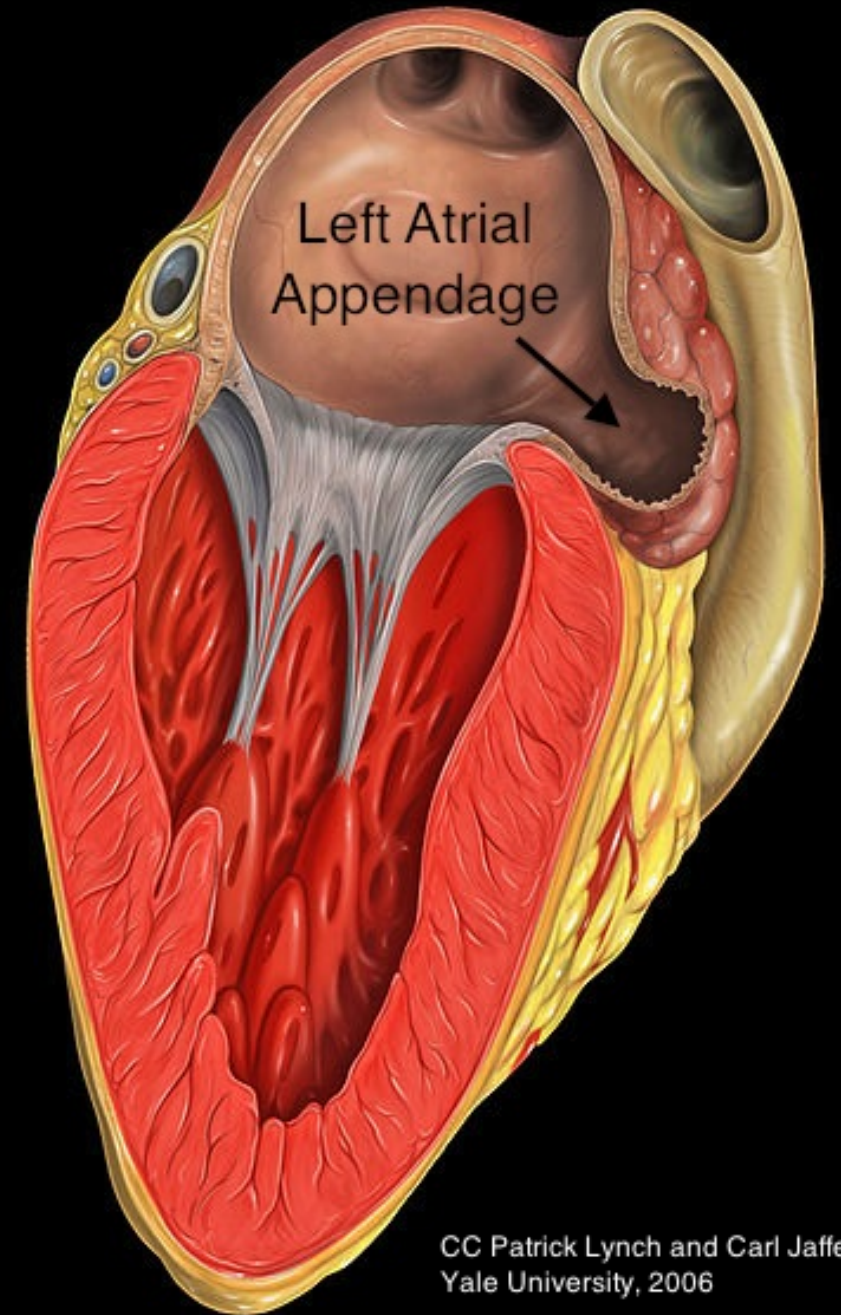


LAA Cases

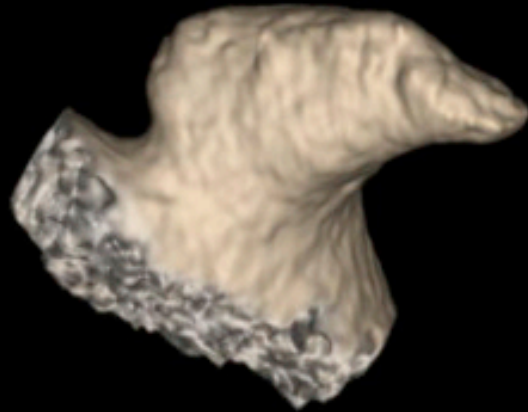
Wendy Tsang, MD, MS

Assistant Professor of Medicine, University of Toronto
Toronto General Hospital – University Health Network

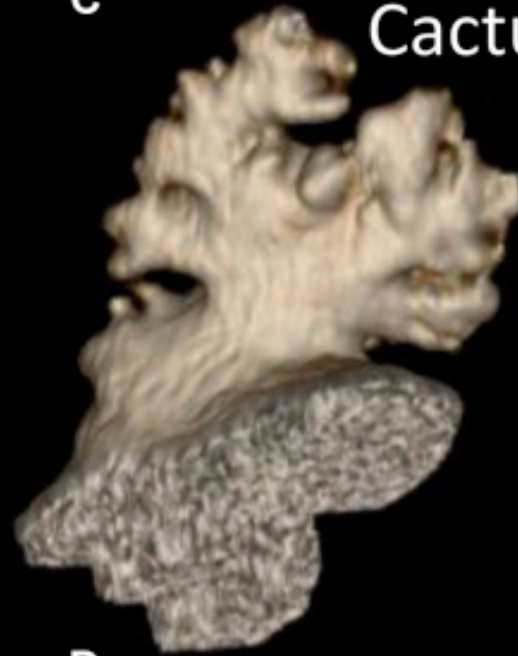
- The left atrial appendage is the most common site for cardiac thrombus
- It is anatomically attached to the left inferior portion of the left atrium and consists of pectinate muscles
- There are four main types of LAA morphologies



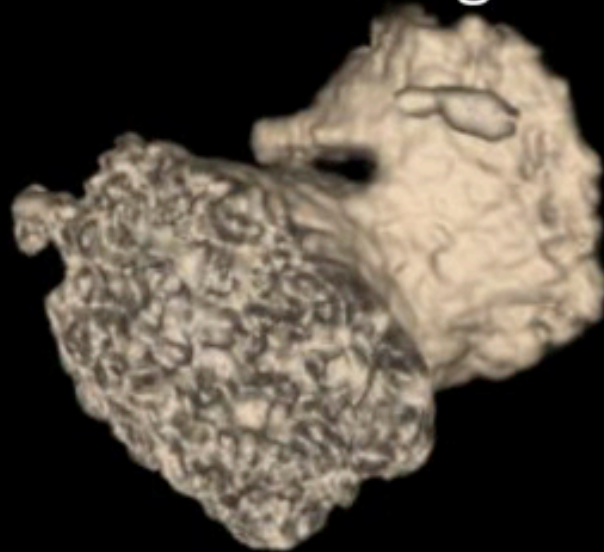
A Windsock



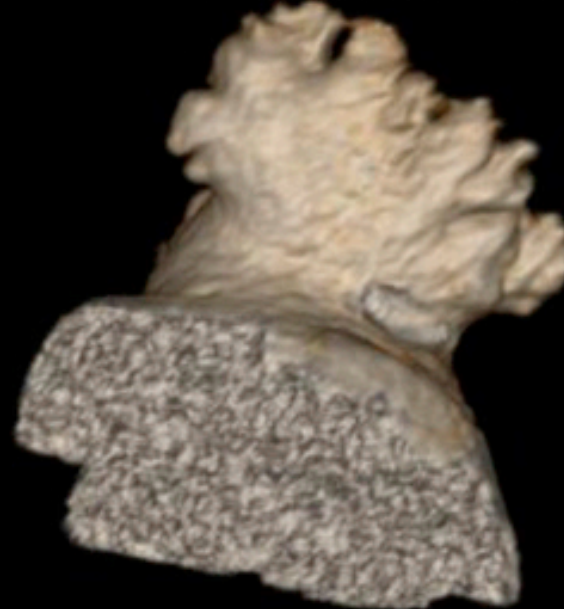
C Cactus



B Chicken wing



D Cauliflower



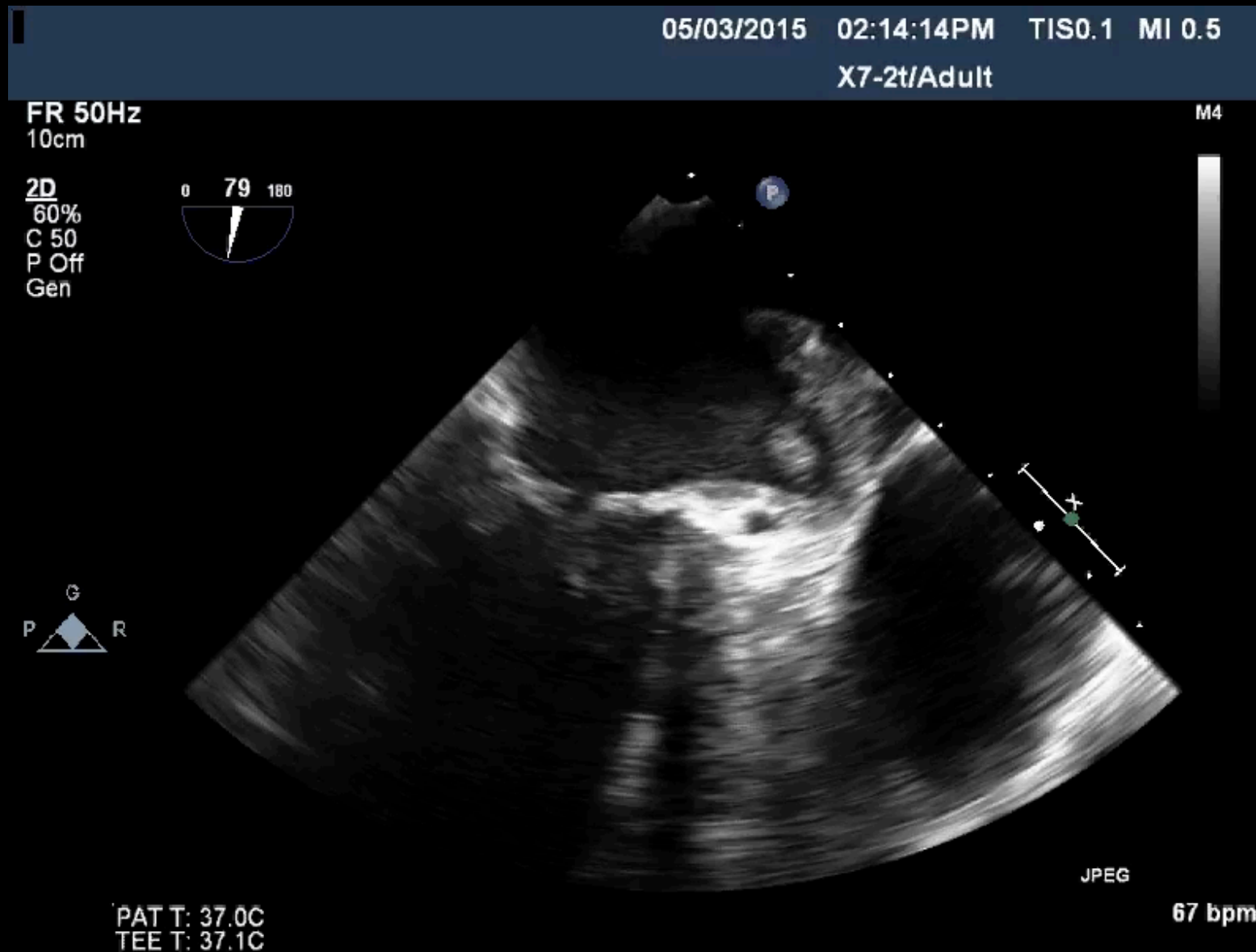
Case 1

- 72 F
- Paroxysmal atrial fibrillation since 2008
- Rivaroxaban started 3 months ago
- Presented with rapid atrial fibrillation with a ventricular rate of 138bpm, BP: 120/80mmHg which is known to be significantly lower than her uncontrolled high blood pressure.
- A TEE was performed to rule out intracardiac thrombus prior to cardioversion

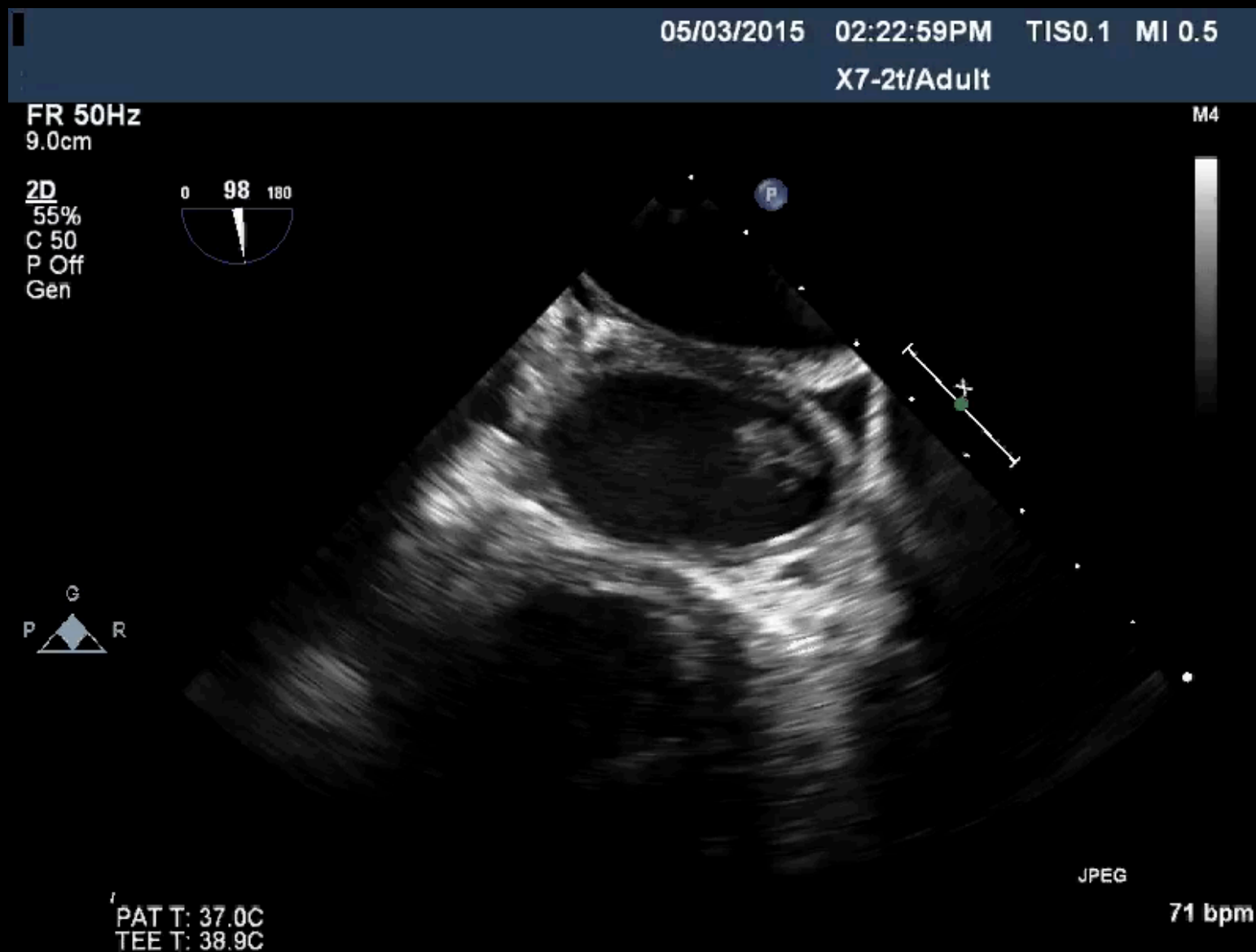
Case 1



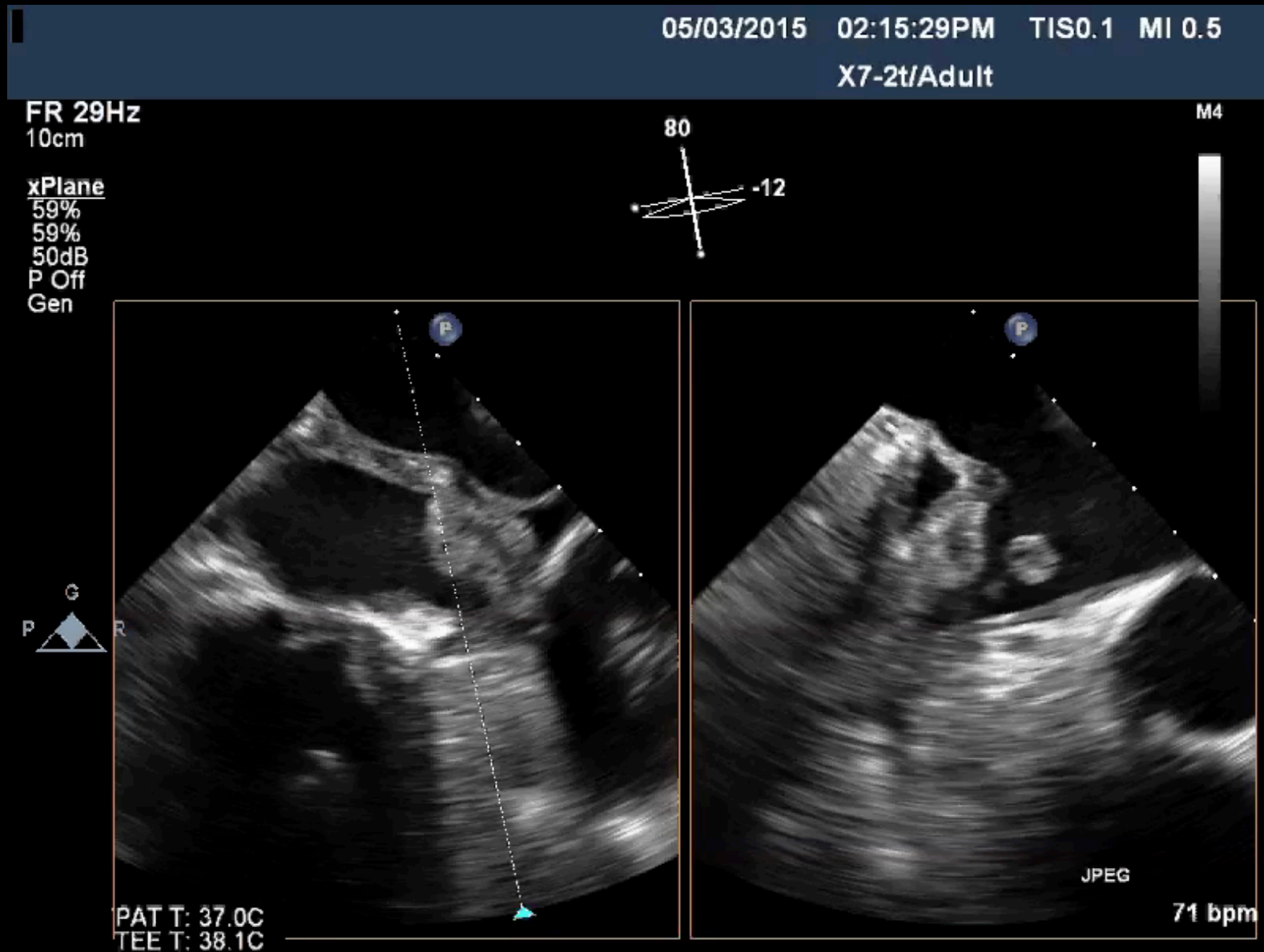
Case 1



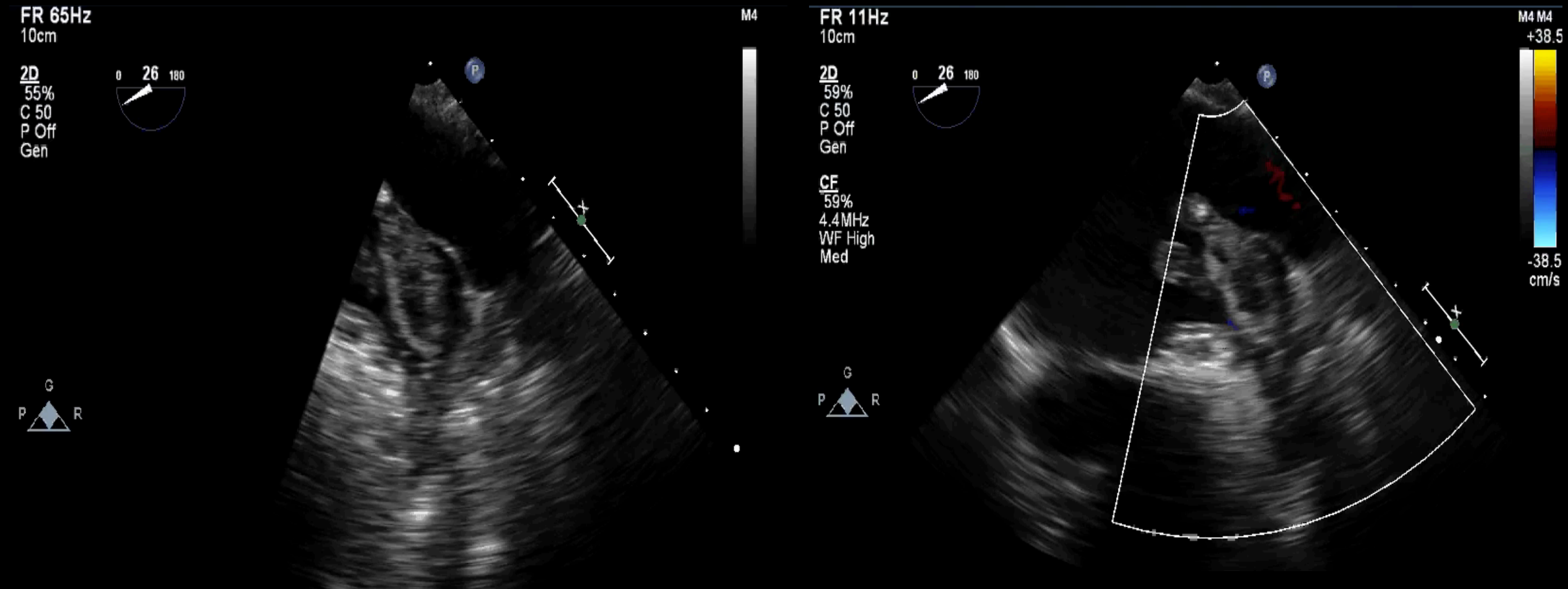
Case 1



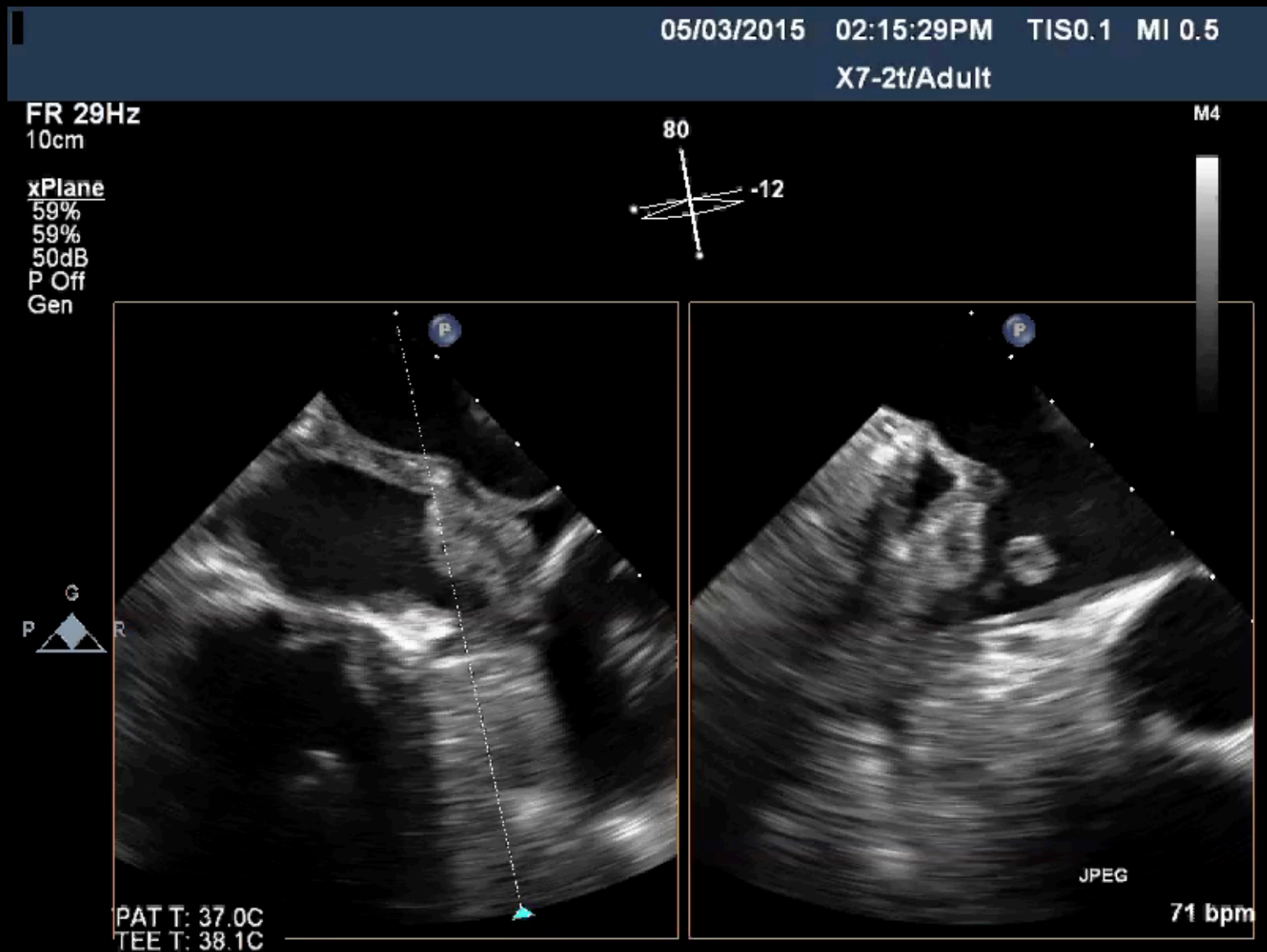
Case 1



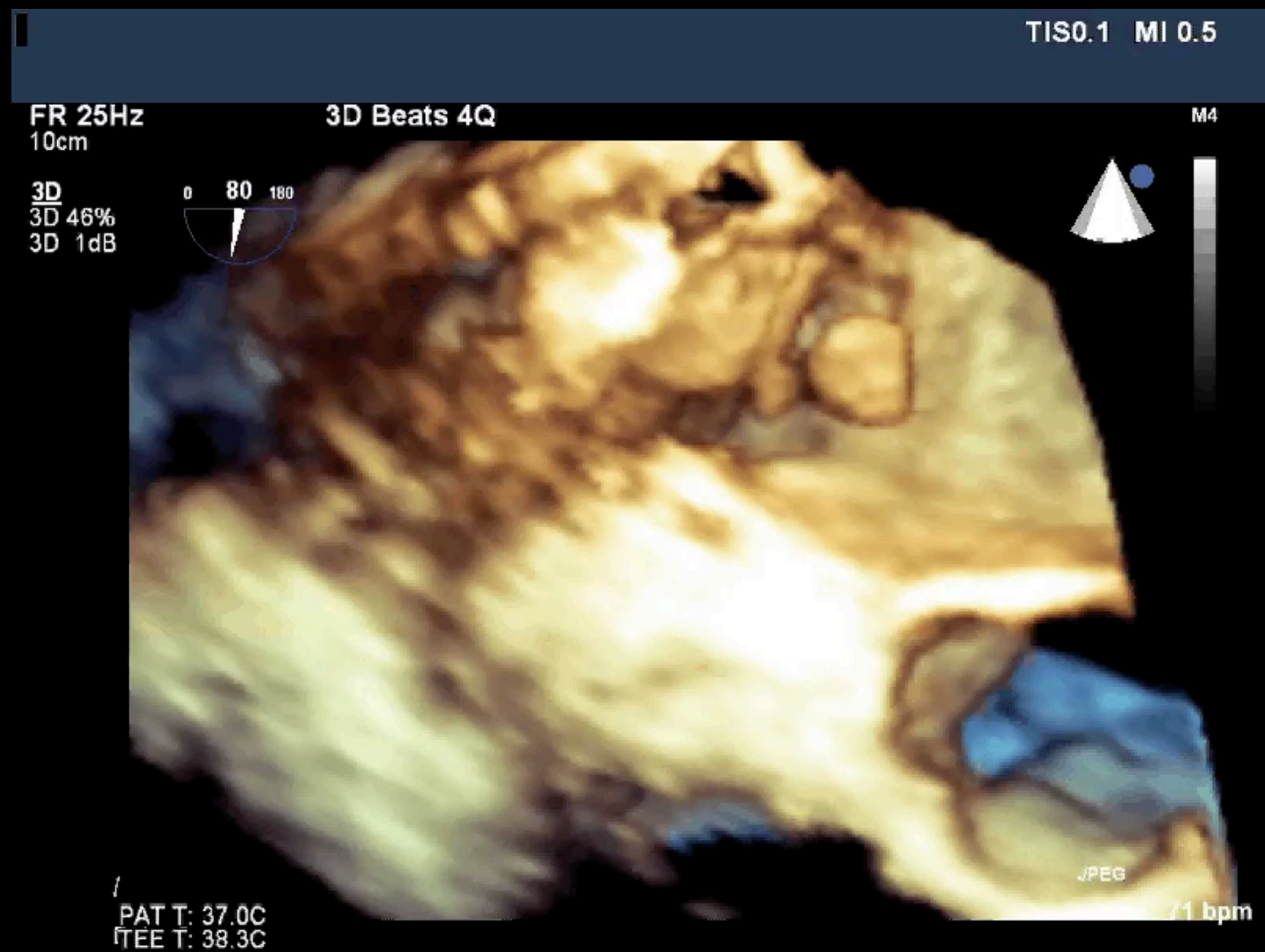
Case 1



Case 1



Case 1



Case 2

- 67M
- Basal septal hypertrophy with mild provokable LVOTO
- Bicuspid aortic valve with severe aortic valve stenosis
- Permanent atrial fibrillation
- For elective CV surgery for myectomy, AVR and LAA ligation

Case 2

Peri-operative TEE

Adult Echo

X7-2t

75Hz

10cm

xPlane

45%

45%

50dB

P Off

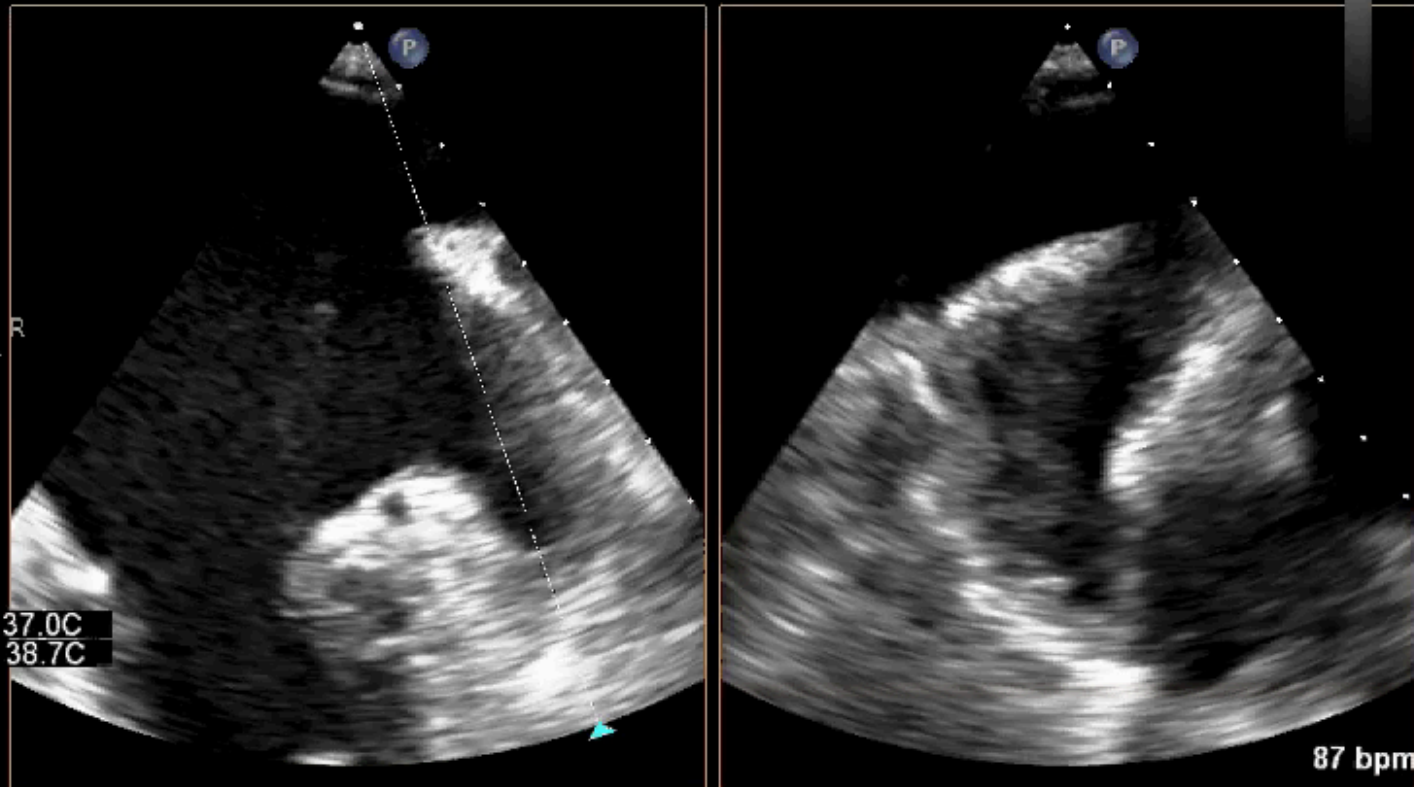
Pen

TISO.2 MI 0.4

M4



PAT T: 37.0C
TEE T: 38.7C



Case 2

Peri-operative TEE

Adult Echo

X7-2t

20Hz

10cm

xPlane

49%

49%

50dB

P Off

Pen

CF

48%

6482Hz

WF 583Hz

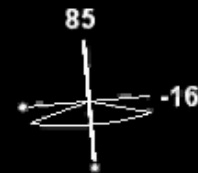
4.4MHz



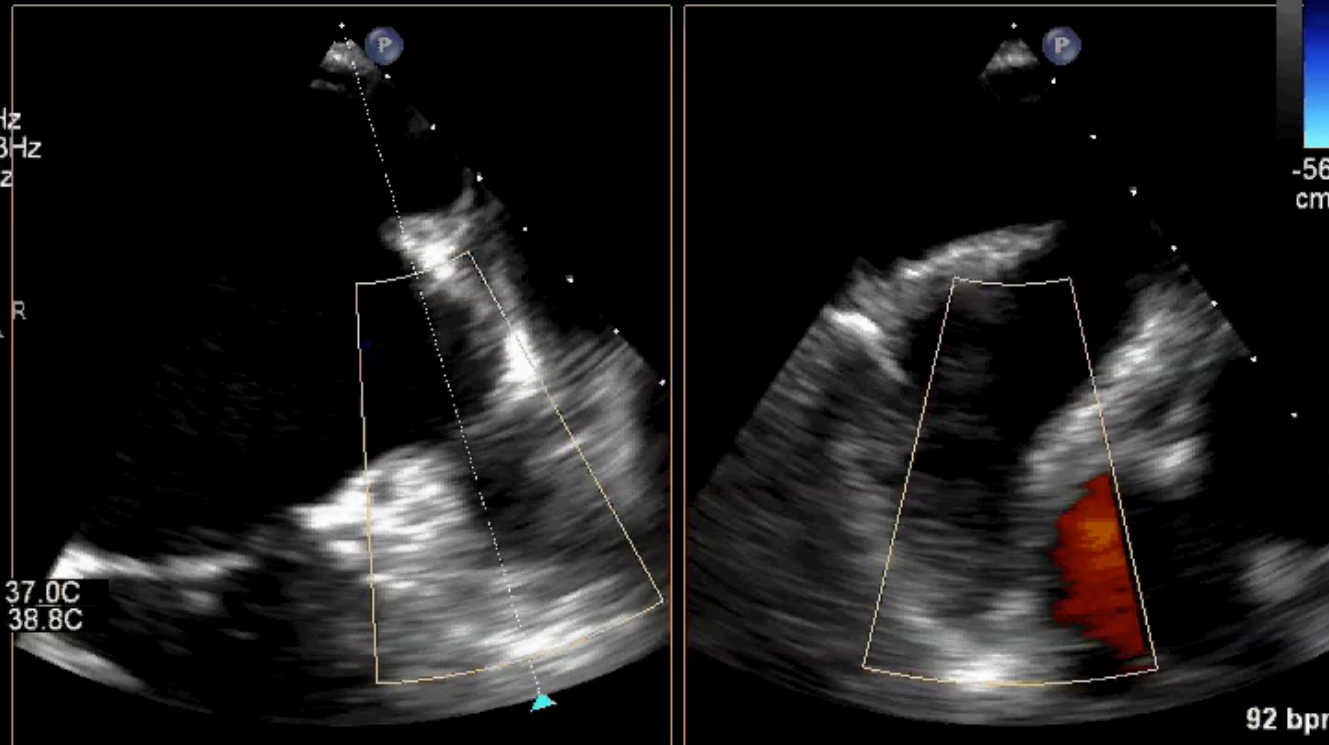
PAT T: 37.0C

TEE T: 38.8C

TIS 0.6 MI 0.4



M4 M4
+56.2



Case 2

Peri-operative TEE

Adult Echo

X7-2t

60Hz

10cm

xPlane

45%

45%

50dB

P Off

Pen

TIS 0.2 MI 0.4

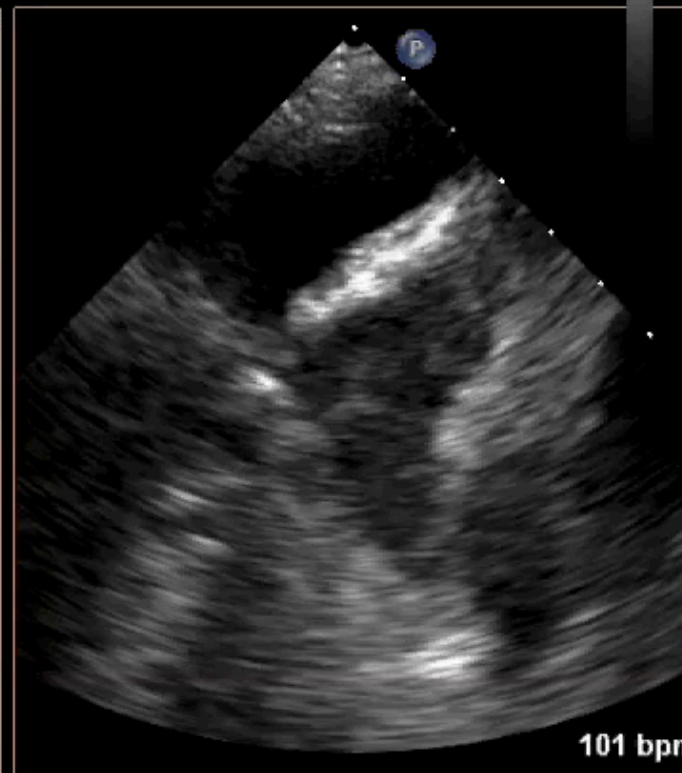
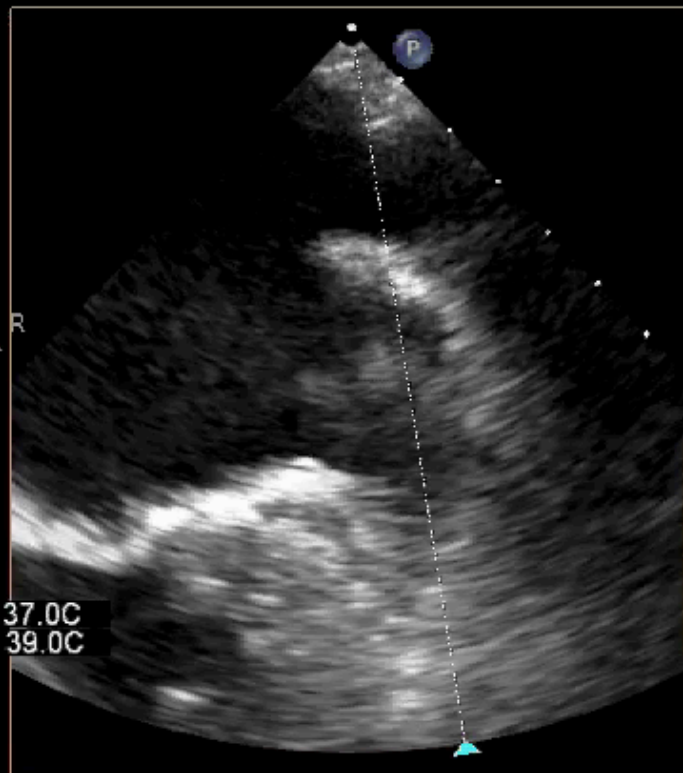
M4

85

-9



PAT T: 37.0C
TEE T: 39.0C



101 bpm

Case 2

Peri-operative TEE

Adult Echo

X7-2t

53Hz

10cm

2D

45%

C 50

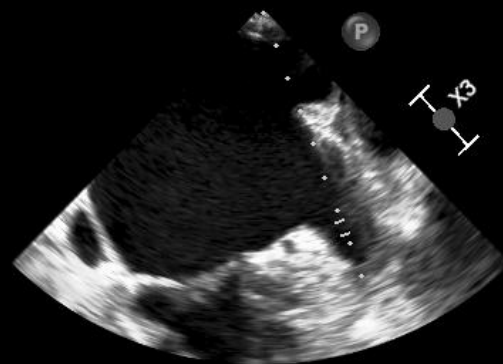
P Off

Pen



TIS0.4 MI 0.4

M4



PW

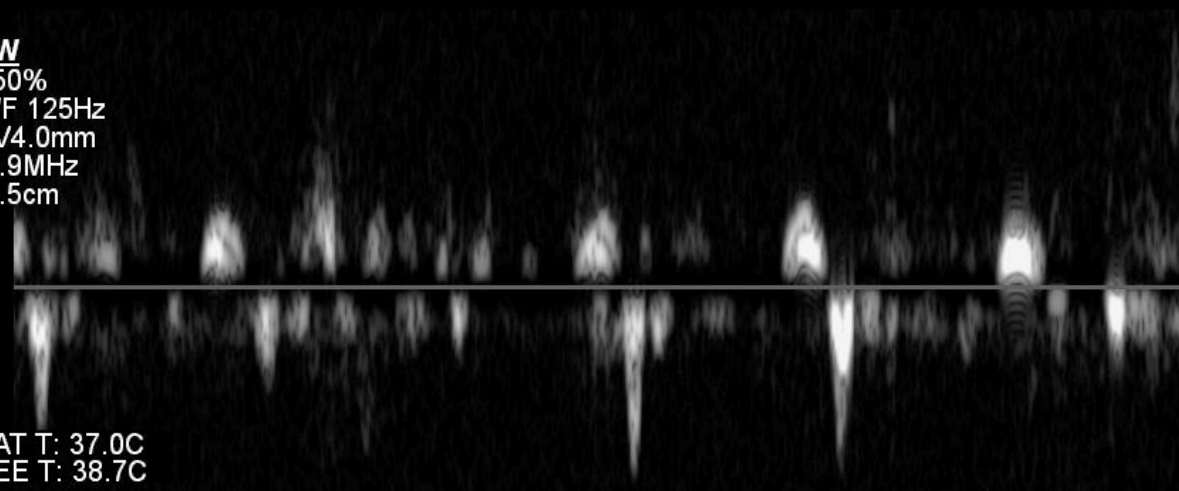
50%

WF 125Hz

SV4.0mm

2.9MHz

6.5cm



PAT T: 37.0C

TEE T: 38.7C

-40

-

-20

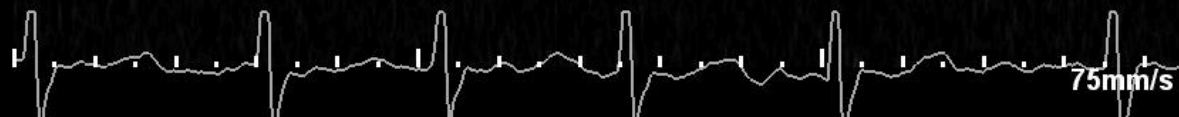
-

-cm/s

-

-20

-



112bpm

Case 2

Off CPB

Adult Echo

X7-2t

53Hz

6.0cm

2D

45%

C 50

P Off

Pen



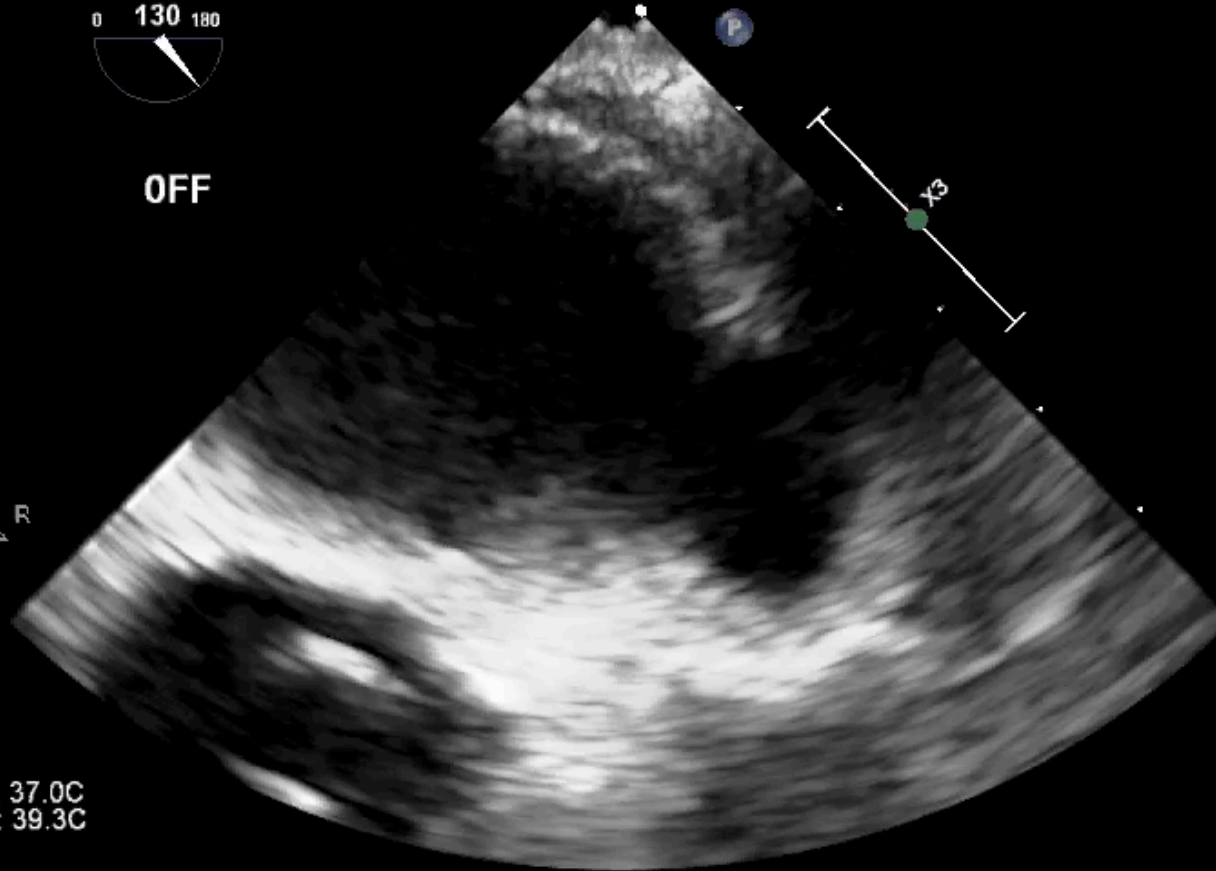
OFF

TIS0.1 MI 0.5

M4



PAT T: 37.0C
TEE T: 39.3C



67 bpm

Case 2

Off CPB

Adult Echo

X7-2t

53Hz

6.0cm

2D

45%

C 50

P Off

Pen



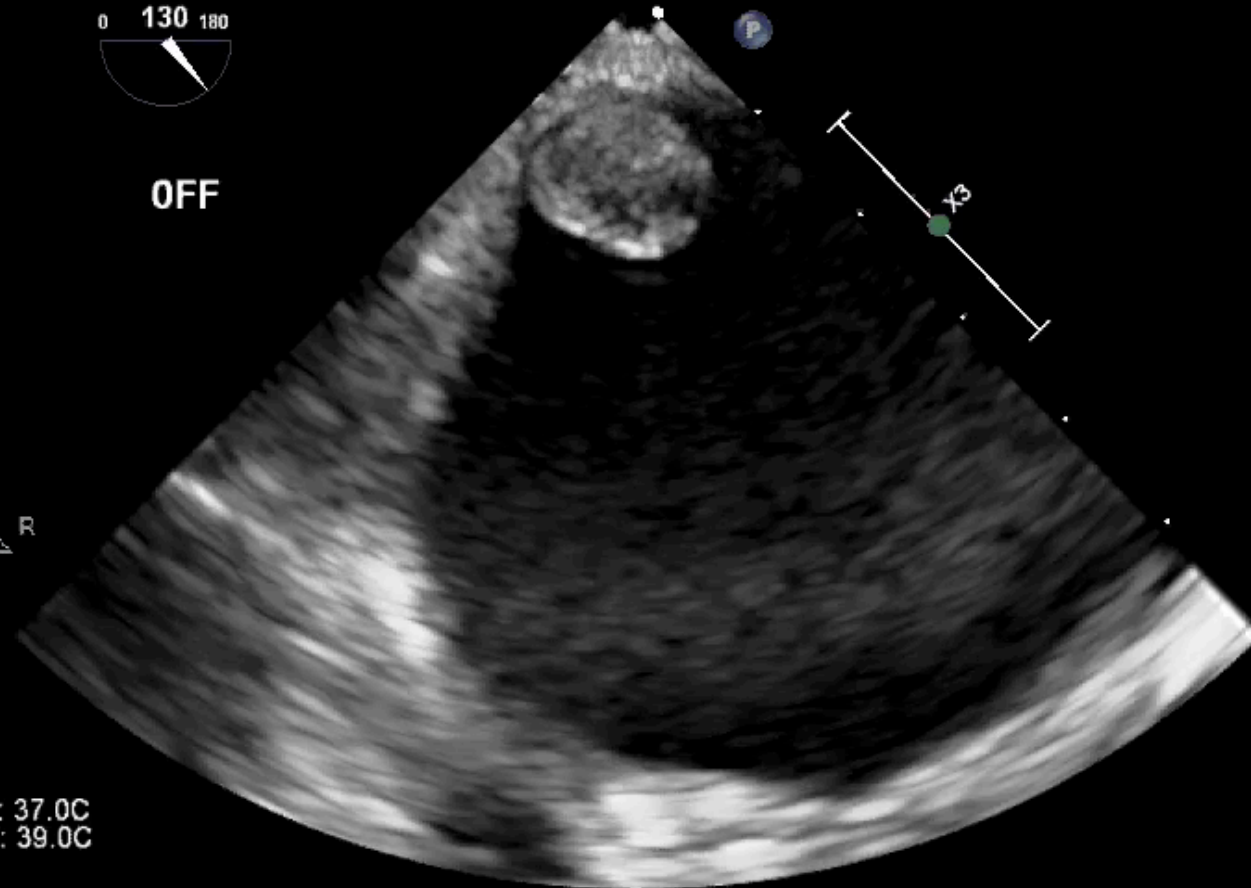
OFF

TIS 0.1 MI 0.5

M4



PAT T: 37.0C
TEE T: 39.0C



87 bpm

Case 2

Off CPB

Adult Echo

X7-2t

66Hz

9.0cm

xPlane

47%

47%

50dB

P Off

Pen

TIS0.2 MI 0.4

M4



OFF



PAT T: 37.0C
TEE T: 40.1C



97 bpm

Case 2



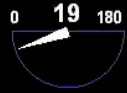
Case 3

- 41M
- Non-obstructive hypertrophic cardiomyopathy
- Recurrent atrial fibrillation/flutter despite 3 successful cardioversions
- TEE ordered to rule out intracardiac thrombus prior to ablation

Case 3

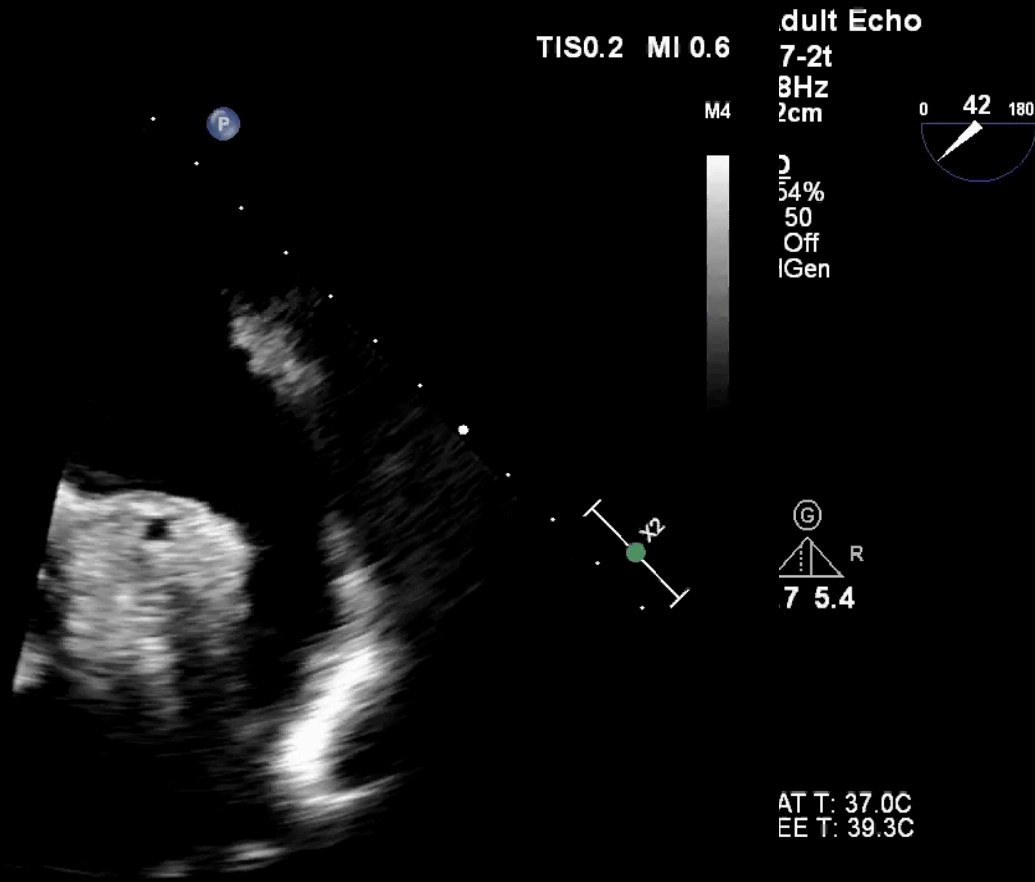
Adult Echo
X7-2t
82Hz
12cm

2D
50%
C 50
P Off
HGen



G
P R
2.7 5.4

PAT T: 37.0C
TEE T: 39.0C



72 bpm

AT T: 37.0C
EE T: 39.3C



75 bpm

Case 3

Adult Echo

X7-2t

76Hz

12cm

xPlane

53%

53%

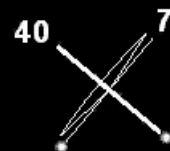
50dB

P Off

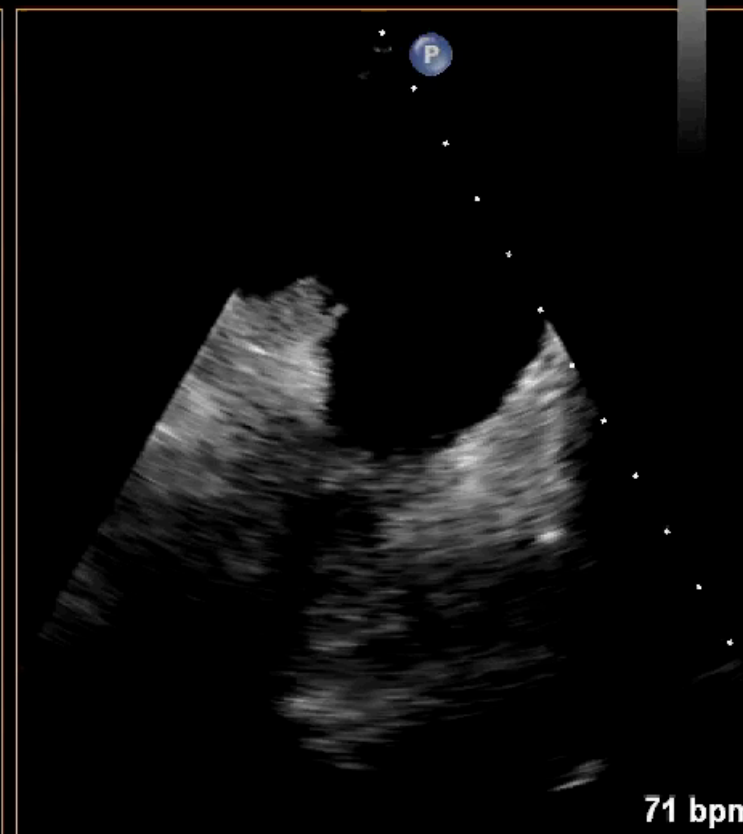
HGen

TIS0.3 MI 0.5

M4



PAT T: 37.0C
TEE T: 39.5C



71 bpm

Case 3

Adult Echo

X7-2t

53Hz

12cm

2D

53%

C 50

P Off

HGen

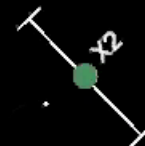


TIS 0.2 MI 0.6

M4



PAT T: 37.0C
TEE T: 39.5C



74 bpm

Adult Echo

X7-2t

52Hz

12cm

xPlane

53%

53%

50dB

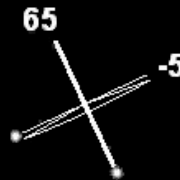
P Off

HGen

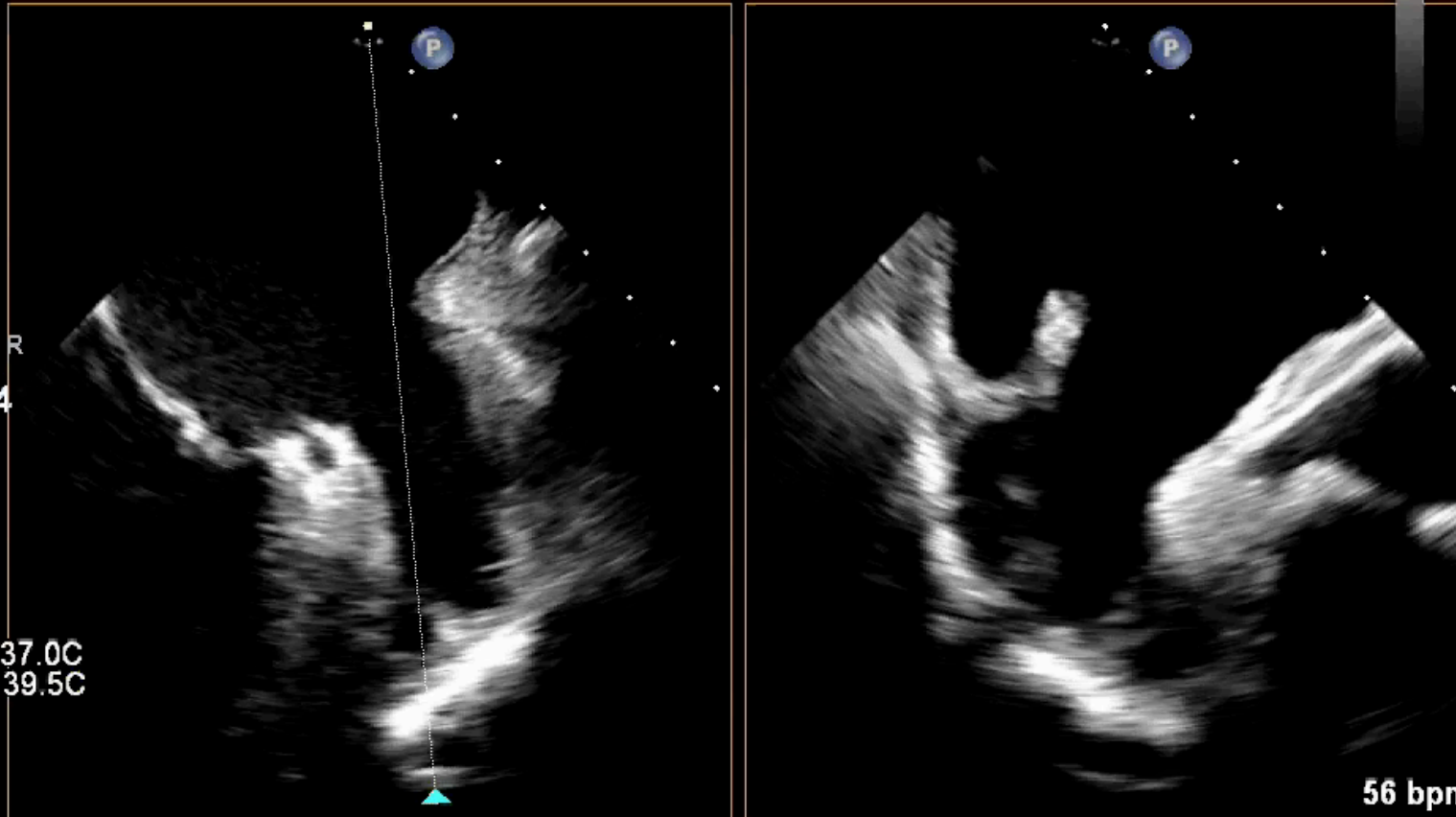
Case 3

TIS0.3 MI 0.5

M4



PAT T: 37.0C
TEE T: 39.5C



56 bpm

Case 3

Adult Echo

X7-2t

78Hz

12cm

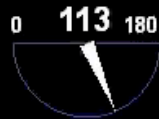
2D

52%

C 50

P Off

HGen

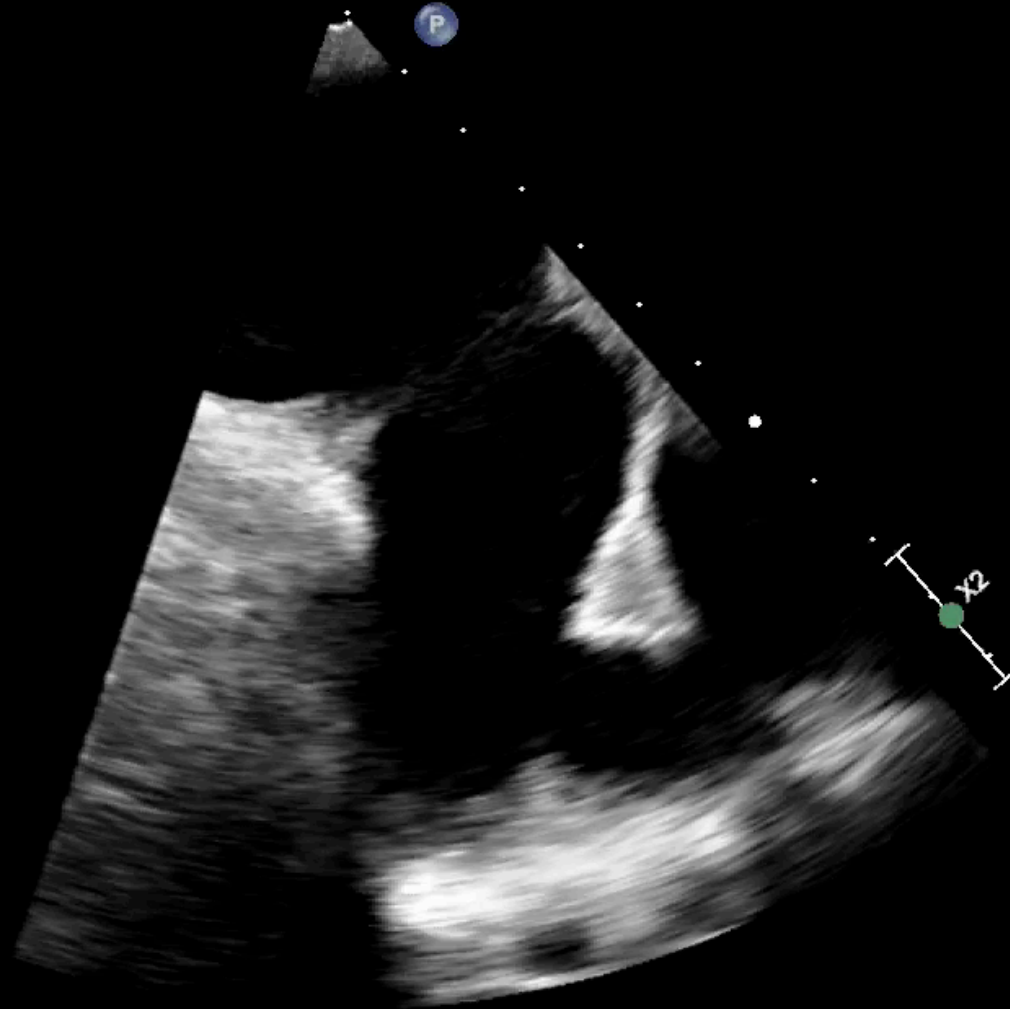


TIS 0.2 MI 0.6

M4



PAT T: 37.0C
TEE T: 39.6C



62 bpm

Adult Echo

X7-2t

76Hz

12cm

xPlane

52%

52%

50dB

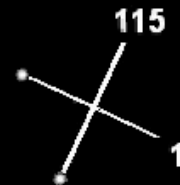
P Off

HGen

Case 3

TIS0.3 MI 0.5

M4



PAT T: 37.0C
TEE T: 39.8C



60 bpm

Clot or Not?

What else can we do ?

Case 3

Adult Echo
X7-2t
82Hz
13cm

2D
51%
C 50
P Off
Gen



PAT T: 37.0C
TEE T: 39.2C

TIS0.2 MI 0.6

M4



Adult Echo
X7-2t
82Hz
13cm

2D
52%
C 50
P Off
HPen



PAT T: 37.0C
TEE T: 39.0C

78 bpm

TIS0.1 MI 0.4

M4



67 bpm

Adult Echo

X7-2t

113Hz

13cm

2D

56%

C 40

P Off

Pen

TDI

69%

4.0MHz

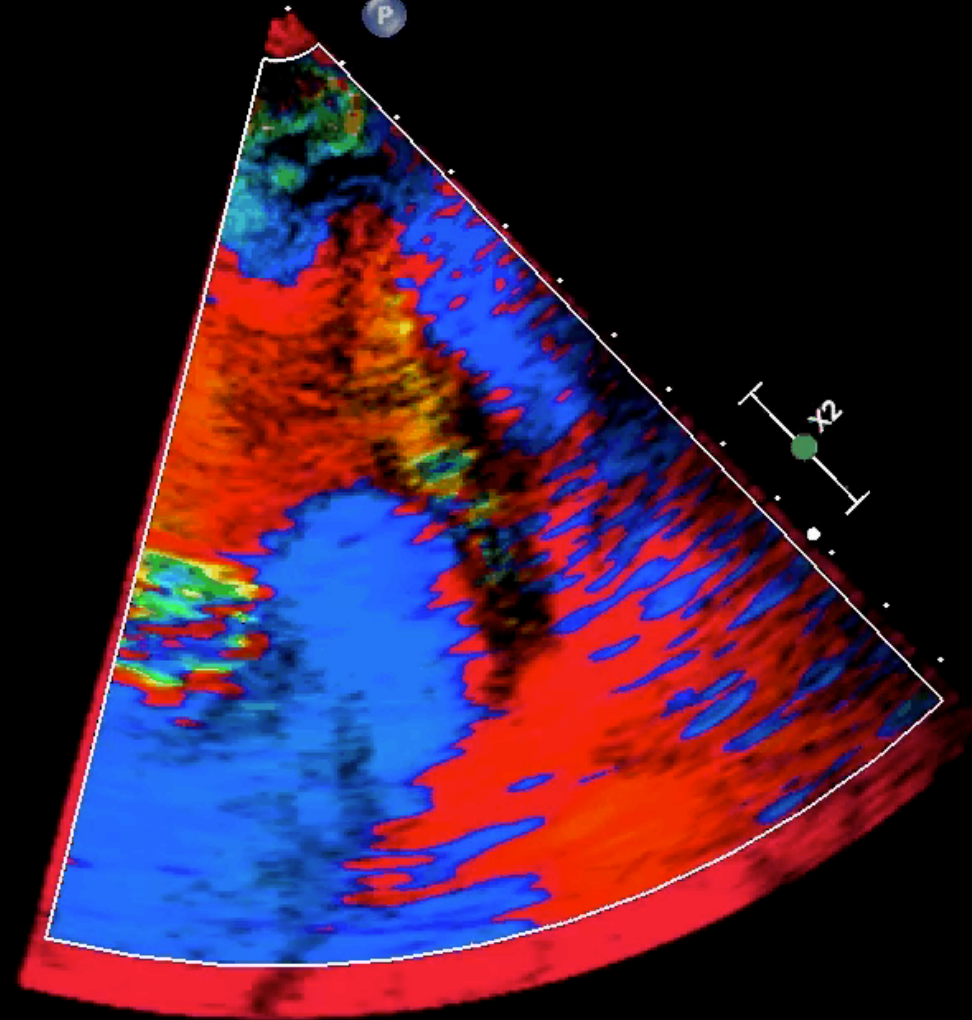
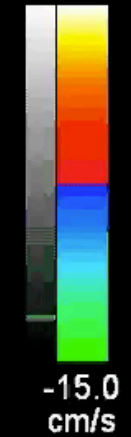


PAT T: 37.0C
TEE T: 39.1C

Case 3

TIS0.1 MI 0.5

M4 M6
+15.0

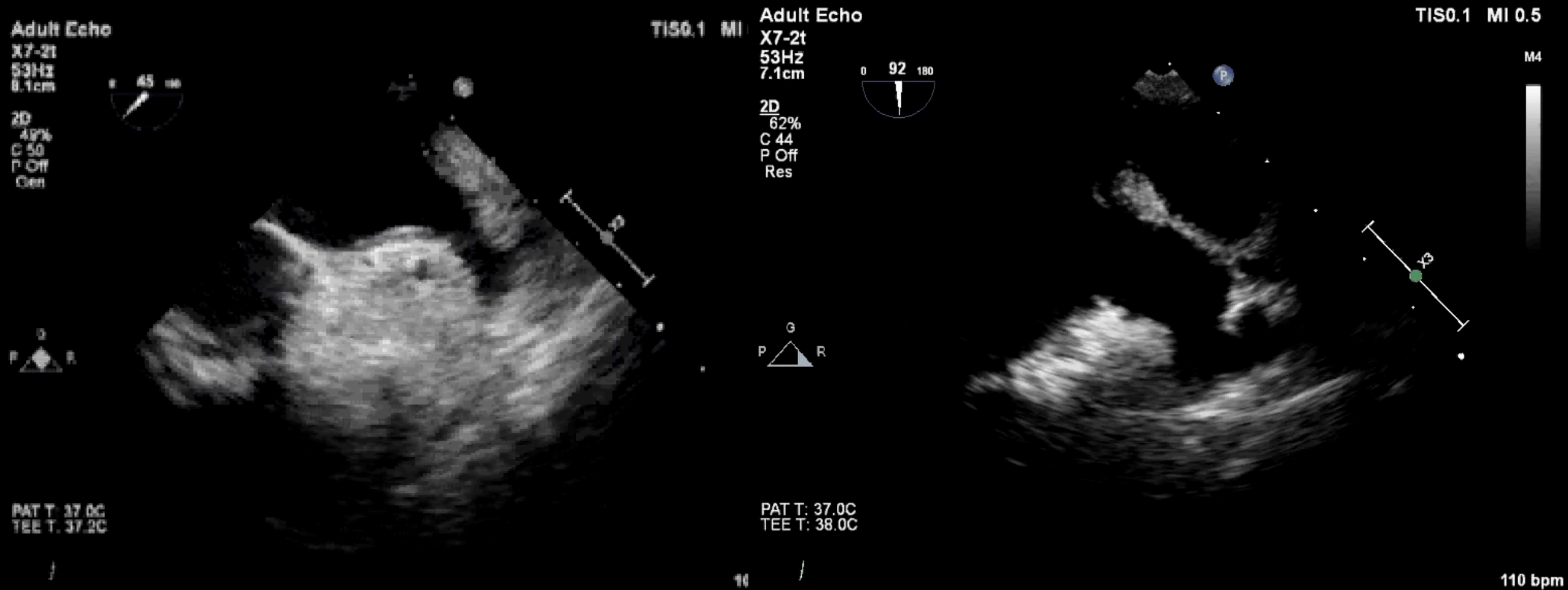


66 bpm

Case 4

- 70M
- Permanent atrial fibrillation
- Prior variceal bleed precluding oral anticoagulation
- Referred for percutaneous LAA closure by device

Case 4



Case 4

Add 3D slide

Adult Echo

X7-2t

53Hz

7.1cm

2D

64%

C 44

P Off

Res



TIS0.1 MI 0.5

M4



PAT T: 37.0C

TEE T: 37.7C

+ Dist 1.87 cm

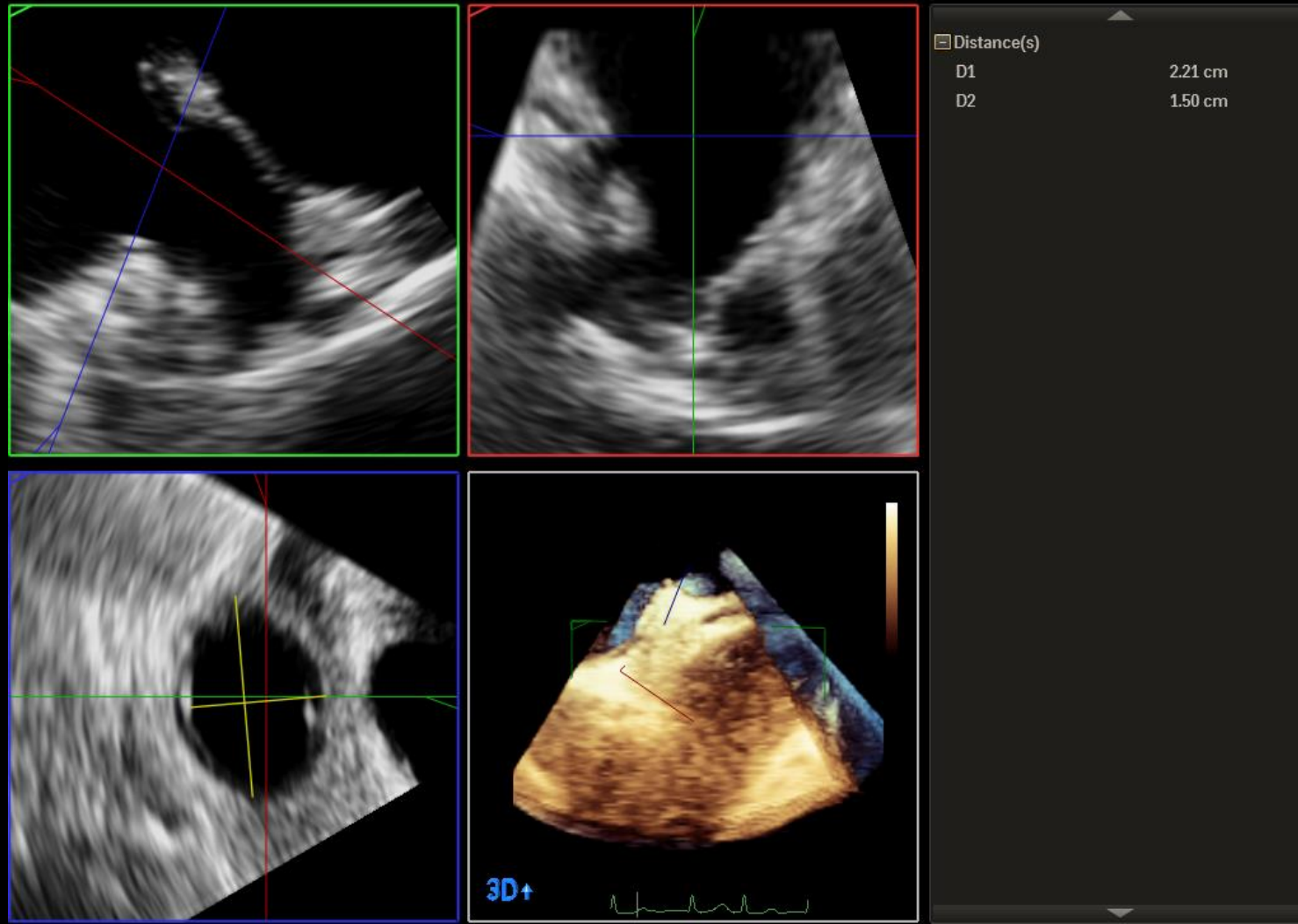
× Dist 0.967 cm

⊙ Dist 1.58 cm

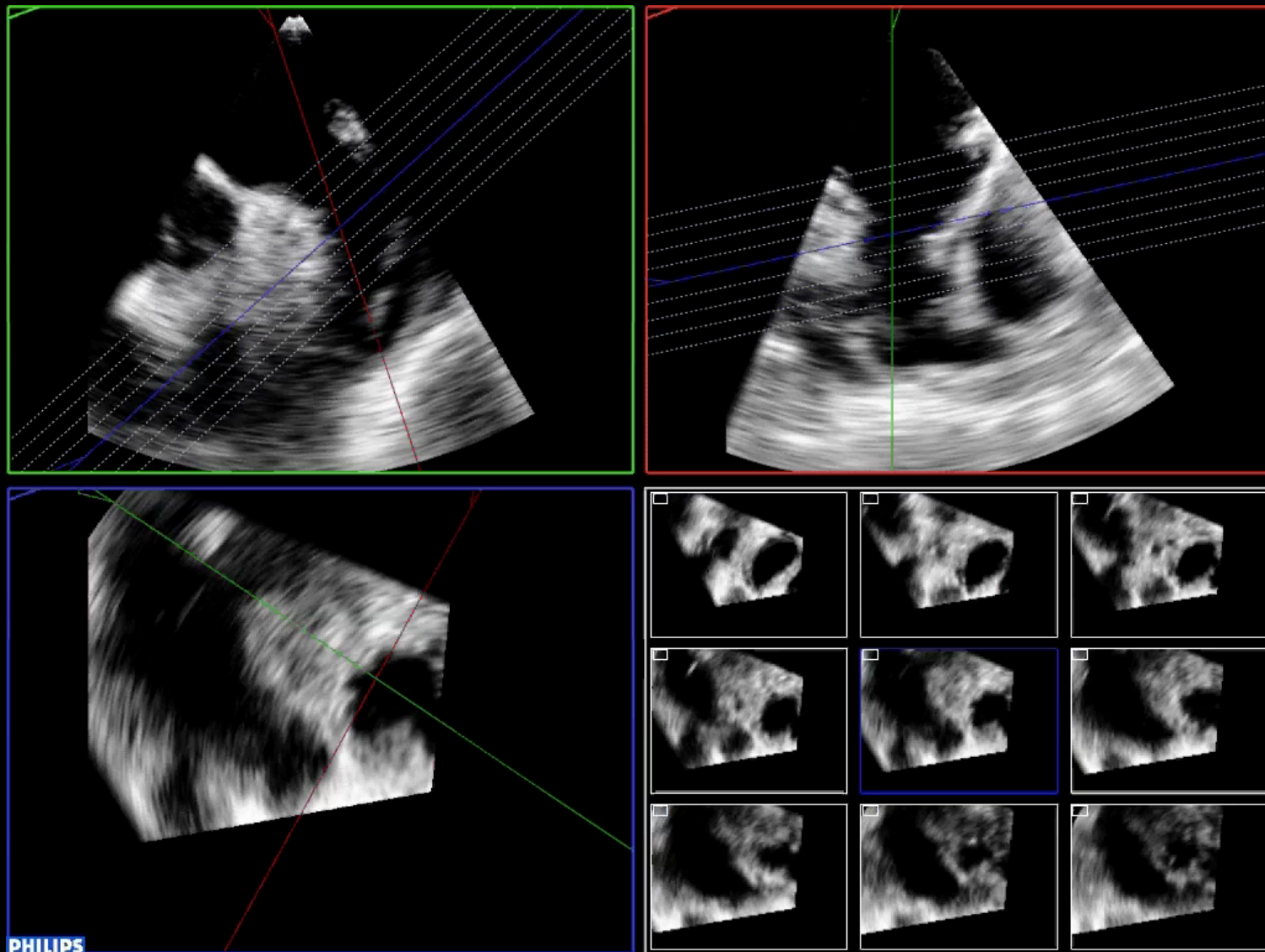


118bpm

Case 4



Case 4



Case 4

Adult Echo

X7-2t
53Hz
8.1cm

2D
46%
C 45
P Off
Gen



PAT T: 37.0C
TEE T: 38.3C

TIS0.1 MI 0.5

M4



Adult Echo

X7-2t
8Hz
8.1cm

Live 3D
2D / 3D
% 41 / 44
C 45 / 30
Gen



PAT T: 37.0C
TEE T: 38.5C

82 bpm

3D Beats 1

TIS0.1 MI 0.4

M4



90 bpm

Case 5

Clot or Not?

Adult Echo

X7-2t
53Hz
8.1cm

2D
54%
C 50
P Off
HGen



TIS0.2 MI 0.6

M4



Adult Echo

X7-2t
53Hz
7.1cm

2D
53%
C 50
P Off
HGen



TIS0.2 MI 0.6

M4



Ⓢ
P R
2.7 5.4

Ⓢ
P R
2.7 5.4

PAT T: 37.0C
TEE T: 39.5C

PAT T: 37.0C
TEE T: 39.6C

77 bpm

67 bpm

Case 5

Clot or Not?

Adult Echo

X7-2t

72Hz

8.1cm

xPlane

54%

54%

50dB

P Off

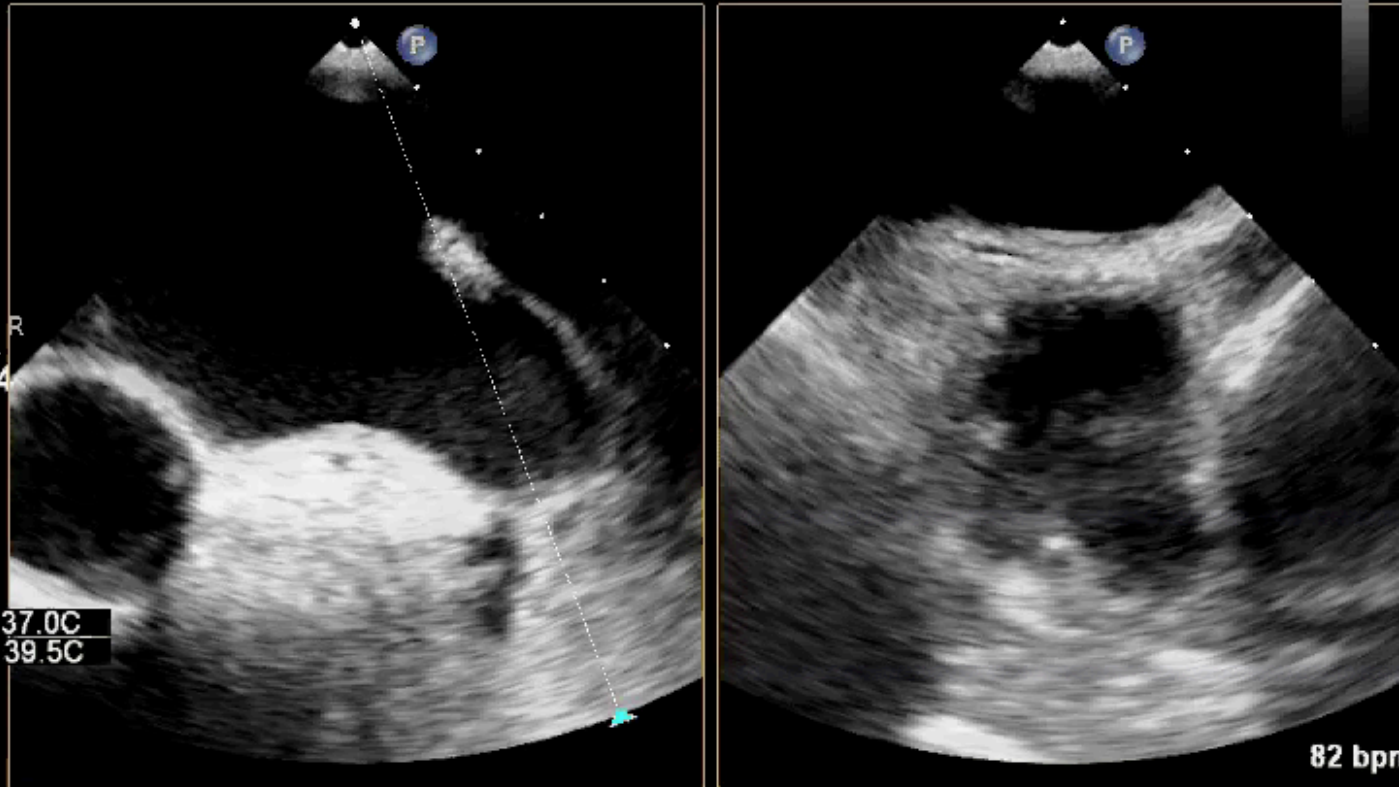
HGen

TIS0.3 MI 0.4

M4



PAT T: 37.0C
TEE T: 39.5C



Case 5

Clot or Not?

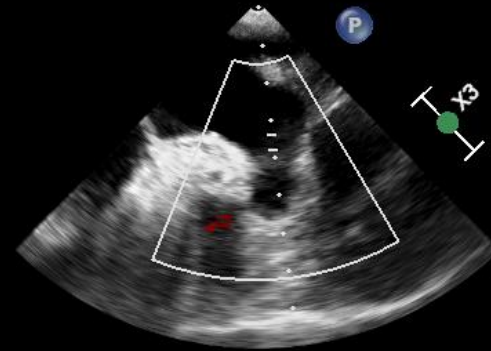
Adult Echo

X7-2t
20Hz
9.0cm

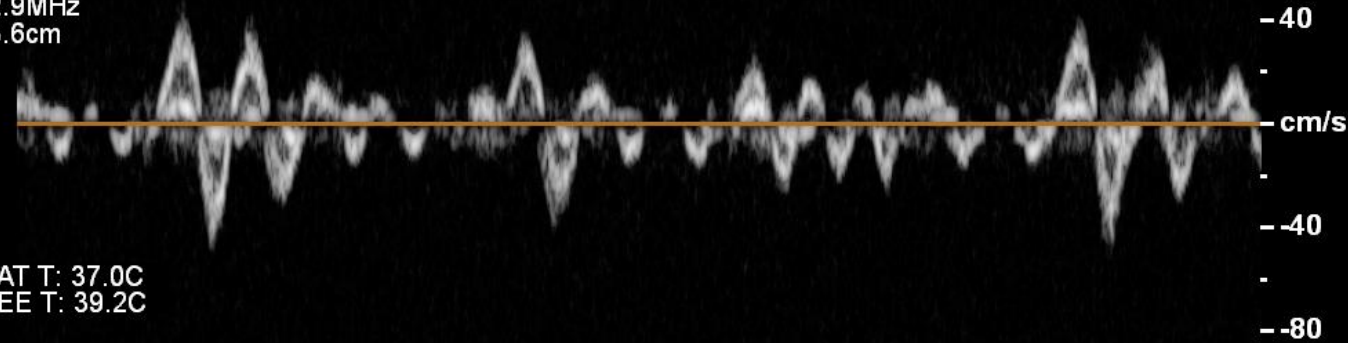
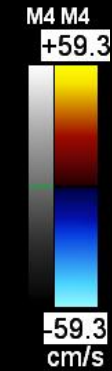
2D
61%
C 50
P Off
HGen

CF
48%
6838Hz
WF 615Hz
4.4MHz

PW
50%
WF 150Hz
SV4.0mm
2.9MHz
3.6cm



TIS0.3 MI 0.2



PAT T: 37.0C
TEE T: 39.2C



Case 5

Clot or Not?

Adult Echo

X7-2t

23Hz

8.1cm

2D / MM

56% 56%

C 50

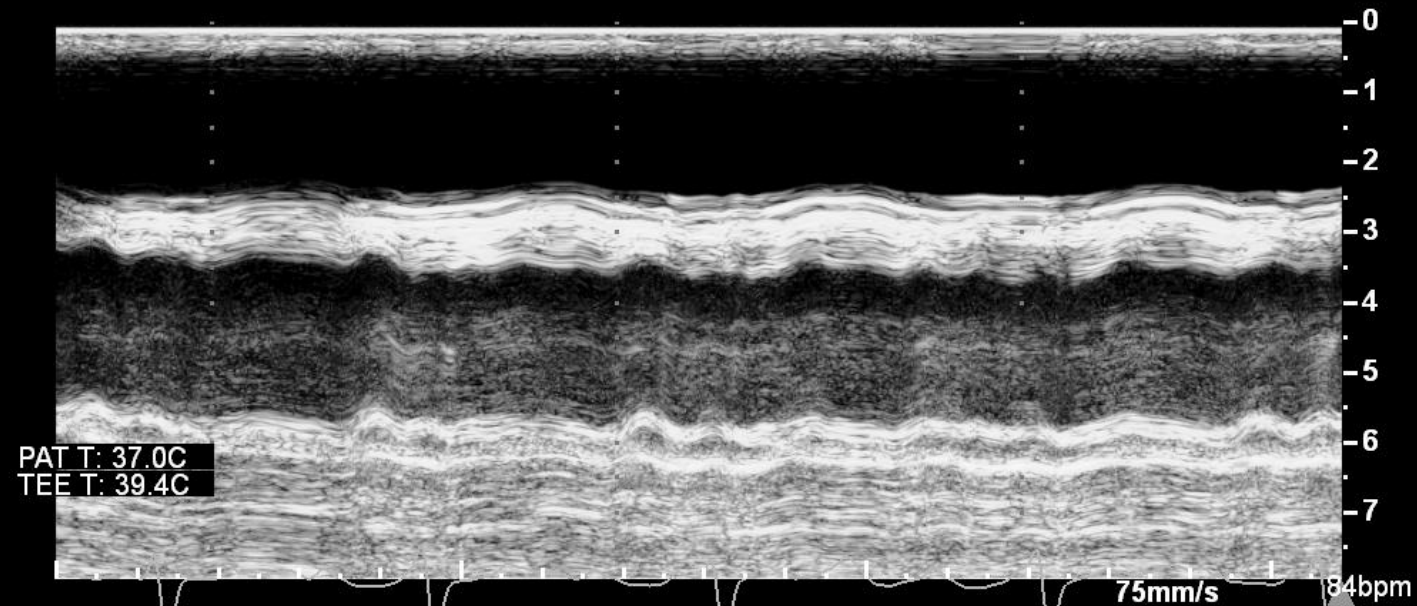
P Off

HGen



TIS 0.2 MI 0.6

M4

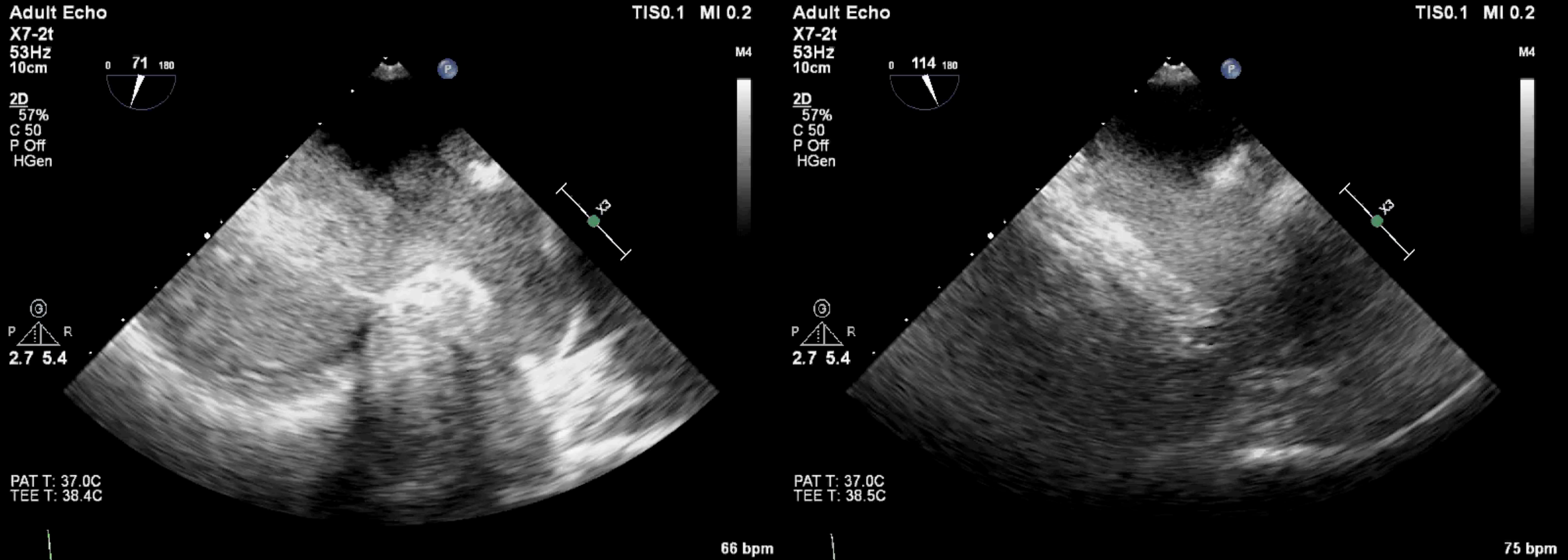


PAT T: 37.0C
TEE T: 39.4C

75mm/s 84bpm

Case 5

Clot or Not?



Case 6

Clot or Not?

Adult Echo
X7-2t
53Hz
10cm

2D
57%
C 50
P Off
HGen



Ⓒ
P R
2.7 5.4

PAT T: 37.0C
TEE T: 38.4C

TIS0.2 MI 0.6

M4

Adult Echo
X7-2t
53Hz
8.1cm

2D
52%
C 47
P Off
HGen



Ⓒ
P R
2.7 5.4

PAT T: 37.0C
TEE T: 39.5C

TIS0.2 MI 0.9

M4

75 bpm

104 bpm

Case 6

Clot or Not?

Adult Echo

X7-2t

88Hz

8.1cm

xPlane

54%

54%

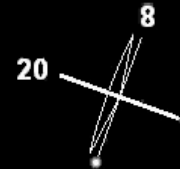
47dB

P Off

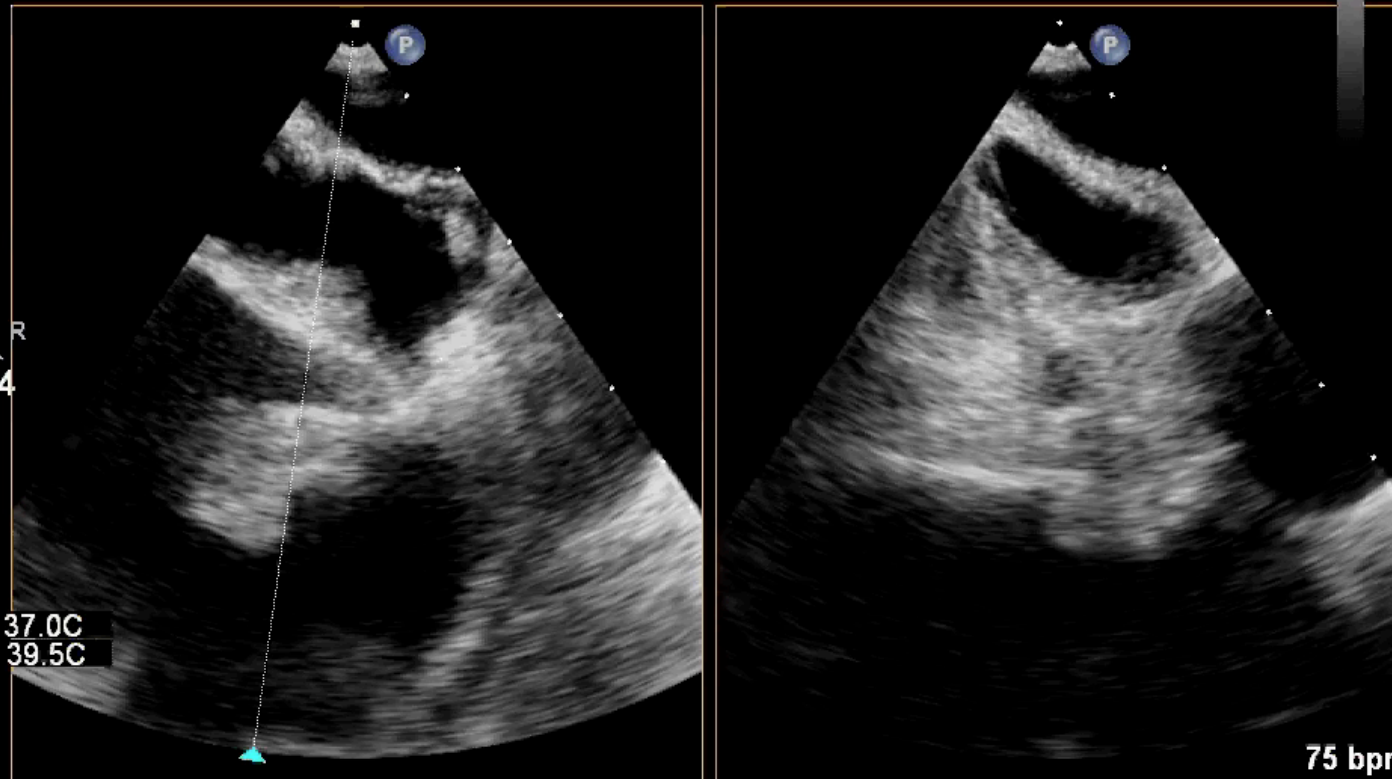
HGen

TIS0.3 MI 0.8

M4



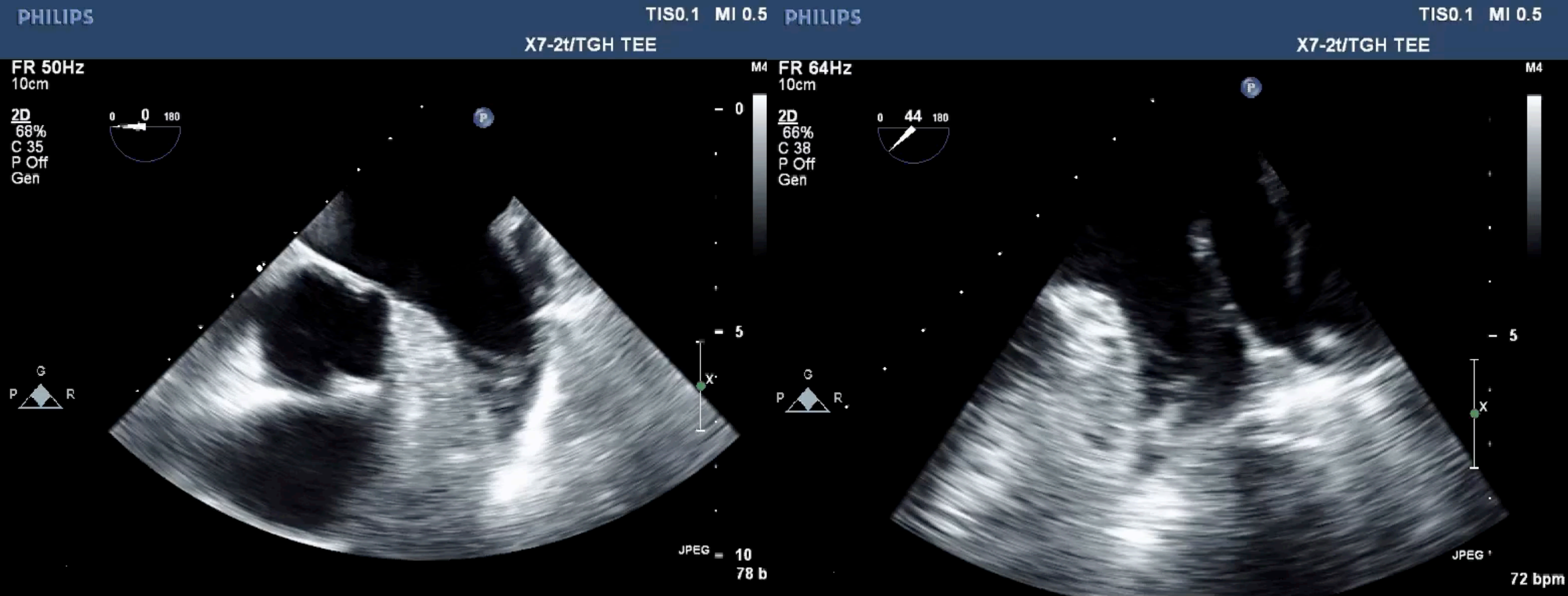
PAT T: 37.0C
TEE T: 39.5C



75 bpm

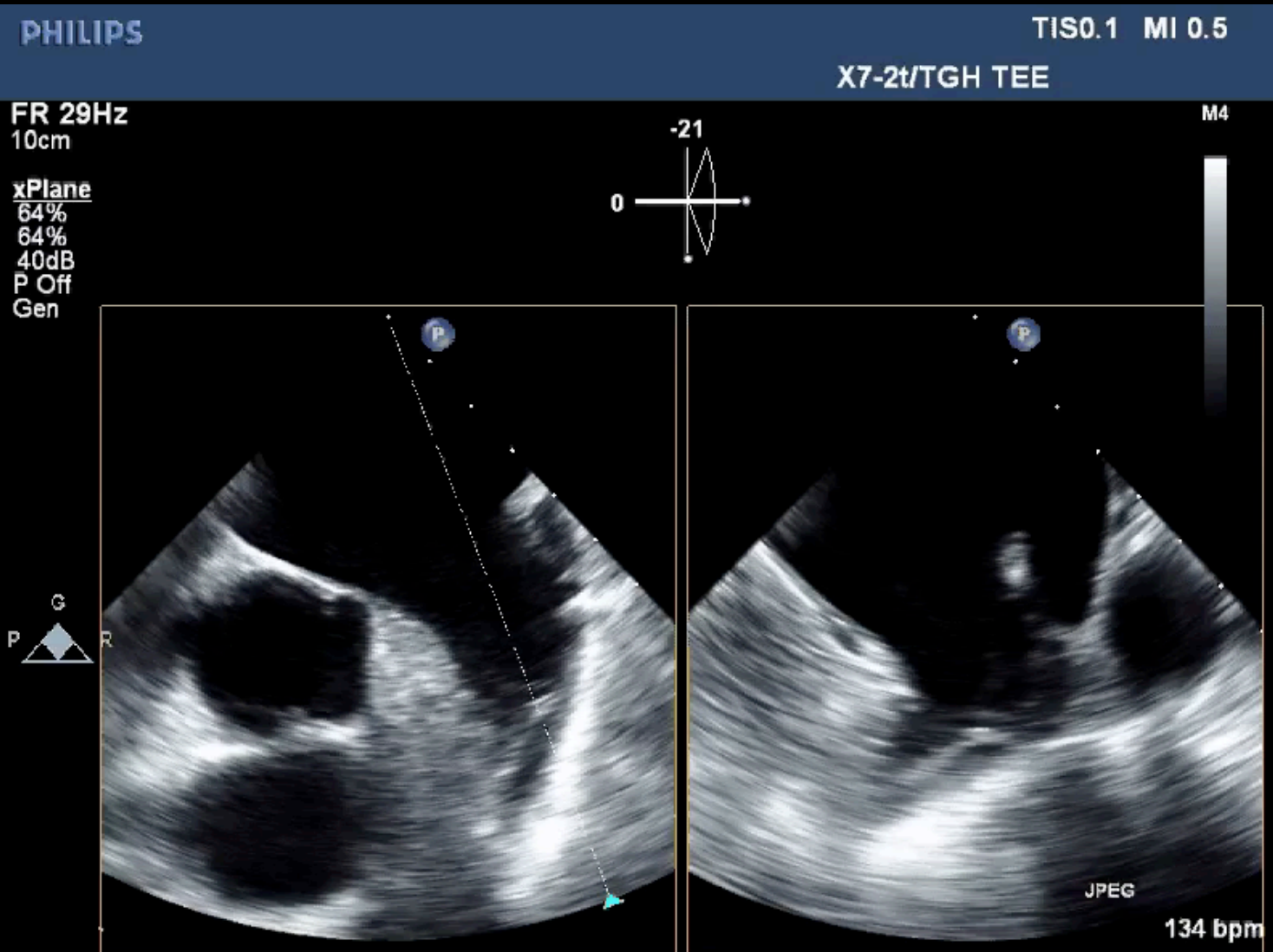
Case 7

Clot or Not?



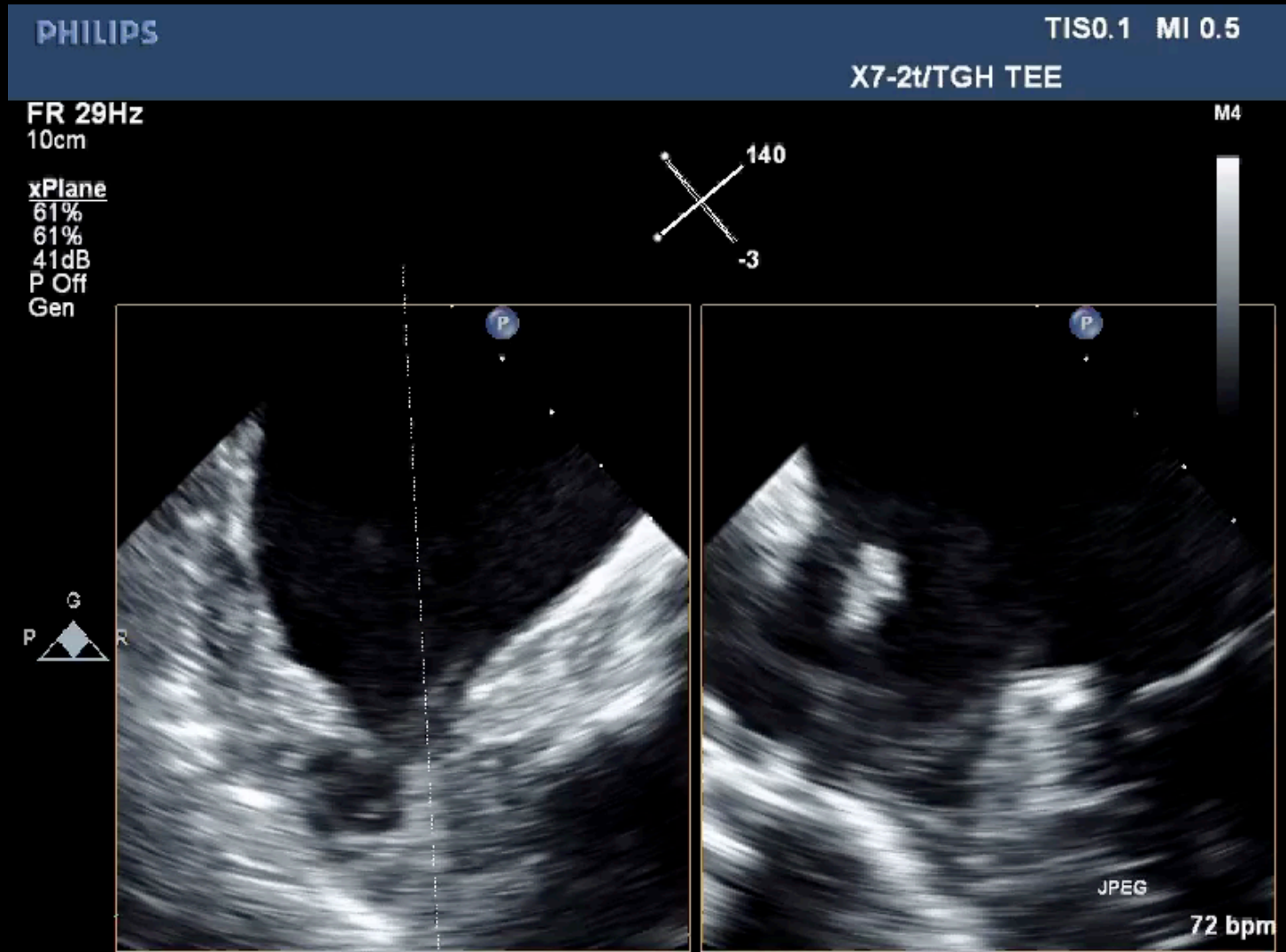
Case 7

Clot or Not?



Case 7

Clot or Not?



Case 8

Clot or Not?

Adult Echo

X7-2t

82Hz

8.1cm

2D

48%

C 50

P Off

HGen

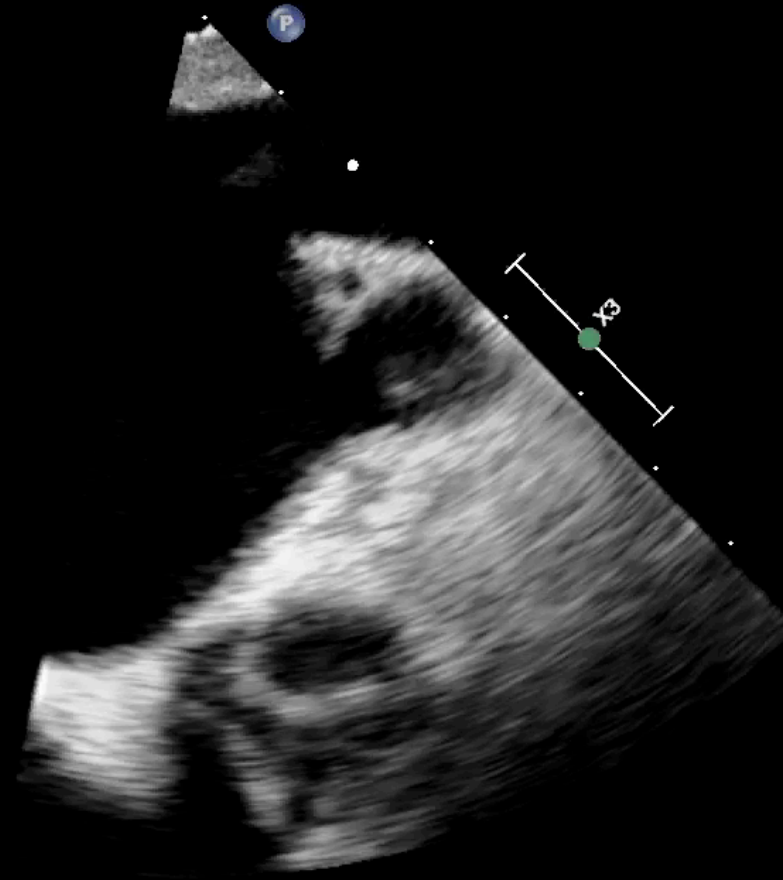


TIS 0.2 MI 0.9

M4



PAT T: 37.0C
TEE T: 39.2C



96 bpm

Case 8

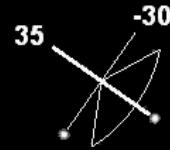
Clot or Not?

Adult Echo
X7-2t
98Hz
8.1cm

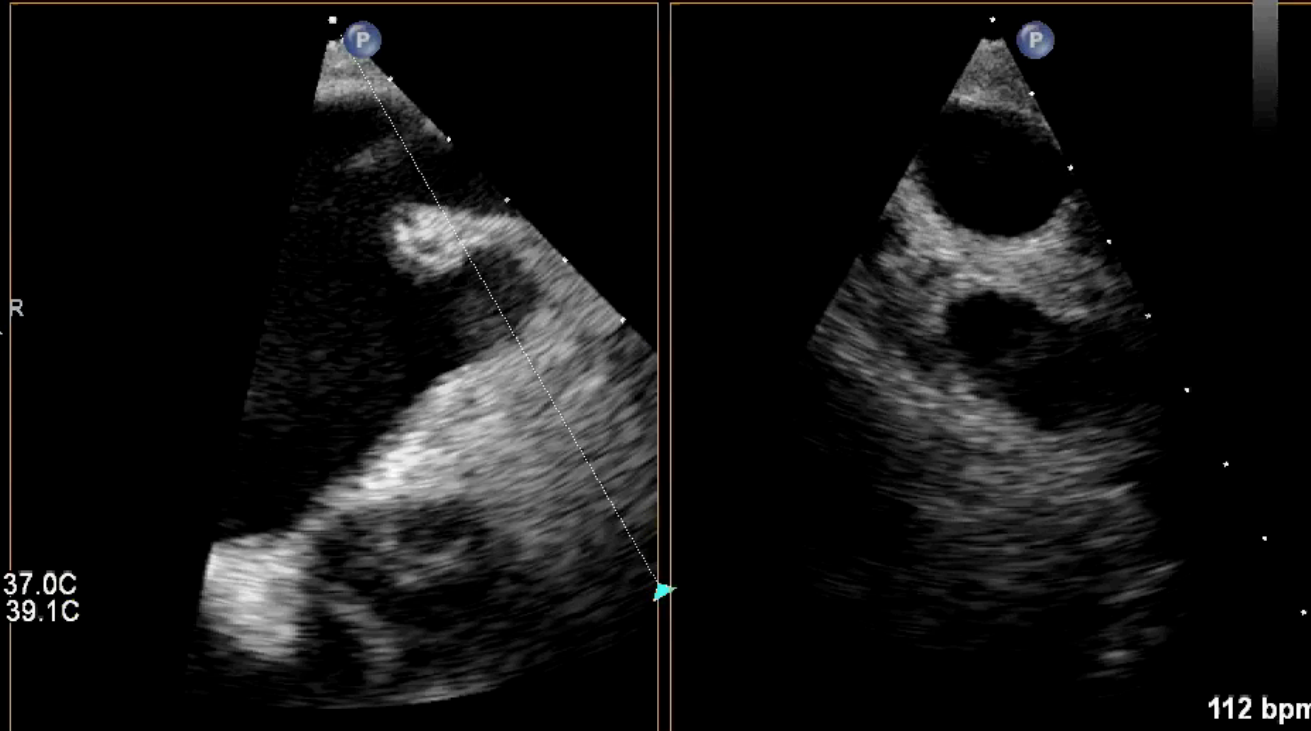
TIS0.2 MI 0.7

xPlane
45%
45%
50dB
P Off
Gen

M4



PAT T: 37.0C
TEE T: 39.1C



112 bpm

Case 8

Clot or Not?

Adult Echo

X7-2t

53Hz

8.1cm

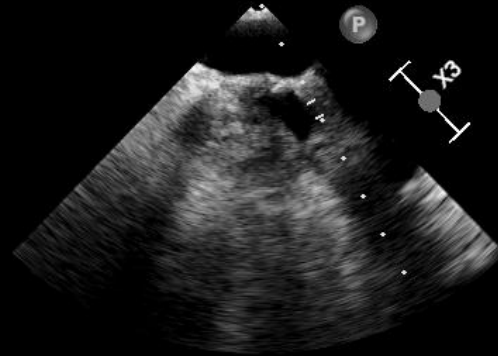
2D

56%

C 50

P Off

HPen



TIS0.4 MI 0.4

M4



PW

50%

WF 150Hz

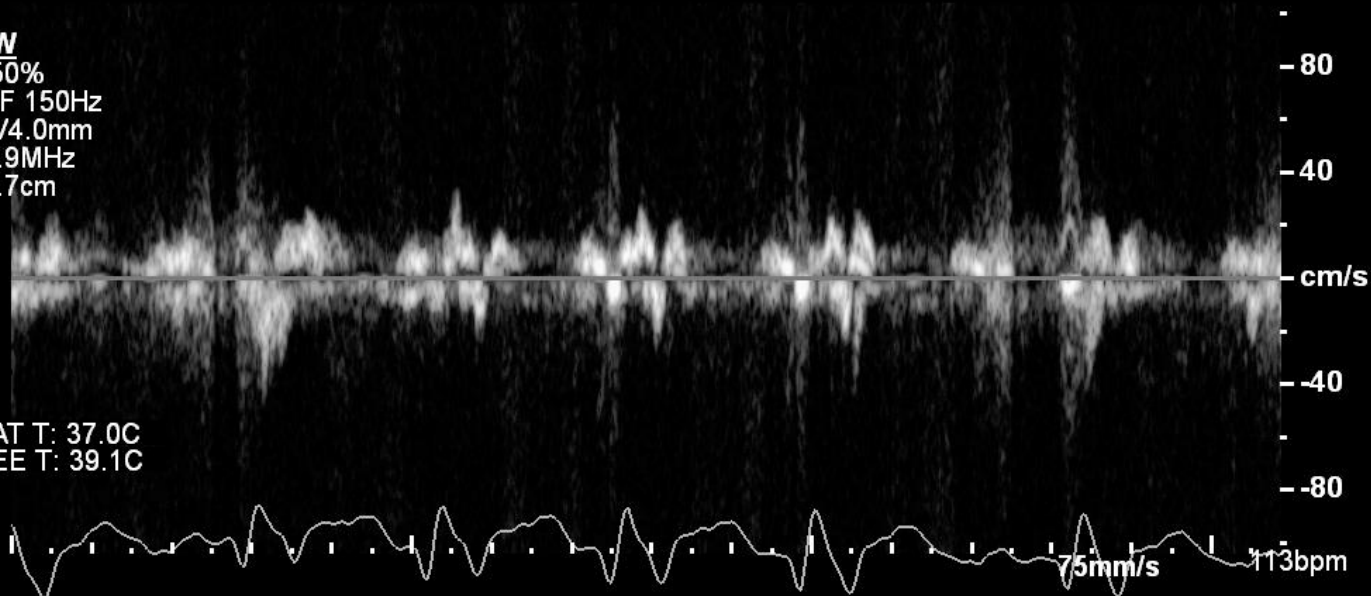
SV4.0mm

2.9MHz

2.7cm

PAT T: 37.0C

TEE T: 39.1C



Case 8

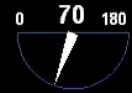
Clot or Not?



Case 9

Clot or Not?

TGHTEE
X7-2t
53Hz
9.0cm



2D
57%
C 41
P Off
HGen

Ⓒ
P R
2.7 5.4

PAT T: 37.0C
TEE T: 39.3C

TIS0.2 MI 0.6

M4

TGHTEE
X7-2t
53Hz
9.0cm



2D
58%
C 41
P Off
HGen

Ⓒ
P R
2.7 5.4

PAT T: 37.0C
TEE T: 39.5C

TIS0.2 MI 0.6

M4

94 bpm

119 bpm

Case 9

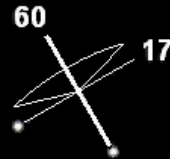
Clot or Not?

TGHTTEE
X7-2t
66Hz
9.0cm

TIS0.3 MI 0.4

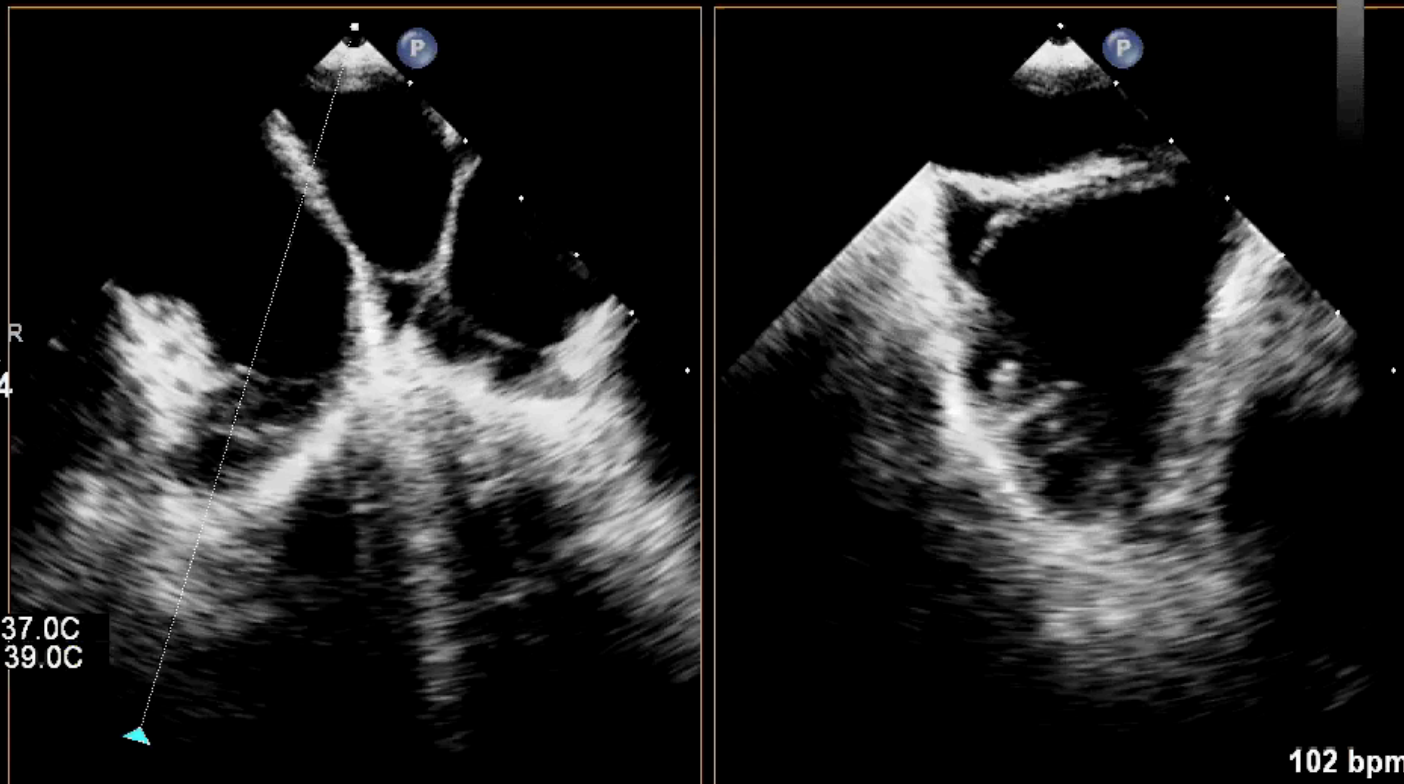
xPlane
58%
58%
41dB
P Off
HGen

M4



Ⓒ
P R
2.7 5.4

PAT T: 37.0C
TEE T: 39.0C



102 bpm

Summary

- Left atrial appendage thrombus can be diagnosed on TEE as TTE views are not adequate to visualize the left atrial appendage
- TEE findings of a left atrial appendage thrombus includes direct visualization of a mobile echodensity within the appendage
- The echodensity should move independent of the walls of the atrium, which helps to distinguish artifact or trabeculae from thrombus
- Definity contrast should be used when 2D and 3D imaging cannot definitively rule out thrombus
- Pulse wave Doppler can be used in the left atrial appendage to determine the flow velocity. A velocity of < 0.4 m/s indicates a higher risk, in general, of thromboembolism

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