VCU Health
Pauley Heart Center

Puzzling Cases to Learn From: Read with the Experts

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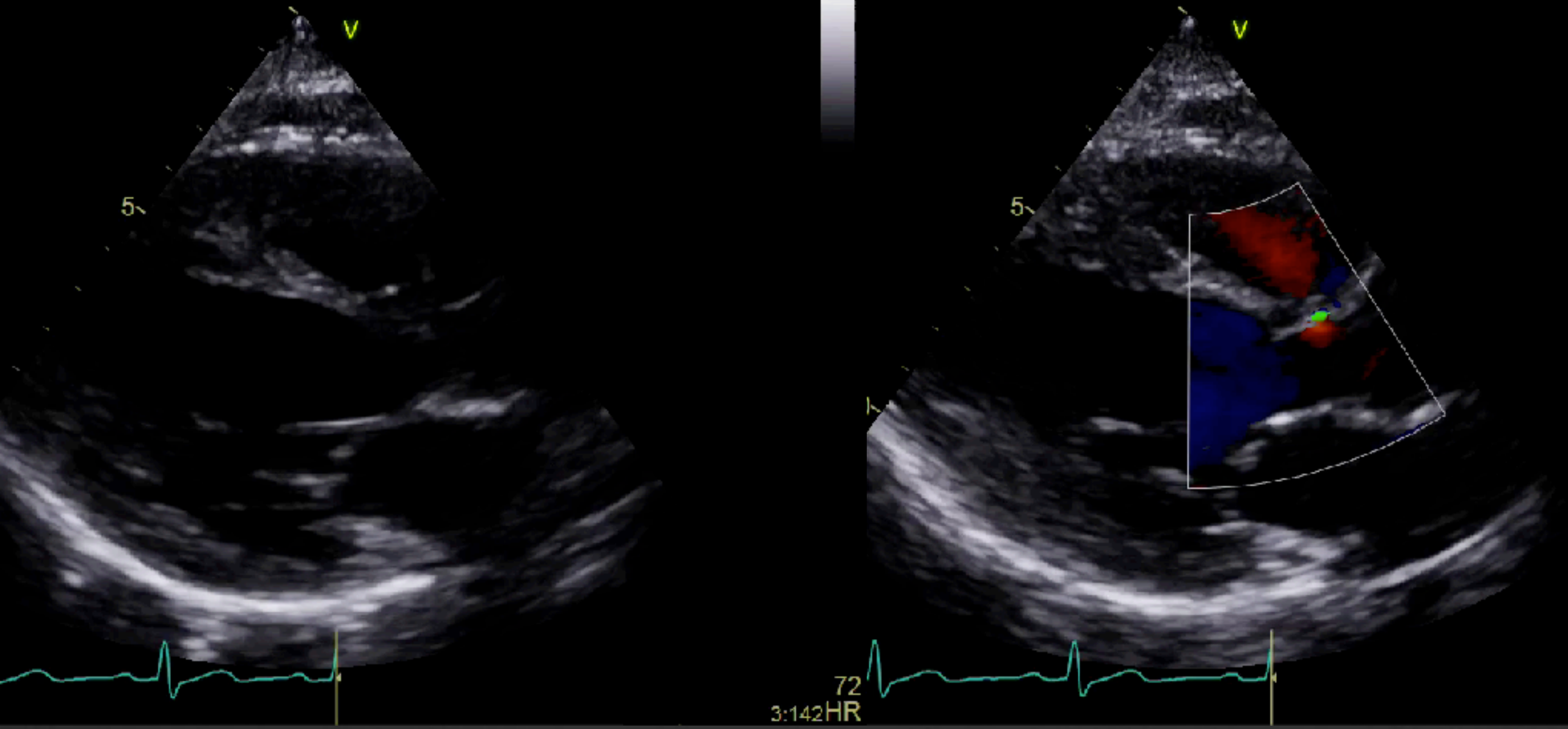
ECHO HAWAII 31st ANNUAL

Case 1

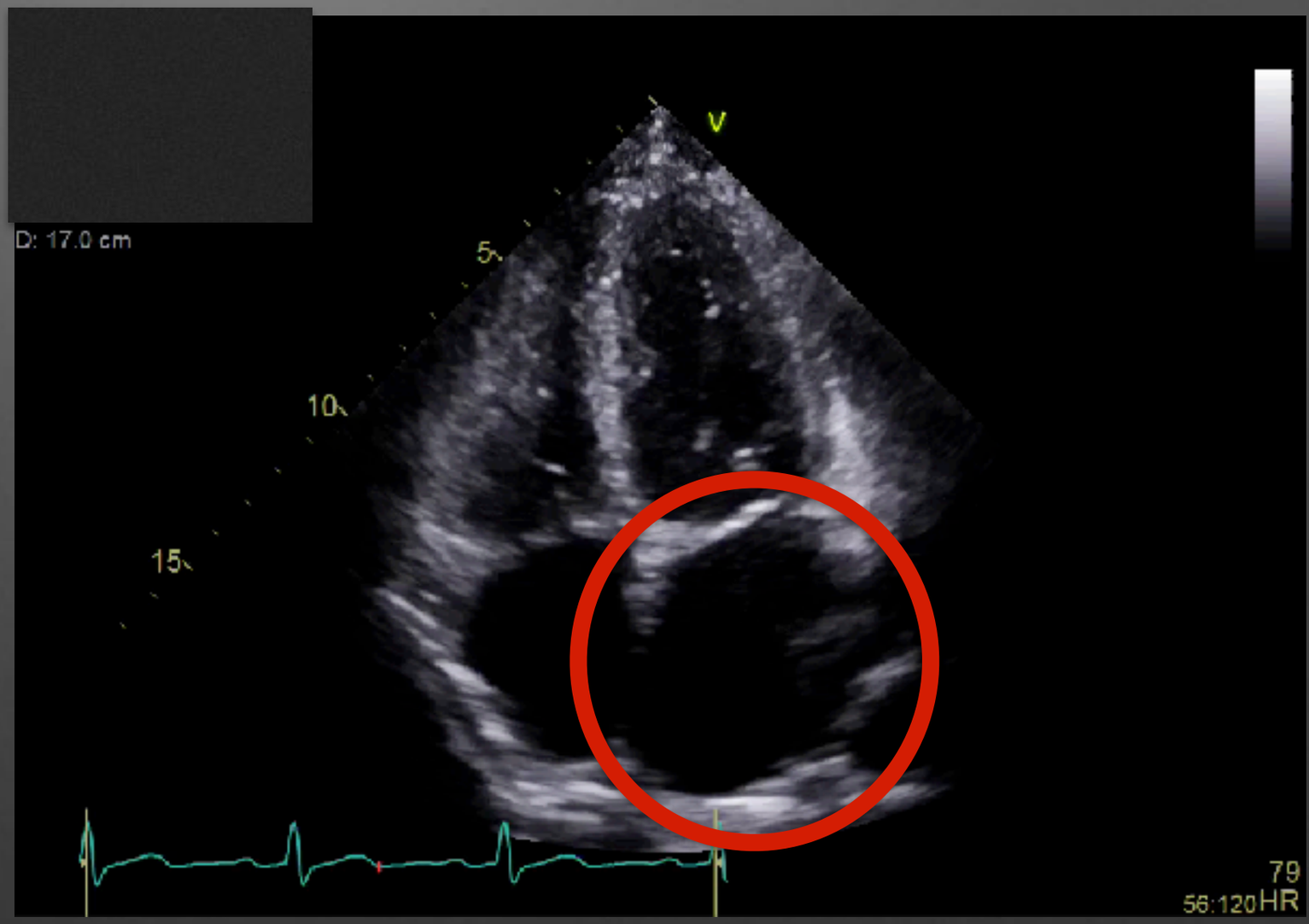
- 45 y.o. woman referred for murmur by primary care physician
- Use to see a cardiologist as child. No cardiac surgery
- Exercises - Aerobic 30-60 minutes at least a few times a week. No symptoms.
- Vital BP 155/70 both arms; Pulse Ox 98%; HR 72 bpm; BMI of 35kg/m^2
- Physical exam 4/6 harsh holo-systolic murmur left sternal border


72
3:142HR

What cardiac chamber enlarges with significant VSD?

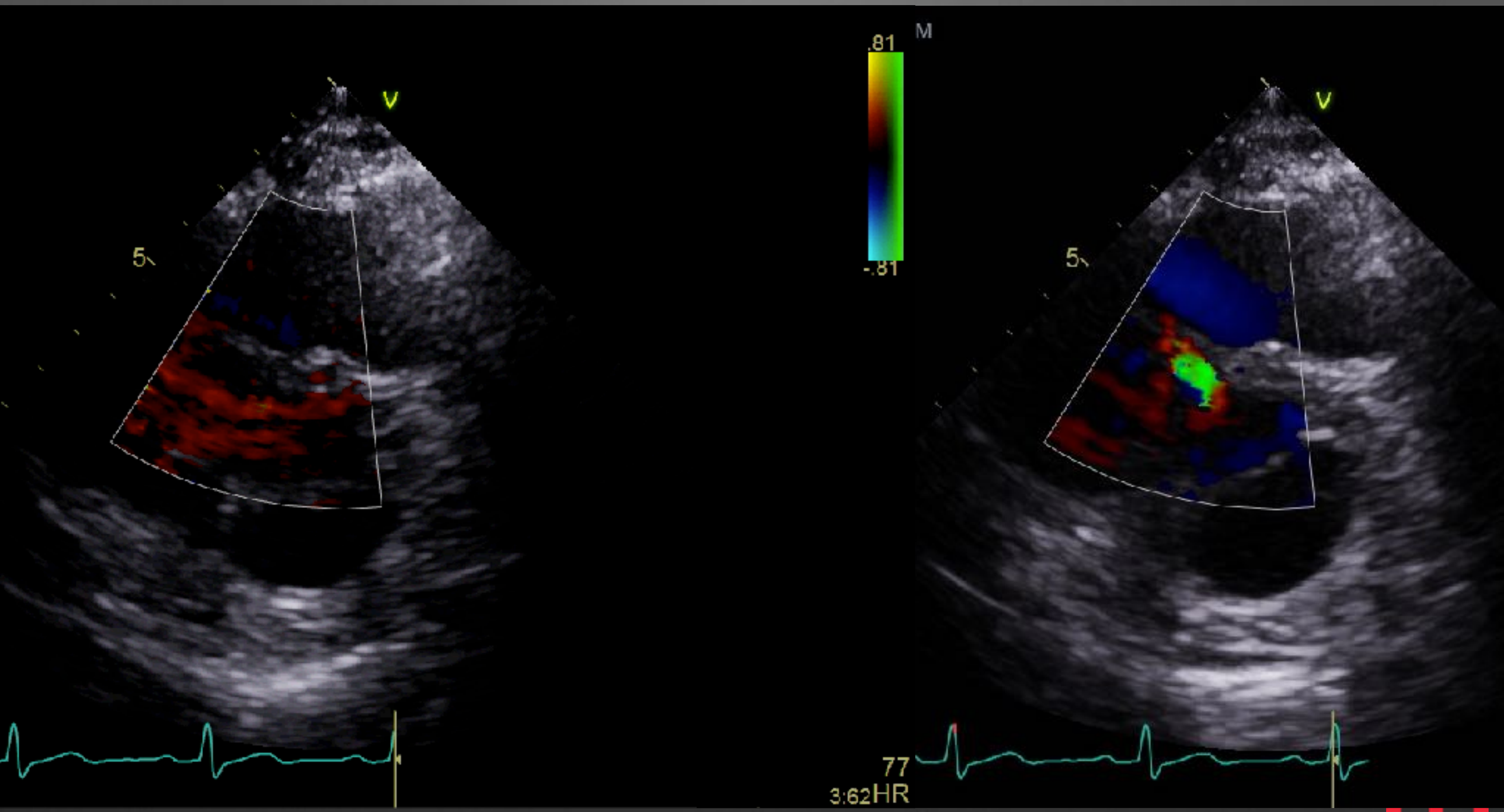
- A. Aorta
- B. Left atrium
- C. Right atrium
- D. Right ventricle

What cardiac chamber enlarges with significant VSD?

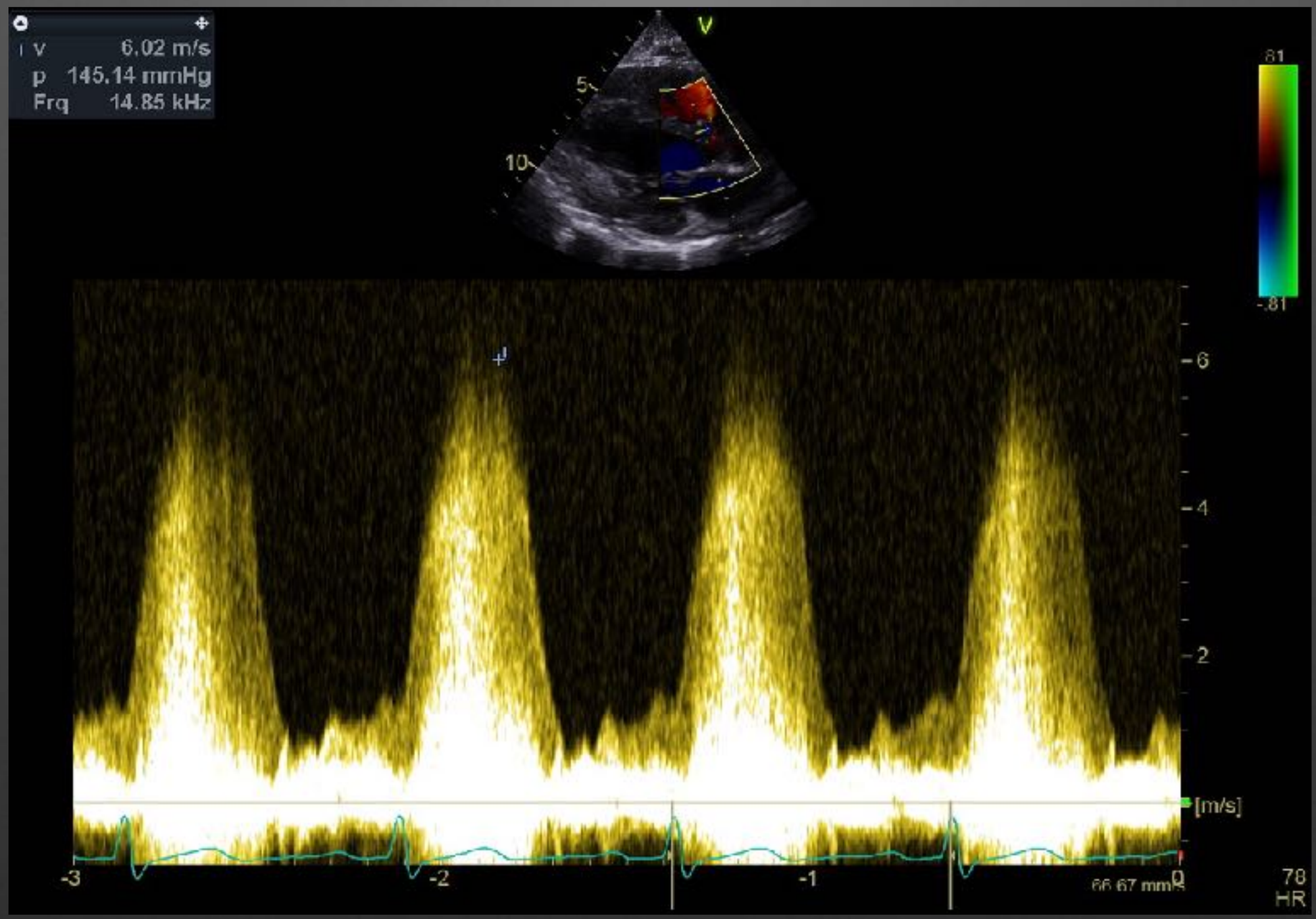


- B. Left atrium

Second view confirmation



VSD Doppler


v 6.02 m/s
p 145.14 mmHg
Frq 14.85 kHz
V
5
10
81
-81
6
4
2
[m/s]
-3
-2
-1
0
66.67 mm/s
78
HR

What is the estimated RV systolic pressure?

- Average E/e’ 8, VSD jet 6m/sec, BP 155/80

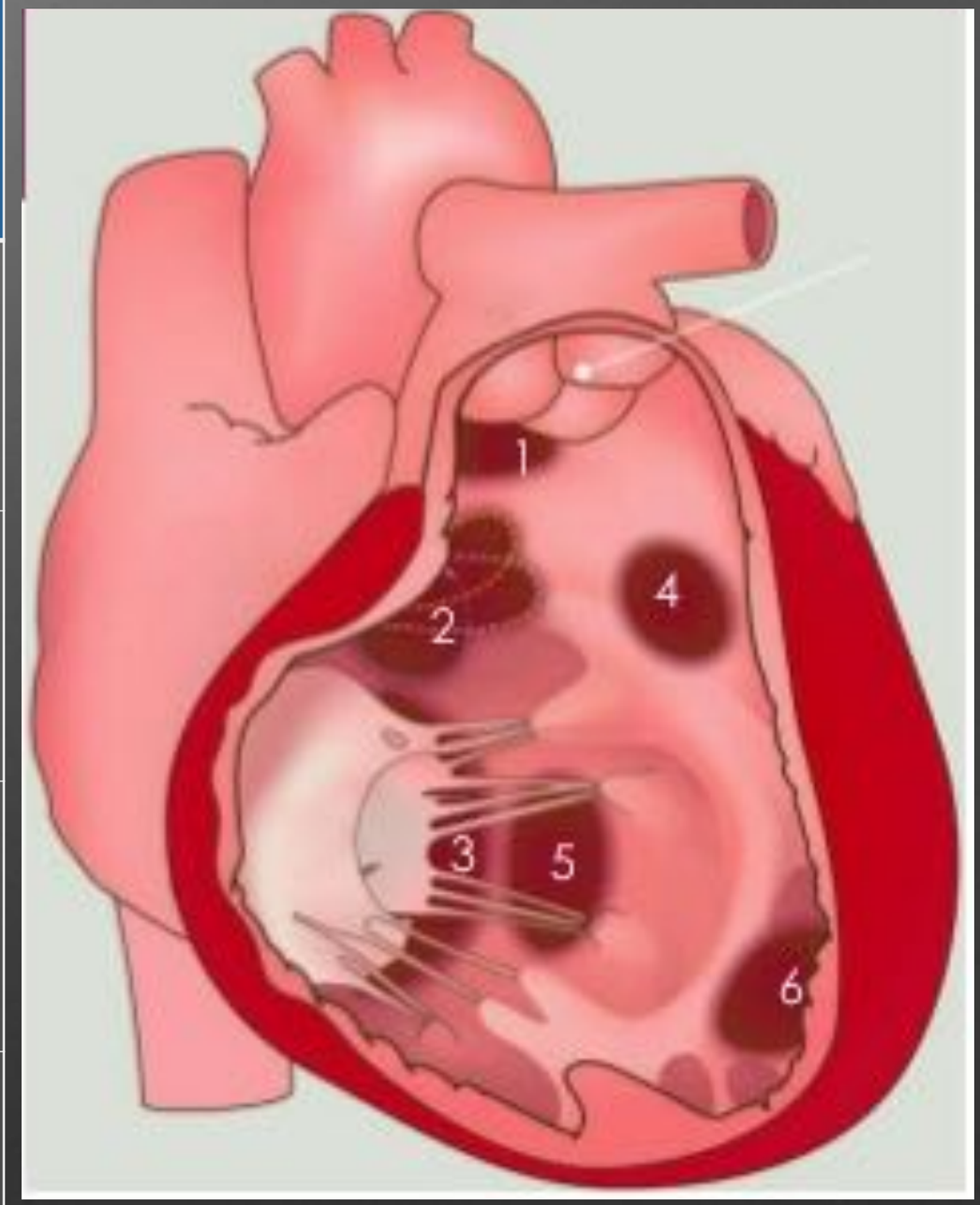
- A. Normal
- B. Elevated

Higher Velocity= Normal RV systolic pressures

- $RVP_{systolic} = BP_{systolic} - 4V^2_{VSD}$
- $RVP_{systolic} = 155 - 144 = 11mmHg$

Ventricular Septal Defect

TYPE	NOMECLATURE
1. SUBARTERIAL	Supra-cristalis, sub pulmonary, outlet, double committed
2. PERIMEMBRANEOUS	Infra-cristalis, Subaortic
3. INLET	AV canal
4-6. MUSCULAR	Muscular



Diagnosis and Plan

- Small perimembranous VSD
- No endocarditis prophylaxis

Case 1a

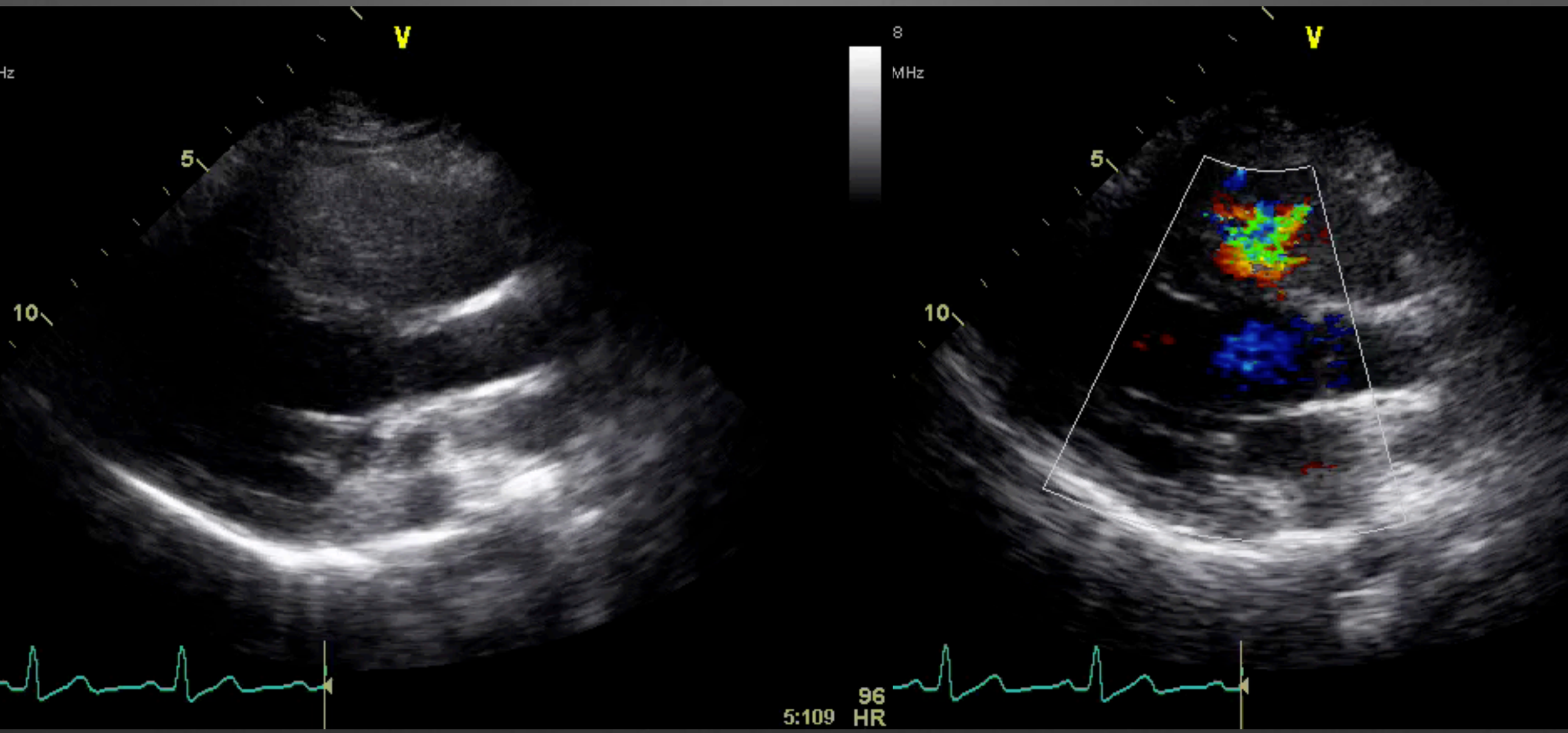
- 30y.o. woman referred for murmur by primary care physician

- Use to see a cardiologist as child until her murmur resolved

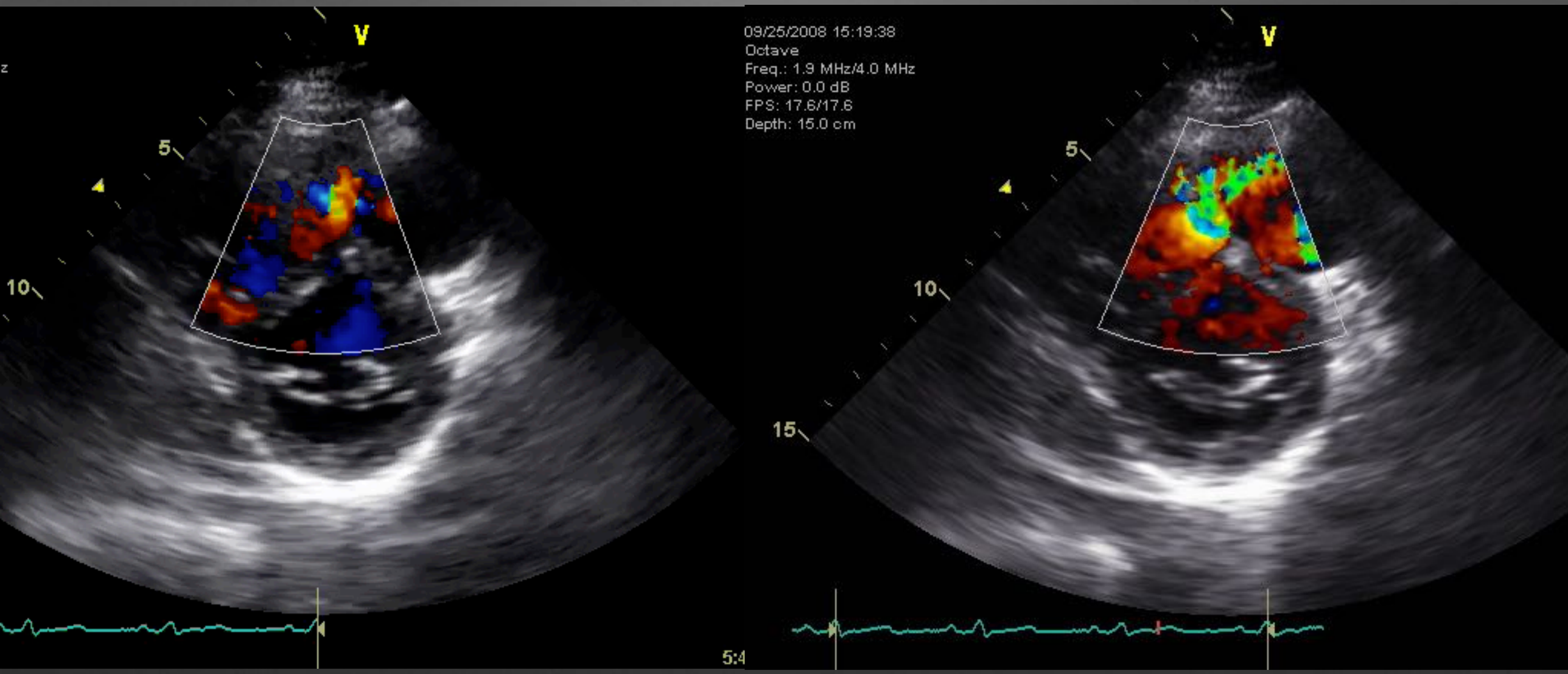
- Worsening dyspnea on exertion for lat least 6 month and now with a cough not resolved with steroids or abs

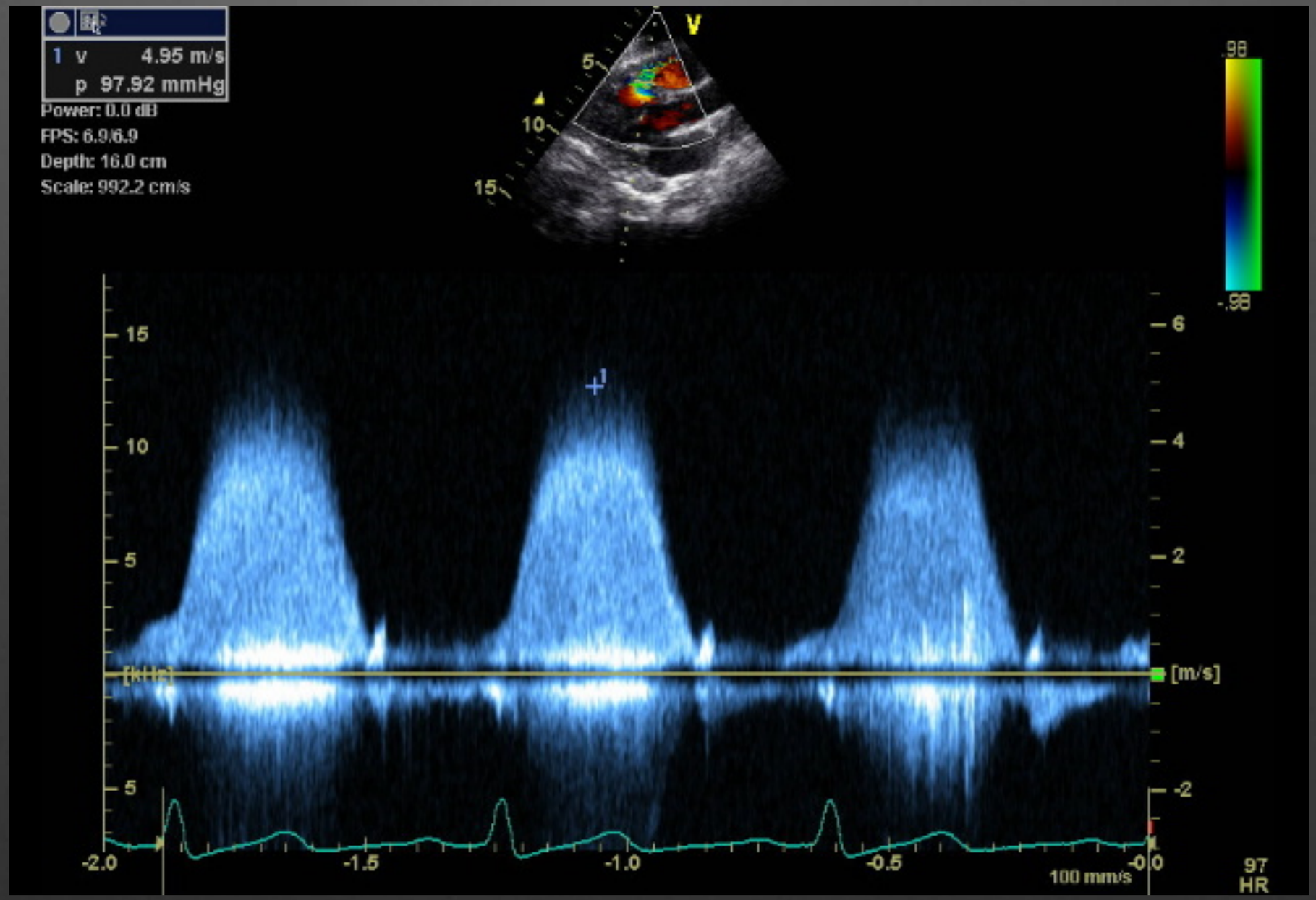
- Vital BP 120/70 both arms; Pulse Ox 98%; HR 100 bpm; BMI of 20kg/m^2

- Physical exam 4/6 harsh systolic murmur left sternal border

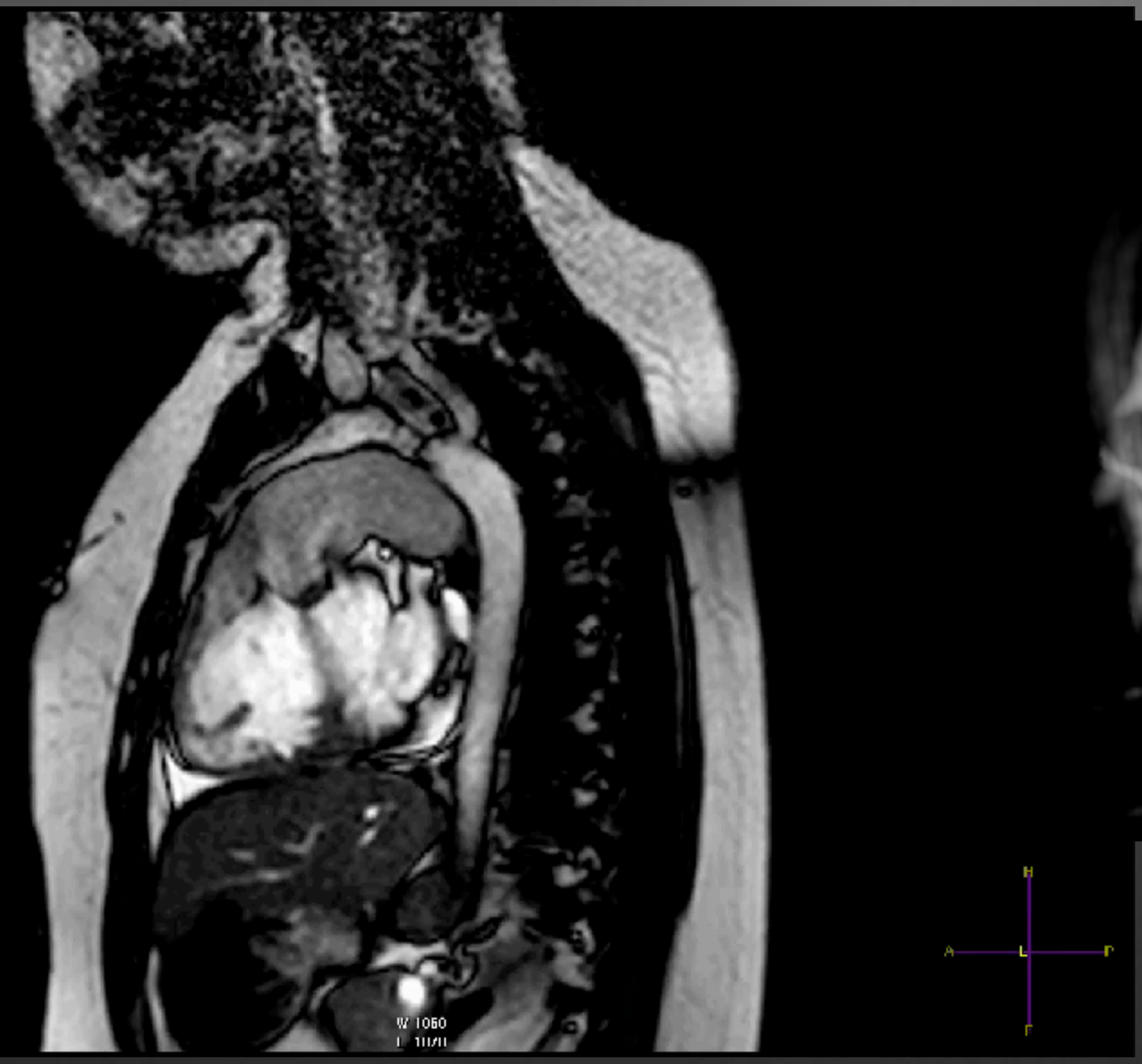

V
Hz
5
10
8
MHz
V
5
10
96
5:109 HR

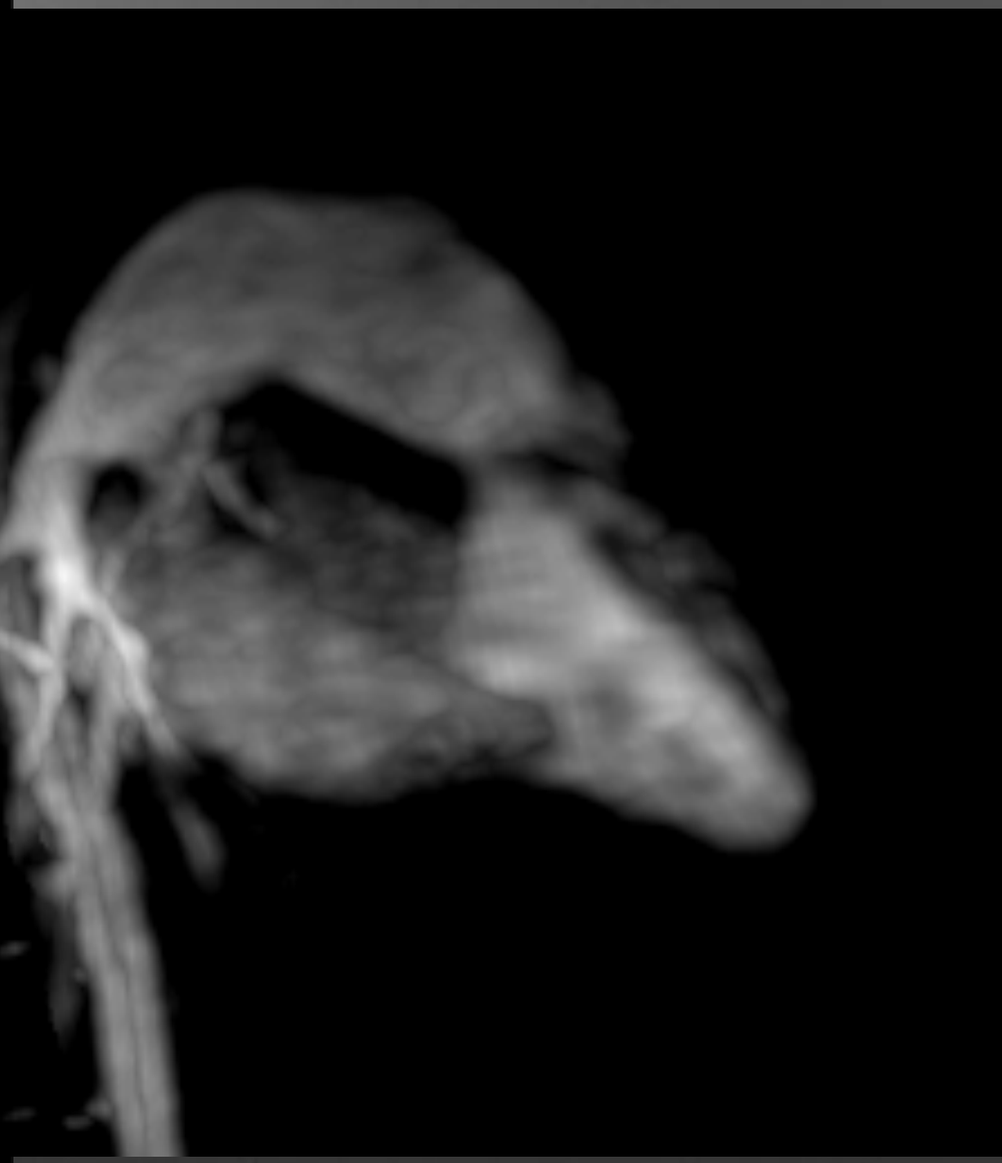
Second view for Confirmation




1 v 4.95 m/s
p 97.92 mmHg
Power: 0.0 dB
FPS: 6.9/6.9
Depth: 16.0 cm
Scale: 992.2 cm/s
V
5
10
15
.98
-.98
15
10
5
5
[kHz]
6
4
2
[m/s]
-2
-2.0
-1.5
-1.0
-0.5
-0.0
100 mm/s
97
HR

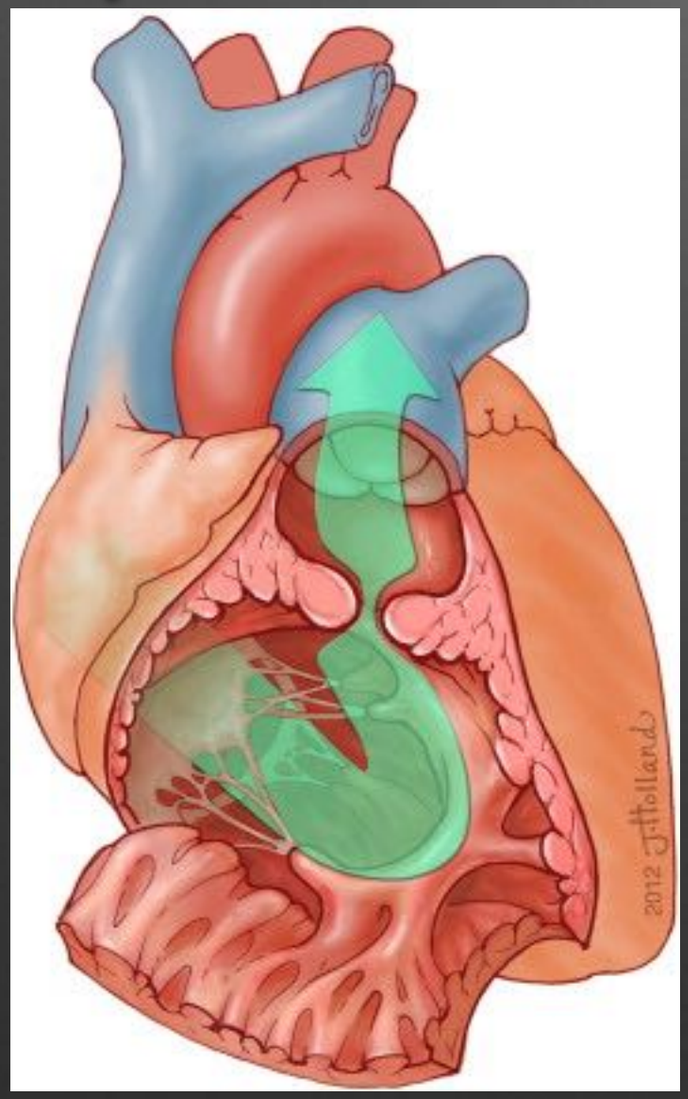
Cardiac MRI

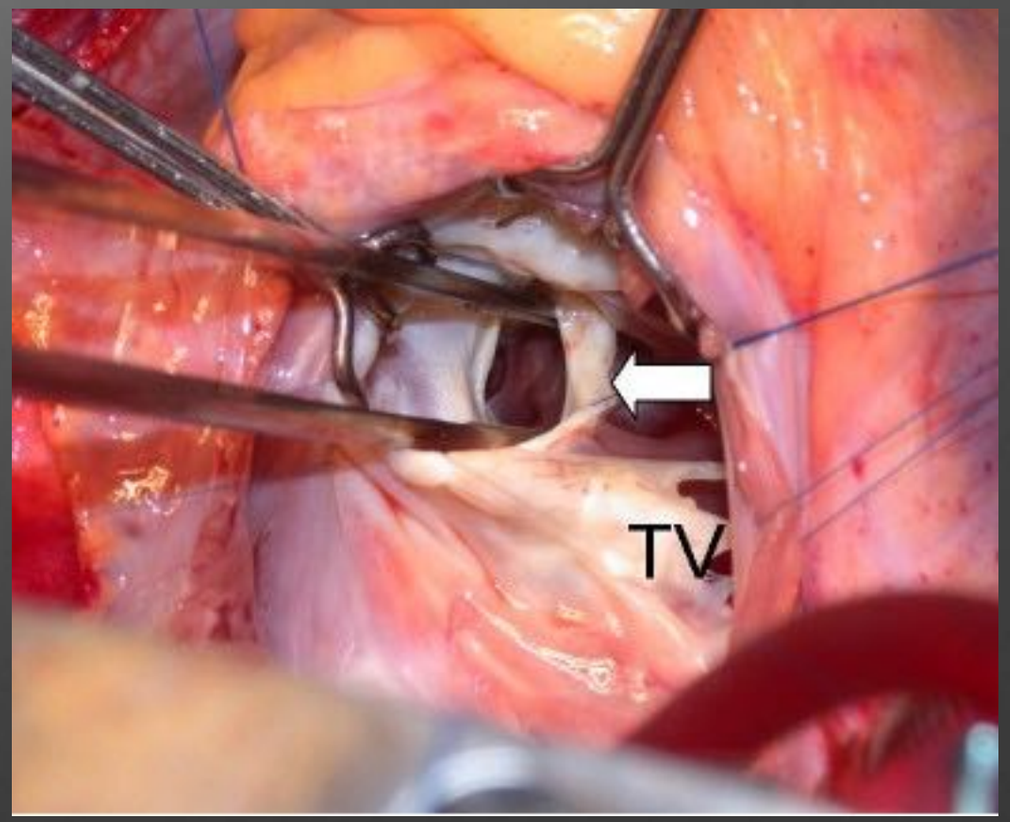




Double Chamber RV

- Associated with VSD can develop years after spontaneous closure





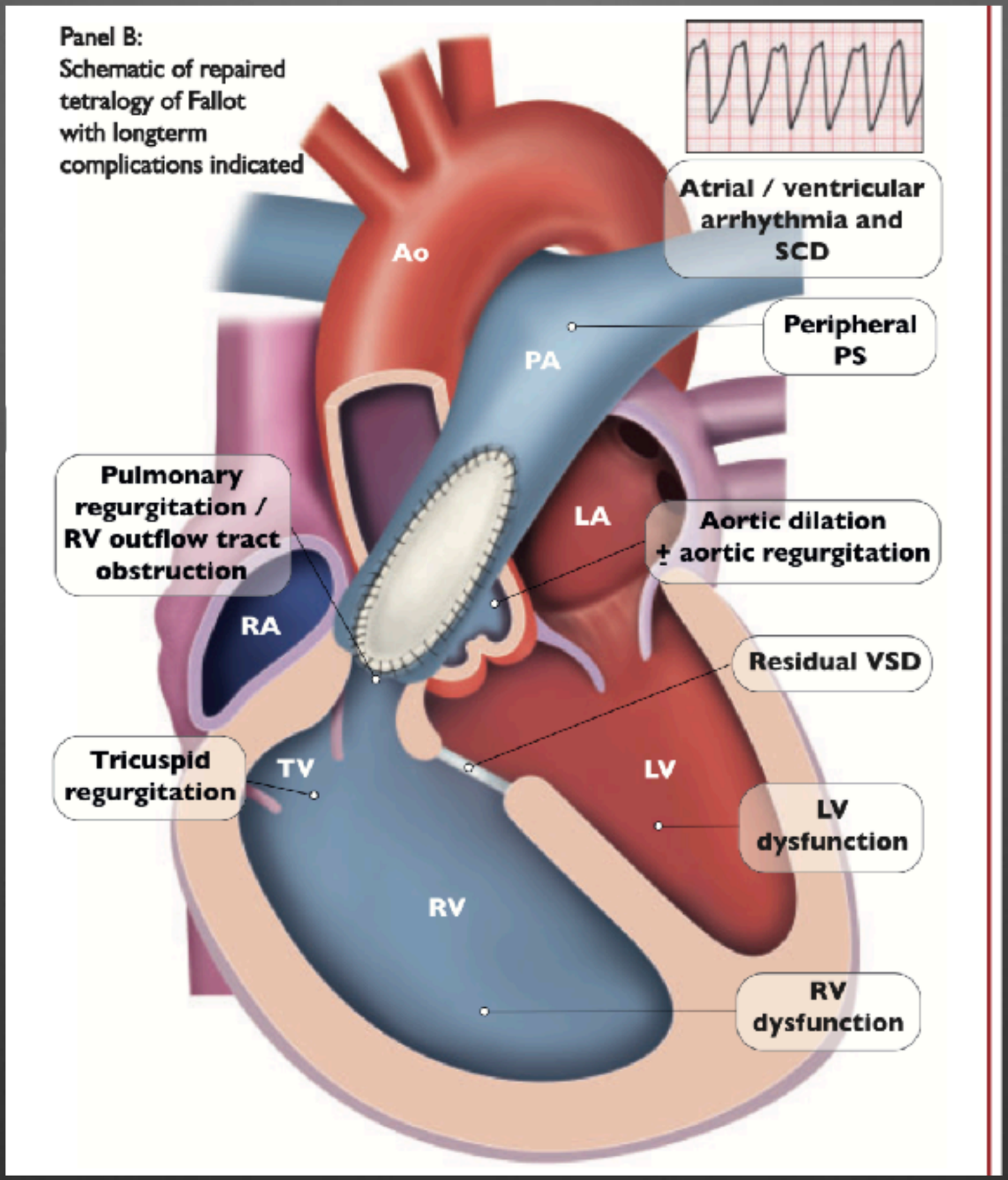
https://doi.org/10.1016/j.carpath.2013.03.004

VSD imaging

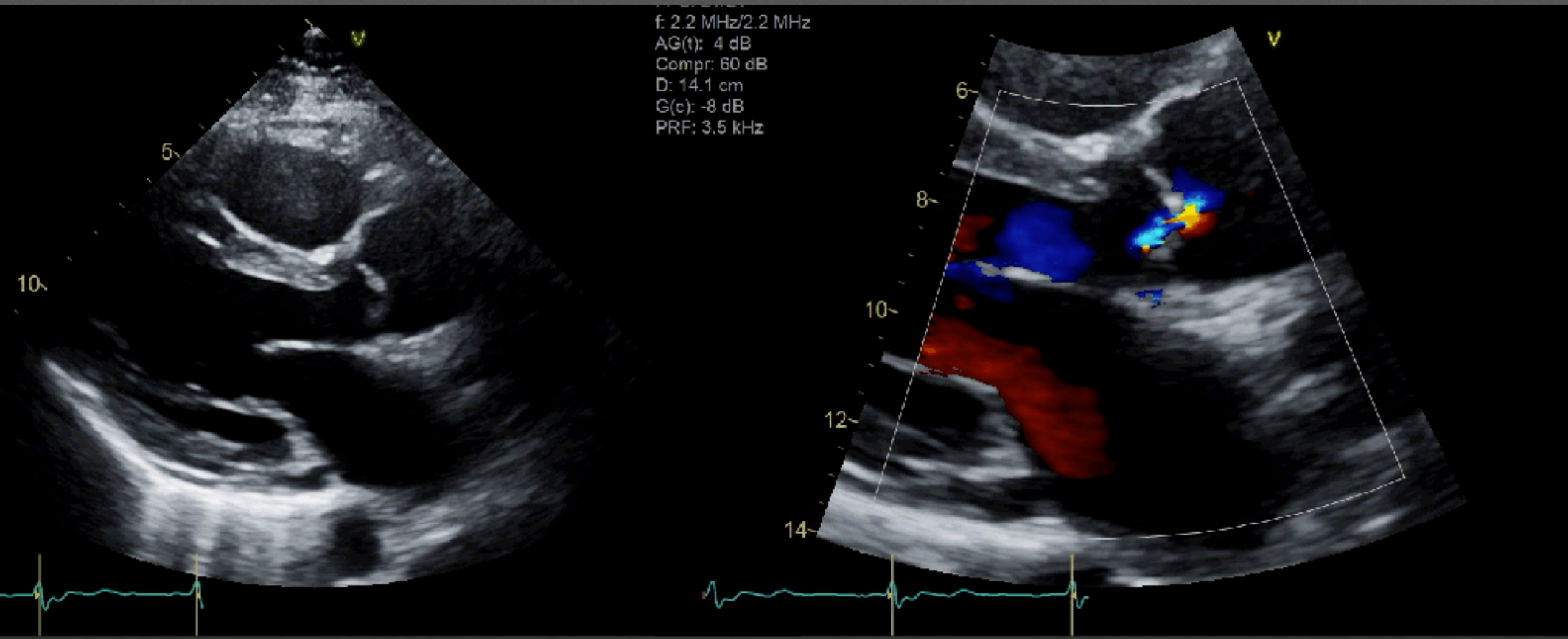
- Location and size of VSD confirmed in two views
- CW Doppler for hemodynamics
- Left Atrial Volume measurement for functional burden
- Associated defects
  - Aortic regurgitation
  - Double Chamber RV
  - Sub-aortic Membrane

Case 2a

- 49 y.o. woman referred to adult congenital clinic to establish care as she has been having progressive dyspnea on exertion
- Tetralogy of Fallot repaired at MVC
  - First year of life right BT shunt (right subclavian to right PA)
  - By 5 years old full repair by Dr. Richard Lower
- Vital BP 146/88 L arm; Pulse Ox 99%; HR 90 bpm; BMI 27kg/m^2
- Physical exam 4/6 harsh hold systolic murmur left sternal border



2020 ESC ACHD guidelines
doi:10.1093/eurheartj/ehaa554


f: 2.2 MHz/2.2 MHz
AG(t): 4 dB
Compr: 60 dB
D: 14.1 cm
G(c): -8 dB
PRF: 3.5 kHz
5
10
6
8
10
12
14

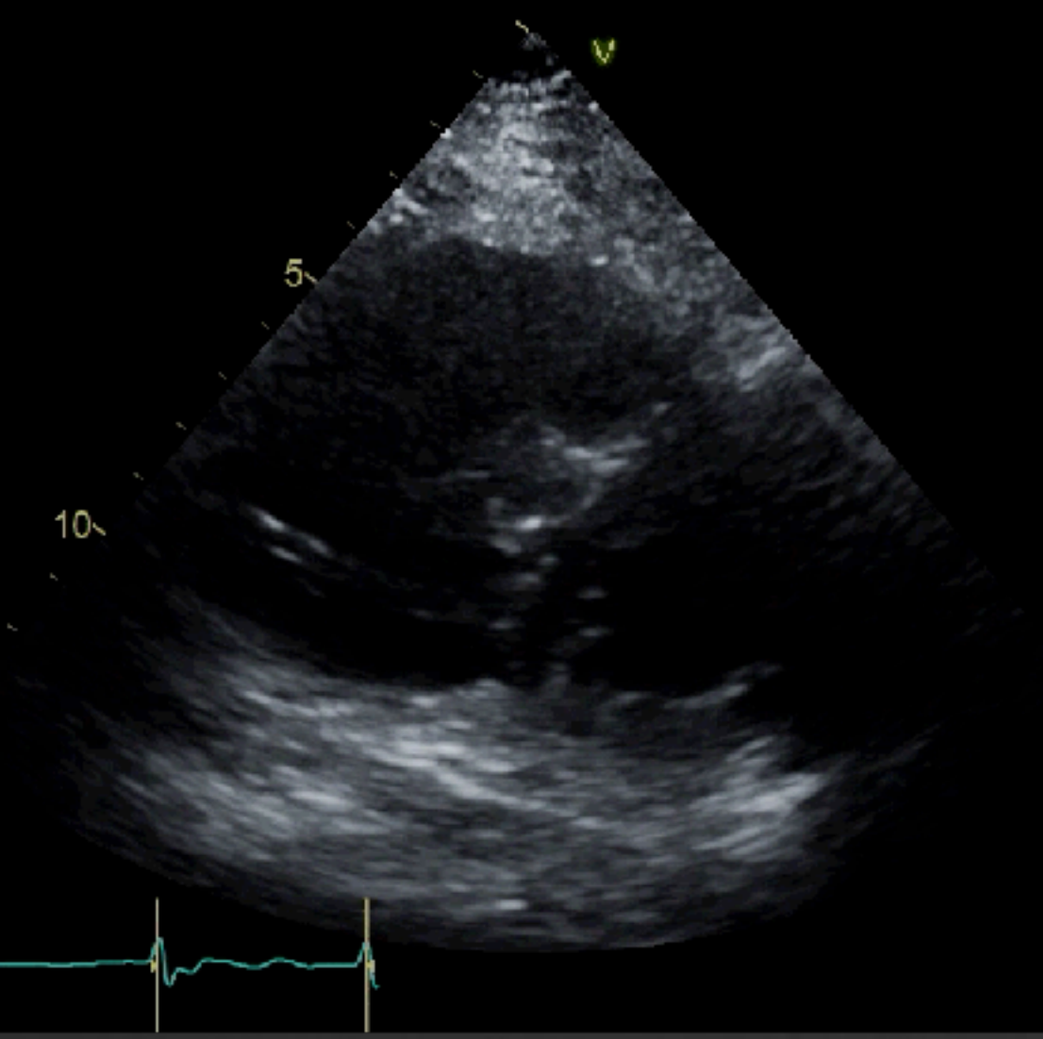
FPS: 20/20
f: 2.2 MHz/2.2 MHz
AG(t): 4 dB
Compr: 60 dB
D: 16.0 cm
(c): -8 dB
RF: 3.5 kHz

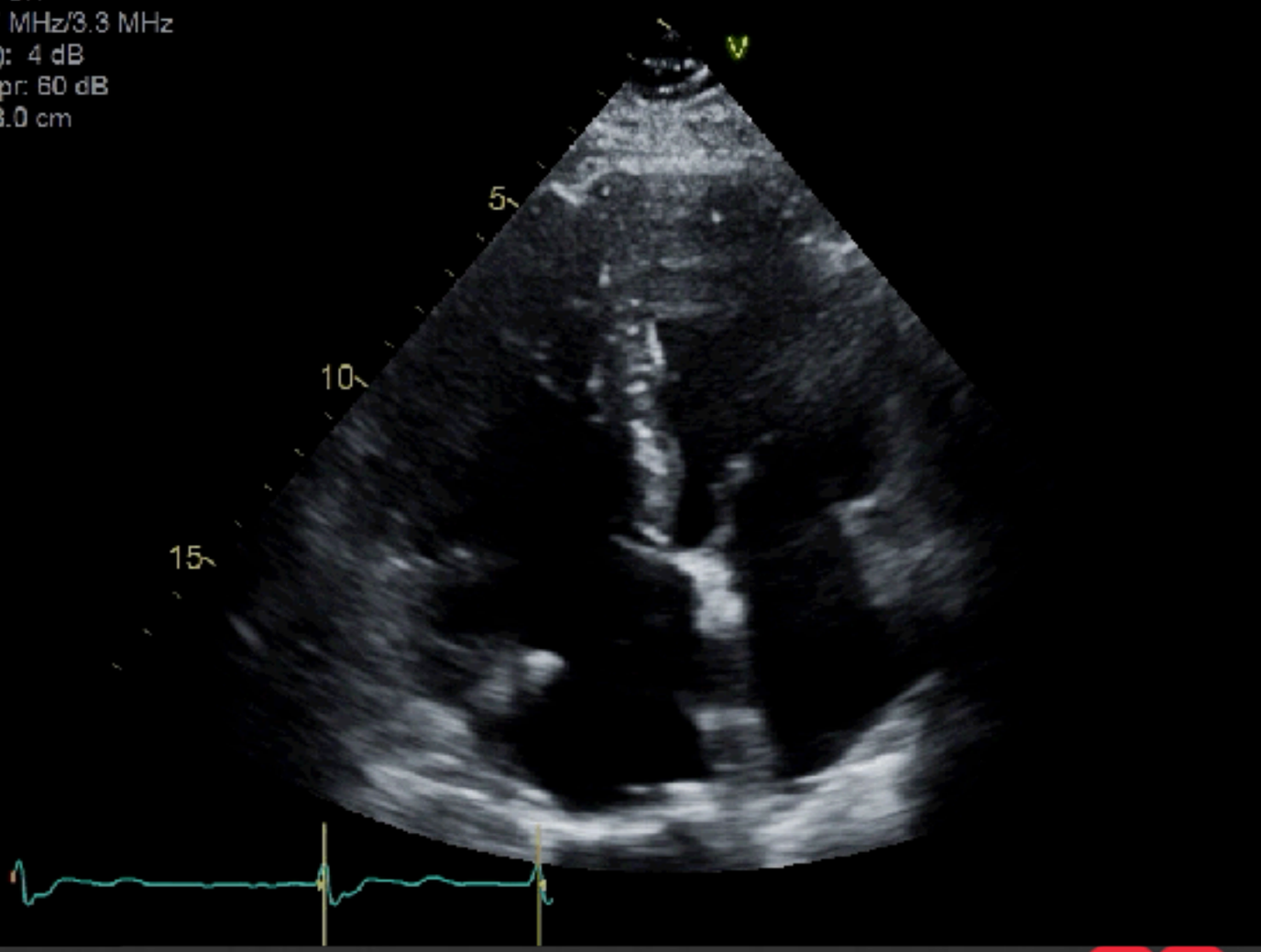
WEST, LISA
12/16/1969, 5299930
VCU HEALTH SYSTEM - GE6
05/13/2021 11:01:56
M5Sc
YCX VCU

D
PS: 20/20
1.9 MHz/1.9 MHz
G(t): 4 dB
ompr: 60 dB
: 16.0 cm
(c): -8 dB
RF: 3.5 kHz
(d): 2 dB

69
HR

FPS: 577
f: 1.7 MHz/3.3 MHz
AG(t): 4 dB
Compr: 60 dB
D: 18.0 cm





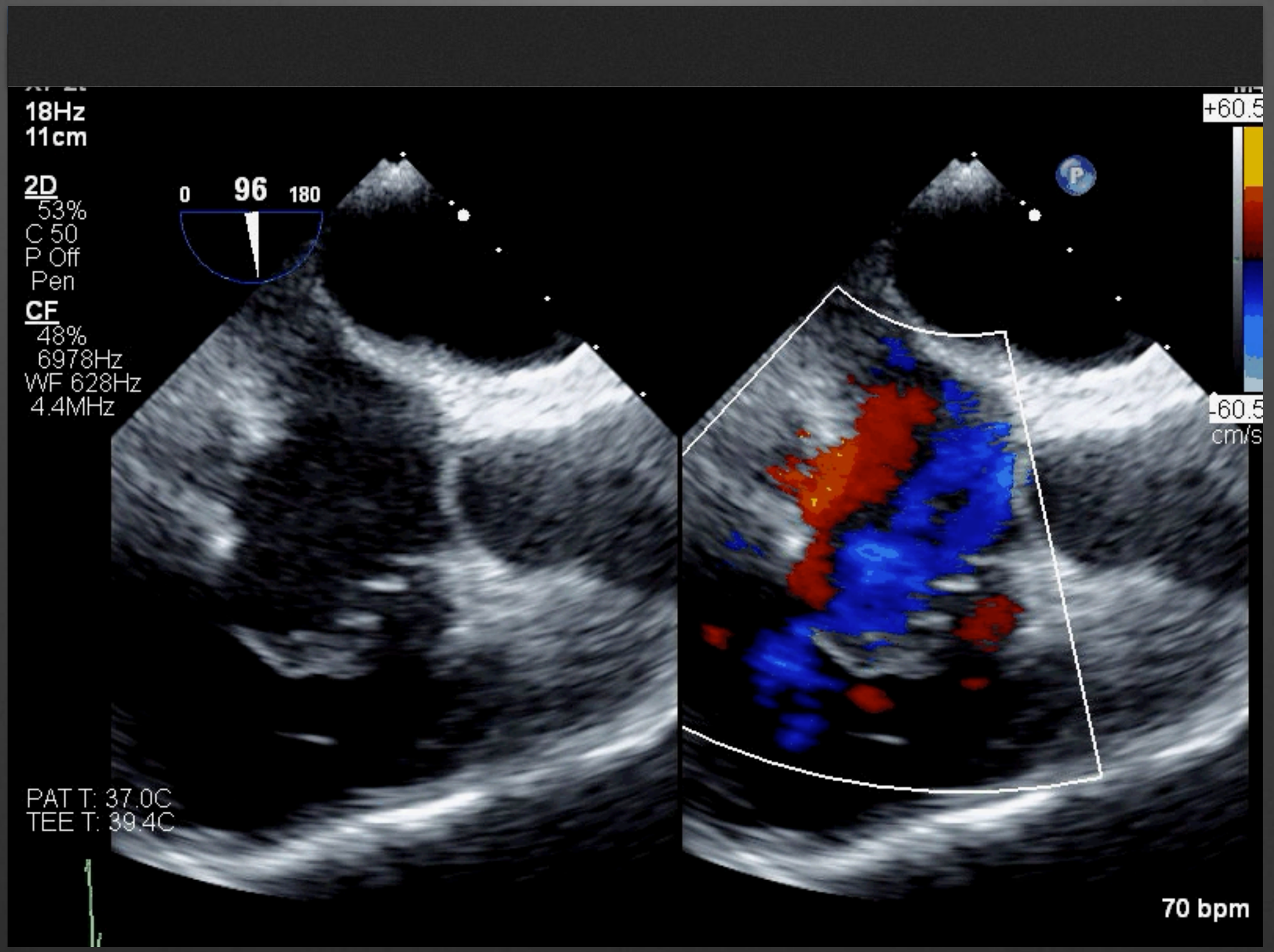
- Enlarged RV with preserved RV systolic function
- Biatrial enlargement (RA>LA)
- Normally functioning pulmonary valve without stenosis or regurgitation
- Normal LV size and systolic function

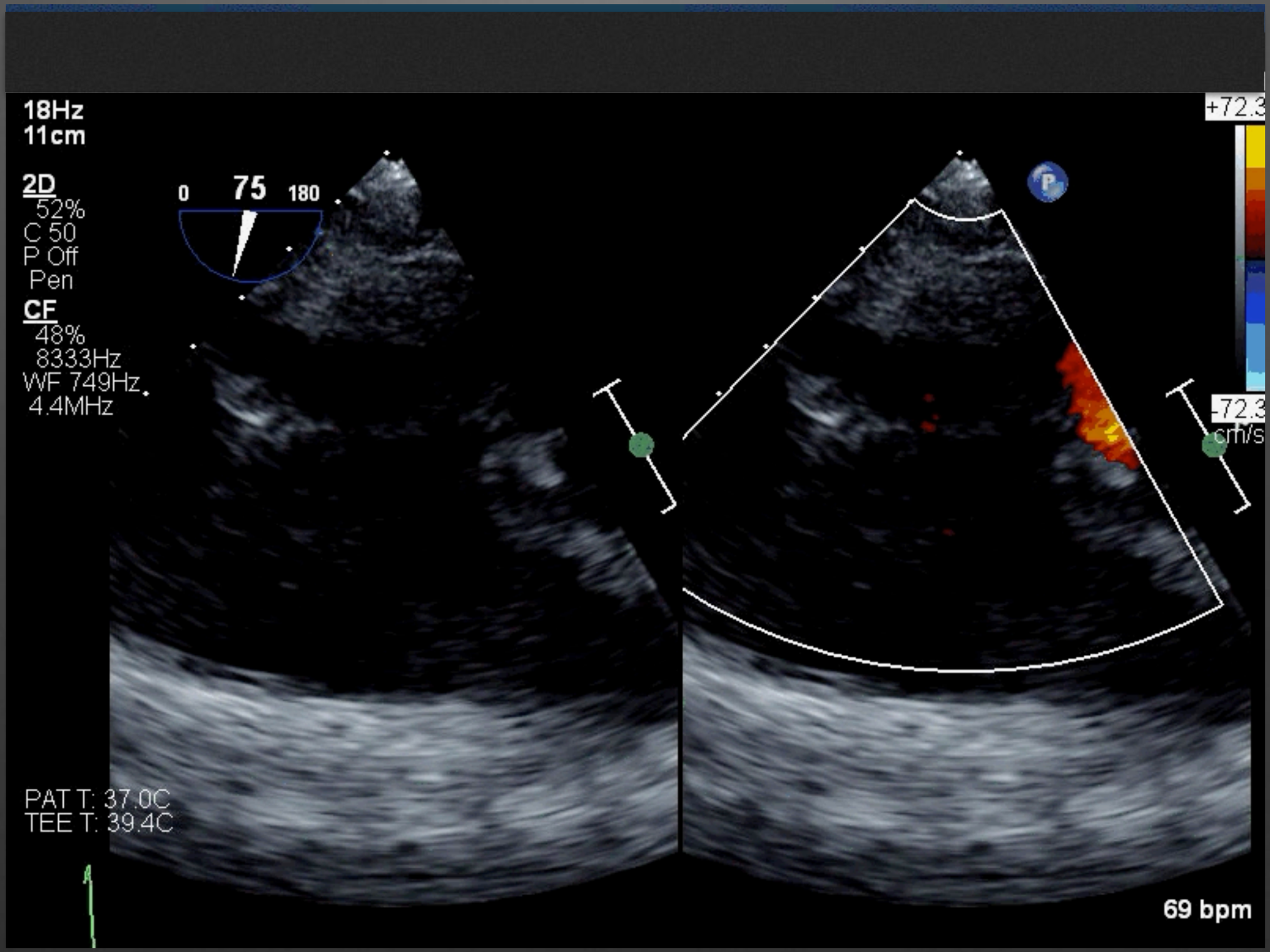
HD
FPS: 15/15
f: 2.2 MHz/2.2 MHz
AG(t): 4 dB
Compr: 60 dB
D: 16.0 cm
G(c): -8 dB
PRF: 3.5 kHz

D: 16.0 cm
G(c): -8 dB
PRF: 3.5 kHz
G(d): 2 dB

[m/s]

TEE


18Hz
11cm
2D
53%
C 50
P Off
Pen
CF
48%
6978Hz
WF 628Hz
4.4MHz
0
96
180
+60.5
-60.5
cm/s
PAT T: 37.0C
TEE T: 39.4C
70 bpm


18Hz
11cm
2D
52%
C 50
P Off
Pen
CF
48%
8333Hz
WF 749Hz
4.4MHz
0
75
180
+72.3
-72.3
cm/s
PAT T: 37.0C
TEE T: 39.4C
69 bpm

Diagnosis and Plan

- Tetralogy of Fallot with initial BT (arterial to PA) shunt followed by repair of VSD and surgical valulotomy of PV with functional PV

- Infected devices 12 months ago with removal of device and cardiac leads

- Severe TR with vegetations vs disruption of TV apparatus with lead extraction

- Scheduled for OR - TV replacement, Removal of current RV lead and placement of epicardial RV lead.

STATE-OF-THE-ART PAPER

Imaging Assessment of Tricuspid Regurgitation Severity

Rebecca T. Hahn, MD,[a] James D. Thomas, MD,[b] Omar K. Khalique, MD,[a] João L. Cavalcante, MD,[c] Fabien Praz, MD,[a,d] William A. Zoghbi, MD[e]

FIGURE 9 Proposed New Grading Scheme

Parameters	MILD	MODERATE	SEVERE	MASSIVE	TORRENTIAL
Vena Contracta width (biplane average)	<3 mm	3-6.9 mm	7 mm - 13 mm	14-20 mm	≥21 mm
EROA by PISA	<20 mm^2	20-39 mm^2	40-59 mm^2	60-79 mm^2	≥80 mm^2
3D Vena Contracta Area or Quantitative Doppler EROA	-	-	75-94 mm^2	95-114 mm^2	≥115 mm^2
Example: