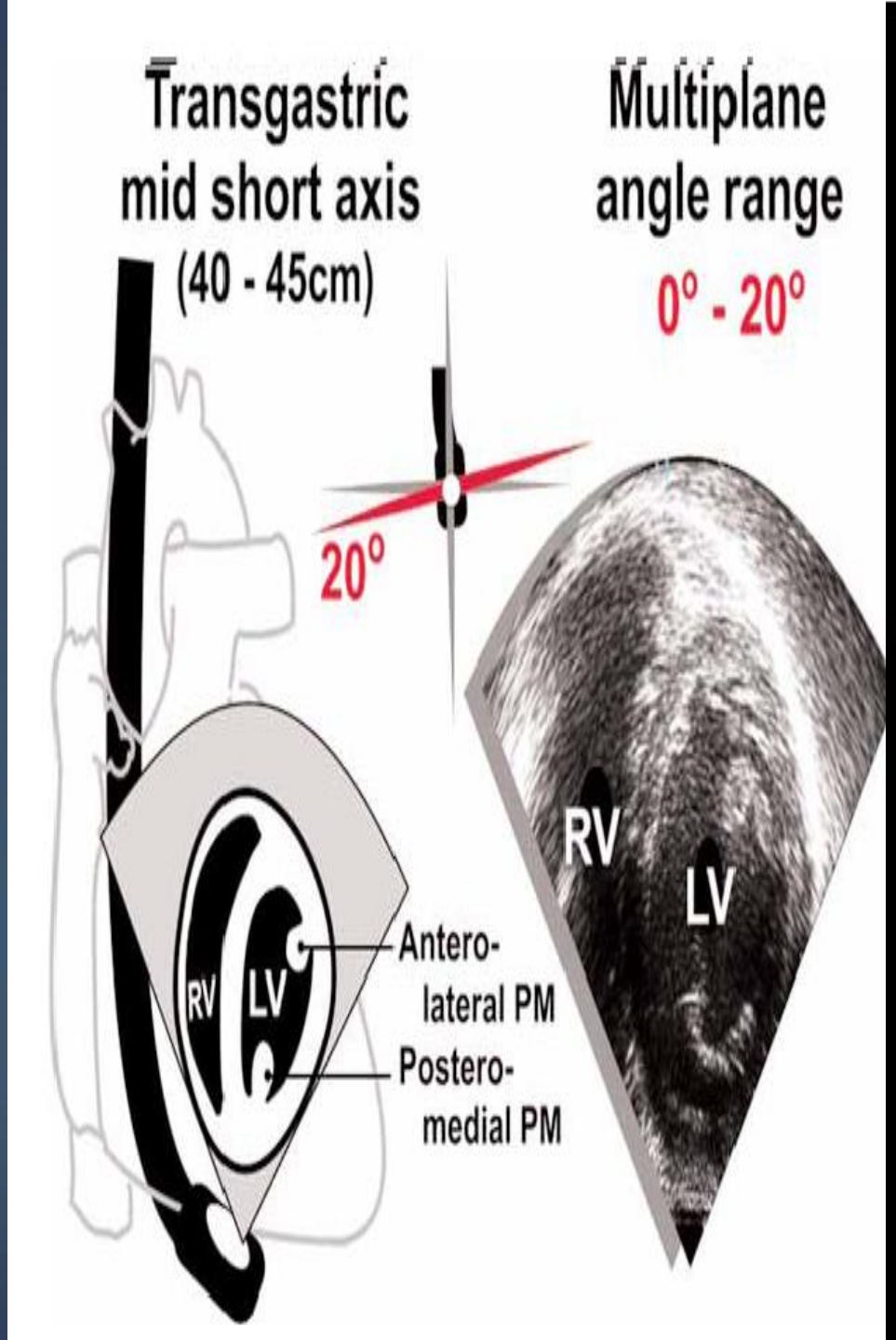
Gastric injury typically occurs in the gastric fundus during deep transgastric probe manipulation, especially when requiring extreme anteflexion to bring the probe inline and in contact with the apex of the heart (e.g., deep transgastric aortic outflow view). The gastroesophageal junction is a vulnerable zone because probe manipulation at this level may place the relatively fixed tissues under considerable tension.

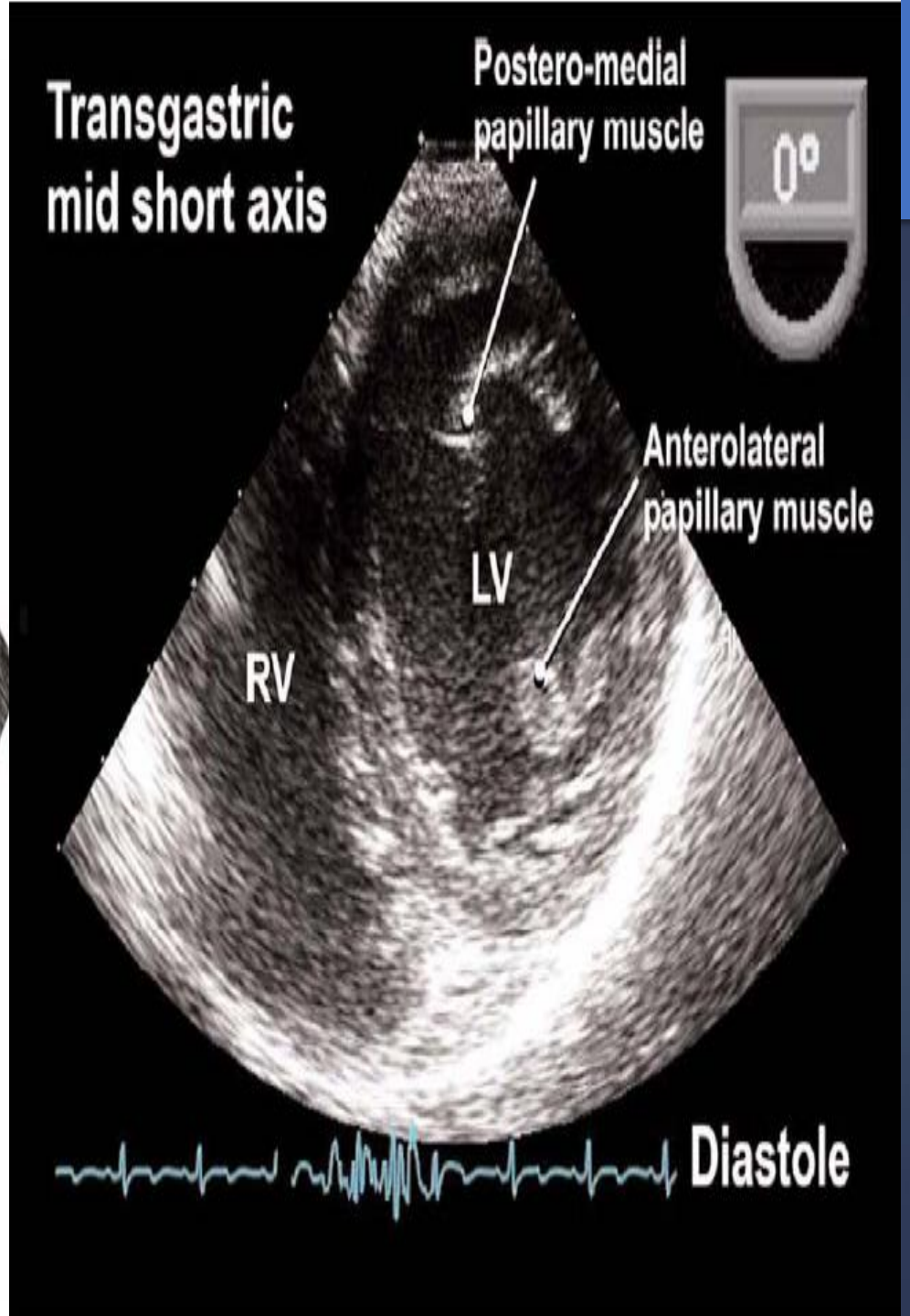



Transgastric
basal short axis
(40 - 45cm)
RV
LV
Multiplane
angle range
0° - 20°
RV
LV
Mitral
orifice


Transgastric
basal short axis
0°
PMVL
AMVL
RV
Mitral orifice

- Transgastric Basal SAX View
- To Obtain the View
  - Insert the probe to the stomach, angle 0°
  - Anteflex the probe to obtain the TG mid SAX view
  - Withdraw the probe until MV is seen in SAX
  - Aim to see symmetric MV commisures
  - Imaged structure:(LV 6 basal segment,MV,RV,IVS)


Transgastric
mid short axis
(40 - 45cm)
Multiplane
angle range
0° - 20°
20°
RV
LV
Antero-
lateral PM
Postero-
medial PM
RV
LV


Transgastric
mid short axis
Postero-medial
papillary muscle
0°
Anterolateral
papillary muscle
LV
RV
Diastole

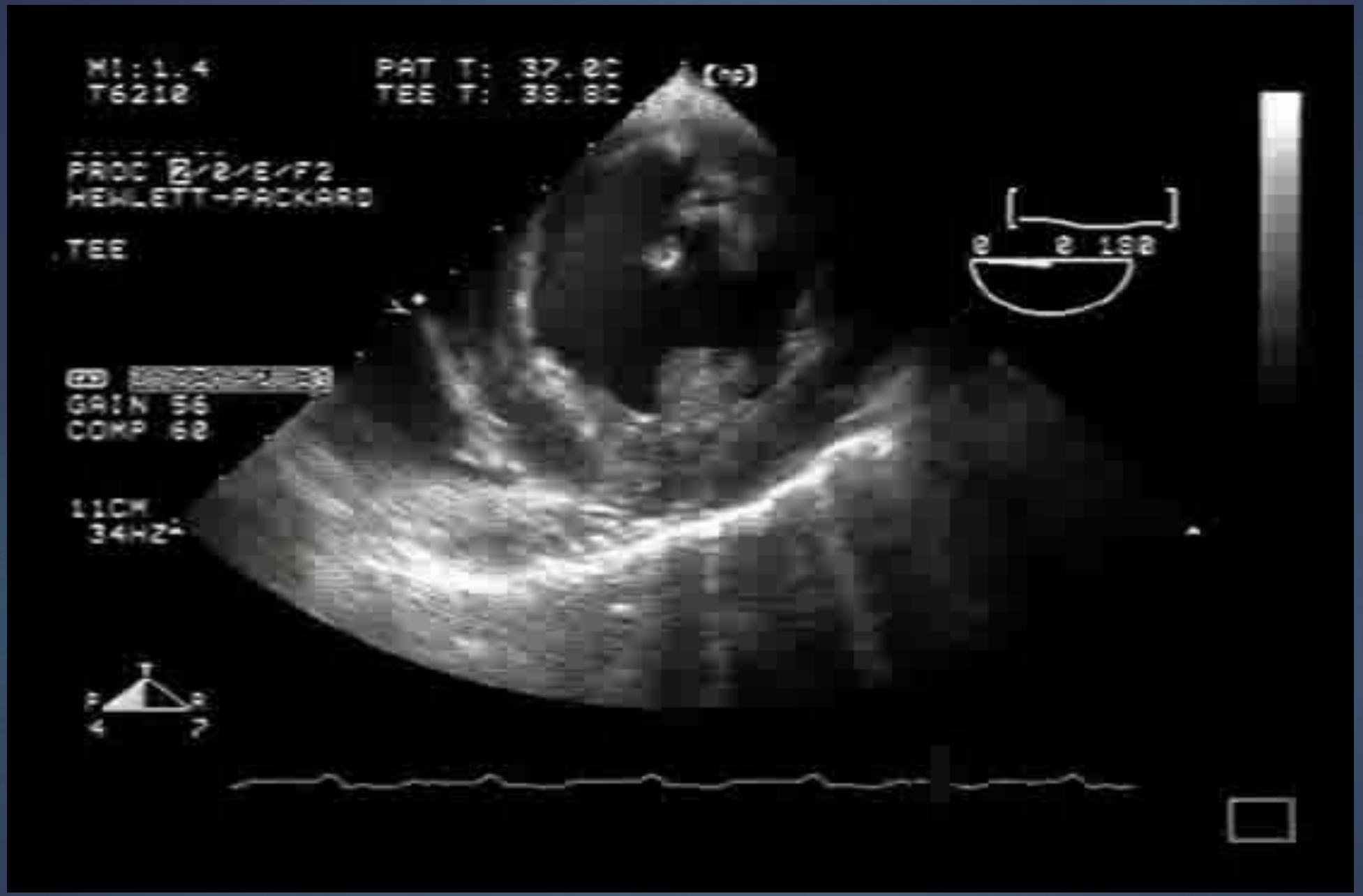
Transgastric Mid SAX View

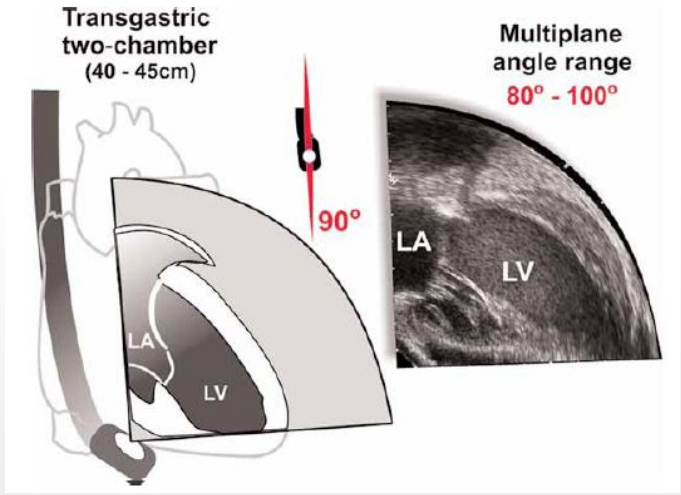
To Obtain the View

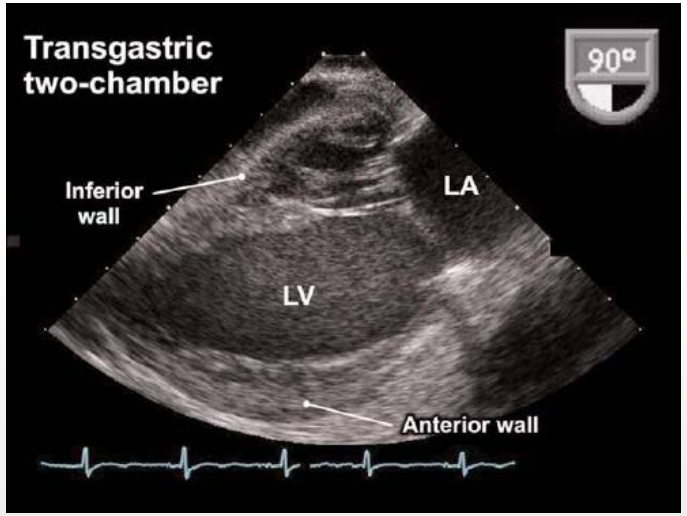
- Insert the probe to the stomach, angle 0°
- Advance probe until see stomach (rugae) or liver
- Anteflex to contact stomach wall and inferior wall of heart
- Center LV by turning probe R or L
- Both papillary muscles imaged
- Increase the gain to optimize endocardial definition

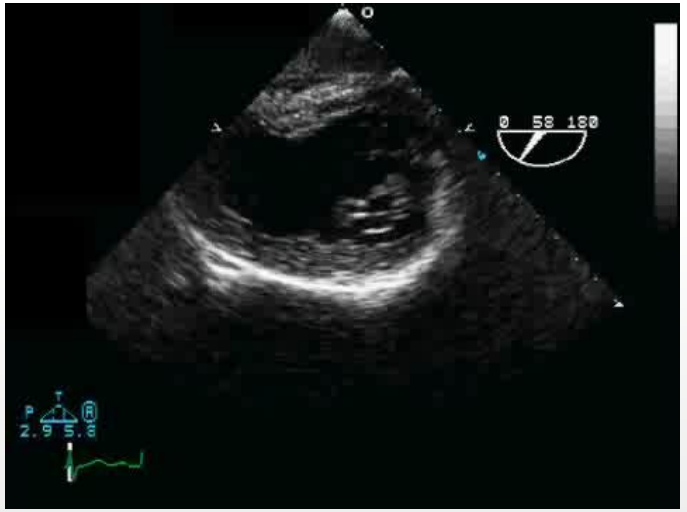
Imaged structures and Diagnostic issues

- Left Ventricle: size, function (opposing mid segment and papillary muscles)
- Interventricular Septal motion
- Ventricular Septal Defect (VSD)
- Pericardial effusion


MI:1.4
T6210
PAT T: 37.0C
TEE T: 39.8C
PROC 2/2/E/F2
HEWLETT-PACKARD
TEE
GAIN 56
COMP 60
11CM
34HZ


Transgastric
two-chamber
(40 - 45cm)
Multiplane
angle range
80° - 100°
90°
LA
LV
LA
LV


Transgastric
two-chamber
90°
Inferior
wall
LA
LV
Anterior wall


0 58 180

Transgastric LAX View

To Obtain the View

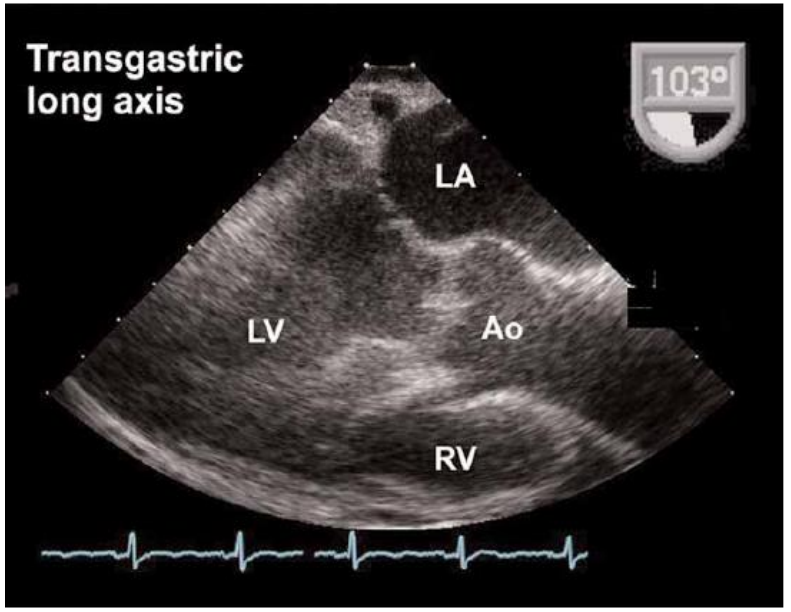
- Insert the probe to the stomach, angle 0°
- From TG 2 chamber (90°)
- Rotate omniplane angle to 110-120°
- May turn probe to right
- AV seen on the right side of display, adjust depth

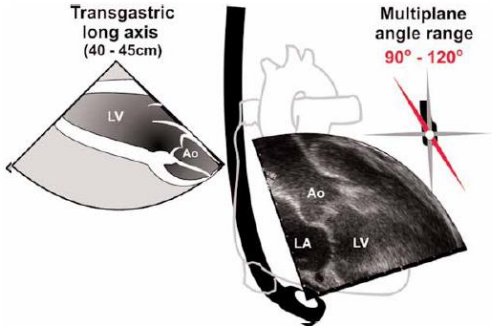
Imaged structures and Diagnostic issues

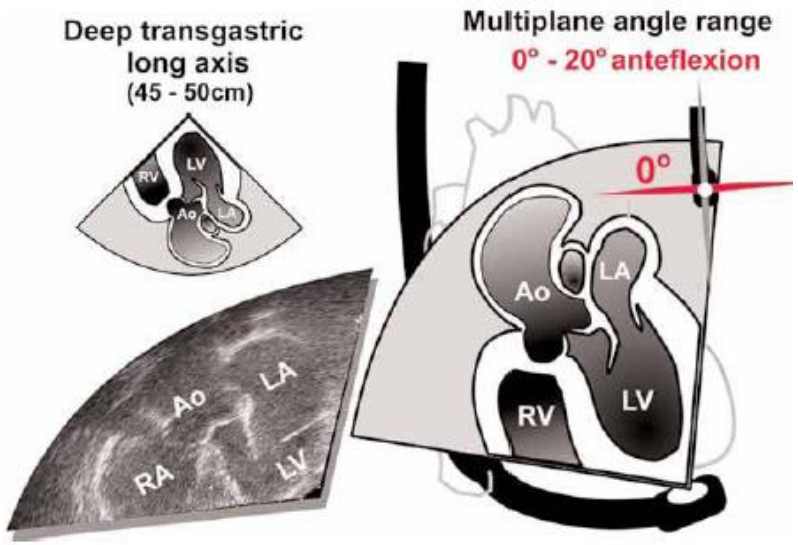
- Lt V (antsep /post walls), LVOT ,IVS,MV ,AV

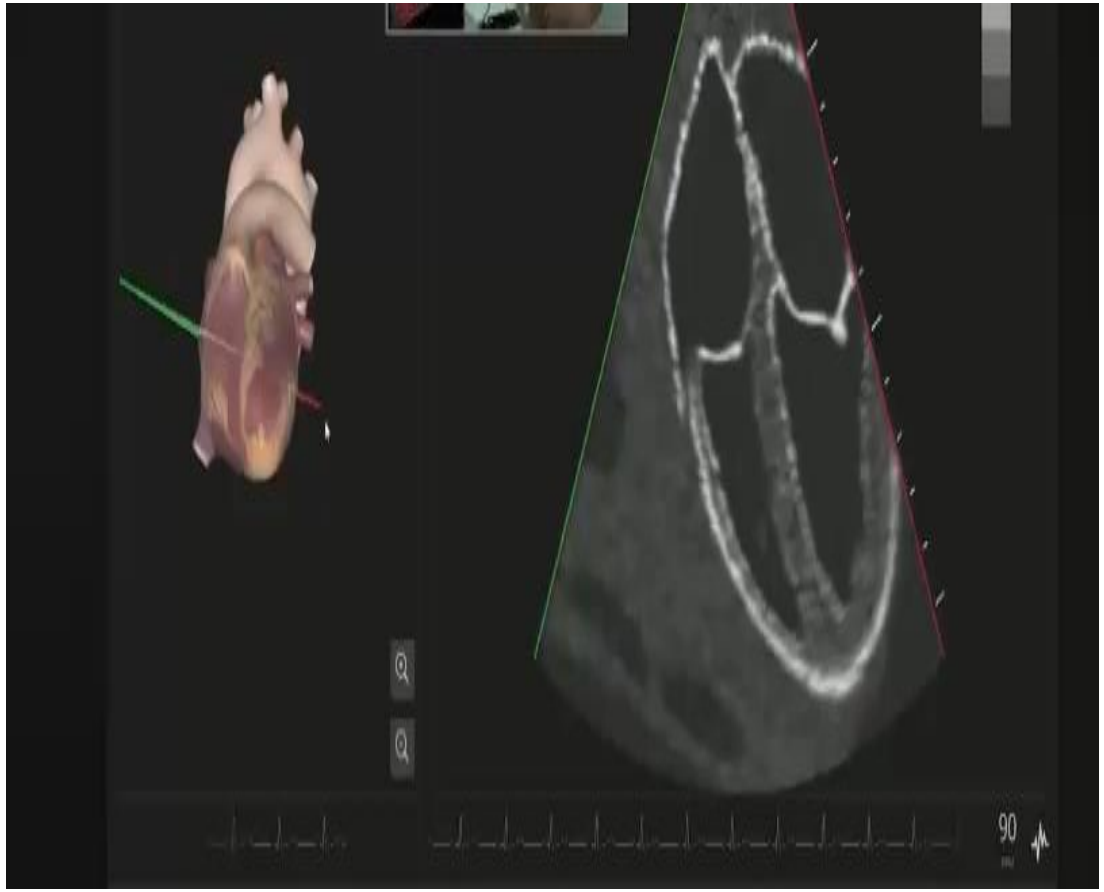
- Mitral Valve Pathology
- Ventricular Septal Defects (VSD)
- LV systolic function
- Aortic Valve: color doppler
- LVOT: color Doppler

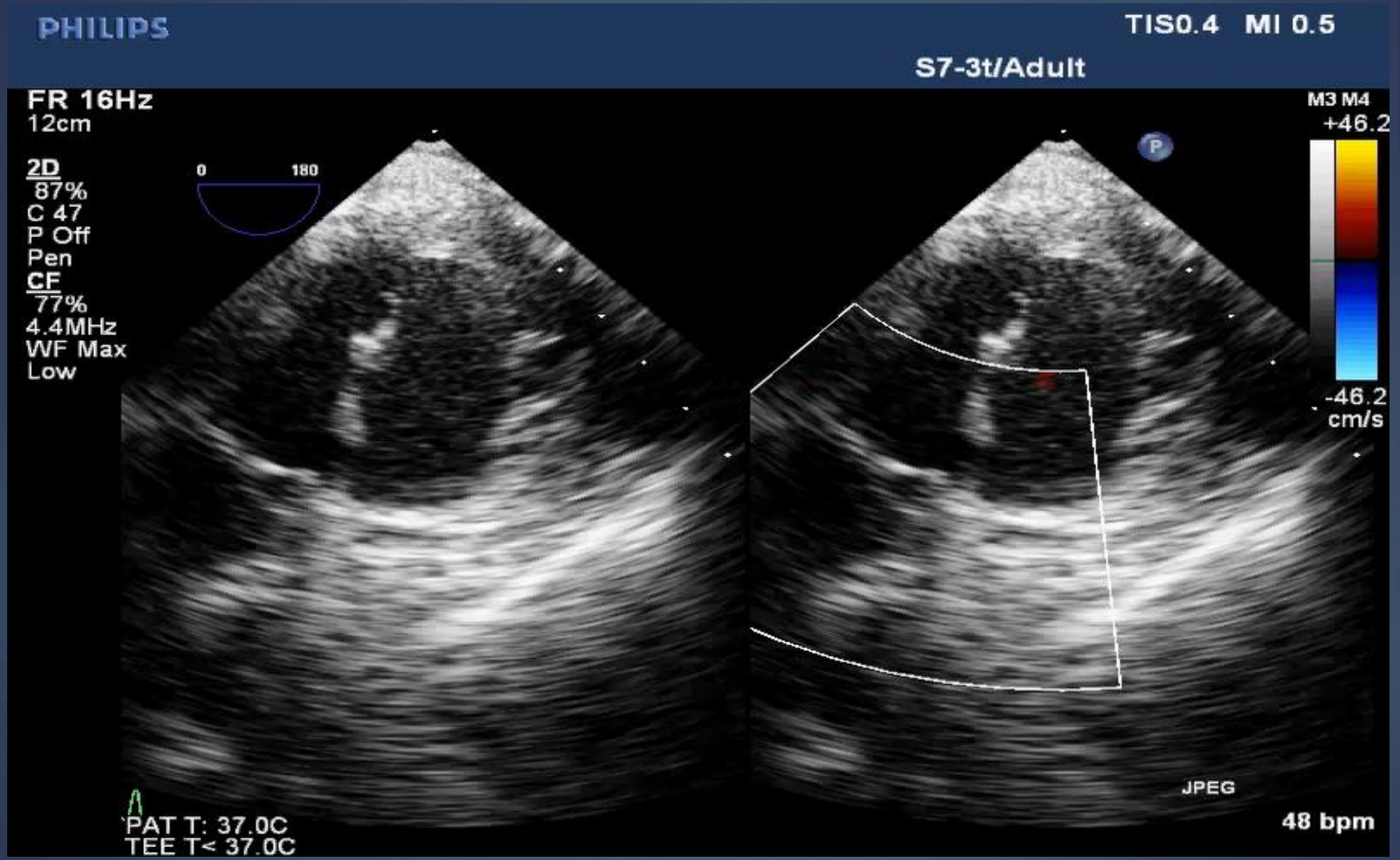

FR 50Hz
9.0cm
2D
67%
C 50
P Off
Gen
128
M4
JPEG
64 bpm
PAT T: 37.0C
TEE T: 39.2C

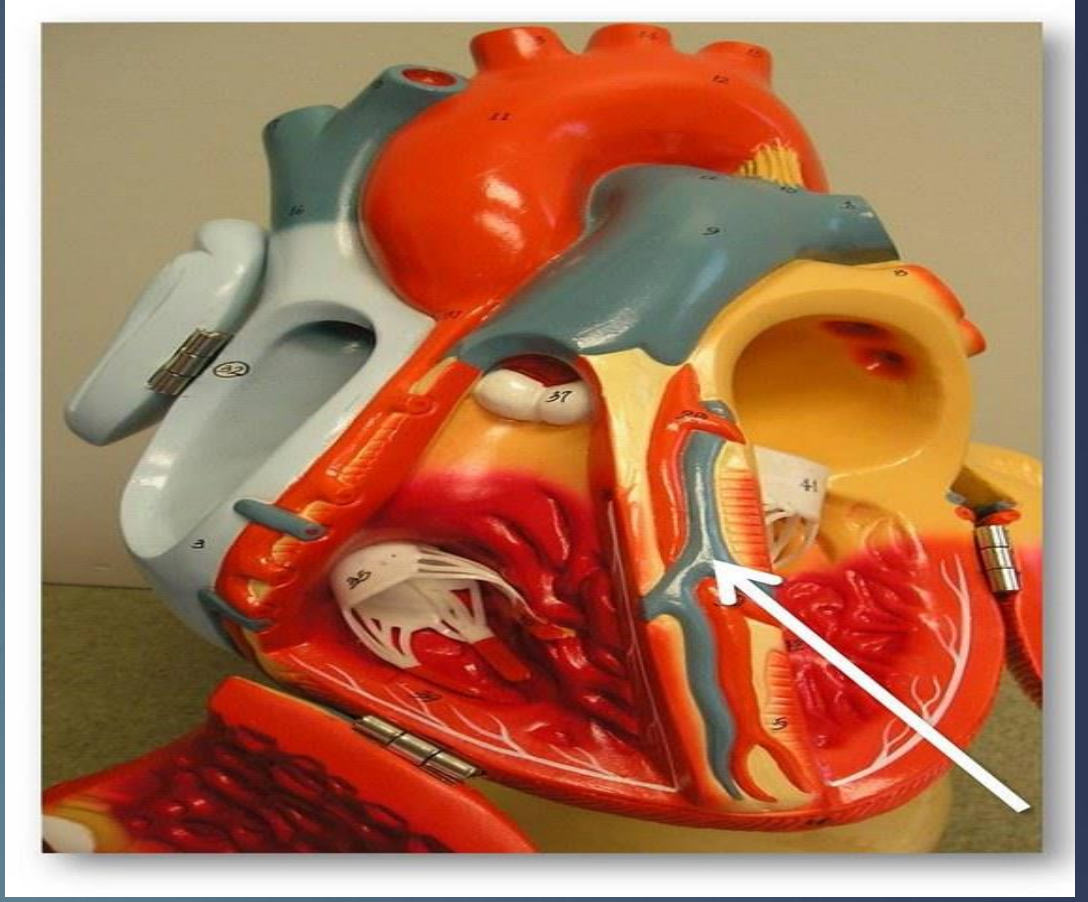

Transgastric
long axis
103°
LA
LV
Ao
RV


Transgastric
long axis
(40 - 45cm)
Multiplane
angle range
90° - 120°
LV
Ao
Ao
LA
LV

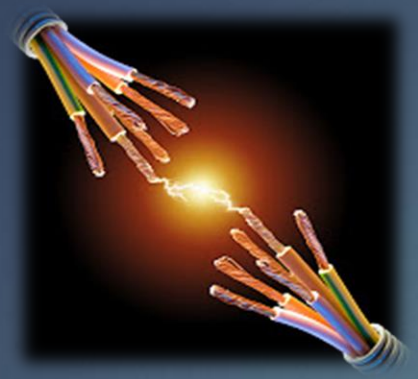

Deep transgastric
long axis
(45 - 50cm)
RV
LV
Ao
LA
Multiplane angle range
0° - 20° anteflexion
0°
Ao
LA
RV
LV
Ao
LA
RA
LV

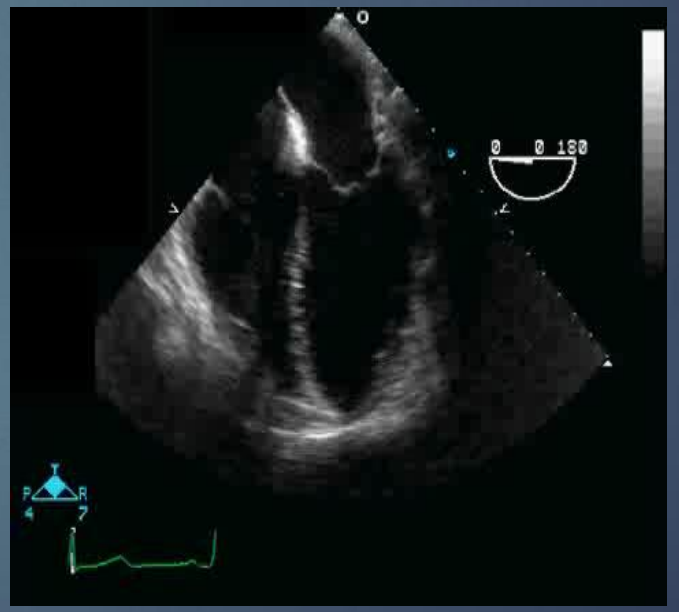

90


PHILIPS
TIS0.4 MI 0.5
S7-3t/Adult
FR 16Hz
12cm
2D
87%
C 47
P Off
Pen
CF
77%
4.4MHz
WF Max
Low
0
180
M3 M4
+46.2
-46.2
cm/s
P
JPEG
48 bpm
PAT T: 37.0C
TEE T< 37.0C



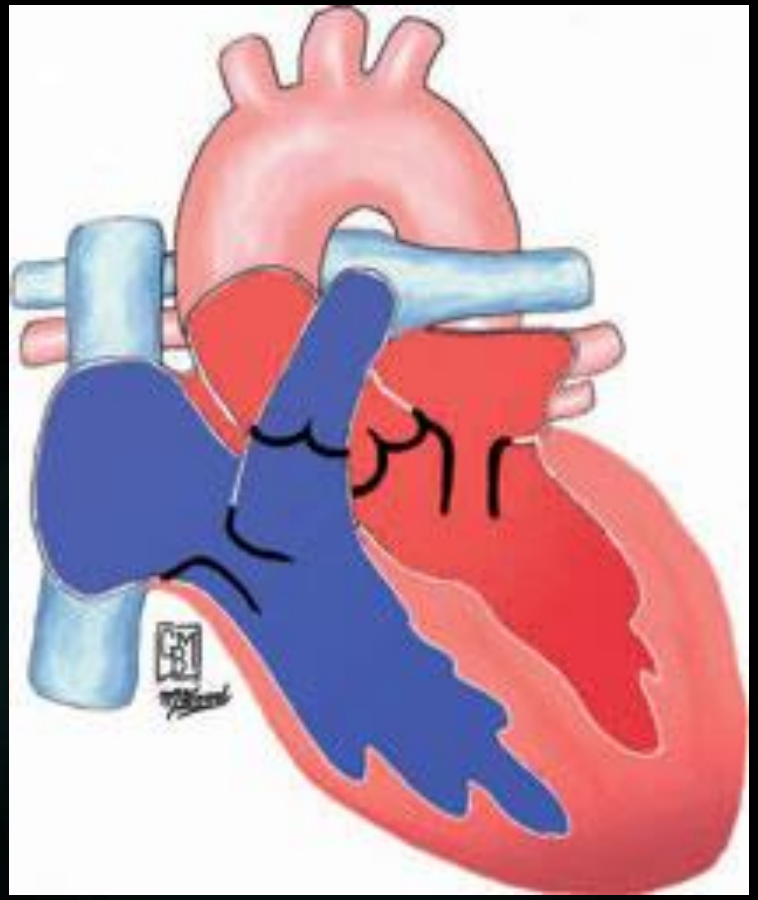
Aorta Examination?????

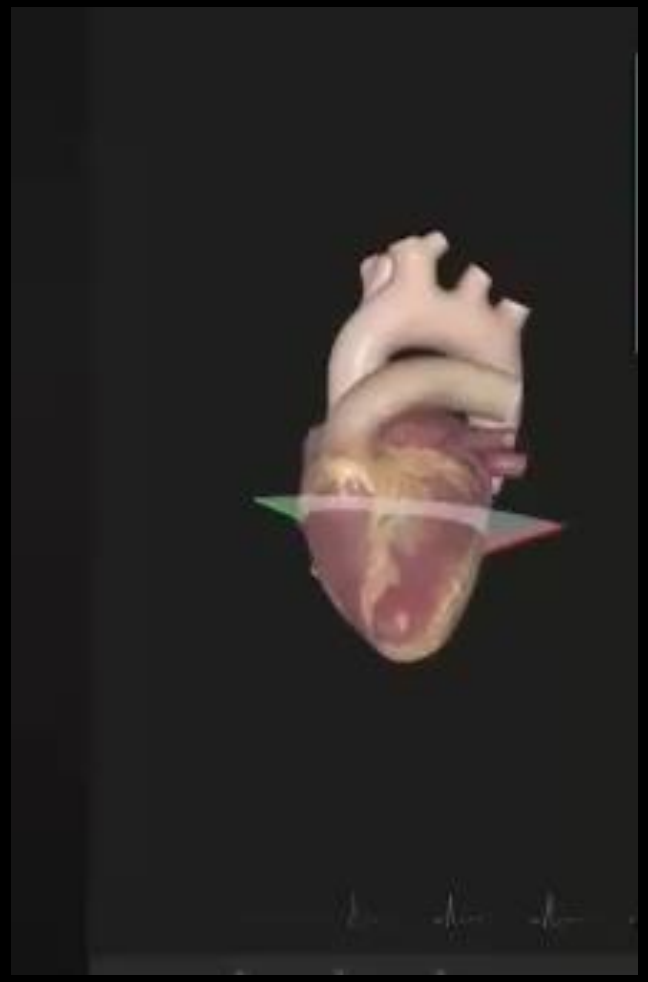


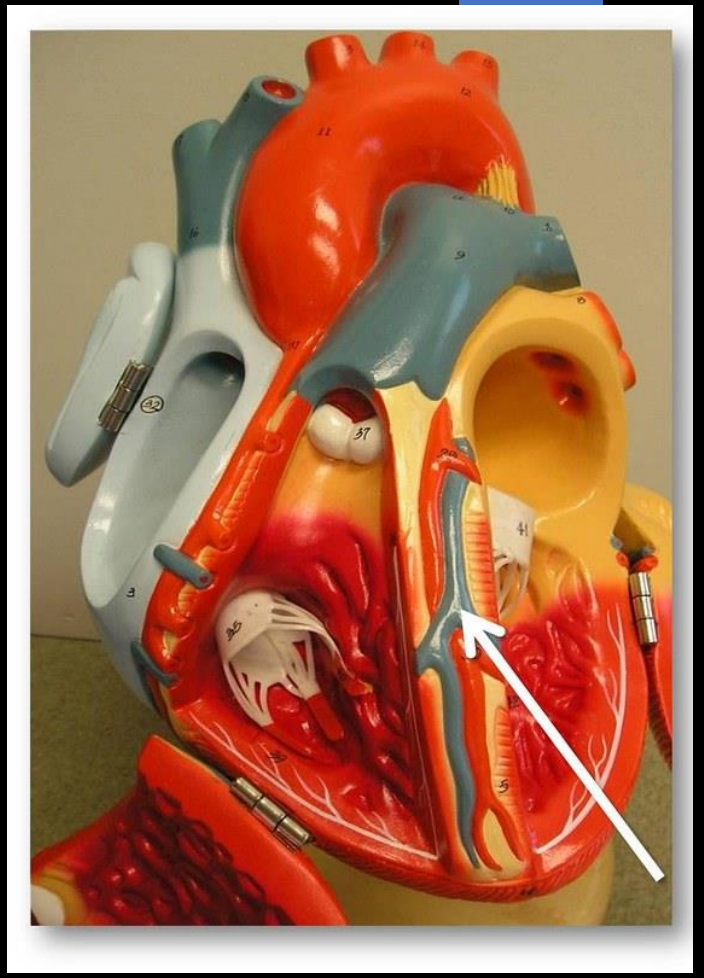


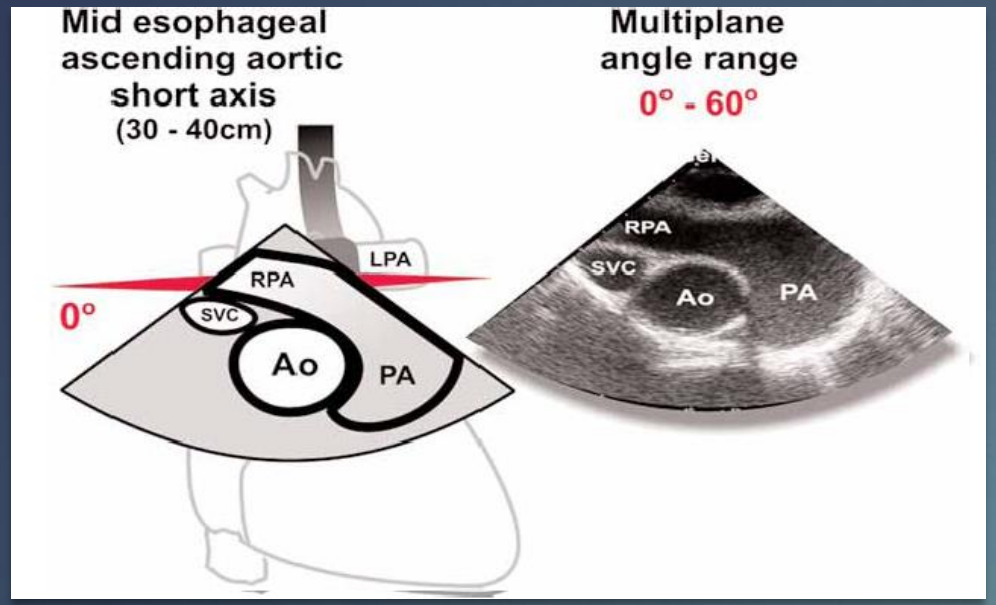
If you get lost

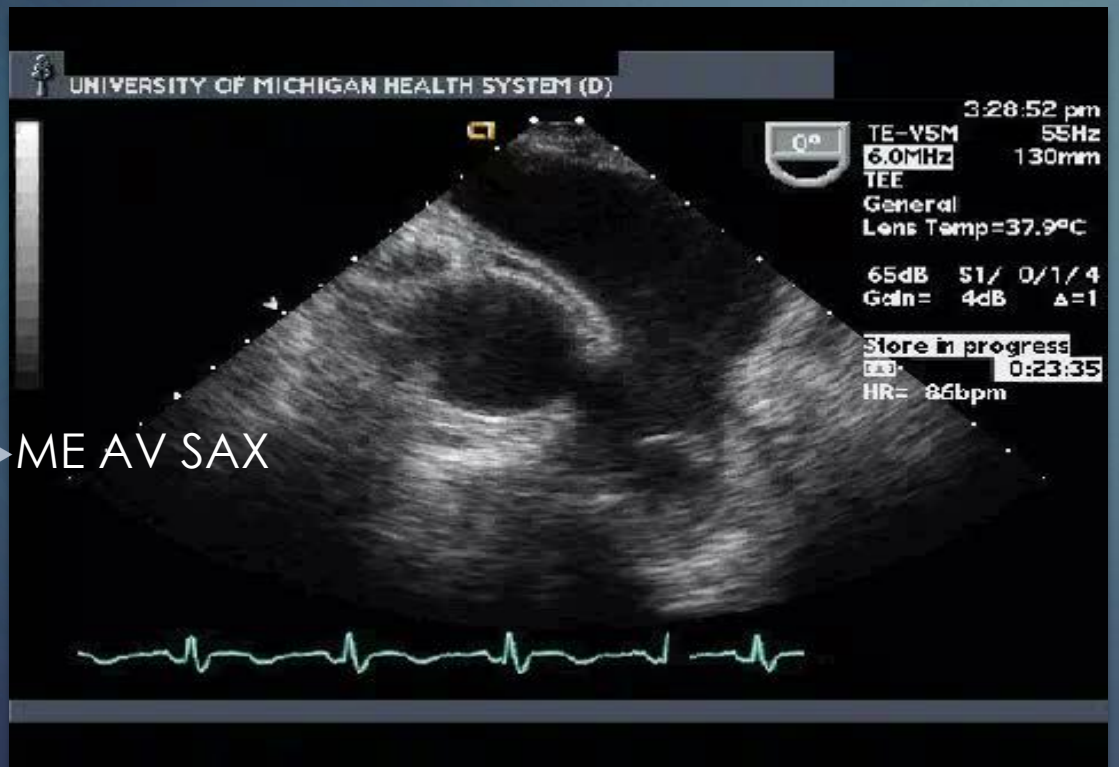
If during a transoesophageal investigation you become disoriented find the **4-chamber view** again.



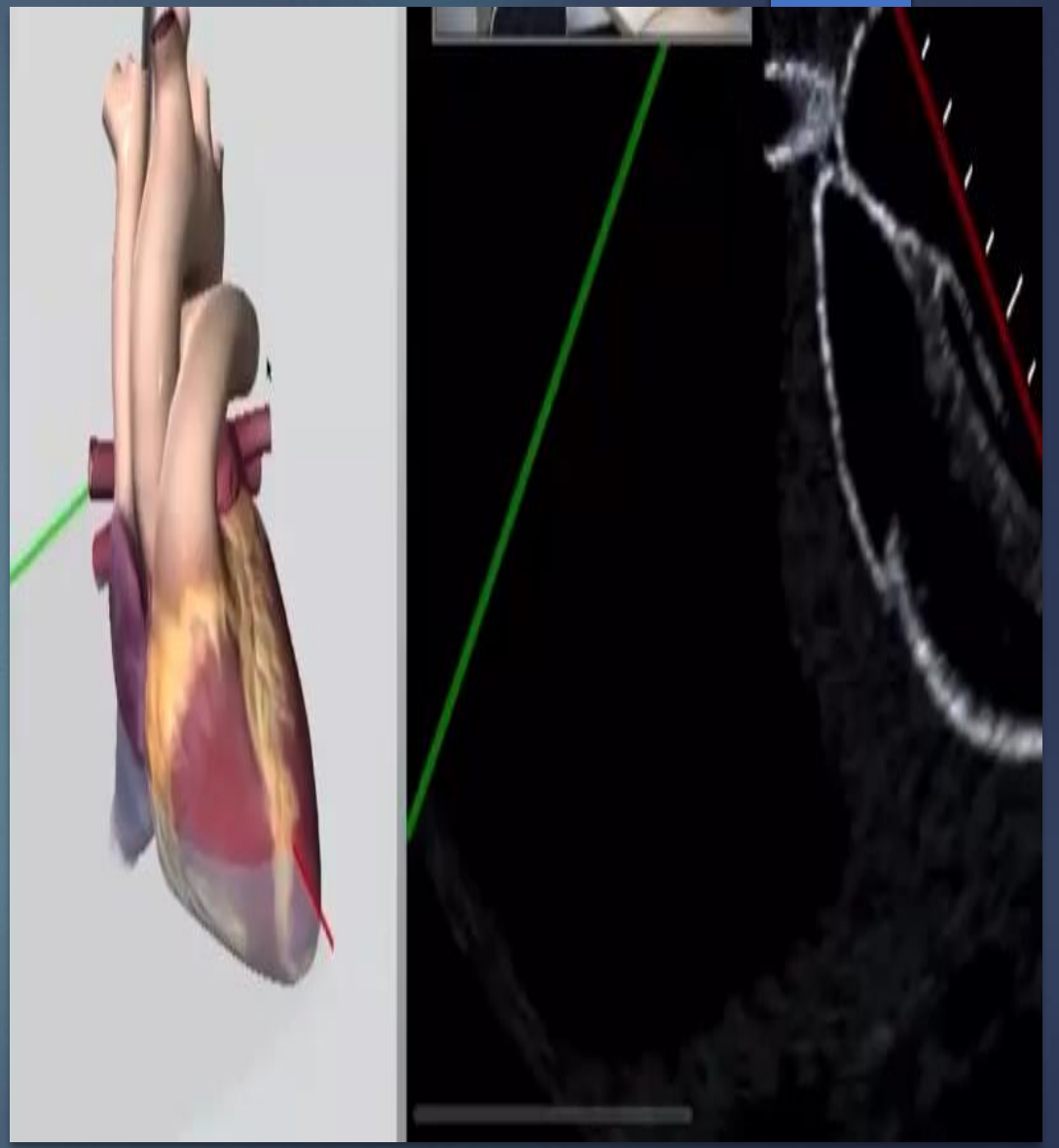




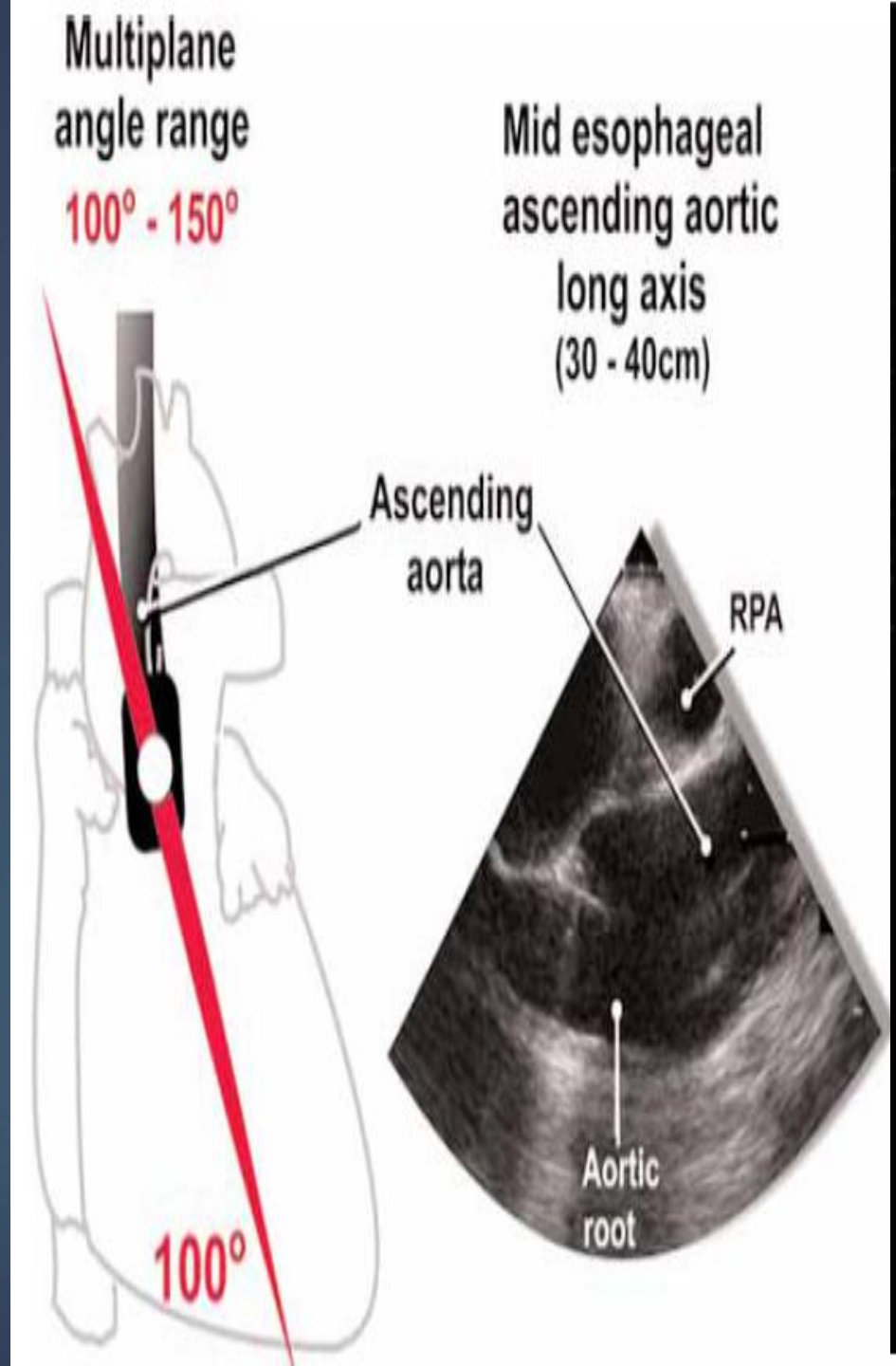

Mid esophageal
ascending aortic
short axis
(30 - 40cm)
Multiplane
angle range
0° - 60°
0°
LPA
RPA
SVC
Ao
PA
RPA
SVC
Ao
PA

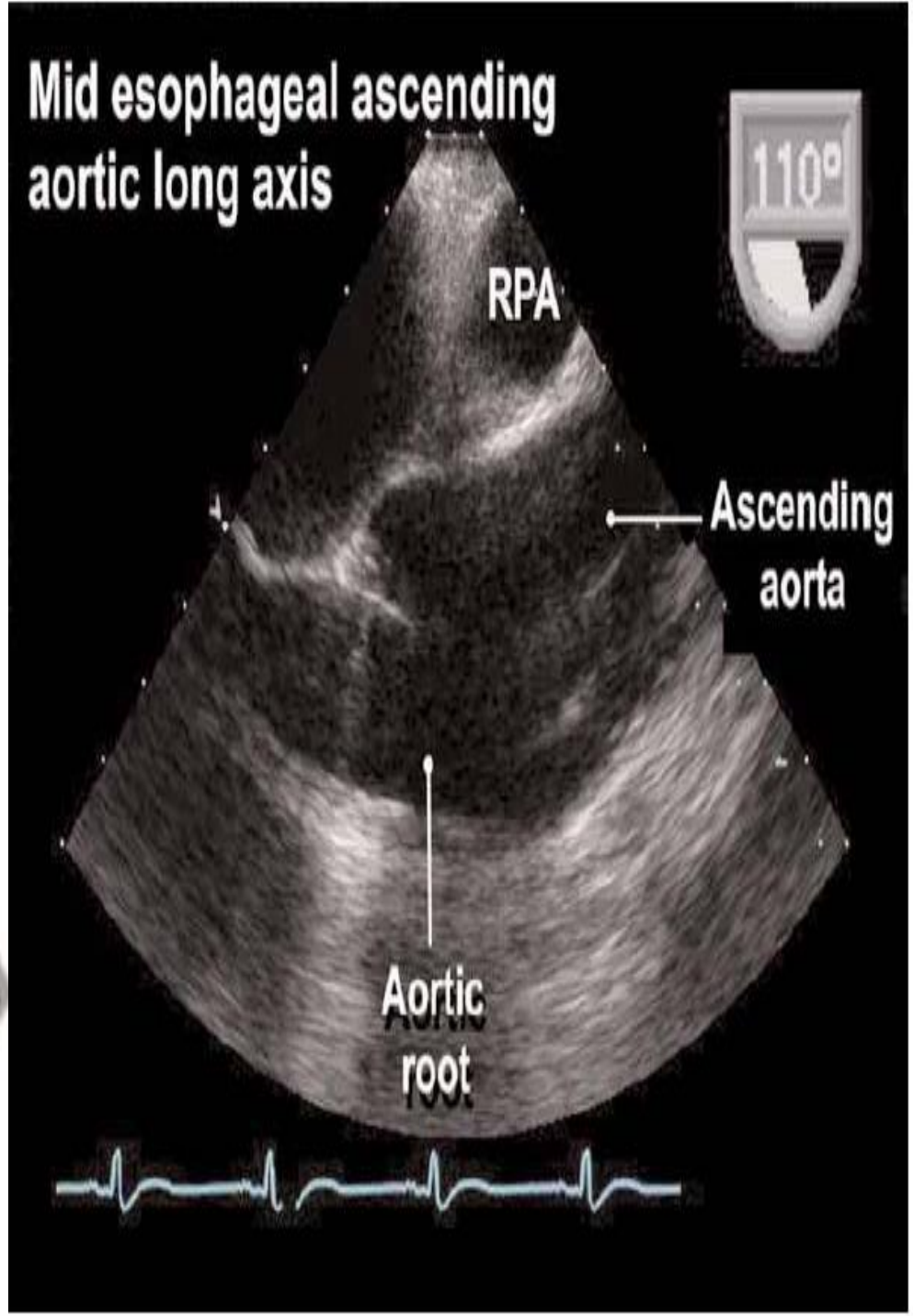

UNIVERSITY OF MICHIGAN HEALTH SYSTEM (D)
3:28:52 pm
TE-V5M
55Hz
6.0MHz
130mm
TEE
General
Lens Temp=37.9°C
65dB S1/ 0/1/4
Gain= 4dB Δ=1
Store in progress
0:23:35
HR= 86bpm

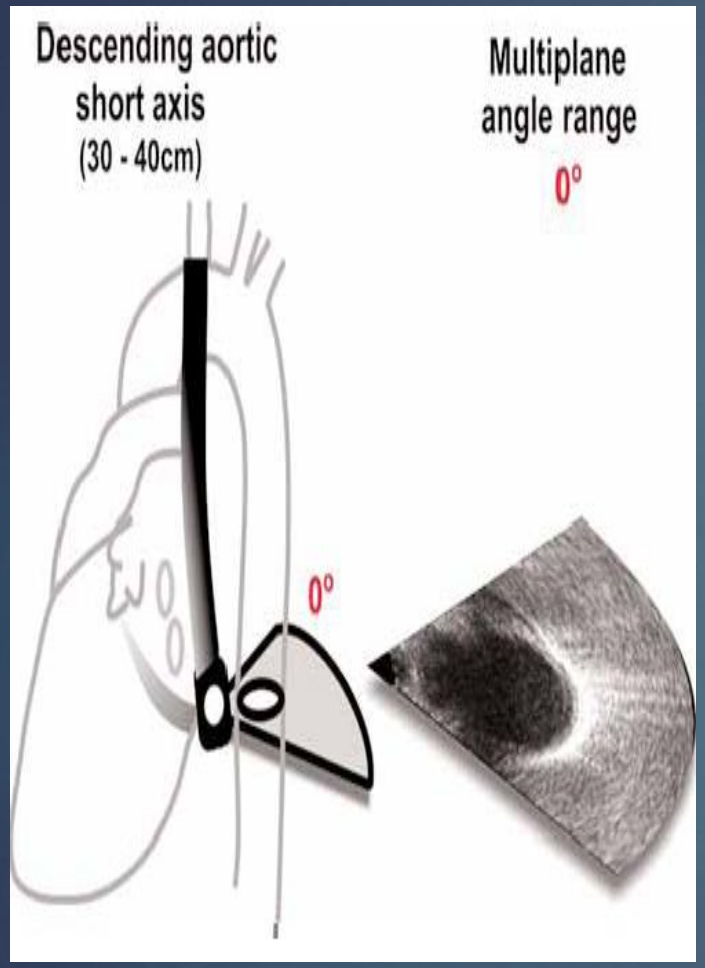
- ME AV SAX

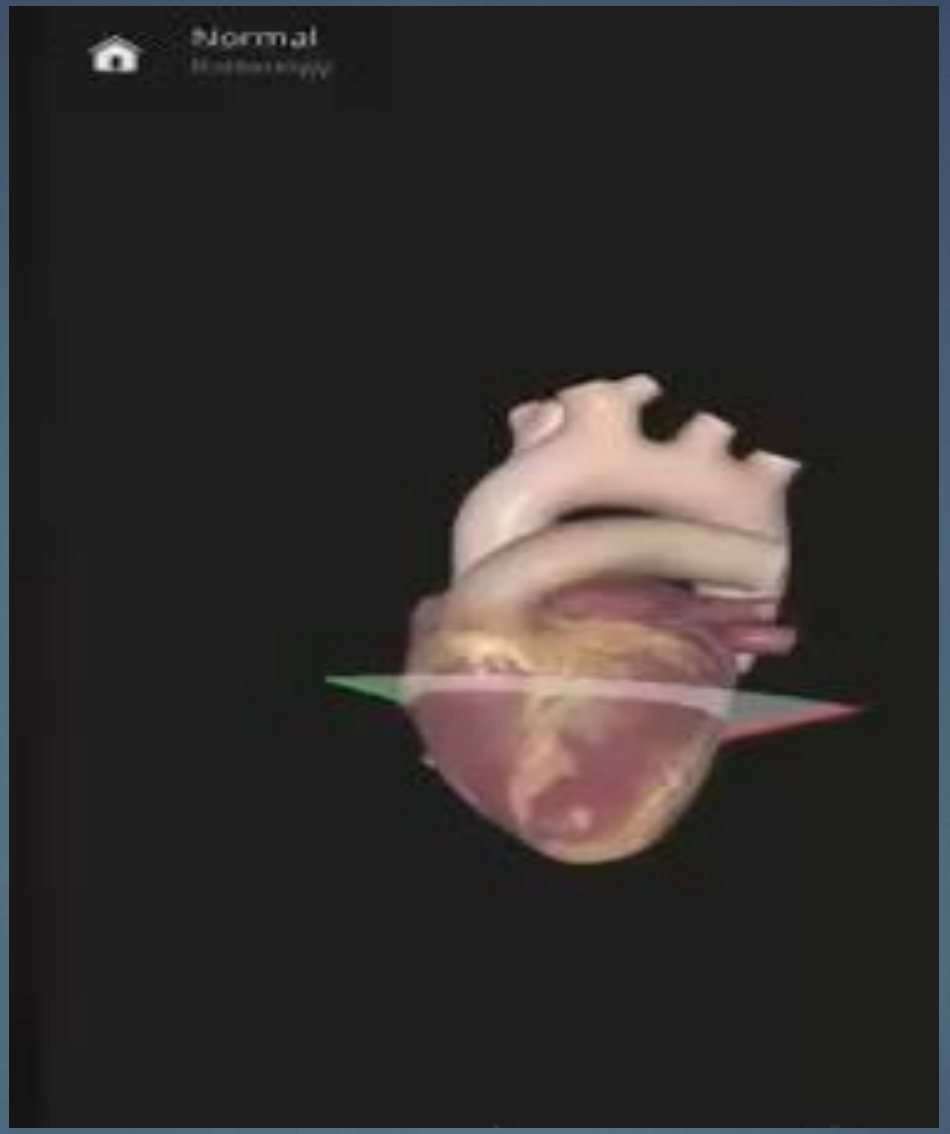


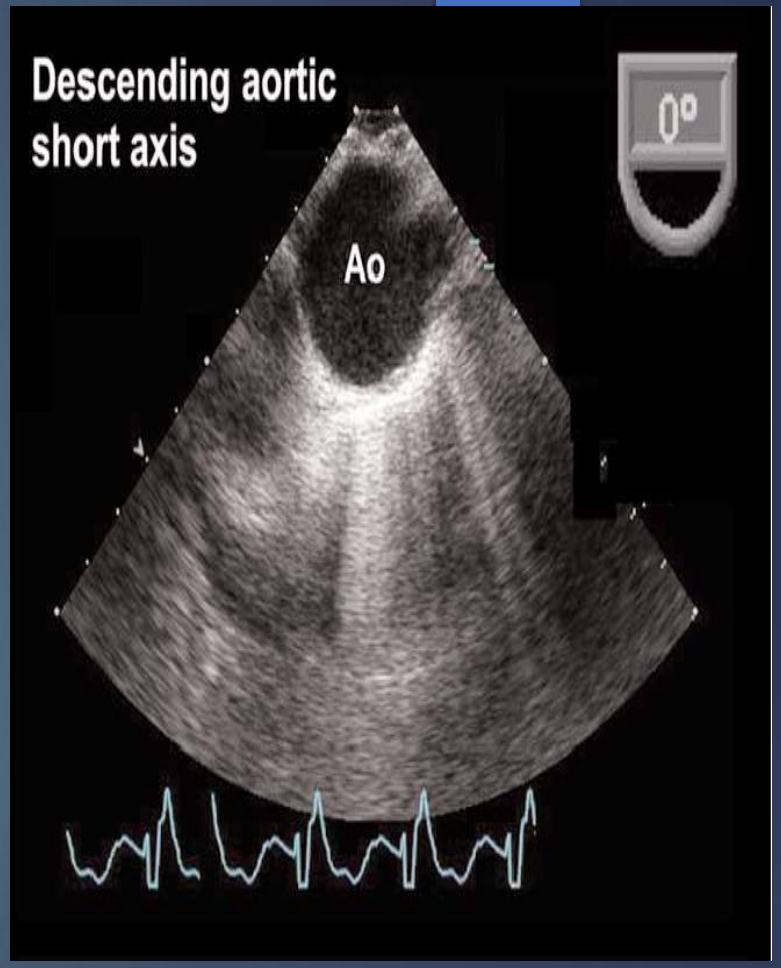

ASUSH
14/12/2022 05:08:52 PM
robea, sahar
6Tc-RS Cardiac_E
MI 0.9 TI 0.4
USR
14/12/2022 05:08:52 PM
post reperfusion
2D
Up/Down
Color Maps
QuickApps


Multiplane
angle range
100° - 150°
Mid esophageal
ascending aortic
long axis
(30 - 40cm)
Ascending
aorta
RPA
Aortic
root
100°


Mid esophageal ascending
aortic long axis
110°
RPA
Ascending
aorta
Aortic
root

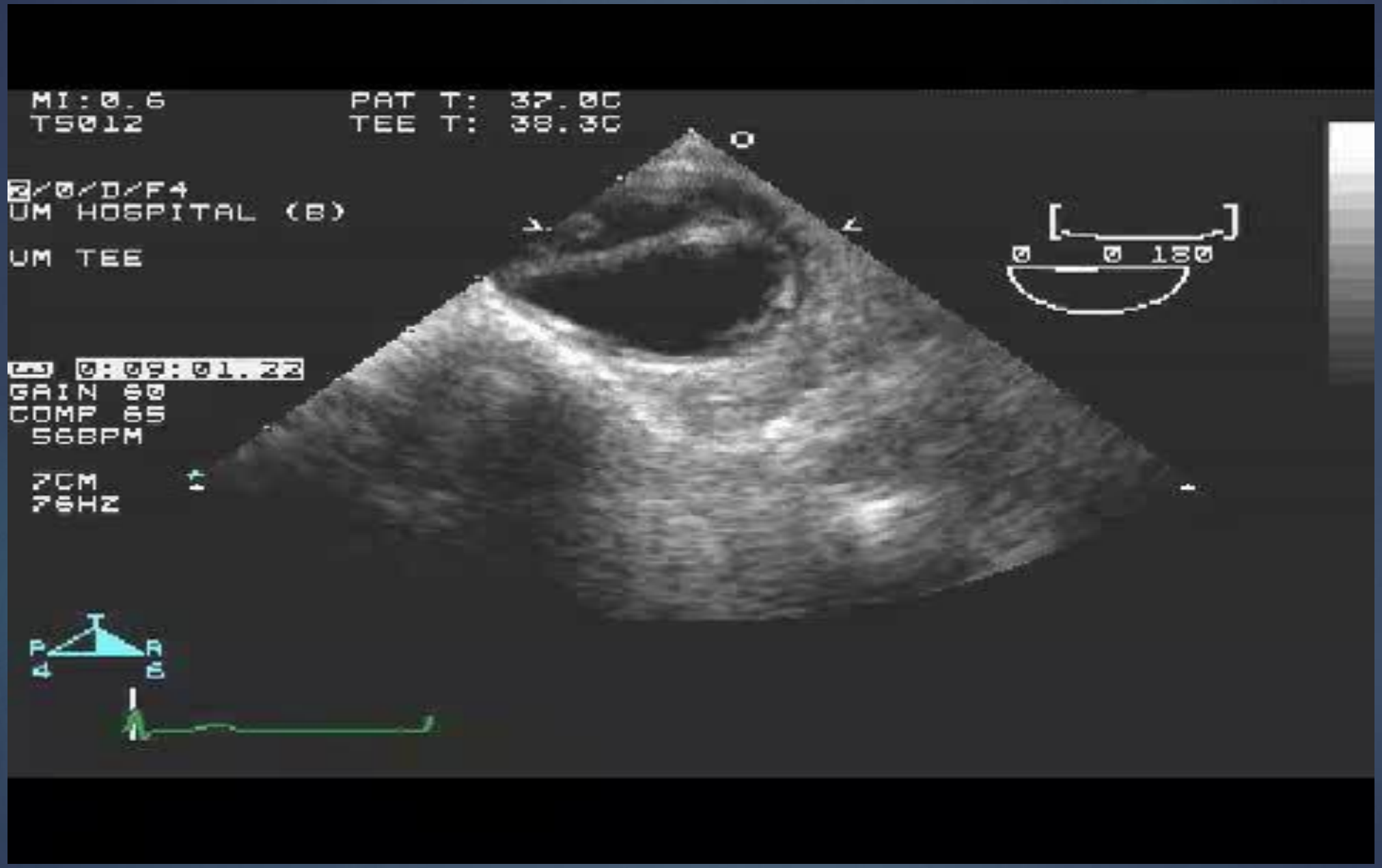


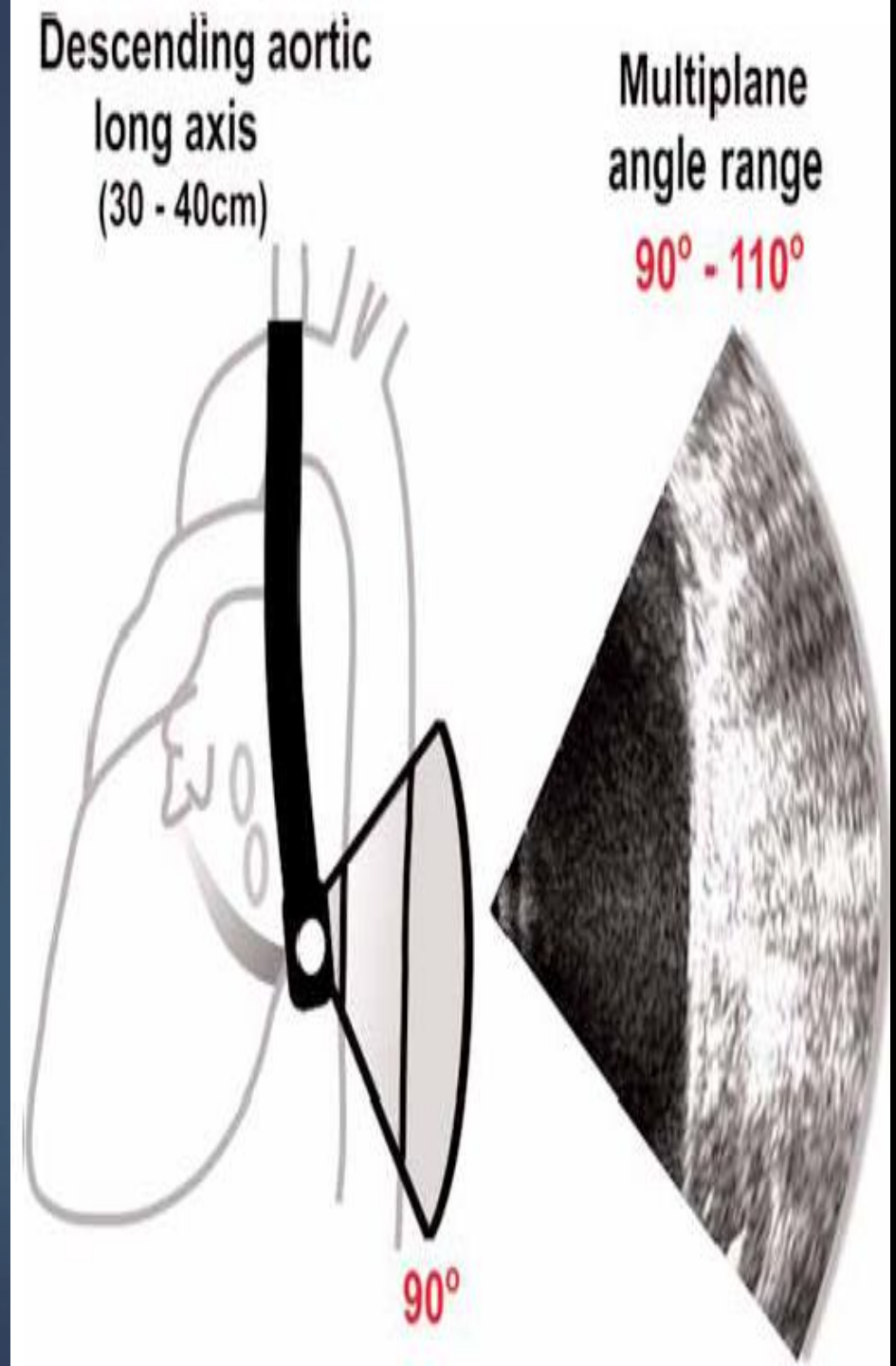




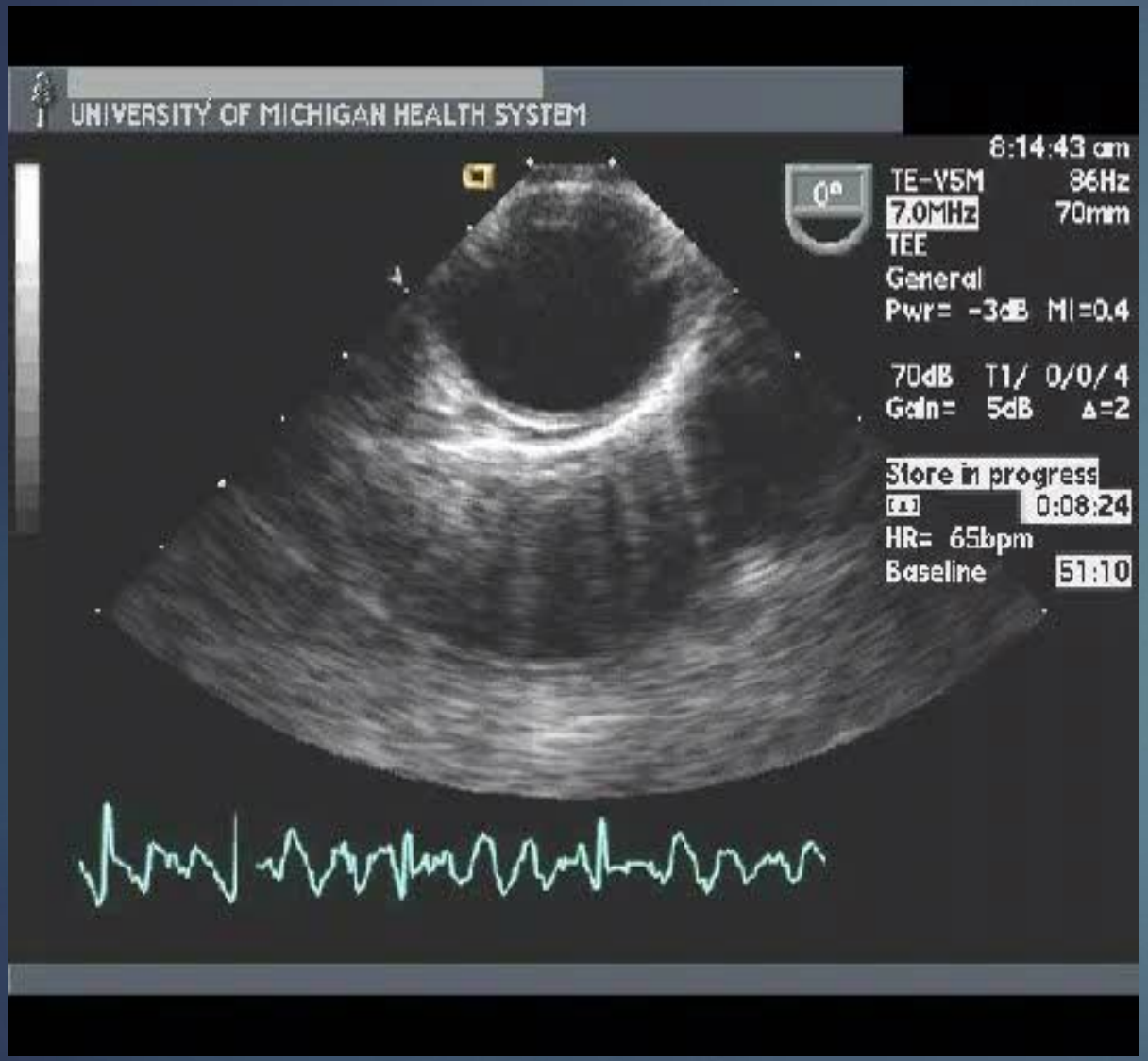
If you get lost

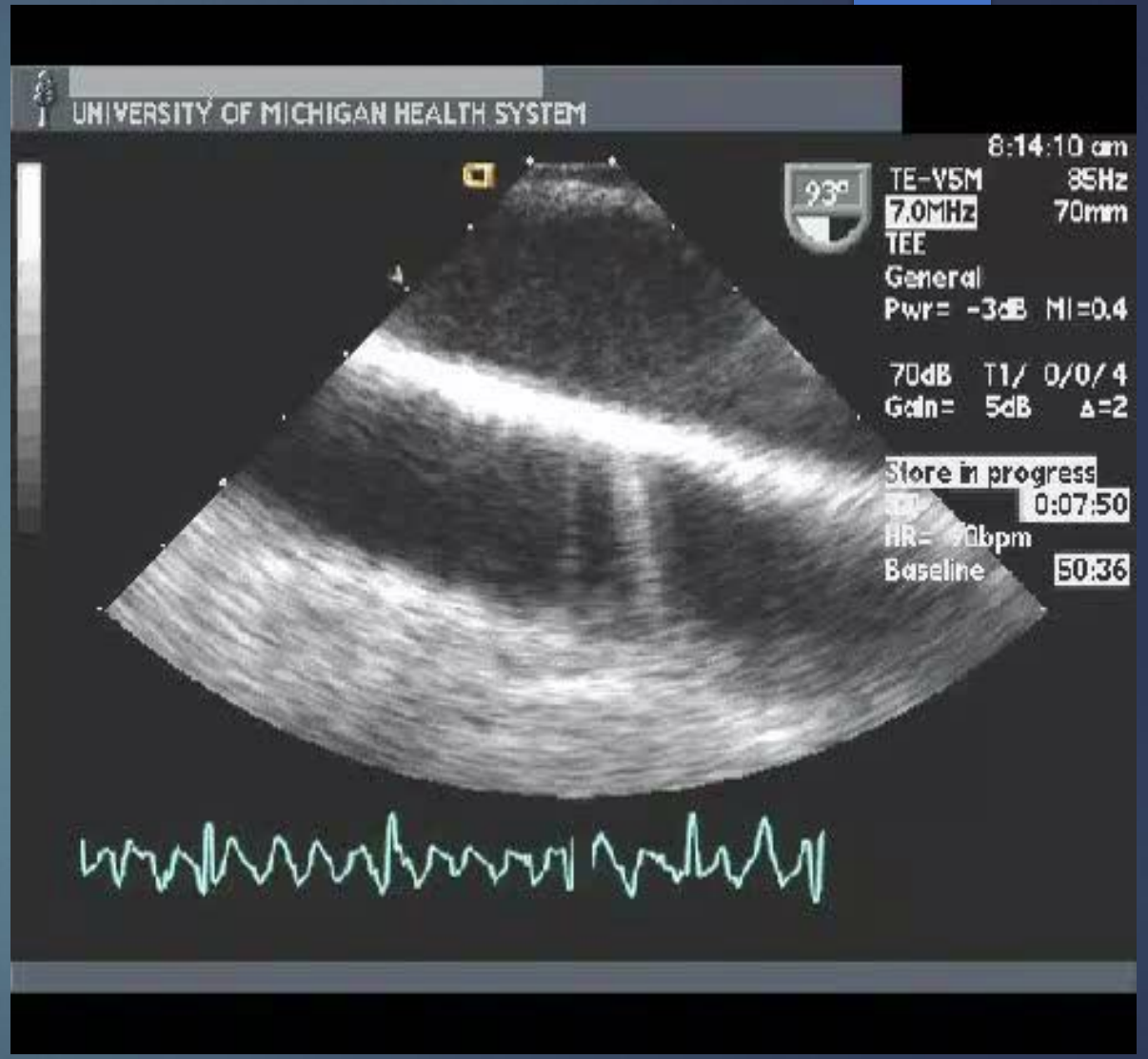
If during a transoesophageal investigation you become disoriented find the **4-chamber view** again.

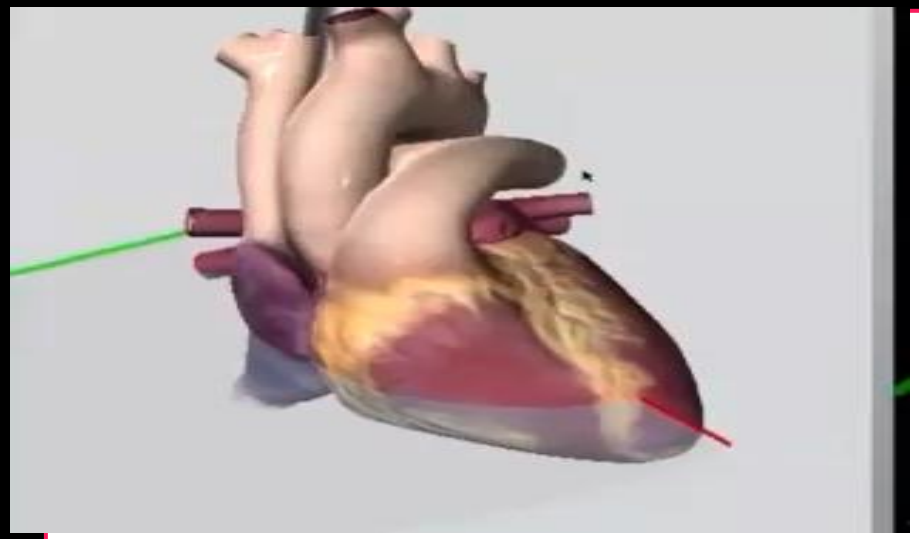

MI:0.6
TSI12
PAT T: 37.0C
TEE T: 38.3C
2/0/D/F4
UM HOSPITAL (B)
UM TEE
0:09:01.22
GAIN 60
COMP 65
56BPM
7CM
76HZ
0
0
180
P
A
4
6

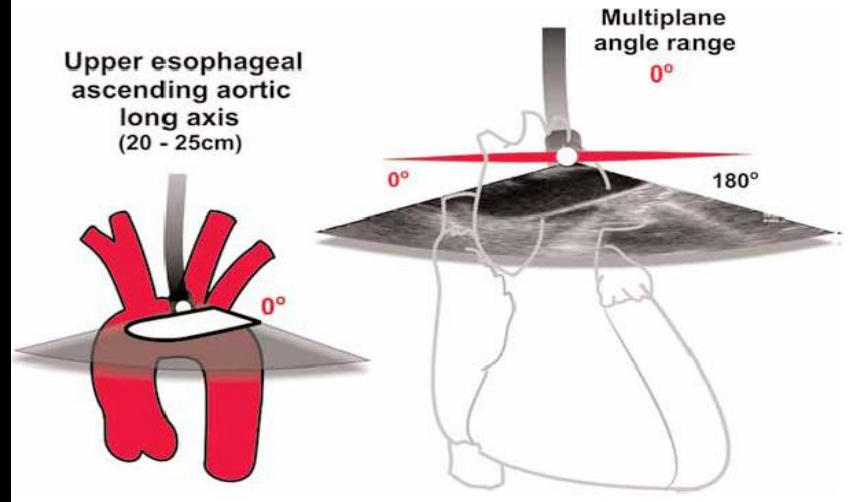

Descending aortic
long axis
(30 - 40cm)
Multiplane
angle range
90° - 110°
90°

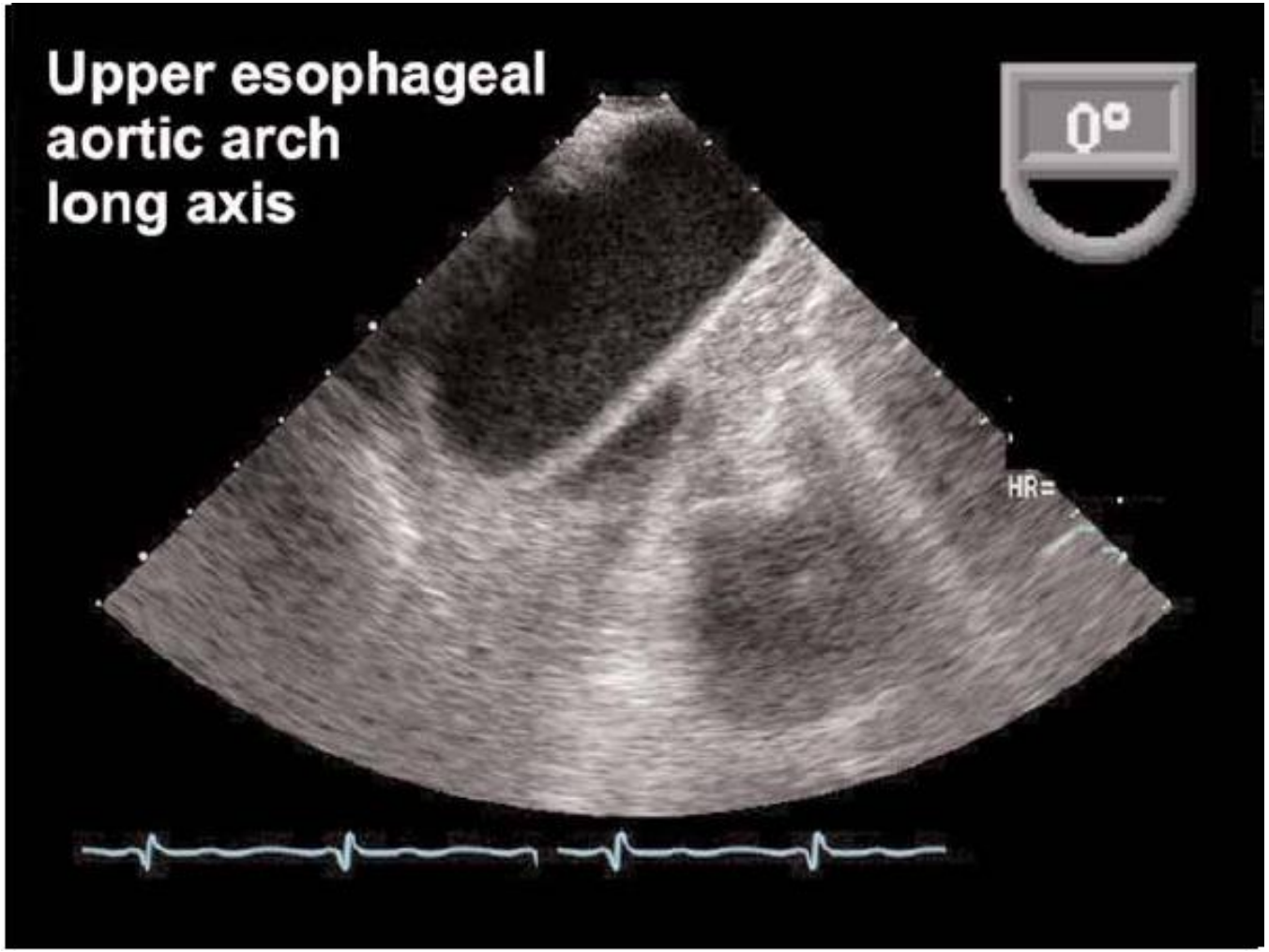

Descending
aortic long-axis
90°


UNIVERSITY OF MICHIGAN HEALTH SYSTEM
8:14:43 am
0°
TE-V5M
7.0MHz
TEE
General
Pwr= -3dB
86Hz
70mm
MI=0.4
70dB
Gain= 5dB
T1/ 0/0/4
Δ=2
Store in progress
0:08:24
HR= 65bpm
Baseline
51:10


UNIVERSITY OF MICHIGAN HEALTH SYSTEM
8:14:10 am
93°
TE-V5M
7.0MHz
TEE
General
Pwr= -3dB
85Hz
70mm
MI=0.4
70dB
Gain= 5dB
T1/ 0/0/4
Δ=2
Store in progress
0:07:50
Baseline
50:36




Upper esophageal
ascending aortic
long axis
(20 - 25cm)
0°
Multiplane
angle range
0°
0°
180°


Upper esophageal
aortic arch
long axis
0°
HR=

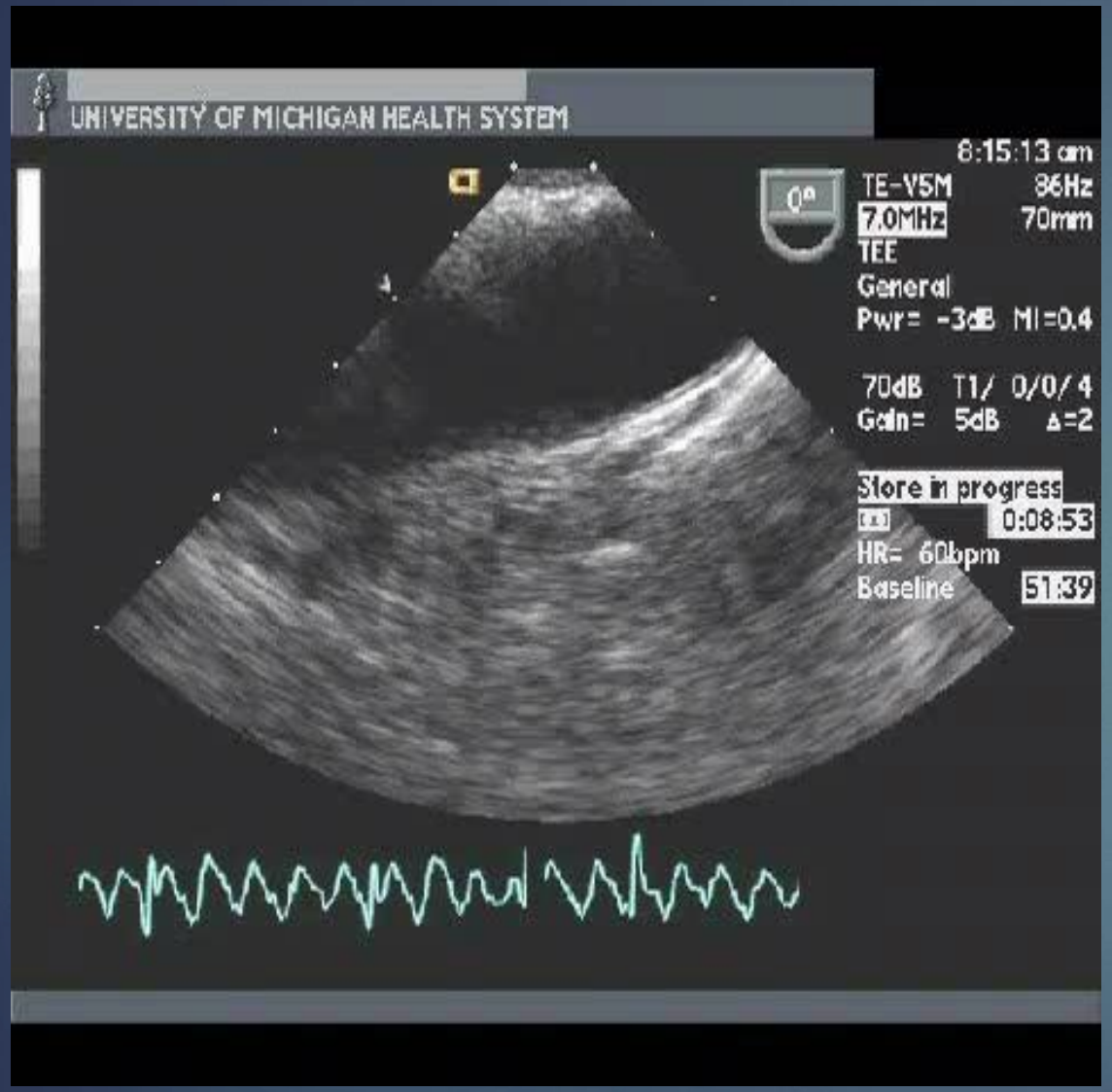
Upper Esophageal Aortic Arch SAX View

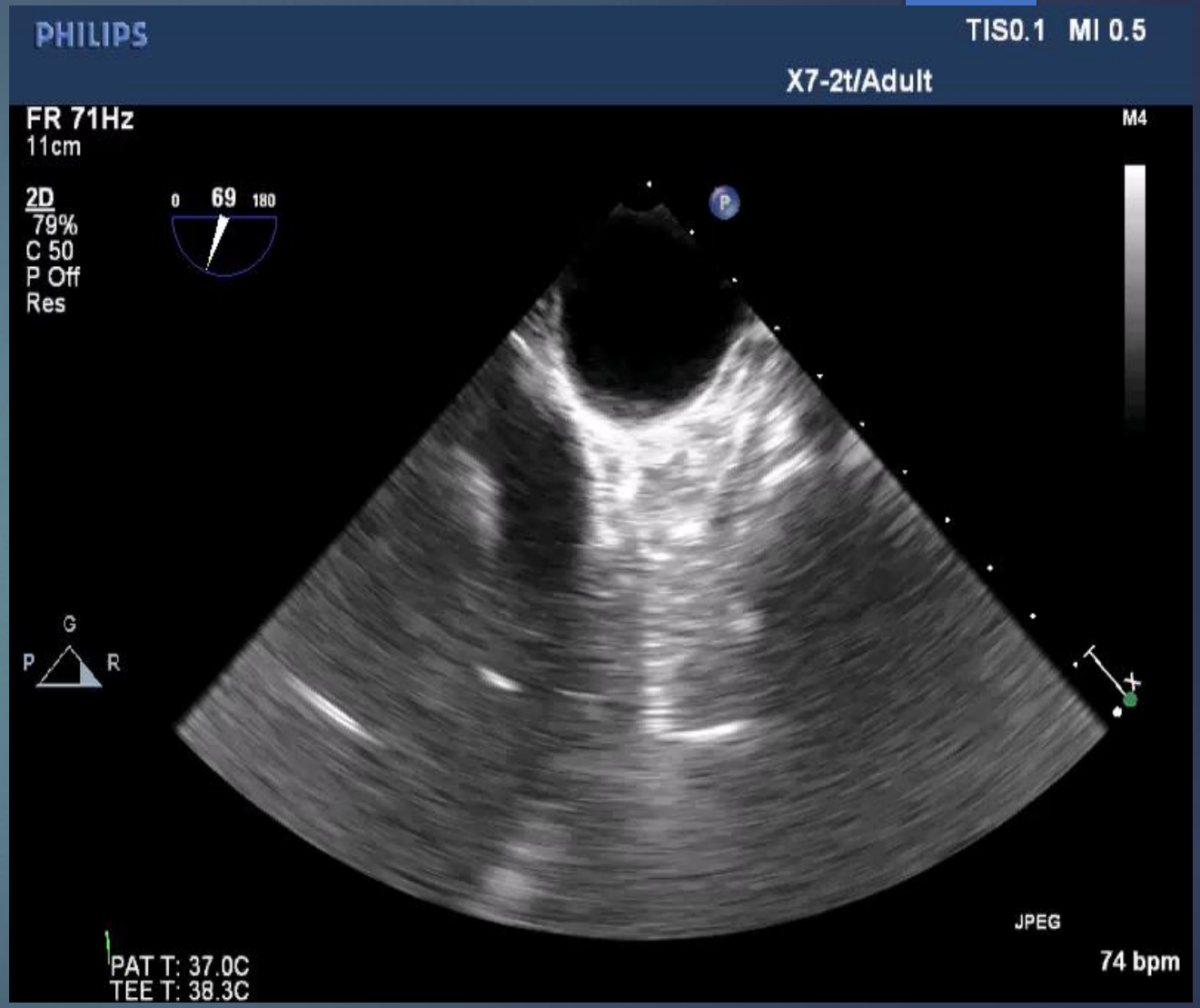
To Obtain the View

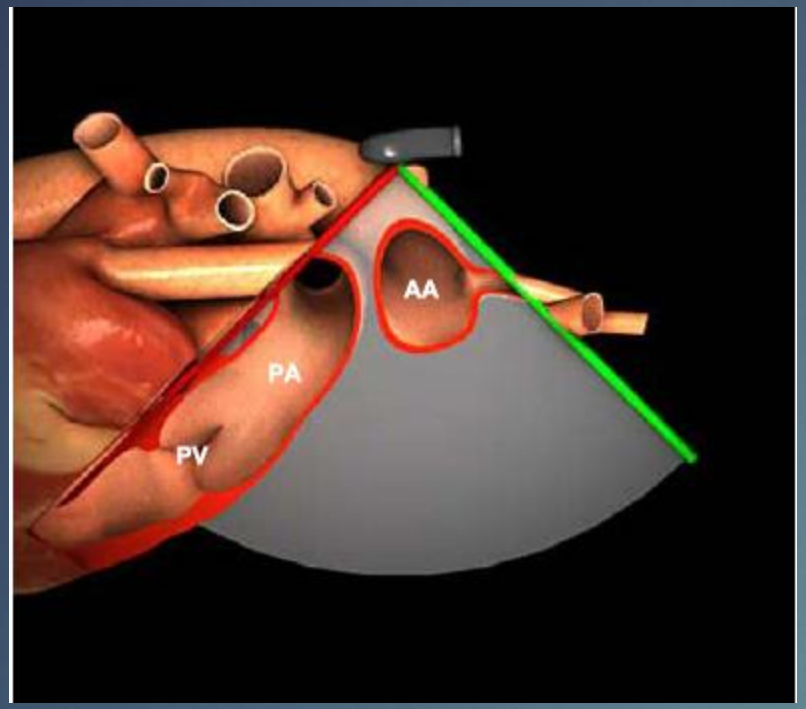
Find the ME descending Aorta SAX (0°) view
Withdraw the probe to obtain the UE Aortic Arch LAX (0°) view
Rotate the omniplane angle to 60-90°
Bring the pulmonic valve and pulmonary artery in view

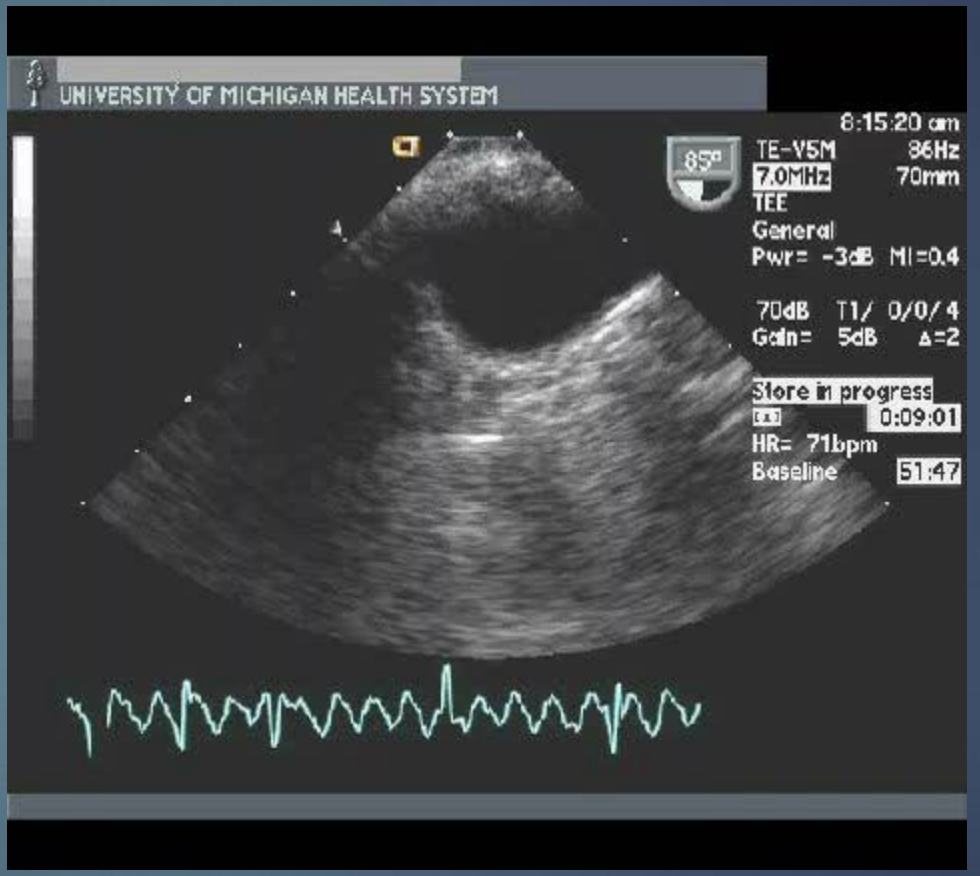
Imaged structures and Diagnostic issues

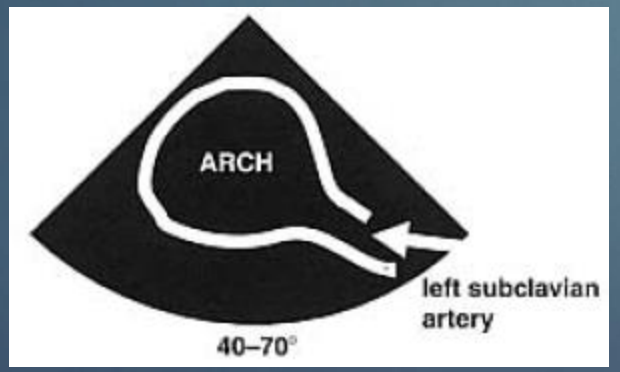
Aortic Arch pathology
Pulmonic Valve disease.
Patent Ductus Arteriosus (PDA)

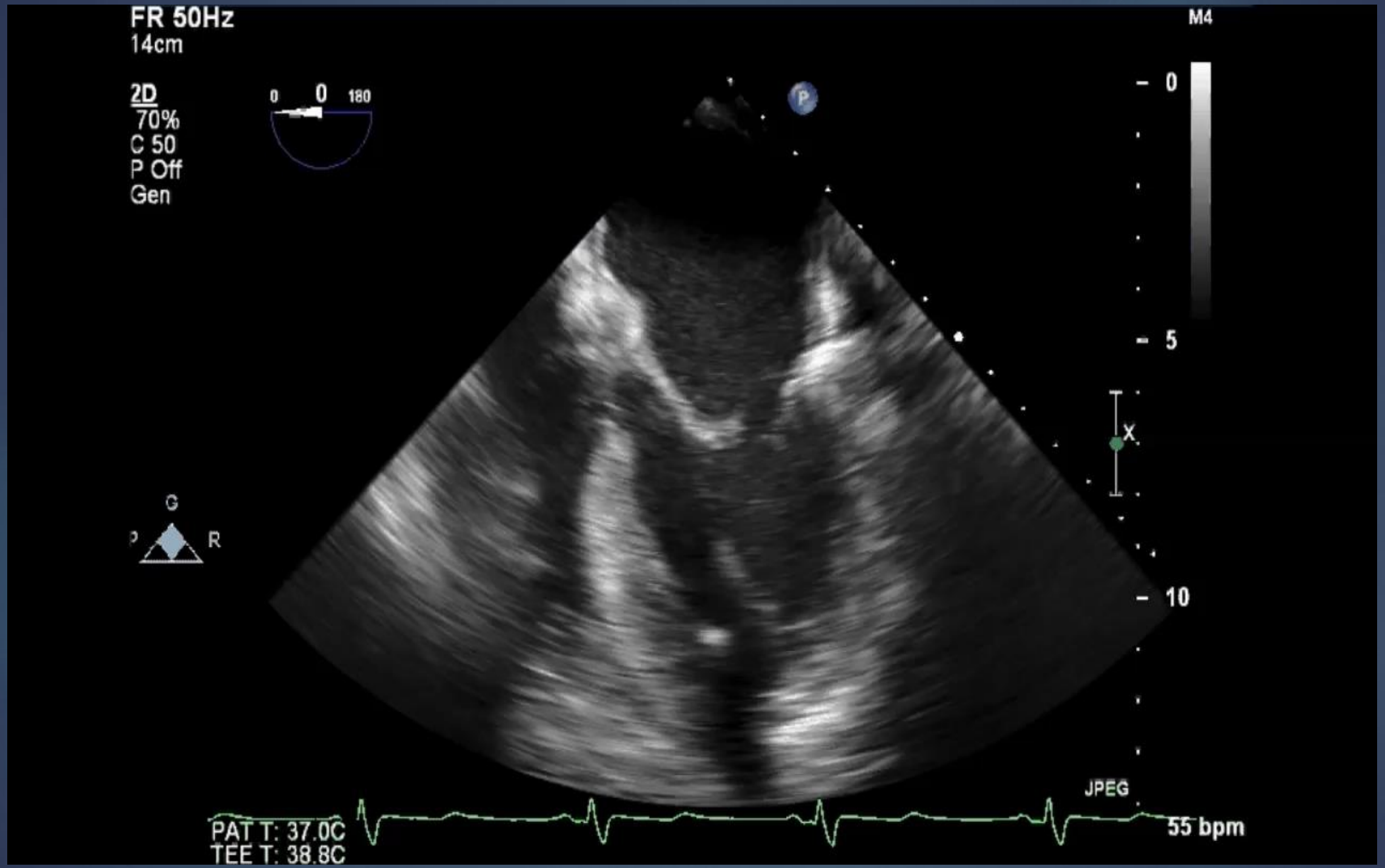

UNIVERSITY OF MICHIGAN HEALTH SYSTEM
8:15:13 am
TE-V5M
86Hz
7.0MHz
70mm
TEE
General
Pwr= -3dB MI=0.4
70dB T1/ 0/0/ 4
Gain= 5dB Δ=2
Store in progress
0:08:53
HR= 60bpm
Baseline
51:39

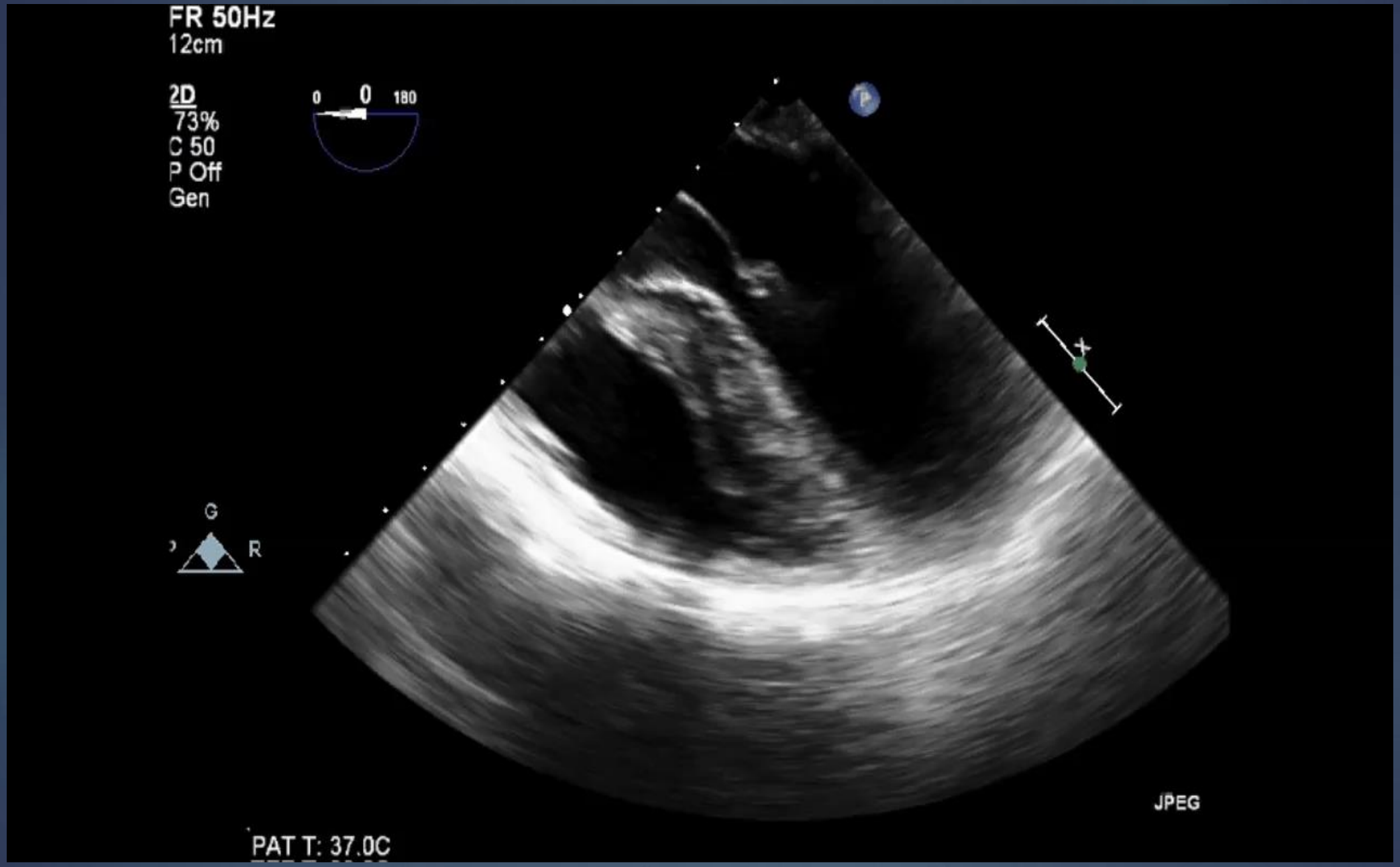

PHILIPS
TIS0.1 MI 0.5
X7-2t/Adult
FR 71Hz
11cm
M4
2D
79%
C 50
P Off
Res
0 69 180
G
P R
JPEG
PAT T: 37.0C
TEE T: 38.3C
74 bpm

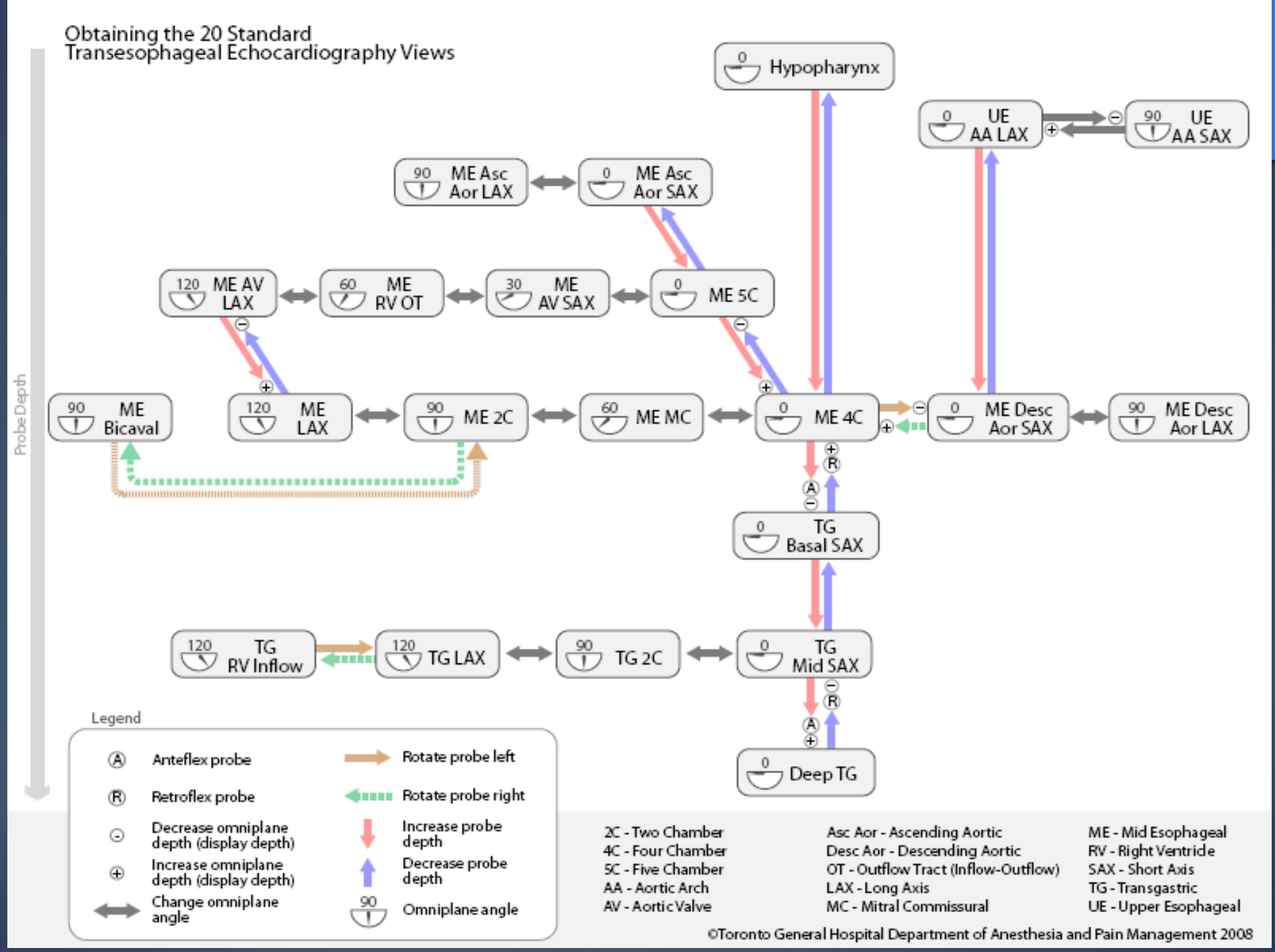

AA
PA
PV


UNIVERSITY OF MICHIGAN HEALTH SYSTEM
8:15:20 am
85°
TE-V5M
7.0MHz
TEE
General
Pwr= -3dB
86Hz
70mm
MI=0.4
70dB
Gain= 5dB
T1/ 0/0/4
Δ=2
Store in progress
0:09:01
HR= 71bpm
Baseline
51:47


ARCH
left subclavian artery
40–70°


FR 50Hz
14cm
2D
70%
C 50
P Off
Gen
0 0 180
M4
0
5
10
X
G
P
R
JPEG
PAT T: 37.0C
TEE T: 38.8C
55 bpm


FR 50Hz
12cm
2D
73%
C 50
P Off
Gen
0 0 180
G
R
JPEG
PAT T: 37.0C


Obtaining the 20 Standard
Transesophageal Echocardiography Views
Probe Depth
0 Hypopharynx
0 UE AA LAX
90 UE AA SAX
90 ME Asc Aor LAX
0 ME Asc Aor SAX
120 ME AV LAX
60 ME RV OT
30 ME AV SAX
0 ME 5C
90 ME Bicaval
120 ME LAX
90 ME 2C
60 ME MC
0 ME 4C
0 ME Desc Aor SAX
90 ME Desc Aor LAX
0 TG Basal SAX
120 TG RV Inflow
120 TG LAX
90 TG 2C
0 TG Mid SAX
0 Deep TG
Legend
Anteflex probe
Retroflex probe
Decrease omniplane depth (display depth)
Increase omniplane depth (display depth)
Change omniplane angle
Rotate probe left
Rotate probe right
Increase probe depth
Decrease probe depth
Omniplane angle
2C - Two Chamber
4C - Four Chamber
5C - Five Chamber
AA - Aortic Arch
AV - Aortic Valve
Asc Aor - Ascending Aortic
Desc Aor - Descending Aortic
OT - Outflow Tract (Inflow-Outflow)
LAX - Long Axis
MC - Mitral Commissural
ME - Mid Esophageal
RV - Right Ventricle
SAX - Short Axis
TG - Transgastric
UE - Upper Esophageal
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Five basic echocardiography comparison views		
TTE view	**TEE view**	**2D anatomical structure evaluation**
Parasternal LAX	ME LAX	LA, MV, LV, LVOT, AV
Parasternal basal, mid, apical SAX	TG basal, mid, apical SAX	RV, MV, LV
Parasternal SAX	ME RV IF OF	RA, TV, RV, PV, RVOT, AV
Apical 4C	ME 4C	RA, TV, RV, LA, MV, LV
Apical 2C	ME 2C	LA, LAA, MV, LV

2C = 2 chamber; 4C = 4 chamber; AV = aortic valve; LAX = long axis; LA = left atrium; LV = left ventricle; LVOT = left ventricular outflow tract; ME = midesophageal; PV = pulmonic valve; RA = right atrium; RV = right ventricle; RV IF OF = right ventricular inflow–outflow view; RVOT = right ventricular outflow tract; SAX = short axis.

Five Standard Transesophageal Echocardiography (TEE) Views with Corresponding Transthoracic Echocardiography (TTE) Views


Thank you!