



Ahmad S. Omran MD, FACC, FESC, FASE

Consultant Cardiologist

Department of Anesthesia and Pain Management

Toronto General Hospital- UHN


University of Toronto




TEE for Intervention in Structural Heart Disease

(Interventional Echocardiography)


June 12, 2019
Toronto General Hospital

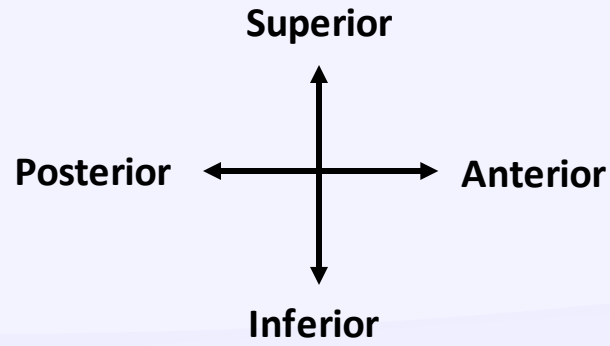
A solid blue horizontal bar spanning the width of the slide at the bottom.

Outline

1. TEE in guiding atrial septal puncture
 2. TEE in MitraClip repair
 3. TEE in percutaneous closure of LAA
 4. TEE in percutaneous mitral balloon valvuloplasty
 5. TEE in TAVI (TAVR)
 6. TEE in percutaneous closure of paravalvular leaks
 7. TEE in Percutaneous intervention in tricuspid valve
 8. TEE in percutaneous closure of ASD/ PFO and VSD
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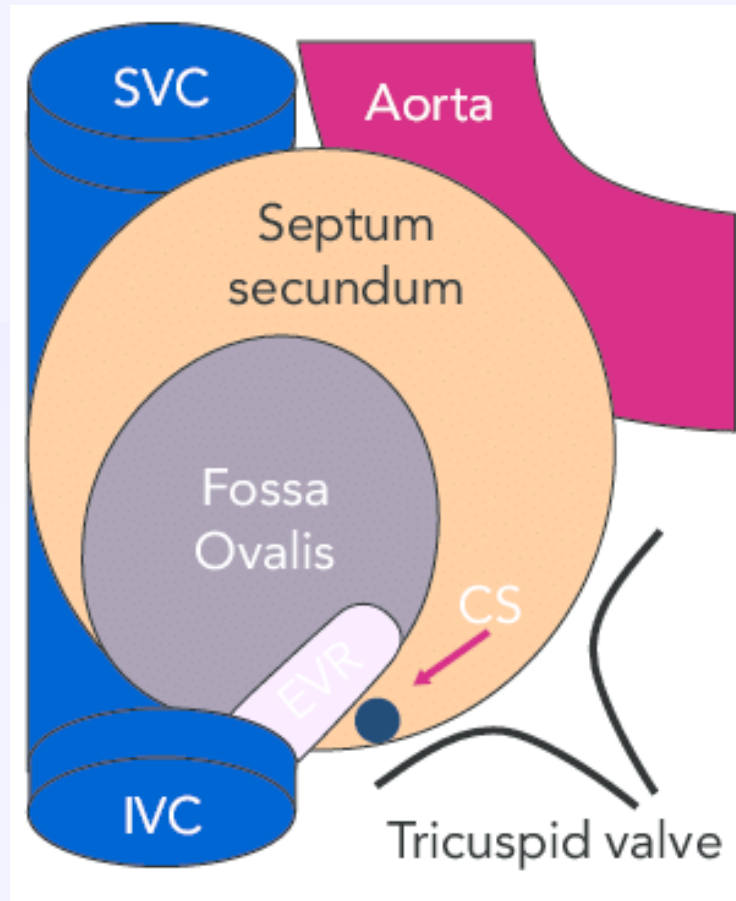


Superior : SVC

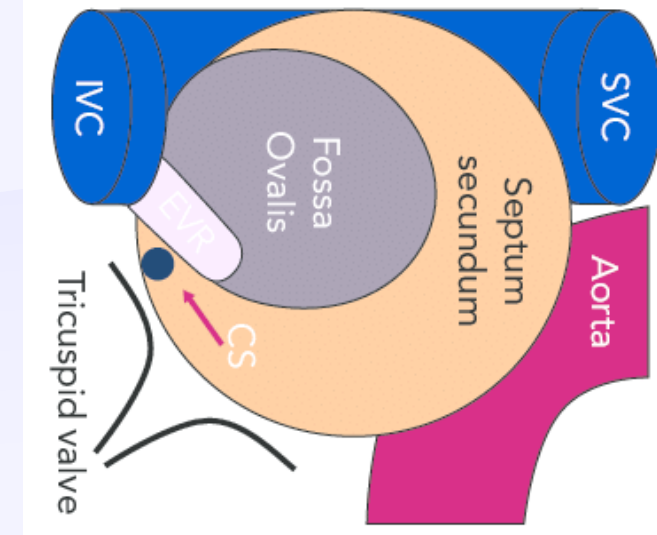
Anterior : Aorta

Inferior : Tricuspid
and mitral valve

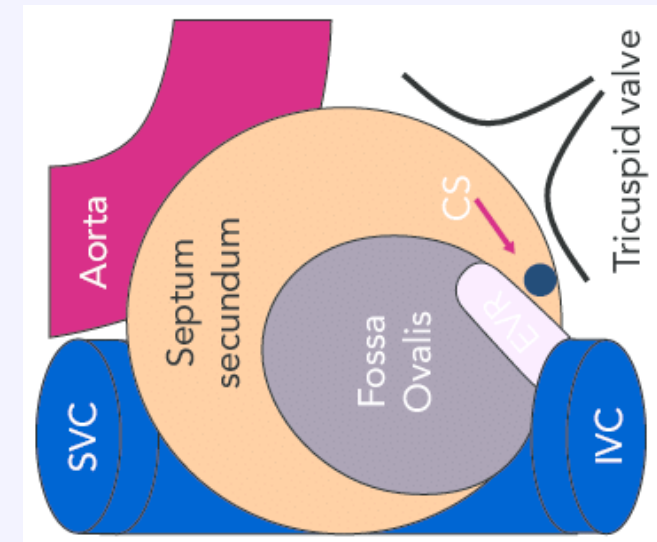
Posterior : IVC, away
from aorta



Diagrammatic illustration of
Interatrial septum (IAS) from
RA side, **fluoroscopic view**

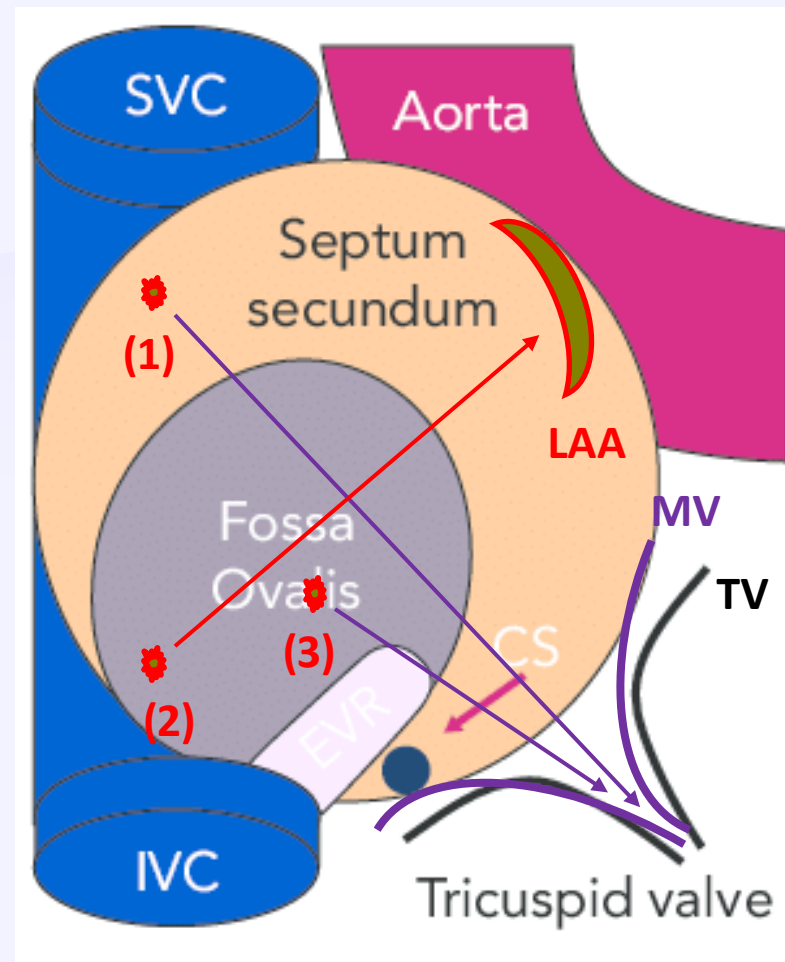


**TEE view,
Bicaval**

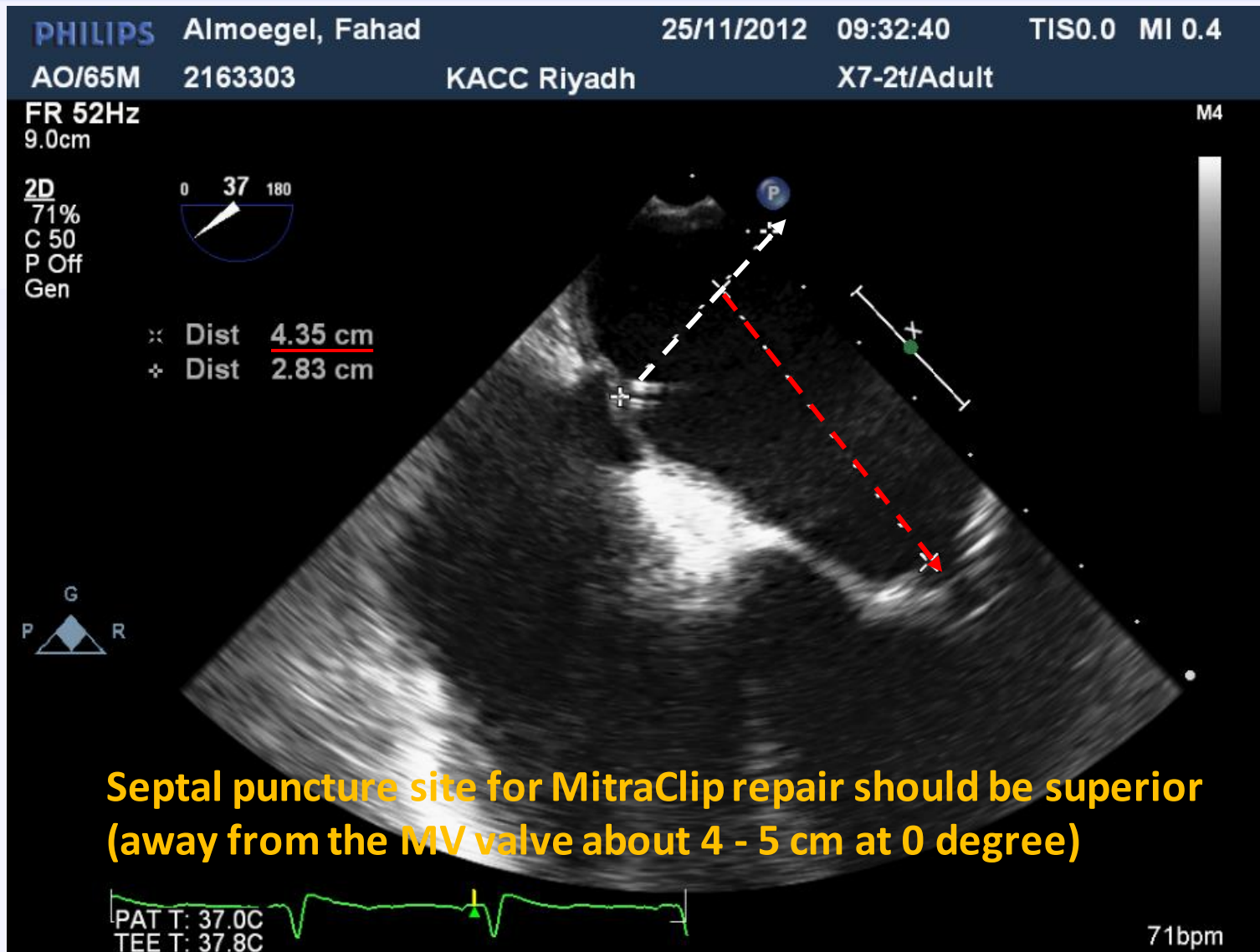


**Surgical
view**

- 1- Septal puncture site for MitraClip repair: Superior and posterior (about 4-5 cm above the mitral valve level and 2.5 cm posterior to the aorta)
- 2- Puncture site for LAA closure: Inferior and posterior of the IAS
- 3- Puncture site for PMBC (PMC): Fossa Ovalis
- 4- Septal puncture site for percutaneous closure of the mitral paravalvular leak: Depends to the location of the leak in 3D TEE map of the mitral annulus



Septal puncture sites for left side interventions



2013/03/27 06:20:04PM
NYU LANGONE 03H

VR 8Hz 110 180
4cm

Live 3D
3D 43%
3D 38dB

SVC

RUPV

AV

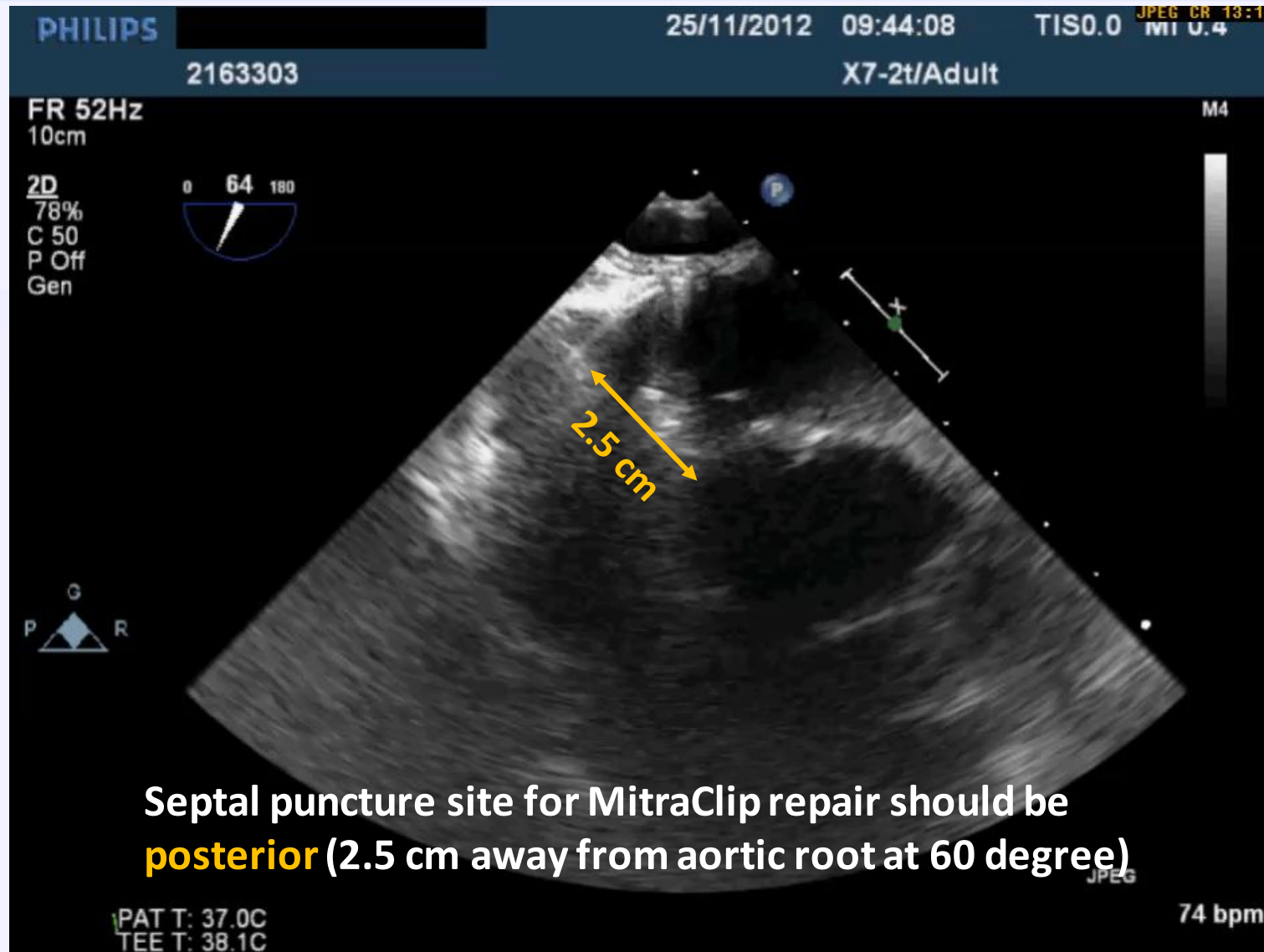
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Left Atrial Aspect
of Atrial Septum

**3D TEE zoom view of the atrial septal tenting during
septal puncture, from LA perspective**

PHILIPS

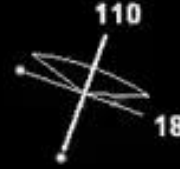
70 bpm



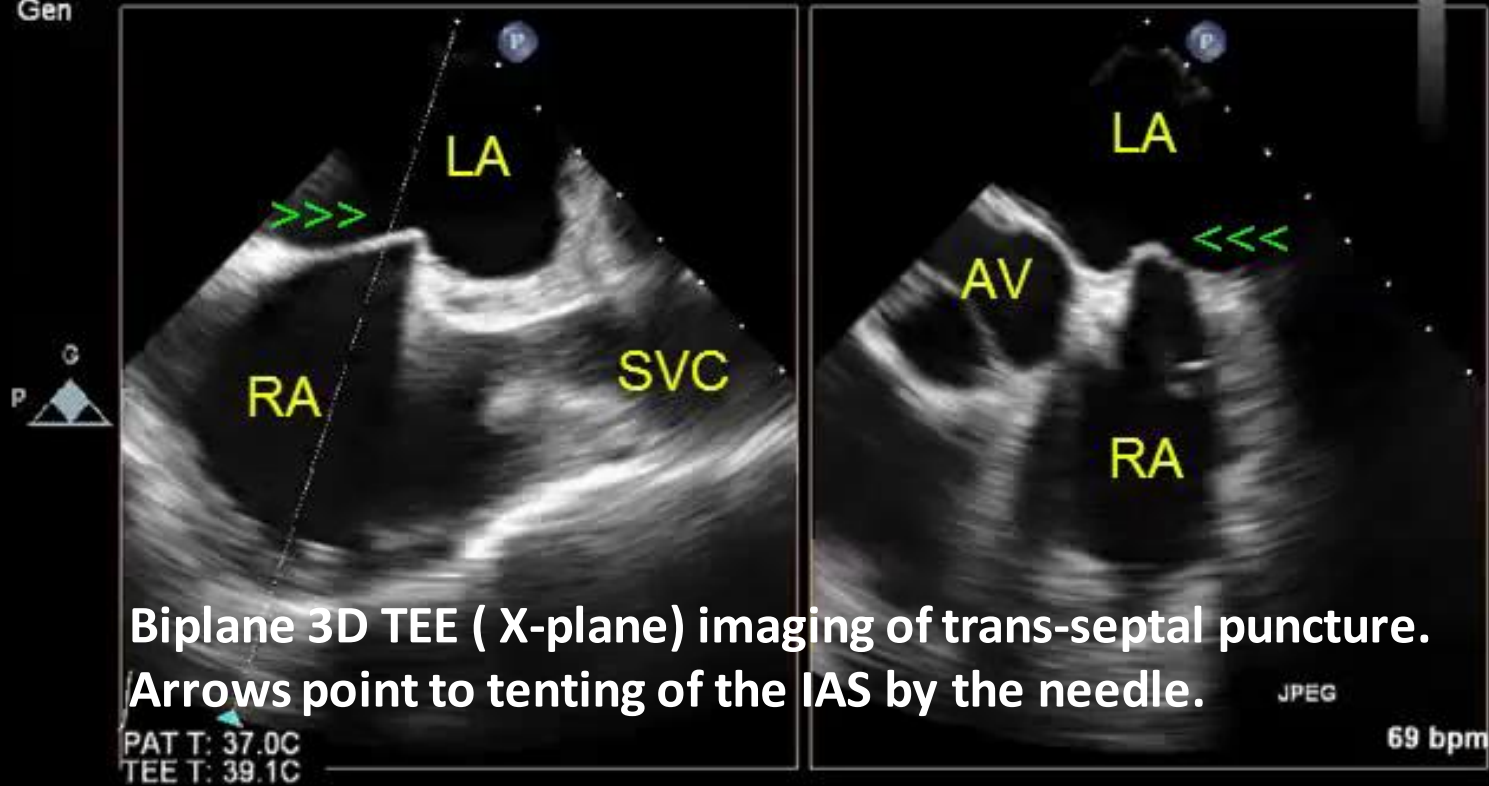
Septal puncture site for MitraClip repair should be **posterior** (2.5 cm away from aortic root at 60 degree)

FR 29Hz
12cm

xPlane
65%
65%
50dB
P Off
Gen



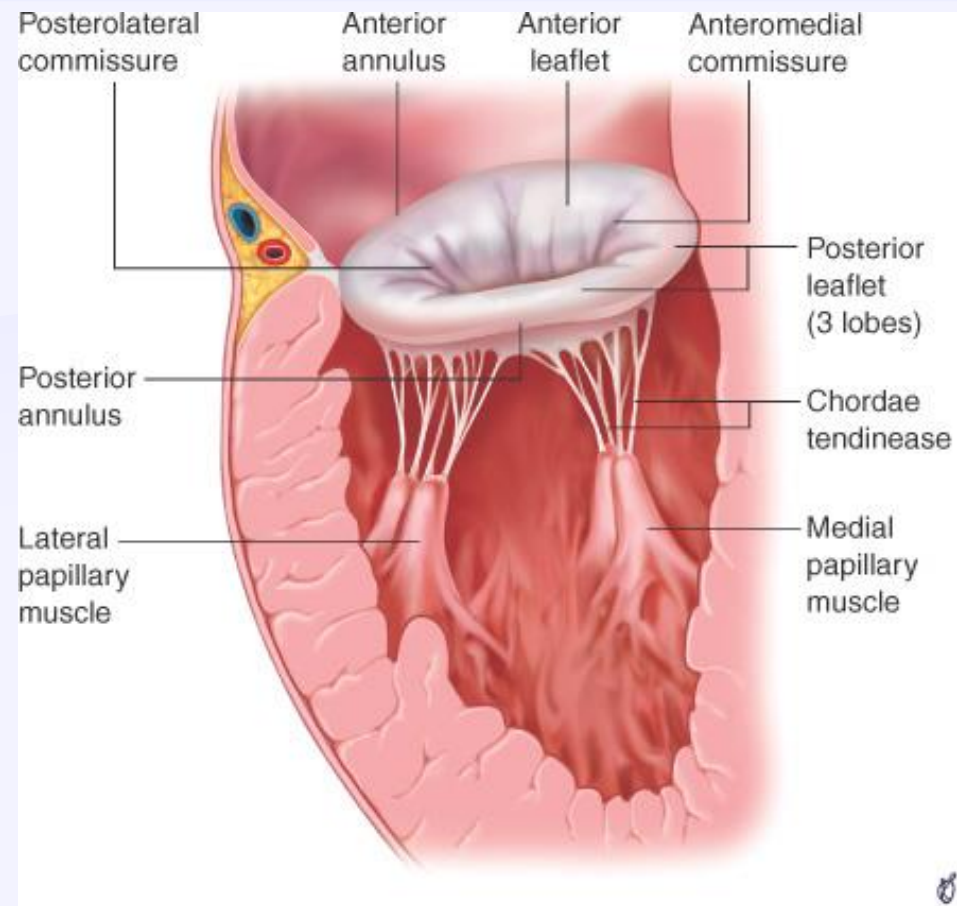
M4



**Biplane 3D TEE (X-plane) imaging of trans-septal puncture.
Arrows point to tenting of the IAS by the needle.**

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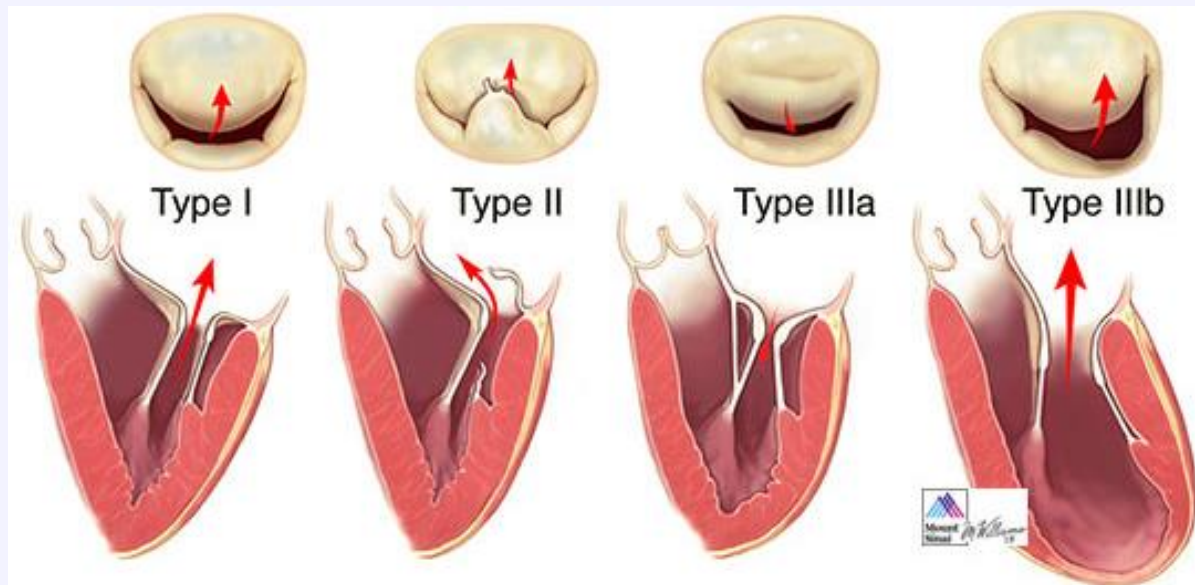
Normal MV from posterior view. Annulus, leaflets and subvalvular apparatus (chordae and papillary muscles)

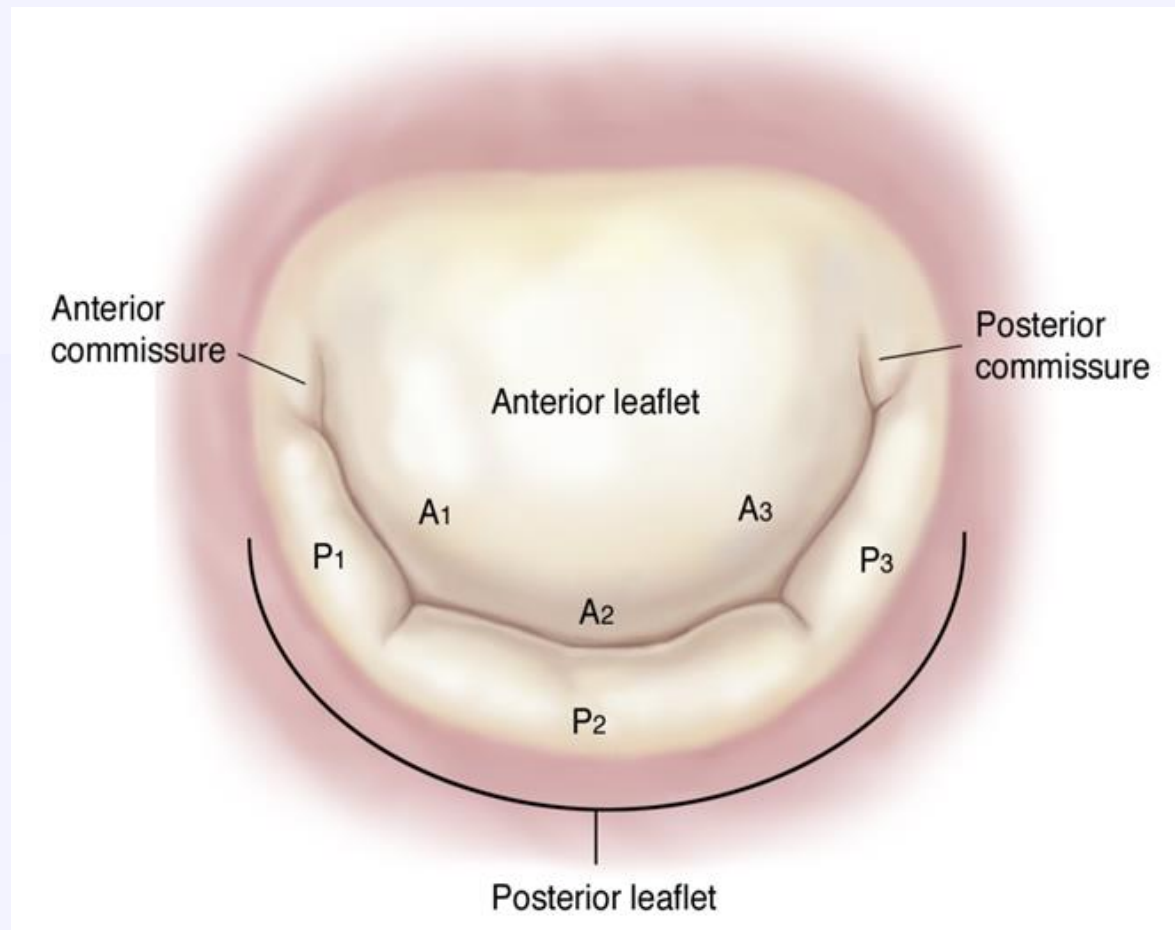


Carpentier's "Functional Classification"

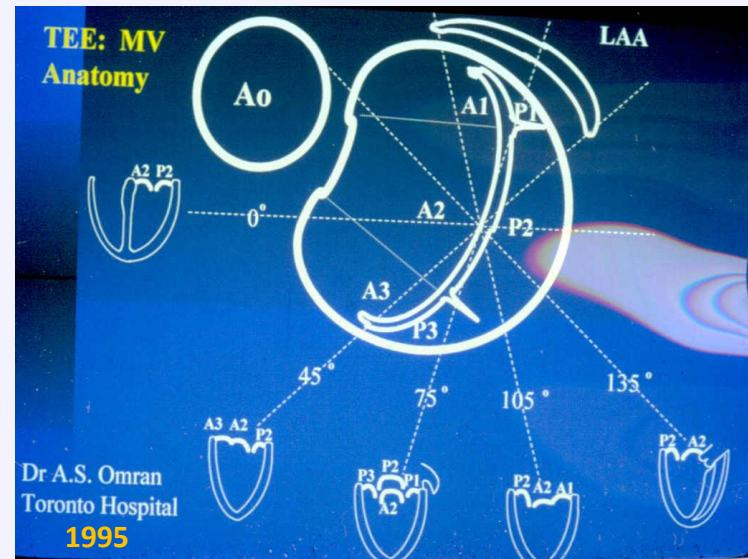
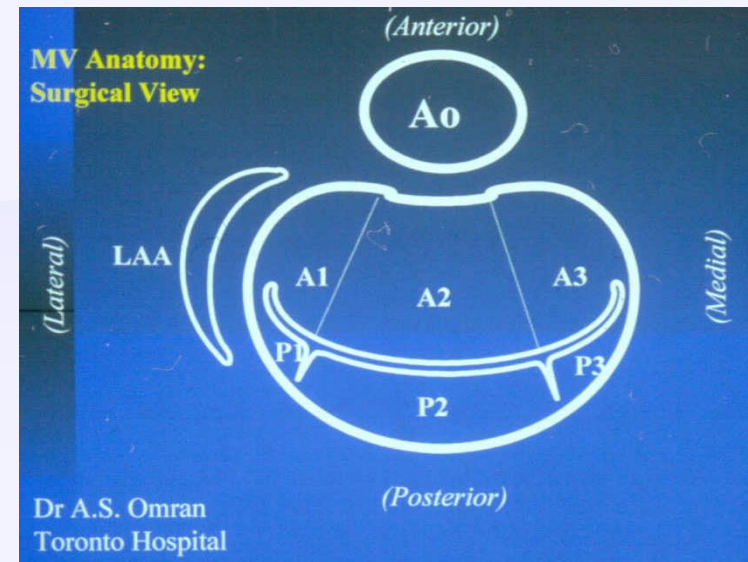
Type I	Normal leaflet motion
Type II	Excess leaflet motion (leaflet prolapse)
Type III	Restricted leaflet motion
IIIa	Restricted opening
IIIb	Restricted closure

J Thorac Cardiovasc Surg. 1983 Sep;86(3):32
 37. Cardiac valve surgery--the "French correction". Carpentier A



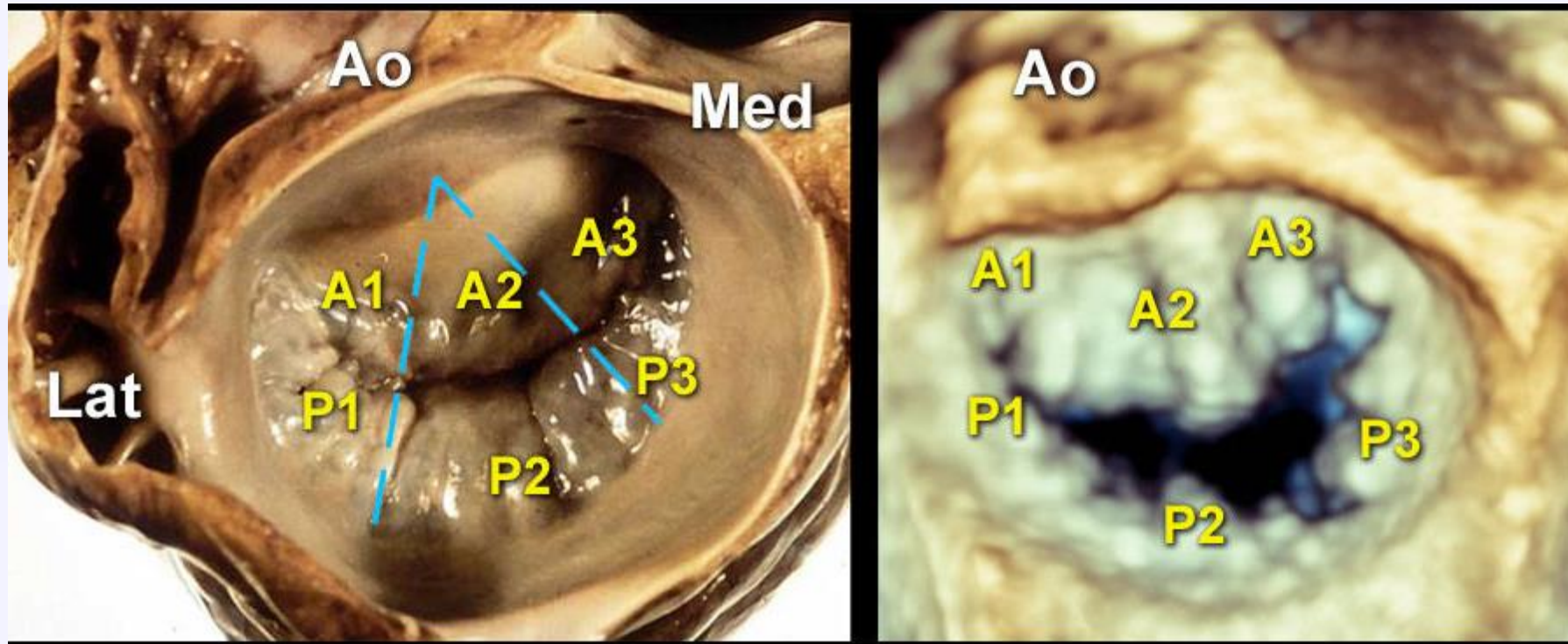


**Carpentier's anatomic classification of the MV
(segmental classification)**

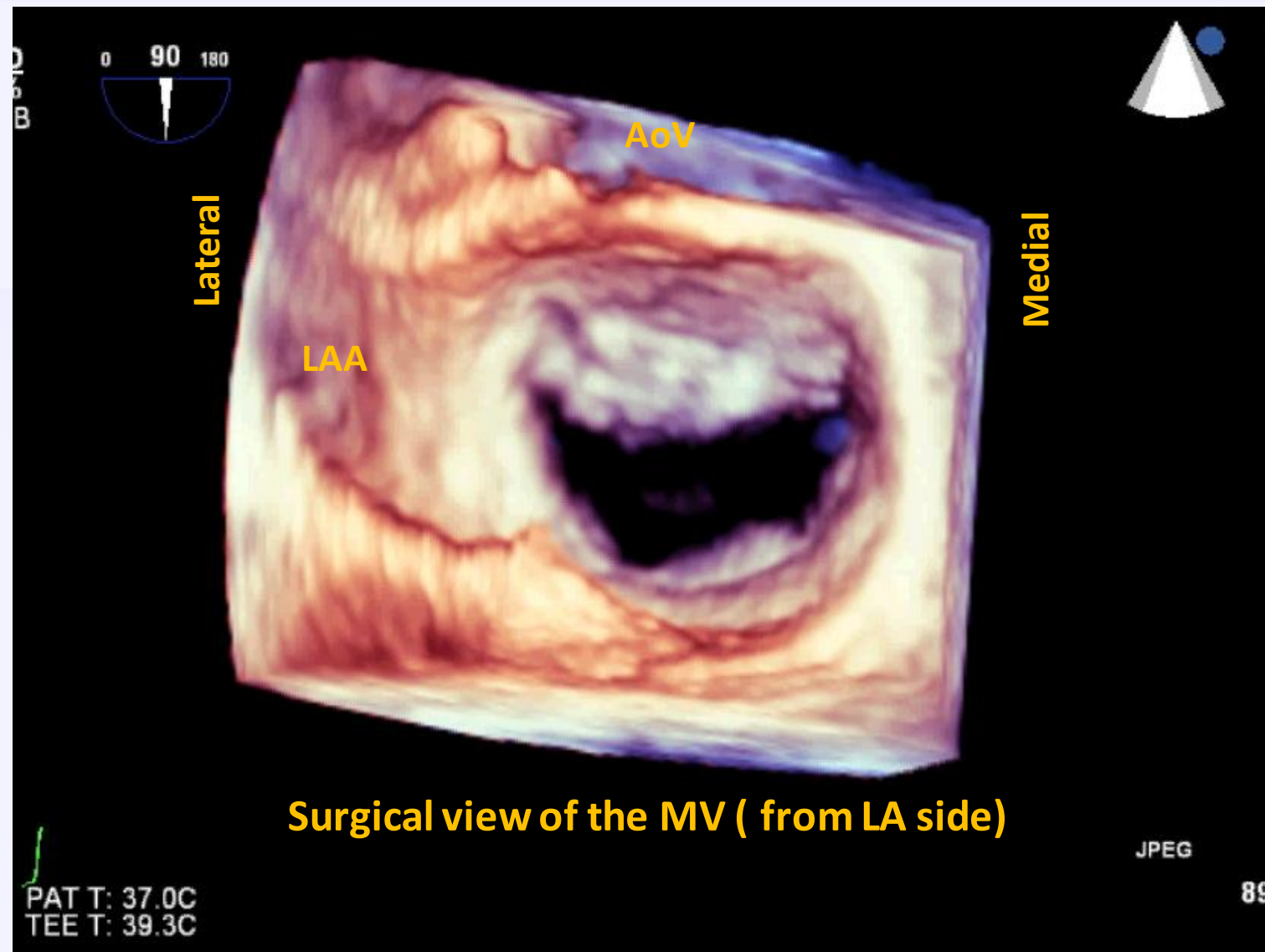


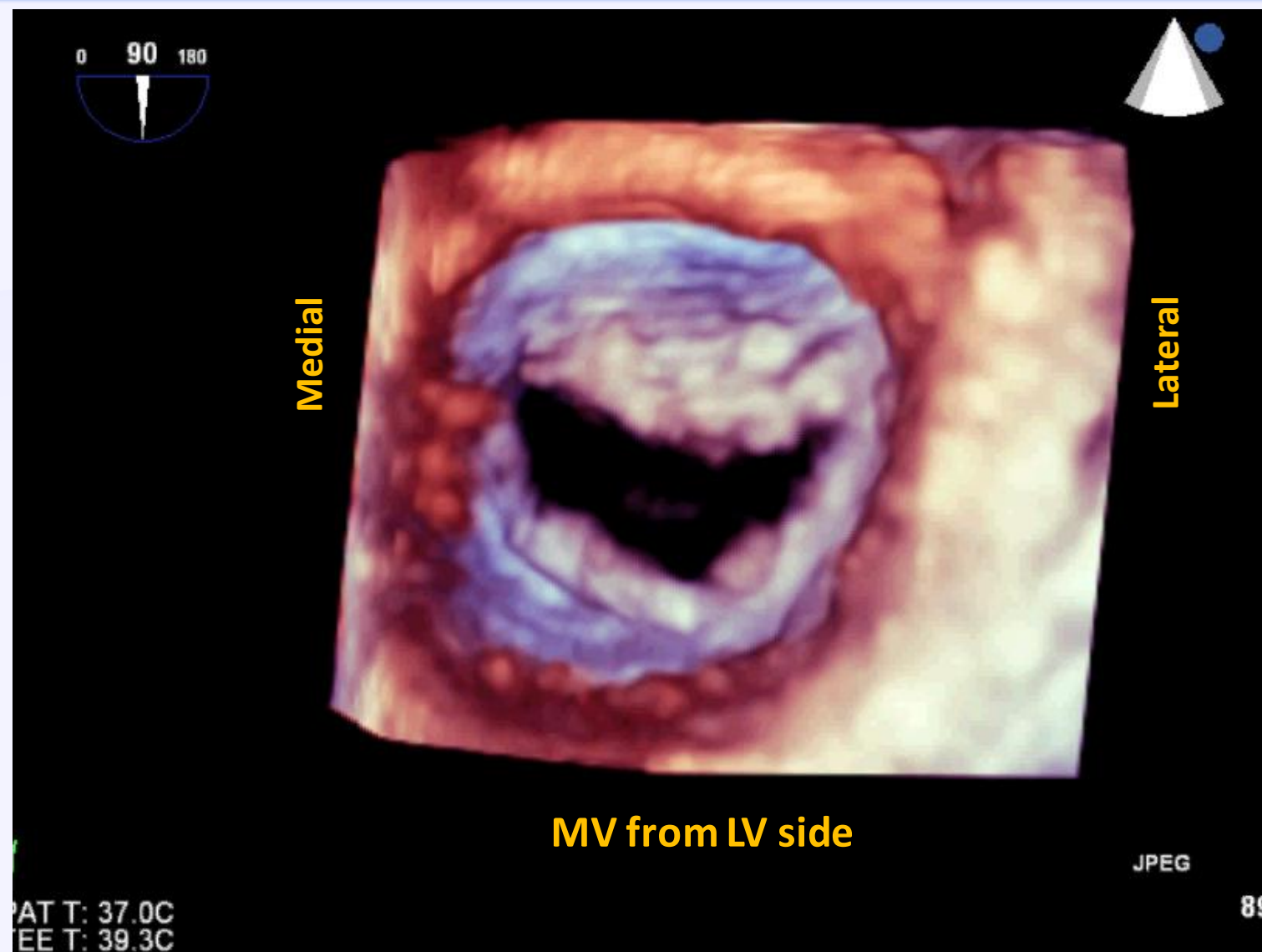
Etiology of mitral valve regurgitation

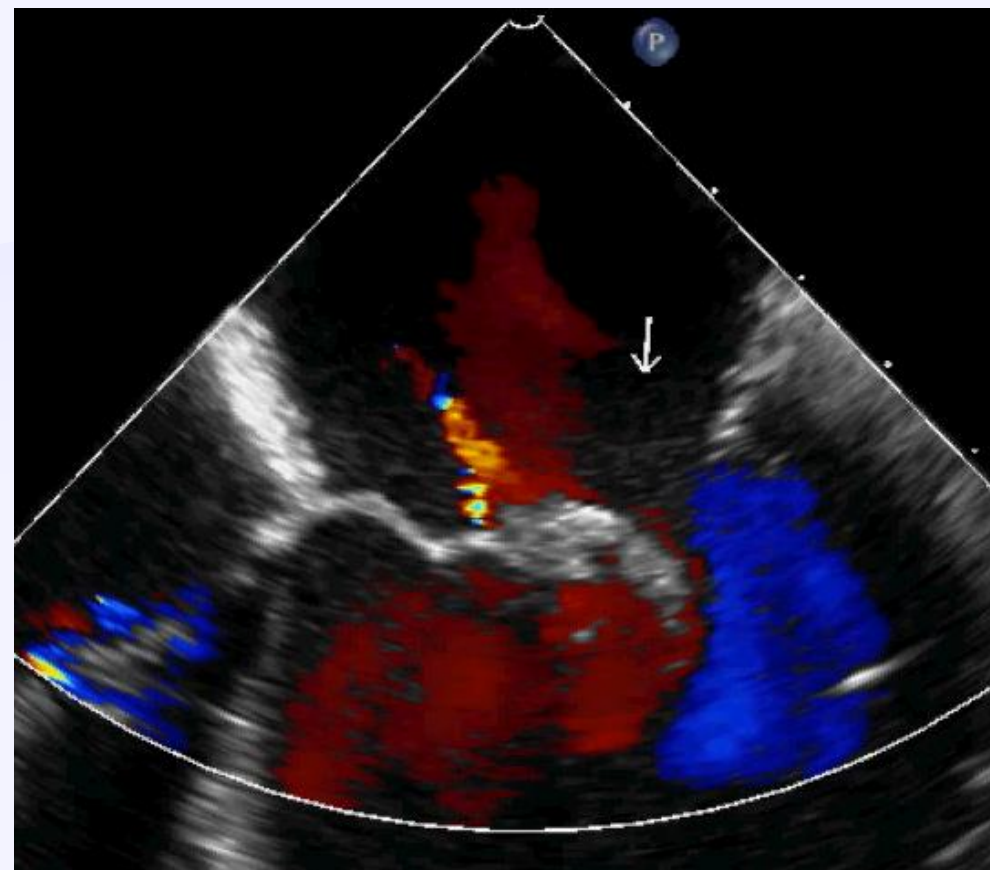
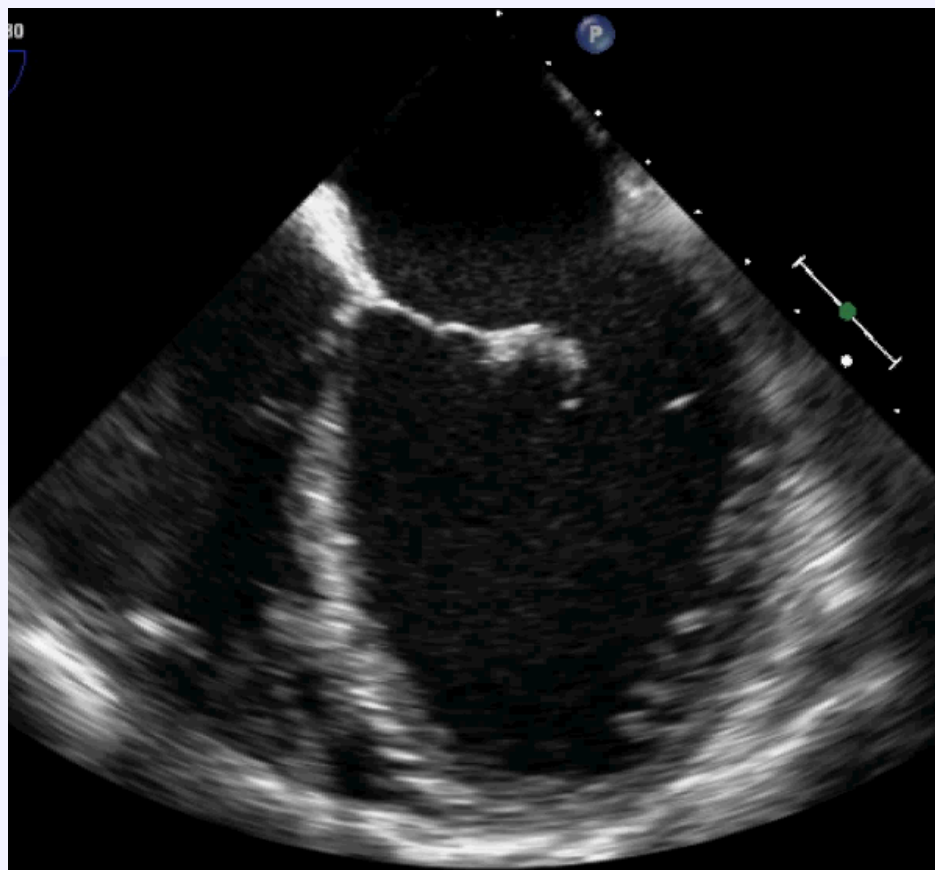
1. Degenerative mitral valve disease
2. Rheumatic heart disease
3. Ischemic heart disease
4. Infective endocarditis
5. Cardiomyopathies
6. Congenital heart disease (cleft mitral valve, arcade....)
7. Collagen vascular disease (SLE, other valvulitis)



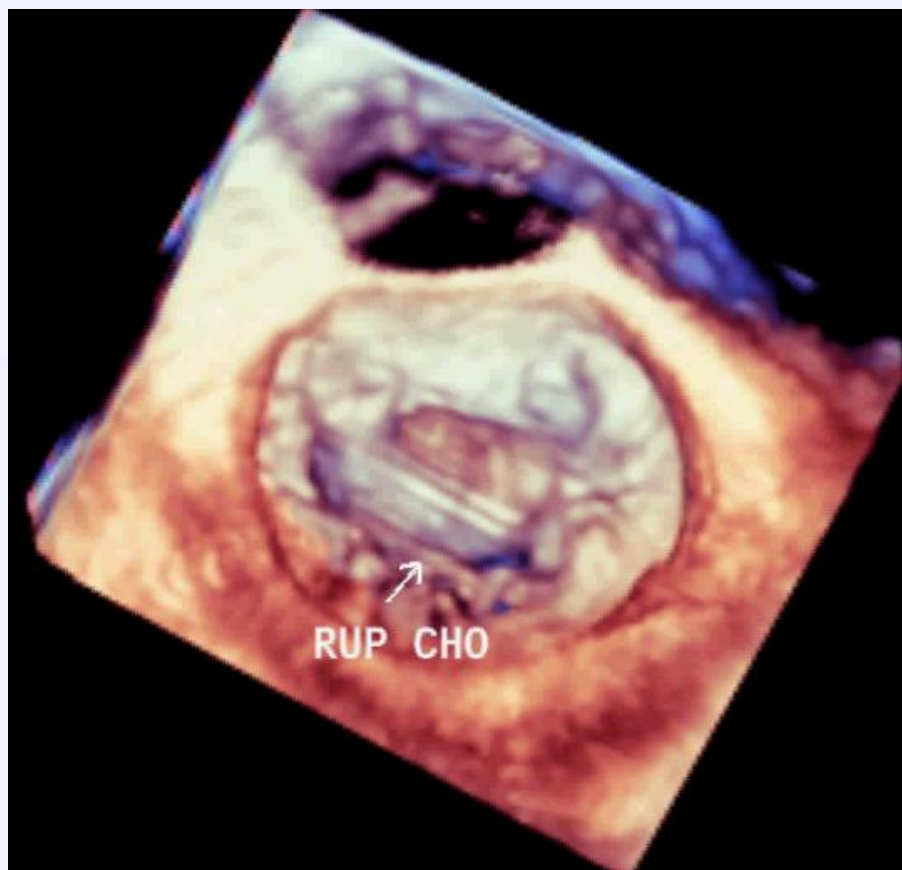
Surgeon's view of the mitral valve (en-face view from LA)



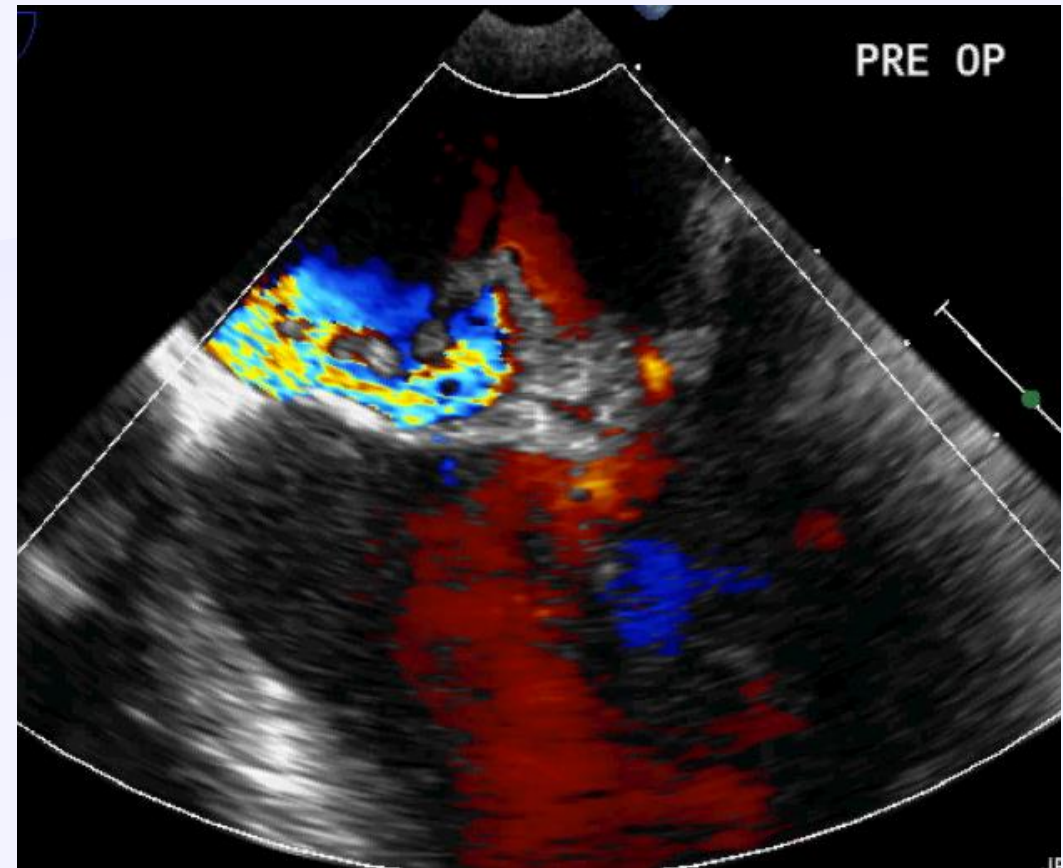
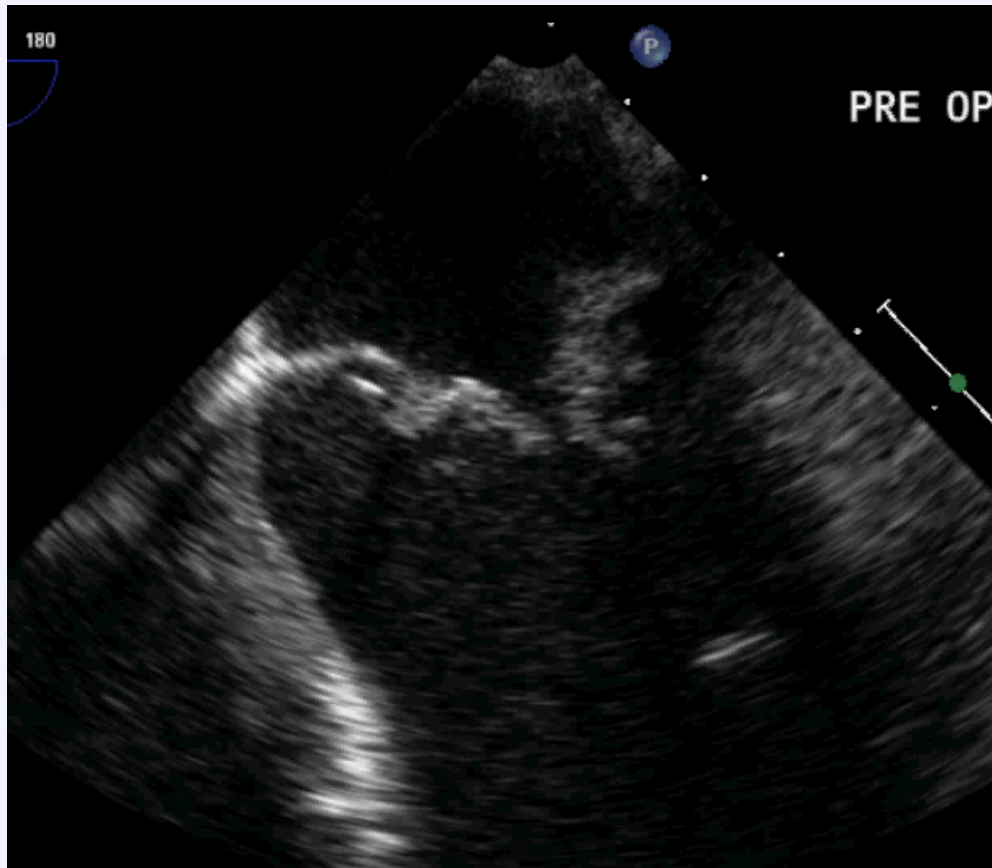




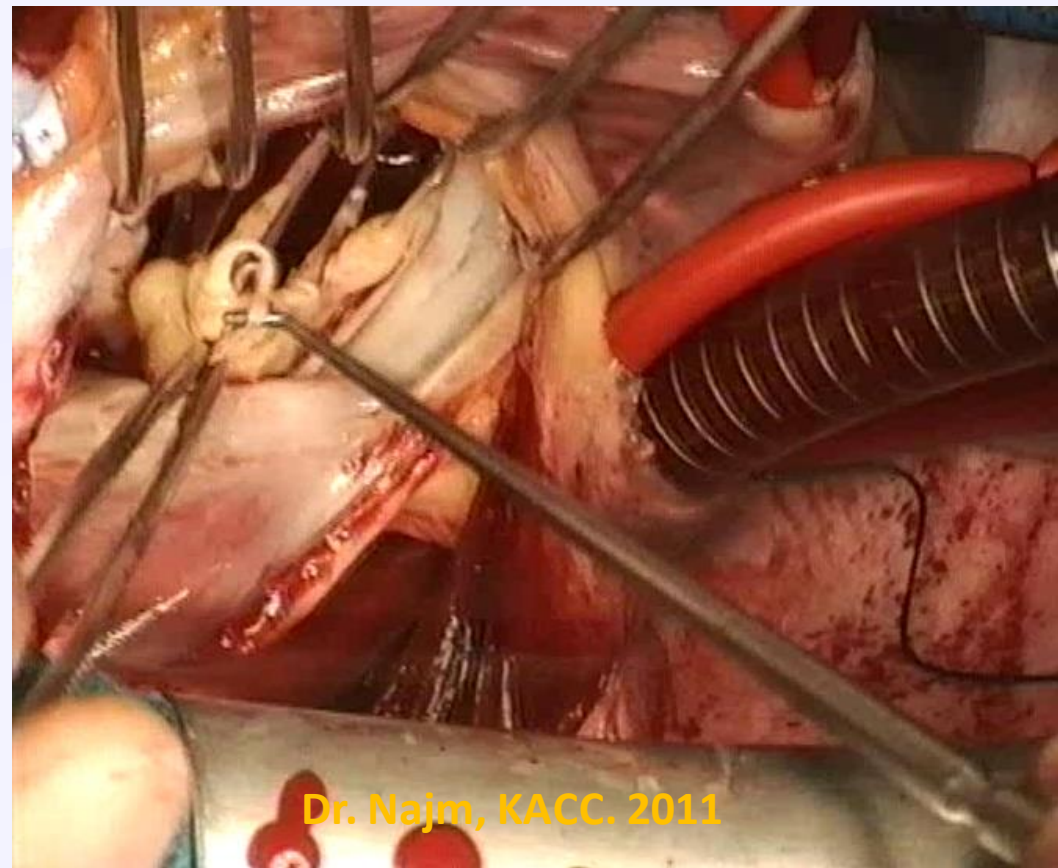
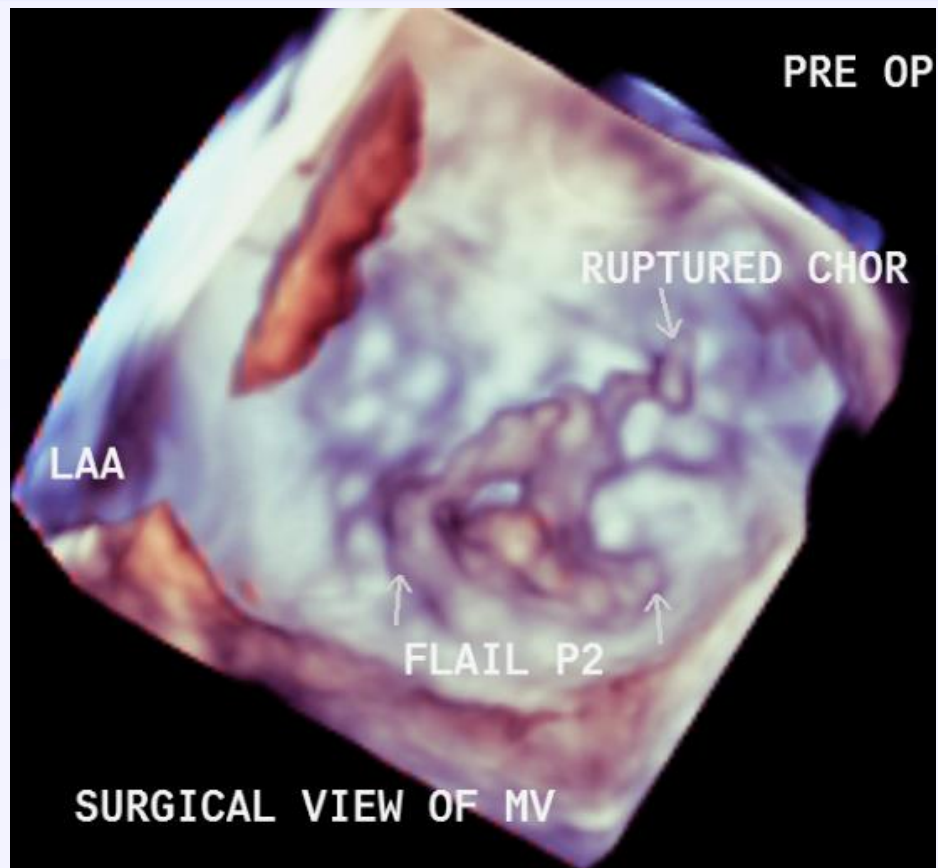
Flail anterior mitral leaflets, severe posteriorly directed jet of MR

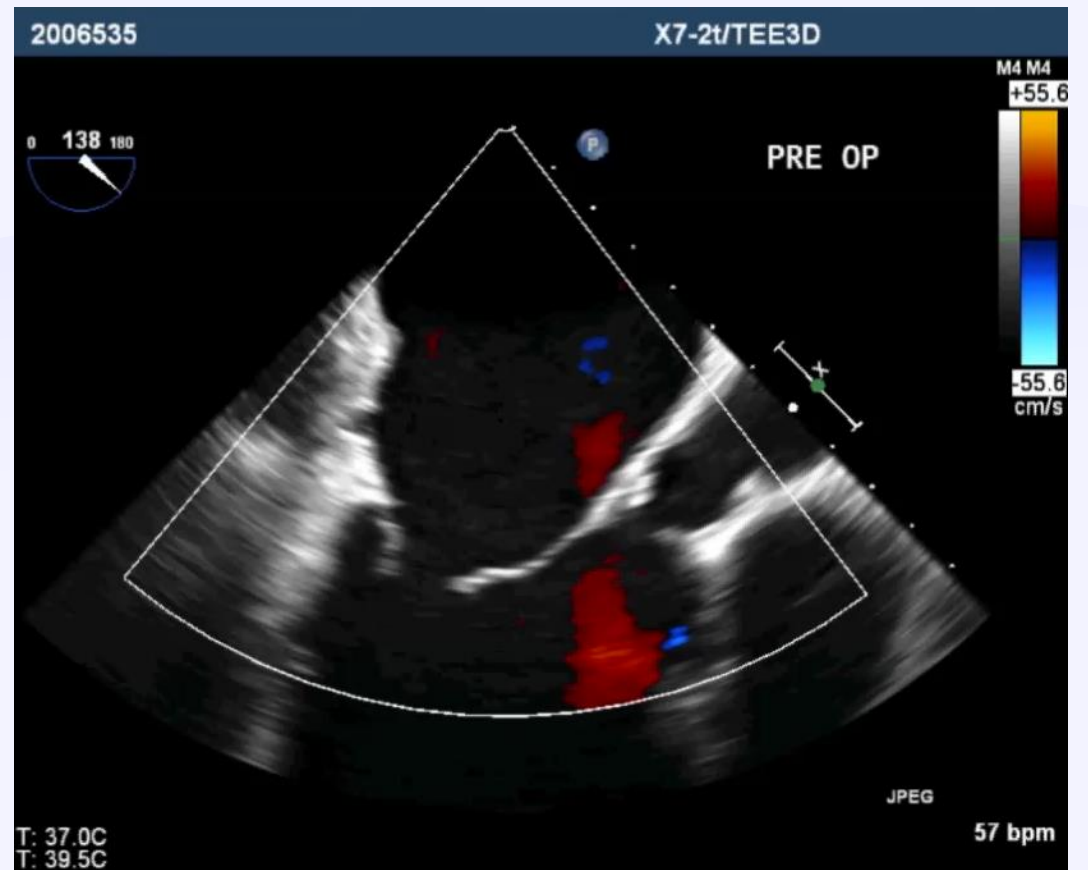
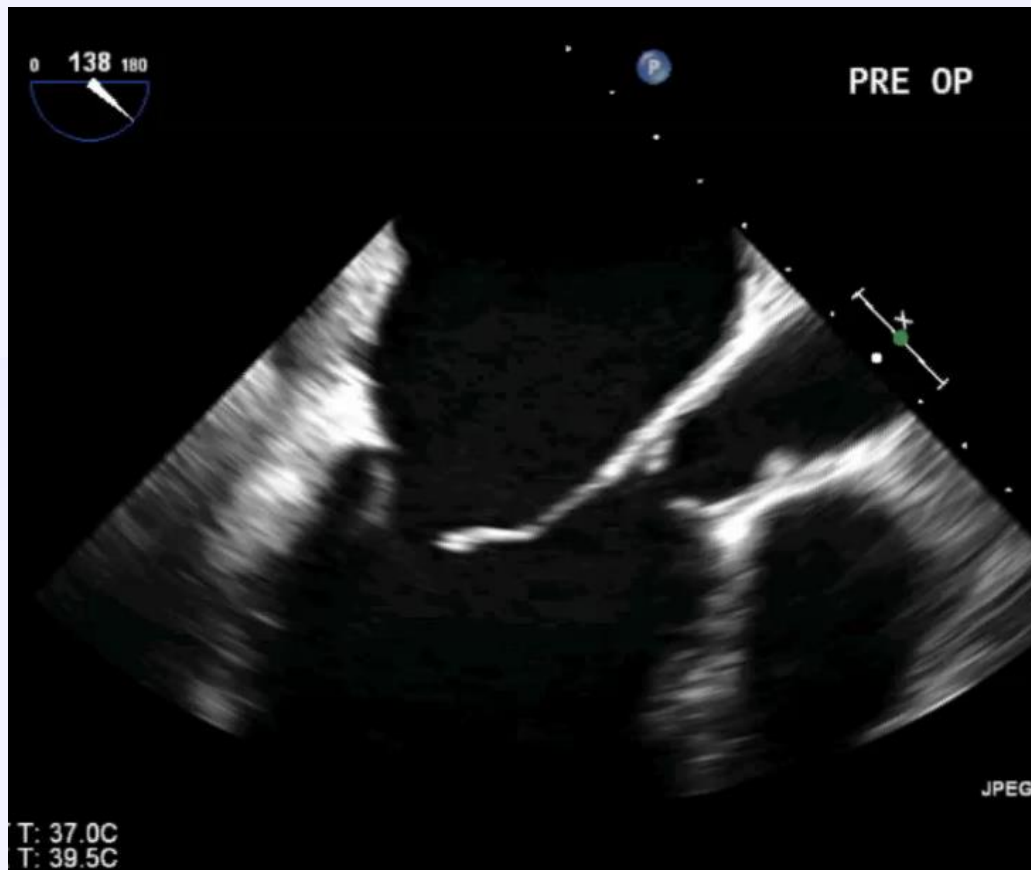


Dr. Najm, KACC. 2011



Flail posterior mitral leaflet, severe anteriorly directed jet of MR





Severe tethering of the posterior leaflet, severe ischemic MR (FMR, secondary MR)

2006535

X7-2t/TEE3D

Hz

3D Beats 1

M4

%
dB



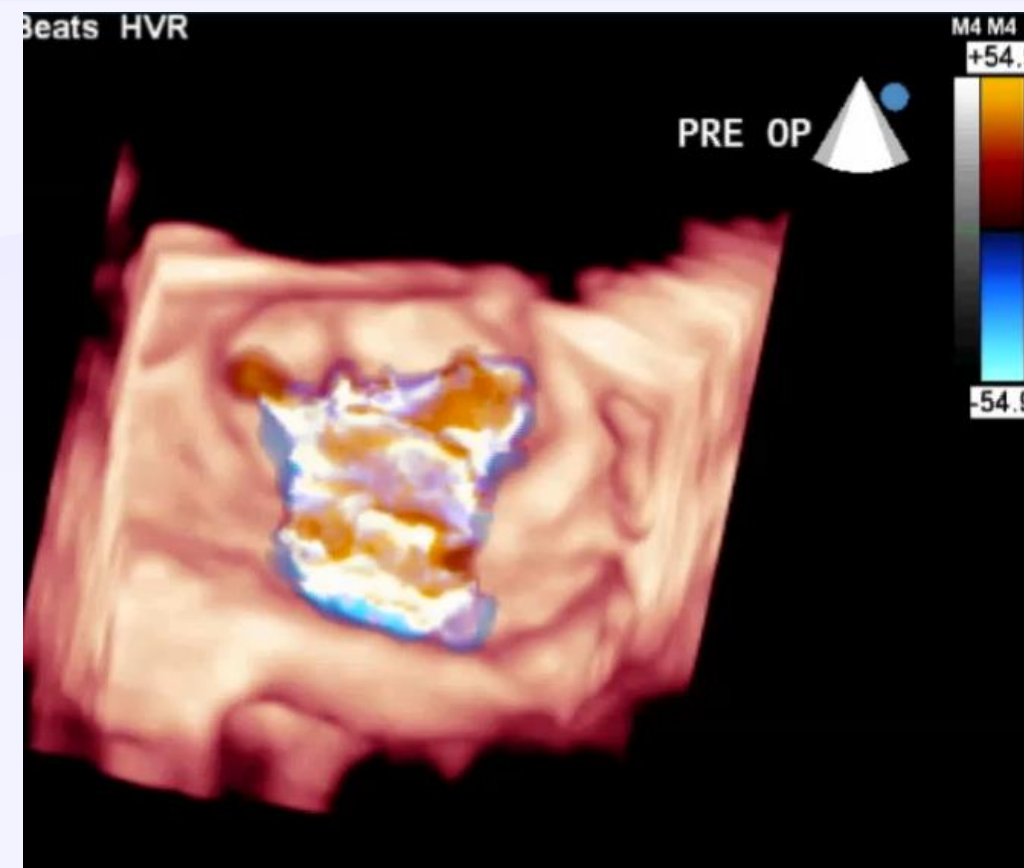
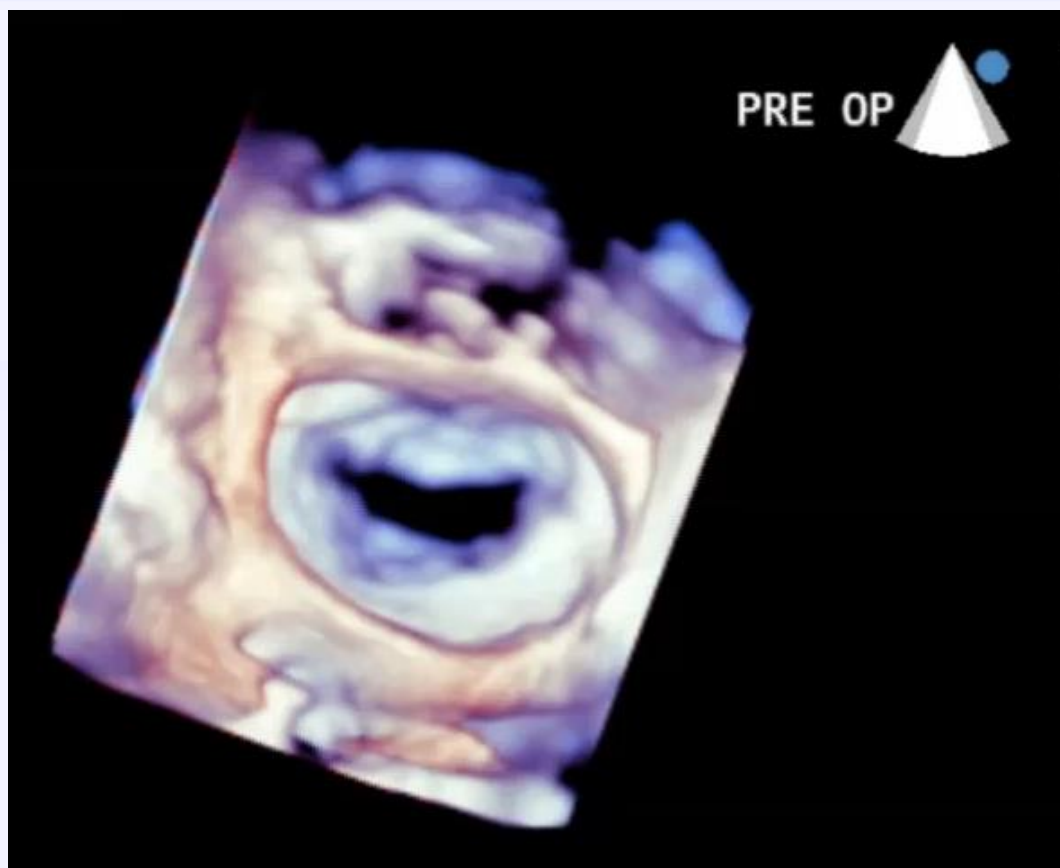
PRE OP

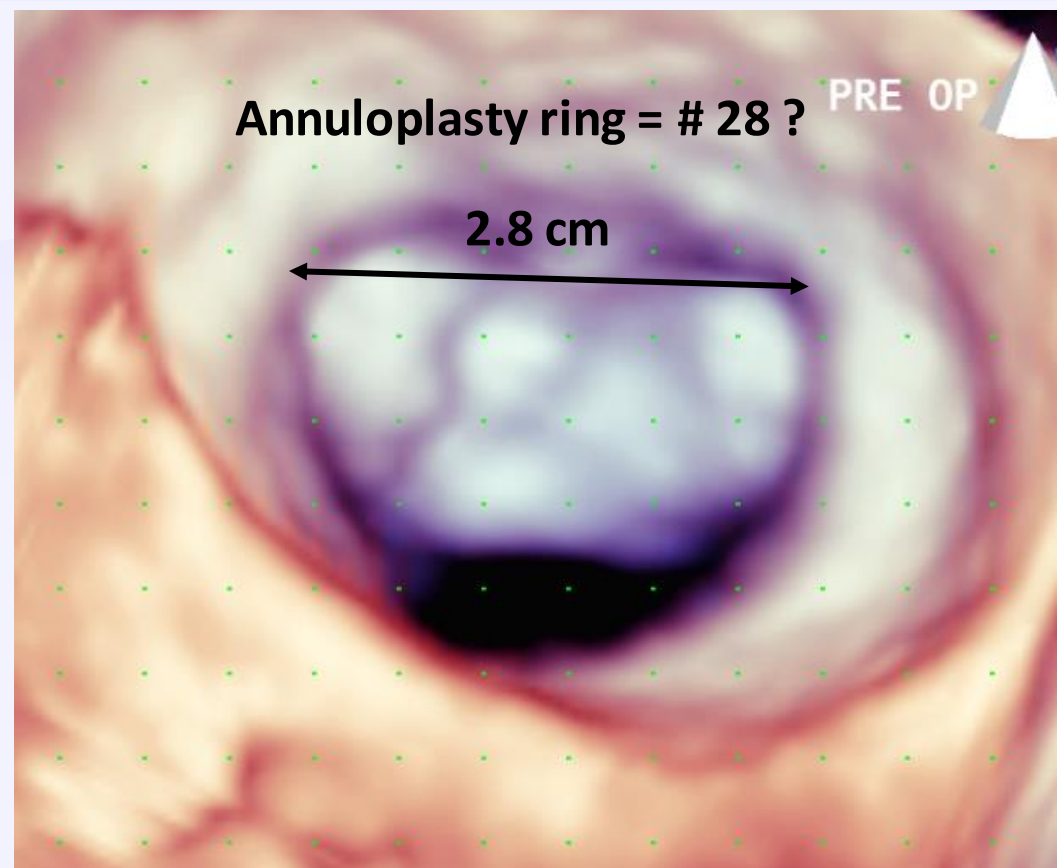
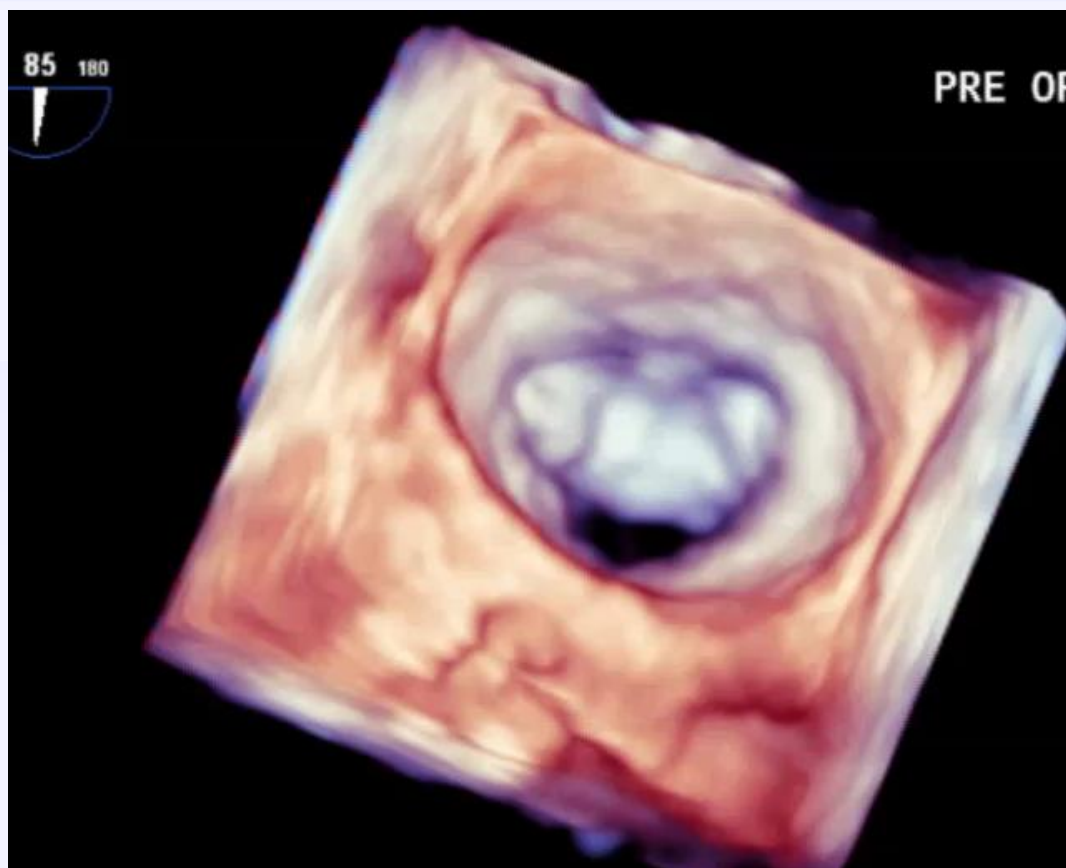


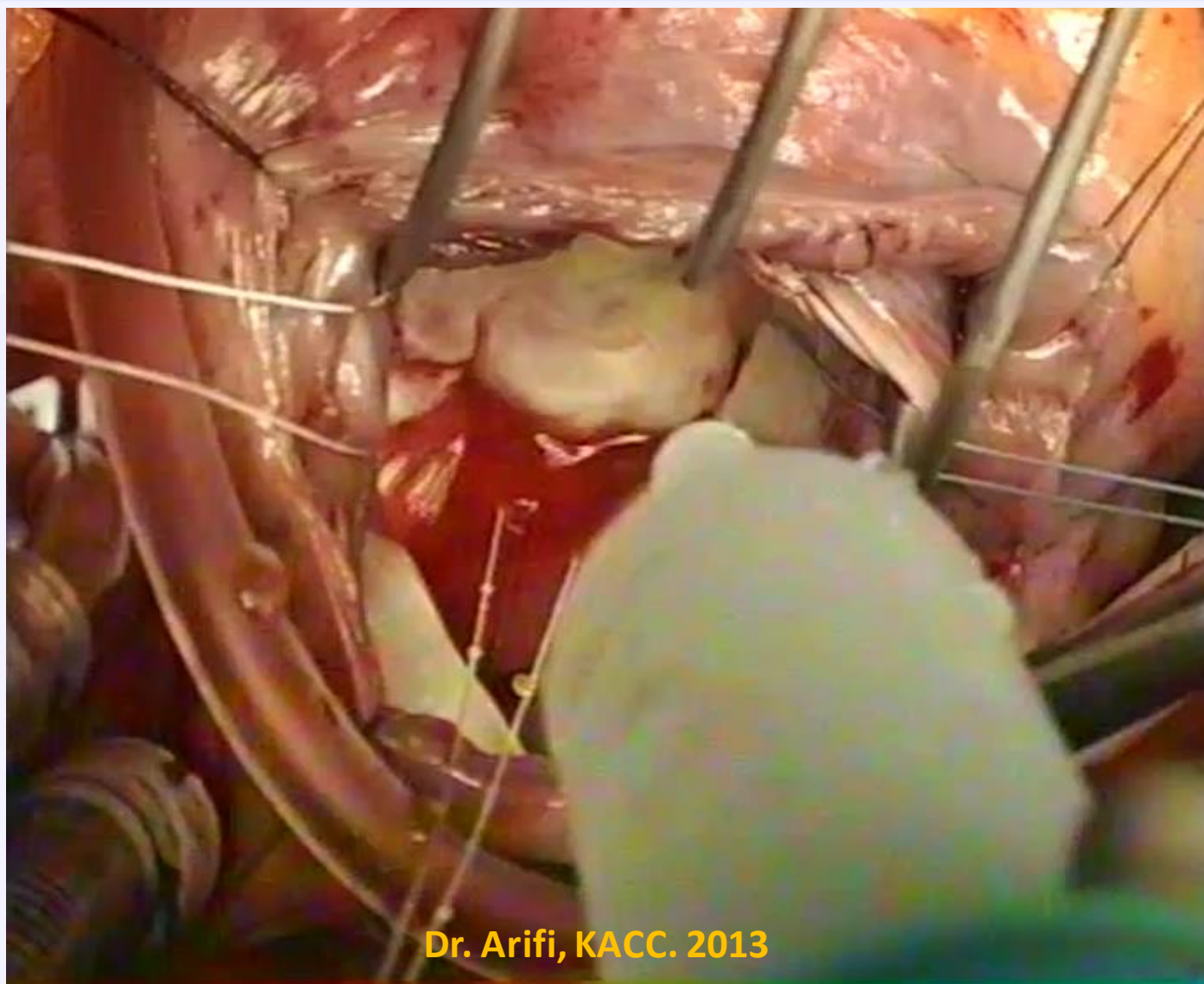
JPEG

PAT T: 37.0C
TEE T: 39.6C

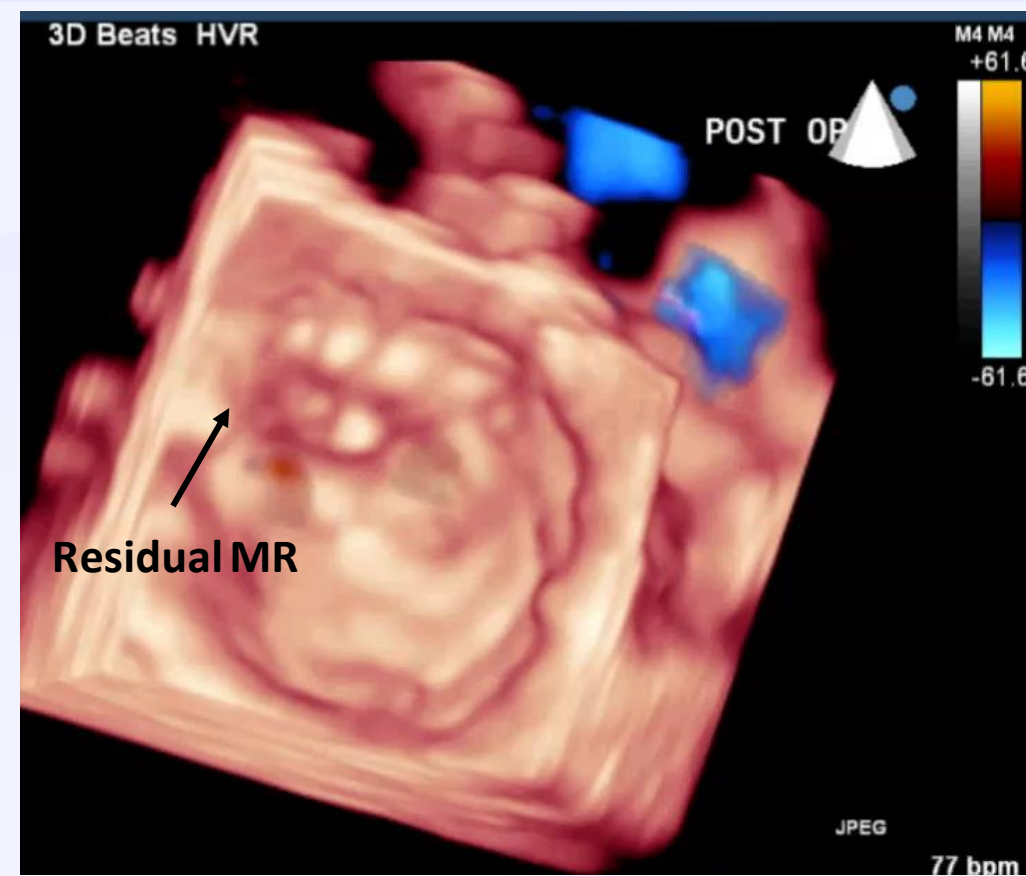
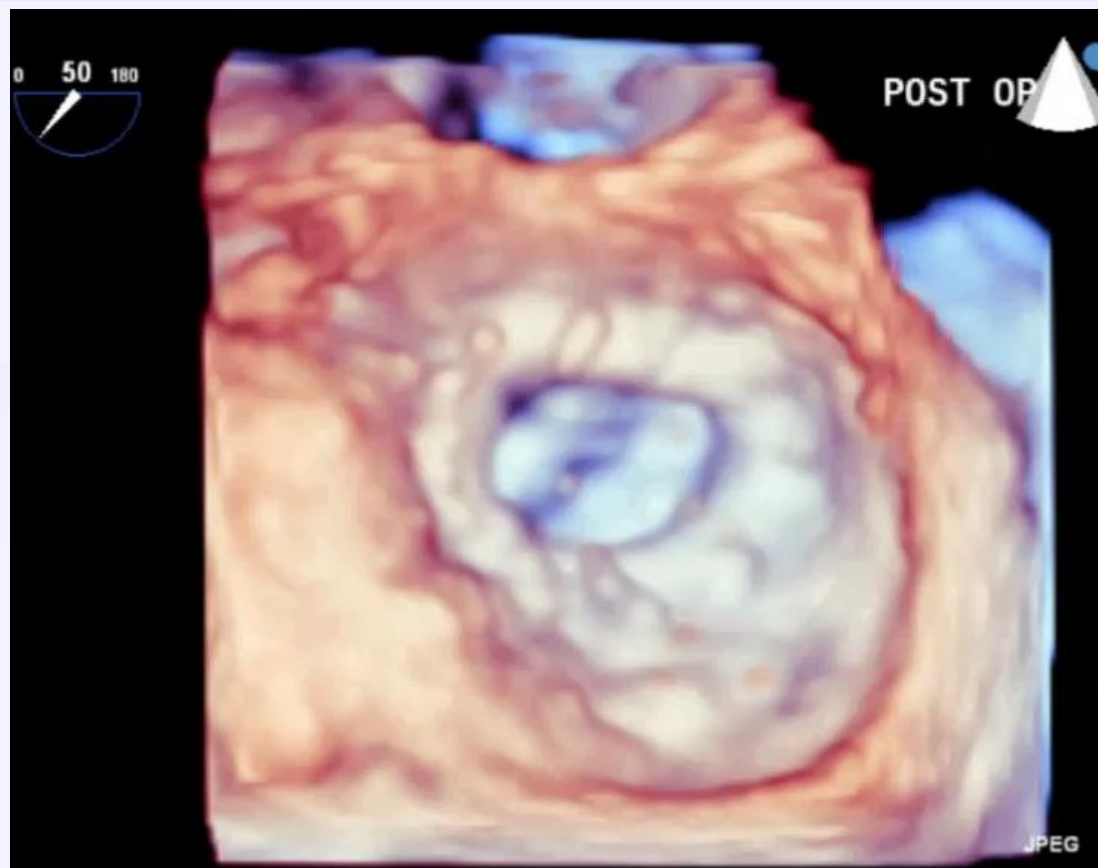
56 bpm



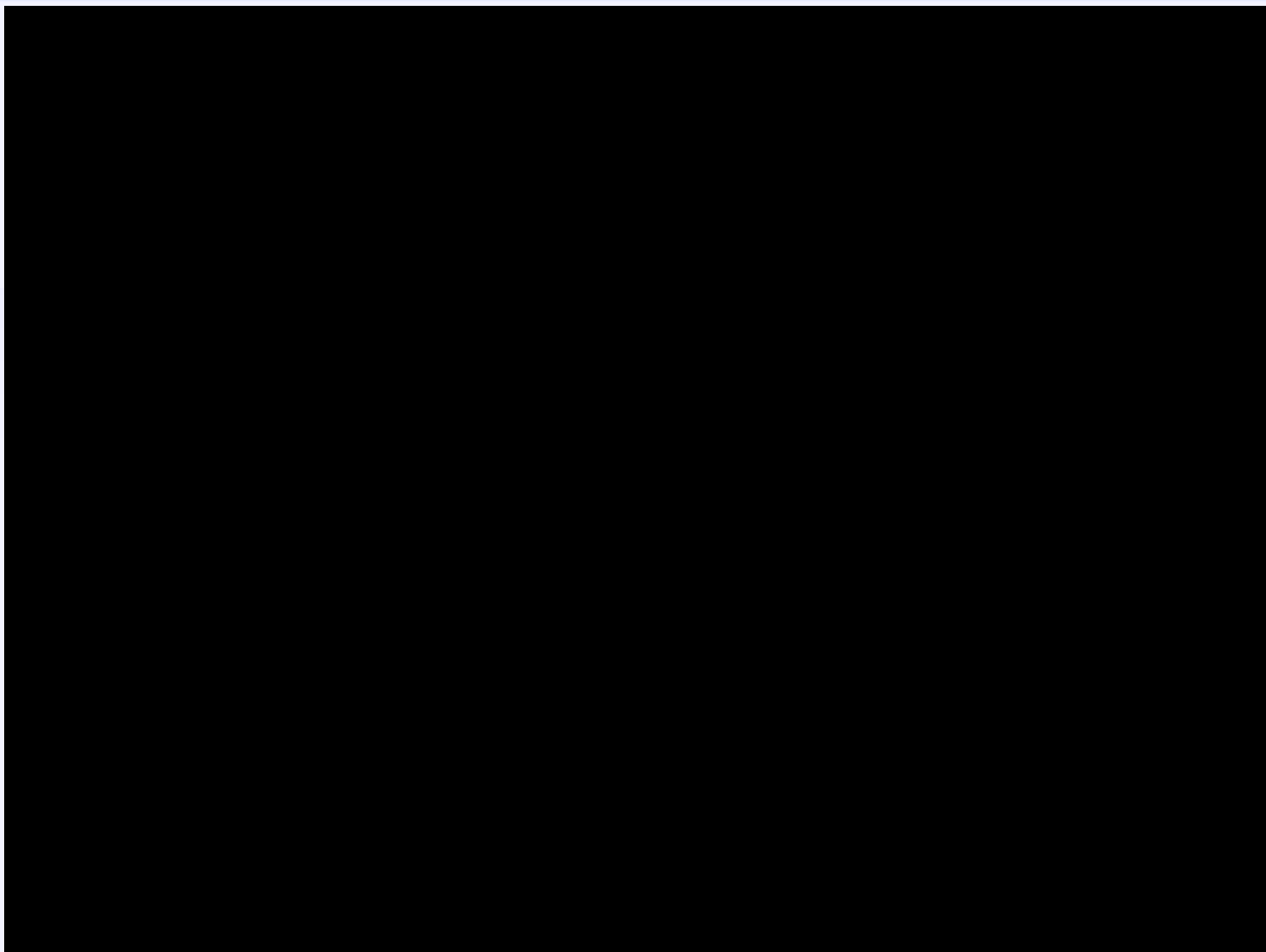




Dr. Arifi, KACC. 2013



MitraClip repair

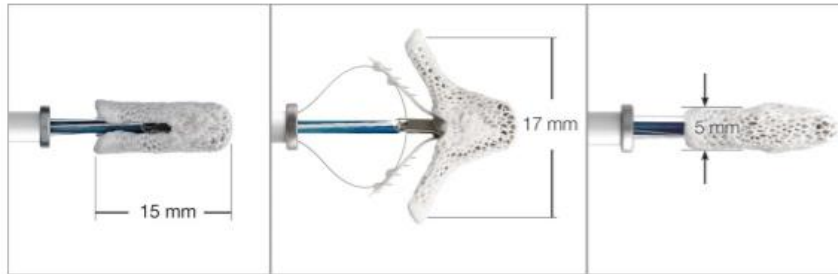


The MitraClip System

■ The first of its kind percutaneous mitral valve repair solution

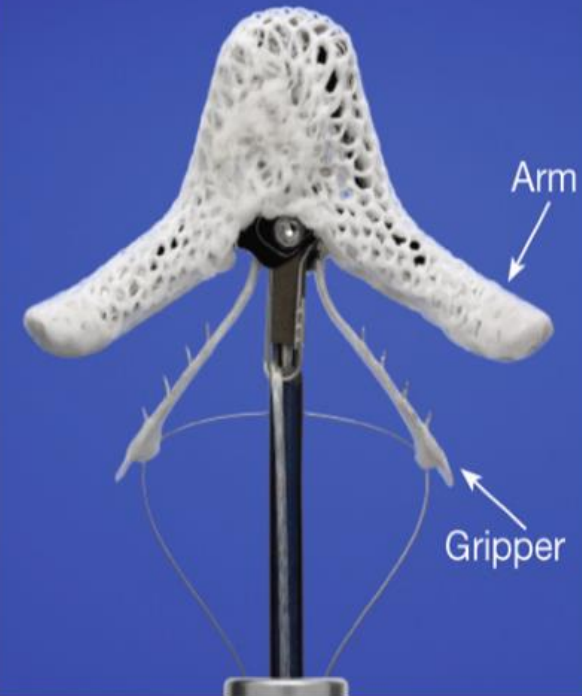


System Components



- Made of **cobalt chromium**.
- Covered by **Polyester** to promote healing.
- MRI Safe to 3 Tesla.
- Surgically removable when required.

MitraClip Device



MitraClip Inclusion & Exclusion Criteria.

Inclusion:

- High risk for surgery.
- Moderate to severe MR.

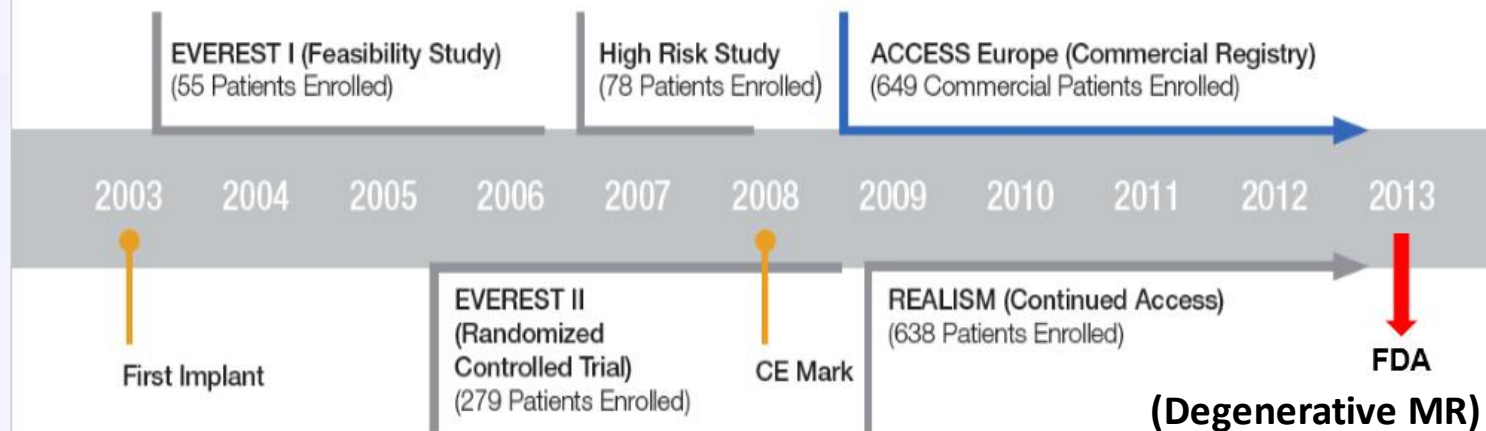
Disease Related – Exclusion Criteria.

- Rheumatic Heart Disease.
- Barlow's Disease.
- Endocarditis.
- Leaflets Perforations.
- Intracardiac Thrombus or Mass.
- Mitral valve reconstruction leaflet surgery or annuloplasty ring.

Procedure Related – Exclusion Criteria.

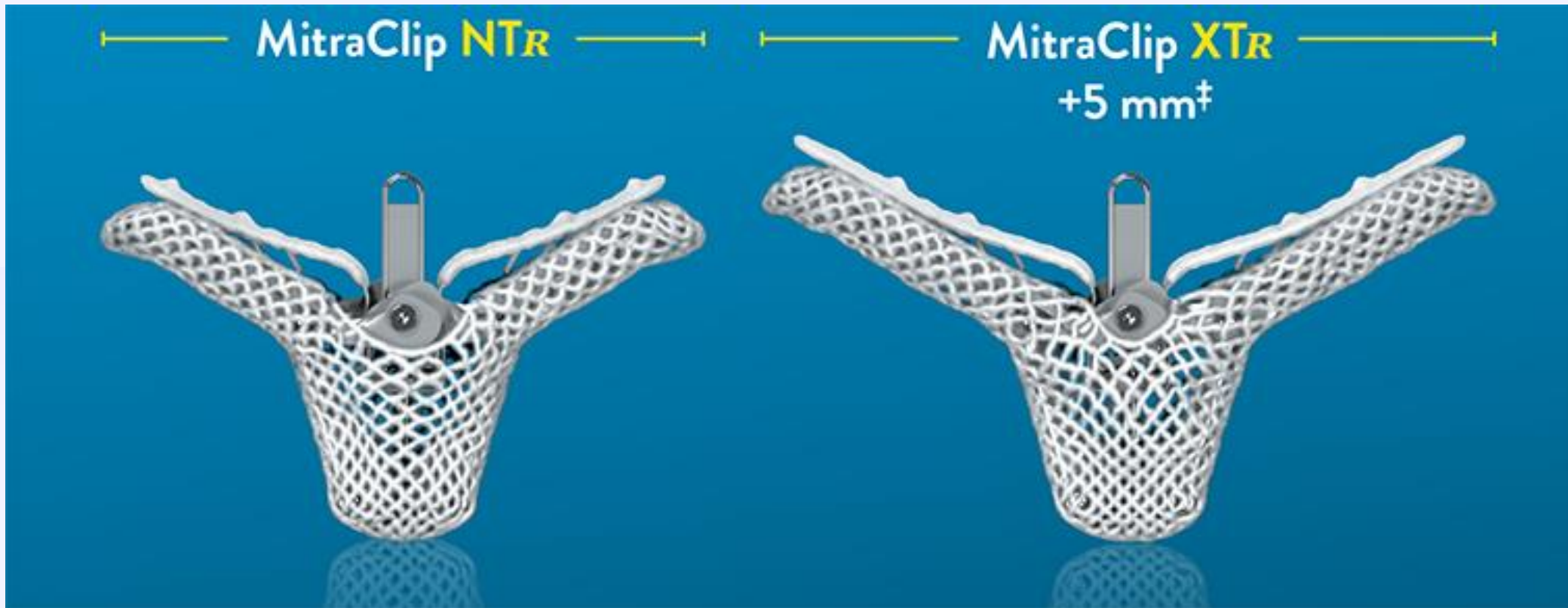
- Short Posterior leaflet < 8mm.
- Severe restriction in the posterior leaflet.
- Severe Calcifications on the grasping area of the leaflets.
- Severe annular Calcifications.
- Cleft (Only to see in the 3D echo).
- Mitral Valve area < 4.0cm
- Prolapse / flail width > 15mm.

Clinical Experience



❖ Latest Trials: 2013.

- **RESHAPE II Trial:** Comparing the MitraClip with the Medical Therapy (In Europe).
- **COAPT Trial:** Comparing the MitraClip with the Medical Therapy (In USA).
- **In March 2019, FDA approved the MitraClip repair for patients with CHF and moderate to severe or severe MR.**



- MitraClip NTR: the original NT Clip size on an improved Clip Delivery System (CDS) is designed to be more precise and predictable through new ease-of-use features
- MitraClip XTR: features longer Clip arms for easier grasping and better reach^{*,†} on an improved CDS (grasping width 120 degree)

MitraClip Therapy Worldwide



Total number of patients treated , more than **70,000**

Information contained herein intended for use outside of the U.S. only.

© 2014 Abbott. All rights reserved. AP2939842-OUS Rev. E (09/2014) 9-EH-4-3874-01 10-2014 REV J | 21

MitraClip

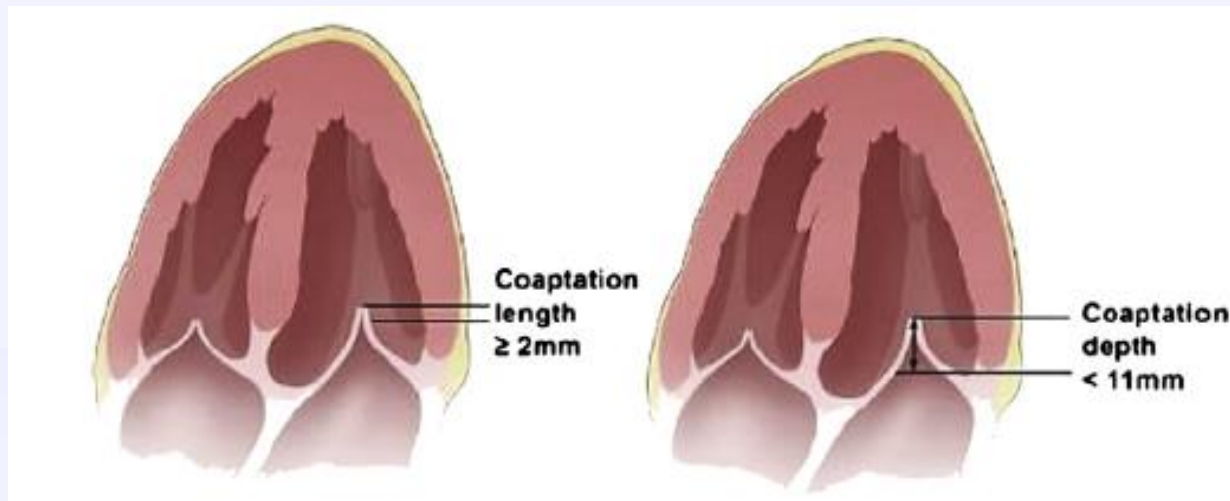


EXPERT CONSENSUS STATEMENT

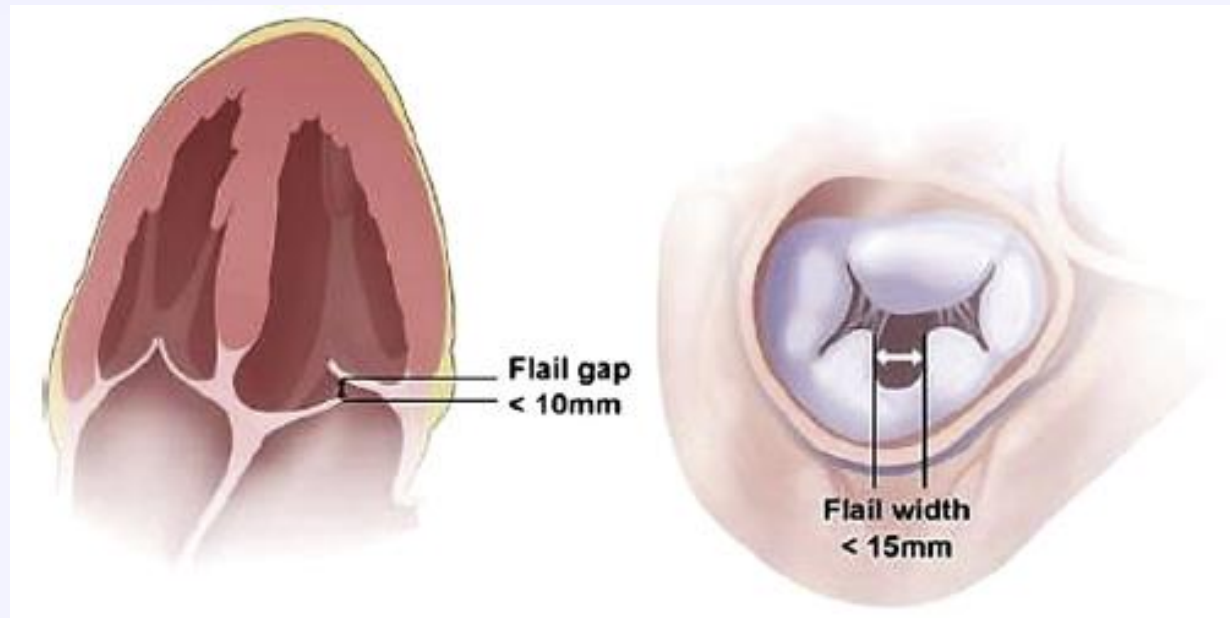
EAE/ASE Recommendations for the Use of Echocardiography in New Transcatheter Interventions for Valvular Heart Disease

Jose L. Zamorano^{1*†}, Luigi P. Badano², Charles Bruce³, Kwan-Leung Chan⁴, Alexandra Gonçalves⁵, Rebecca T. Hahn⁶, Martin G. Keane⁷, Giovanni La Canna⁸, Mark J. Monaghan⁹, Petros Nihoyannopoulos¹⁰, Frank E. Silvestry⁷, Jean-Louis Vanoverschelde¹¹, and Linda D. Gillam^{12†}, *Rochester, Minnesota; Ottawa, Ontario, Canada; Porto, Portugal; New York, New York; Philadelphia, Pennsylvania; London, United Kingdom; Brussels, Belgium; Morristown, New Jersey*

JASE 2011



Functional MR



Myxomatous MR

Endovascular Valve Edge-to-Edge REpair Study (EVEREST II) Randomized Clinical Trial: Primary Safety and Efficacy Endpoints

Ted Feldman, Laura Mauri, Elyse Foster, Don Glower on
behalf of the EVEREST II Investigators

American College of Cardiology

March 14, 2010

Atlanta, GA

EVEREST II Randomized Clinical Trial

Study Design

279 Patients enrolled at 37 sites

Significant MR (3+/-4+)
Specific Anatomical Criteria

↓
Randomized 2:1

↙ ↘
Device Group
MitraClip System
N=184

↙ ↘
Control Group
Surgical Repair or Replacement
N=95

↓ ↓
Echocardiography Core Lab and Clinical Follow-Up:
Baseline, 30 days, 6 months, 1 year, 18 months, and
annually through 5 years

Baseline characteristics of patients

Characteristic *	Percutaneous Repair Group (n = 184)	Surgical Group (n = 95)
Age, yrs, mean \pm SD (n)	67.3 \pm 12.8 (184)	65.7 \pm 12.9 (95)
Sex		
Male	62.5% (115/184)	66.3% (63/95)
Female	37.5% (69/184)	33.7% (32/95)
MR etiology, % (n/N)		
Functional	26.6% (49/184)	27.4% (26/95)
Degenerative		
With anterior or bileaflet flail, or prolapse	31.5% (58/184)	26.3% (25/95)
With posterior flail or prolapse	39.1% (72/184)	44.2% (42/95)
With neither flail nor prolapse	2.7% (5/184)	2.1% (2/95)

EVEREST II Randomized Clinical Trial

Key Inclusion/Exclusion Criteria

Inclusion

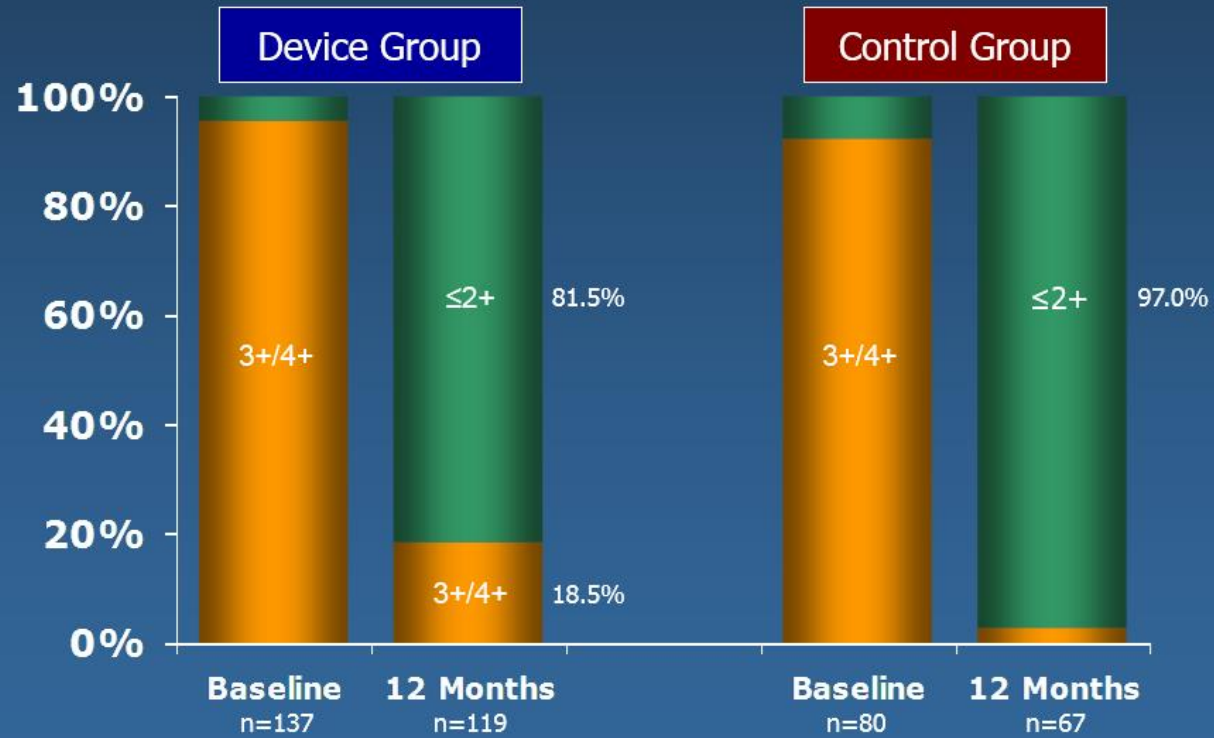
- Candidate for MV Surgery
- Moderate to severe (3+) or severe (4+) MR
 - Symptomatic
 - $>25\%$ EF & LVESD $\leq 55\text{mm}$
 - Asymptomatic with one or more of the following
 - LVEF 25-60%
 - LVESD $\geq 40\text{mm}$
 - New onset atrial fibrillation
 - Pulmonary hypertension

ACC/AHA Guidelines
JACC 52:e1-e142, 2008

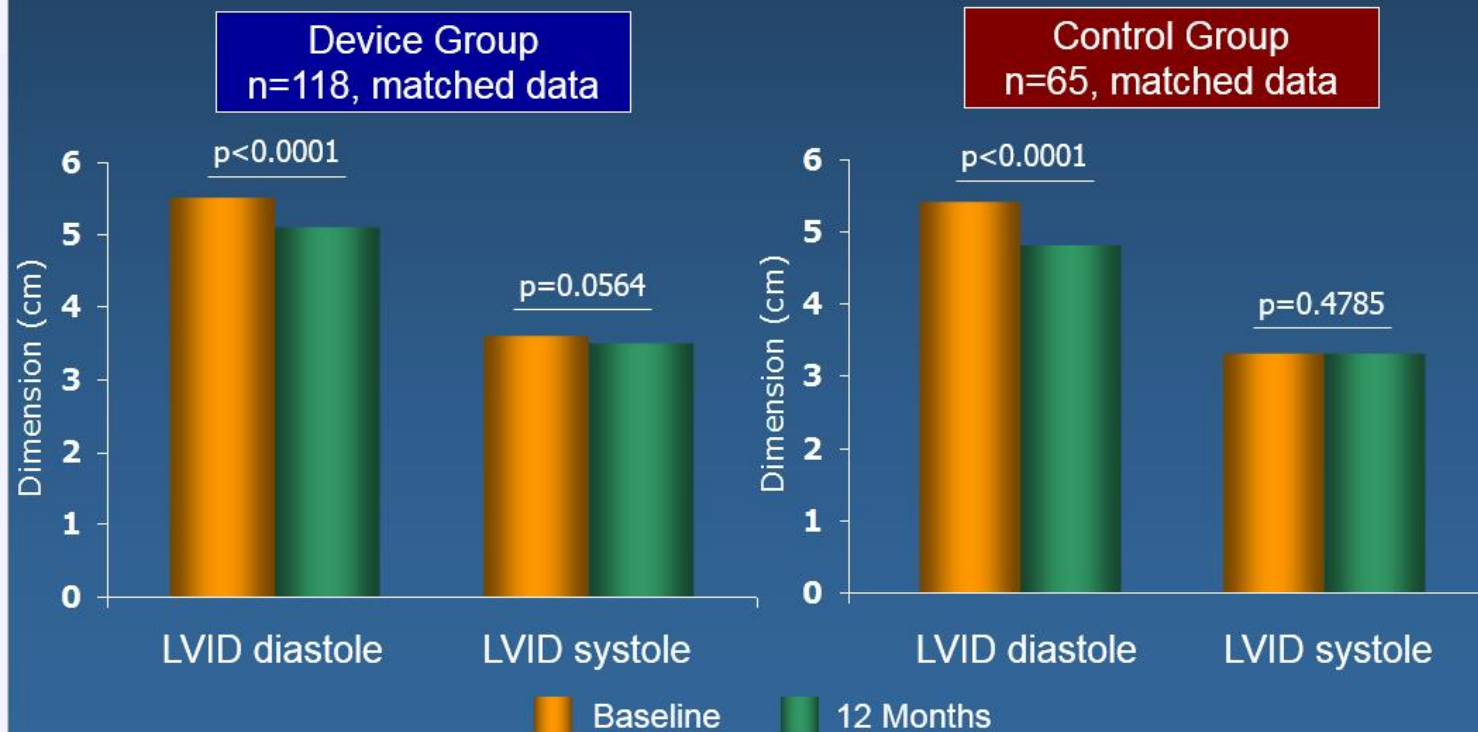
Exclusion

- AMI within 12 weeks
- Need for other cardiac surgery
- Renal insufficiency
 - Creatinine $>2.5\text{mg/dl}$
- Endocarditis
- Rheumatic heart disease
- MV anatomical exclusions
 - Mitral valve area $<4.0\text{cm}^2$
 - Leaflet flail width ($\geq 15\text{mm}$) and gap ($\geq 10\text{mm}$)
 - Leaflet tethering/coaptation depth ($>11\text{mm}$) and length ($<2\text{mm}$)

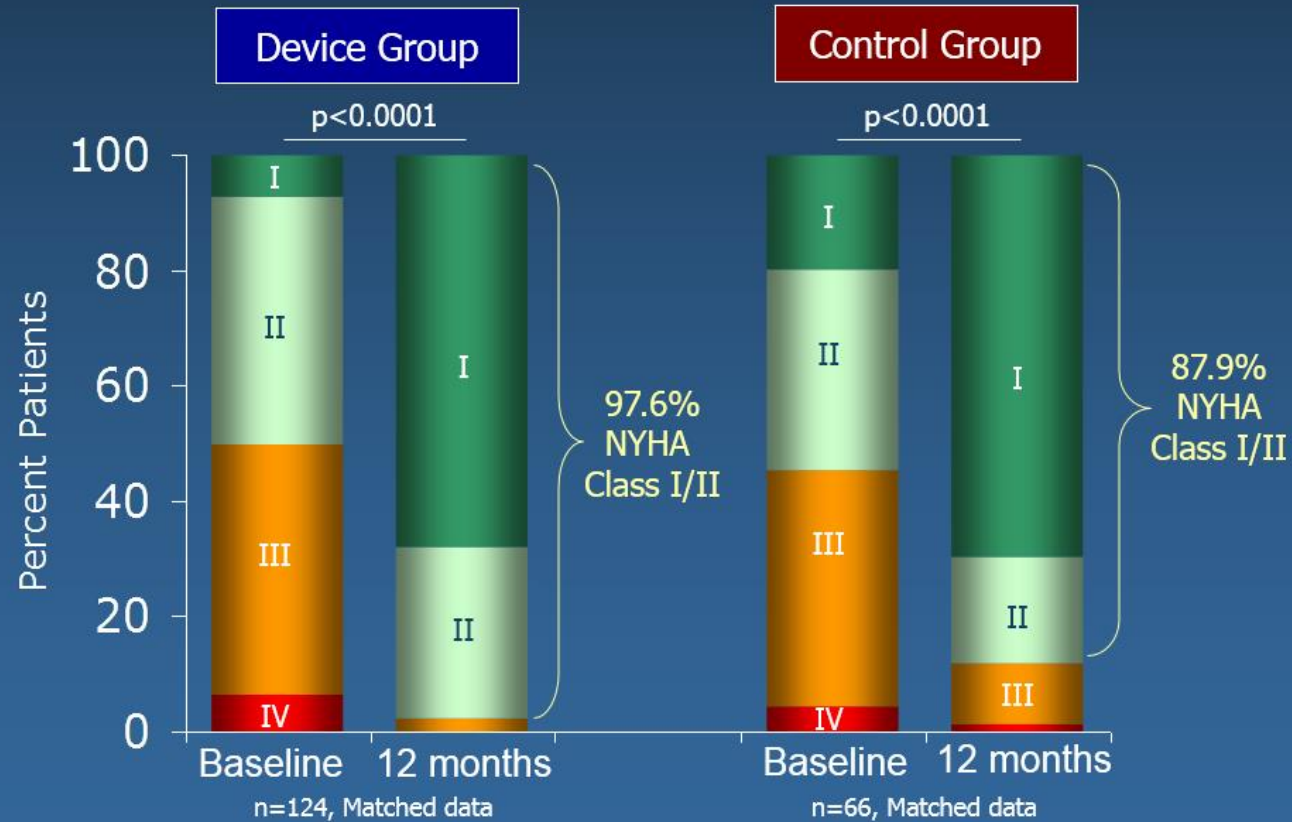
EVEREST II RCT: MR Reduction Per Protocol Cohort



EVEREST II RCT: Left Ventricular Dimension Per Protocol Cohort



EVEREST II RCT: NYHA Functional Class Per Protocol Cohort



EVEREST II RCT: Conclusion

The MitraClip procedure is an important therapeutic option for selected patients with significant mitral regurgitation given the demonstrated safety, effectiveness and clinical benefit.

JACC 2013

4-Year Results of a Randomized Controlled Trial of Percutaneous Repair Versus Surgery for Mitral Regurgitation

Laura Mauri, MD,^{*†} Elyse Foster, MD,[‡] Donald D. Glower, MD,[§] Patricia Apruzzese, MS,[†]
Joseph M. Massaro, PhD,^{†||} Howard C. Herrmann, MD,[¶] James Hermiller, MD,[#]
William Gray, MD,^{**} Andrew Wang, MD,[‡] Wesley R. Pedersen, MD,^{††} Tanvir Bajwa, MD,^{‡‡}
John Lasala, MD, PhD,^{§§} Reginald Low, MD,^{||||} Paul Grayburn, MD,^{¶¶} Ted Feldman, MD,^{##}
for the EVEREST II Investigators

*Boston, Massachusetts; San Francisco and Davis, California; Durham, North Carolina;
Philadelphia, Pennsylvania; Indianapolis, Indiana; New York, New York; Minneapolis, Minnesota;
Milwaukee, Wisconsin; St. Louis, Missouri; Dallas, Texas; and Evanston, Illinois*

Objectives

This study sought to evaluate 4-year outcomes of percutaneous repair versus surgery for mitral regurgitation.

Background

Transcatheter therapies are being developed to treat valvular heart disease. In the EVEREST (Endovascular Valve Edge-to-Edge Repair Study) II trial, treatment of mitral valve regurgitation (MR) with a novel percutaneous device was compared with surgery and showed superior safety, but less reduction in MR at 1 year overall. We report the 4-year outcomes from the EVEREST II trial.

Conclusions: 4-year outcomes from the EVEREST II trial

“Patients treated with percutaneous repair of the mitral valve more commonly require surgery to treat residual MR; however, after the first year of follow-up, there were few surgeries required after either percutaneous or surgical treatment and no difference in the prevalence of moderate-severe and severe MR or mortality at 4 years.”

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Dec 13, 2018

Transcatheter Mitral-Valve Repair in Patients with Heart Failure

G.W. Stone, J.A. Lindenfeld, W.T. Abraham, S. Kar, D.S. Lim, J.M. Mishell,
B. Whisenant, P.A. Grayburn, M. Rinaldi, S.R. Kapadia, V. Rajagopal,
I.J. Sarembock, A. Brieke, S.O. Marx, D.J. Cohen, N.J. Weissman,
and M.J. Mack, for the COAPT Investigators*

COAPT

Percutaneous Repair or Medical Treatment for Secondary Mitral Regurgitation

J.-F. Obadia, D. Messika-Zeitoun, G. Leurent, B. Iung, G. Bonnet, N. Piriou, T. Lefèvre, C. Piot, F. Rouleau,
D. Carrié, M. Nejjari, P. Ohlmann, F. Leclercq, C. Saint Etienne, E. Teiger, L. Leroux, N. Karam, N. Michel,
M. Gilard, E. Donal, J.-N. Trochu, B. Cormier, X. Armoiry, F. Boutitie, D. Maucort-Boulch, C. Barnel,
G. Samson, P. Guerin, A. Vahanian, and N. Mewton, for the MITRA-FR Investigators*

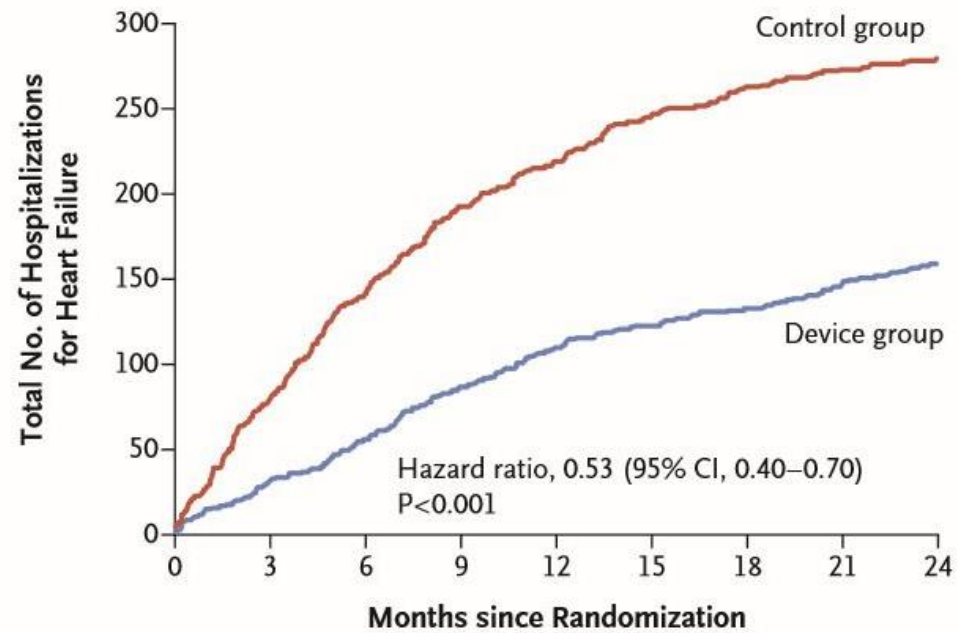
MITRA- FR

Transcatheter Mitral-Valve Repair in Patients with Heart Failure

COAPT Trial

- ◆ Multicenter, USA and Canada.
 - ◆ Symptomatic heart failure patients with mod-severe (3+) or severe (4+) secondary MR on optimal medical therapy
 - ◆ Transcatheter mitral-valve repair + medical therapy (302) vs medical therapy alone (312)
 - ◆ Outcome: hospitalizations, death
 - ◆ Follow up: 2 years
 - ◆ Sponsored by Abbott
- EF 20 – 50% (Average EF 31%)
 - ~50% had 3+MR, ~50% had 4+MR
 - **NYHA II** (40%), III (50%), IVa(10%)
 - Mean **age**: 71
 - **Etiology** of HF – ischemic (60%), non-ischemic (40%)
 - **Comorbidities**: Hypertension (80%), AF (55%), DM2 (35%), prior MI (50%), stroke (15%),

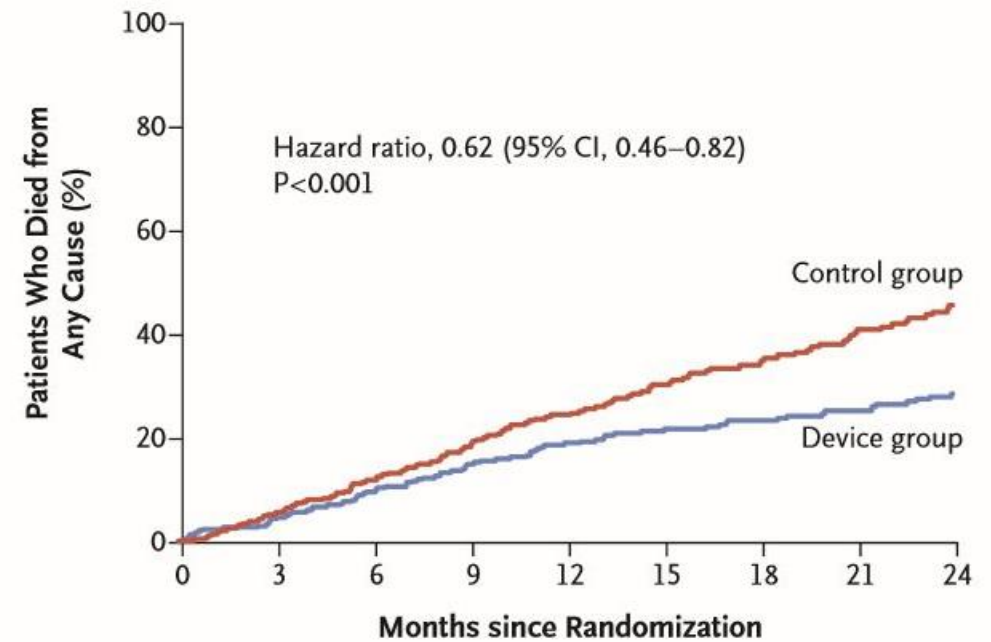
Hospitalization for Heart Failure



Device group - 35% /Year

Control group - Control group – 67% /Year

Death from Any Cause



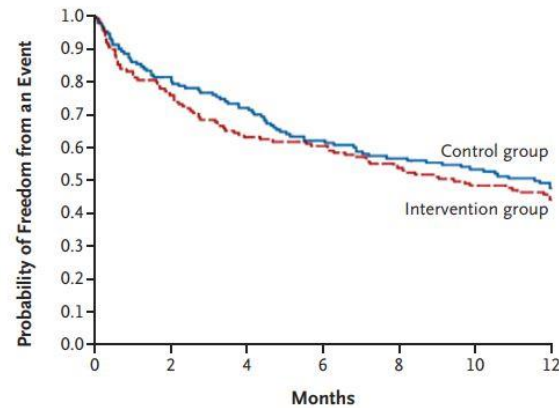
Device group – 29 %

Control group – 46 %

MITRA- FR

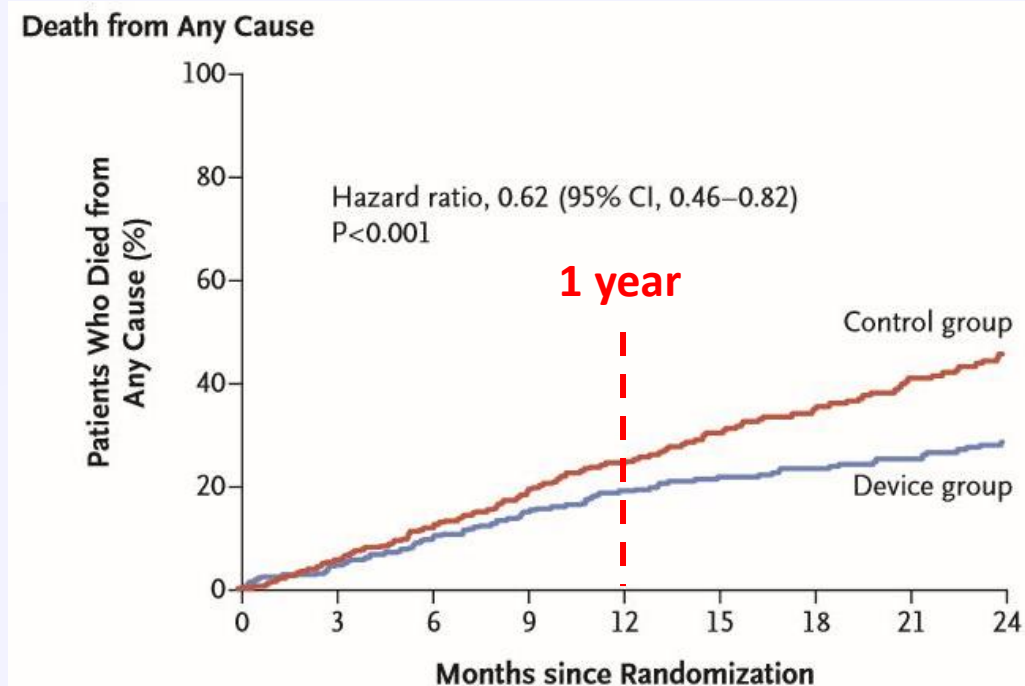
Table 3. Primary Outcome and Secondary Efficacy Outcomes at 12 Months (Intention-to-Treat Population).

Outcome	Intervention Group (N=152)	Control Group (N=152)	Hazard Ratio or Odds Ratio (95% CI)*
Composite primary outcome: death from any cause or unplanned hospitalization for heart failure at 12 months — no. (%)	83 (54.6)	78 (51.3)	1.16 (0.73–1.84)
Secondary outcomes‡			
Death from any cause	37 (24.3)	34 (22.4)	1.11 (0.69–1.77)
Cardiovascular death	33 (21.7)	31 (20.4)	1.09 (0.67–1.78)
Unplanned hospitalization for heart failure	74 (48.7)	72 (47.4)	1.13 (0.81–1.56)
Major adverse cardiovascular events§	86 (56.6)	78 (51.3)	1.22 (0.89–1.66)

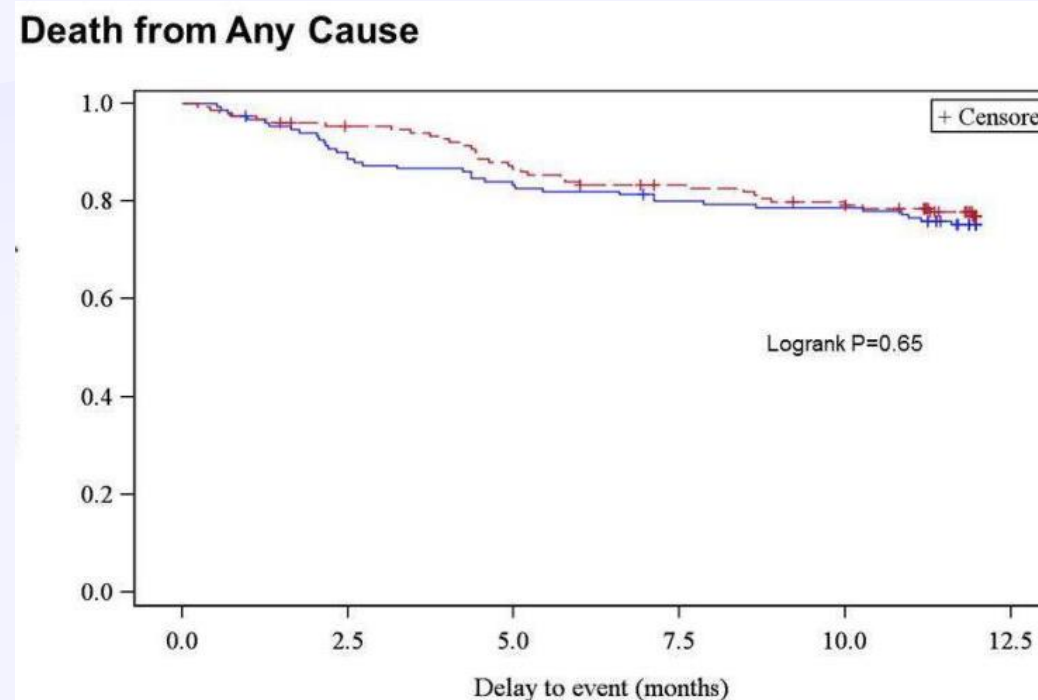


No. at Risk							
Control group	152	123	109	94	86	80	73
Intervention group	151	114	95	91	81	73	67

COAPT (2 years F/U)



MITRA- FR (1 year F/U)



Reconciling the two studies

Medical management – maximal medical therapy

- Mean BNP – COAPT ~1000, MITRA-FR ~800
- Annualized hospitalization rates – COAPT - 68%, MITRA-FR – 47%

Patient selection

- Regurgitant orifice – COAPT – 4.1mm², MITRA-FR – 3.1mm²

Operative approach/success

- More clips in COAPT
- More complications in MITRA-FR
- More mod-severe MR in MITRA-FR at 1 year

Duration of follow up

- COAPT - 2 years
- MITRA-FR – 1 year

Table 32. Recommendations for Surgical/Percutaneous/Transcatheter Interventional Treatments of HF

Recommendations	COR	LOE	References
CABG or percutaneous intervention is indicated for HF patients on GDMT with angina and suitable coronary anatomy, especially significant left main stenosis or left main equivalent	I	C	10,12,14,848
CABG to improve survival is reasonable in patients with mild to moderate LV systolic dysfunction and significant multivessel CAD or proximal LAD stenosis when viable myocardium is present	IIa	B	848–850
CABG or medical therapy is reasonable to improve morbidity and mortality for patients with severe LV dysfunction (EF <35%), HF, and significant CAD	IIa	B	309,851
Surgical aortic valve replacement is reasonable for patients with critical aortic stenosis and a predicted surgical mortality of no greater than 10%	IIa	B	852
Transcatheter aortic valve replacement is reasonable for patients with critical aortic stenosis who are deemed inoperable	IIa	B	853
CABG may be considered in patients with ischemic heart disease, severe LV systolic dysfunction, and operable coronary anatomy whether or not viable myocardium is present	IIb	B	307–309
Transcatheter mitral valve repair or mitral valve surgery for functional mitral insufficiency is of uncertain benefit	IIb	B	854–857
Surgical reverse remodeling or LV aneurysmectomy may be considered in HF/EF for specific indications, including intractable HF and ventricular arrhythmias	IIb	B	858

2013 ACCF/ AHA guideline for the management of heart failure

Chronic *Primary* Mitral Regurgitation: Intervention (cont.)

Recommendations	COR	LOE
MV surgery may be considered in symptomatic patients with chronic severe primary MR and LVEF $\leq 30\%$ (stage D)	IIb	C
<u>Transcatheter</u> mitral valve repair may be considered for severely symptomatic patients (NYHA class III to IV) with chronic severe primary MR (stage D) who have favorable anatomy for the repair procedure and a reasonable life expectancy but who have a prohibitive surgical risk because of severe comorbidities and remain severely symptomatic despite optimal GDMT for HF	IIb	B
MVR should not be performed for the treatment of isolated severe primary MR limited to less than one half of the posterior leaflet unless MV repair has been attempted and was unsuccessful	III: Harm	B



2017 ACC/ AHA guideline for valvular heart disease

*Helping Cardiovascular Professionals
Learn. Advance. Heal.*



Indications for intervention in severe primary mitral regurgitation *(continued)*


Recommendations	Class	Level
Mitral valve replacement may be considered in symptomatic patients with severe LV dysfunction (LVEF <30% and/or LVESD >55 mm) refractory to medical therapy when likelihood of successful repair is low and comorbidity low.	IIb	C
<u>Percutaneous edge-to-edge procedure</u> may be considered in patients with symptomatic severe primary mitral regurgitation who fulfil the echocardiographic criteria of eligibility and are judged inoperable or at high surgical risk by the Heart Team, avoiding futility.	IIb	C

Indications for mitral valve intervention in chronic secondary mitral regurgitation (continued)

Recommendations	Class	Level
When revascularization is not indicated and surgical risk is not low, a percutaneous edge-to-edge procedure may be considered in patients with severe secondary mitral regurgitation and <u>LVEF >30%</u> who remain symptomatic despite optimal medical management (including CRT if indicated) and who have a suitable valve morphology by echocardiography, avoiding futility.	IIb	C
In patients with severe secondary mitral regurgitation and <u>LVEF <30%</u> who remain symptomatic despite optimal medical management (including CRT if indicated) and who have no option for revascularization, <u>the Heart Team</u> may consider percutaneous edge-to-edge procedure or valve surgery after careful evaluation for ventricular assist device or heart transplant according to individual patient characteristics.	IIb	C

King Abdulaziz Cardiac Center (KACC), Riyadh, KAS
Experience in MitraClip Repair
(2012- 2018)

Case 1

- 51-year-old male presented to our center with acute pulmonary edema
 - No history of hypertension or CAD
- 

PHILIPS

2409405

08/01/2012

08:53:29

TIS0.8

JPEG CR 19:1
MI 1.5

S5-1/CARDIAC NEW

FR 42Hz
20cm

M2

2D
72%
C 41
P Low
HGen



JPEG

78 bpm

PHILIPS

2409405

08/01/2012 08:56:14

TIS2.8

JPEG CR 19:1
MI 1.1

S5-1/CARDIAC NEW

FR 15Hz
20cm

2D

69%
C 41
P Low
HGen

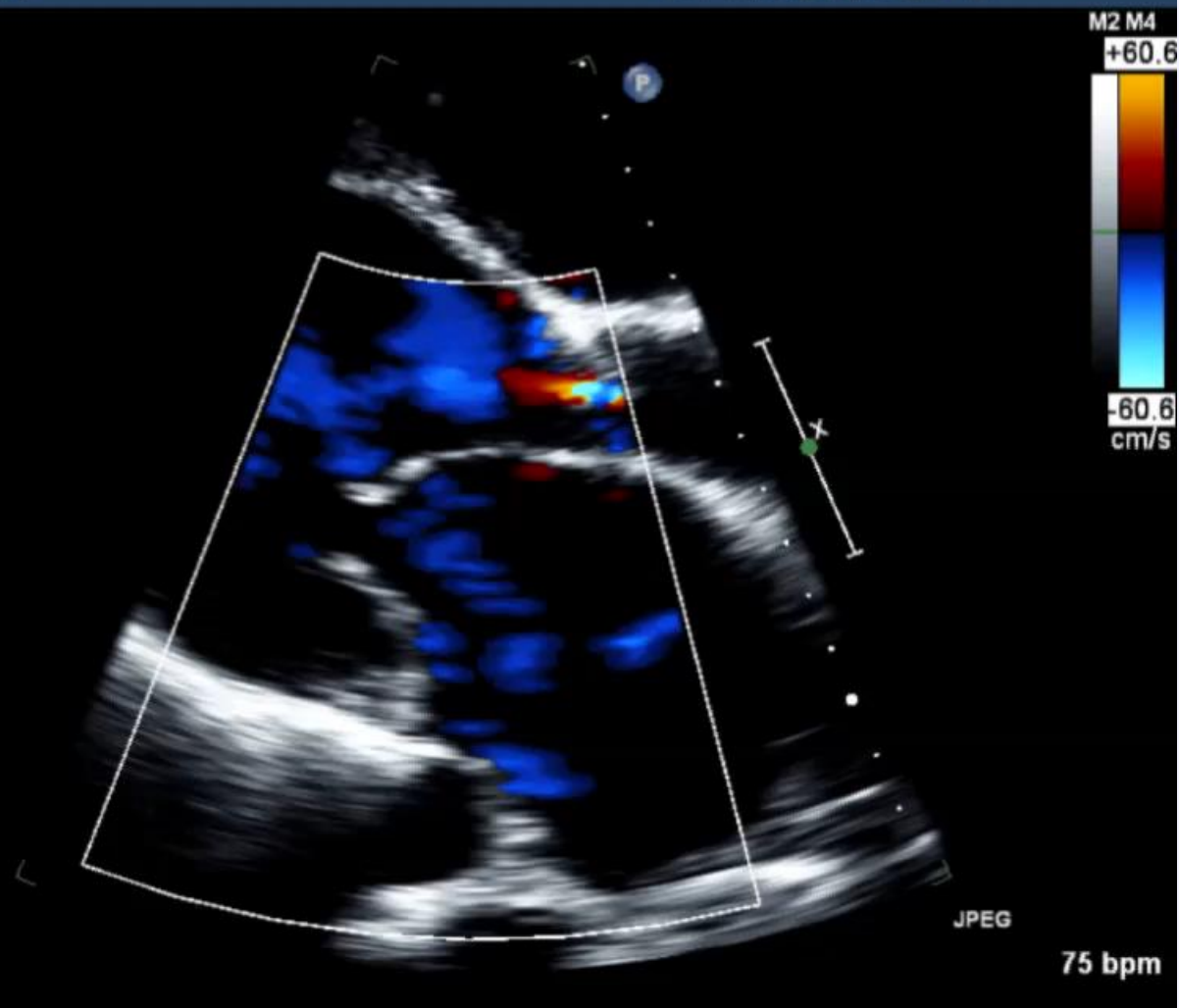
CF

70%
2.3MHz
WF High
Med

M2 M4

+60.6

-60.6
cm/s



PHILIPS

2409405

08/01/2012 09:09:41

TIS0.8

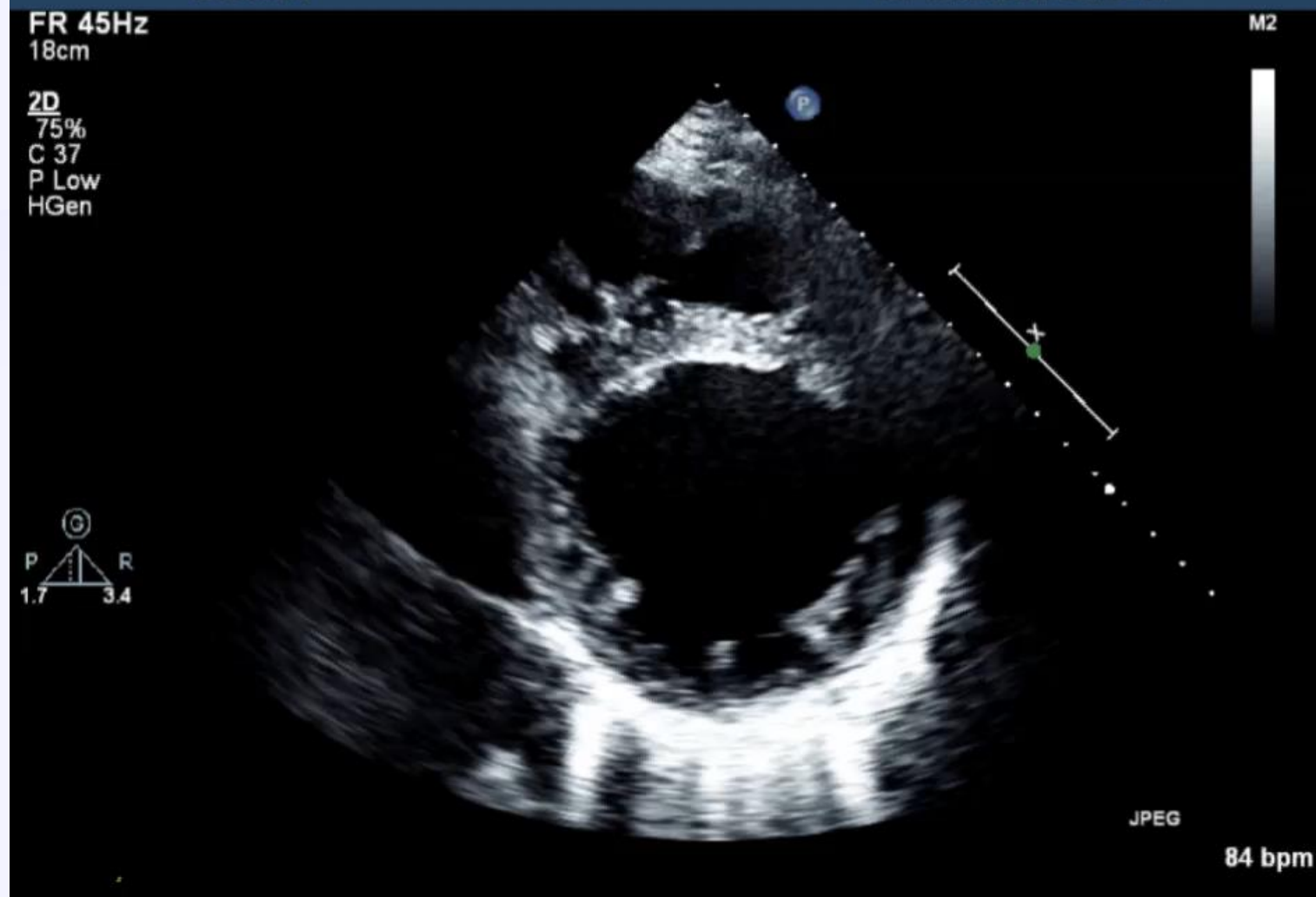
JPEG CR 19:1
MI 1.5

S5-1/CARDIAC NEW

FR 45Hz
18cm

2D
75%
C 37
P Low
HGen

M2



84 bpm

PHILIPS

08/01/2012

09:23:42

TIS0.8

JPEG CR 23:1
MI 1.5

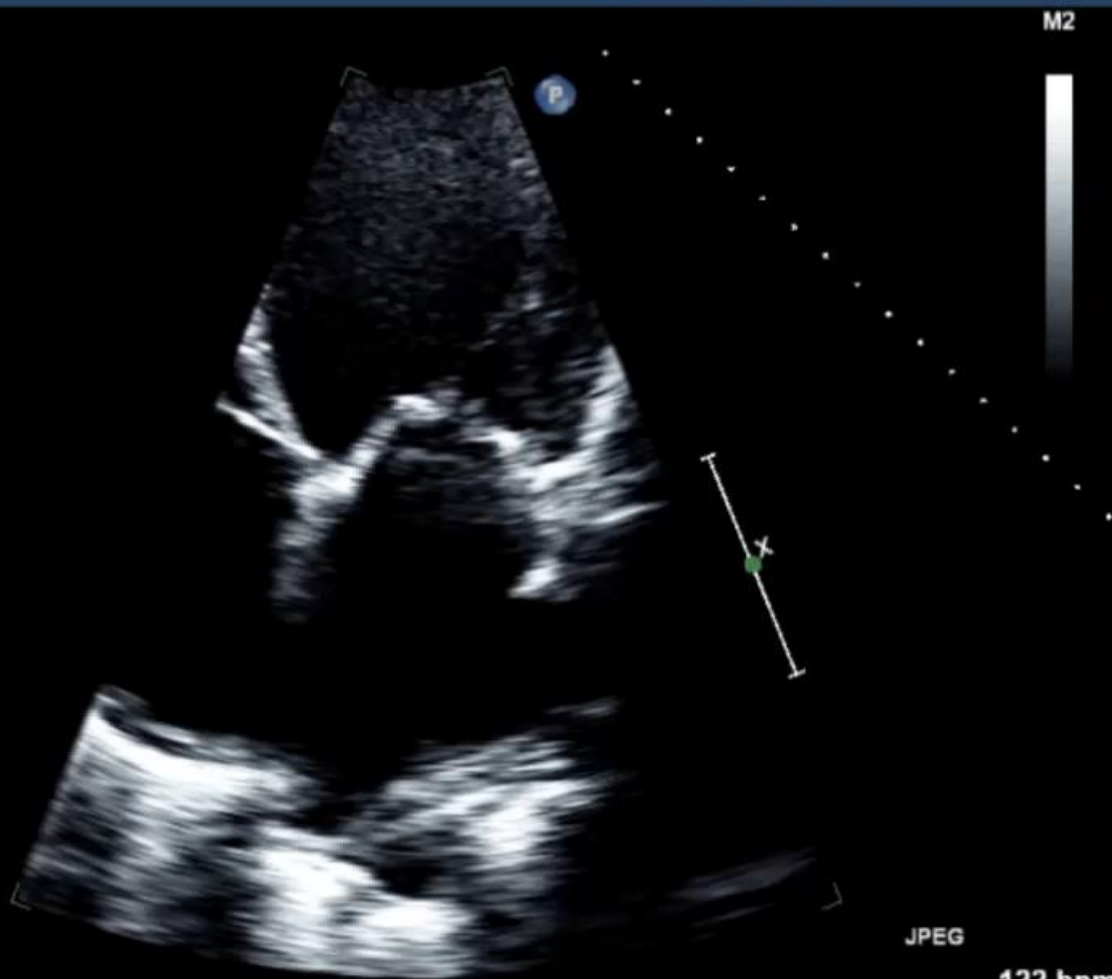
2409405

S5-1/CARDIAC NEW

FR 68Hz
25cm

2D
81%
C 37
P Low
HGen

M2



JPEG

122 bpm

PHILIPS

2409405

08/01/2012 09:24:50

TIS2.7

JPEG CR 18:1
MI 1.2

S5-1/CARDIAC NEW

FR 13Hz
25cm

2D

82%
C 37
P Low
HGen

CF

70%
2.3MHz
WF High
Med

M2 M4

+47.3

-47.3

cm/s

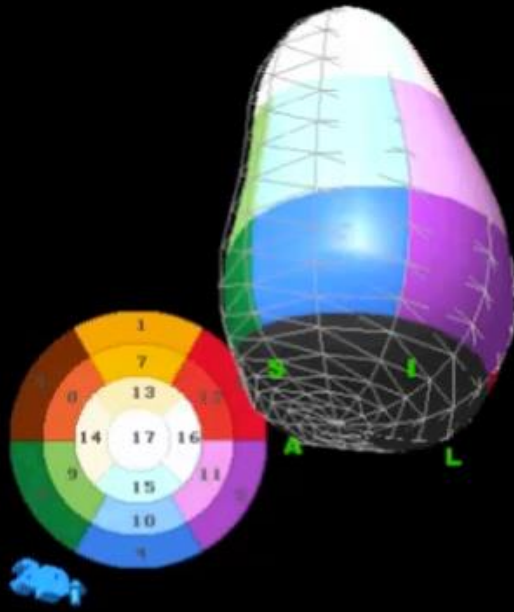


JPEG

75 bpm



3D LV full volume assessment for CRT



Volume(s)

EDV = 302.3 ml

ESV = 222.4 ml

Calculation(s)

EF = 26.4 %

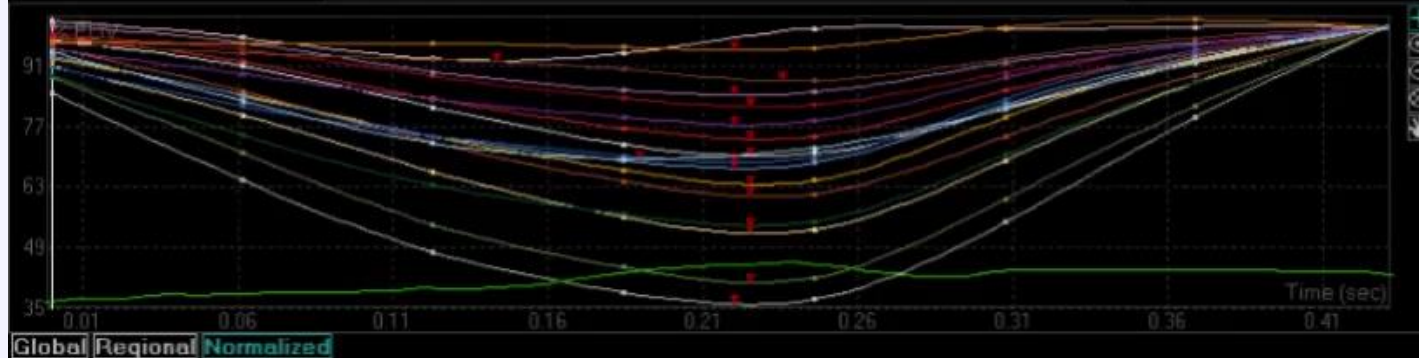
SV = 79.9 ml

Regional

Tmsv Sel-SD =
22 ms

Tmsv Sel-Dif =
96 ms

Tmsv Sel-SD =
3.45 %



Global Regional (msec) **Regional (%R-R)** Parametric Imaging

Regional (%R-R) Report Page

Tmsv 16-SD*	3.55	%
Tmsv 12-SD	0.77	%
Tmsv 6-SD	1.02	%
Tmsv 16-Dif	15.15	%
Tmsv 12-Dif	2.80	%
Tmsv 6-Dif	2.77	%
Tmsv 3-6	-0.22	%
Tmsv 3-5	0.20	%
Tmsv Sel-SD	3.45	%
Tmsv Sel-Dif	15.15	%
R-R Time	632	ms

Volume(s)

EDV = 302.3 ml

ESV = 222.4 ml

Calculation(s)

EF = 26.4 %

SV = 79.9 ml

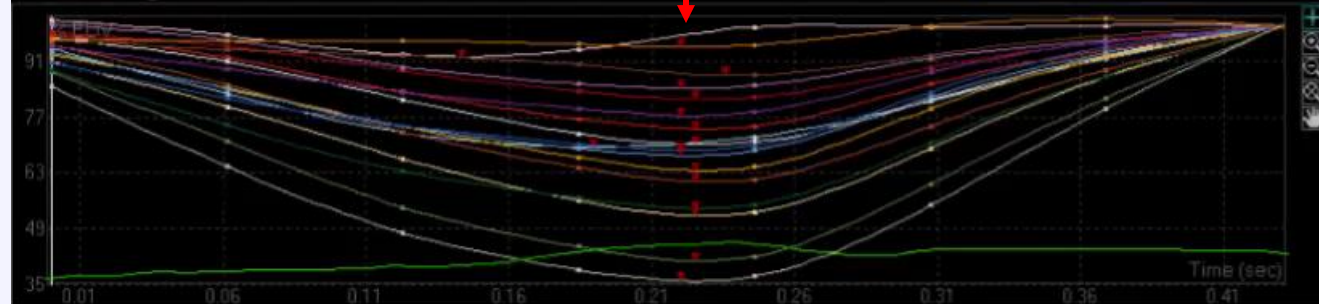
Regional

Tmsv Sel-SD = 22 ms

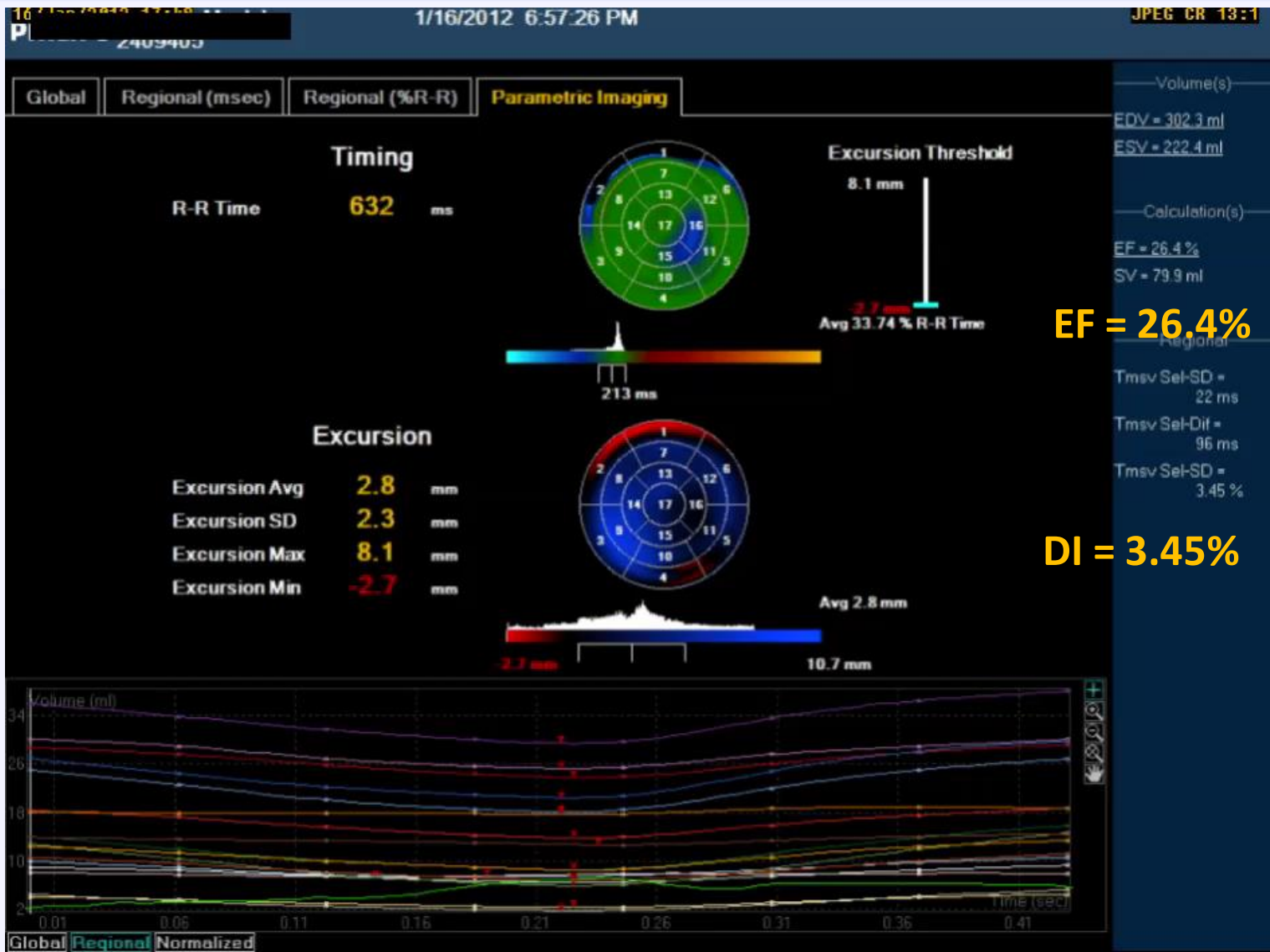
Tmsv Sel-Dif = 96 ms

Tmsv Sel-SD = 3.45 %

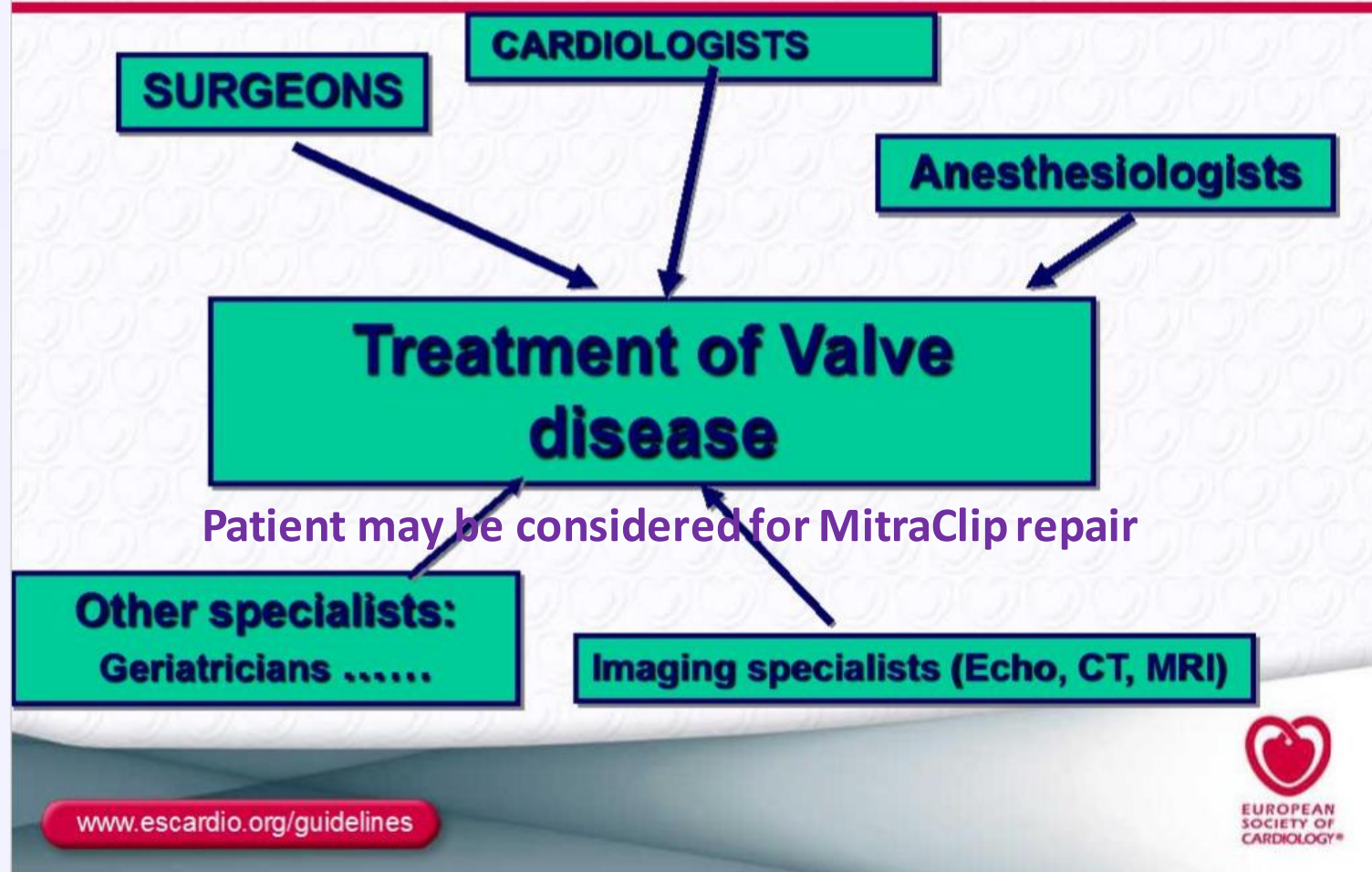
* Excludes Segment 17



Global Regional **Normalized**



The « Heart Team »



PHILIPS

2409405

08/04/2012 09:16:29

TIS0.1

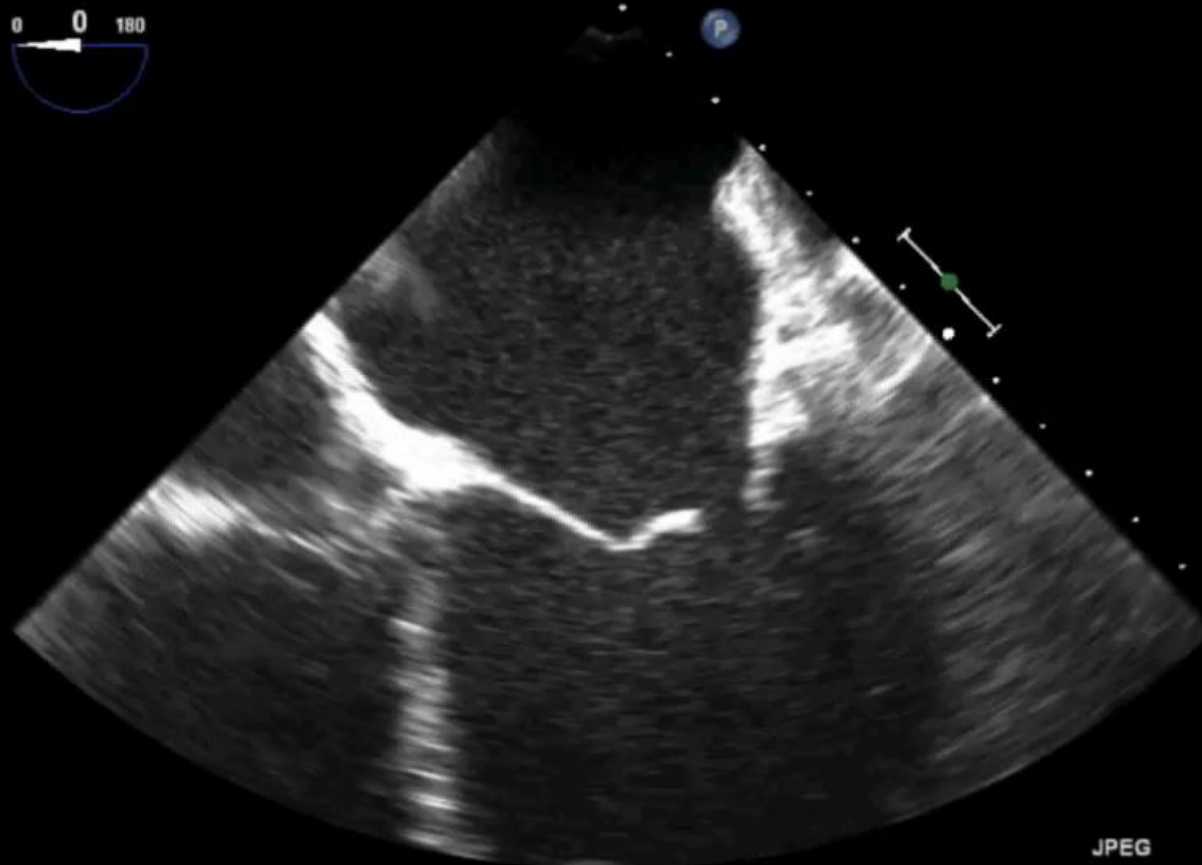
JPEG CR 28:1
MI 0.5

X7-2t/Adult

FR 52Hz
13cm

M4

2D
75%
C 50
P Off
Gen



JPEG

PAT T: 37.0C
TEE T: 38.4C

71 bpm

PHILIPS

08/04/2012 09:19:06

TIS0.7

JPEG CR 17:1
MI 0.4

2409405

X7-2t/Adult

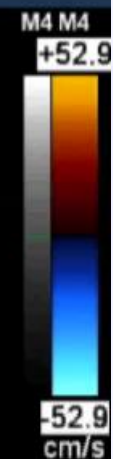
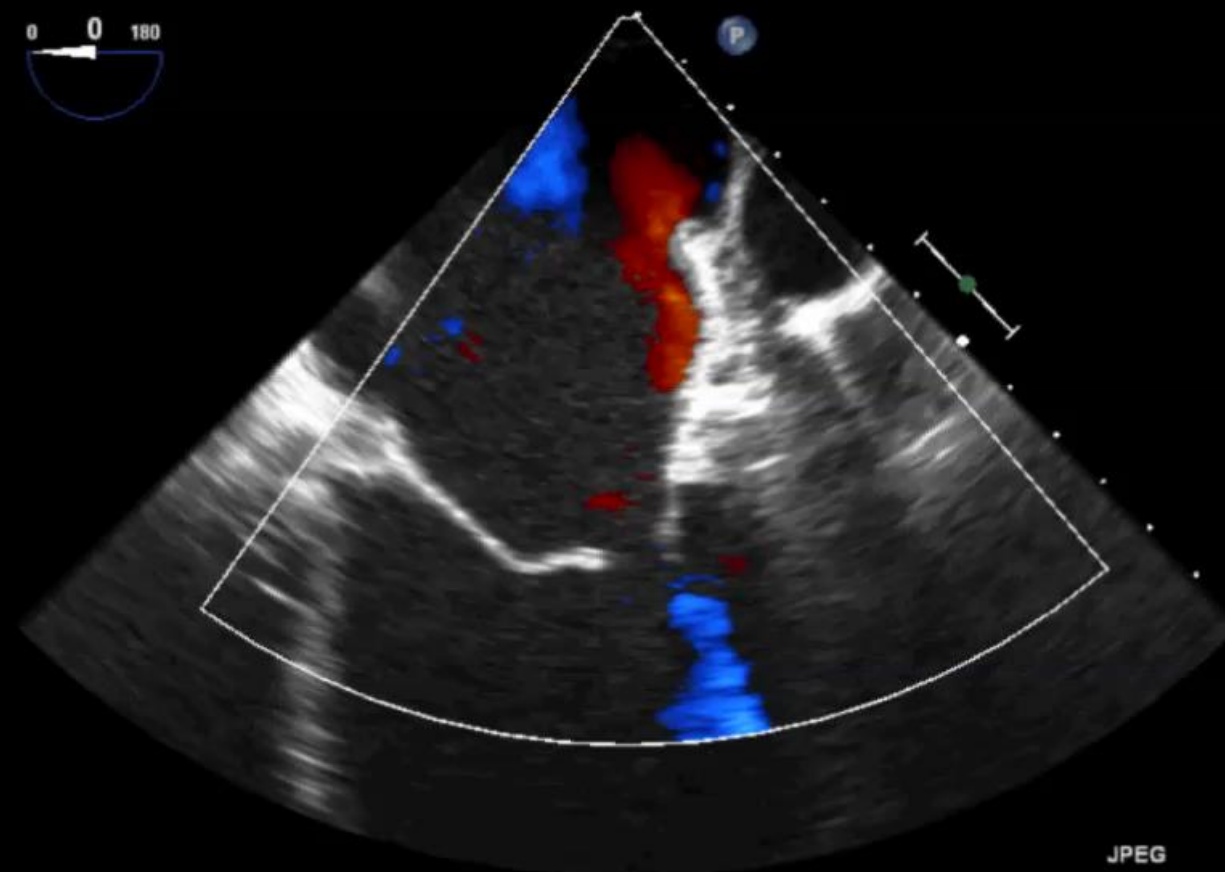
FR 10Hz
13cm

2D

73%
C 50
P Off
Gen

CF

59%
4.4MHz
WF High
Med



PAT T: 37.0C
TEE T: 39.1C

JPEG

83 bpm

PHILIPS

08/04/2012 09:38:22

TIS0.2

JPEG CR 14:1
MI 0.5

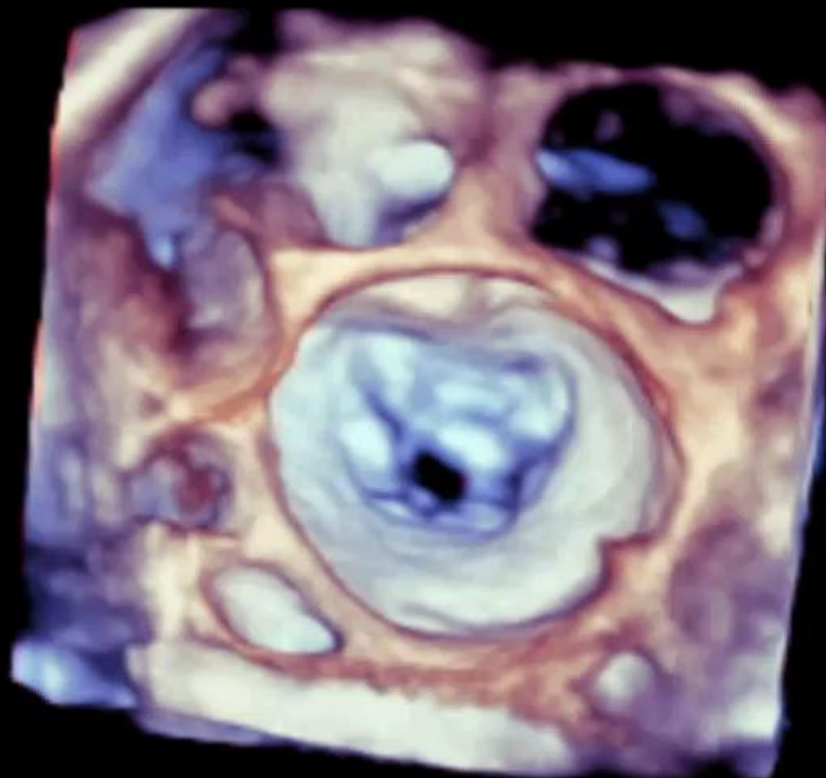
2409405

X7-2t/Adult

FR 27Hz
12cm

M4

Full Volume 0 75 100
3D 0%
3D 40dB



PAT T: 37.0C
TEE T: 39.2C

JPEG

74 bpm

PHILIPS

08/04/2012 09:46:11

TISO.9

JPEG CR 16:1
MI 0.7

2409405

X7-2t/Adult

FR 11Hz
12cm

Full Volume 0 90 180

3D 27%

3D 40dB

CF

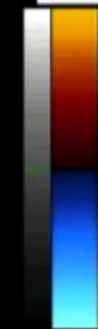
50%

4.4MHz

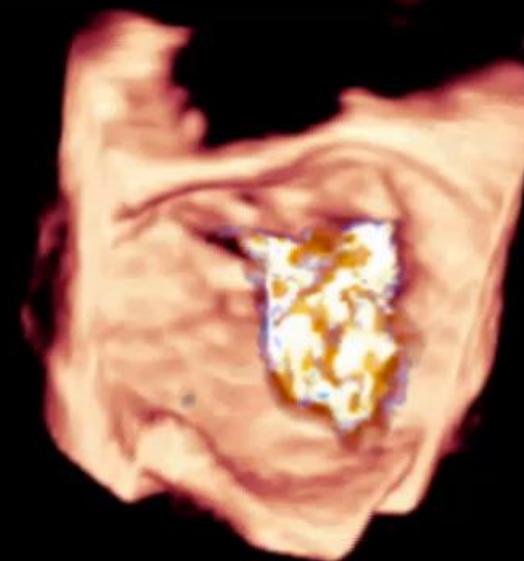


M4 M4

+49.3



-49.3



MV, SURGICAL VIEW, ORIGIN OF MR



PAT T: 37.0C
TEE T: 40.0C

JPEG

74 bpm



Patient underwent mitral clipping procedure
on 24-Nov- 2012

(The First MitraClip procedure in our center)

24/Nov/2012 09:11

PHILIPS

24/11/2012 12:34:03

TISO.2

JPEG CR 18:1
MI U.S

2409405

X7-2t/Adult

FR 27Hz
12cm

M4

Full Volume 0 85 100
3D 14%
3D 40dB



Double-orifice MV

PAT T: 37.0C
ITEE T: 38.4C

JPEG

74 bpm

24/Nov/2012 09:14

PHILIPS

24/11/2012 12:34:03

TISO.2

JPEG CR 19:1
MI 0.5

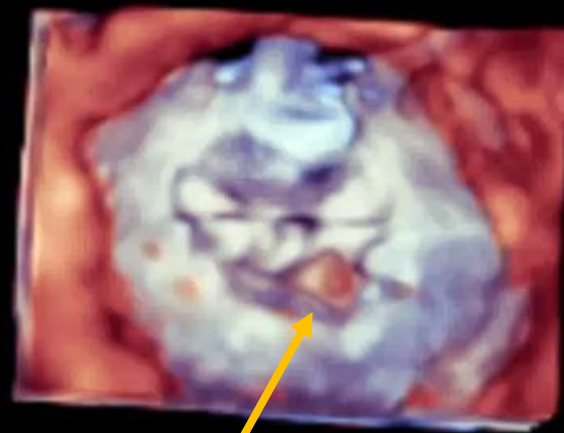
2409405

X7-2t/Adult

FR 27Hz
12cm

M4

Full Volume 0 85 100
3D 14%
3D 40dB



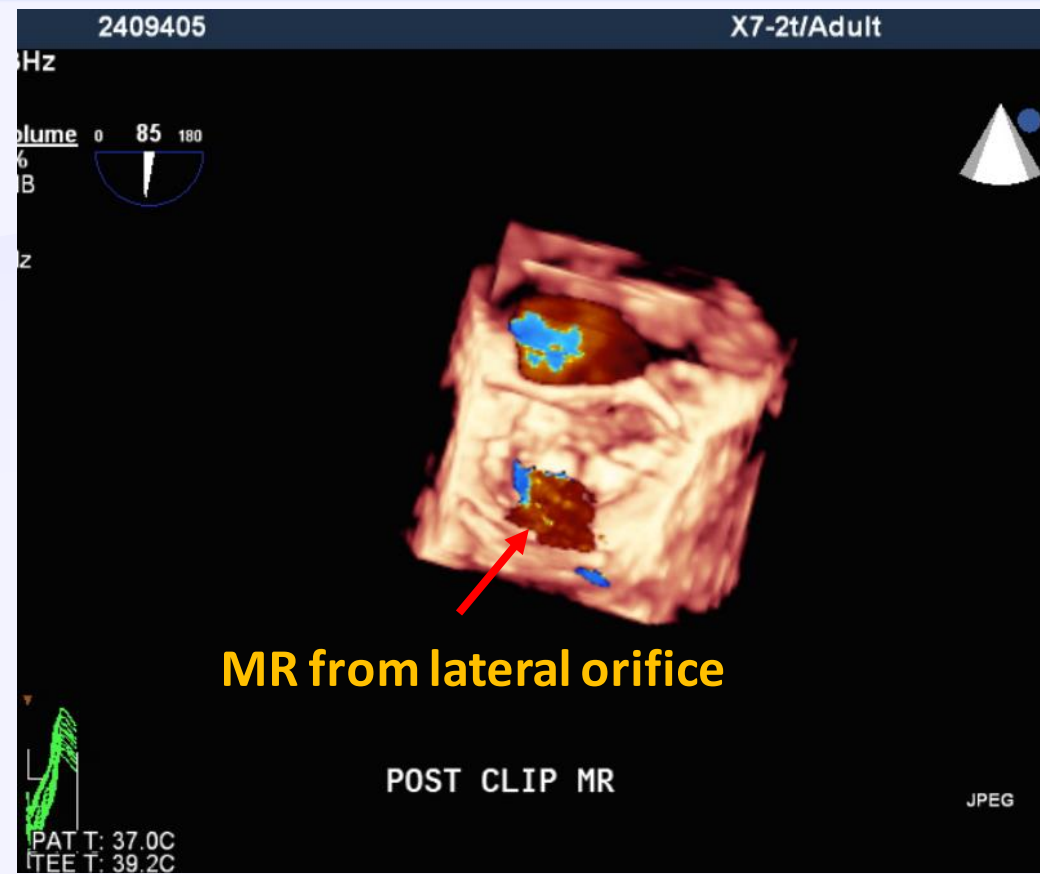
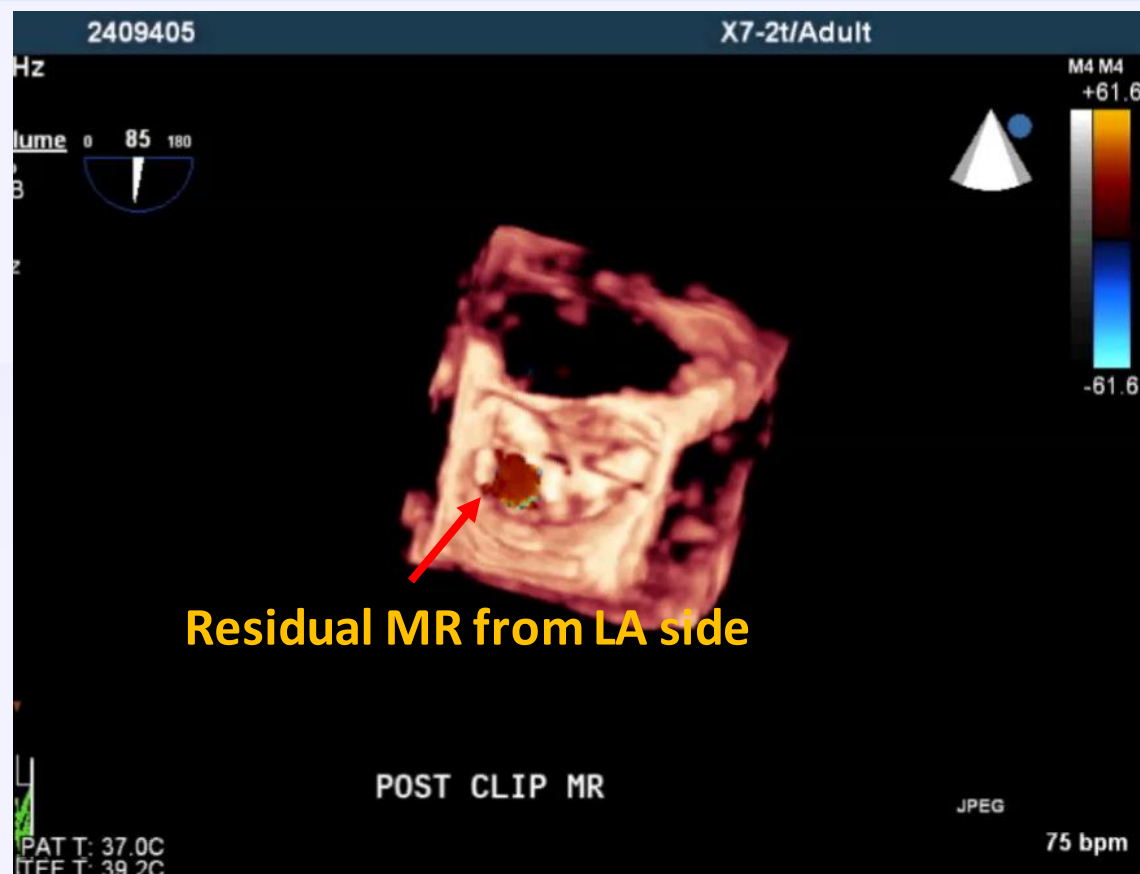
Clip from LV side

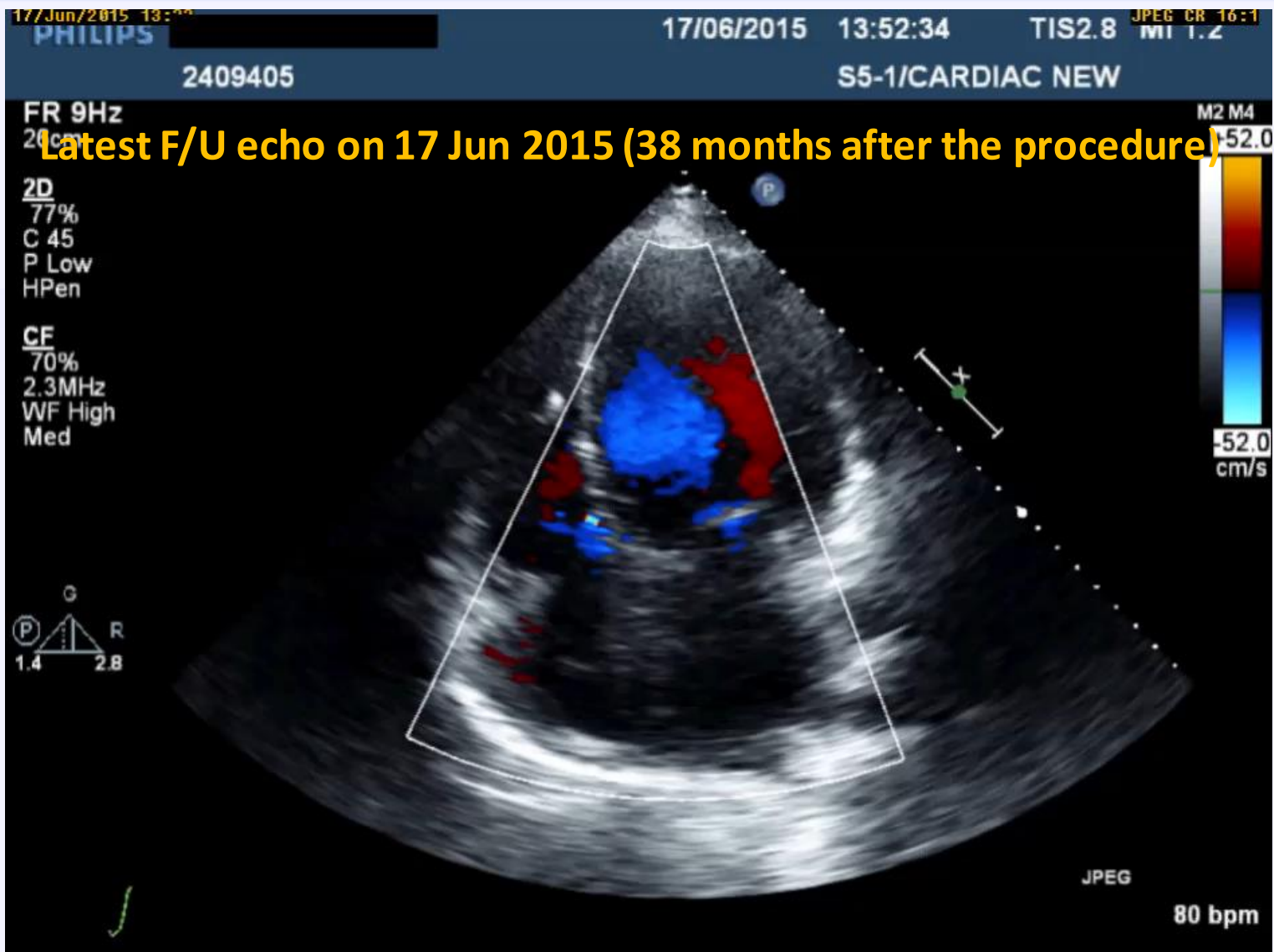
POST MITRACLIP, LV SIDE

PAT T: 37.0C
ITEE T: 38.4C

JPEG

74 bpm



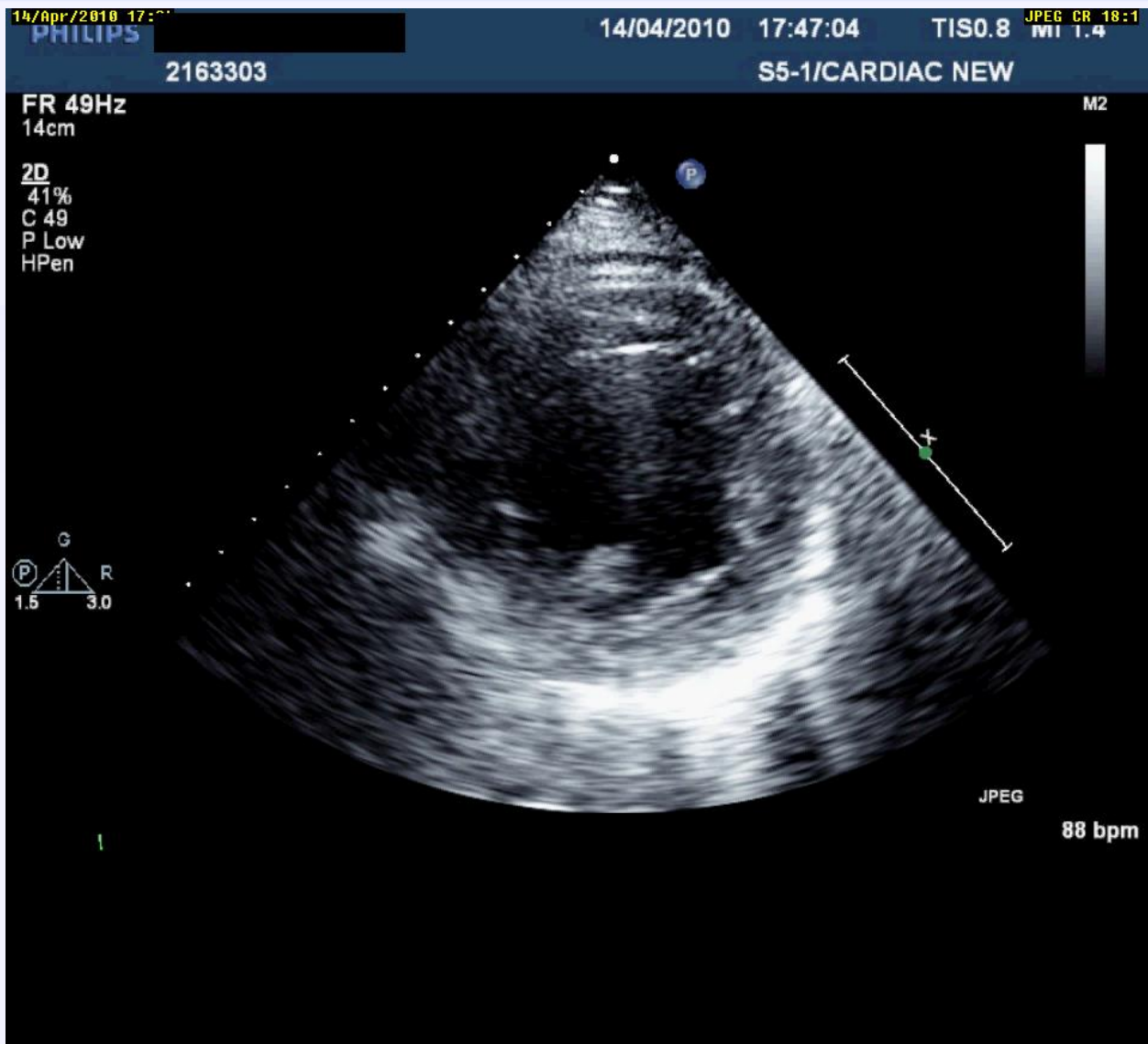


Case 2

65-year-old male with history of severe SOB

(Second case of KACC)

A solid blue horizontal bar spanning the width of the slide at the bottom.



14/Apr/2010 17:00

PHILIPS

14/04/2010 17:59:03

TIS2.6

JPEG CR 16:1
MI 1.1

2163303

S5-1/CARDIAC NEW

FR 18Hz
18cm

2D

64%
C 46
P Low
HPen

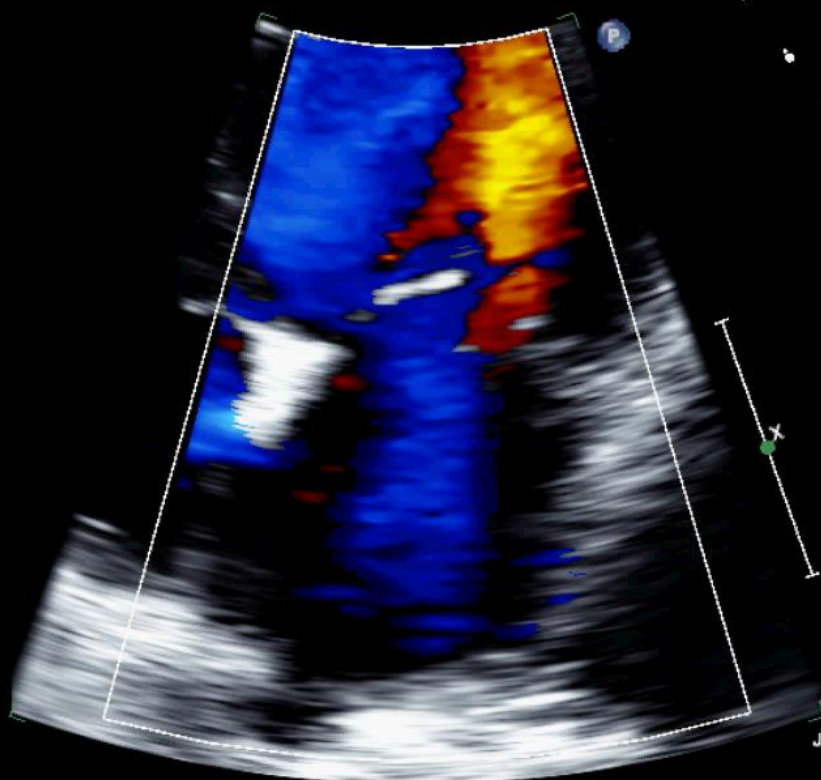
CF

70%
2.3MHz
WF High
Med

M2 M4

+66.4

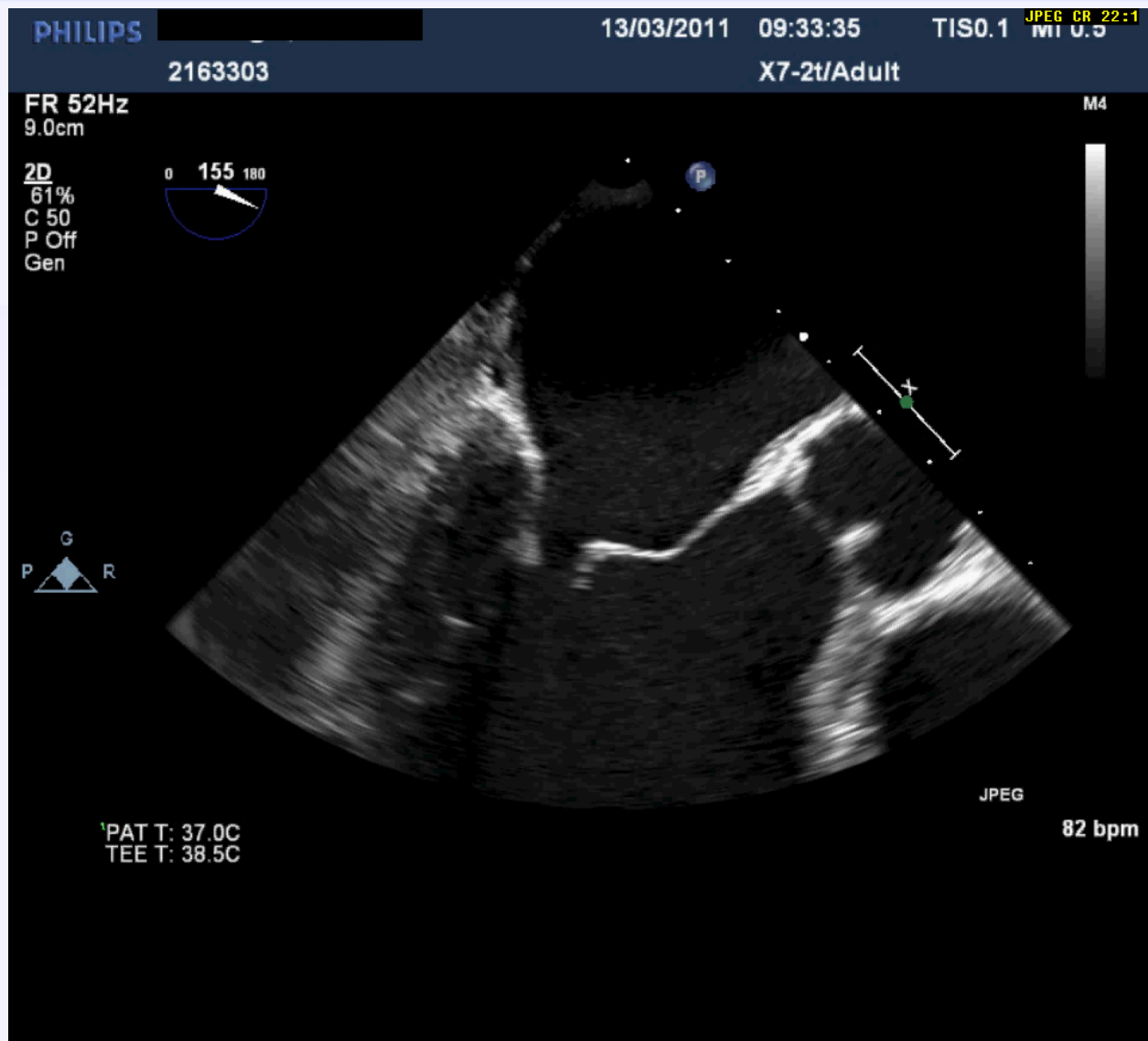
-66.4
cm/s

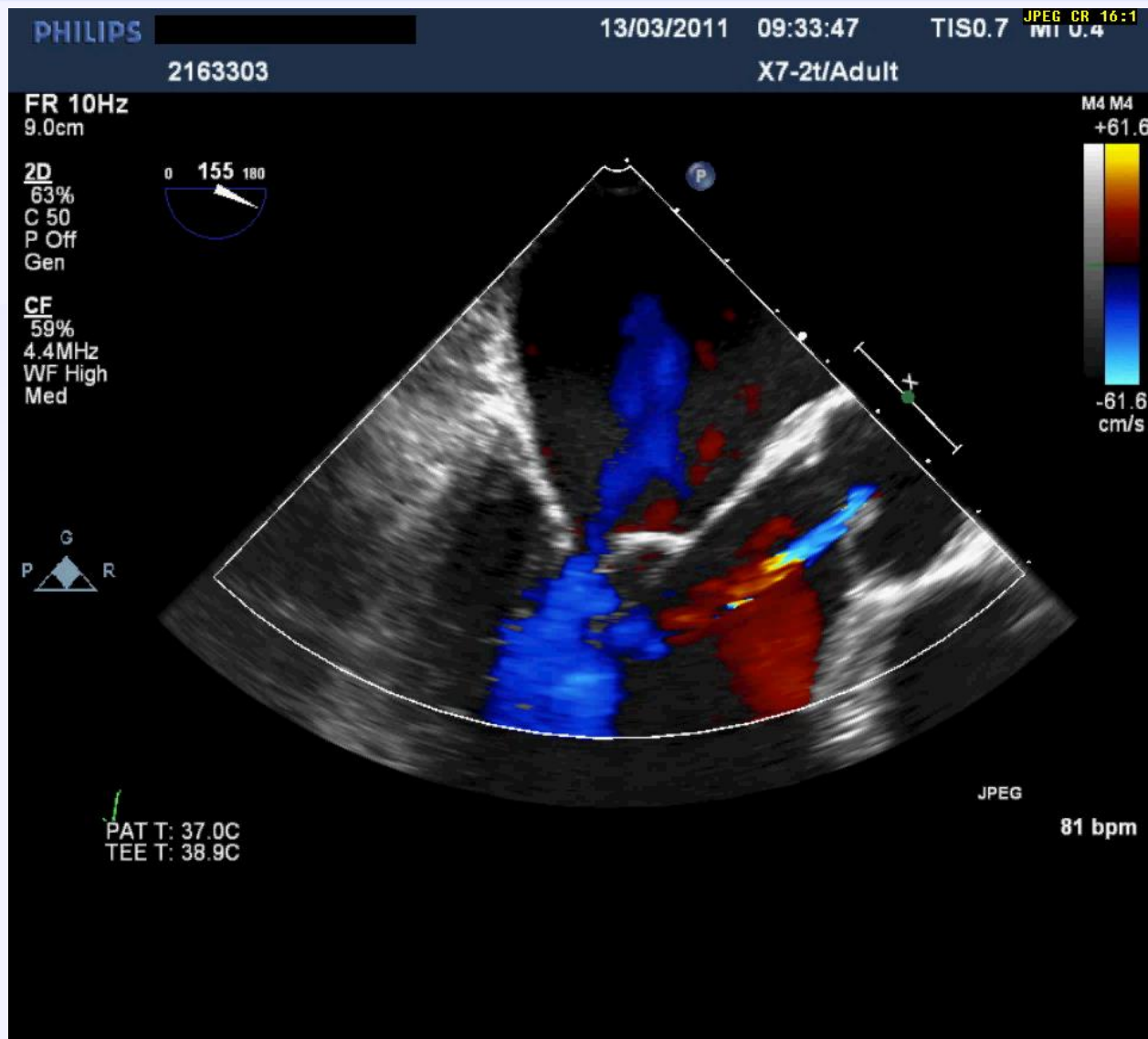


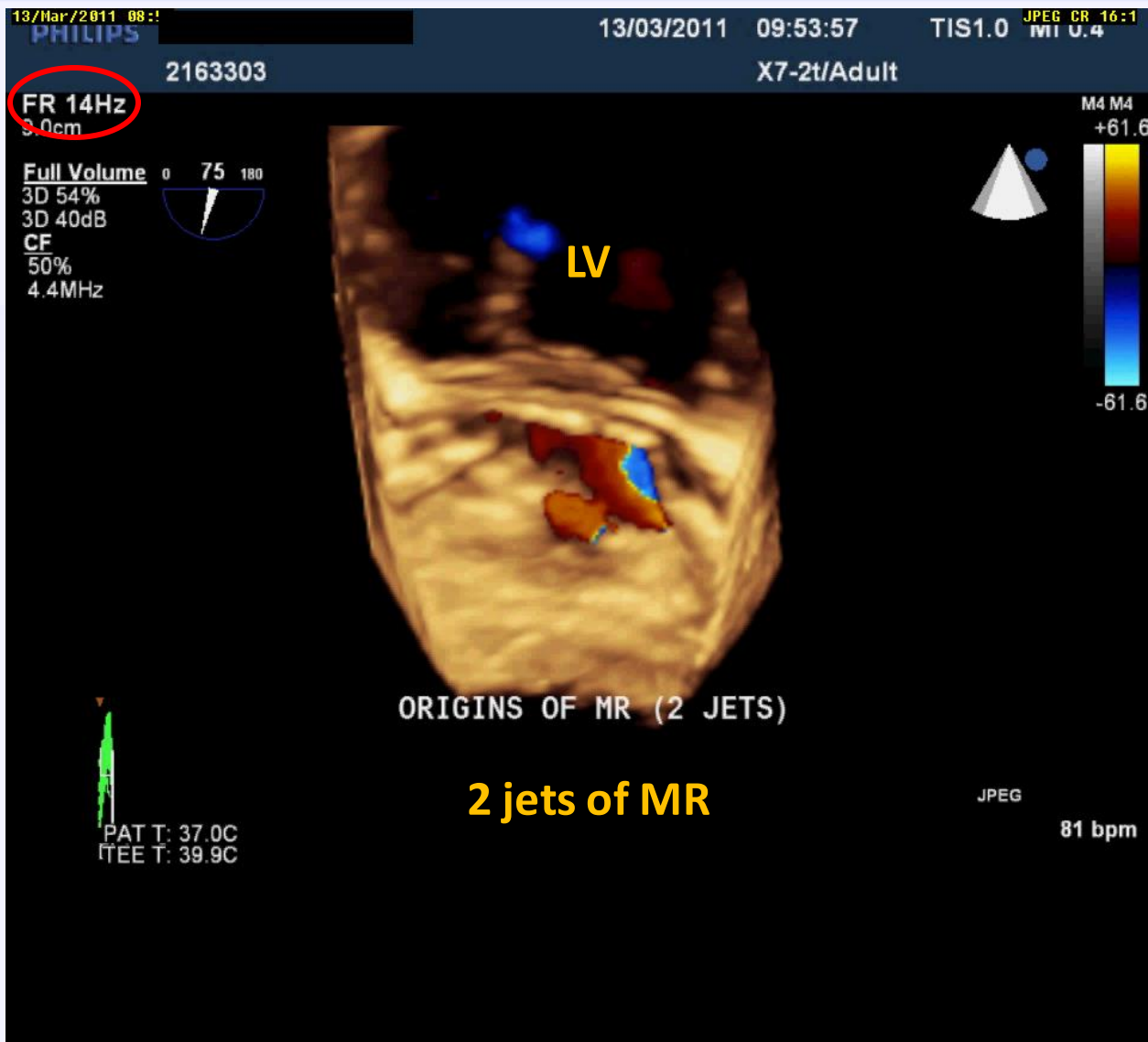
JPEG

89 bpm

TEE prior to Cath lab.







PHILIPS

2163303

13/03/2011 09:53:57

TIS1.0 JPEG CR 16:1 MI 0.4

X7-2t/Adult

FR 14Hz
9.0cm

Full Volume 0 75 180
3D 54%
3D 40dB
CF
50%
4.4MHz

M4 M4
+61.6

-61.6

ORIGINS

PAT T: 37.0C
TEE T: 39.9C

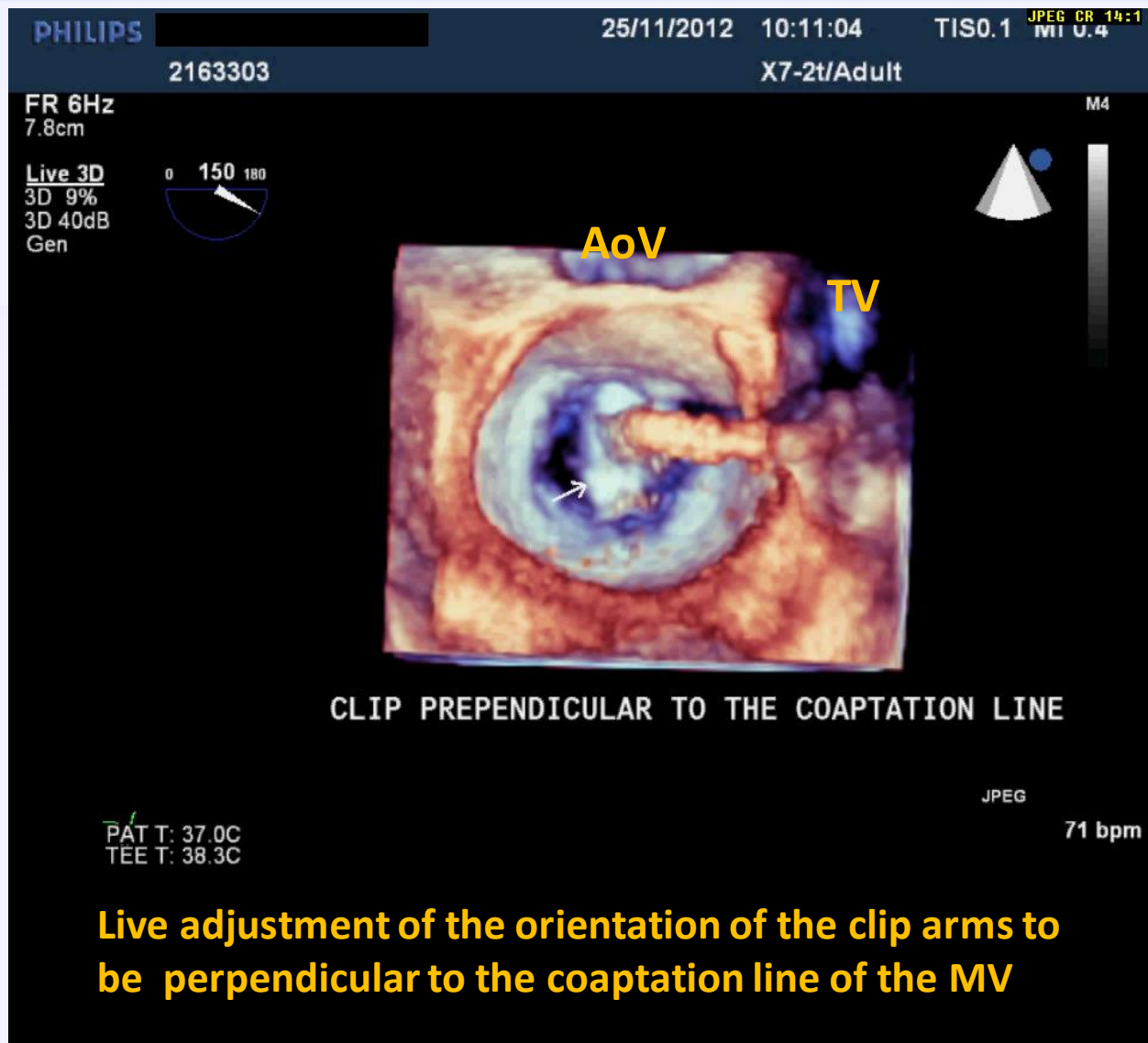
JPEG

81 hnm
3 of 9

TEE in the Cath lab during procedure



Note: Clip arms are open but are not perpendicular to the coaptation line of the MV



Live adjustment of the orientation of the clip arms to be perpendicular to the coaptation line of the MV

25/Nov/2012 08:

25/11/2012 10:11:04

TIS0.1 MI 0.4

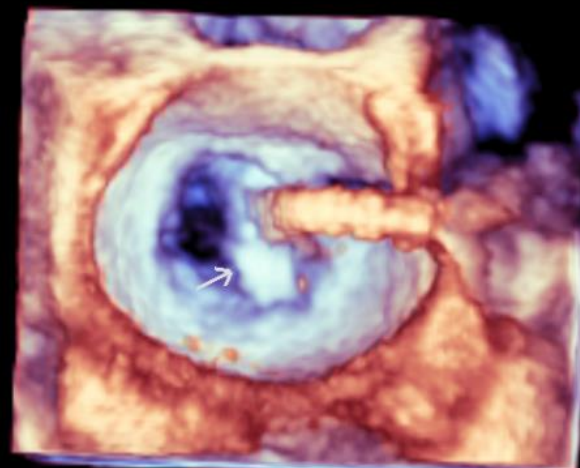
PHILIPS
AO/65M 2163303

X7-2t/Adult

FR 6Hz
7.8cm

M4

Live 3D
3D 9%
3D 40dB
Gen



CLIP PREPENDICULAR TO THE COAPTATION LINE

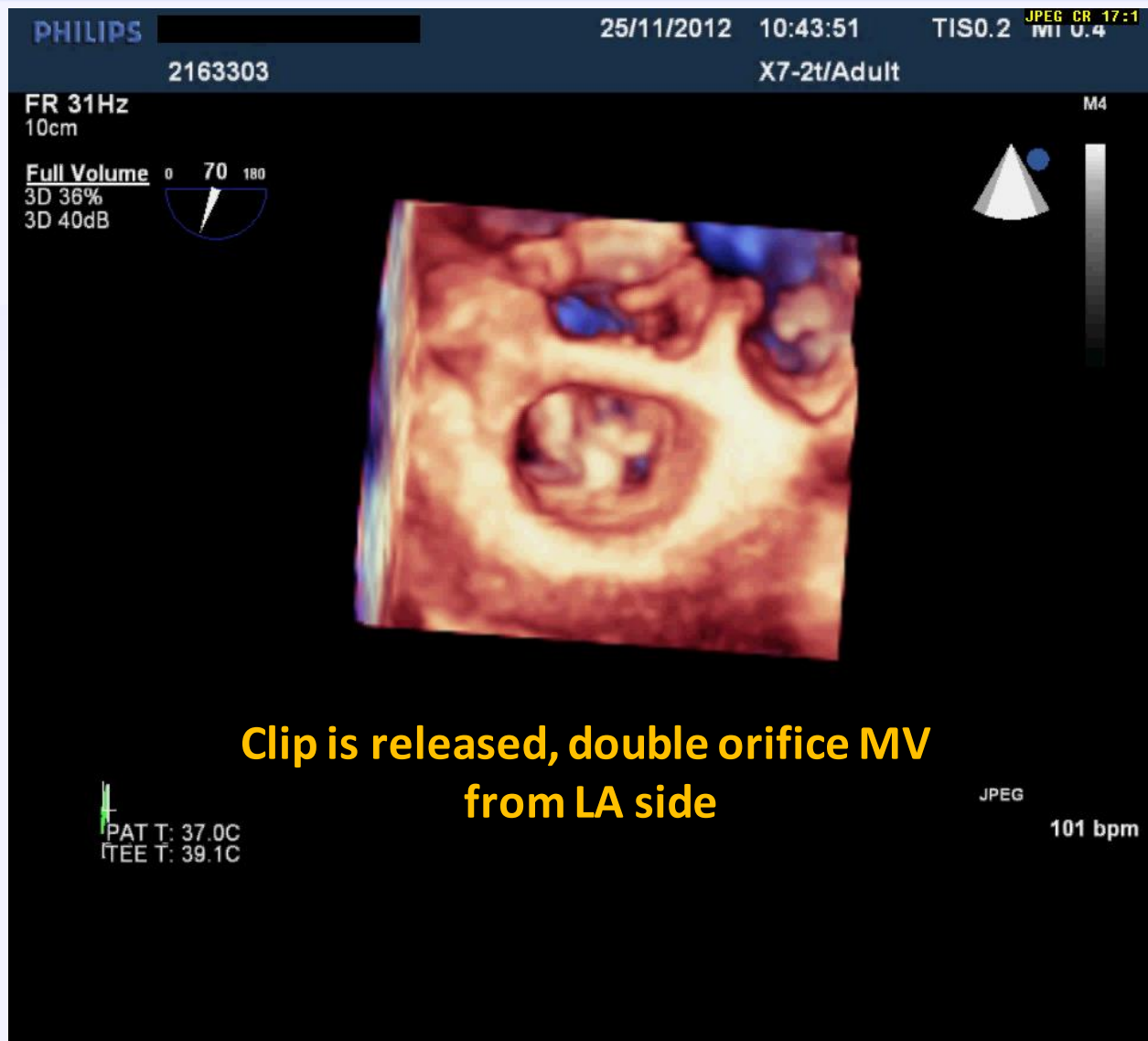
F# 8

49

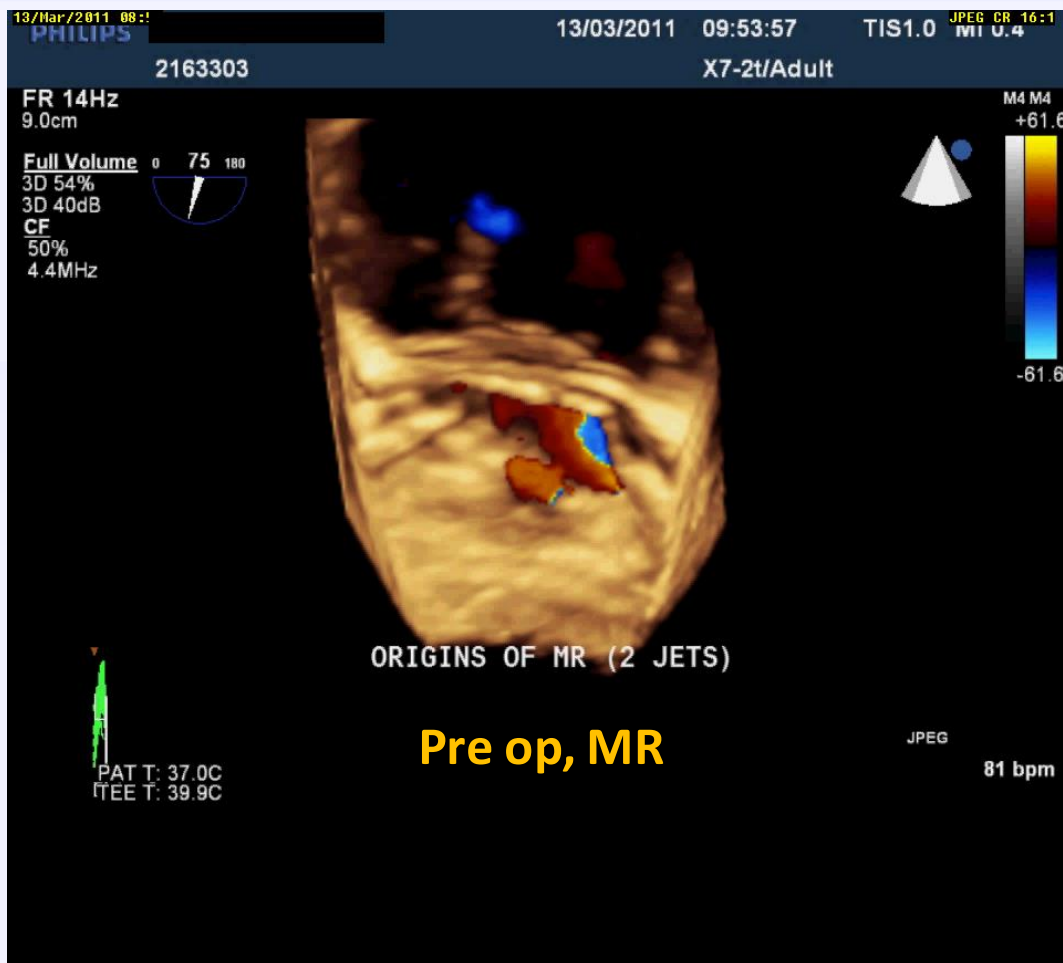
PAT T: 37.0C
TEE T: 38.3C

71 bpm

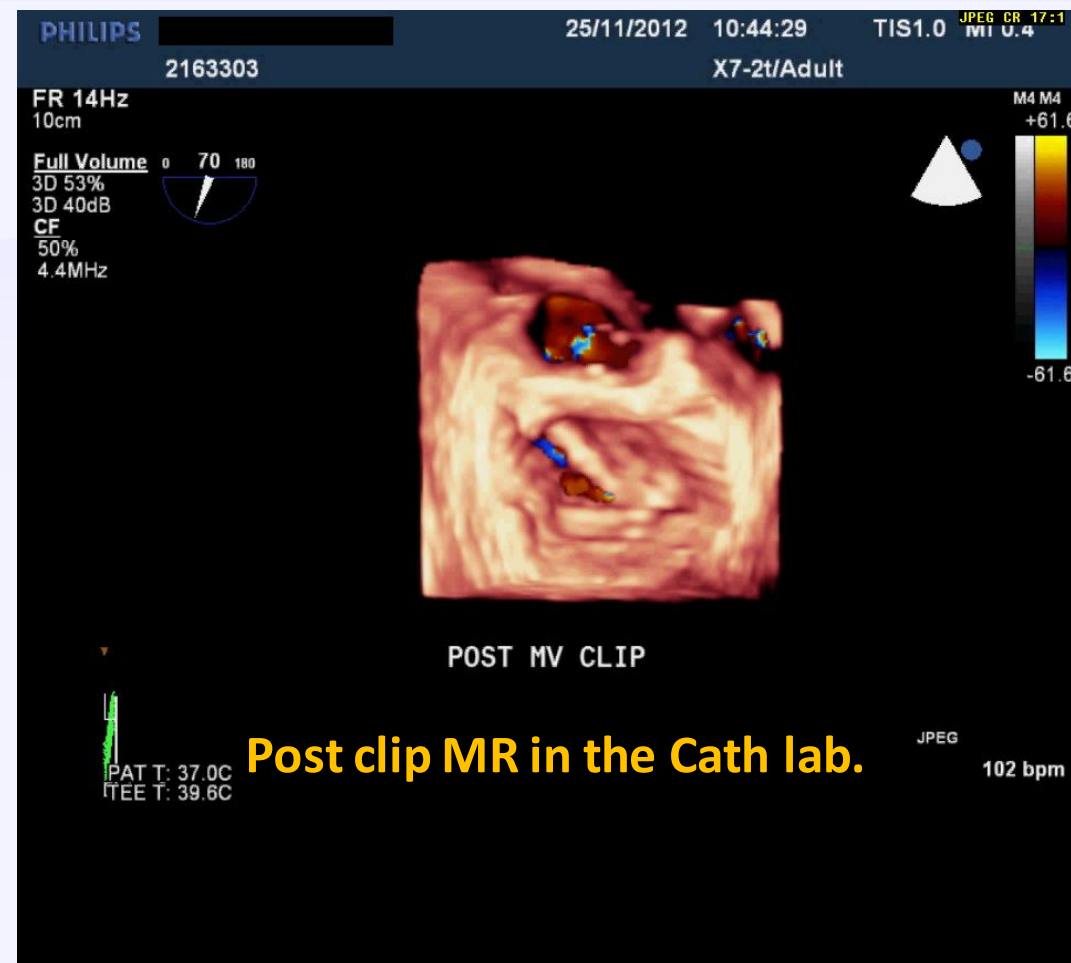
**Clip arms perpendicular to the coaptation line,
ready to dive inside the LA cavity (dive or die!!)**







Pre op, MR



Post clip MR in the Cath lab.

Latest F/U echo on 07-Jan-2014
(14 month after clip repair)

PHILIPS

07/01/2014

14:59:11

TIS2.9

JPEG CR 15:1
MI 1.1

2163303

S5-1/CARDIAC NEW

FR 18Hz
20cm

2D

71%
C 45
P Low
HPen

CF

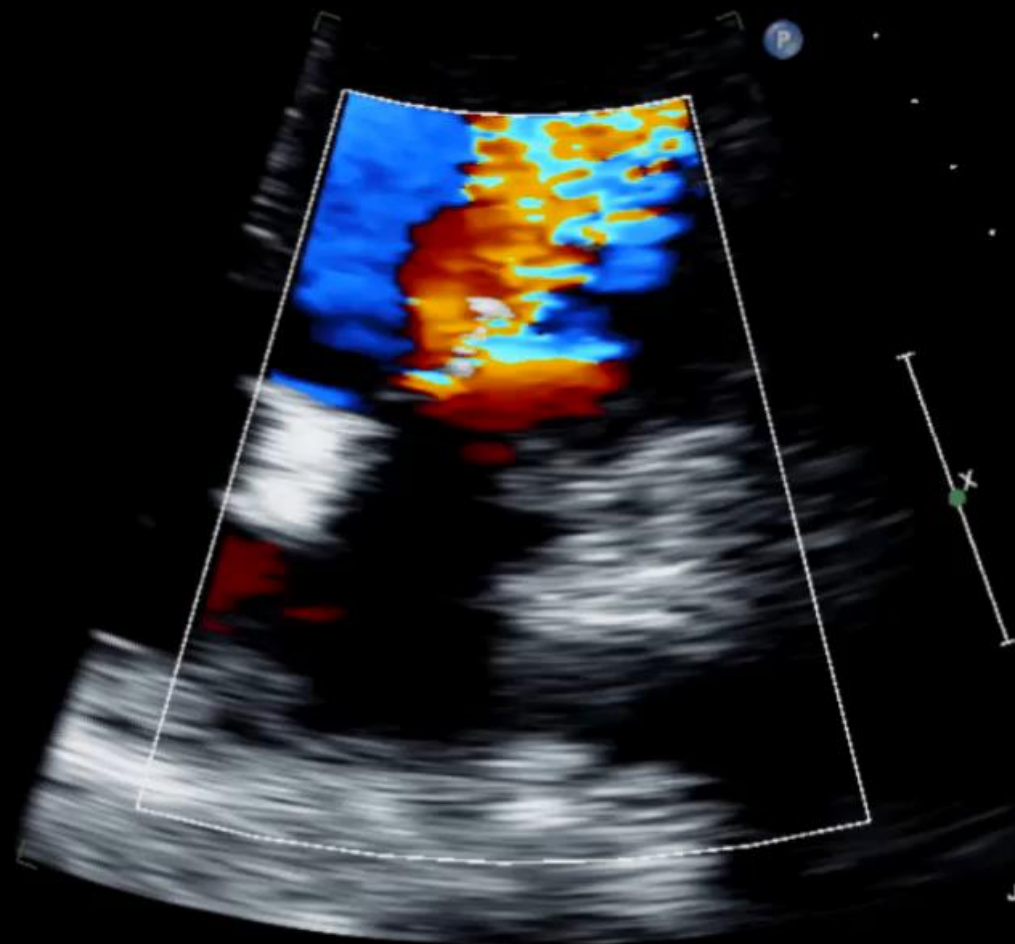
70%
2.3MHz
WF High
Med

M2 M4

+62.5

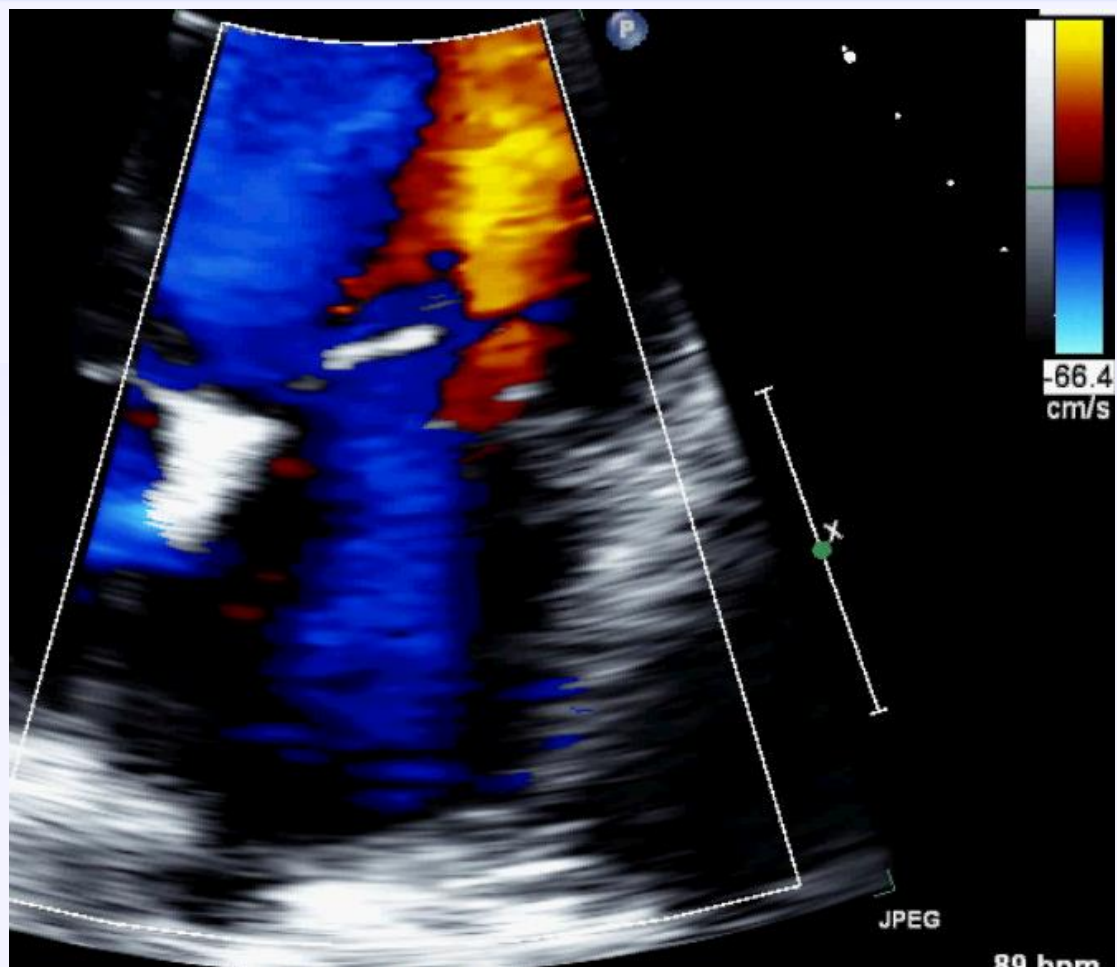
-62.5

cm/s

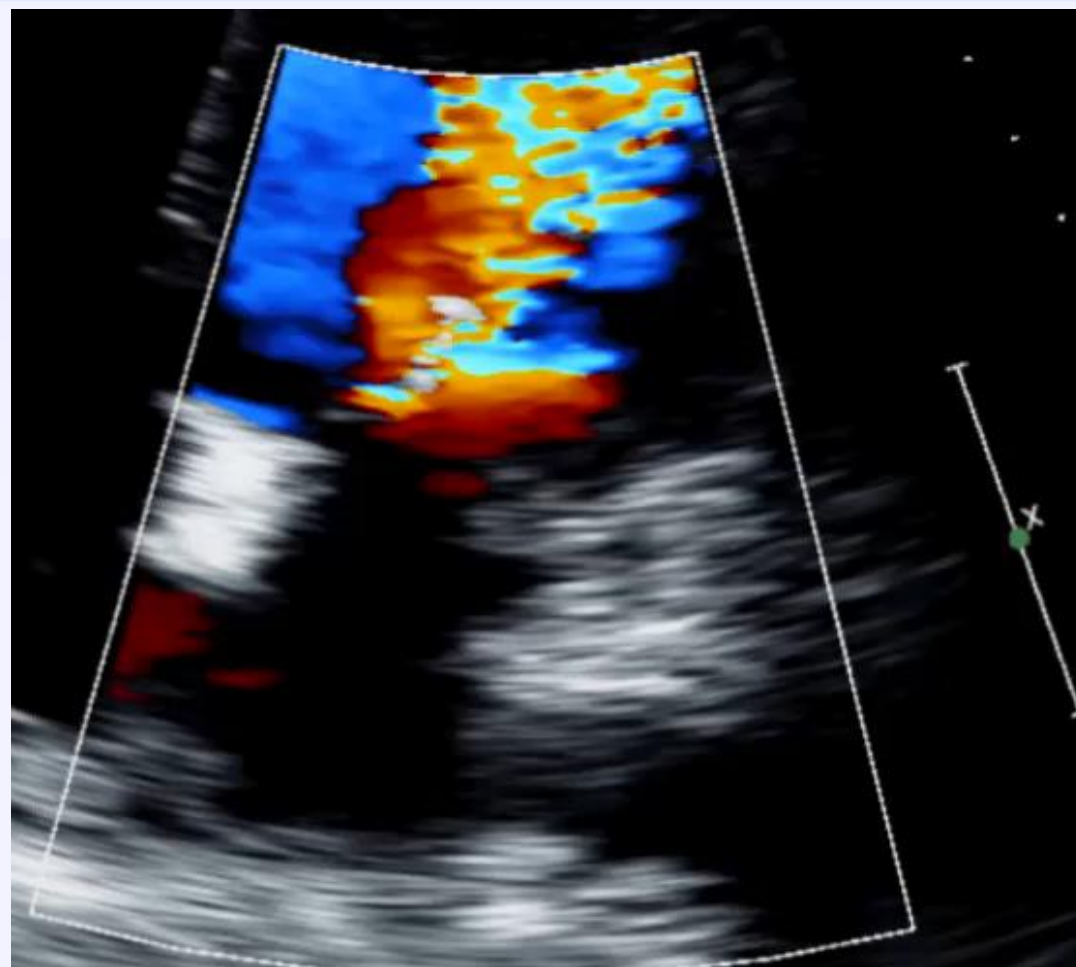


JPEG

69 bpm



Baseline echo prior to clip



MR 14 months after clip

Case 3

63-year-old female with history of severe MR
and multiple admissions for CHF

TEE in Cath lab during MitraClip repair

09/04/2014 11:30

PHILIPS

09/04/2014 12:35:28

TIS0.1

JPEG CR 18:1

2453747

X7-2t/Adult

FR 52Hz
13cm

M4

2D
72%
C 50
P Off
Gen



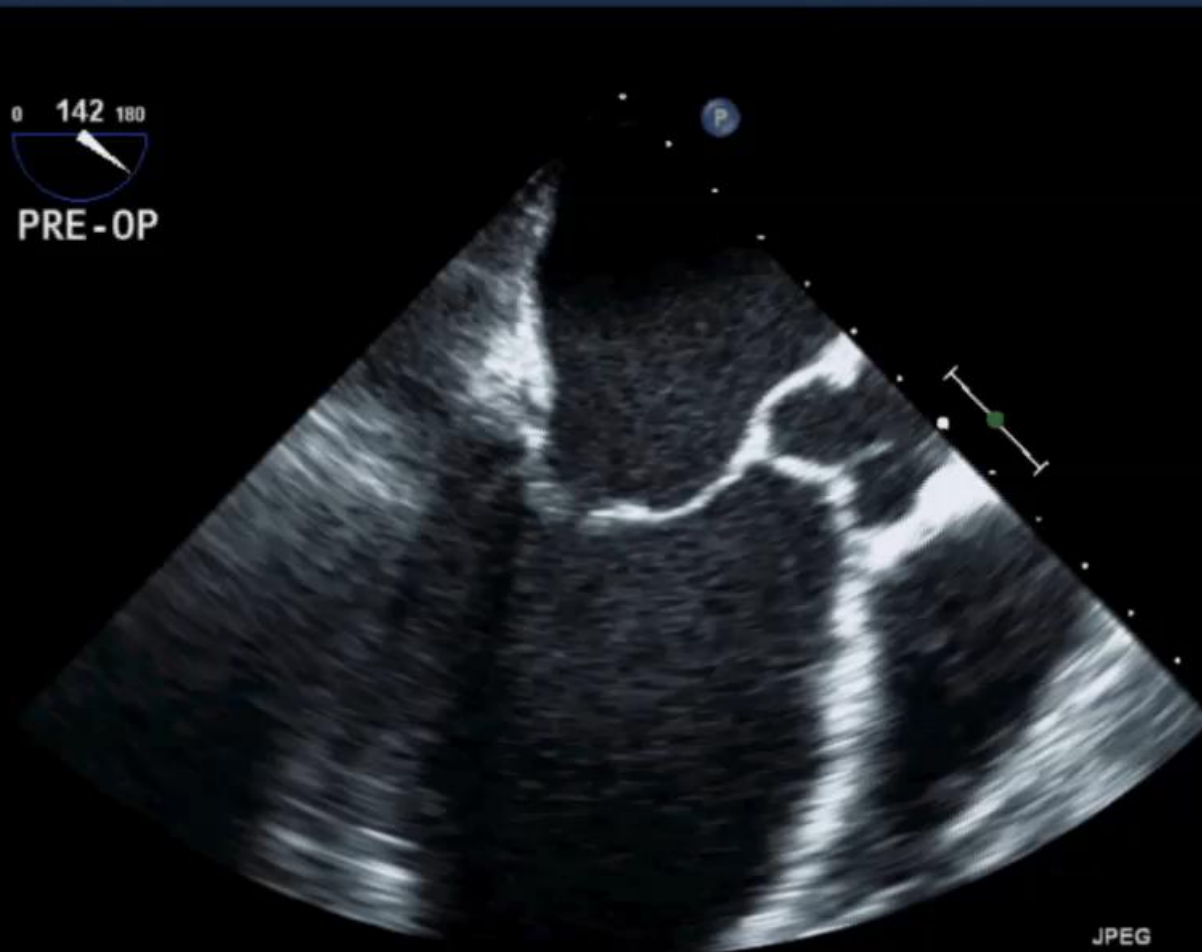
PRE-OP



PAT T: 37.0C
TEE T: 38.9C

JPEG

60 bpm



09/Apr/2014 11:--

PHILIPS

09/04/2014

12:36:04

TISO.1 MI 0.5

JBG/AO 2453747

KAMC RIYADH

X7-2t/Adult

FR 52Hz
13cm

M4

2D
72%
C 50
P Off
Gen

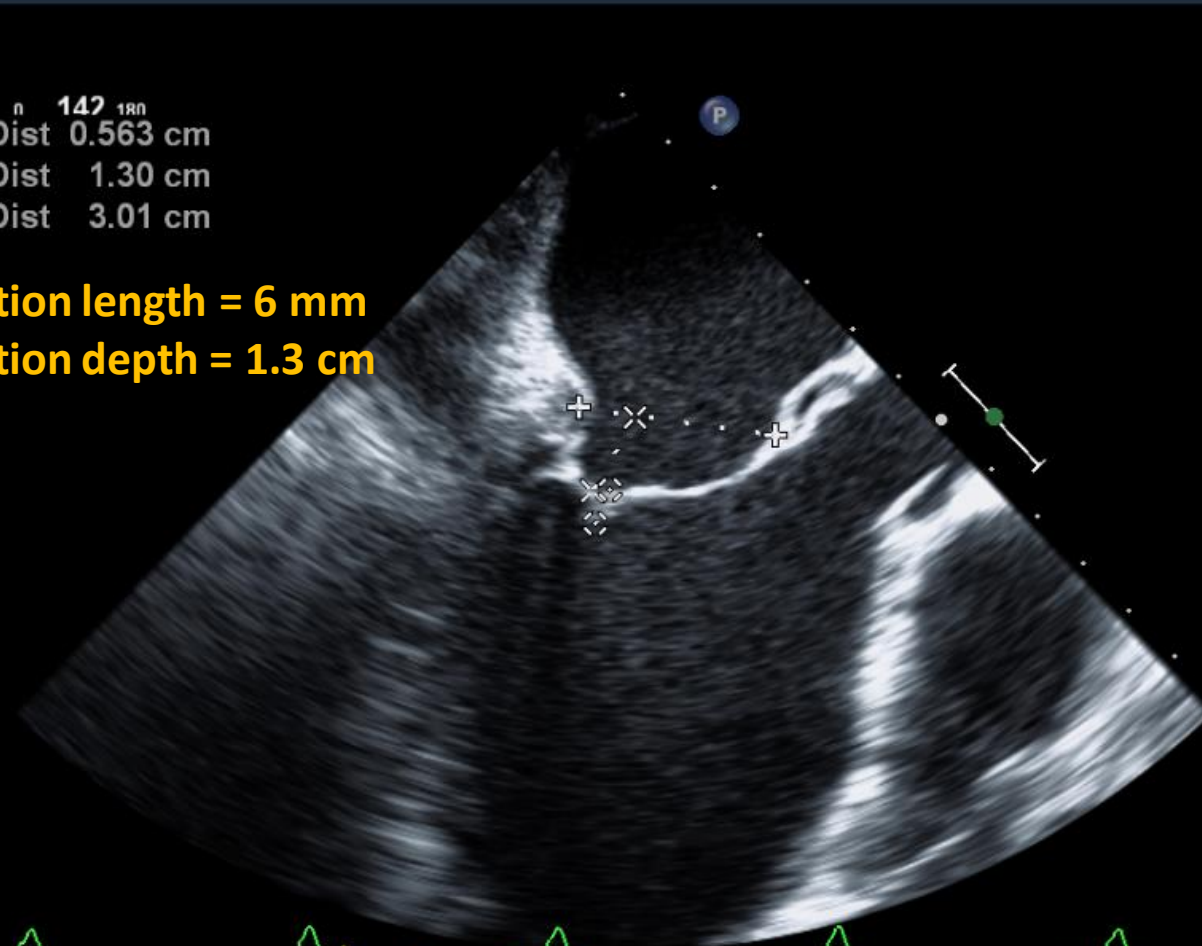
n 142 1RN
Dist 0.563 cm
Dist 1.30 cm
Dist 3.01 cm

Coaptation length = 6 mm
Coaptation depth = 1.3 cm



PAT T: 37.0C
TEE T: 38.0C

60bpm



09/04/2014 11:44

PHILIPS

09/04/2014 12:36:30

TIS0.7

JPEG CR 15:1
MI 0.5

2453747

X7-2t/Adult

FR 10Hz
12cm

2D

73%
C 50
P Off
Gen

0 142 180

PRE-OP

CF

60%
4.4MHz
WF High
Med

M4 M4

+49.3

-49.3

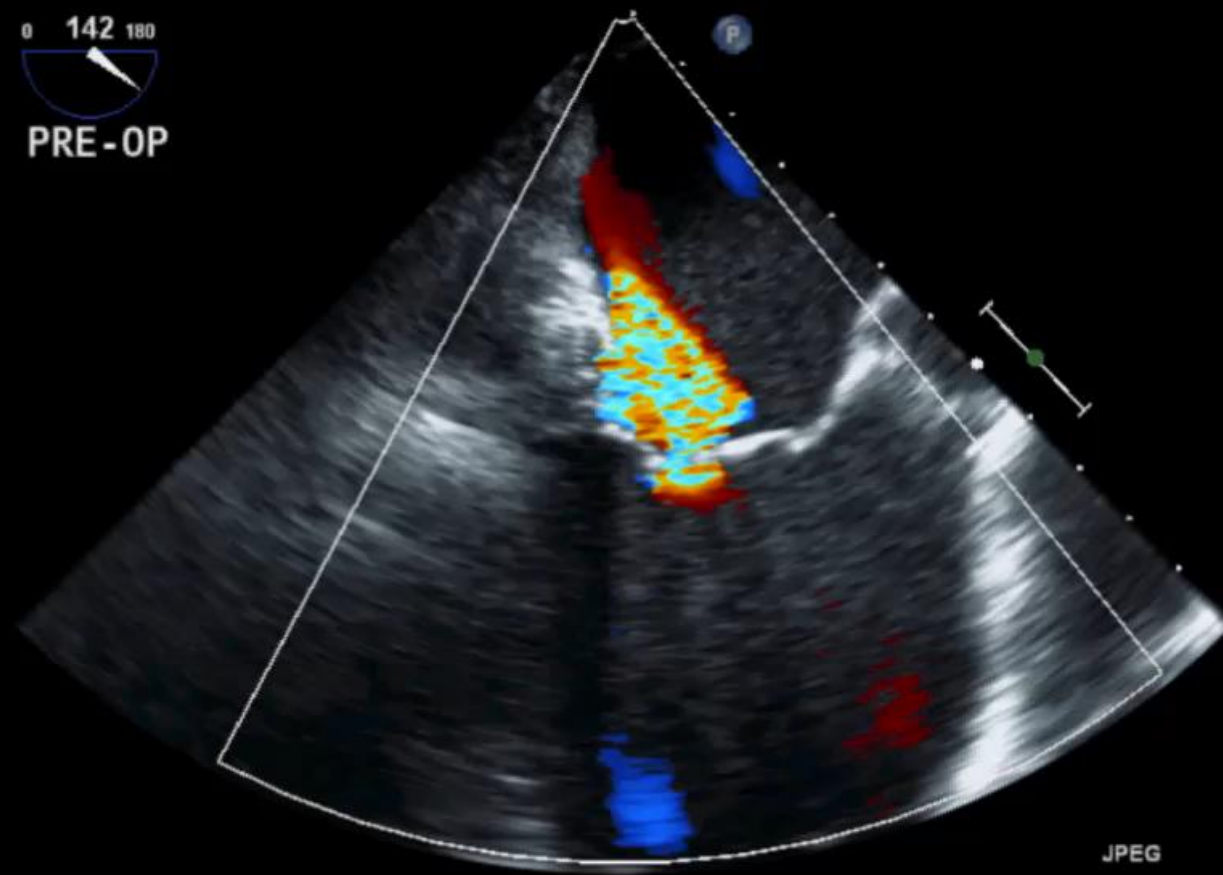
cm/s



PAT T: 37.0C
TEE T: 38.0C

JPEG

60 bpm



09/Apr/2014 11:27

PHILIPS

09/04/2014

12:37:38

TISO.5 MI 0.4

JBG/AO

2453747

KAMC RIYADH

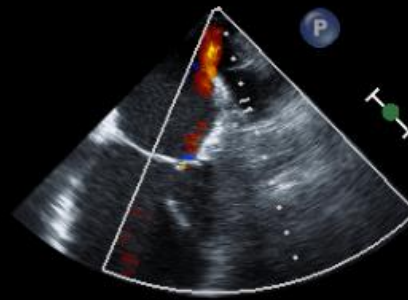
X7-2t/Adult

FR 11Hz
11cm

2D
72%
C 50
P Off
Gen

CF
60%
4.4MHz
WF High
Med

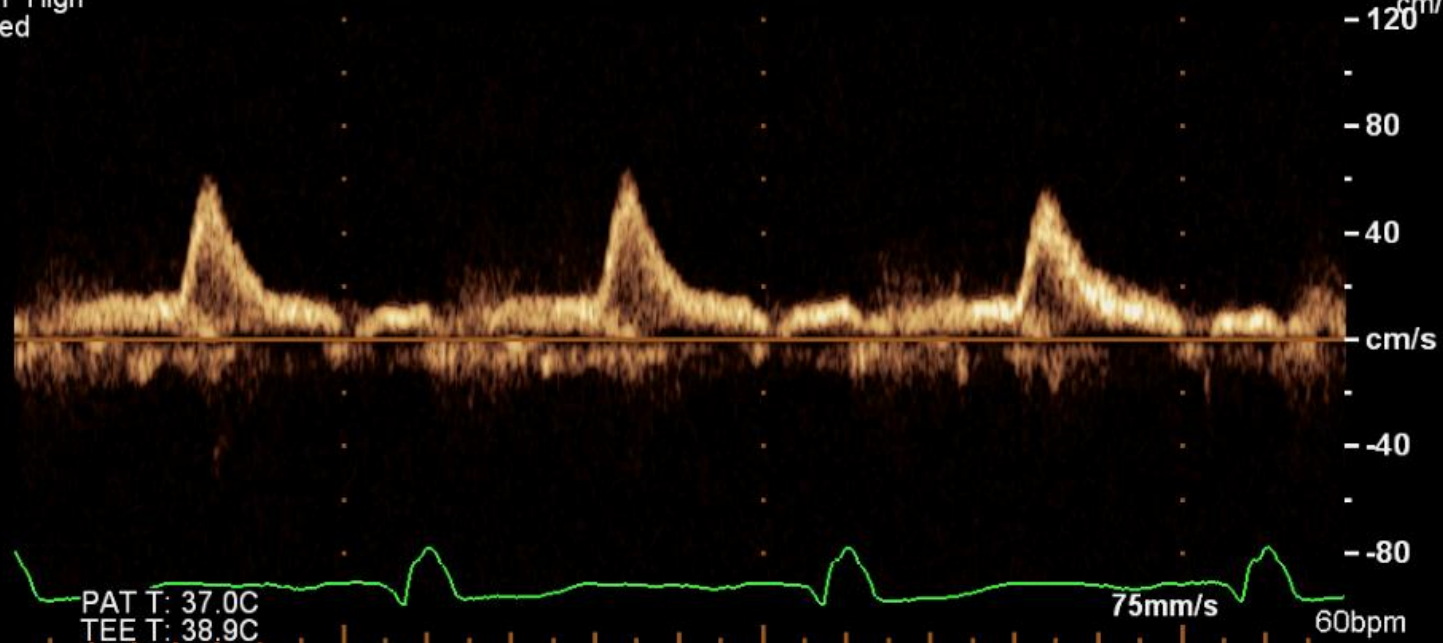
0 18 180
PRE-OP



LUPV

PW
80%
2.9MHz
WF 150Hz
SV 4.0mm
3.9cm

M4 M4
+53.5
-53.5
cm/s



PAT T: 37.0C
TEE T: 38.9C

75mm/s

60bpm

09/04/2014 11:2

PHILIPS

09/04/2014 12:40:55

TISO.2

JPEG CR 12:1

2453747

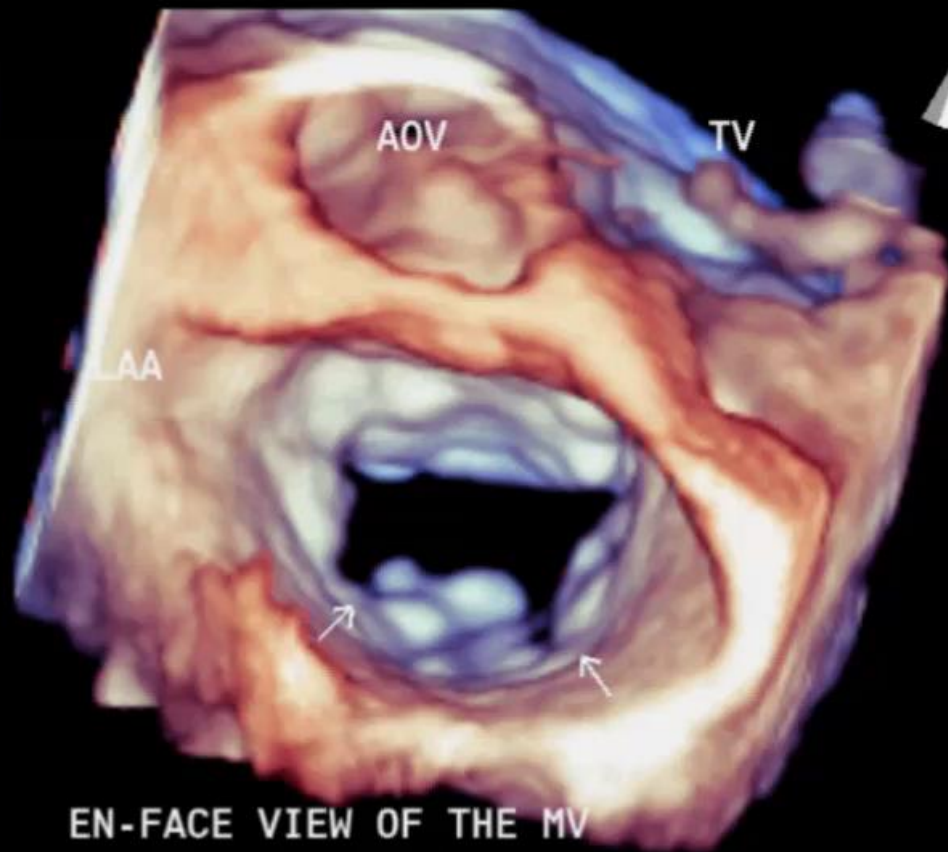
X7-2t/Adult

FR 9Hz
9.5cm

Live 3D
3D 14%
3D 0dB
Gen



M4



JPEG

60 bpm

PAT T: 37.0C
TEE T: 39.2C

09/04/2014 11:00

PHILIPS

09/04/2014 12:40:30

TISO.9

JPEG CR 15:1
MI 0.4

2453747

X7-2t/Adult

FR 13Hz
11cm

Full Volume 0 75 100

3D 6%

3D 13dB

CF

50%

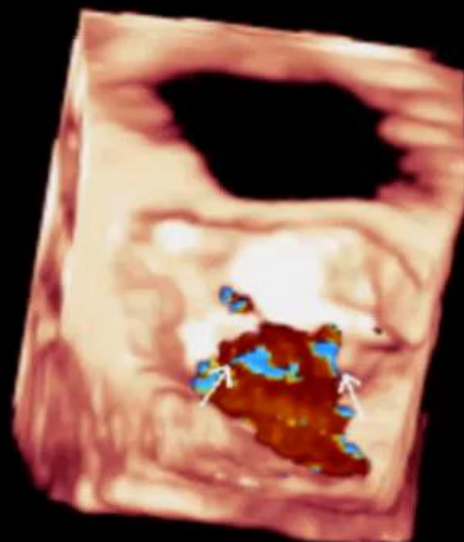
4.4MHz



M4 M4

+54.9

-54.9



SURGICAL (EN-FACE) VIEW OF THE MV

DEEP INDENTATIONS (CLEFT?)



PAT T: 37.0C
TEE T: 39.7C

JPEG

60 bpm

09/Apr/2014 11:00

PHILIPS

09/04/2014 12:42:13

TISO.3 MI 0.0

JBG/AO

2453747

KAMC RIYADH

X7-2t/Adult

FR 14Hz

11cm

2D

67%

C 50

P Off

Gen

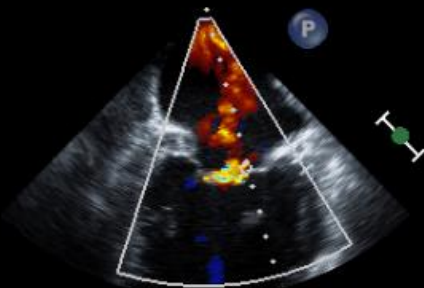
CF

60%

4.4MHz

WF High

Med



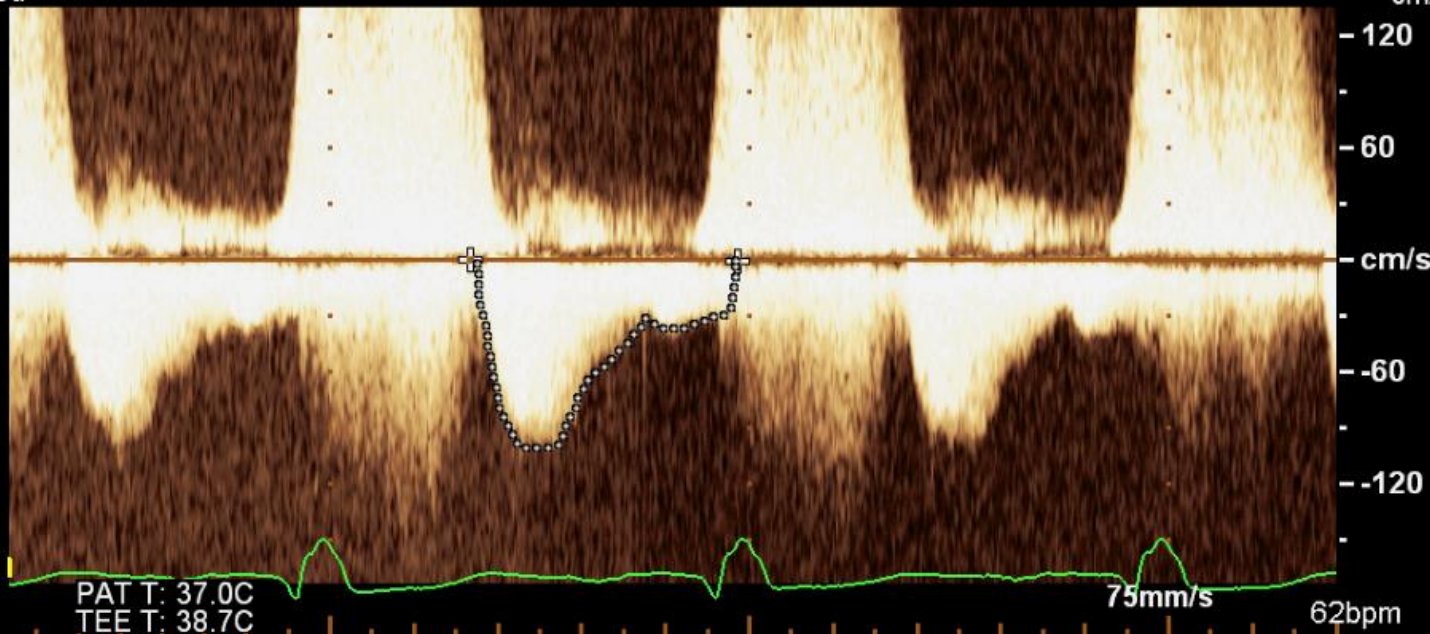
Vmax 101 cm/s CW
Vmean 56.2 cm/s 80%
Max PG 4 mmHg 2.5MHz
Mean PG 2 mmHg WF 225Hz
VTI 36.0 cm

M4 M4

+54.9

-54.9

cm/s



Septal puncture



09/Apr/2014 11:00

PHILIPS

09/04/2014

12:53:42

TIS0.1 MI 0.5

JBG/AO 2453747

KAMC RIYADH

X7-2t/Adult

FR 52Hz
11cm

M4

2D

69%

C 50

P Off

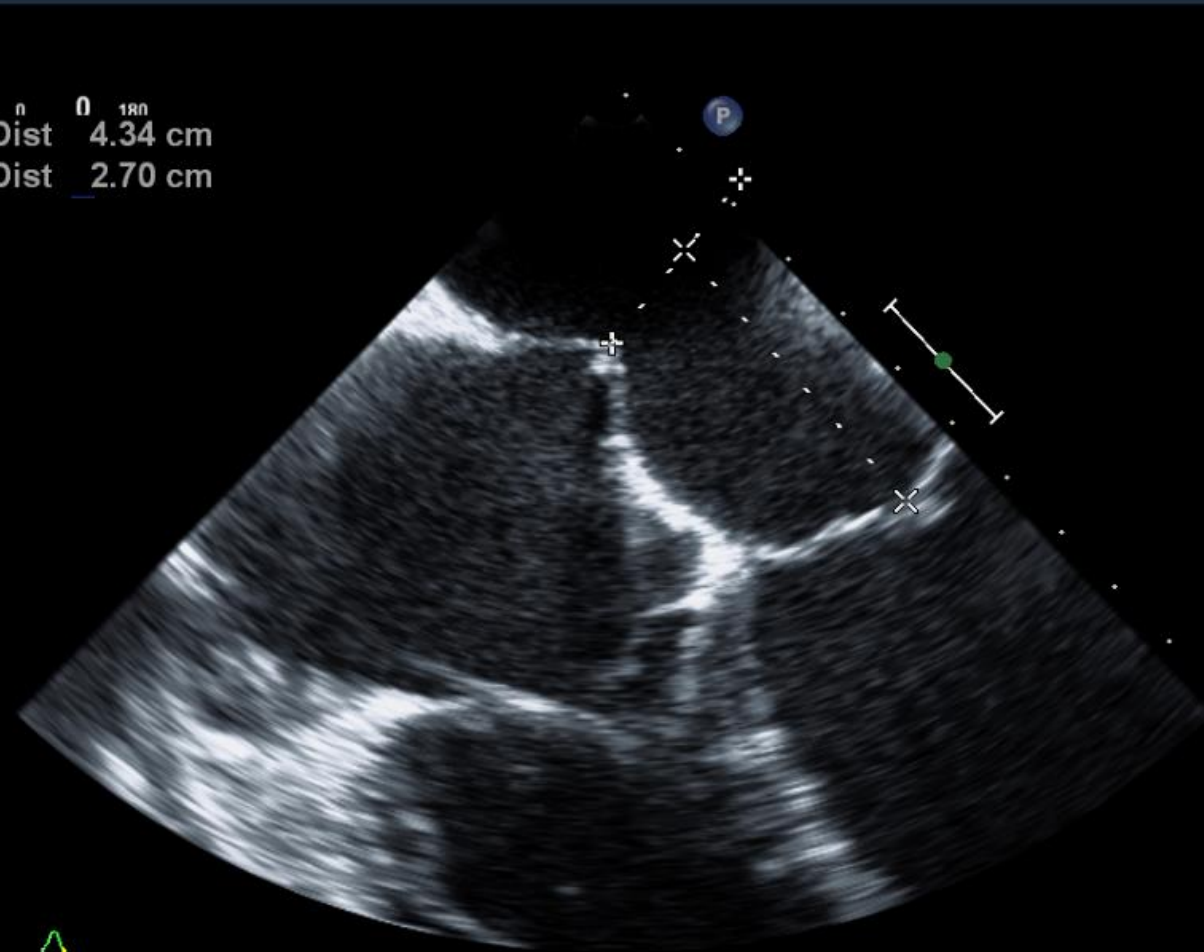
Gen

Dist 4.34 cm
Dist 2.70 cm



PAT T: 37.0C
TEE T: 37.8C

60bpm



09/04/2014 11:11

PHILIPS

09/04/2014 12:54:00

TISO.1

JPEG CR 18:1

2453747

X7-2t/Adult

FR 52Hz
11cm

M4

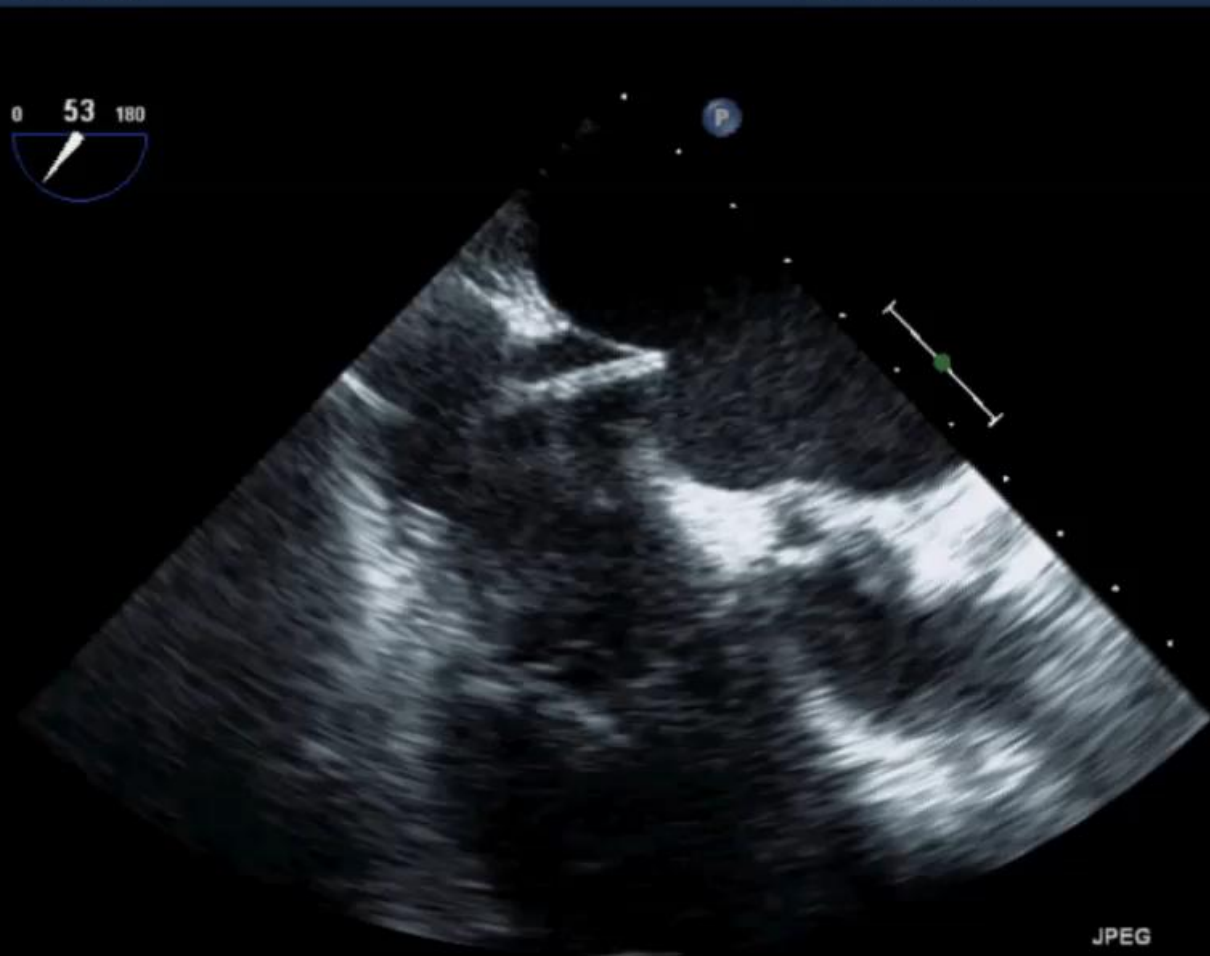
2D
69%
C 50
P Off
Gen



PAT T: 37.0C
TEE T: 38.2C

JPEG

60 bpm



09/Apr/2014 11:20

PHILIPS

09/04/2014

12:54:19

TISO.1 MI 0.5

JBG/AO

2453747

KAMC RIYADH

X7-2t/Adult

FR 52Hz

11cm

M4

2D

69%

C 50

P Off

Gen

Dist 1.98 cm



PAT T: 37.0C
TEE T: 38.0C

60bpm

09/Apr/2014 11:20

PHILIPS

09/04/2014

12:55:13

TISO.1 MI 0.5

JBG/AO 2453747

KAMC RIYADH

X7-2t/Adult

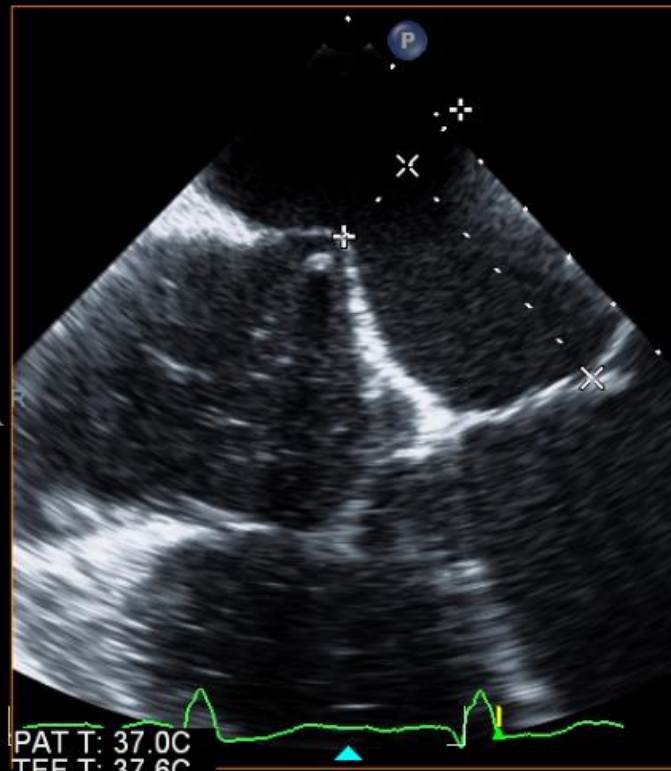
FR 30Hz
11cm

xPlane

69% Dist 2.28 cm
69% Dist 4.33 cm
50dB Dist 2.65 cm
P Off
Gen

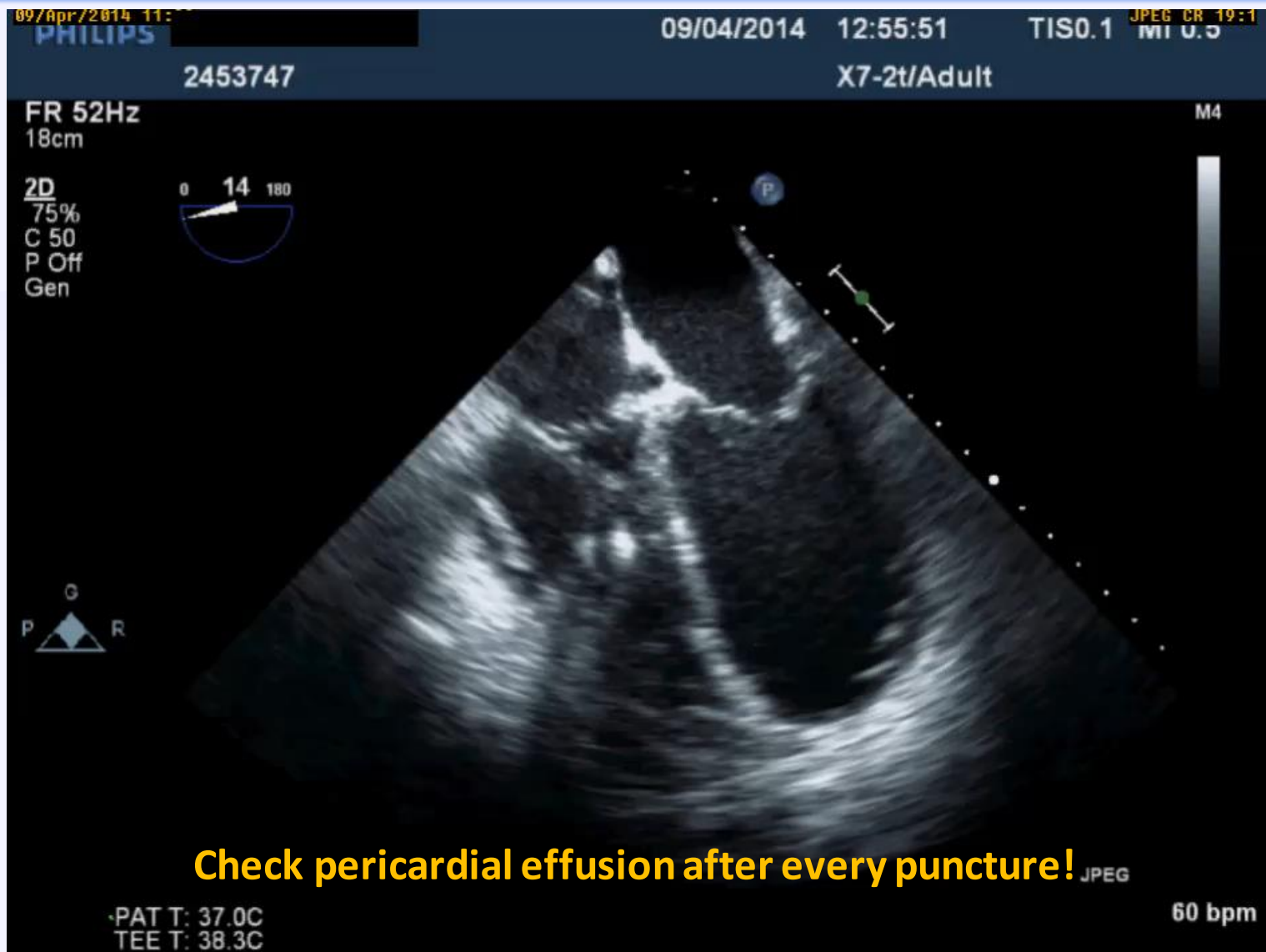


M4



PAT T: 37.0C
TEE T: 37.6C







Safe place for parking of left side catheter is RUPV, not LAA !

09/04/2014 11:40

PHILIPS

09/04/2014 13:10:44

TISO.1

JPEG CR 10:1

2453747

X7-2t/Adult

FR 5Hz
5.5cm

5 mm

Live 3D
3D 13%
3D 0dB
Gen



M4



RA

LA

GUIDING CATHETER IS TOO DEEP IN LA

JPEG

PAT T: 37.0C
TEE T: 38.6C

81 bpm

09/04/2014 11:2

PHILIPS

09/04/2014 13:12:50

TISO.1

JPEG CR 17:1

2453747

X7-2t/Adult

FR 52Hz
11cm

M4

2D
67%
C 50
P Off
Gen



DILATOR IS TAKEN OUT

JPEG

PAT T: 37.0C
TEE T: 38.0C

60 bpm

09/Apr/2014 11:

PHILIPS

09/04/2014

13:15:15

TIS0.1 MI 0.5

JBG/AO 2453747

KAMC RIYADH

X7-2t/Adult

FR 52Hz
11cm

M4

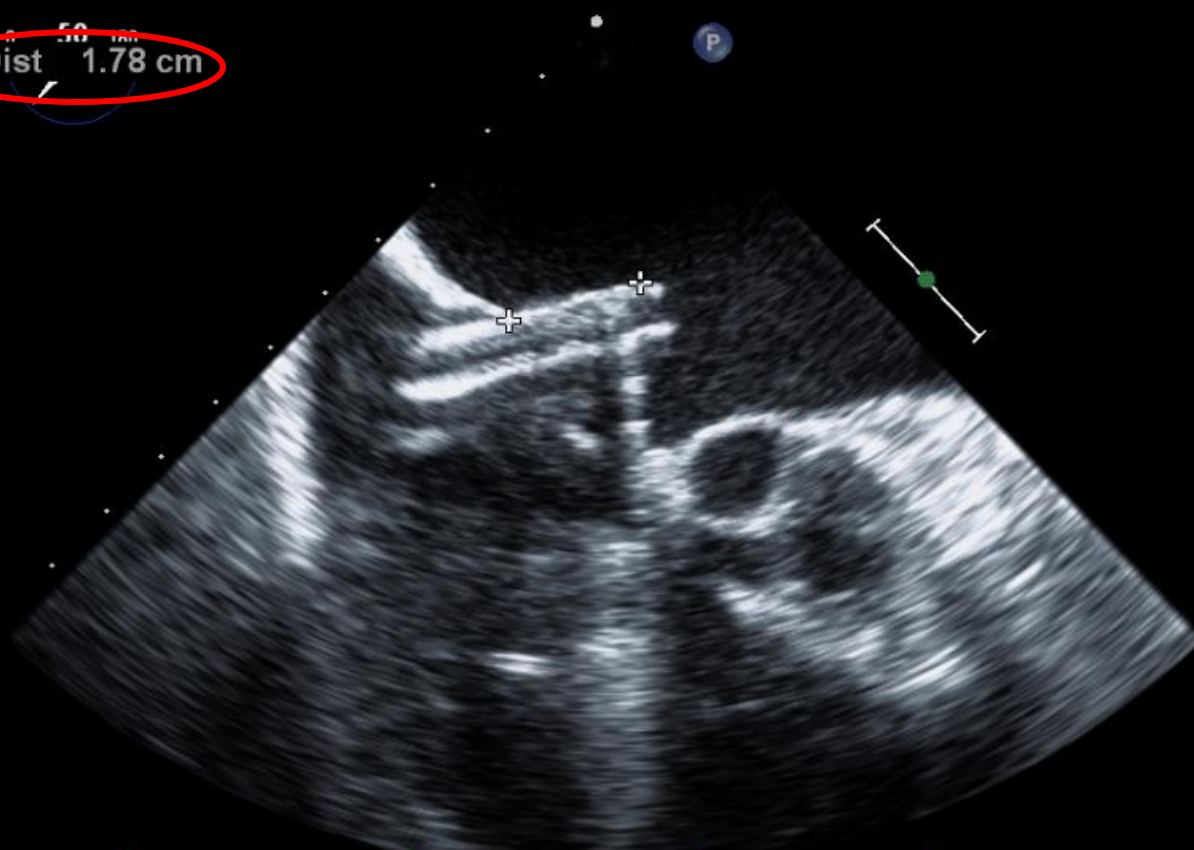
2D
67%
C 50
P Off
Gen

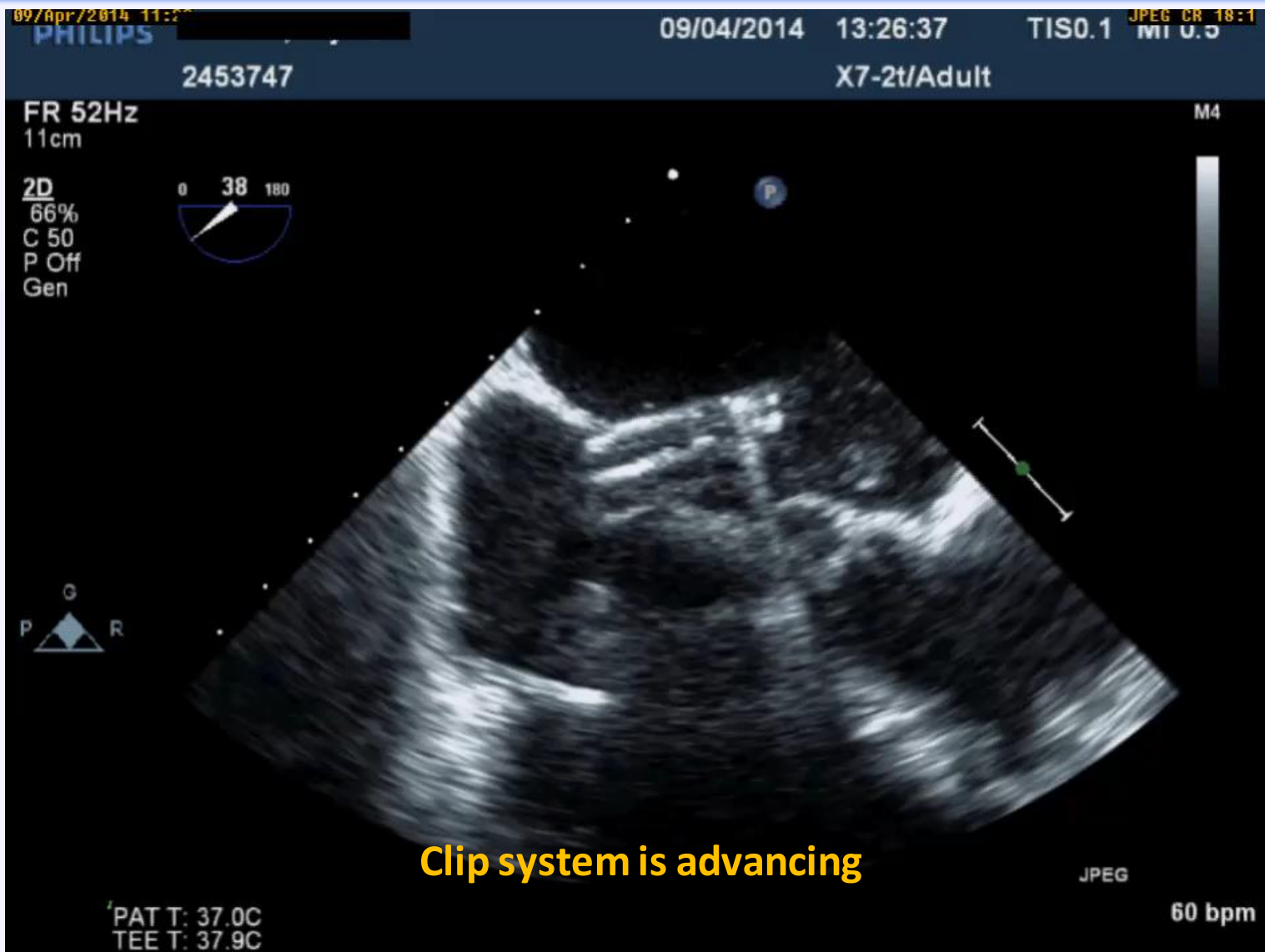
Dist 1.78 cm

G
P R

PAT T: 37.0C
TEE T: 38.0C

60bpm





09/04/2014 11:28

PHILIPS

2453747

09/04/2014 13:29:47

TISO.1

JPEG CR 17:1

X7-2t/Adult

FR 52Hz
11cm

M4

2D
68%
C 50
P Off
Gen



CLIP IN THE LAA

JPEG

PAT T: 37.0C
TEE T: 38.7C

60 bpm

09/Apr/2014 11:00

PHILIPS

09/04/2014

13:31:20

TIS0.1

JPEG CR 14:1

MI 0.5

2453747

X7-2t/Adult

FR 30Hz
11cm

xPlane
67%
67%
50dB
P Off
Gen

M4

95

-21



PAT T: 37.0C
TEE T: 38.8C



60 bpm

09/04/2014 11:2

PHILIPS

09/04/2014 13:35:17

TIS0.7

JPEG CR 15:1
MI 0.4

2453747

X7-2t/Adult

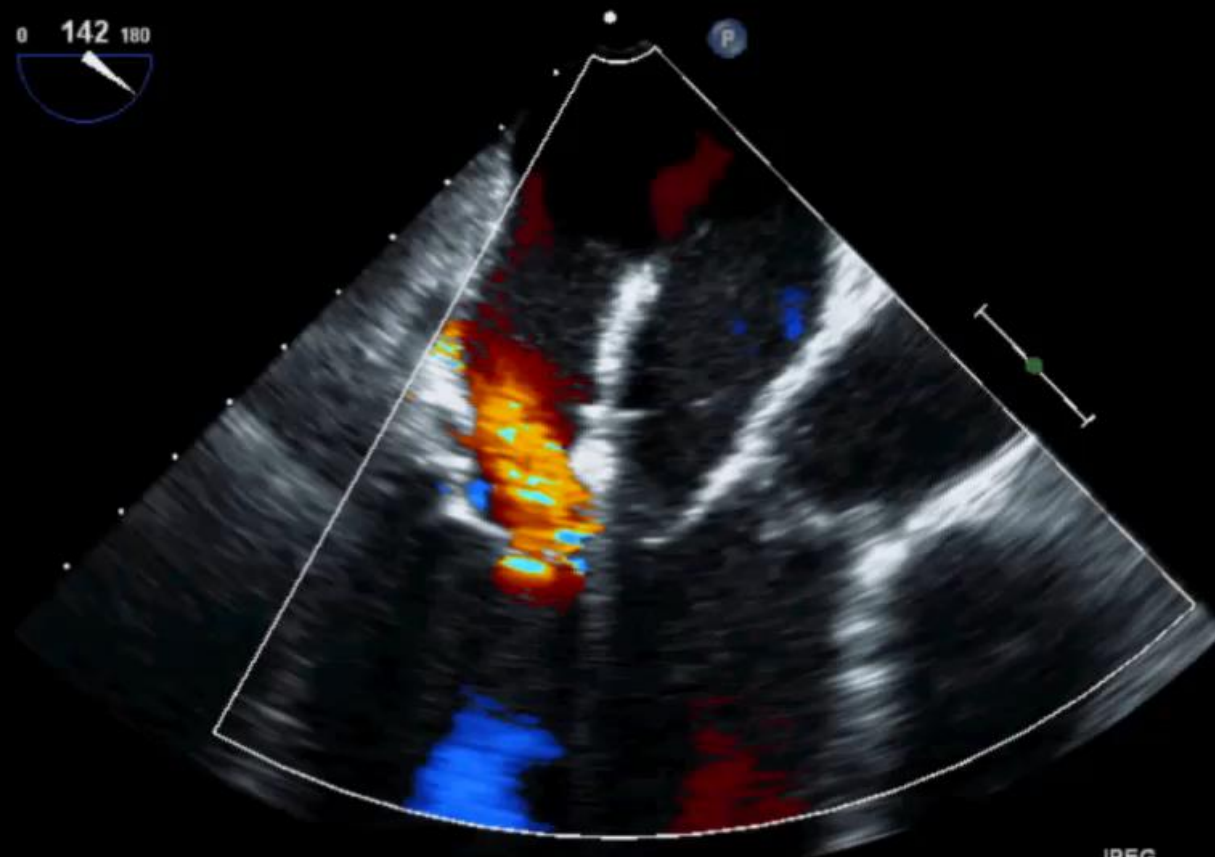
FR 10Hz
11cm

2D

68%
C 50
P Off
Gen

CF

60%
4.4MHz
WF High
Med



M4 M4

+54.9

-54.9

cm/s

JPEG

PAT T: 37.0C
TEE T: 39.0C

60 bpm

09/04/2014 11:22

PHILIPS

09/04/2014 13:38:31

TIS0.1

JPEG CR 18:1

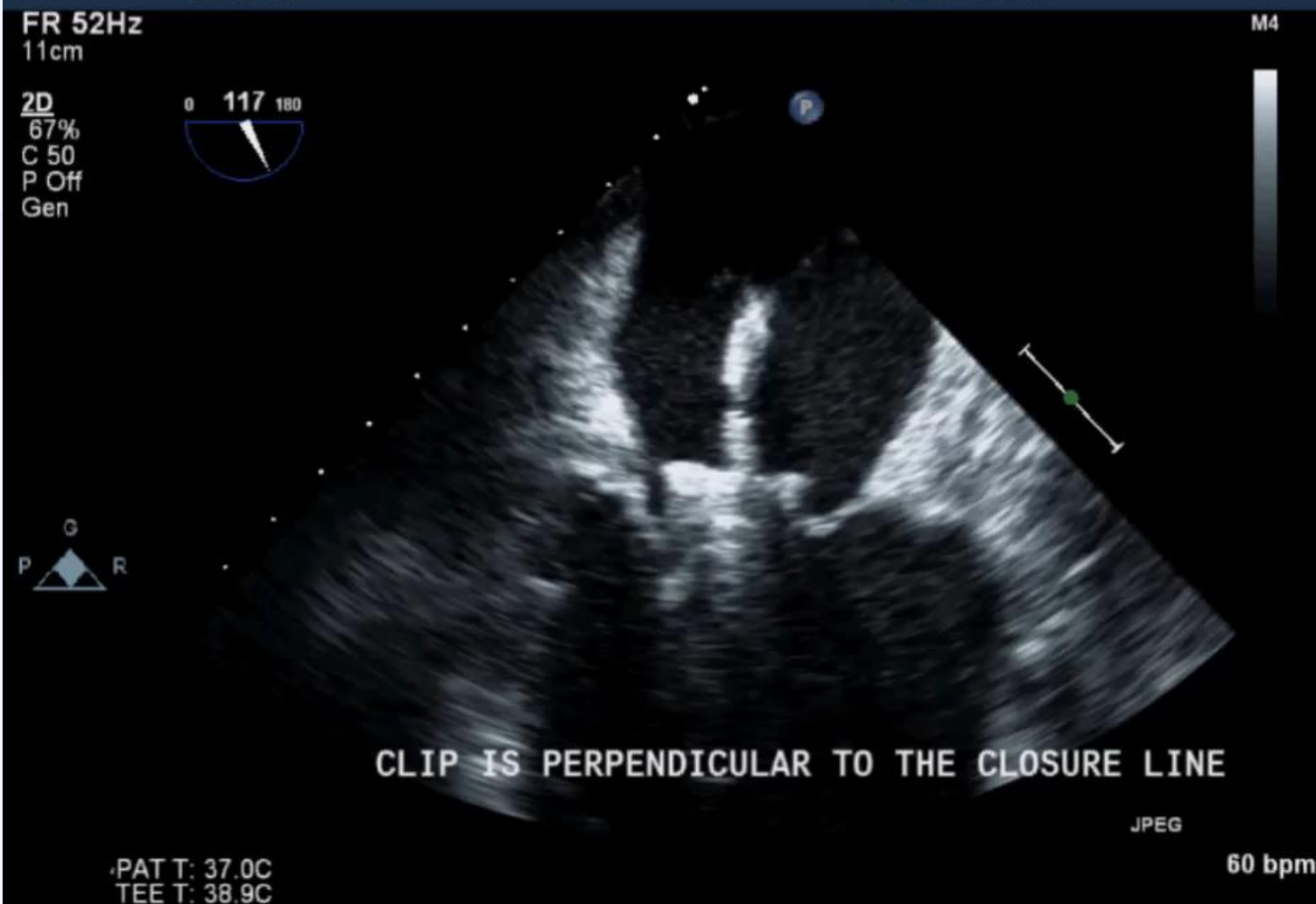
2453747

X7-2t/Adult

FR 52Hz
11cm

M4

2D
67%
C 50
P Off
Gen



CLIP IS PERPENDICULAR TO THE CLOSURE LINE

JPEG

60 bpm

PAT T: 37.0C
TEE T: 38.9C

09/04/2014 11:28

PHILIPS Alalawi, Aljazi
2453747

09/04/2014 13:48:54
X7-2t/Adult

TISO.1 MI 0.5

JPEG CR 18:1

FR 52Hz
14cm

M4

2D
70%
C 50
P Off
Gen



CLIP NOT PERPENDICULAR!

JPEG

60 bpm

PAT T: 37.0C
TEE T: 38.8C

09/04/2014 11:44

PHILIPS

09/04/2014 13:55:48

TIS0.1

JPEG CR 18:1

2453747

X7-2t/Adult

FR 52Hz
14cm

M4

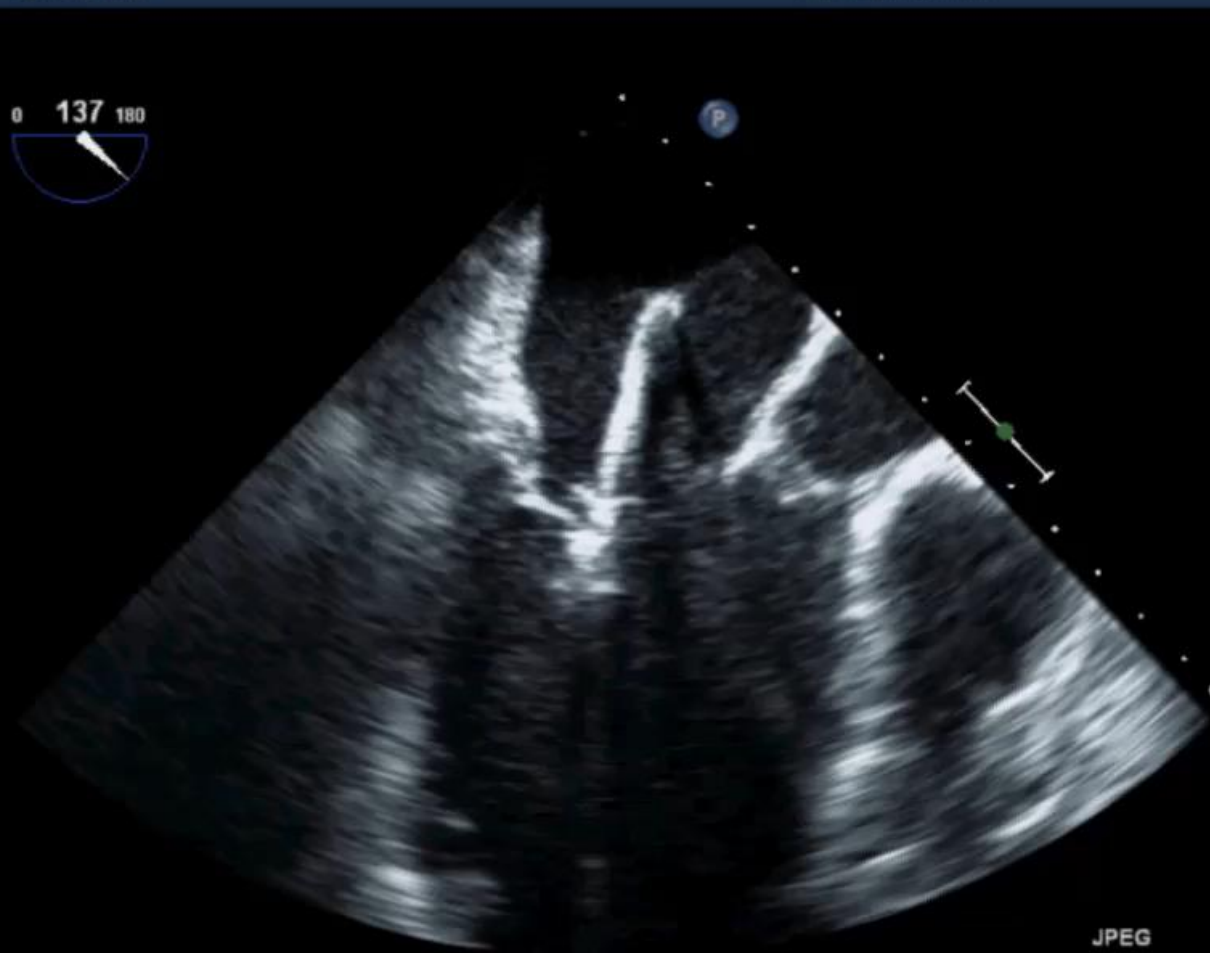
2D
72%
C 50
P Off
Gen



PAT T: 37.0C
TEE T: 38.7C

JPEG

60 bpm



09/04/2014 11:00

PHILIPS

09/04/2014 14:02:50

TISO.1

JPEG CR 18:1

2453747

X7-2t/Adult

FR 52Hz
13cm

M4

2D
70%
C 50
P Off
Gen



LEAFLET INSERTION ASSESSMENT BY 2D TEE
WHILE DELIVERY SYSTEM IS STILL THERE

JPEG

PAT T: 37.0C
TEE T: 38.7C

60 bpm

09/04/2014 11:2

PHILIPS

09/04/2014 13:57:19

TISO.2

JPEG CR 14:1

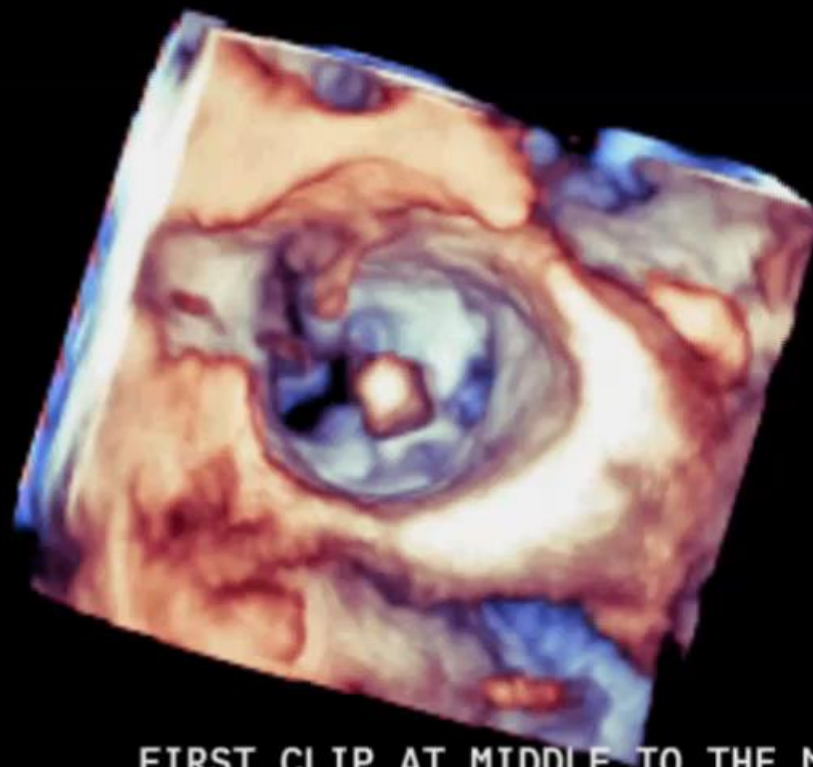
2453747

X7-2t/Adult

FR 5Hz
9.8cm

M4

Live 3D
3D 0%
3D 0dB
Gen



FIRST CLIP AT MIDDLE TO THE MEDIAL

PAT T: 37.0C
TEE T: 38.8C

JPEG

60 bpm

09/04/2014 11:

PHILIPS

09/04/2014 13:57:19

TIS0.2

JPEG CR 13:1

MI 0.5

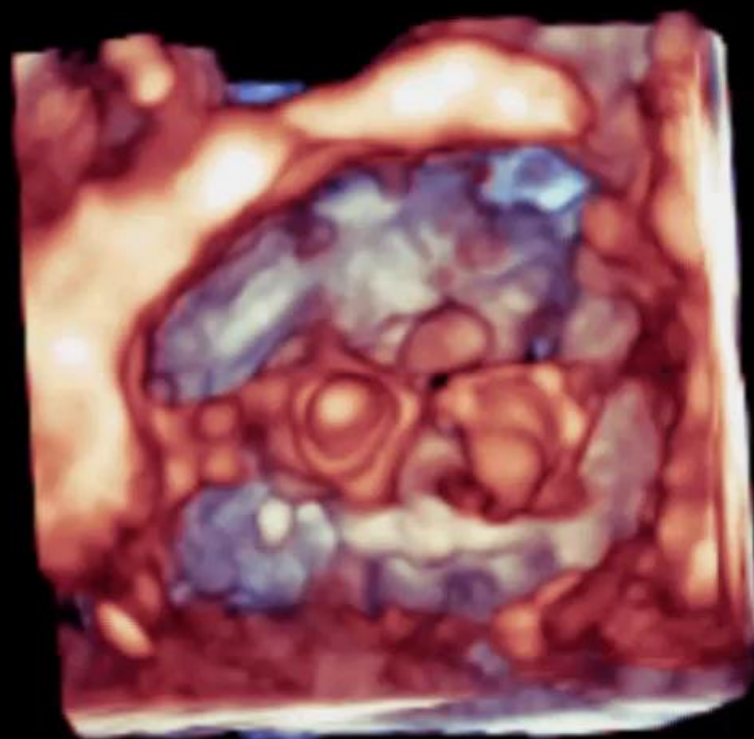
2453747

X7-2t/Adult

FR 5Hz
9.8cm

M4

Live 3D
3D 0%
3D 0dB
Gen

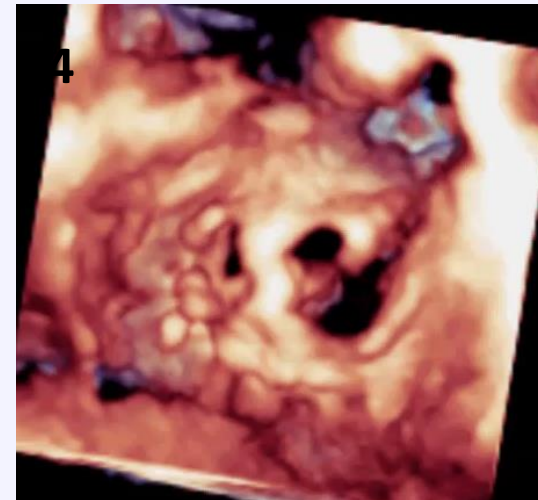
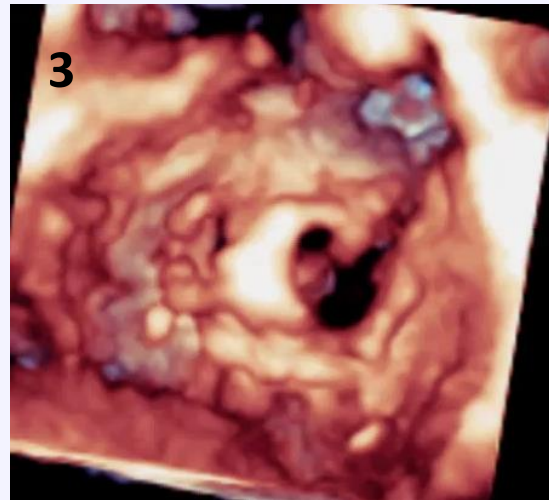
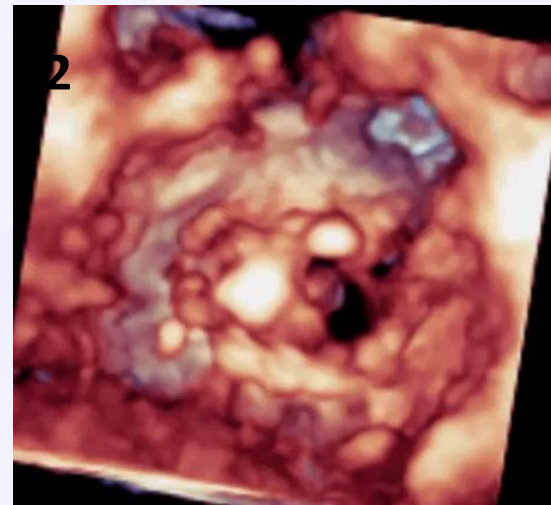
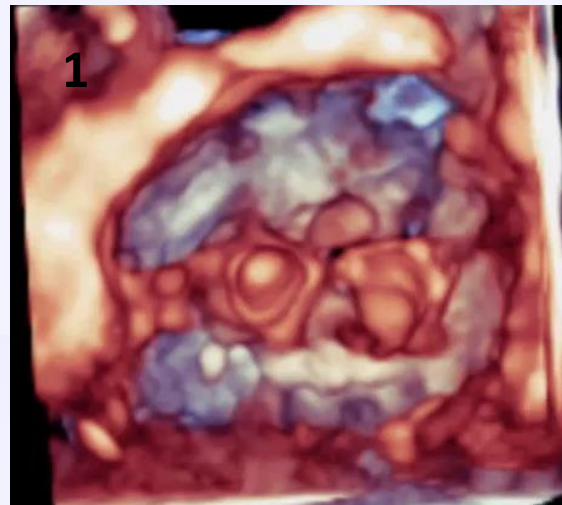


FIRST CLIP AT MIDDLE TO THE MEDIAL
LV SIDE

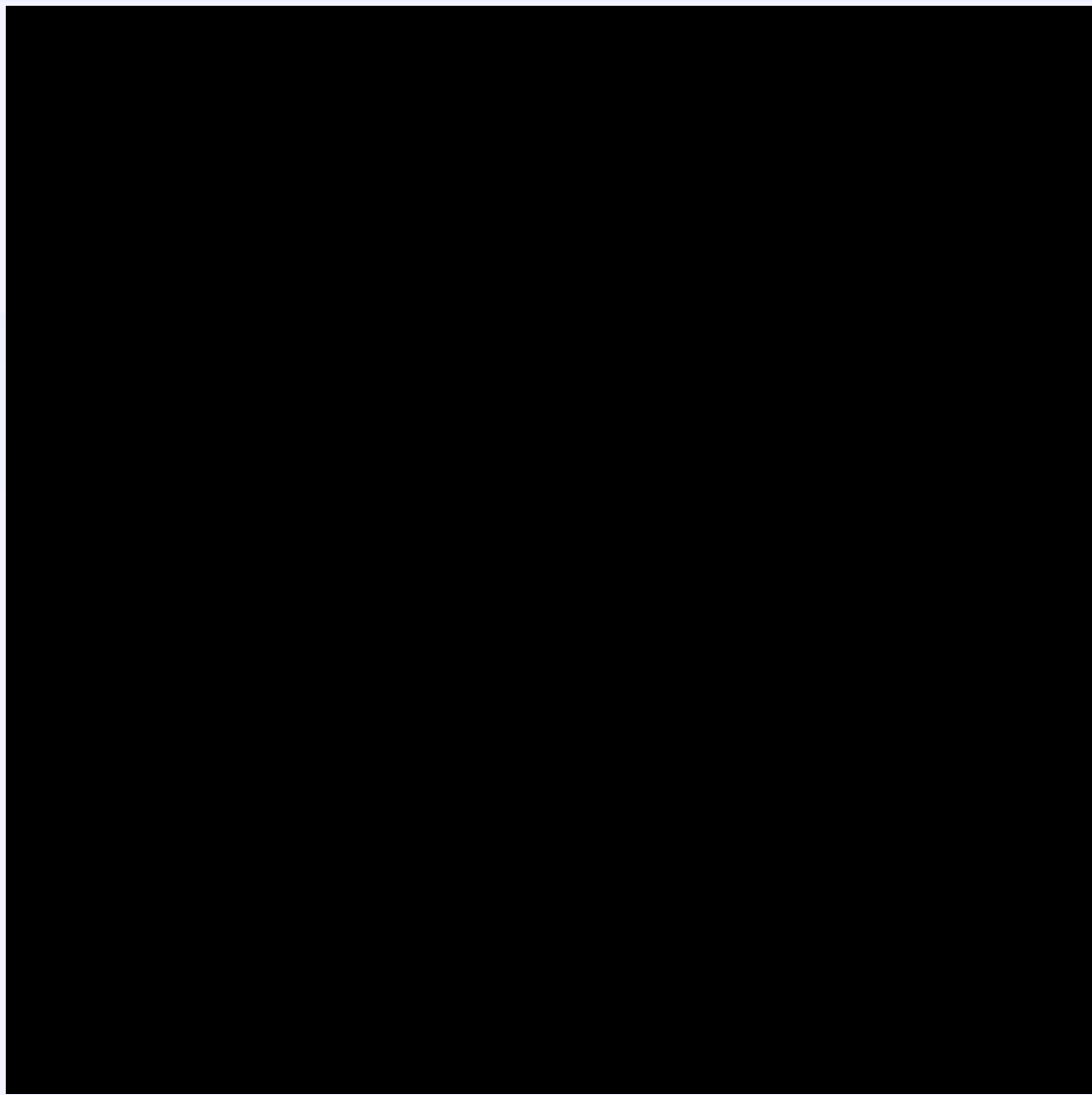
JPEG

PAT T: 37.0C
TEE T: 38.8C

60 bpm



Leaflets insertion assessment by 3D cropping from LV side



09/04/2014 11:00

PHILIPS

09/04/2014 14:00:02

TIS0.7

JPEG CR 16:1
MI 0.4

2453747

X7-2t/Adult

FR 12Hz
14cm

2D

73%
C 50
P Off
Gen

CF

60%
4.4MHz
WF High
Med

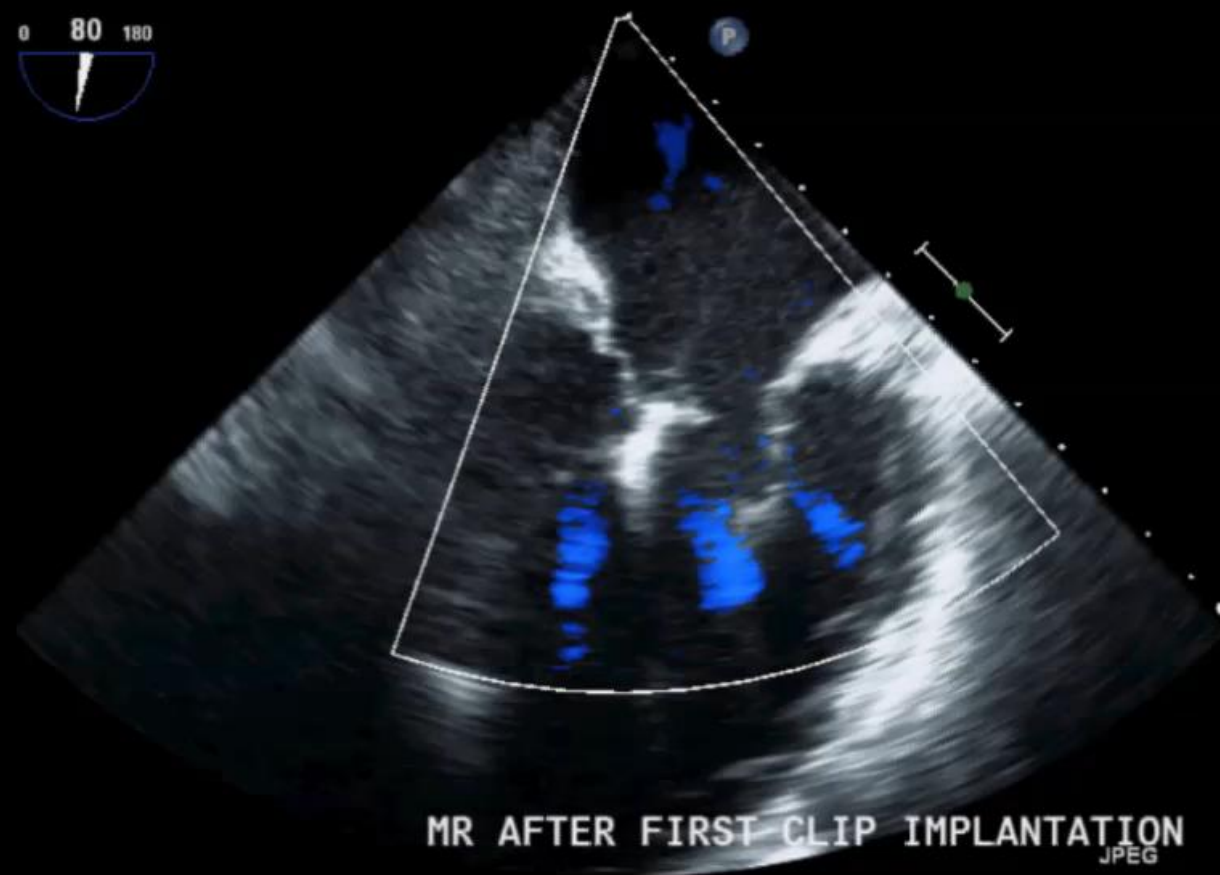


M4 M4

+52.9

-52.9

cm/s



MR AFTER FIRST CLIP IMPLANTATION

JPEG

PAT T: 37.0C
TEE T: 38.5C

59 bpm

09/Apr/2014 11:--

PHILIPS

09/04/2014

14:02:14

TISO.3 MI 0.0

JBG/AO

2453747

KAMC RIYADH

X7-2t/Adult

FR 13Hz

13cm

2D

73%

C 50

P Off

Gen

CF

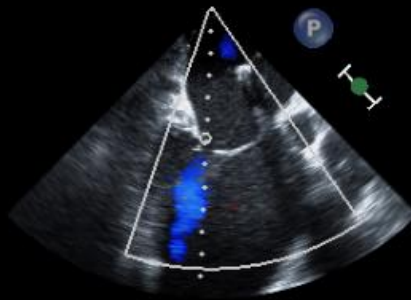
60%

4.4MHz

WF High

Med

0 116 180



Vmax 141 cm/s CW

Vmean 63.7 cm/s 70%

Max PG 8 mmHg 2.5MHz

Mean PG 2 mmHg

VTI 33.8 cm

M4 M4

+50.4

cm/s

cm/s

cm/s

cm/s

cm/s

cm/s

cm/s

cm/s

cm/s

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cm/s

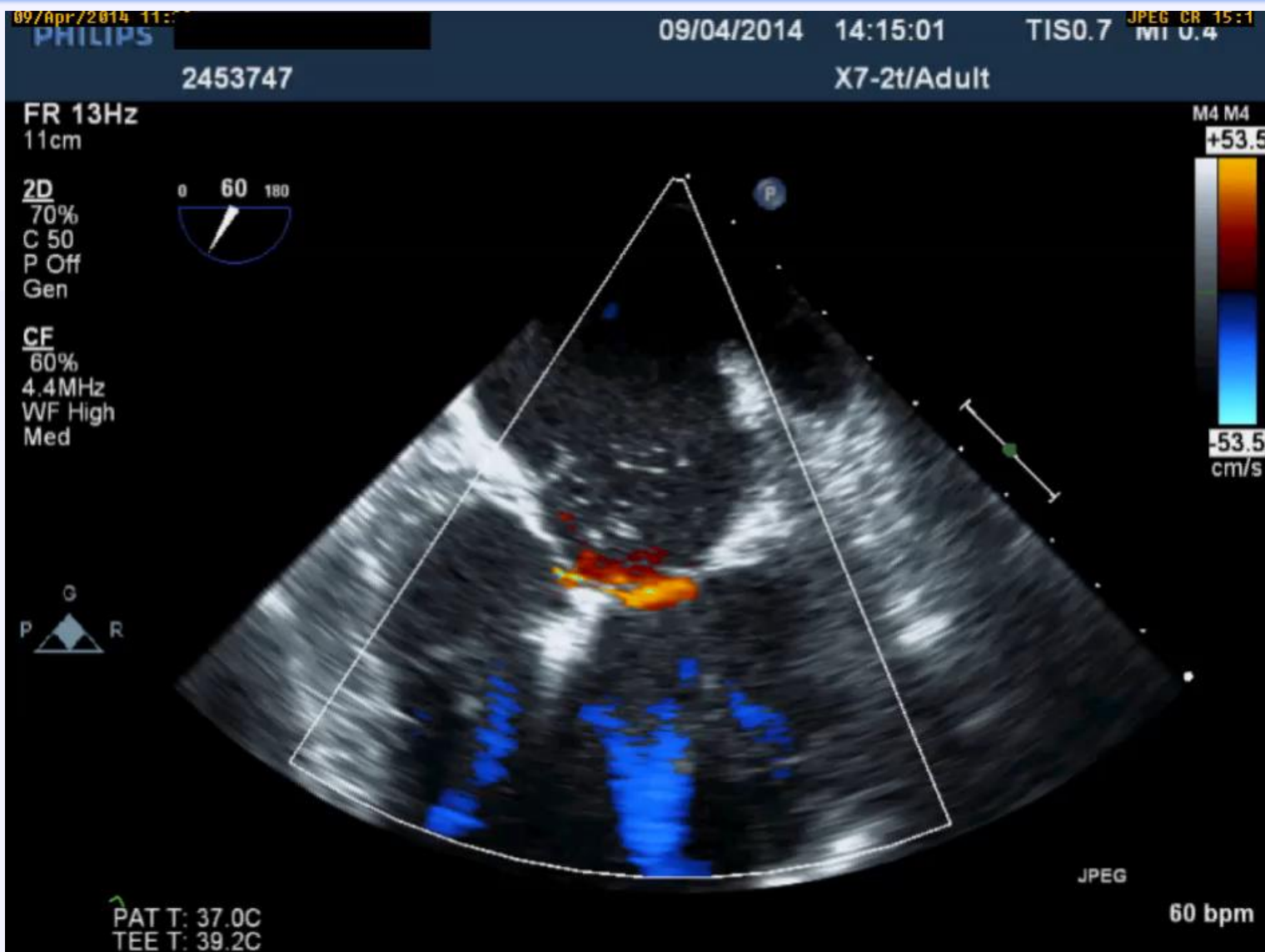
cm/s

PAT T: 37.0C

TEE T: 38.2C

75mm/s

60bpm



09/Apr/2014 11:

PHILIPS

09/04/2014

14:22:13

TISO.7 MI 0.5

JBG/AO

2453747

KAMC RIYADH

X7-2t/Adult

FR 14Hz

11cm

2D

70%

C 50

P Off

Gen

CF

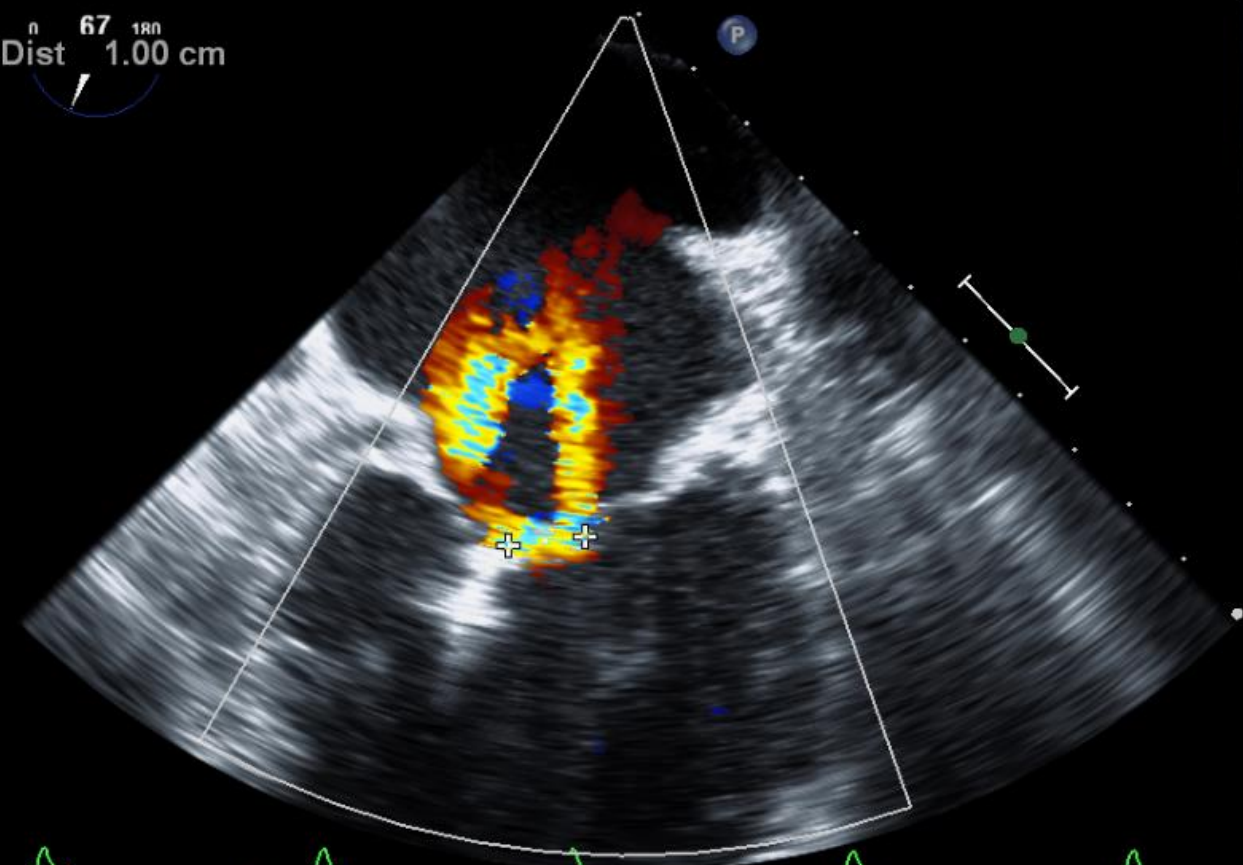
60%

4.4MHz

WF High

Med

Dist 1.00 cm



M4 M4

+53.5

-53.5

cm/s

PAT T: 37.0C

TEE T: 38.0C

60bpm

Second clip insertion

09/Apr/2014 11:00

PHILIPS

09/04/2014

14:26:45

TISO.1 MI 0.5

JBG/AO 2453747

KAMC RIYADH

X7-2t/Adult

FR 52Hz
11cm

M4

2D
68%
C 50
P Off
Gen

Dist 1.61 cm

2nd CLIP



PAT T: 37.0C
TEE T: 38.0C

60bpm

09/04/2014 11:00

PHILIPS

09/04/2014

14:37:30

TISO.1

JPEG CR 14:1

MI 0.5

2453747

X7-2t/Adult

FR 36Hz
11cm

xPlane
66%
66%
50dB
P Off
Gen



M4

2nd CLIP



PAT T: 37.0C
TEE T: 39.1C



60 bpm

09/04/2014 11:00

PHILIPS

09/04/2014

14:37:30

TISO.1

JPEG CR 13:1

2453747

X7-2t/Adult

FR 36Hz
11cm

xPlane
66%
66%
50dB
P Off
Gen



M4

2nd CLIP



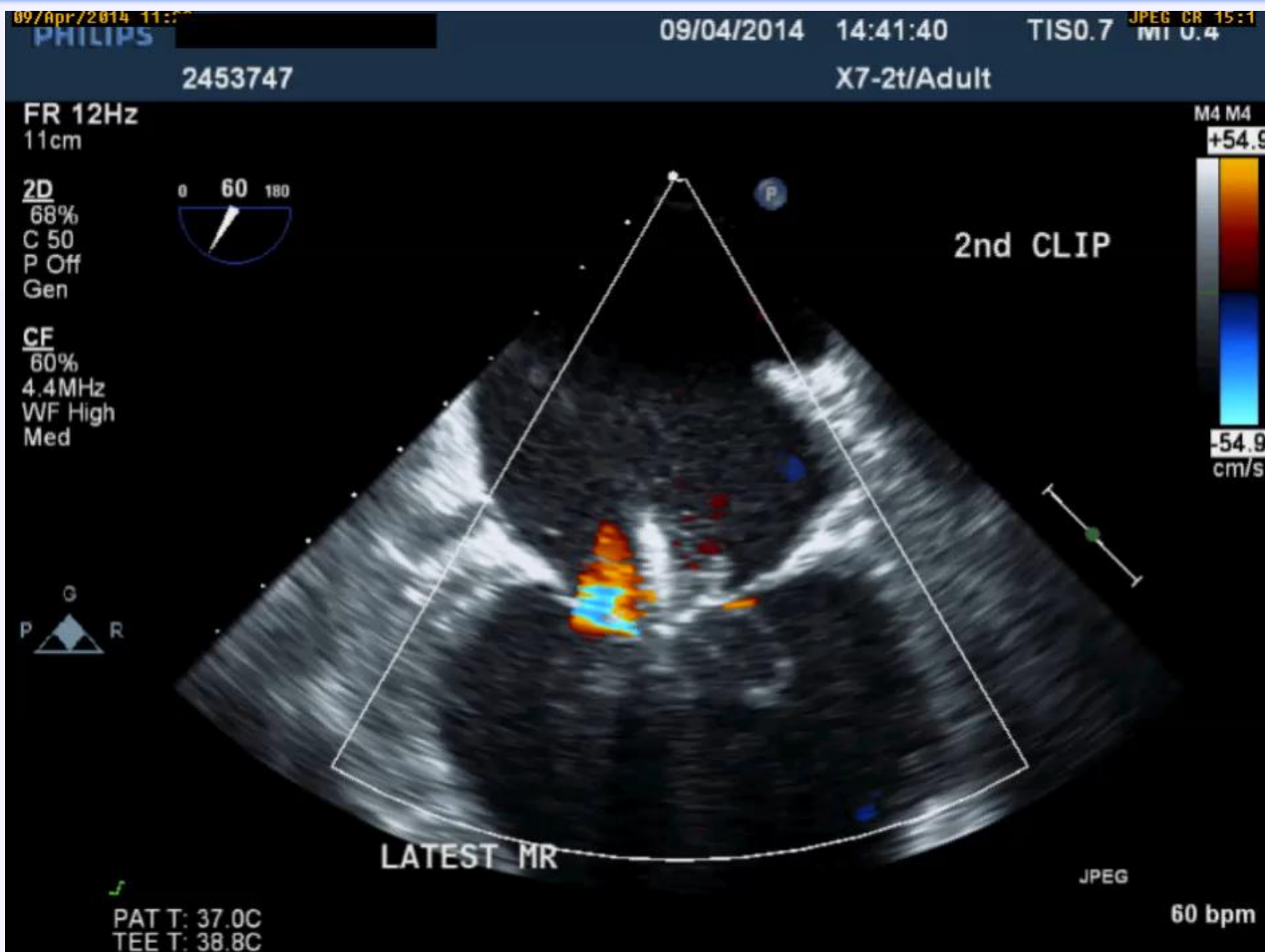
PATT: 37.0G
TELE: 09.10

SECOND CLIP GUIDING BY X-PLANE

SCANNING IN COMMISSURAL VIEW AND CHECKING IN LAX VIE

JPEG

60 bpm



09/Apr/2014 11:00

PHILIPS

09/04/2014

14:38:35

TISO.3 MI 0.0

JBG/AO

2453747

KAMC RIYADH

X7-2t/Adult

FR 12Hz

11cm

2D

69%

C 50

P Off

Gen

CF

60%

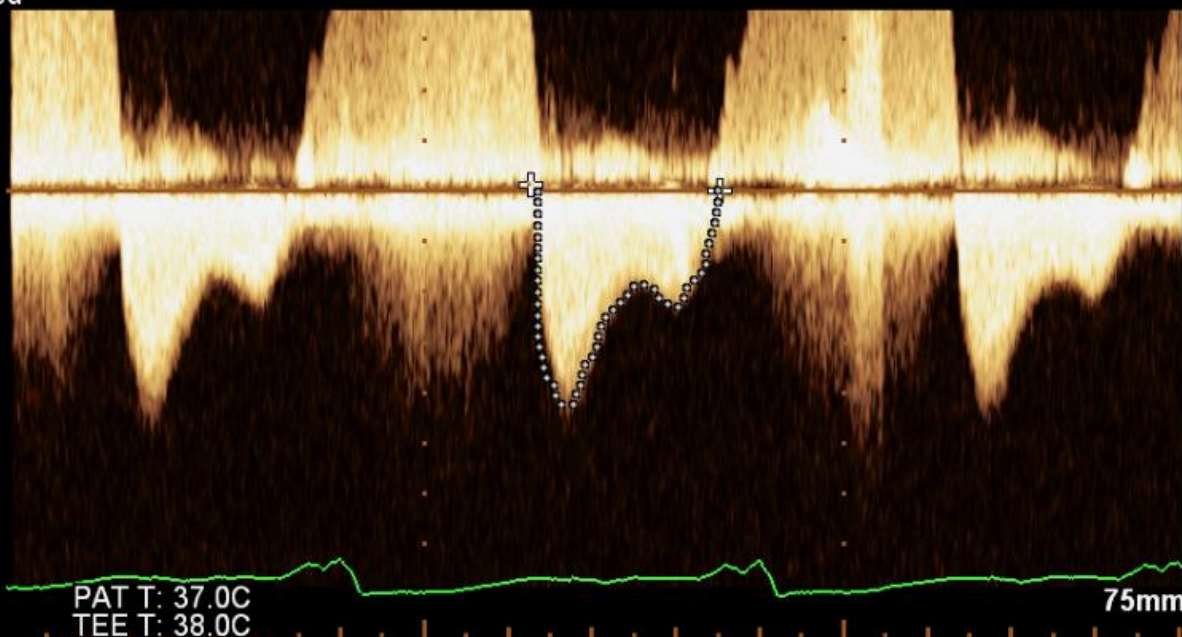
4.4MHz

WF High

Med



Vmax 127 cm/s CW
Vmean 72.8 cm/s 70%
Max PG 6 mmHg 2.5MHz
Mean PG 3 mmHg LIP
VTI 33.1 cm



09/Apr/2014 11:

PHILIPS

09/04/2014

14:39:16

TISO.7 MI 0.5

JBG/AO

2453747

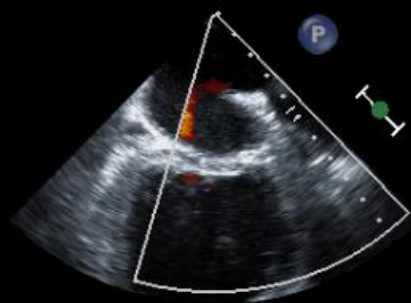
KAMC RIYADH

X7-2t/Adult

FR 12Hz
11cm

2D
69%
C 50
P Off
Gen

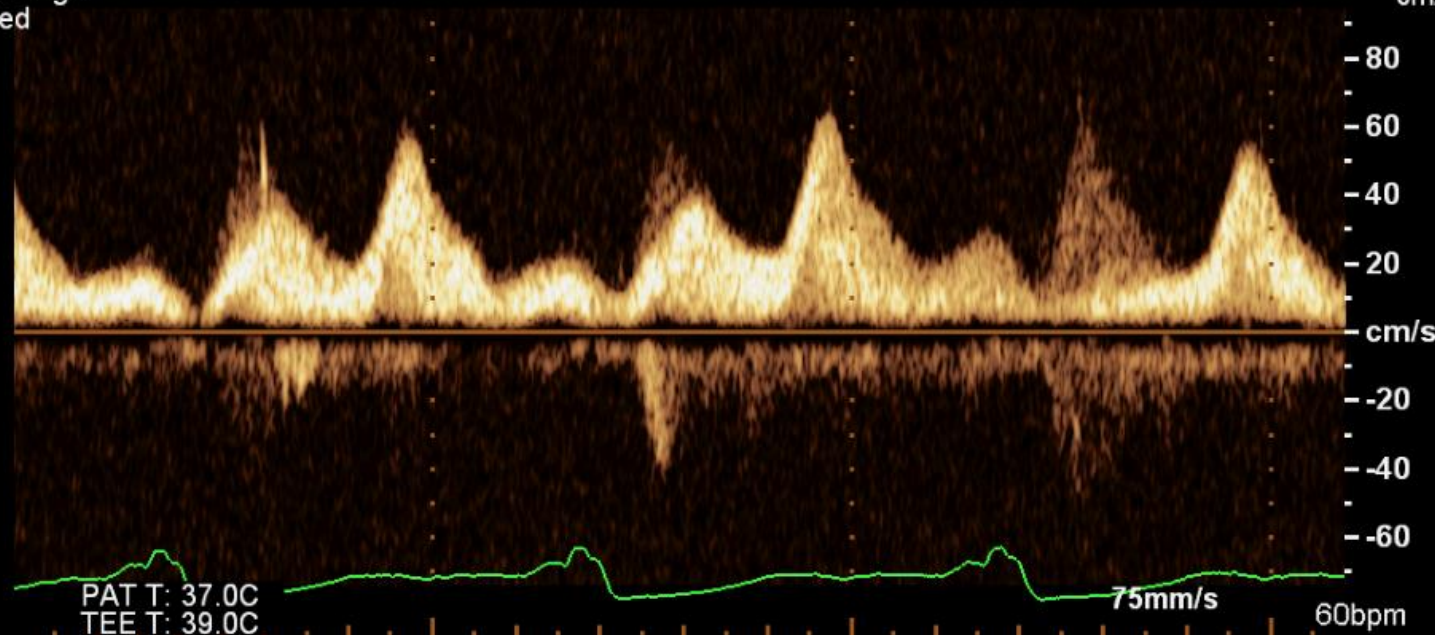
CF
60%
4.4MHz
WF High
Med



PW
100%
2.9MHz
WF 150Hz
SV 10mm
4.8cm

2nd CF

M4 M4
+54.9
-54.9
cm/s



09/04/2014 11:24

PHILIPS

09/04/2014

14:41:12

TIS0.2

JPEG CR 16:1

2453747

X7-2t/Adult

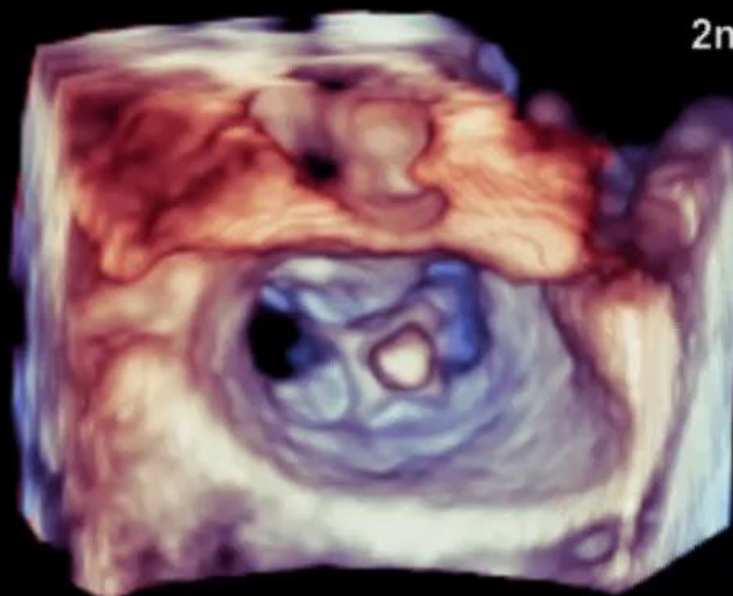
FR 7Hz
9.1cm

M4

Live 3D
3D 0%
3D 0dB
Gen



2nd CLIP



JPEG

60 bpm

PAT T: 37.0C
TEE T: 38.6C

09/04/2014 11:

PHILIPS

09/04/2014

14:41:12

TIS0.2

JPEG CR 16:1

MI 0.5

2453747

X7-2t/Adult

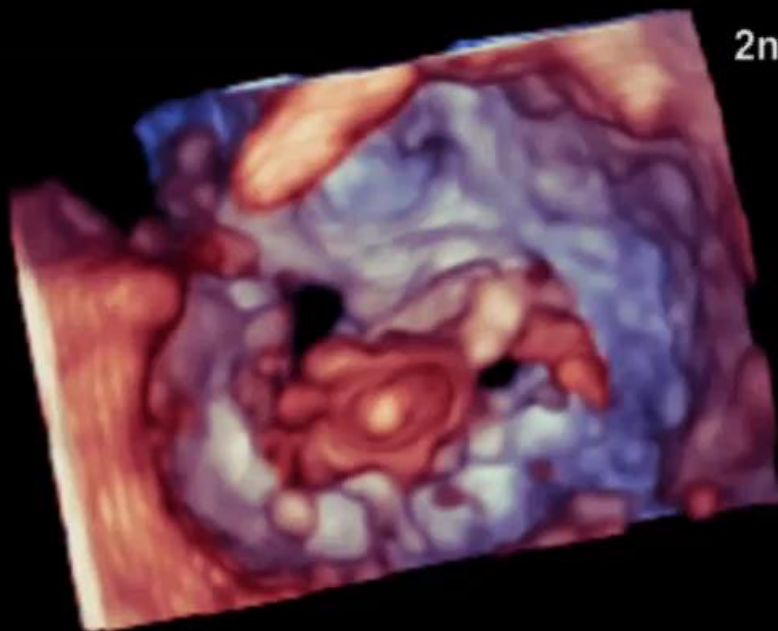
FR 7Hz
9.1cm

M4

Live 3D
3D 0%
3D 0dB
Gen



2nd CLIP



JPEG

60 bpm

PAT T: 37.0C
TEE T: 38.6C

09/04/2014 11:22

PHILIPS

09/04/2014 14:42:08

TIS0.9

JPEG CR 18:1
MI 0.4

2453747

X7-2t/Adult

FR 13Hz
11cm

Full Volume 0 60 180

3D 8%

3D 8dB

CF

50%

4.4MHz



2nd CLIP

M4 M4

+54.9



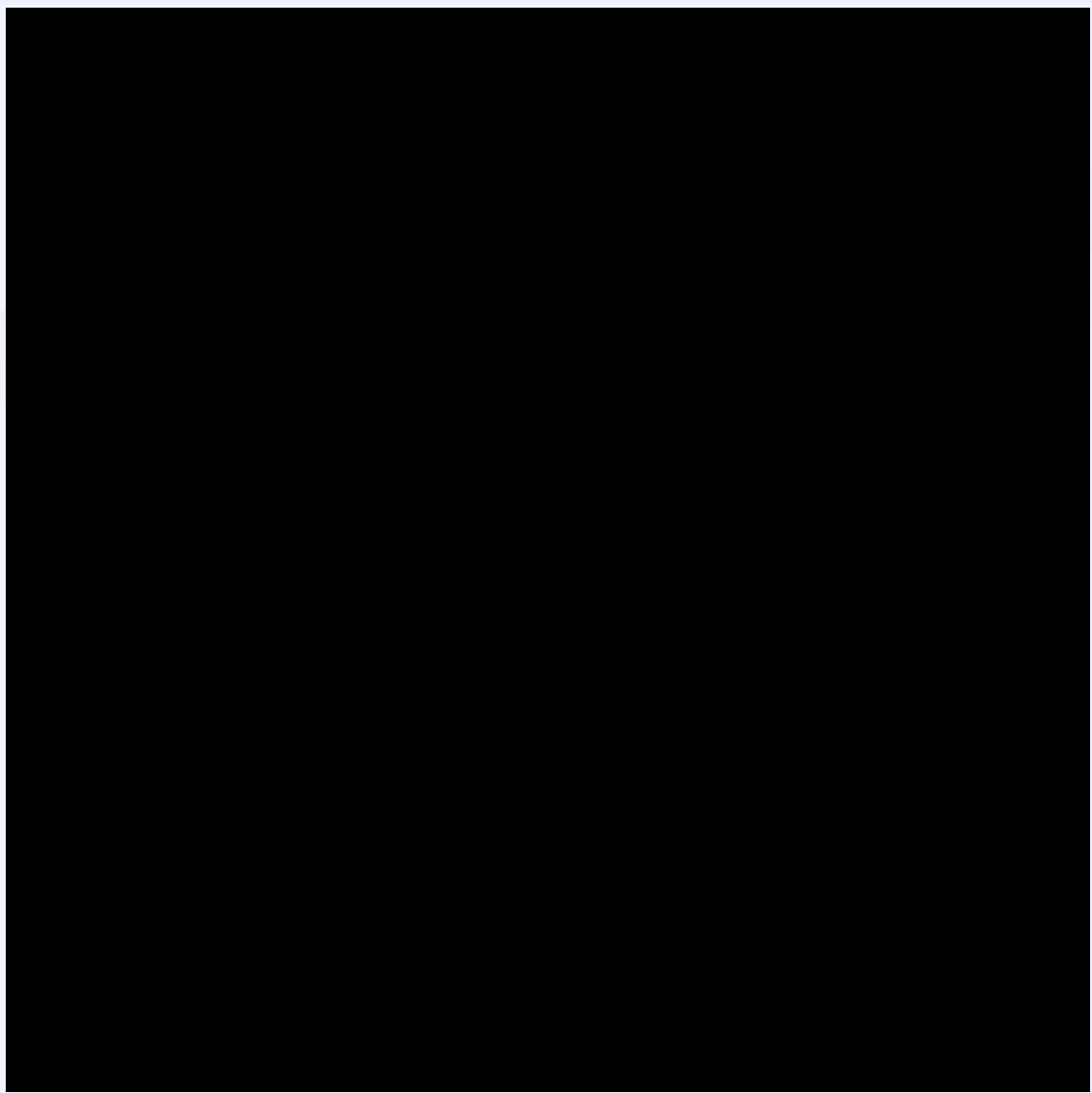
-54.9

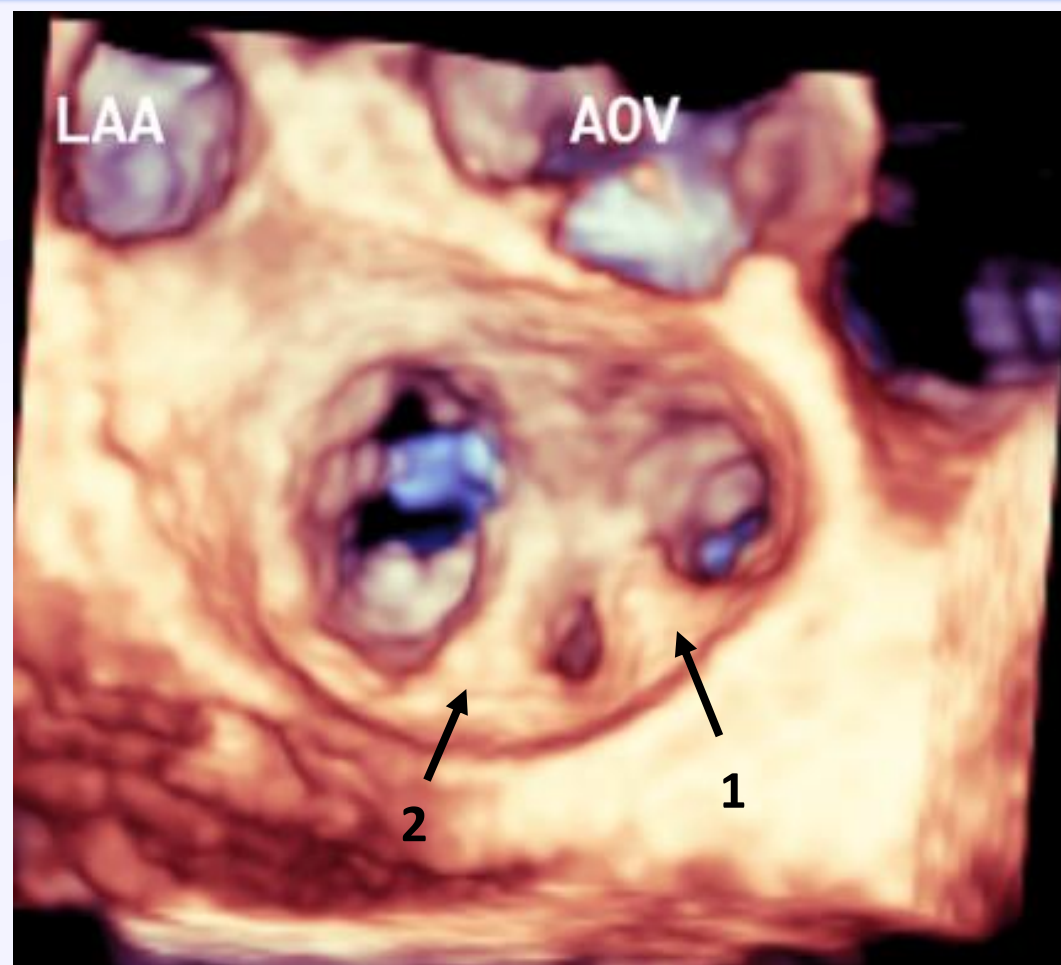
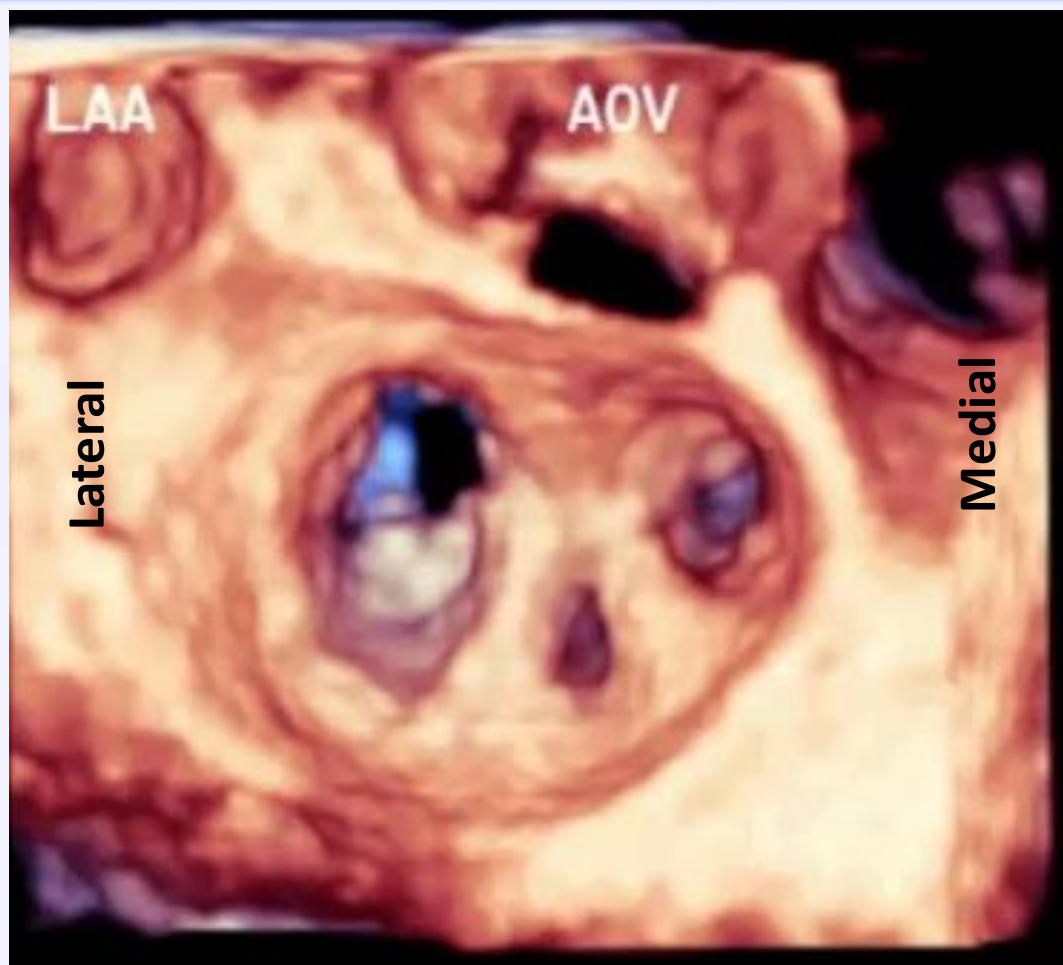
100%

PAT T: 37.0C
TEE T: 39.3C

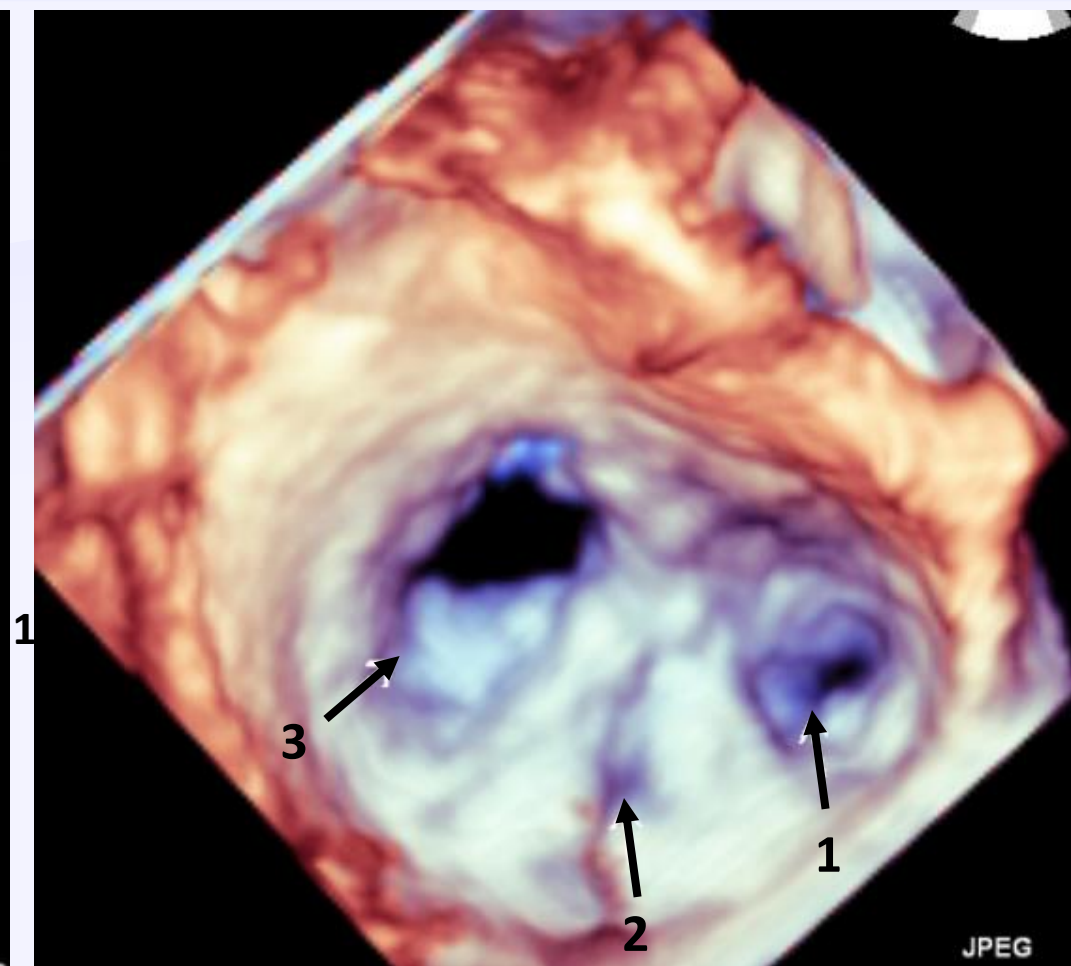
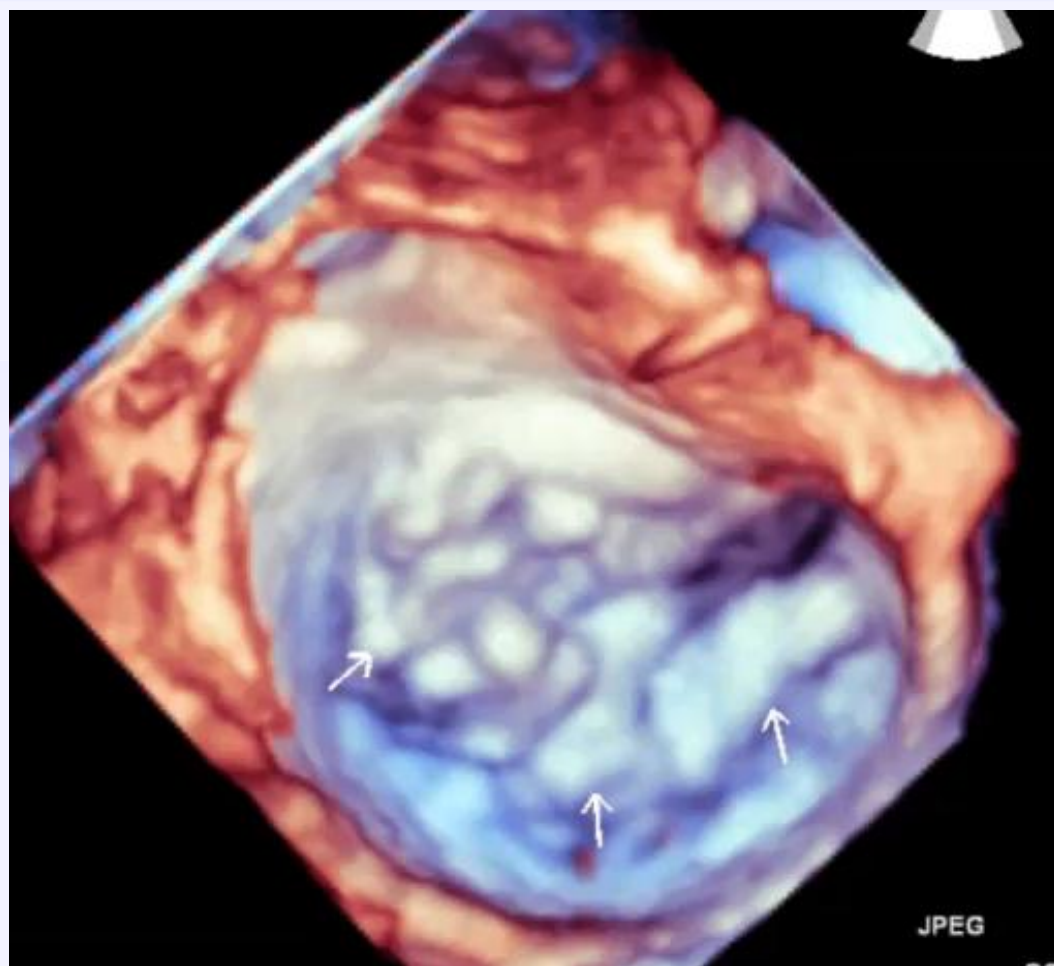
JPEG

60 bpm





LA view, 2 clips



LA view, triple-orifice MV

Case 4

- 76-year-old man presented to our center due to acute pulmonary edema
- TTE and TEE showed myxomatous mitral valve and flail anterior leaflet
- Patient was discussed in our heart team and decision was made for MitraClip repair due to comorbidity and prohibitive risk for surgical mitral valve repair

PHILIPS

10/25/2015 10:05:27AM TIS0.1 MI 0.5

120006113

X7-2t/Adult

FR 52Hz
13cm

M4

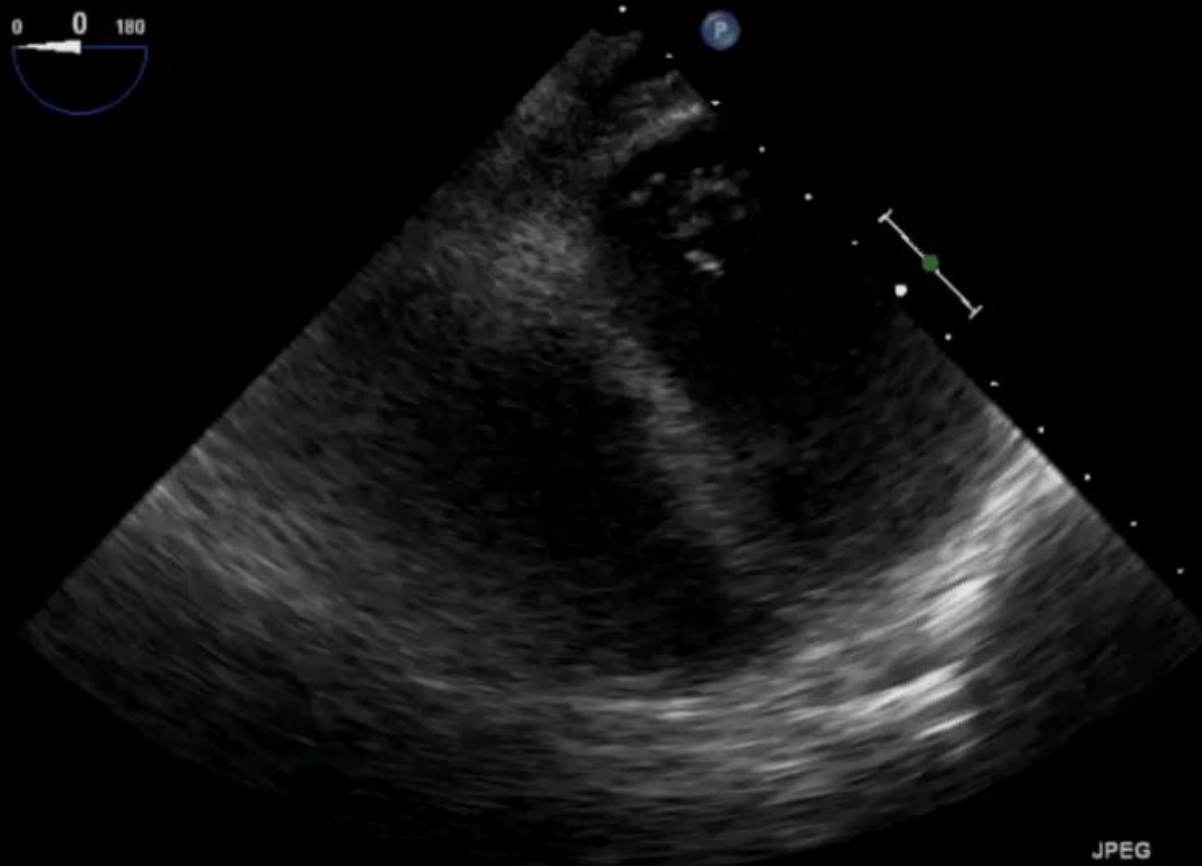
2D
74%
C 50
P Off
Gen



PAT T: 37.0C
TEE T: 39.1C

JPEG

64 bpm



PHILIPS

120006113

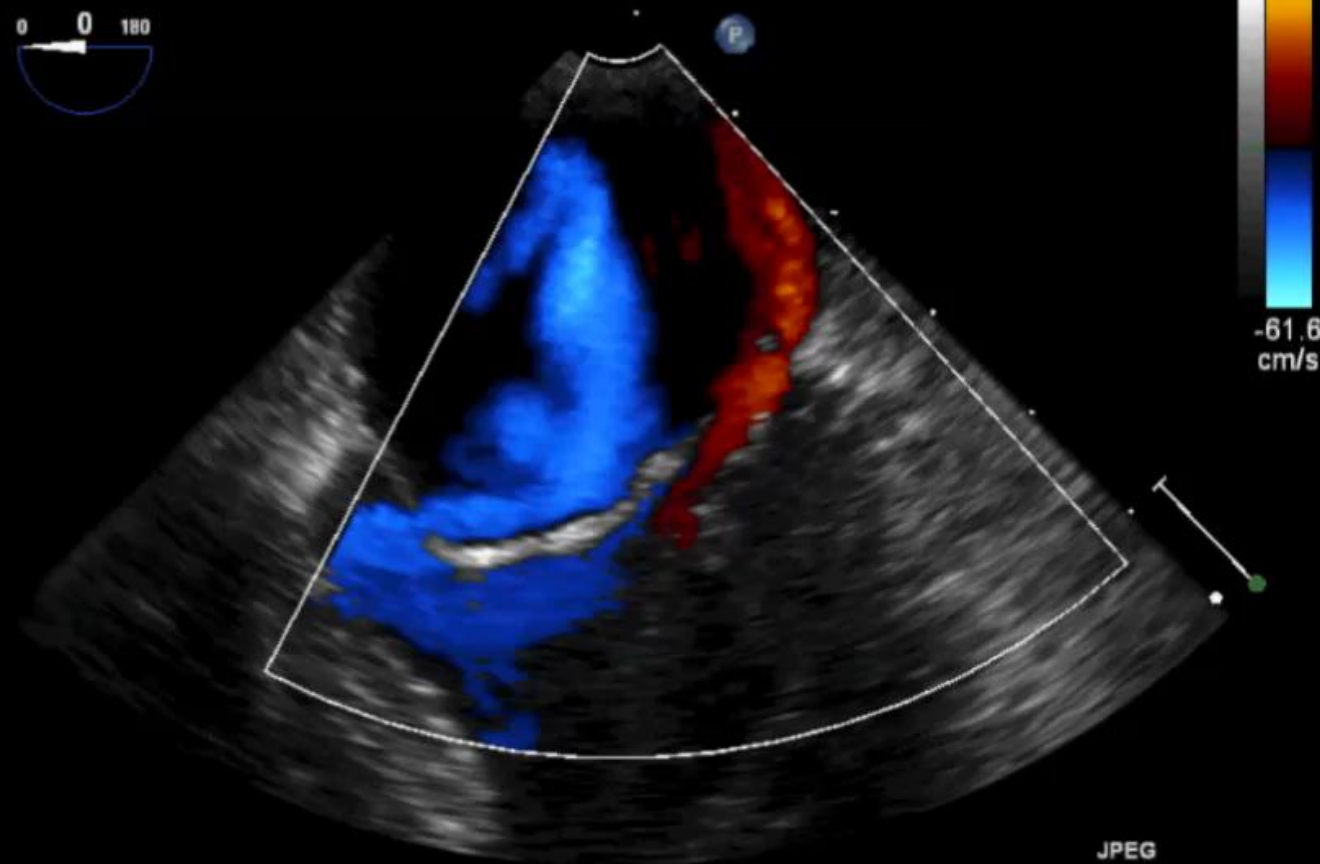
10/25/2015 09:54:47AM TIS0.4 MI 0.8

X7-2t/Adult

FR 12Hz
6.0cm

2D
55%
C 50
P Off
Gen

CF
59%
4.4MHz
WF High
Med



M4 M4
+61.6
-61.6
cm/s

PAT T: 37.0C
TEE T: 38.9C

JPEG

*** bpm

PHILIPS

120006113

10/25/2015 10:14:14AM TIS0.3 MI 0.5

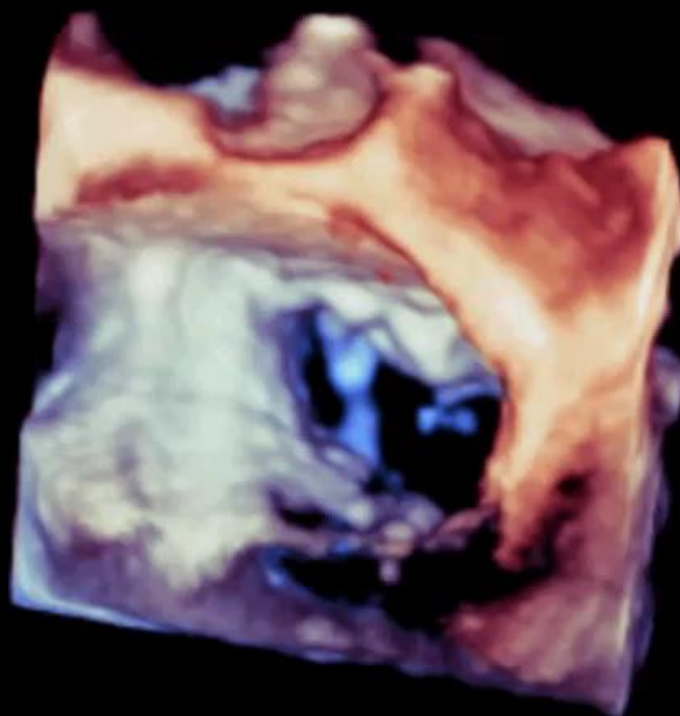
X7-2t/Adult

FR 6Hz
5.7cm

Live 3D
3D 47%
3D 22dB
Gen



M4



JPEG

PAT T: 37.0C
TEE T: 39.1C

36 bpm

PHILIPS

120006113

10/25/2015 10:25:56AM TIS0.3 MI 0.5

X7-2t/Adult

FR 6Hz
6.1cm

Live 3D
3D 29%
3D 0dB
Gen



M4



First clip (medial)

JPEG

PAT T: 37.0C
TEE T: 39.4C

73 bpm

PHILIPS

120006113

10/25/2015 10:28:52AM TIS0.6 MI 0.8

X7-2t/Adult

FR 14Hz
7.0cm

Full Volume 0 65 100

3D 55%

3D 12dB

CF

50%

4.4MHz



M4 M4
+61.6

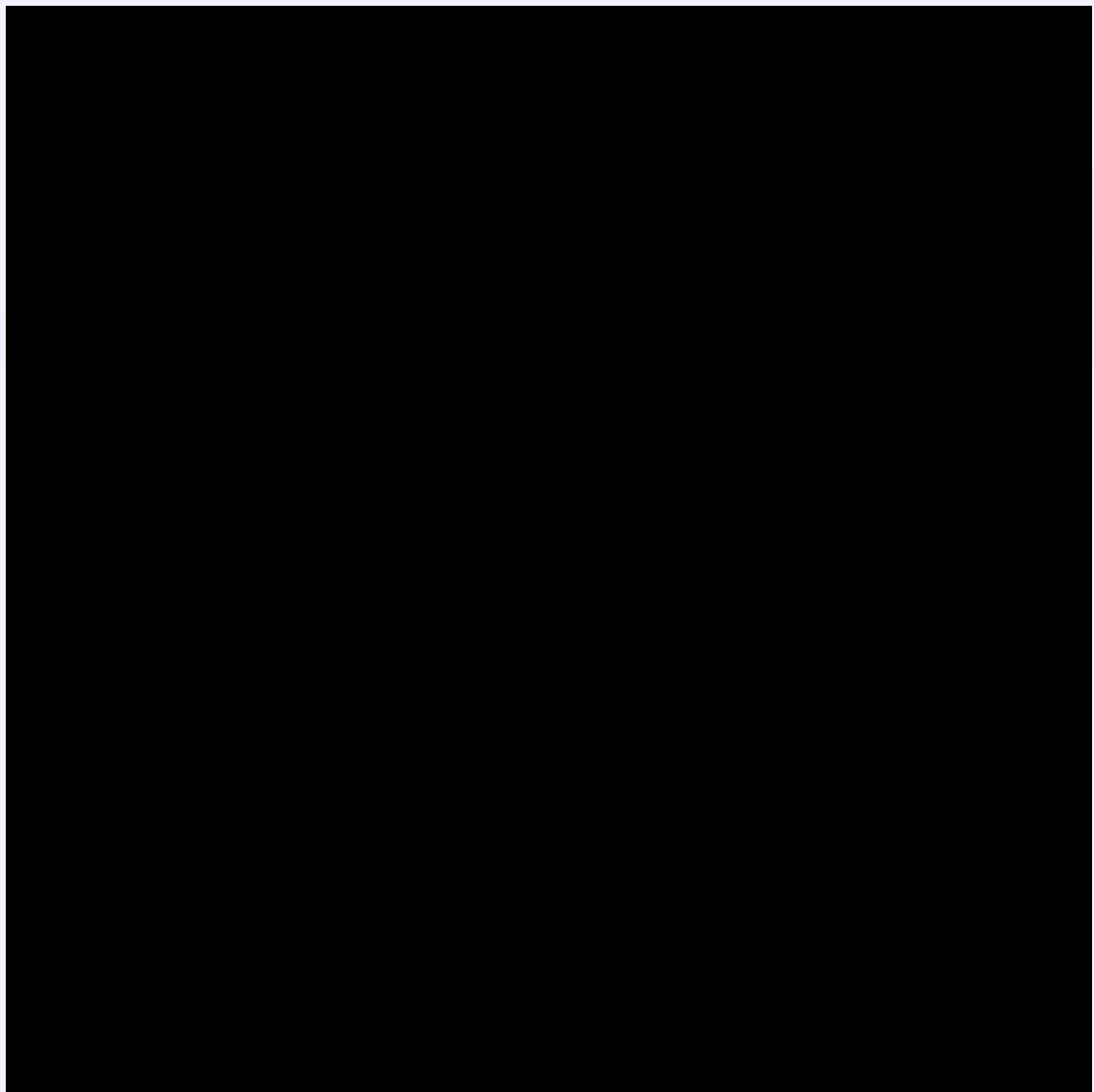


-61.6

PAT T: 37.0C
ITEE T: 39.2C

JPEG

72 bpm



PHILIPS

120006113

25/10/2015 11:07:12AM TIS0.4 MI 0.8

X7-2t/Adult

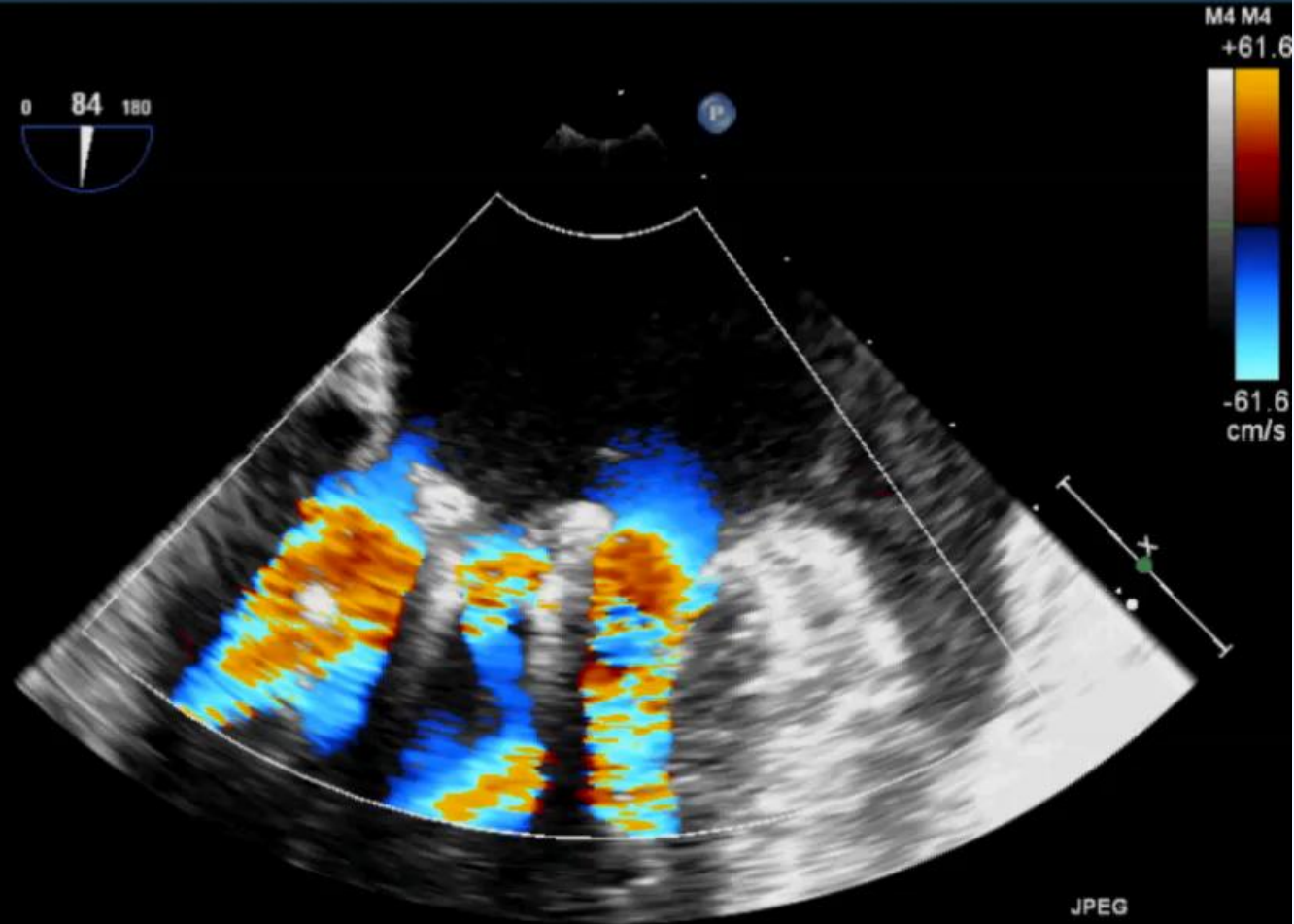
FR 10Hz
7.0cm

2D

66%
C 50
P Off
Gen

CF

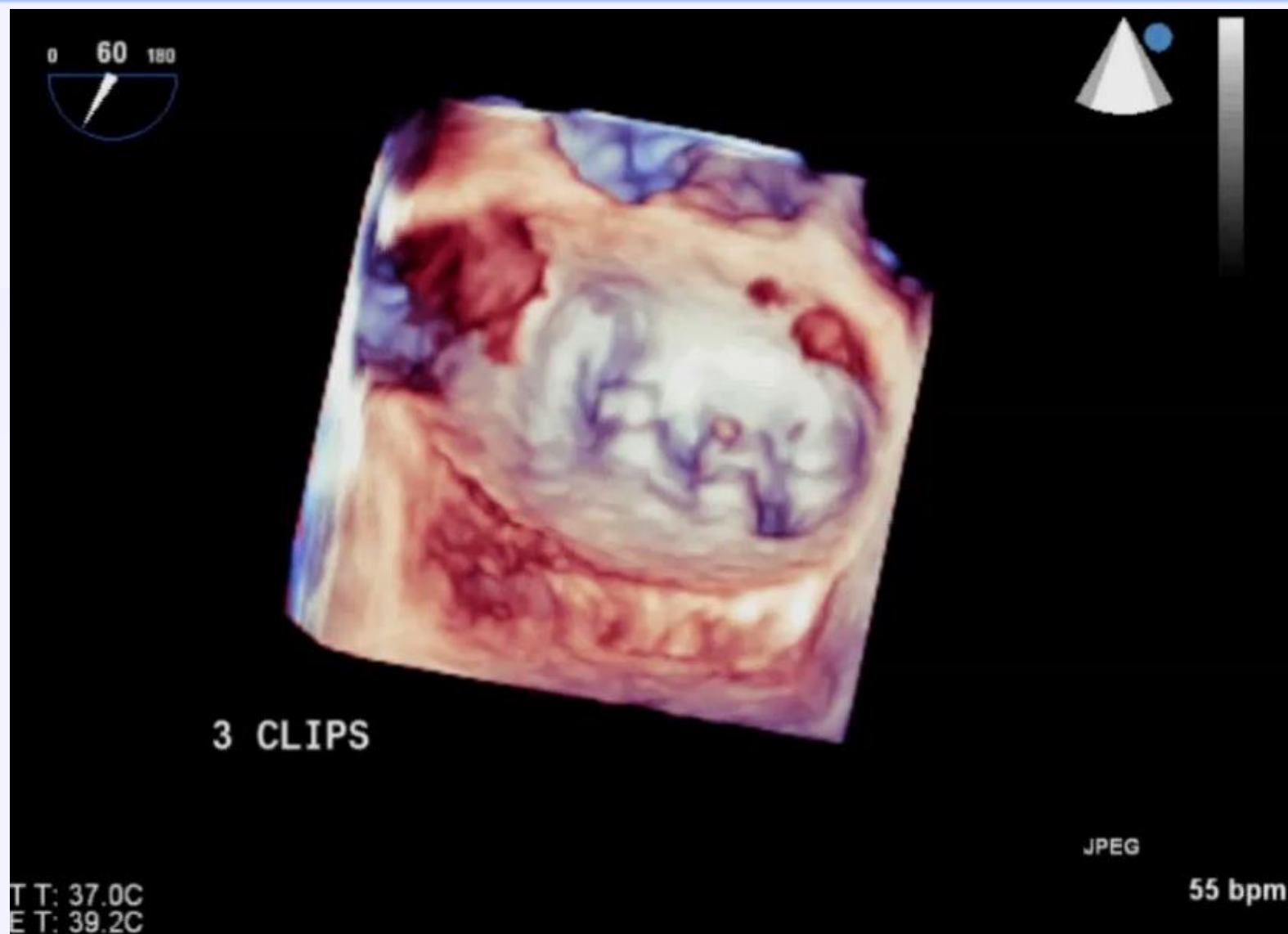
59%
4.4MHz
WF High
Med

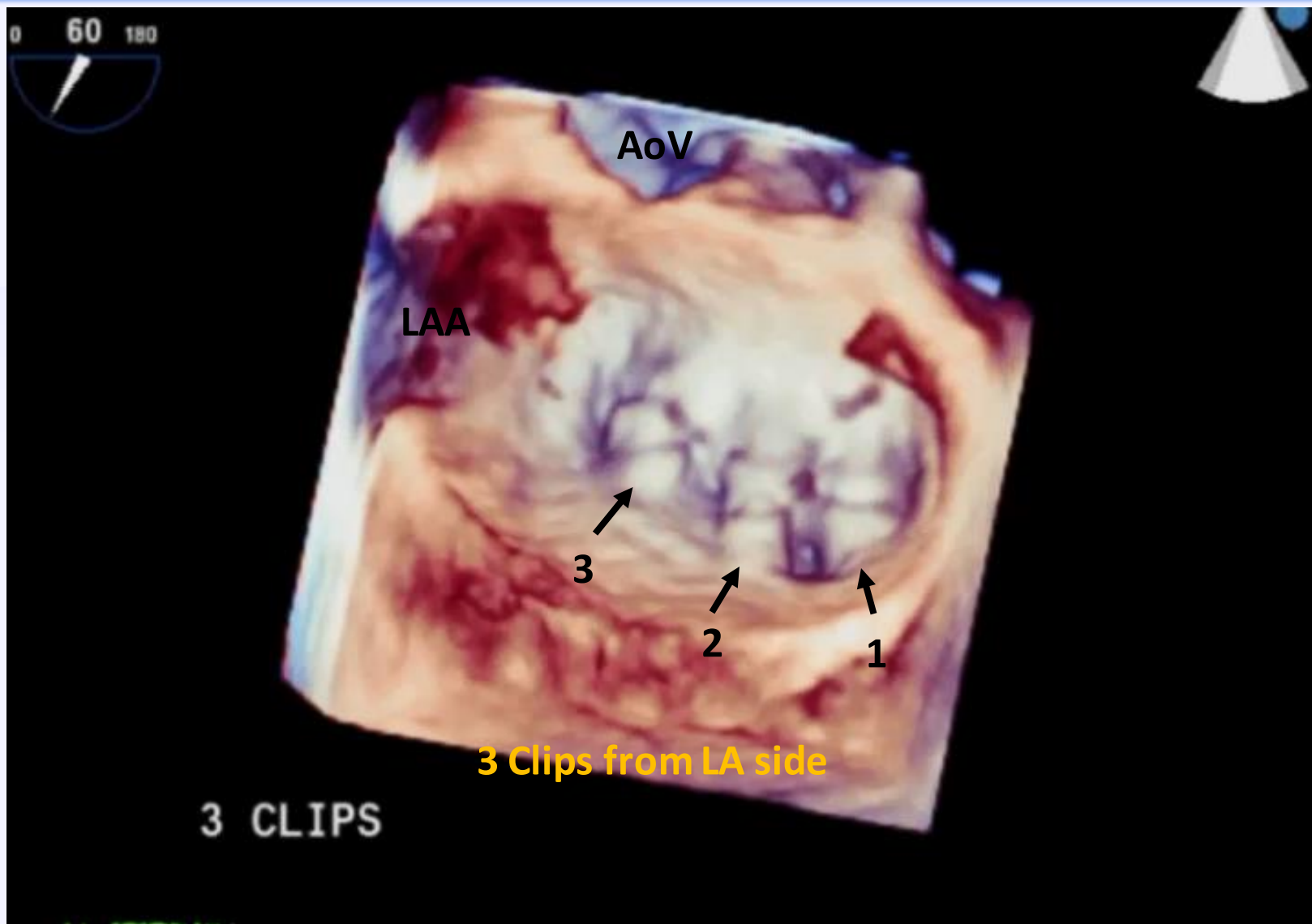


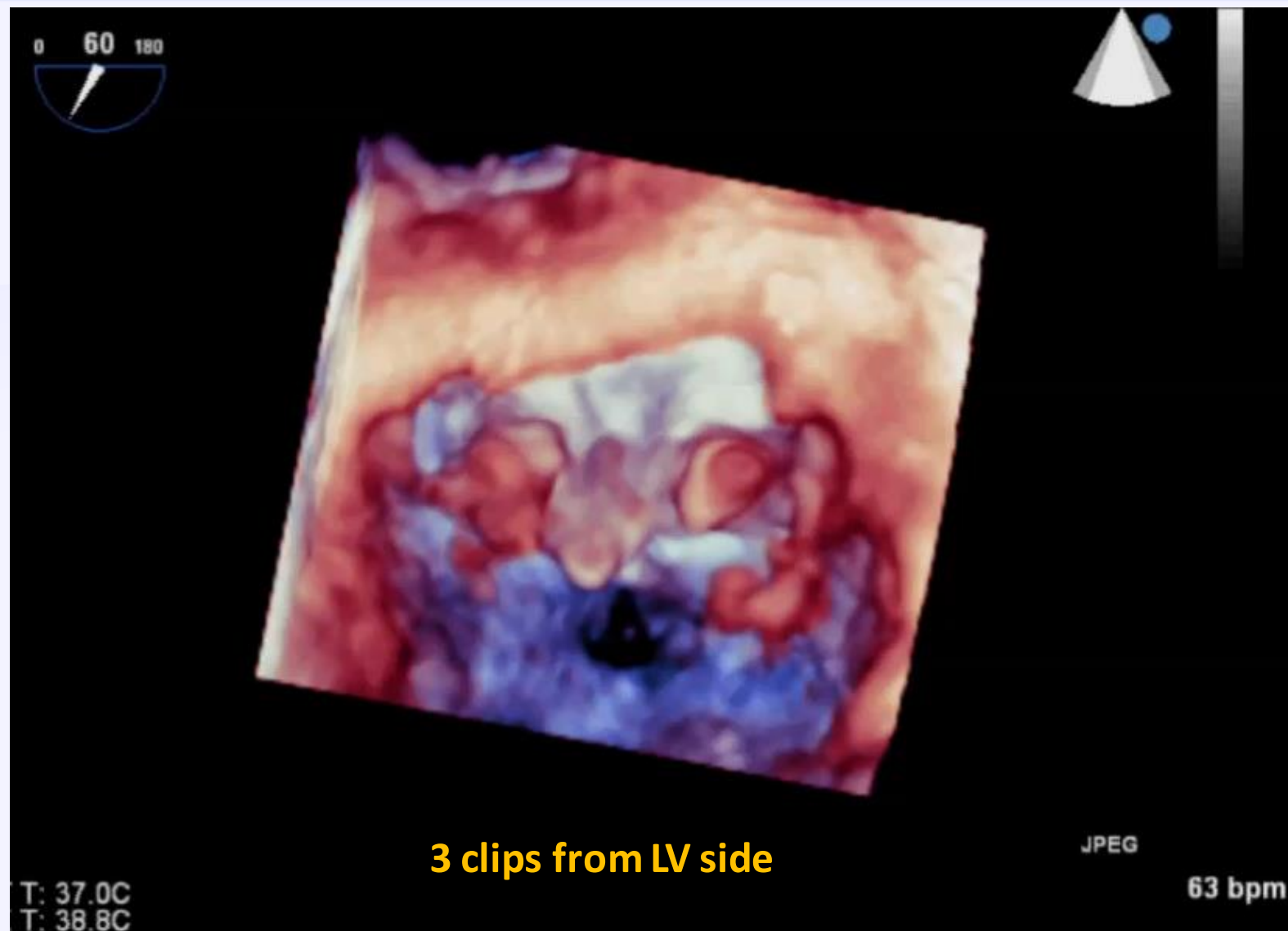
PAT T: 37.0C
TEE T: 39.3C

JPEG

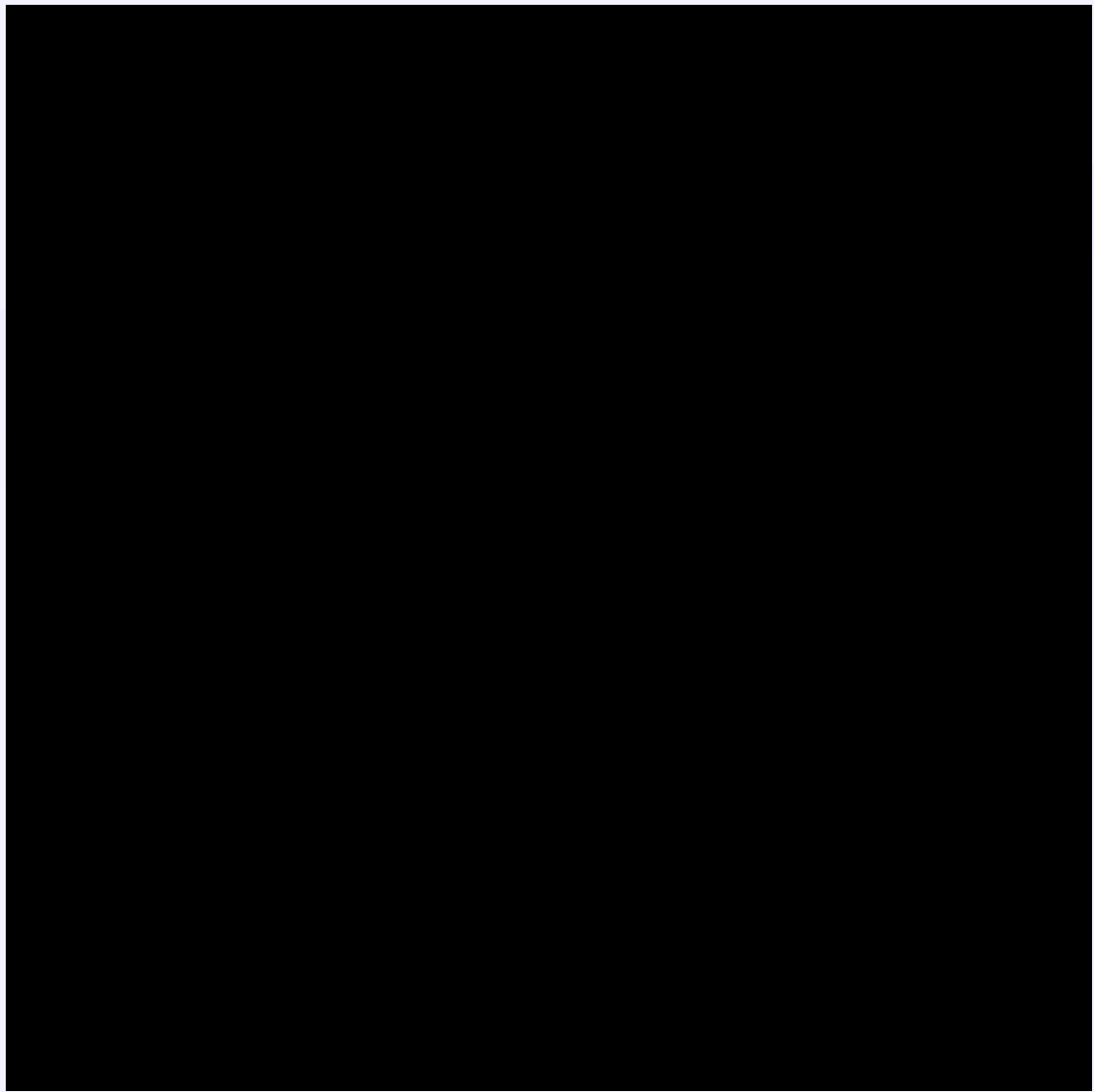
57 bpm





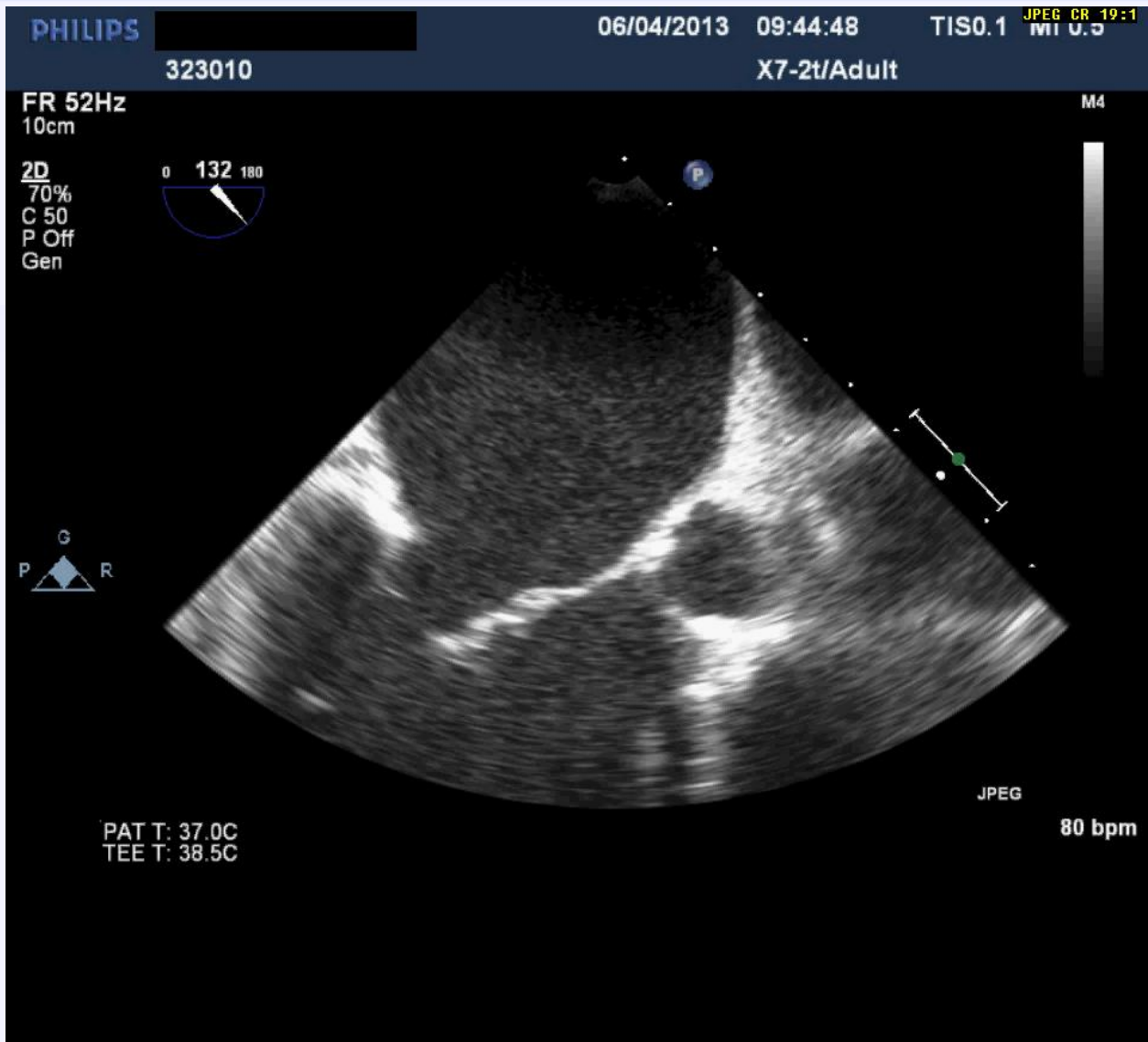






Case 5

73-year-old male with history of severe MR



PHILIPS

323010

06/04/2013

10:03:09

TIS1.0

JPEG CR 19:1
MI 0.4

X7-2t/Adult

FR 13Hz
11cm

Full Volume 0 70 180
3D 53%
3D 40dB
CF
50%
4.4MHz



M4 M4

+42.2

-70.4

ORIGIN OF MR

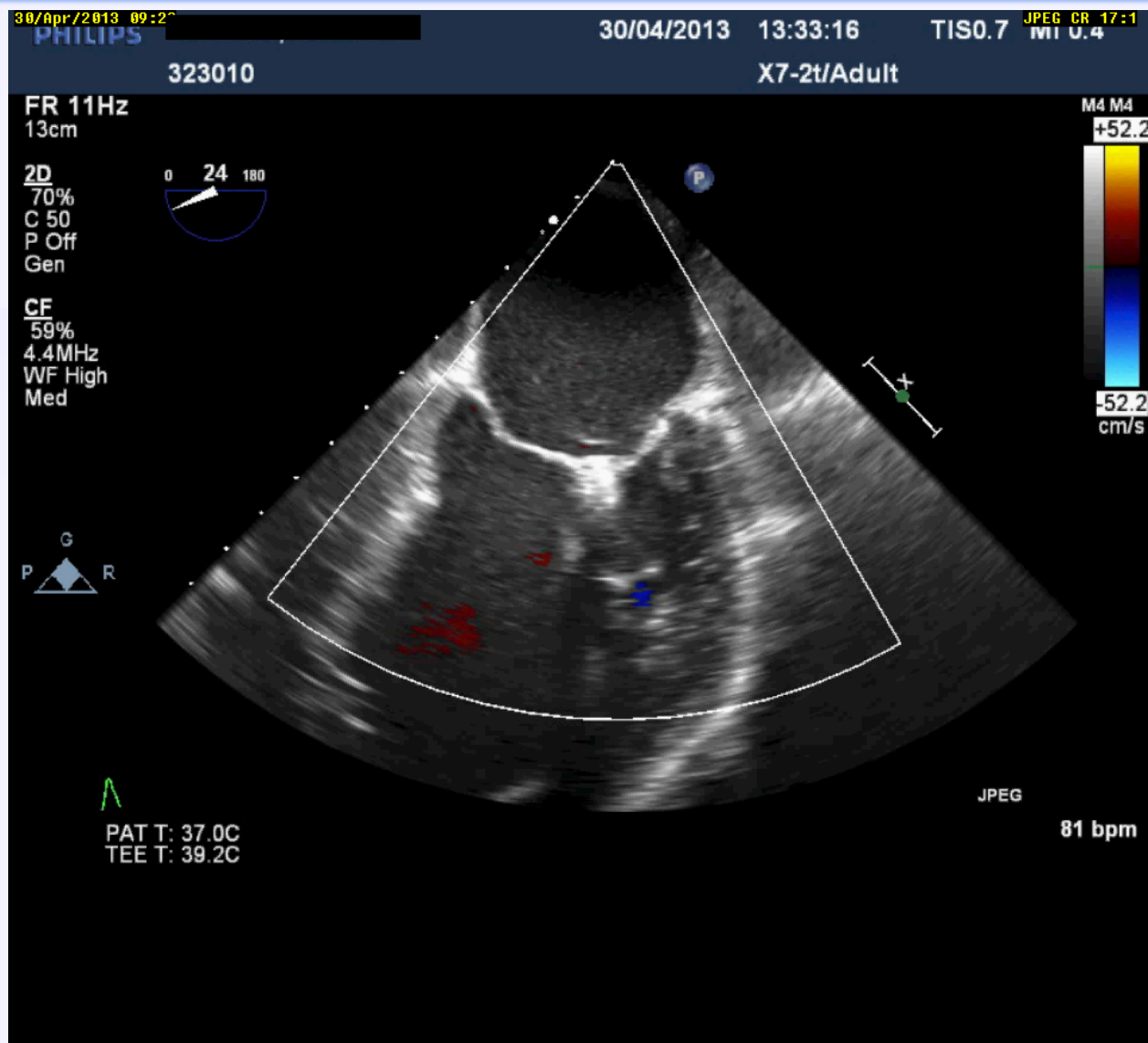


PAT T: 37.0C
TEE T: 39.8C

JPEG

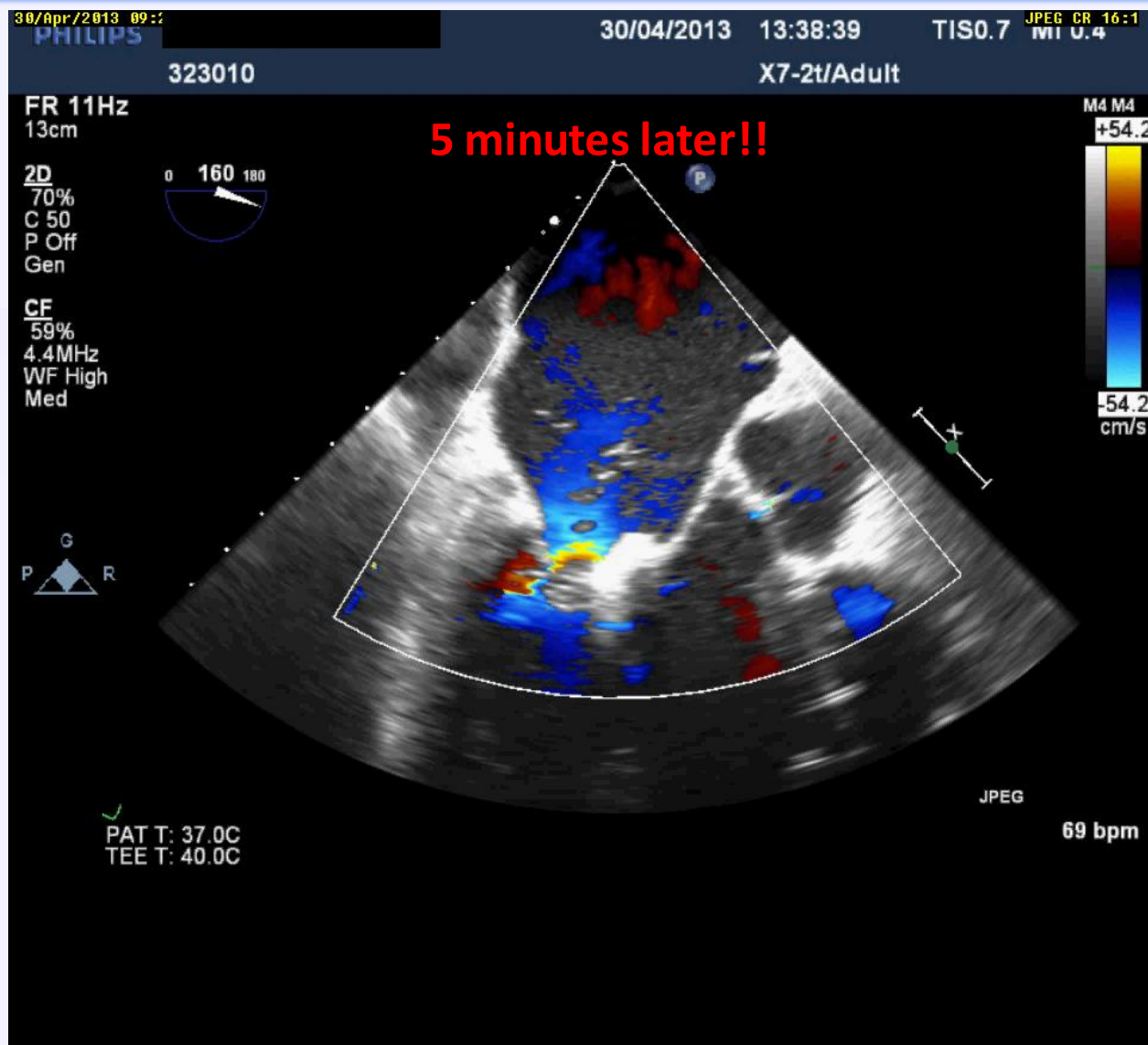
74 bpm

TEE in Cath lab during MitraClip repair

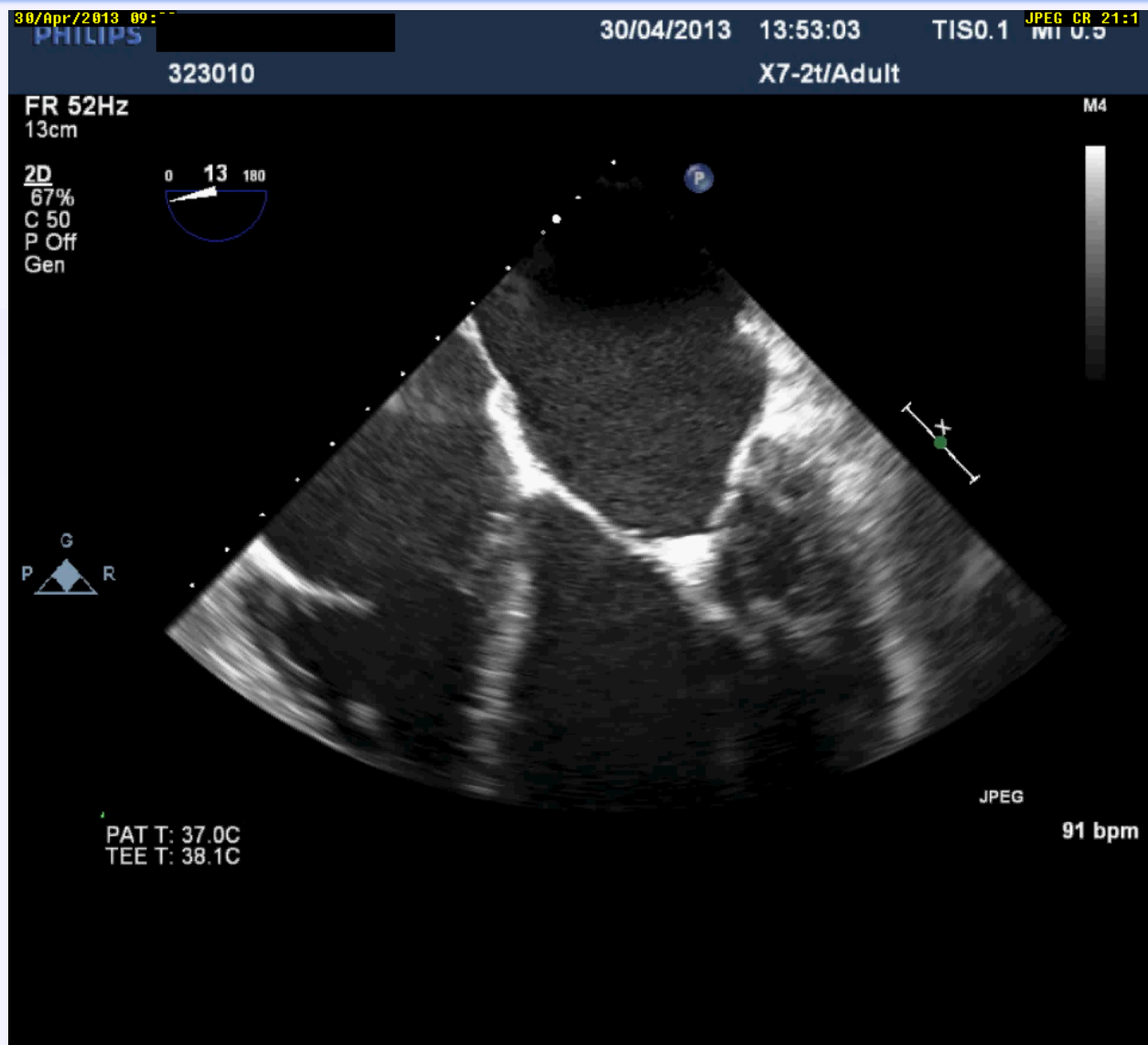


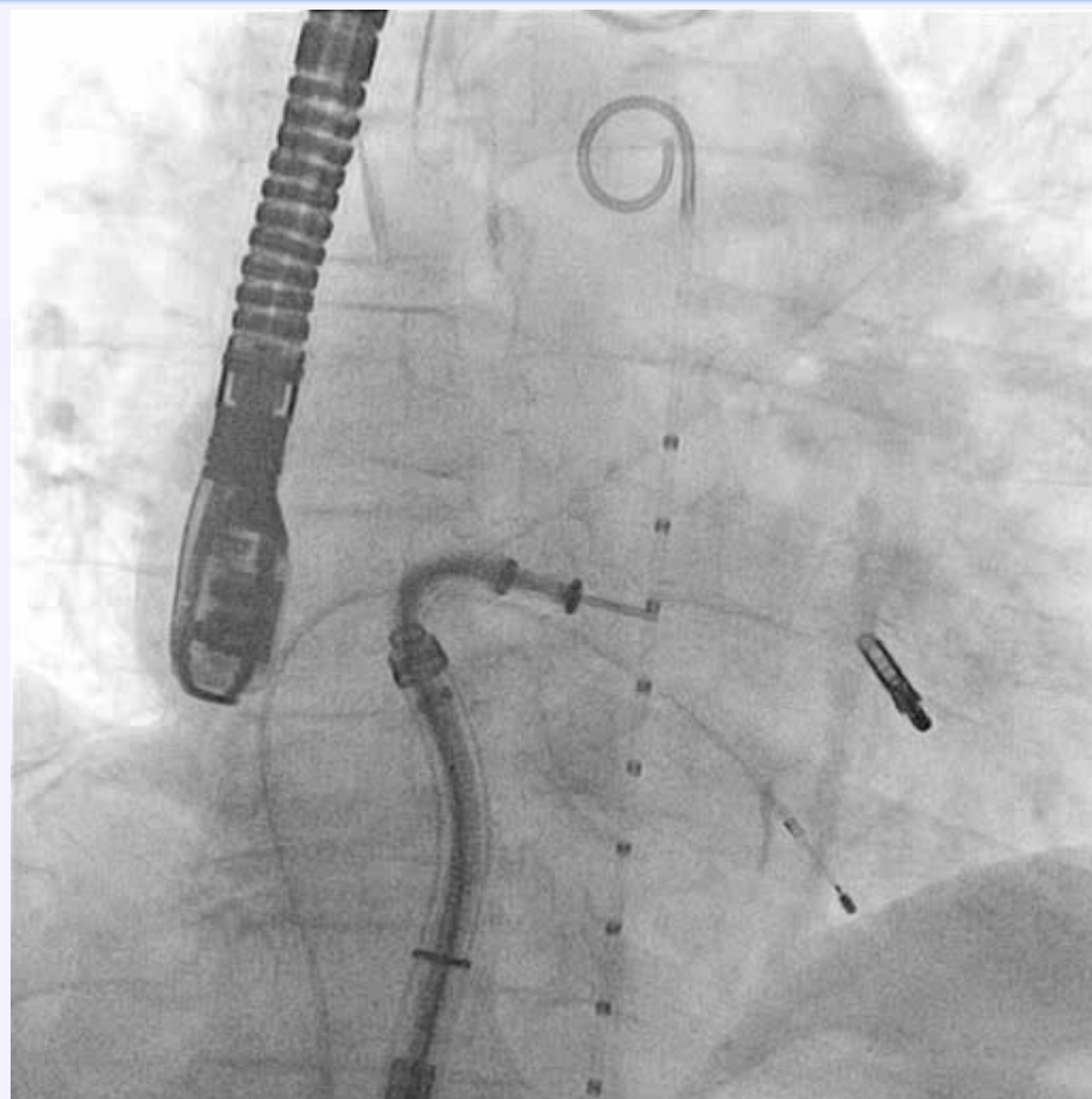


Echocardiopher:
Clip is stable, you can release the clip now!!



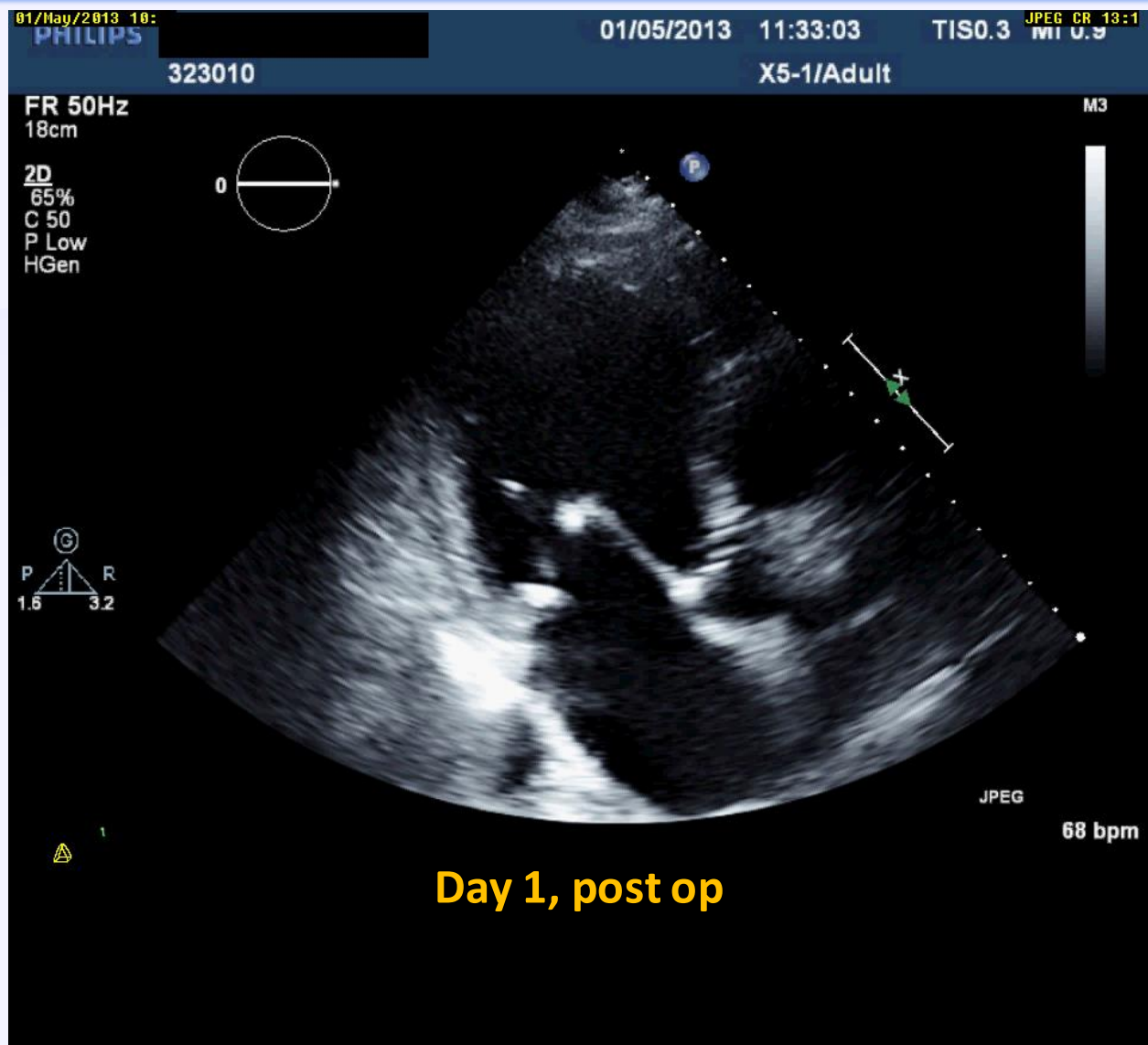


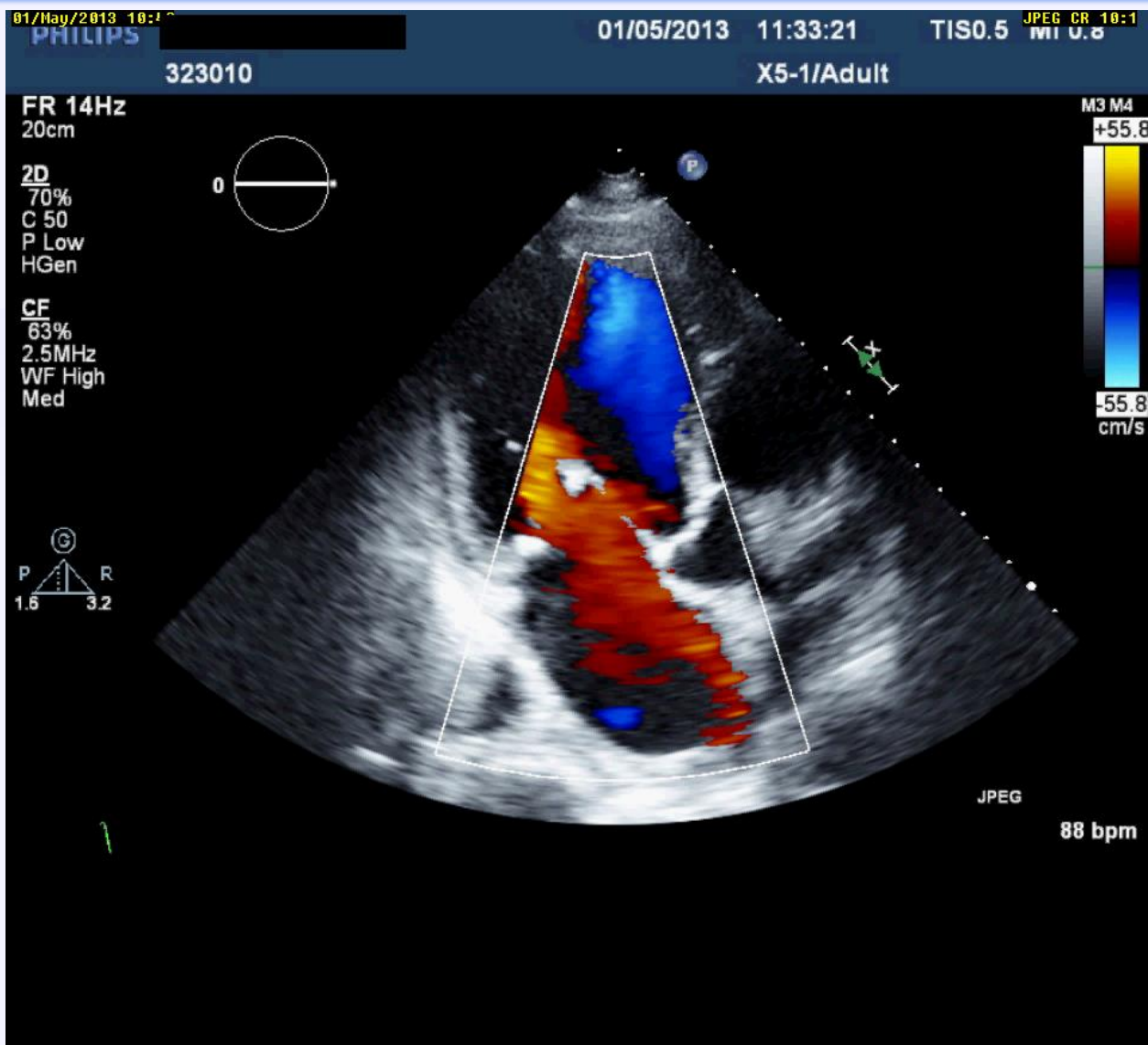




What should we do?

A light blue wavy shape that spans the width of the slide, positioned below the text. It has a soft, undulating top edge and a flat bottom edge, creating a subtle background element.A solid dark blue horizontal bar at the bottom of the slide, serving as a footer or design element.





Day 5 post op TTE, clip was not seen!!

(What should we do now?)

05/May/2013 15:0

PHILIPS

05/05/2013 03:43:54PM TISO.1 MI 0.5

JPEG CR 13:1

323010

X7-2t/TEE3D

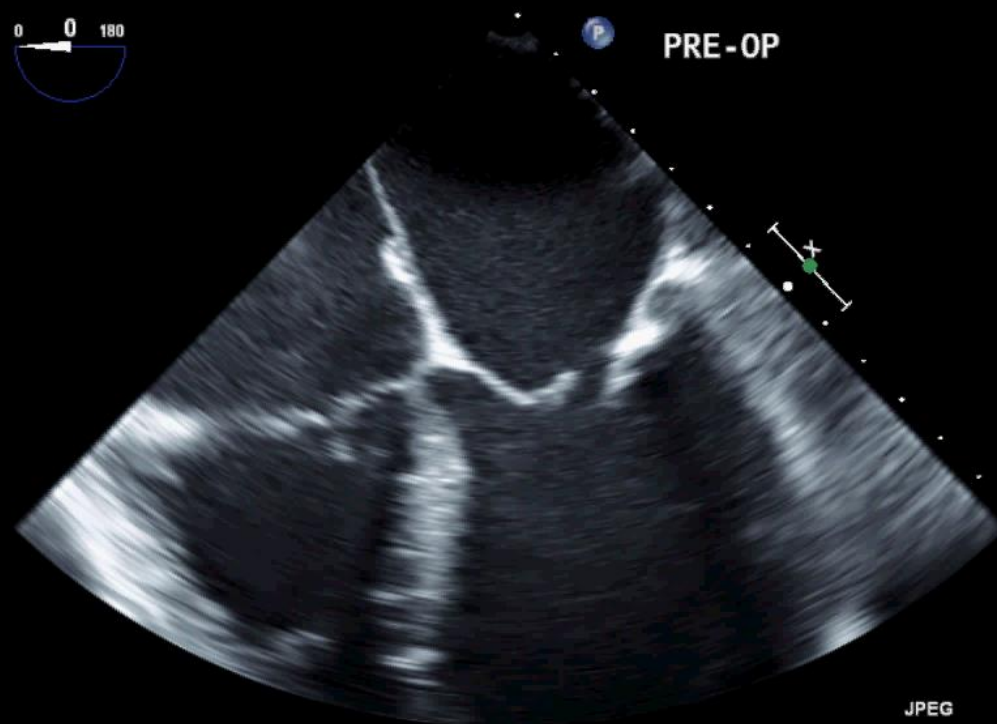
FR 50Hz
13cm

M4

2D
68%
C 50
P Off
Gen



PRE-OP

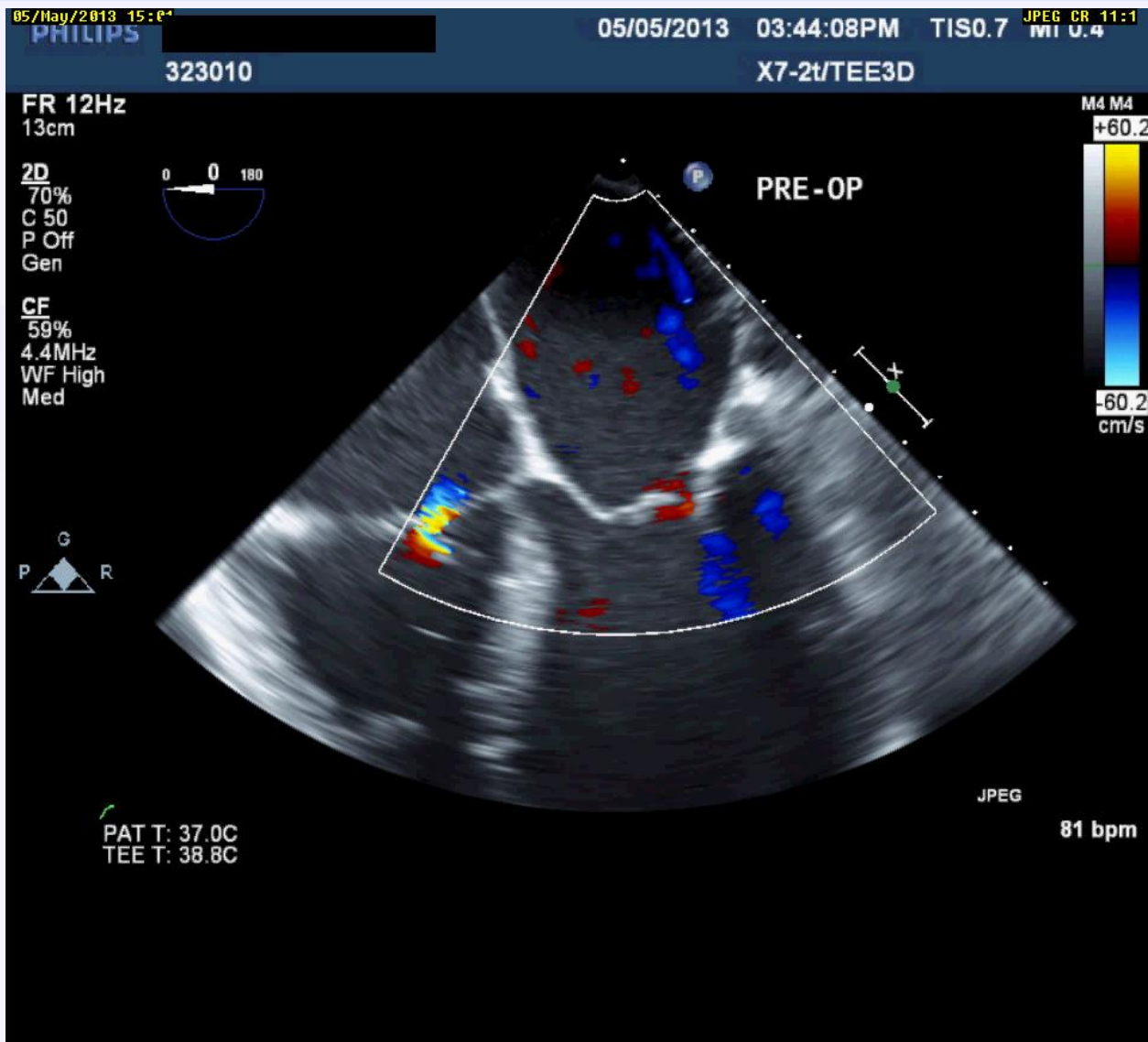


JPEG



PAT T: 37.0C
TEE T: 38.5C

89 bpm



Dr. Arifi, KACC, 05 May 2013

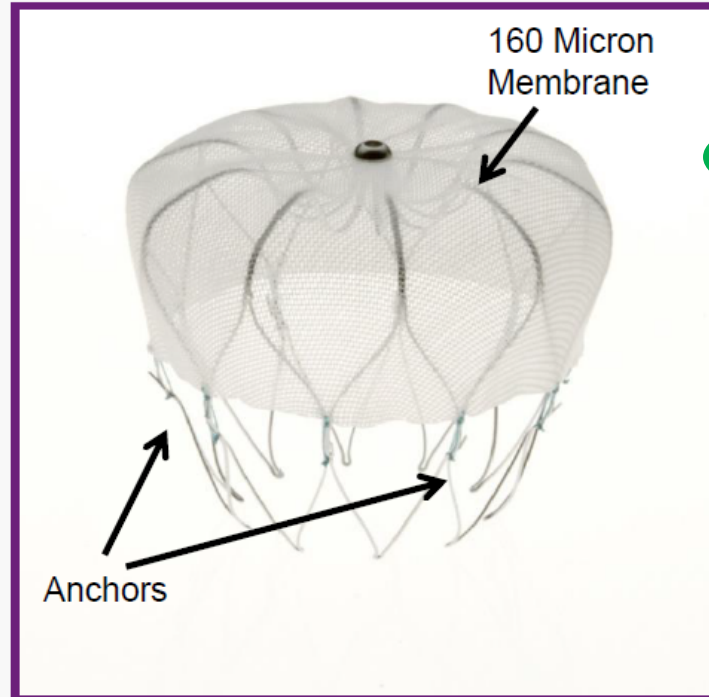
Summary (role of TEE in MitraClip repair)

- In patients with primary or secondary MR who have indication for valve repair but judged inoperable or at unacceptably high risk, percutaneous edge-to-edge repair may be considered in order to improve the symptoms.
- Echocardiography plays a major role for appropriate selection of the patients, monitoring the procedure in the Cath lab, and follow up of the patients after procedure.
- TEE, especially 3D TEE with en-face view of the mitral valve, creates a common language between **echocardiographer** and **interventional cardiologist** in the Cath lab. It has a crucial role to monitor the mitral clipping procedure.

Outline

1. TEE in guiding atrial septal puncture
2. TEE in MitraClip repair
- 3. TEE in percutaneous closure of LAA**
4. TEE in percutaneous mitral balloon valvuloplasty
5. TEE in TAVI (TAVR)
6. TEE in percutaneous closure of paravalvular leaks
7. TEE in Percutaneous intervention in tricuspid valve
8. TEE in percutaneous closure of ASD/ PFO and VSD

WATCHMAN LAAC - WATCHMAN Device



Nitinol Frame

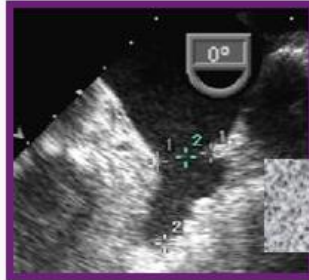
- Radially expands to maintain position in LAA
- Available sizes:
 - 21, 24, 27, 30, 33 mm (diameter)
- 10 Active fixation anchors around device perimeter designed to engage LAA tissue for stability and retention
- Contour shape accommodates most LAA anatomies

160 Micron Membrane

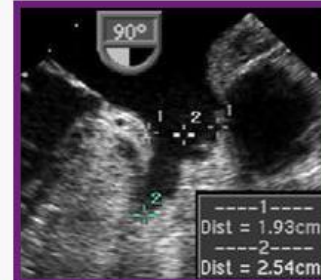
- Polyethylene terephthalate (PET) cap
- Designed to block emboli from exiting the LAA
- Intended to promote healing process

Assessment of LAA

Confirm the absence of LA / LAA thrombus



Measure LAA ostium in at least 4 TEE views



At 0 deg (from left coronary artery to a point 2 cm from tip of the LUPV limbus)



At 45, 90, 135 deg (from the top of the MV annulus to a point 2 cm from tip of the LUPV limbus)



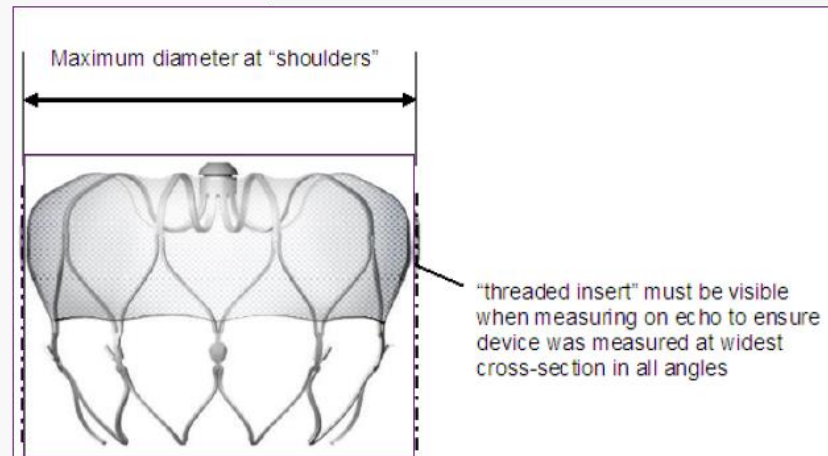
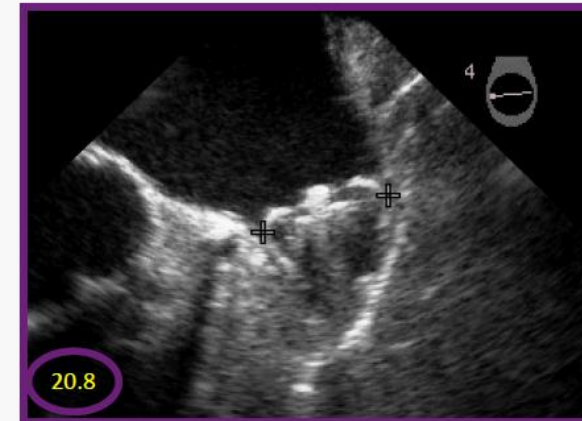
Measure the approximate LAA useable length from the ostium line to the apex of the LAA

Device Release Criteria – Size

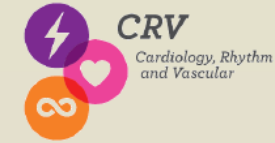
Compression

Device Size (uncompressed diameter)	Maximum (20%) Compression Measured Diameter*	Minimum (8%) Compression Measured Diameter*
21	16.8 mm	19.3 mm
24	19.2 mm	22.1 mm
27	21.6 mm	24.8 mm
30	24.0 mm	27.6 mm
33	26.4 mm	30.4 mm

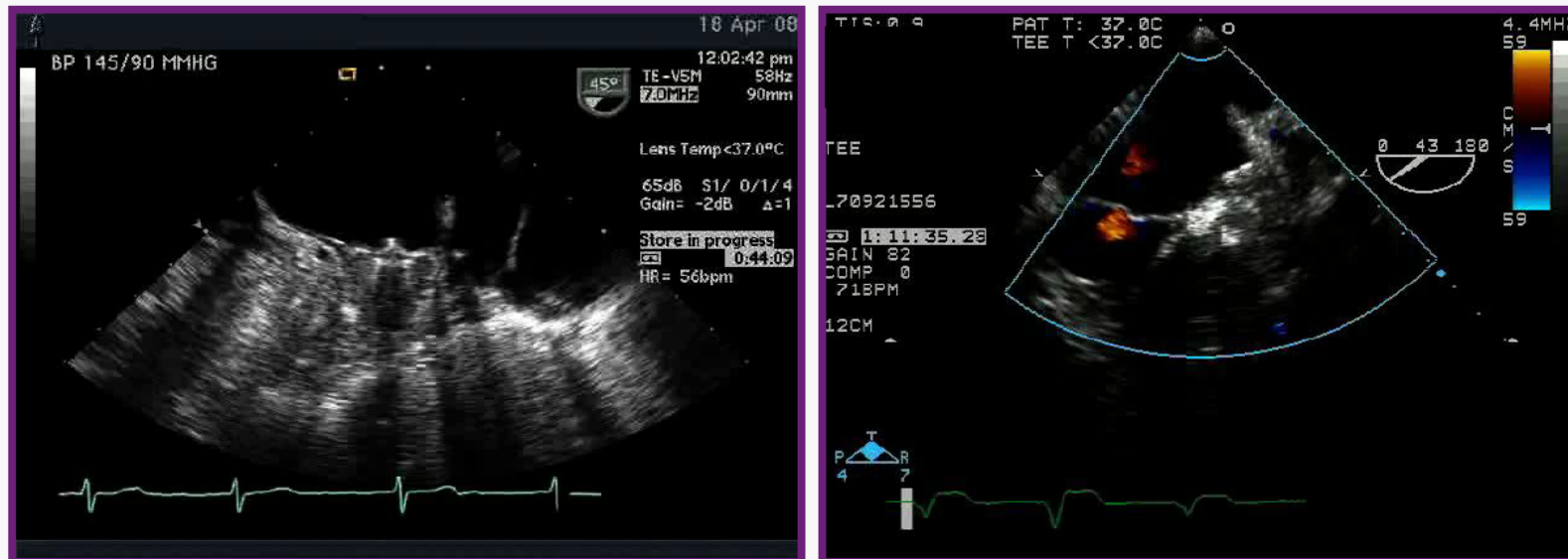
**Measure in-situ device diameter at approximate TEE angles of 0, 45, 90 and 135 degrees to accurately assess device compression*



Device Release Criteria – Seal



- No residual flow noted around device



- If all 4 device release criteria are met (PASS), device can be released
- Counter clockwise on proximal handle 3-5 turns

PHILIPS

11/05/2013

12:31:38

TIS0.1

JPEG CR 19:1
MI 0.5

648991

X7-2t/Adult

FR 52Hz
11cm

M4

2D

66%
C 50
P Off
Gen



JPEG

PAT T: 37.0C
TEE T: 38.8C

80 bpm

PHILIPS

11/05/2013

12:32:49

TIS0.7

JPEG CR 16:1
MI 0.4

648991

X7-2t/Adult

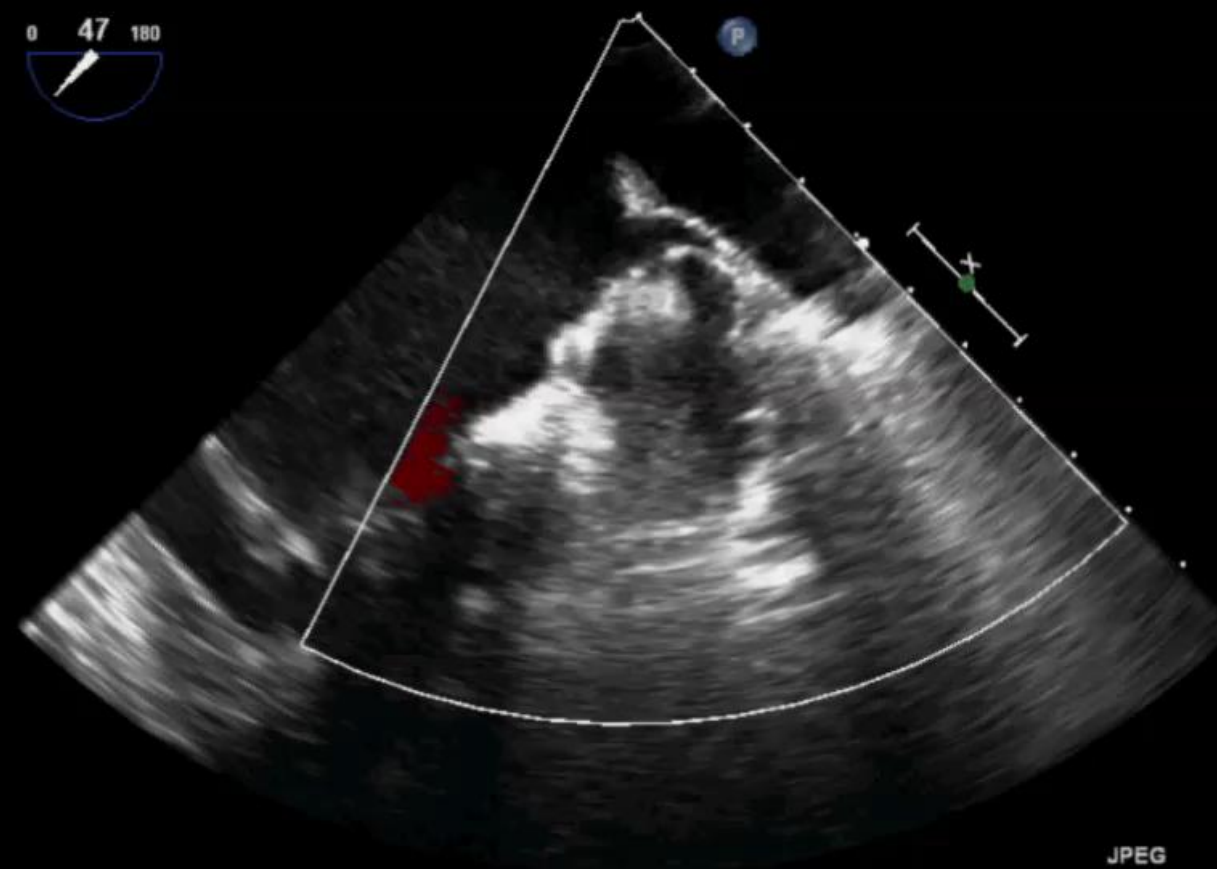
FR 11Hz
11cm

2D

69%
C 50
P Off
Gen

CF

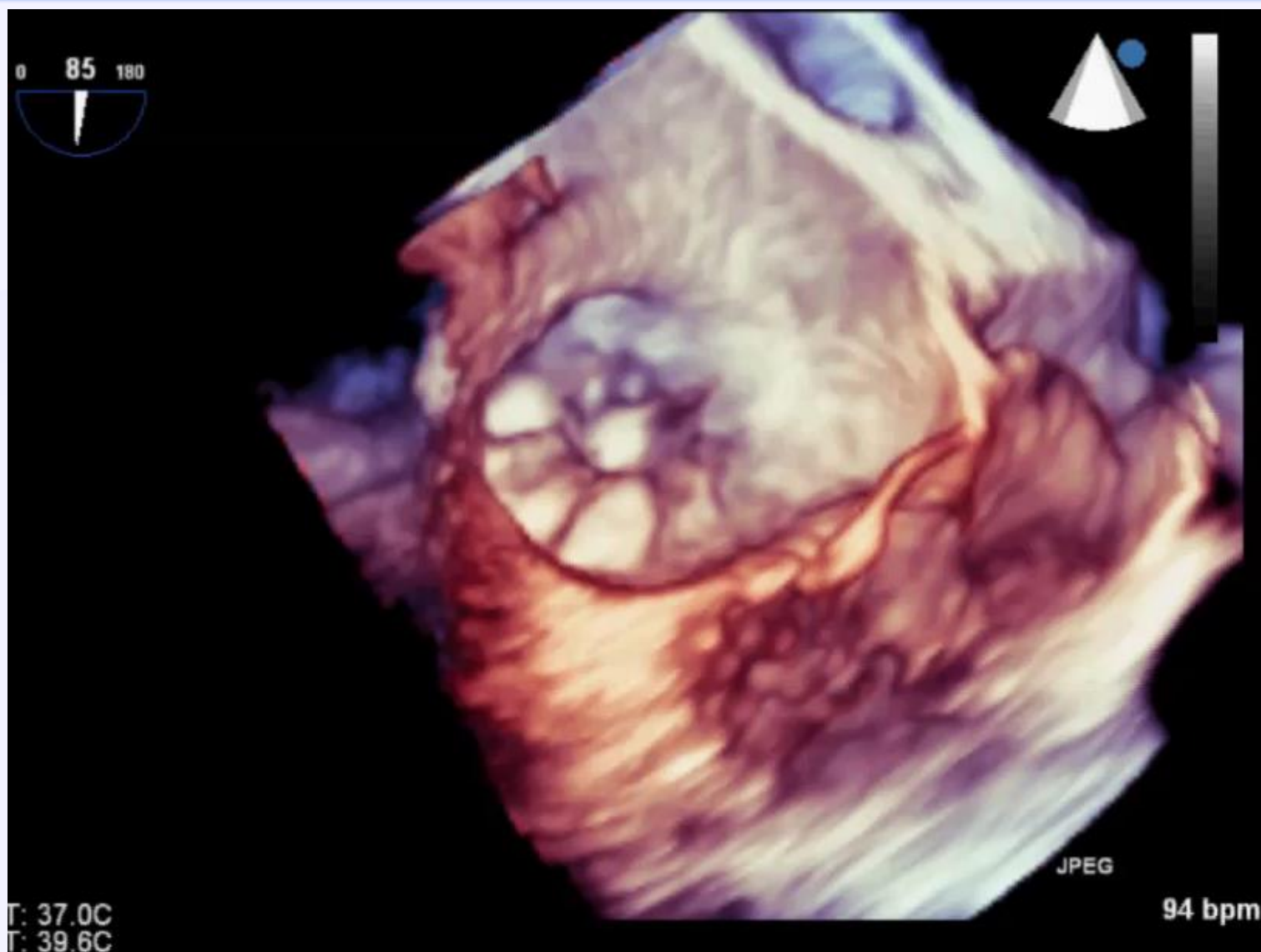
59%
4.4MHz
WF High
Med

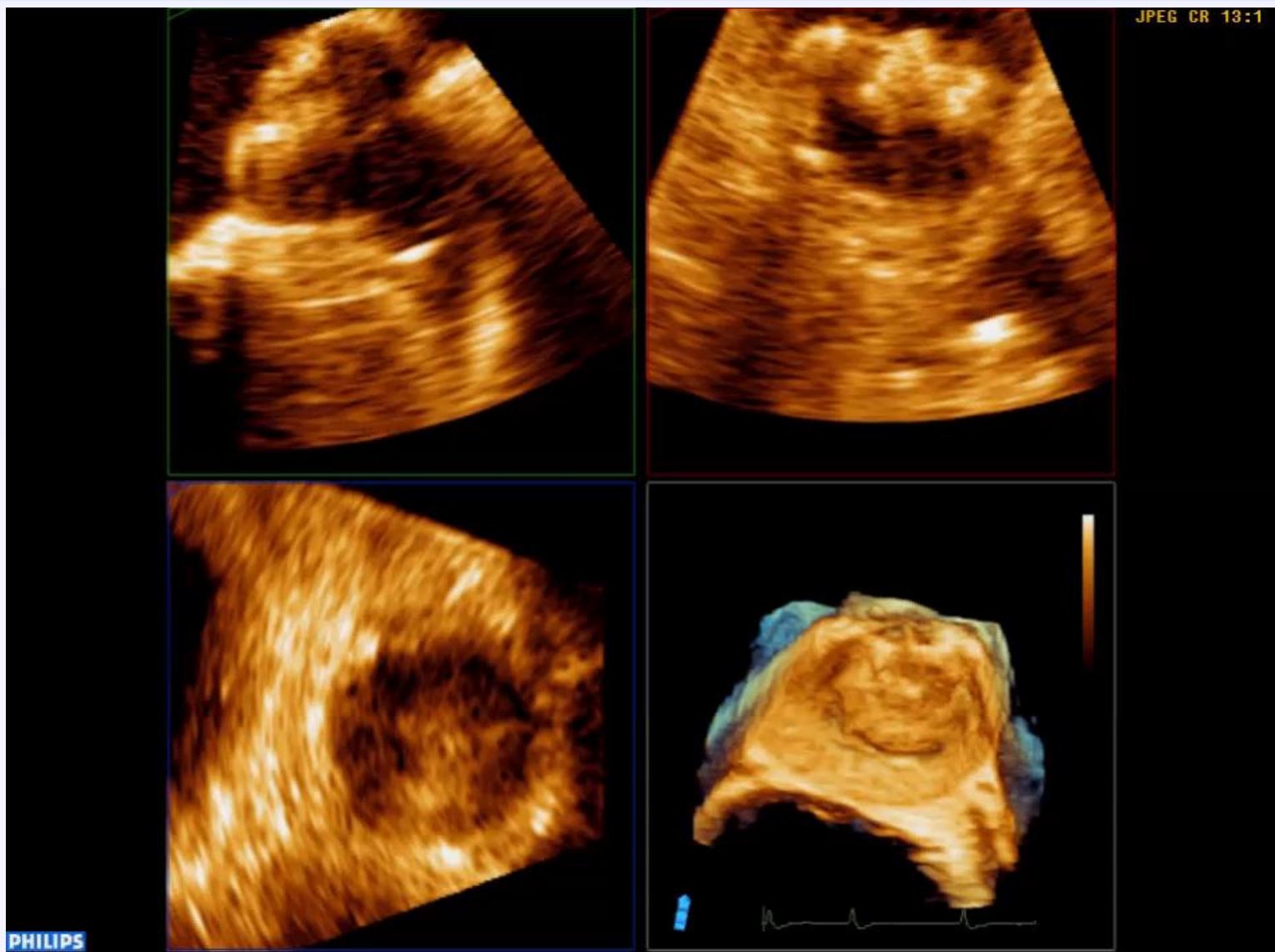


PAT T: 37.0C
TEE T: 38.1C

JPEG

78 bpm







Toronto

Thank you.