



# **Volume Assessment**

**POCUS Rural Ninja Skills**

**Claire Heslop MD/PhD FRCPC  
University of Toronto/UHN**

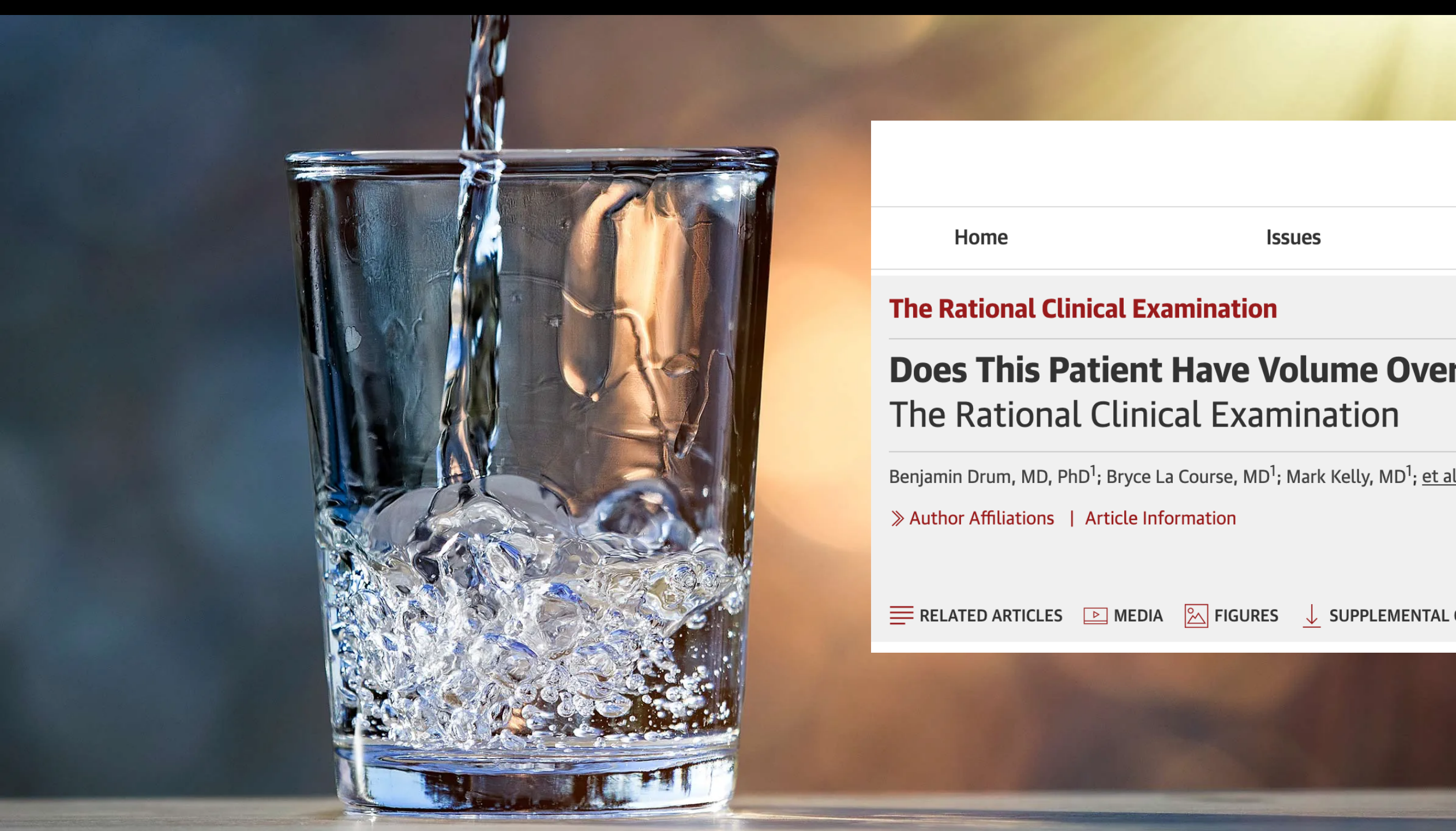
**I have no conflicts  
of interest.\***



**\*except that I want you to do echo: constantly, always, on everyone**

**Positive Possum  
believes you can  
do the thing.**





**JAMA**

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**The Rational Clinical Examination**

**Does This Patient Have Volume Overload?**  
The Rational Clinical Examination

Benjamin Drum, MD, PhD<sup>1</sup>; Bryce La Course, MD<sup>1</sup>; Mark Kelly, MD<sup>1</sup>; [et al](#)

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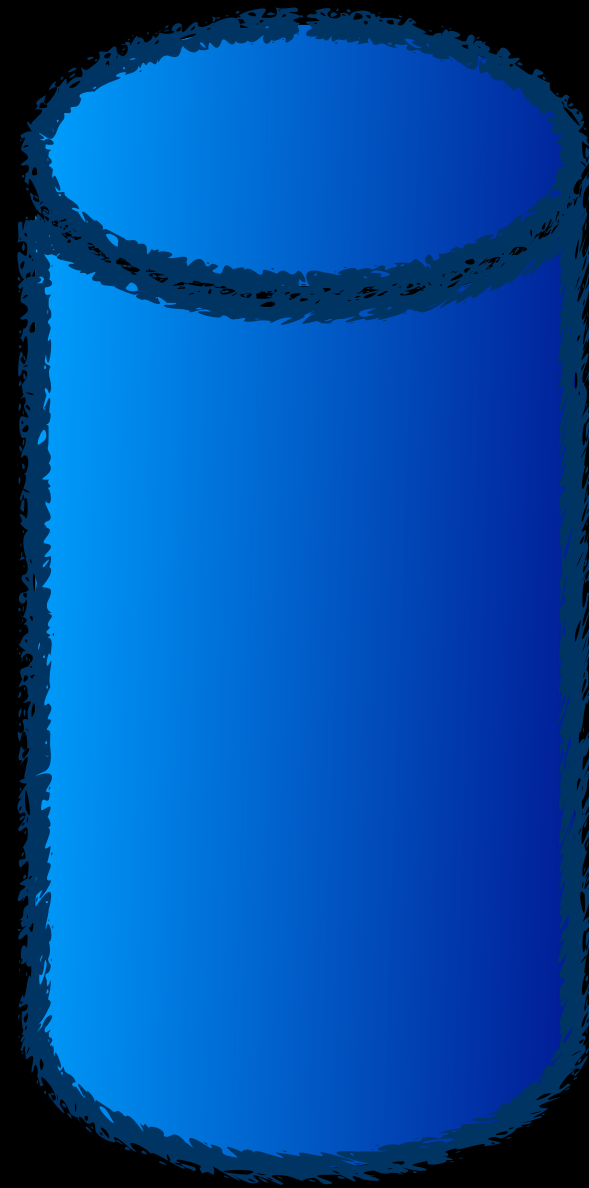
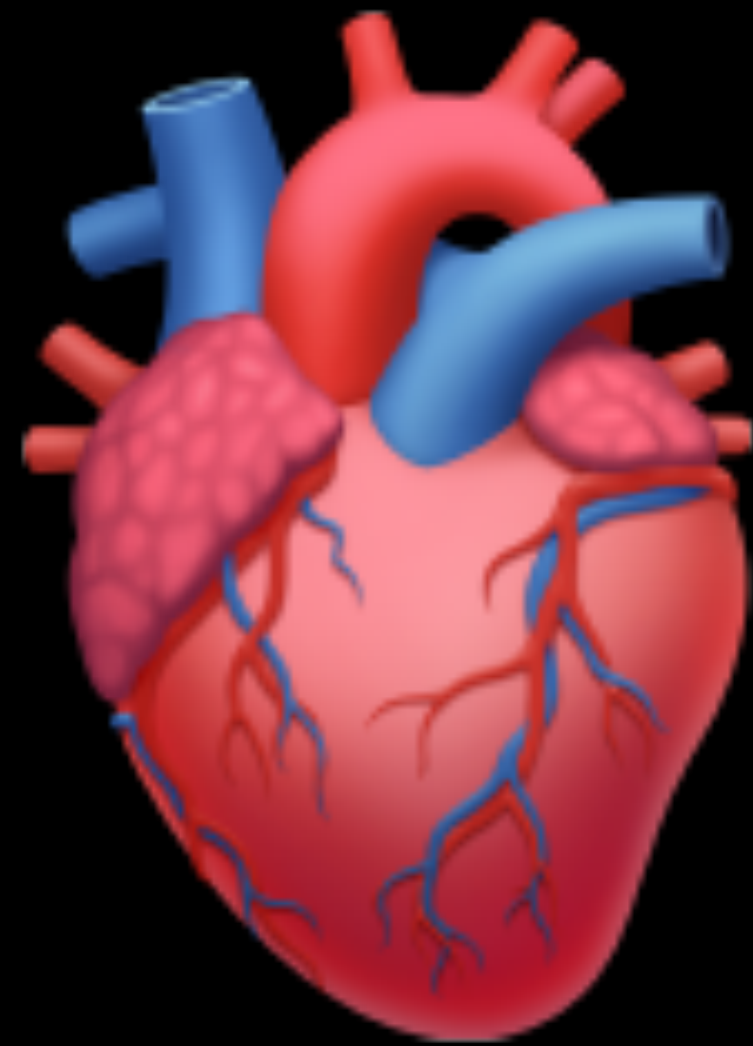
**JAMA**  
**Published Online: February 23, 2026**  
2026;335;(13):1159-1168.  
[doi:10.1001/jama.2026.0446](#)

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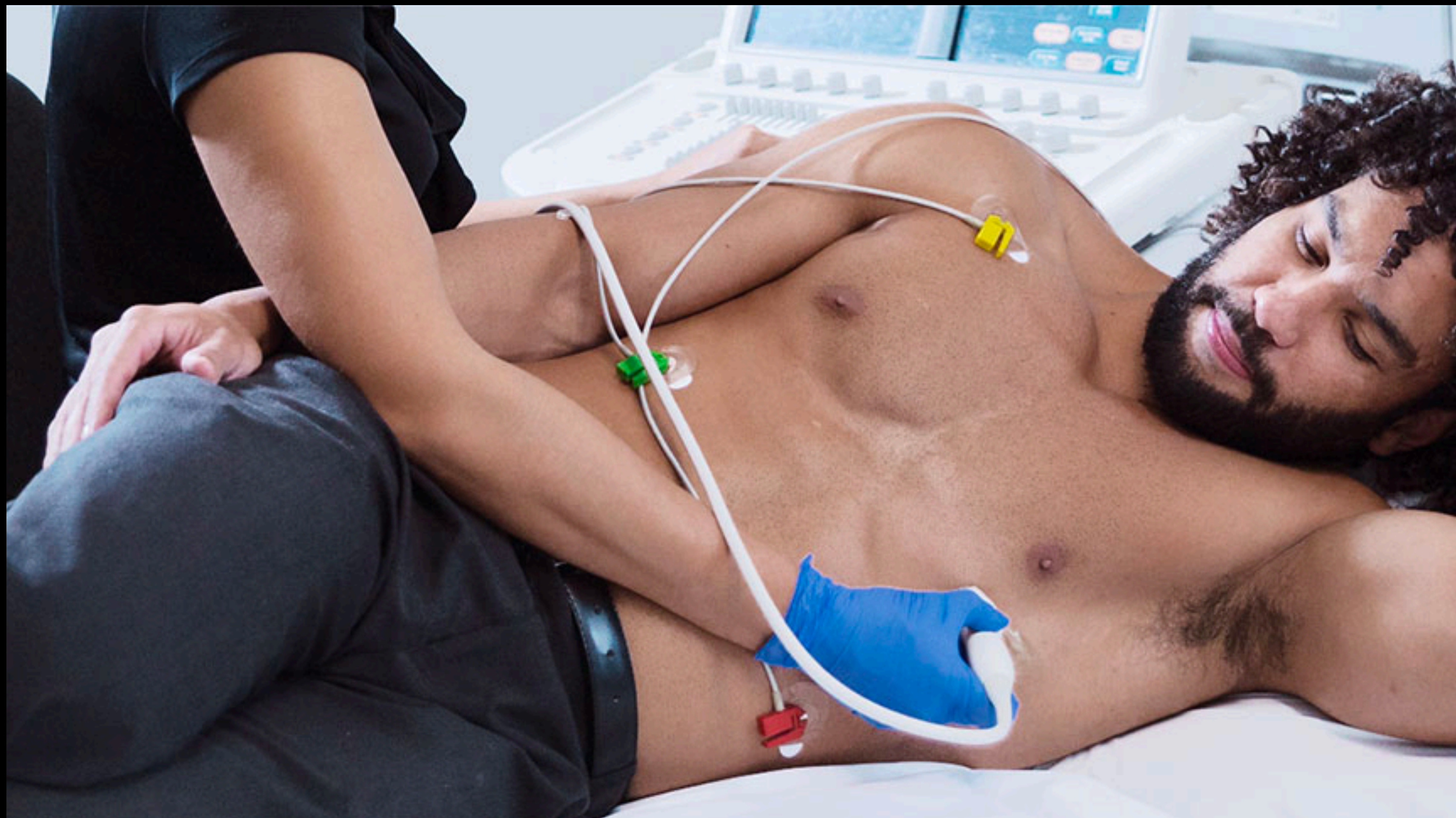
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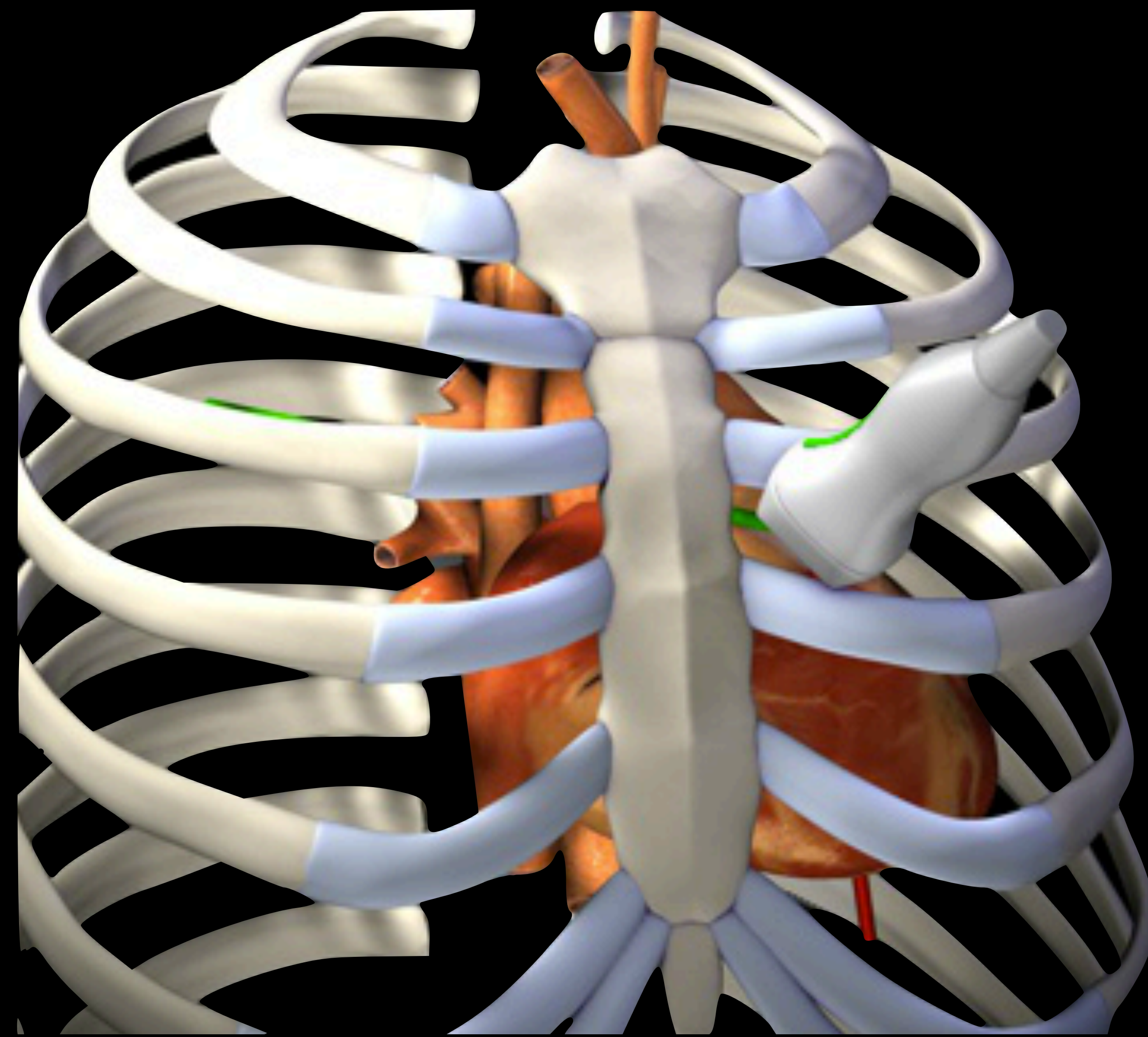
# THREE EASY STEPS



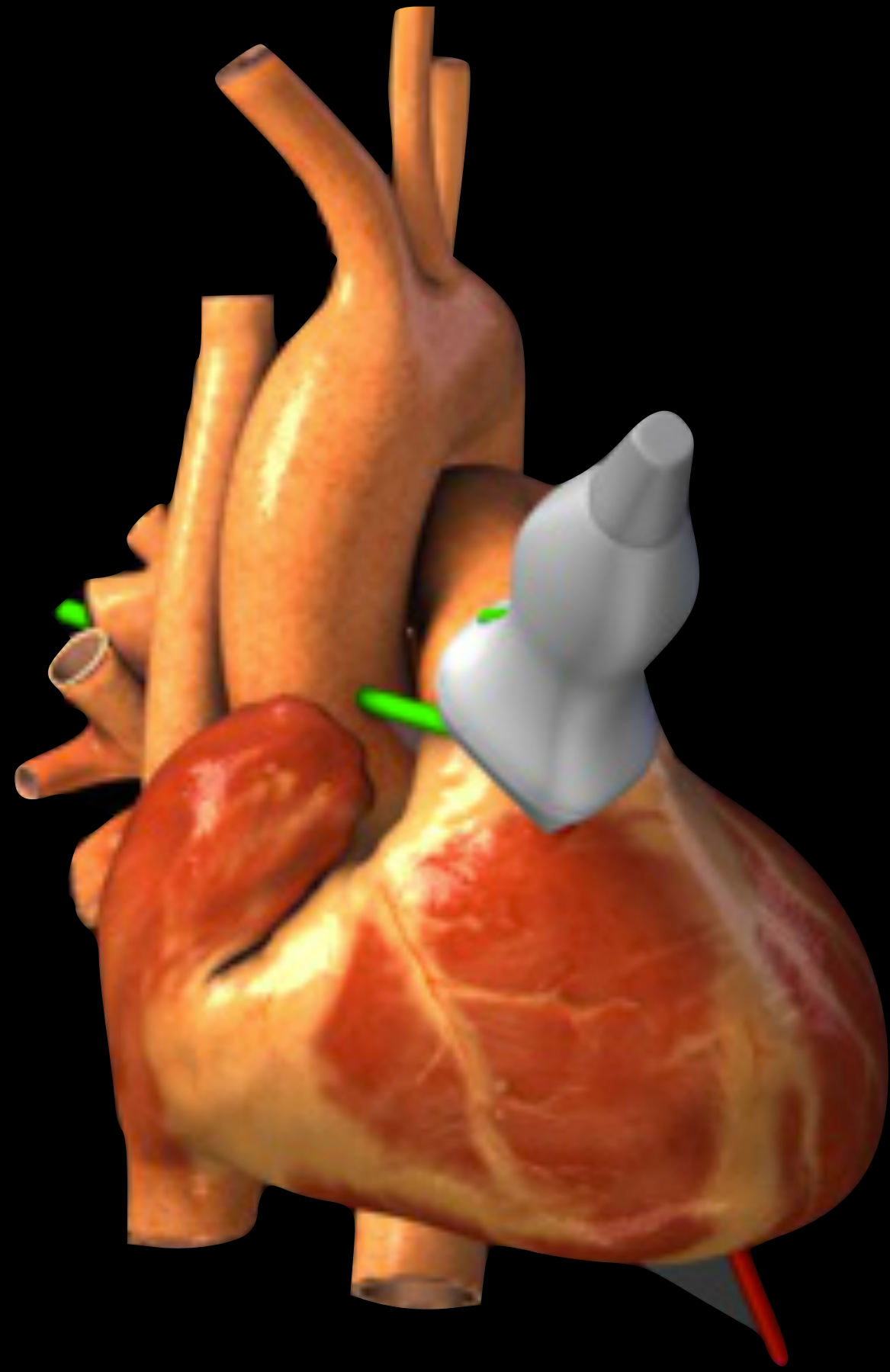
# ROLL EVERYONE



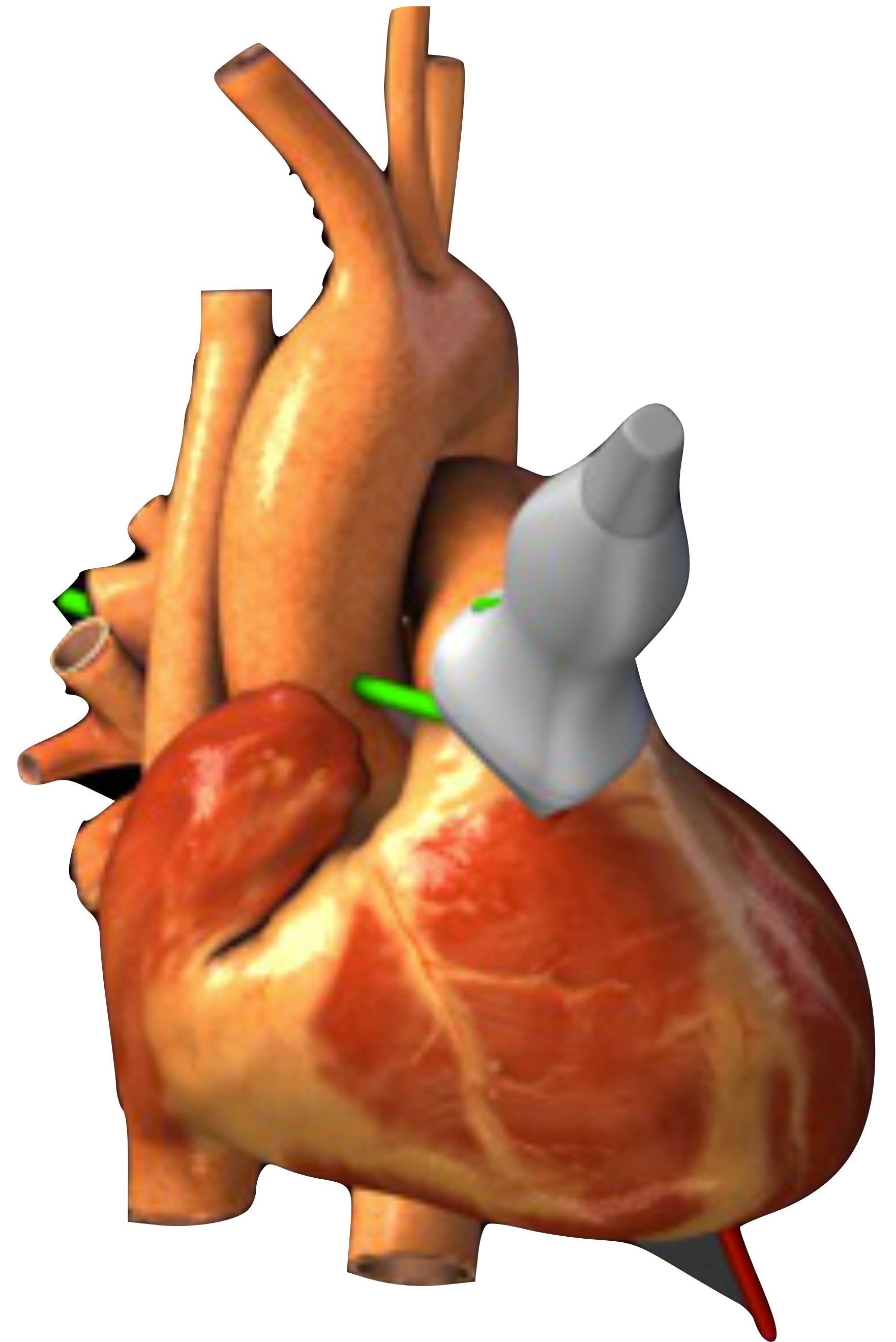
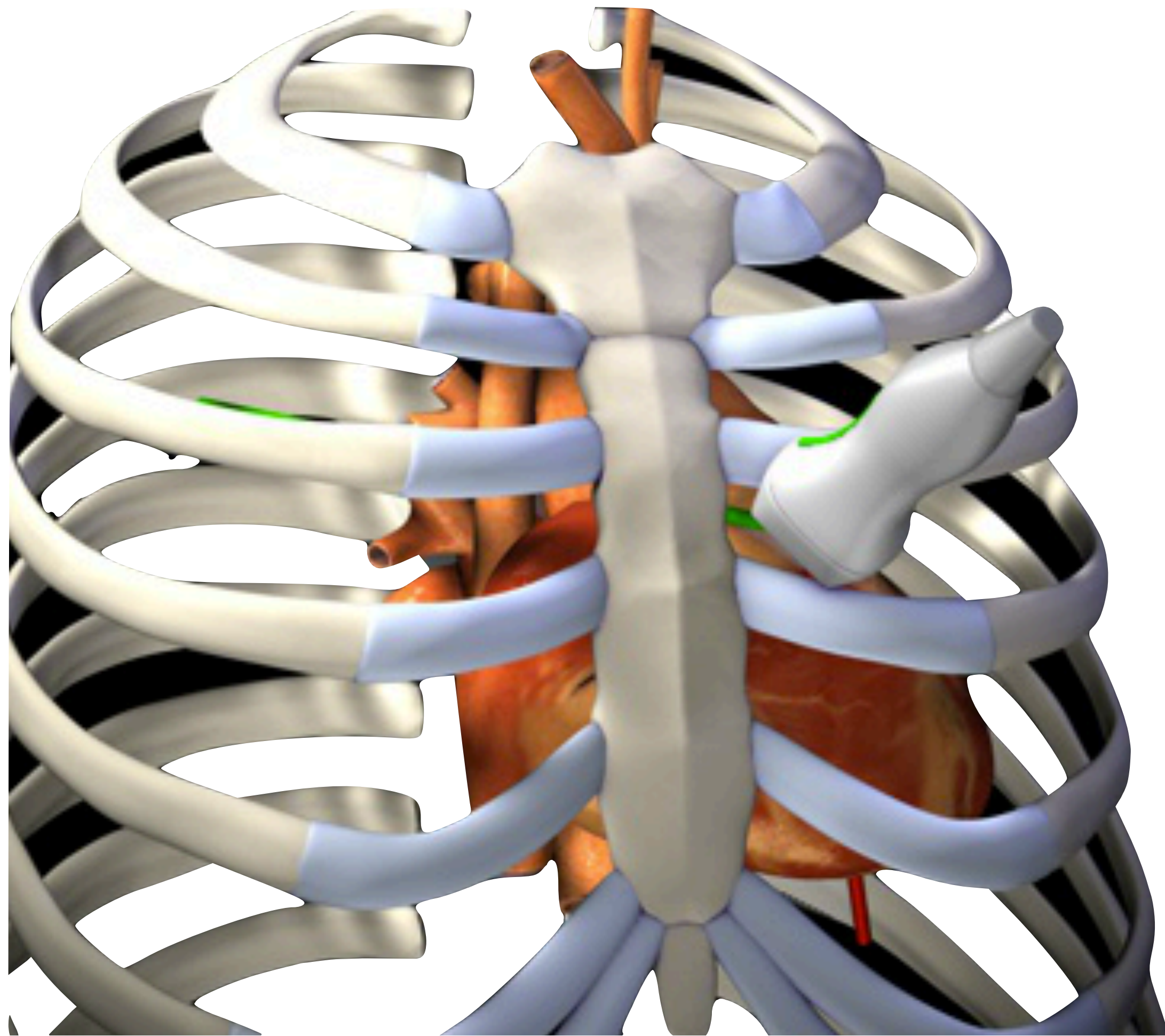
**MAKE FRIENDS  
WITH THE RIBS.**

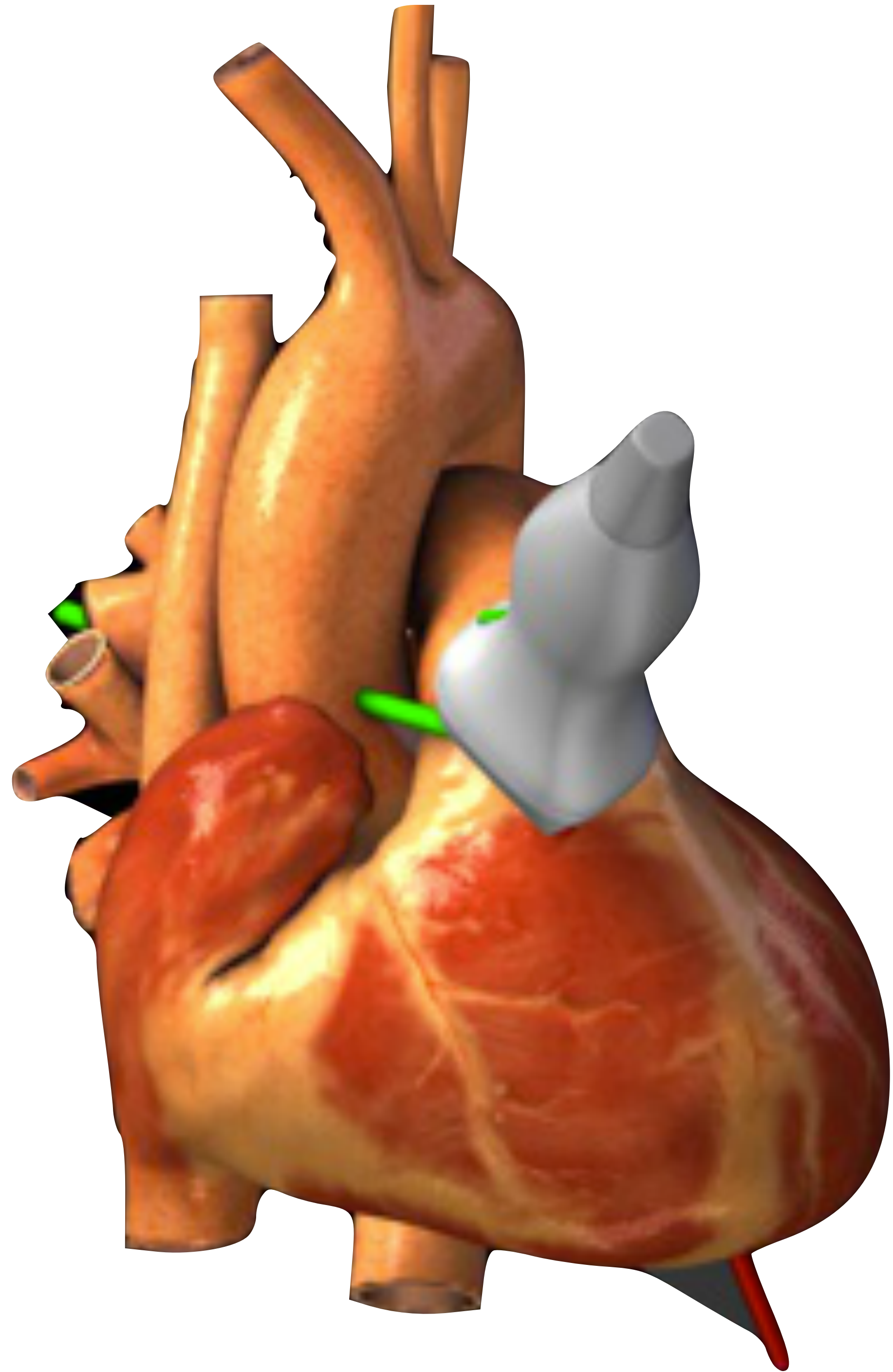


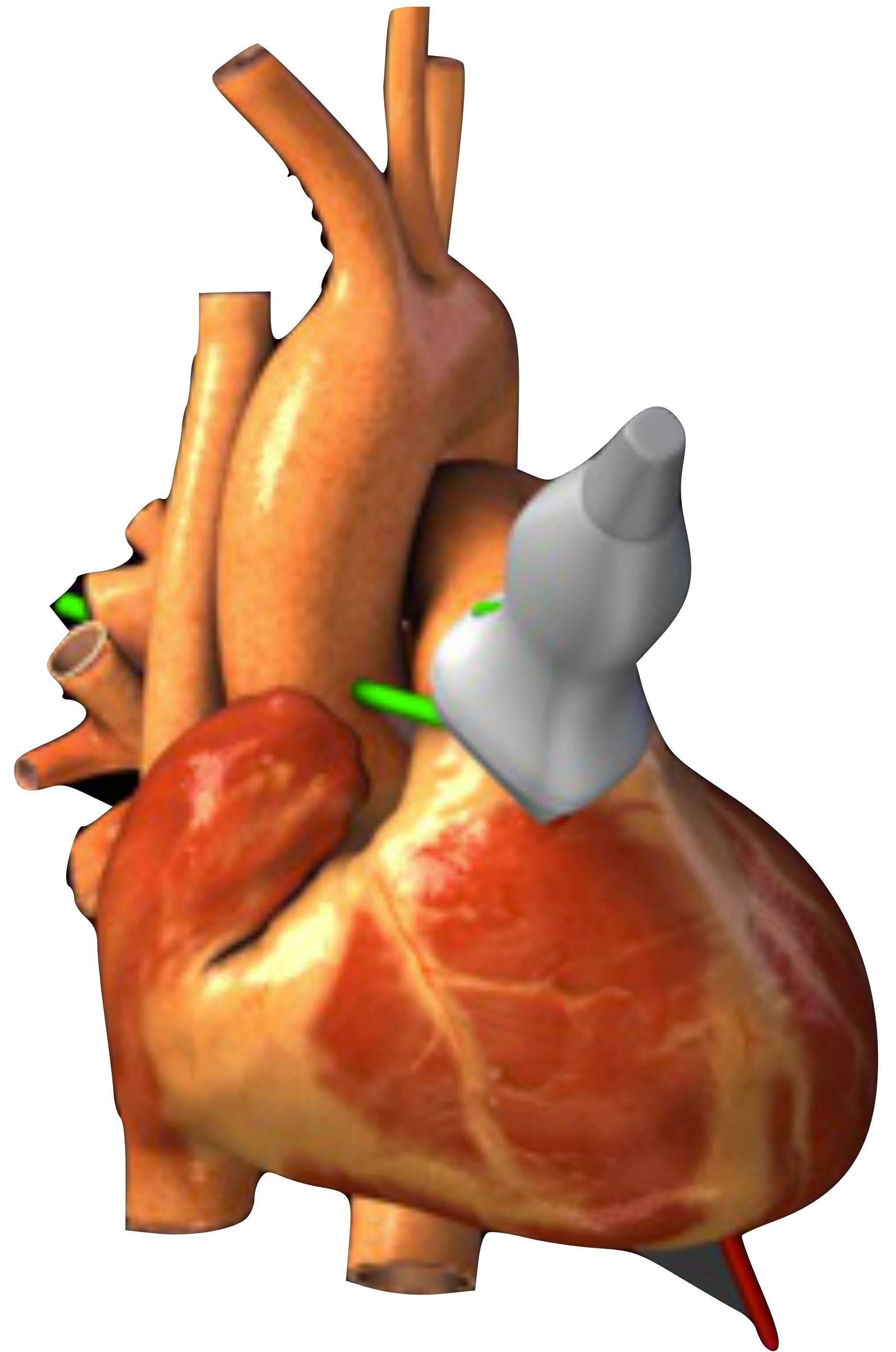
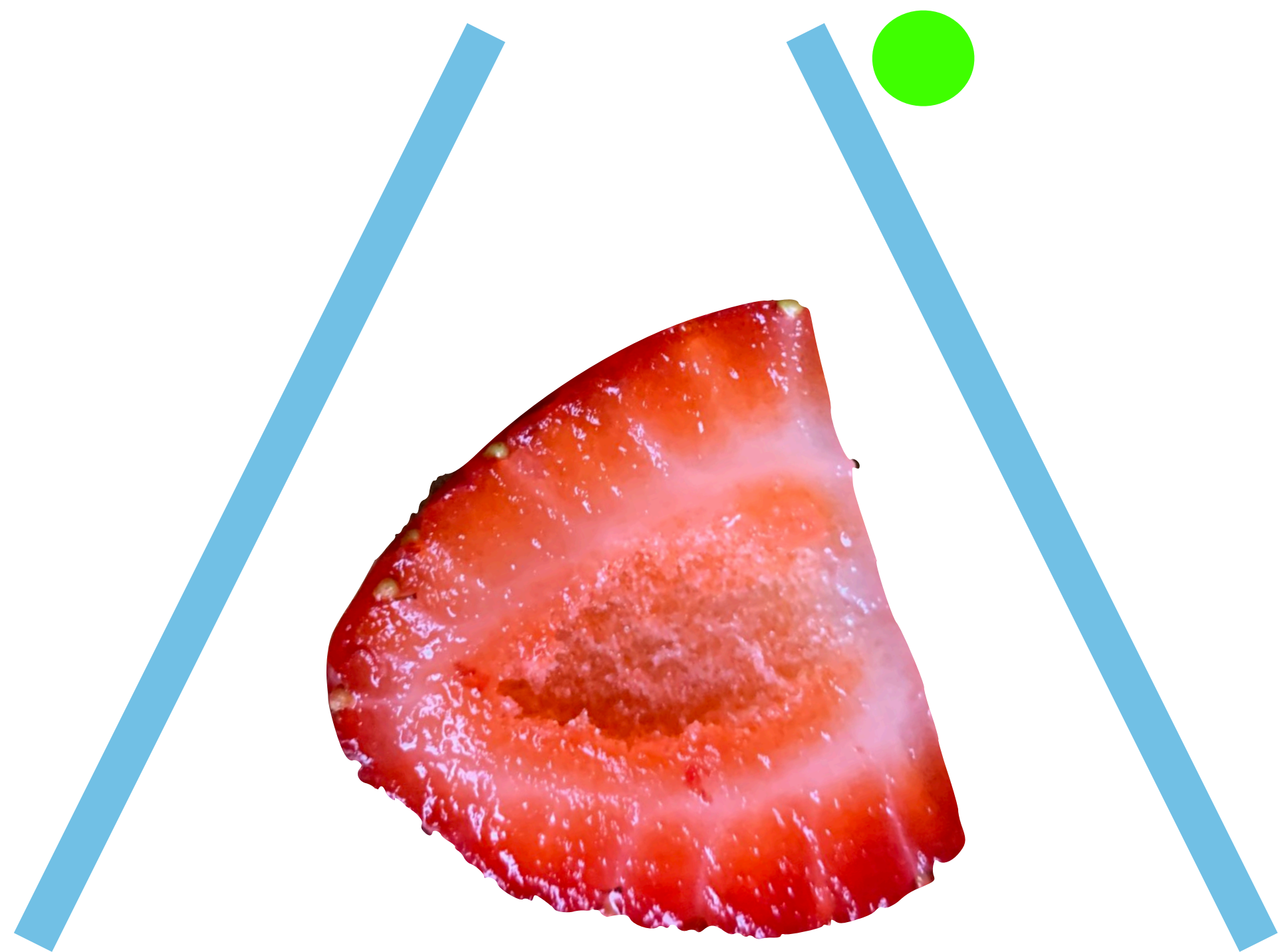




**PARASTERNAL  
LONG AXIS**

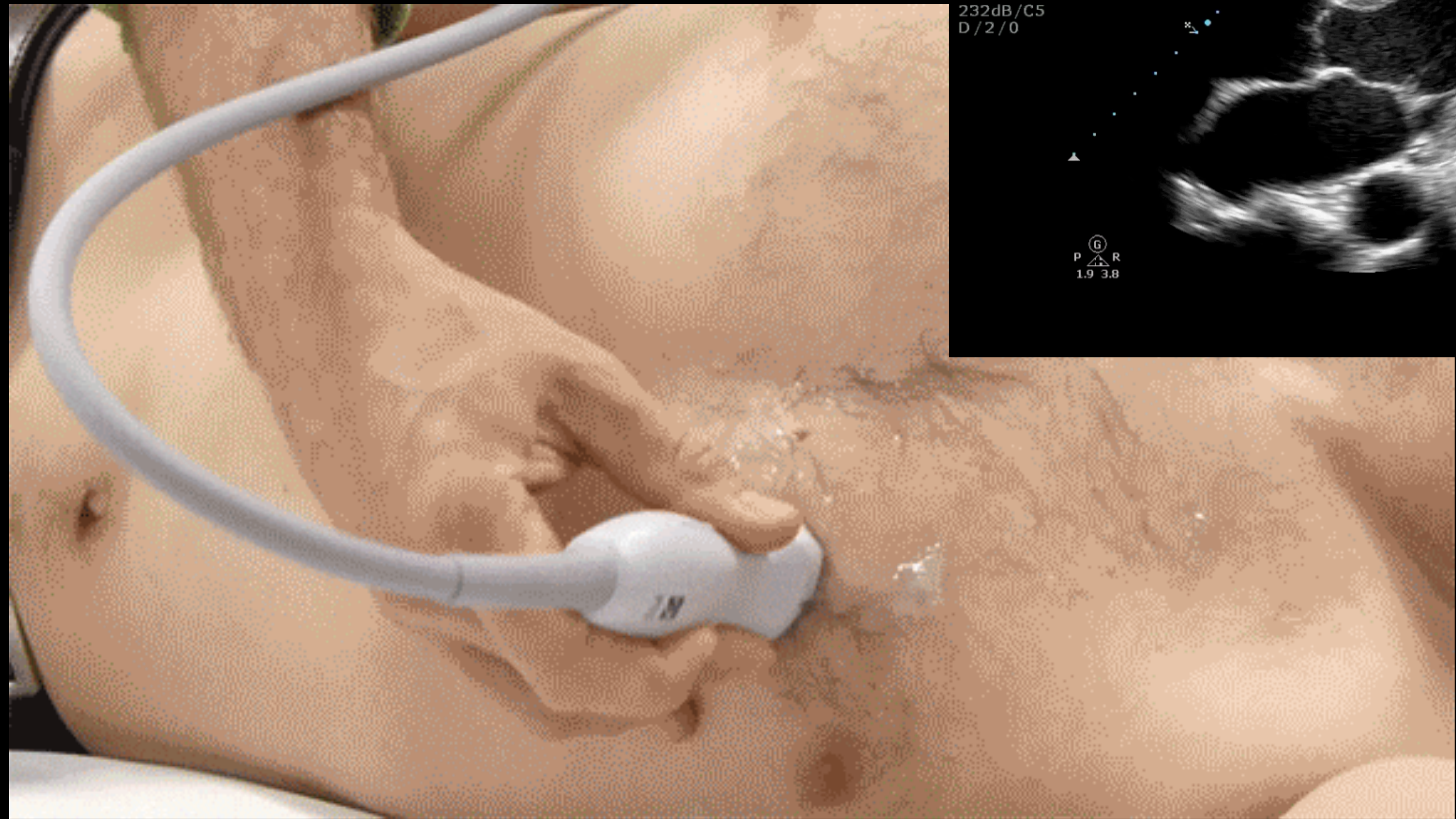
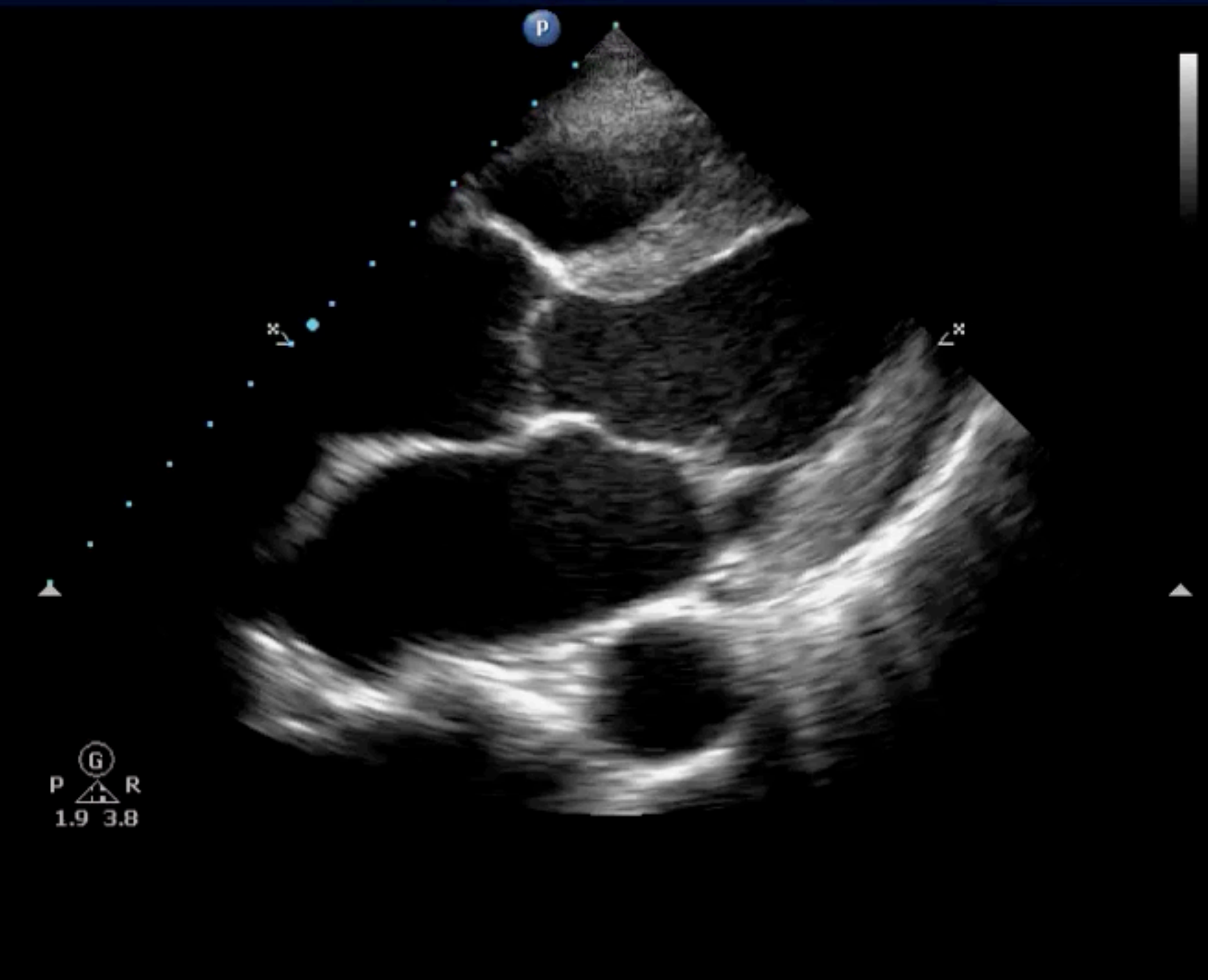




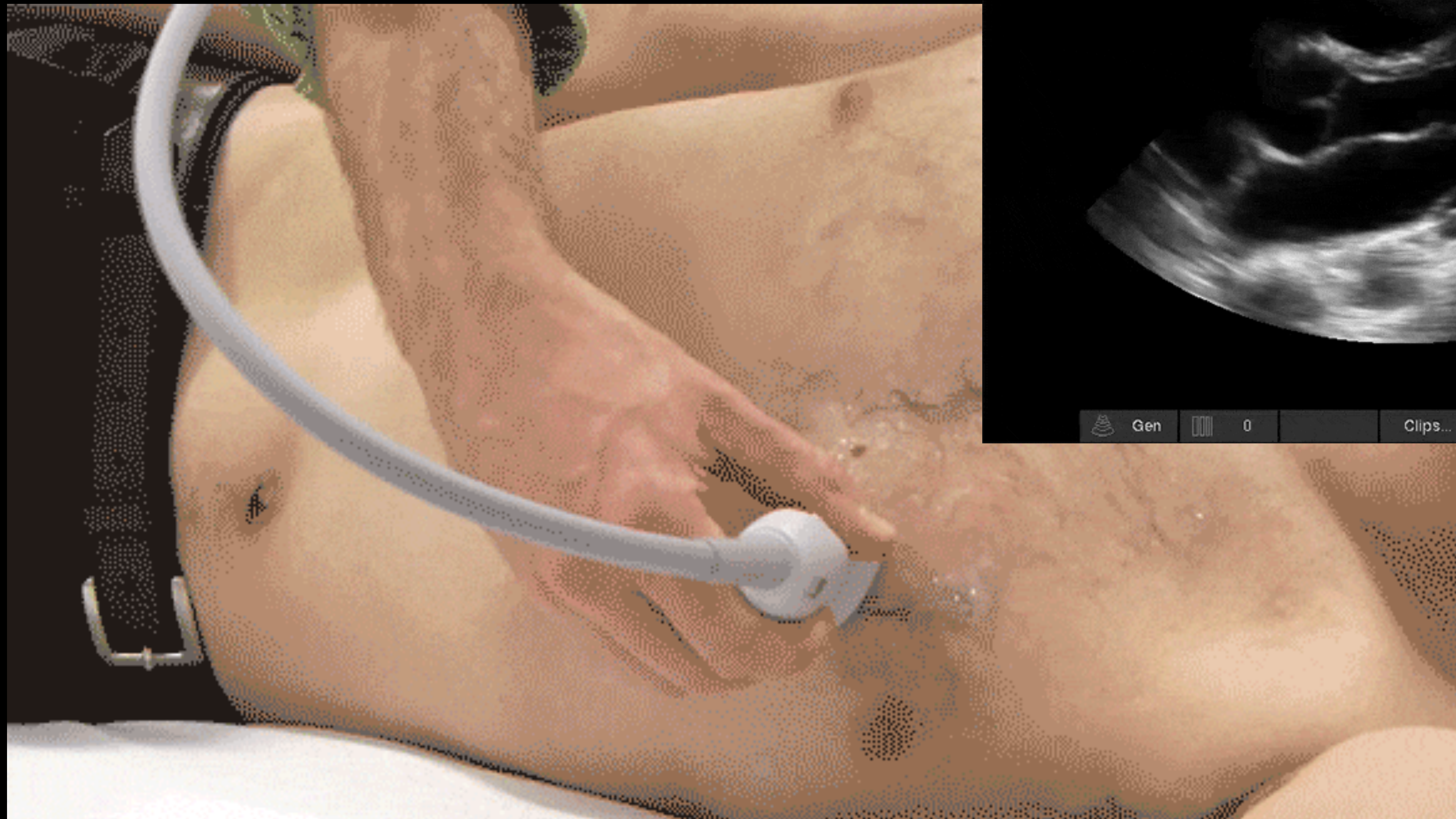


# SLIDE

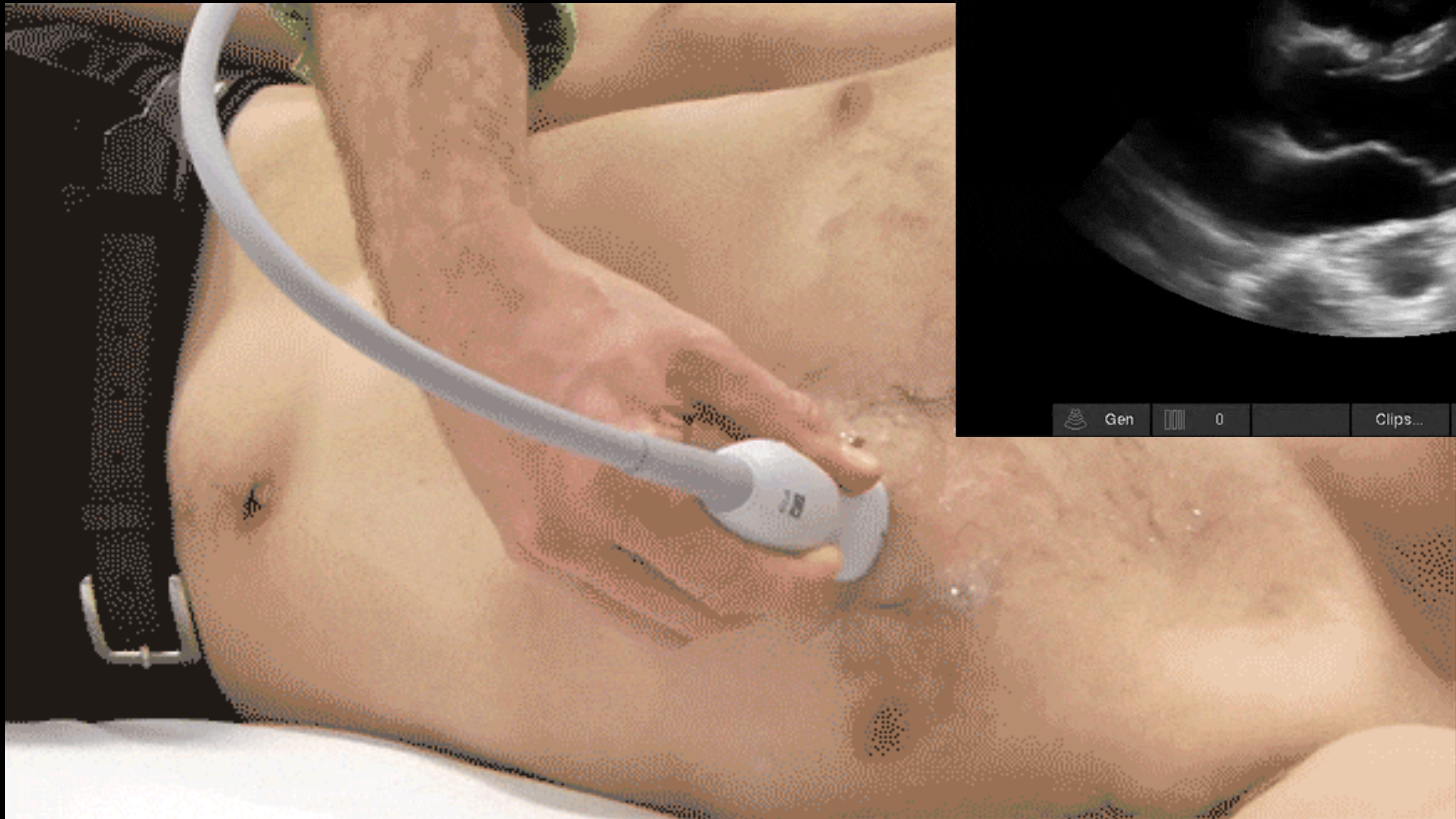
ED ECHO  
S4-2  
34Hz  
14cm  
  
2D  
H3  
Gn 62  
232dB/C5  
D/2/0



# FAN/TILT



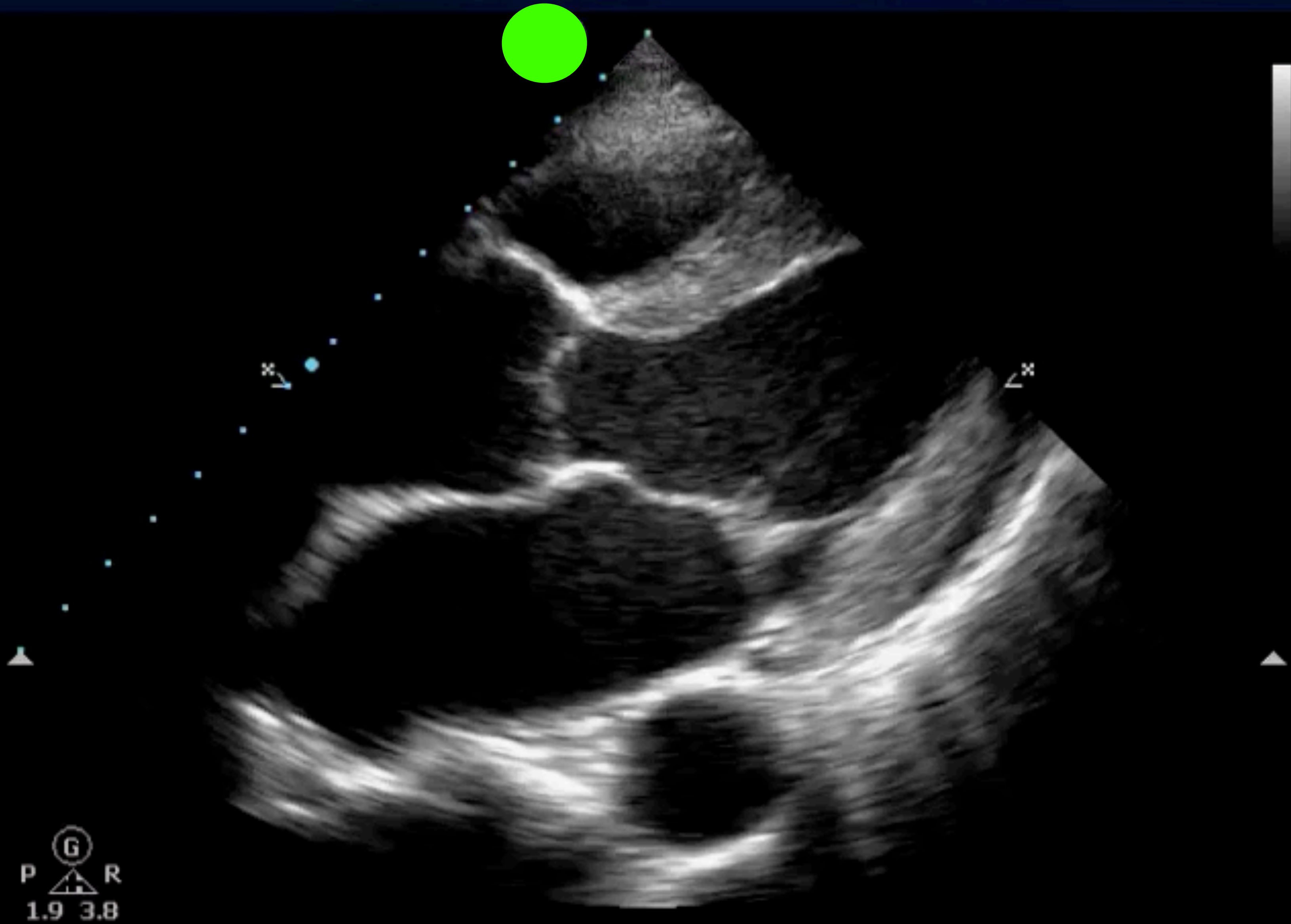
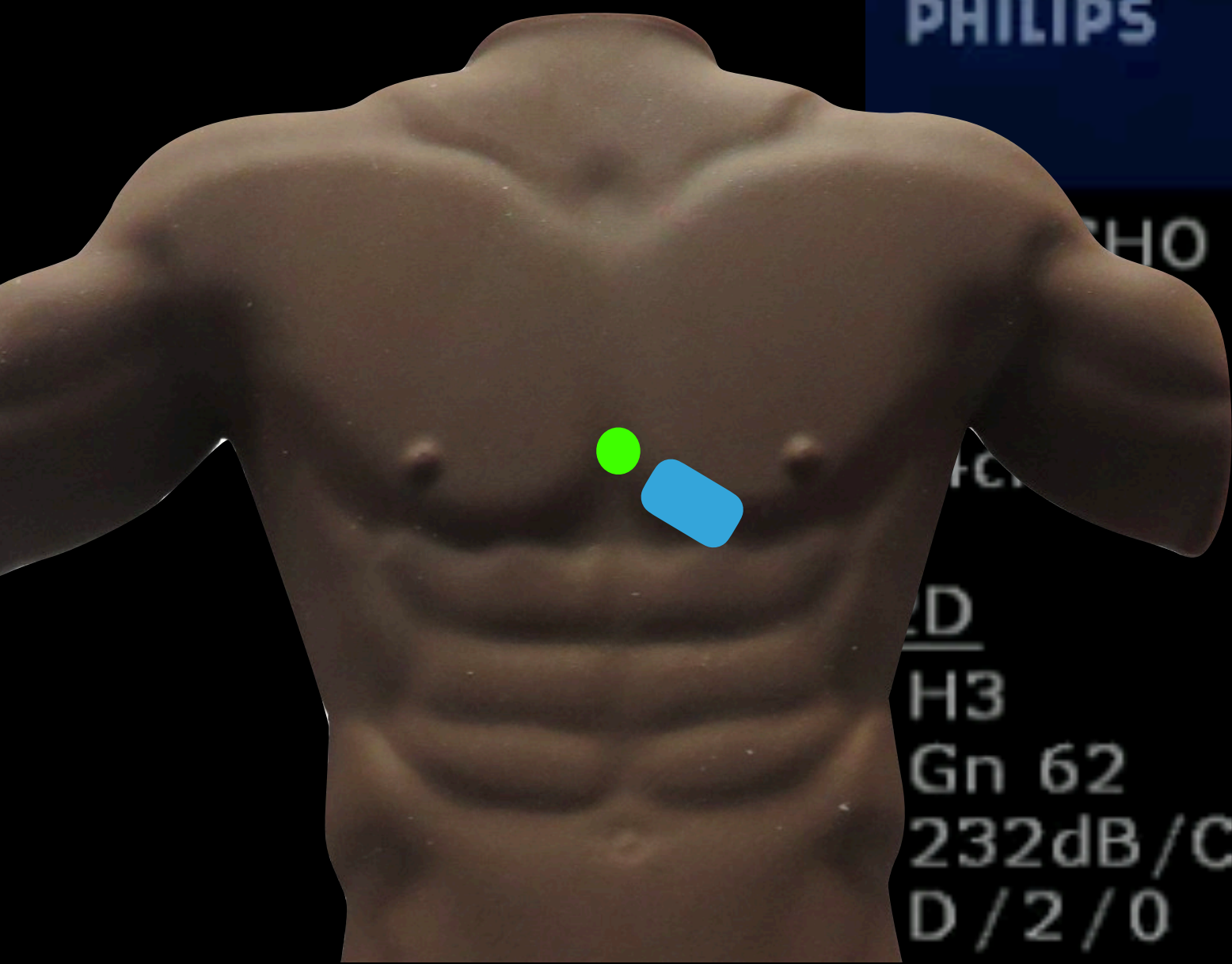
# ROTATE



PHILIPS

MI 1.4

YALE EMERGENCY MEDICINE TIS 0.8



ED ECHO  
S4-2  
34Hz  
15.0cm

2D  
HGen  
Gn 50  
50  
5/2/0

YALE ED TIS 0.6

Ⓞ  
P △ R  
1.6 3.2



Gen THI

ED ECHO  
S4-2  
34Hz  
14cm  
2D  
H3  
Gn 62  
232dB/C5  
D/2/0

YALE EMERGENCY MEDICINE TIS 0.8



# M-Mode on Tip of Ant MV Leaflet

Crd  
P21



26%

MI

1.0

TIS

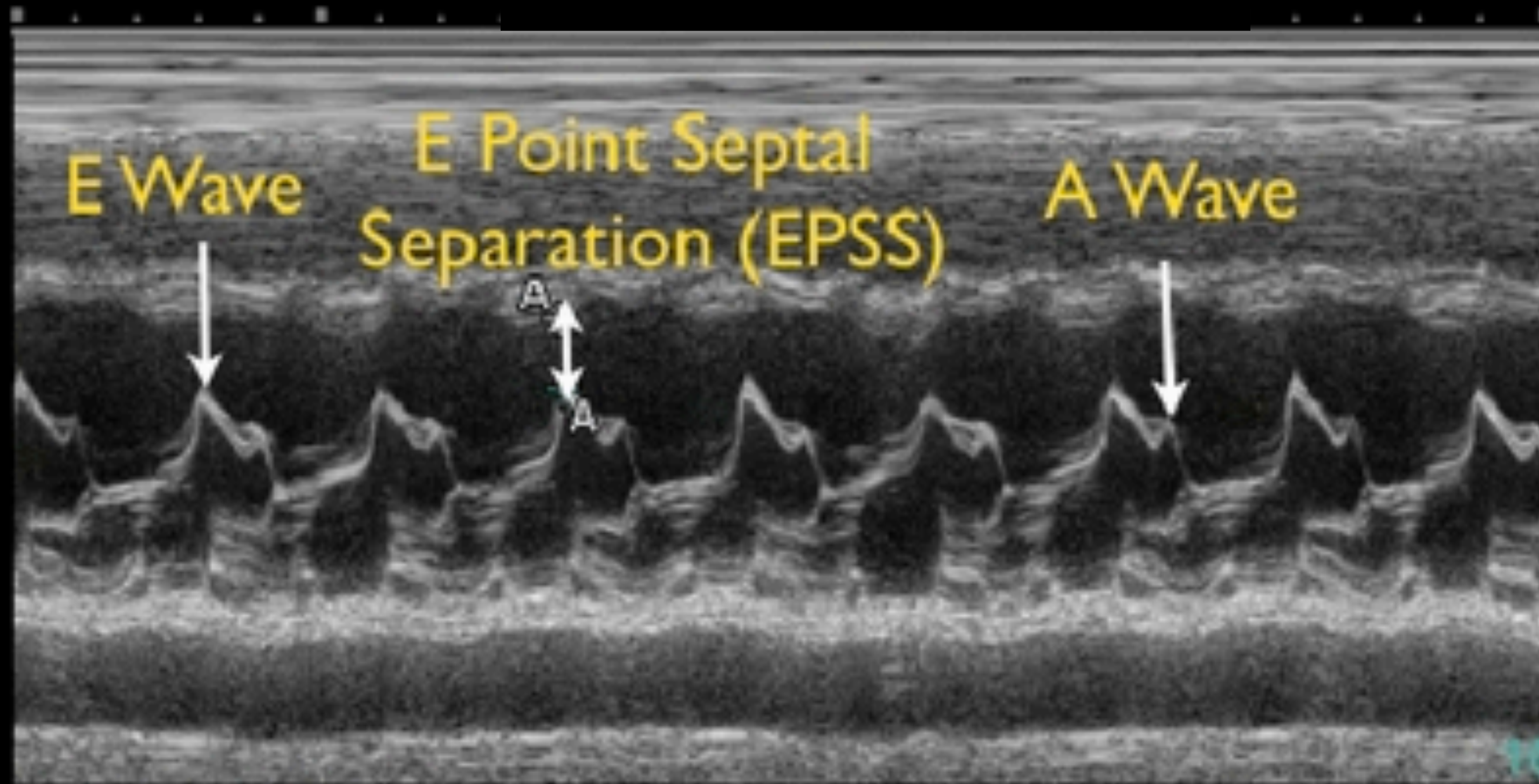
0.3




A

B

RV  
Septum  
LV  
Mitral  
Valve

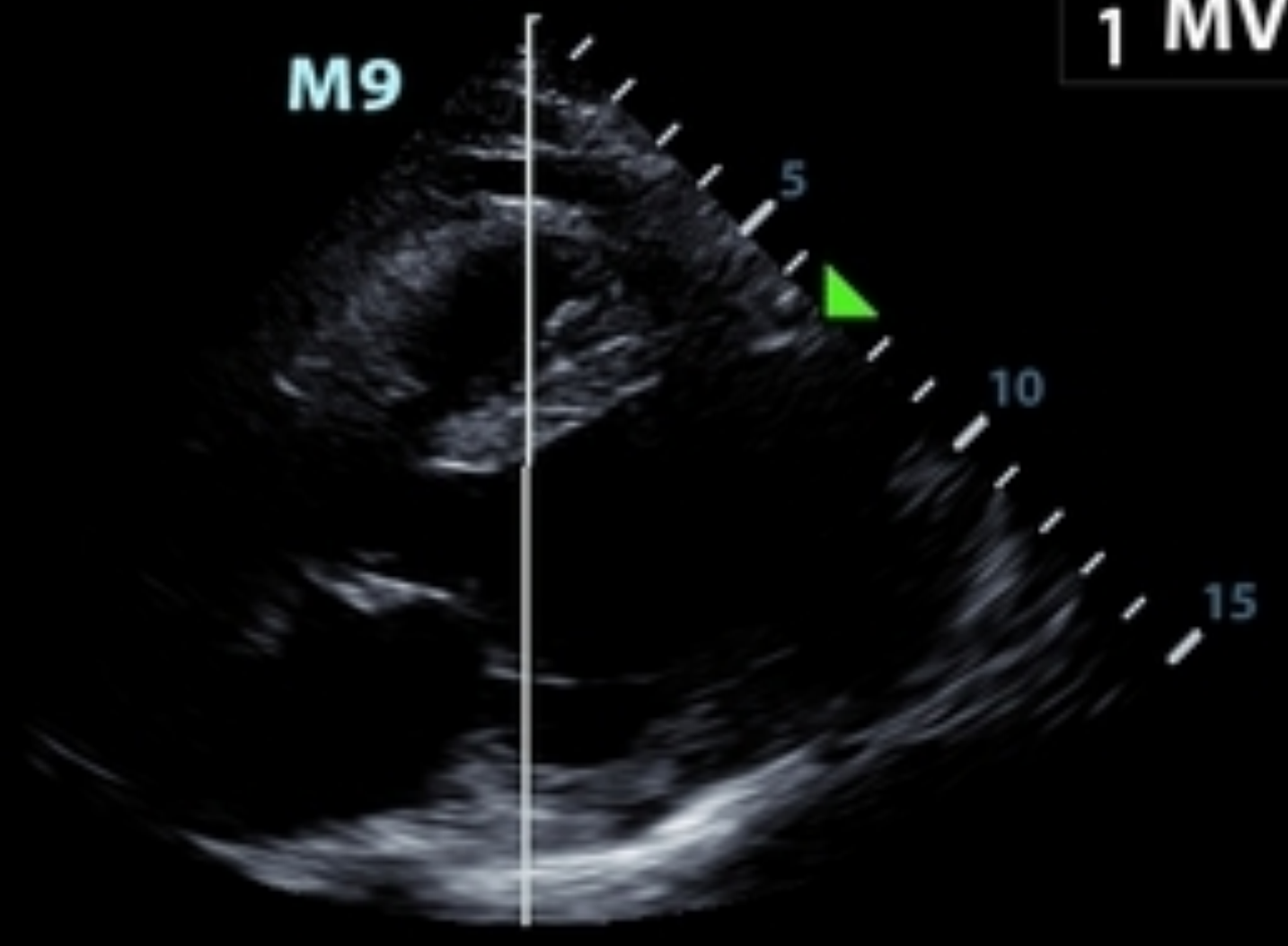


A 1.45cm 0.01s

AP 96.6% MI 1.4 TIS 0.8 

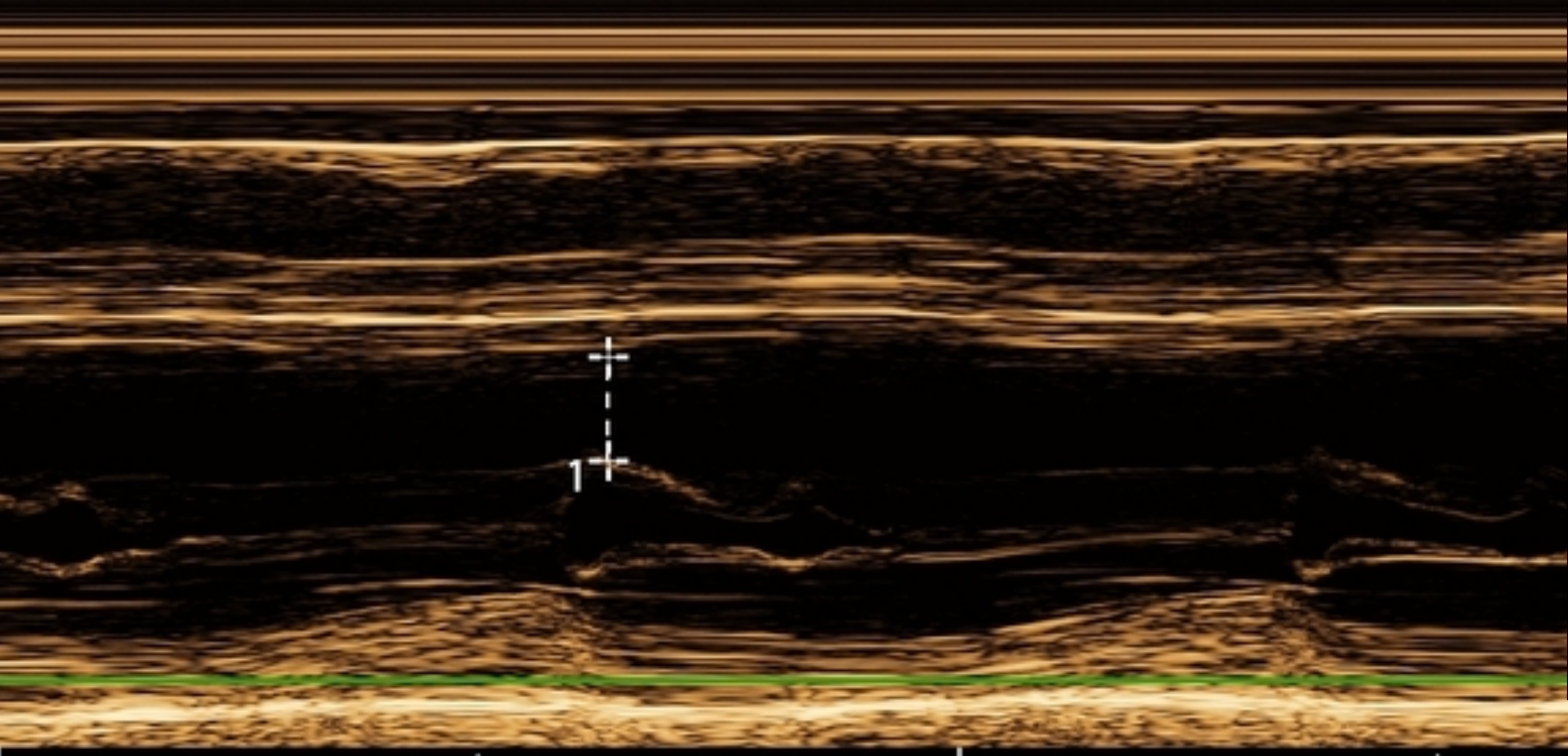
1 MV EPSS 2.06 cm

mindray



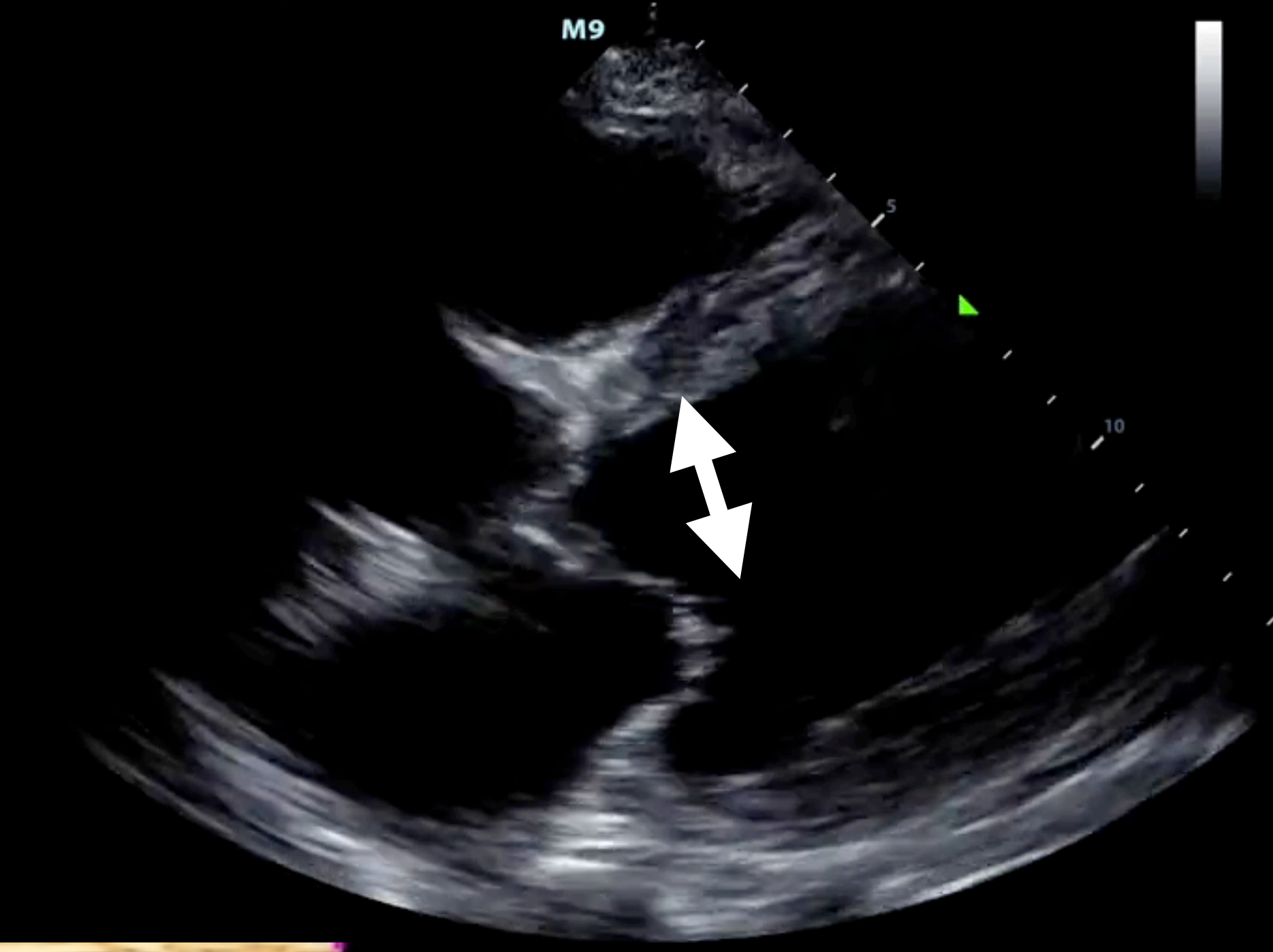
B  
F PH3.4  
D 15.0  
G 53  
FR 23  
DR 120  
iClear 4  
Echo Boost  
M  
F PH3.4

264/279



11.6/12.2

AP 96.6% MI 1.4 TIS 0.9

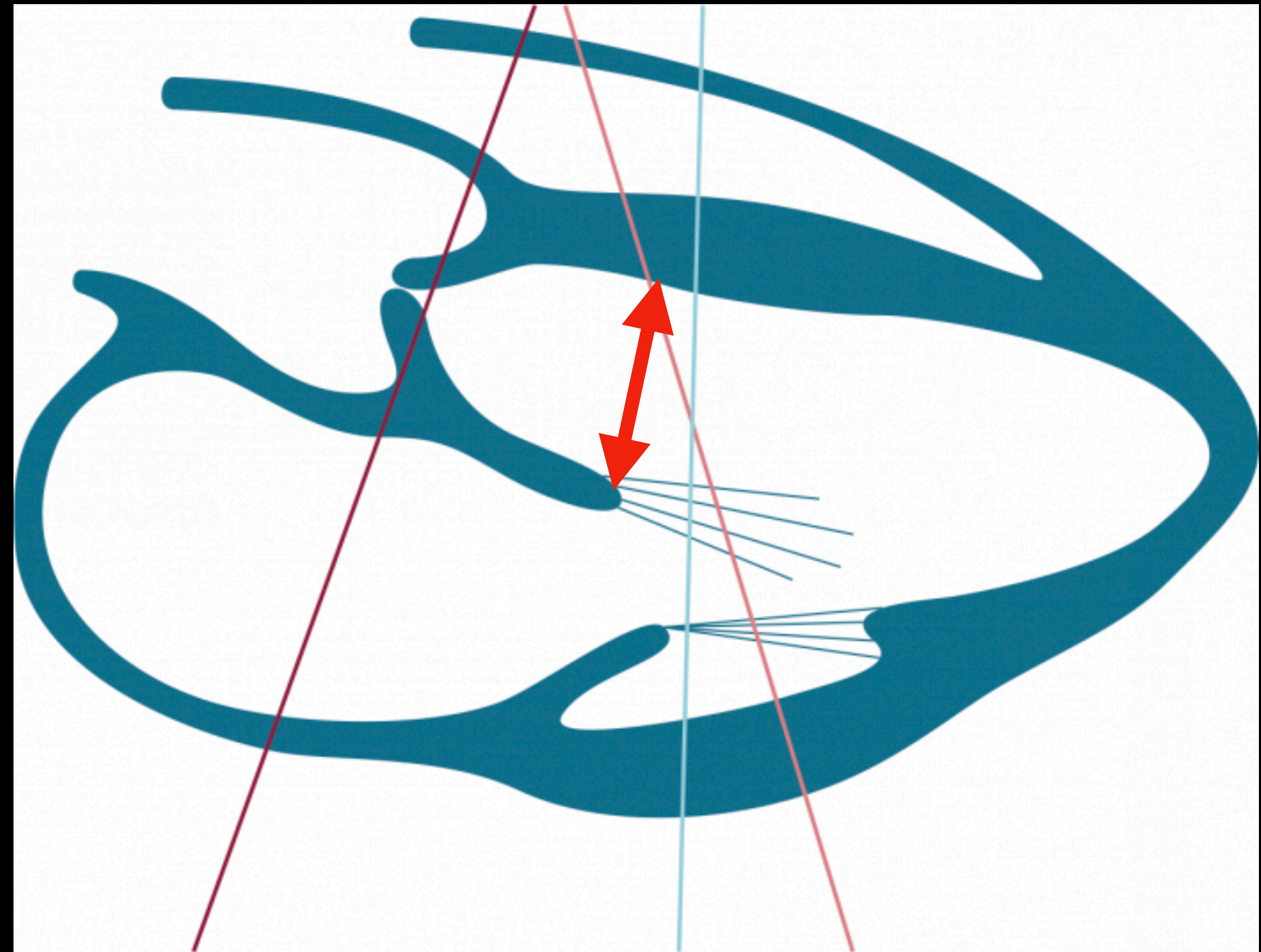


# EPSS

< 8mm = > 55%

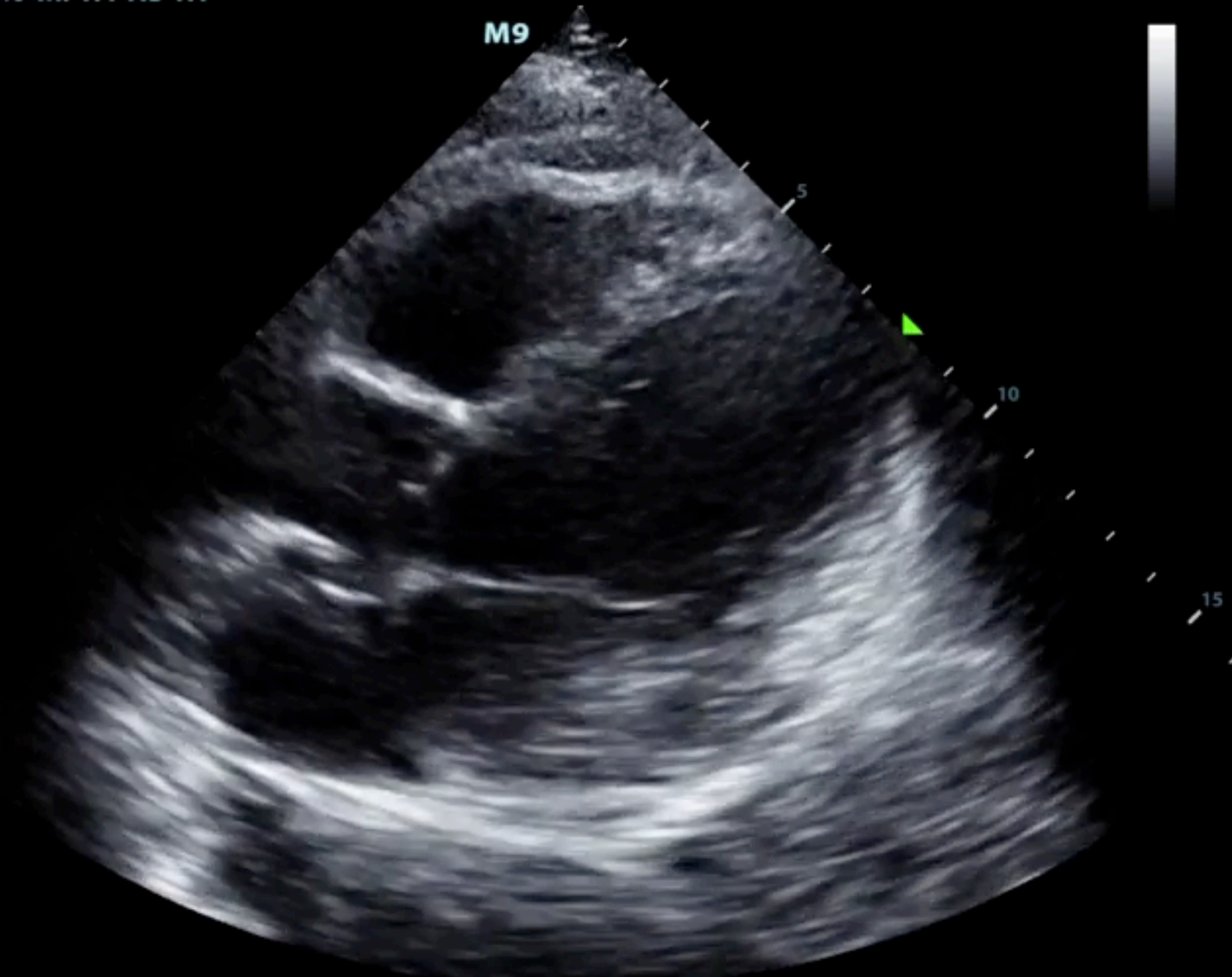
8-18 mm = 30-50%

> 18 mm = < 30 %



$EF = 75.5 - (2.5 \times EPSS \text{ in mm})$  \* caution in AI or MS

M9



B  
F PH3.4  
D 17.0  
G 59  
FR 27  
DR 120  
iClear 4  
Echo Boost

5

10

15

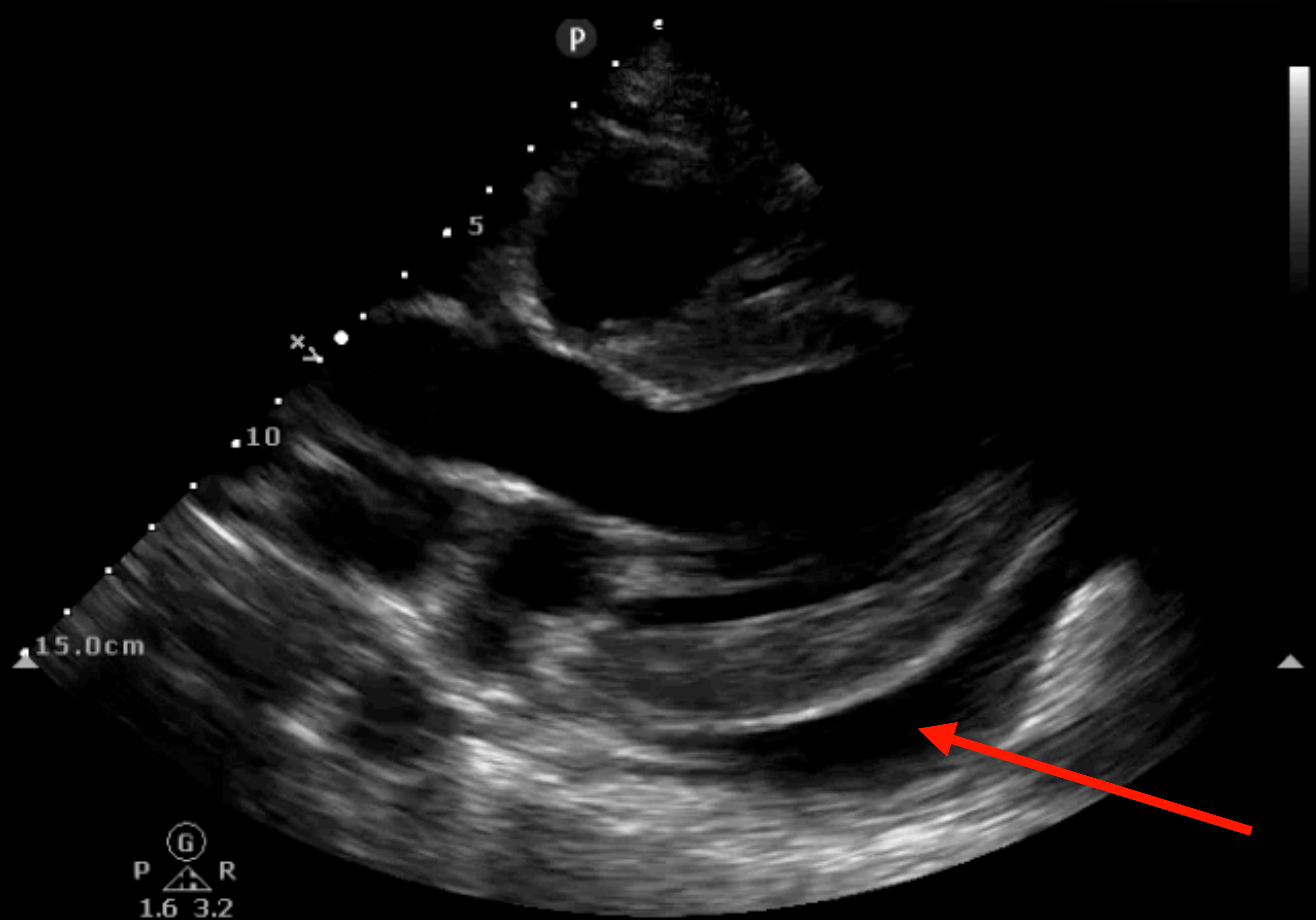
ED ECHO  
S4-2  
28Hz  
19.0cm

2D  
HGen  
Gn 50  
50  
5/2/0



ED ECHO  
S4-2  
32Hz  
15.0cm

2D  
HGen  
Gn 50  
50  
5/2/0



P (G) R  
1.6 3.2

AP 96.6% MI 1.4 TIS 1.1

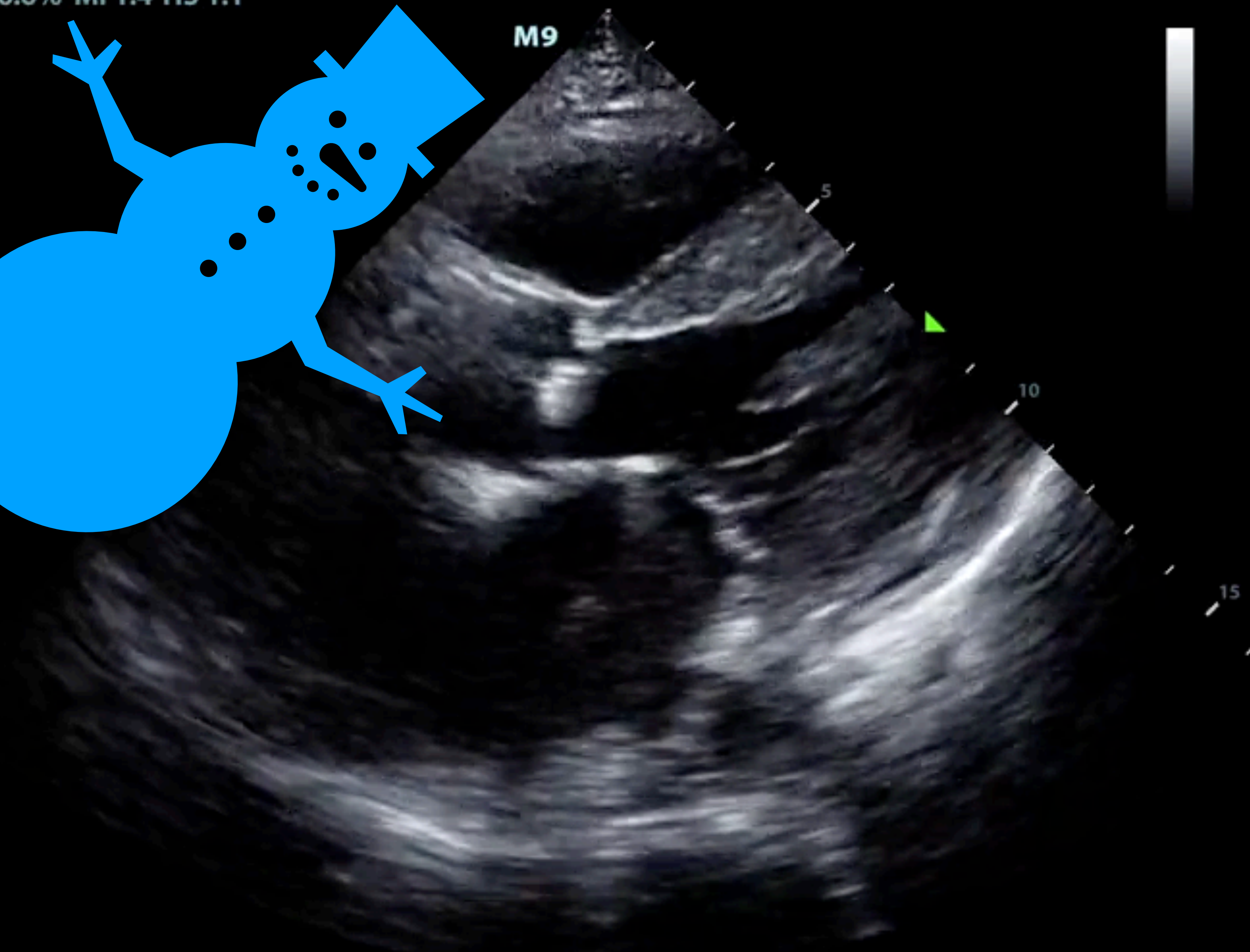
**mindray**



M9



B  
F PH3.4  
D 17.0  
G 53  
FR 27  
DR 120  
iClear 4  
Echo Boost



5

10

15

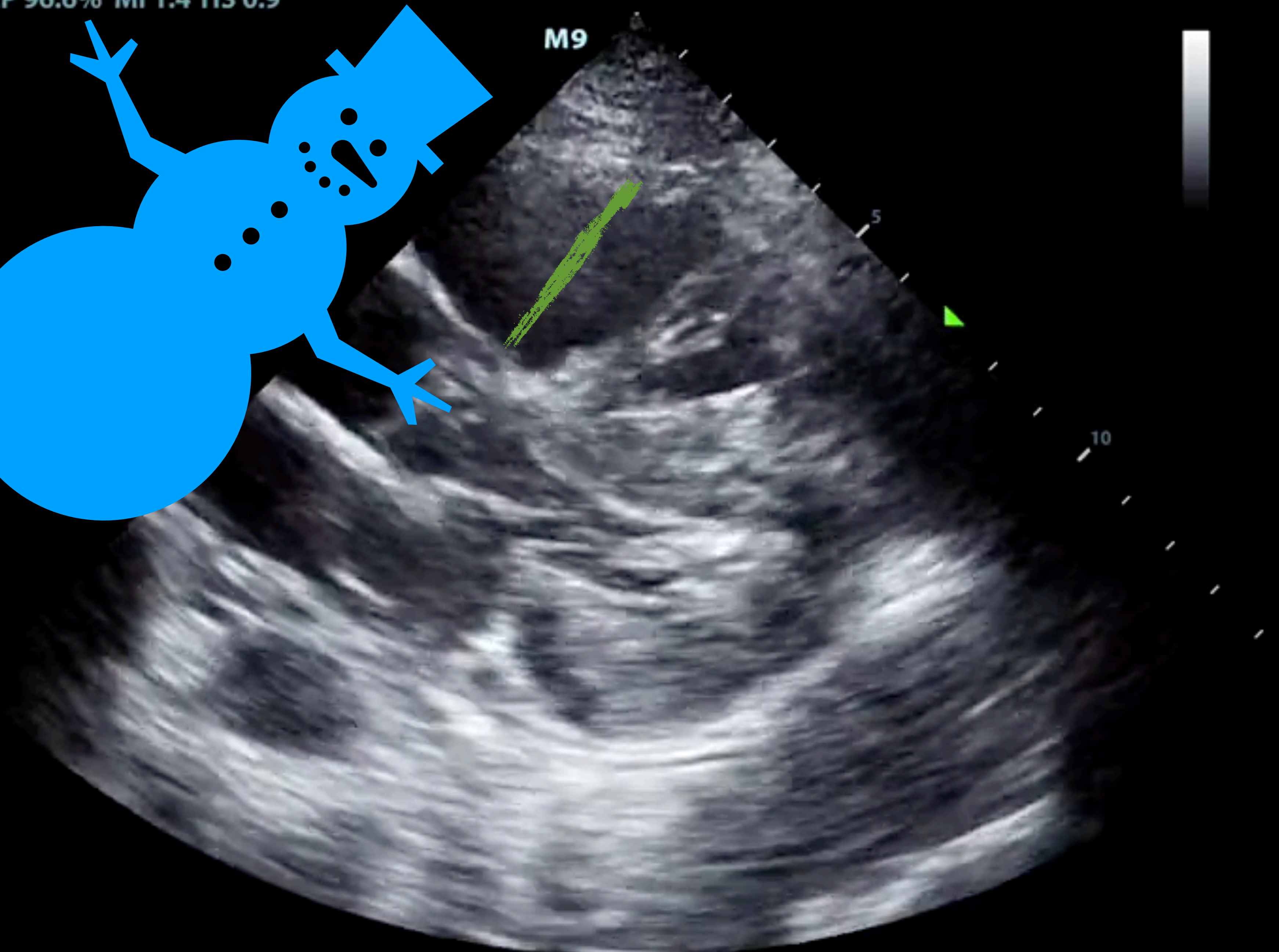
AP 96.6% MI 1.4 TIS 0.9

**mindray**

M9



B  
F PH3.4  
D 15.0  
G 53  
FR 30  
DR 120  
iClear 4  
Echo Boost



Stroke volume

Normal systolic function

Poor systolic function

$$b' > a'$$

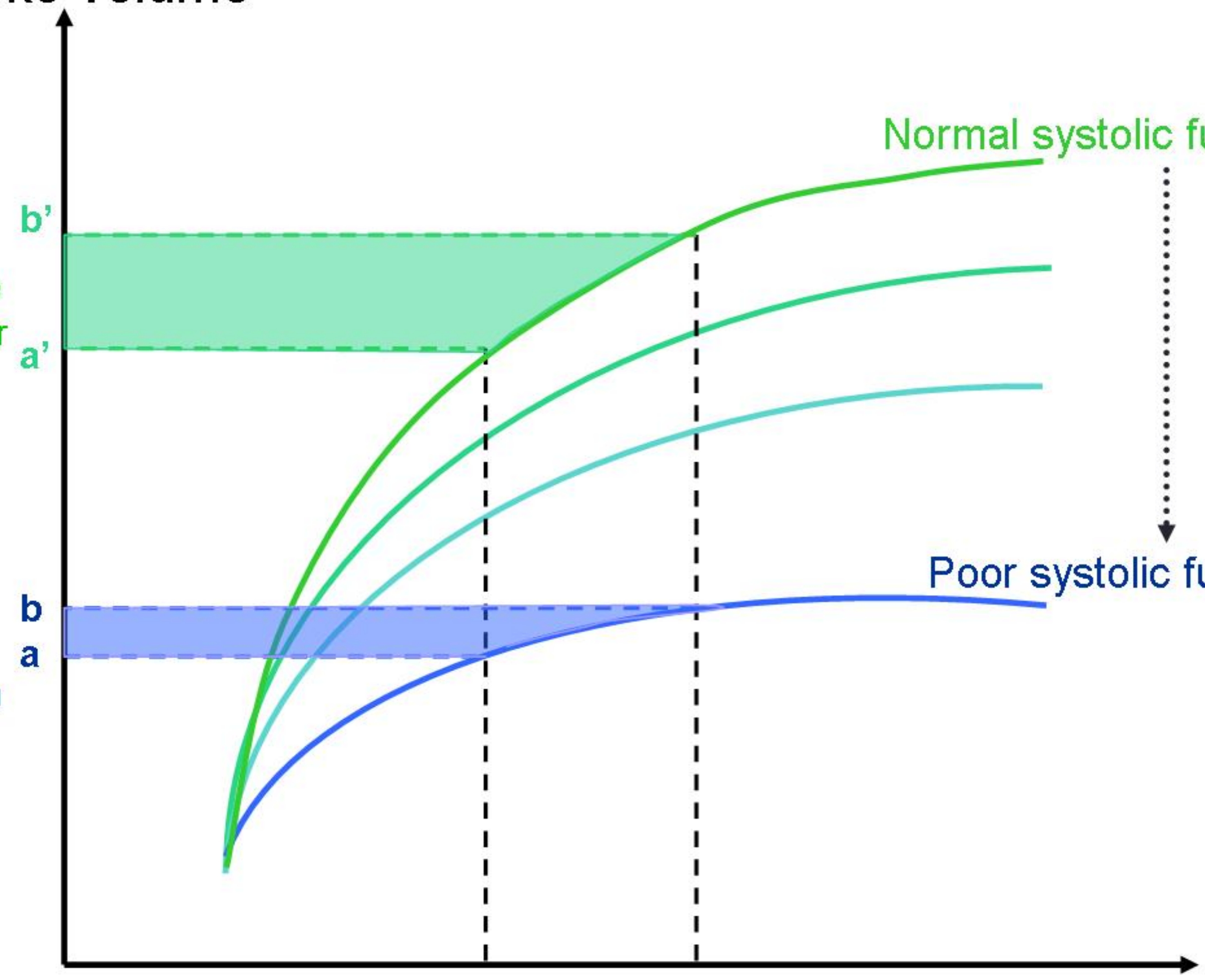
Stroke volume increases after volume expansion

$$b = a$$

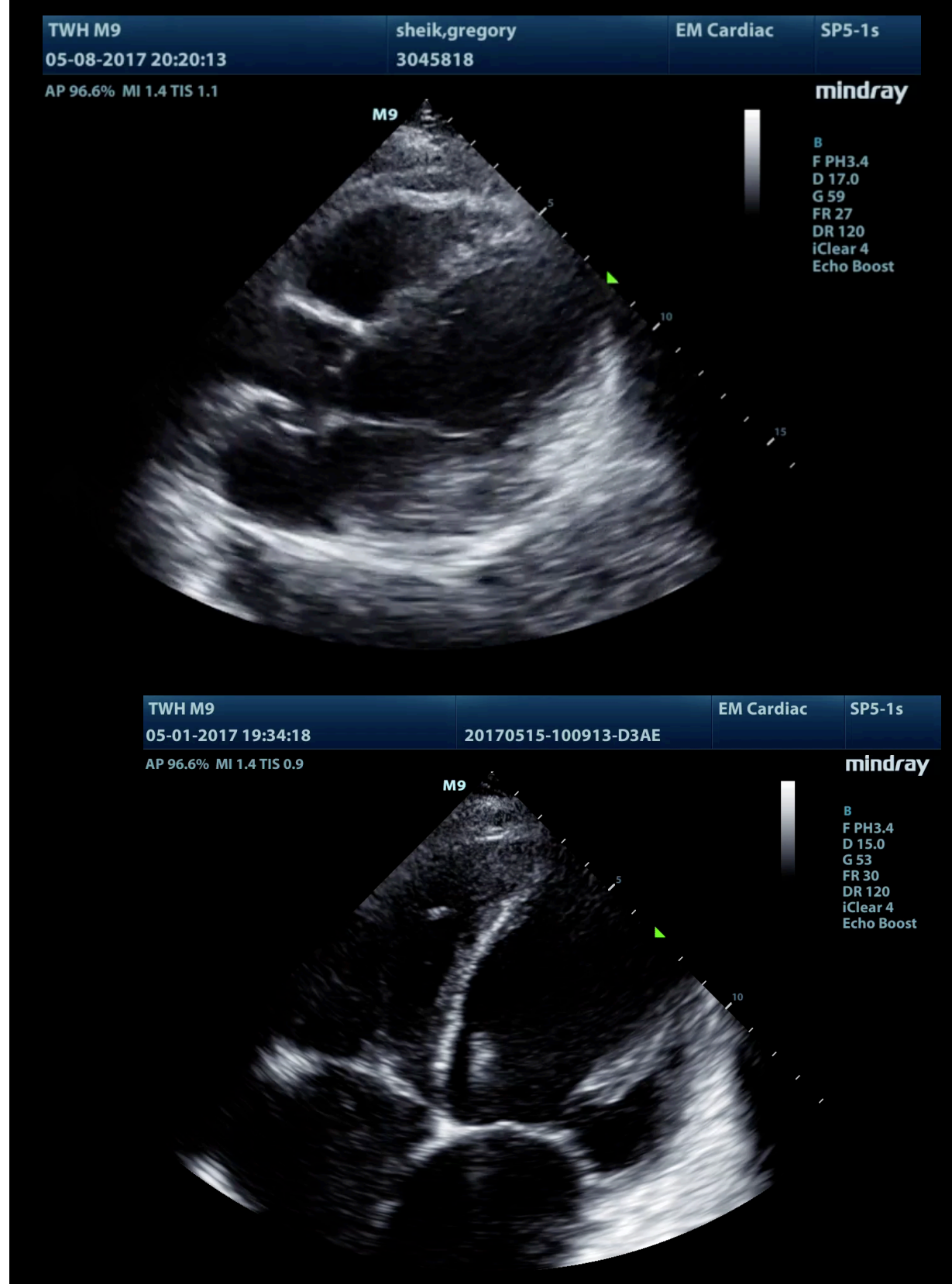
No increase in stroke volume after volume challenge

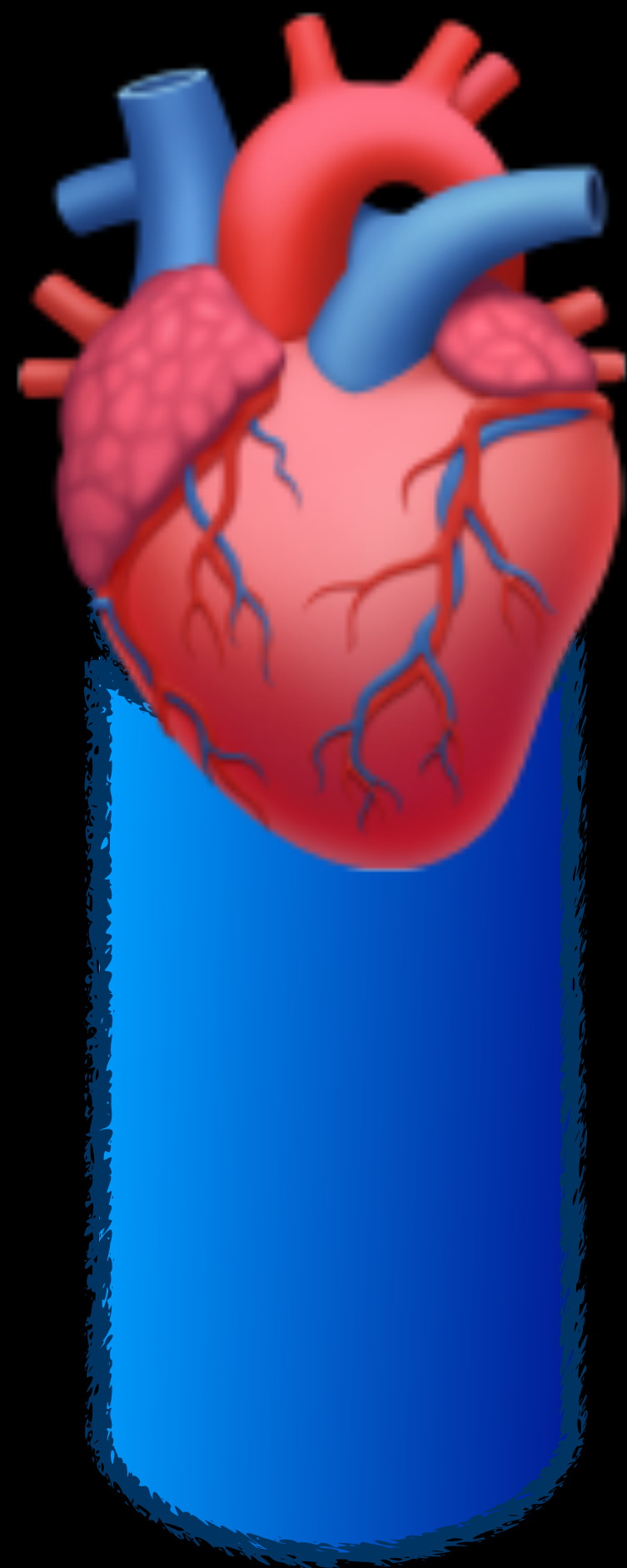
Volume challenge: A → B

Pre-load

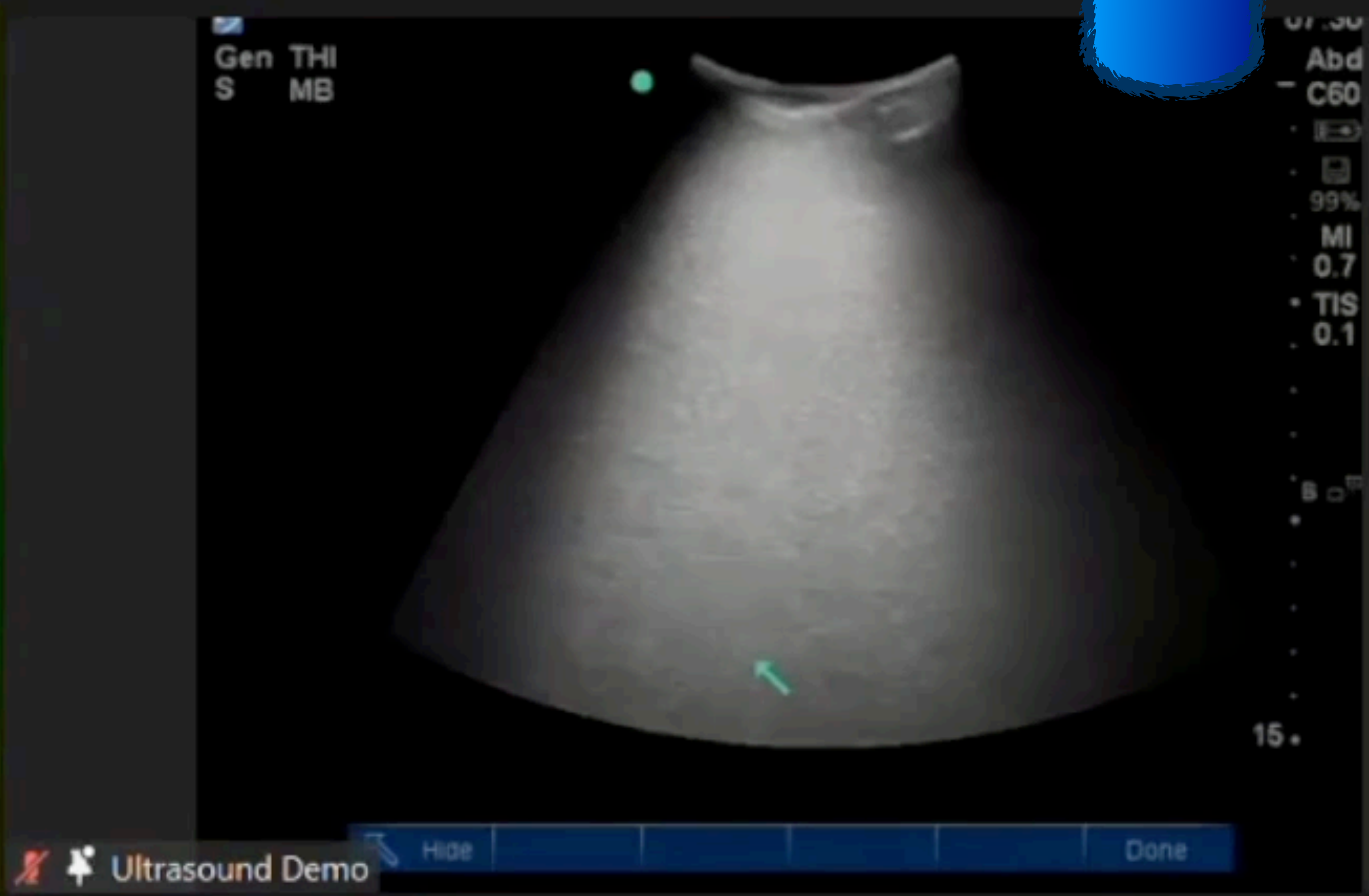


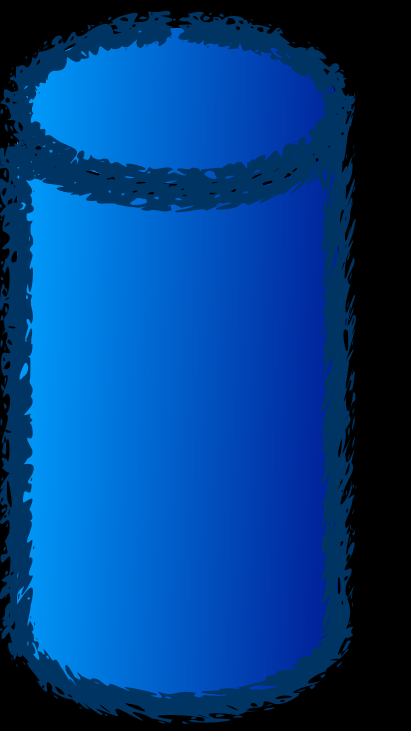
65 Hz

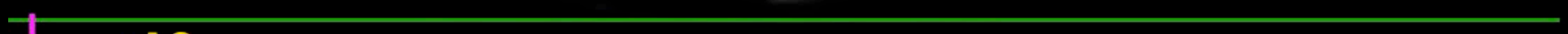
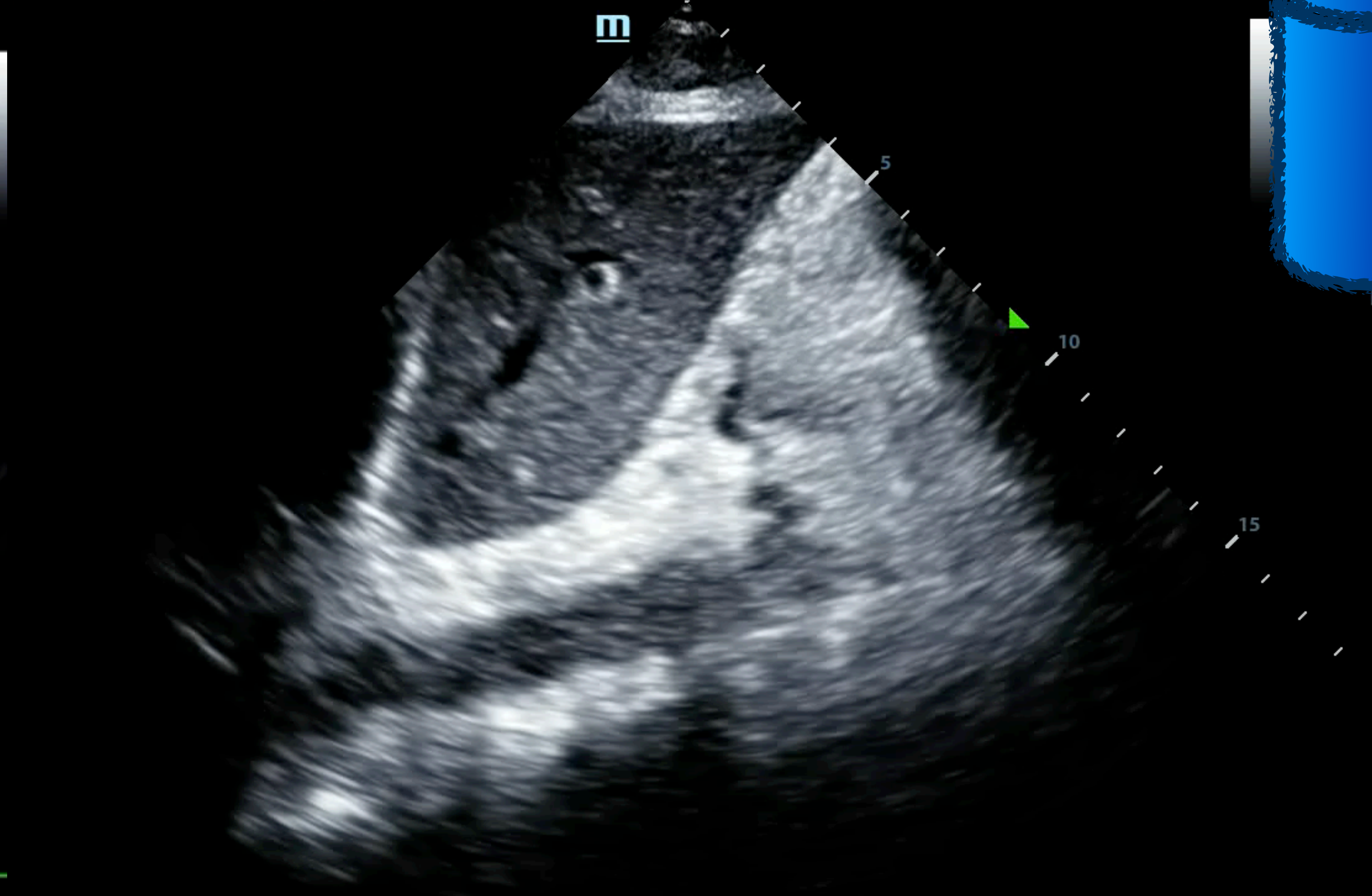




***ALWAYS CHECK  
THE IVC***





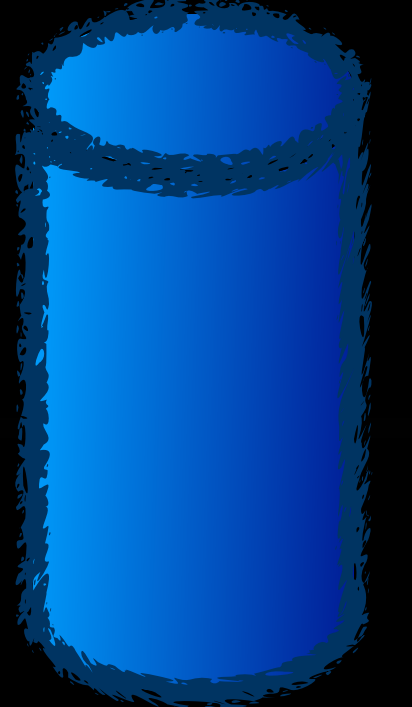
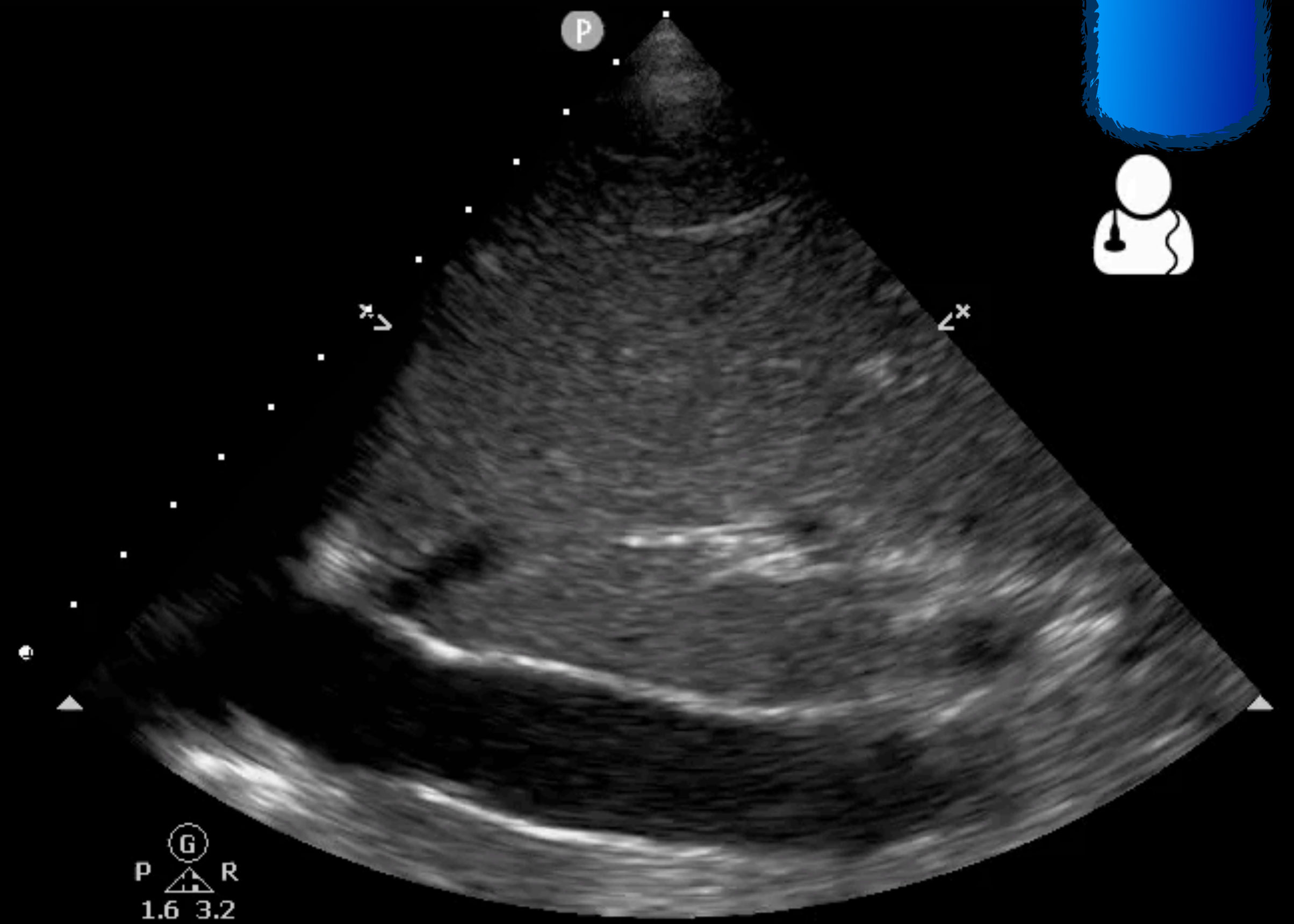


AO

AP 96.6% MI 1.3 TIS 0.3

mindray

M9



G  
P R  
1.6 3.2

## Remarks

ON

EARLY SIGNS OF CARDIAC FAILURE  
OF THE CONGESTIVE TYPE.\*

BY

SIR THOMAS LEWIS, M.D., F.R.C.P., F.R.S.,

PHYSICIAN TO UNIVERSITY COLLEGE HOSPITAL.

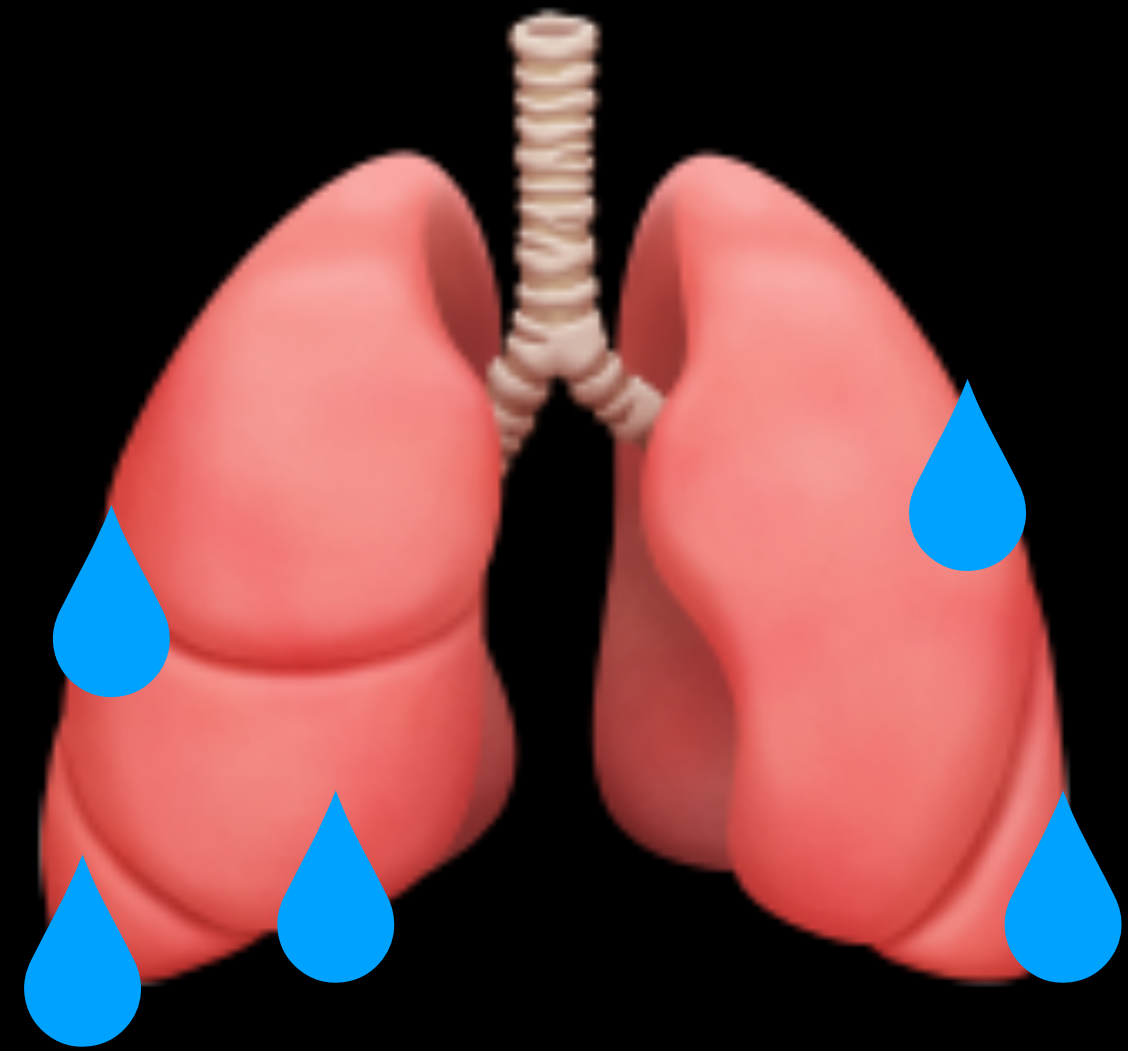
To the student of cardio-vascular disease the ability to form a broad estimate of the way in which the general circulation is carried on under various circumstances is of paramount importance. When a patient seeks advice, and disease of the heart is suspected or is present, one question should stand prominently in the foreground, namely, What is the capacity of the heart for work? The answer to this question dominates both prognosis and treatment to an extent that forces other considerations well into the background in most cases of chronic heart disease.

Innumerable tests have been, and continue to be, devised to answer this question; they are based mainly upon pulse and blood pressure readings taken in various circumstances of posture, exercise, etc. One danger of these tests is that, as they are frequently presented by means of formulæ, they are apt to create an impression of scientific accuracy that they are far from possessing. Experience of such tests has convinced me that they have little practical value, and, tending as they often do to become rules of thumb, they likewise become most undesirable. Recently, numerous attempts have been made to estimate cardiac output in terms of fluid volume:

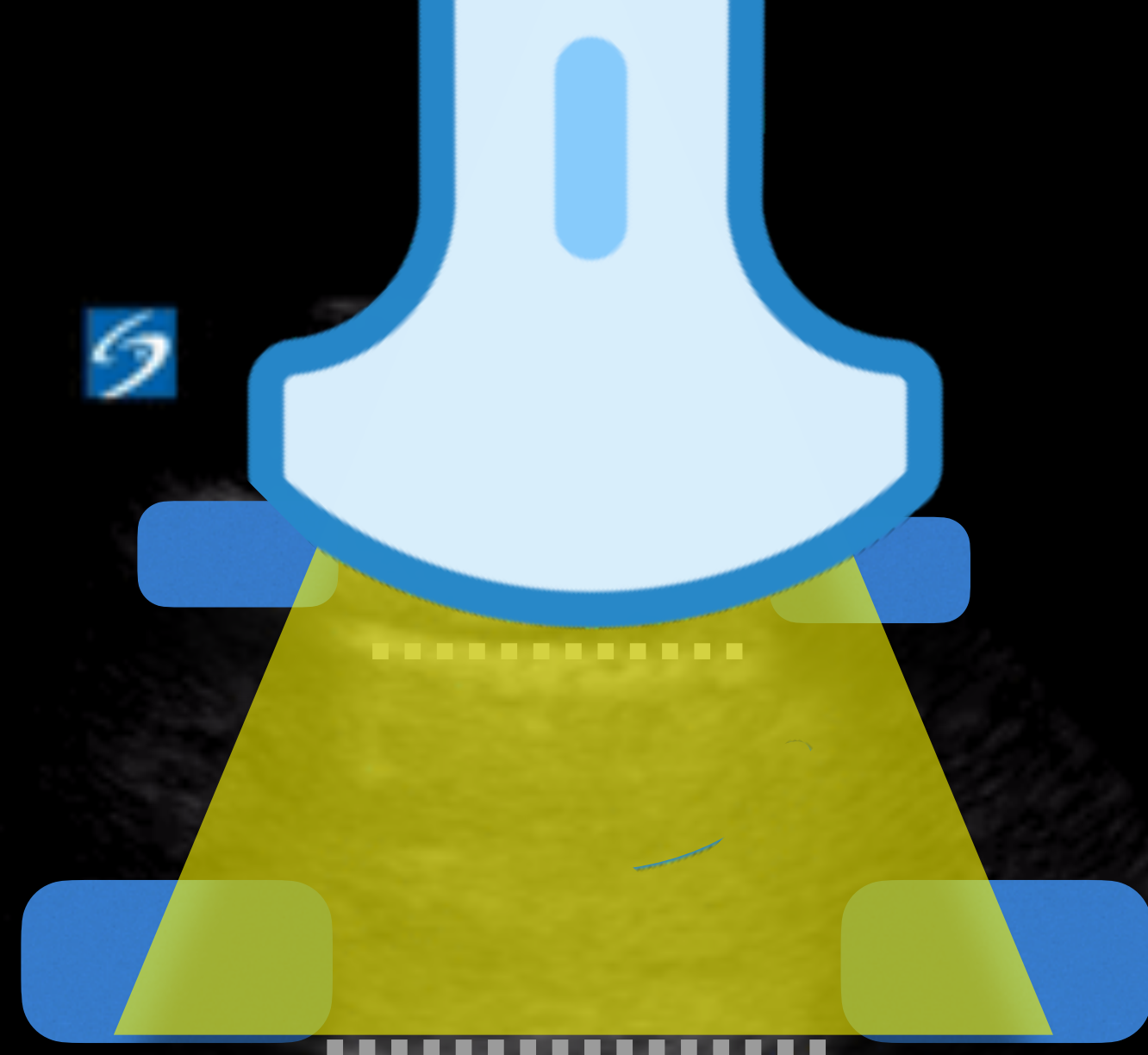
or it may occur in definite stages, the first being the most commoner. In grading the first instance, not by the amount of breathlessness into breathlessness but by the amount of walking quickly or up walking slowly short present when at rest; last two stages that congestion appear, and ness at rest becomes m Thus the complete course is displayed by the graded in its degree from exertion to constant d pletely. These grades various deficiencies in the brain; at first the exercises in which normal above resting value; a physiological quantity of the body is at rest. It on the venous side and of congested veins, and, enlargement of the liver, urine, ascites, dropsy of congested and oedematance, however, are the because they are usually detected; for that reason make a full study of the

Direct measurement used in my wards in past a good idea, within its

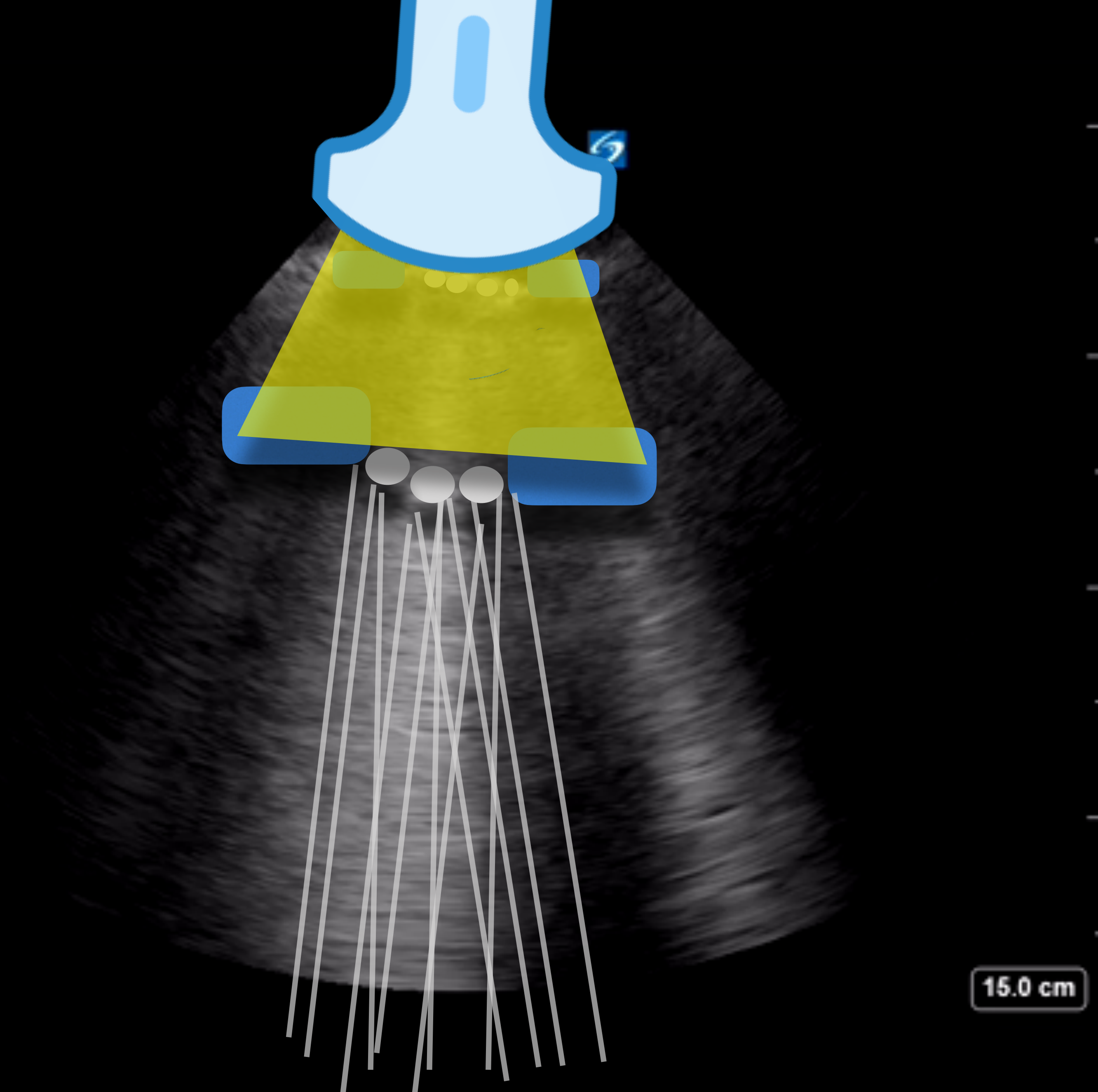




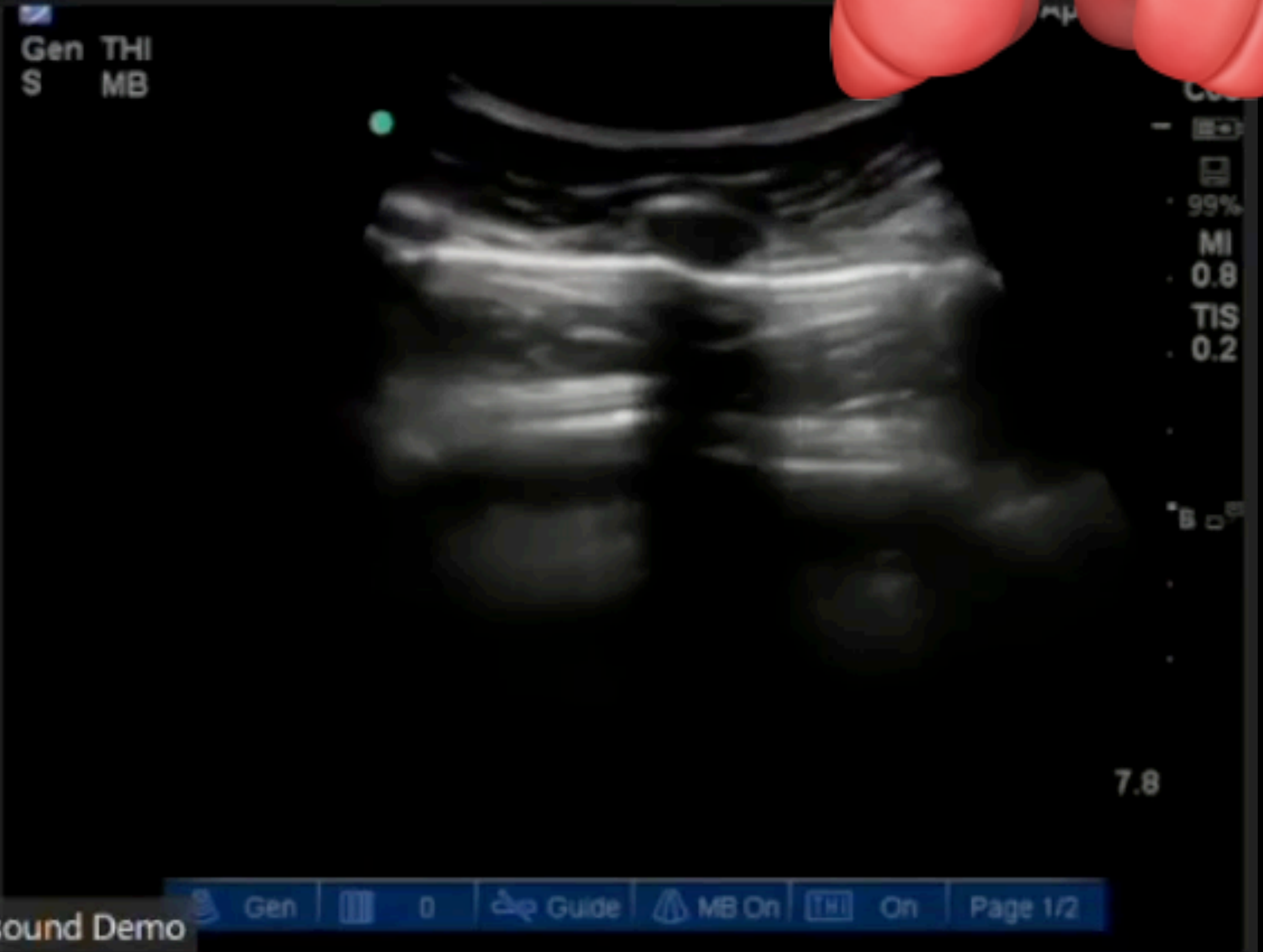
**Check the Lungs**



11.0 cm

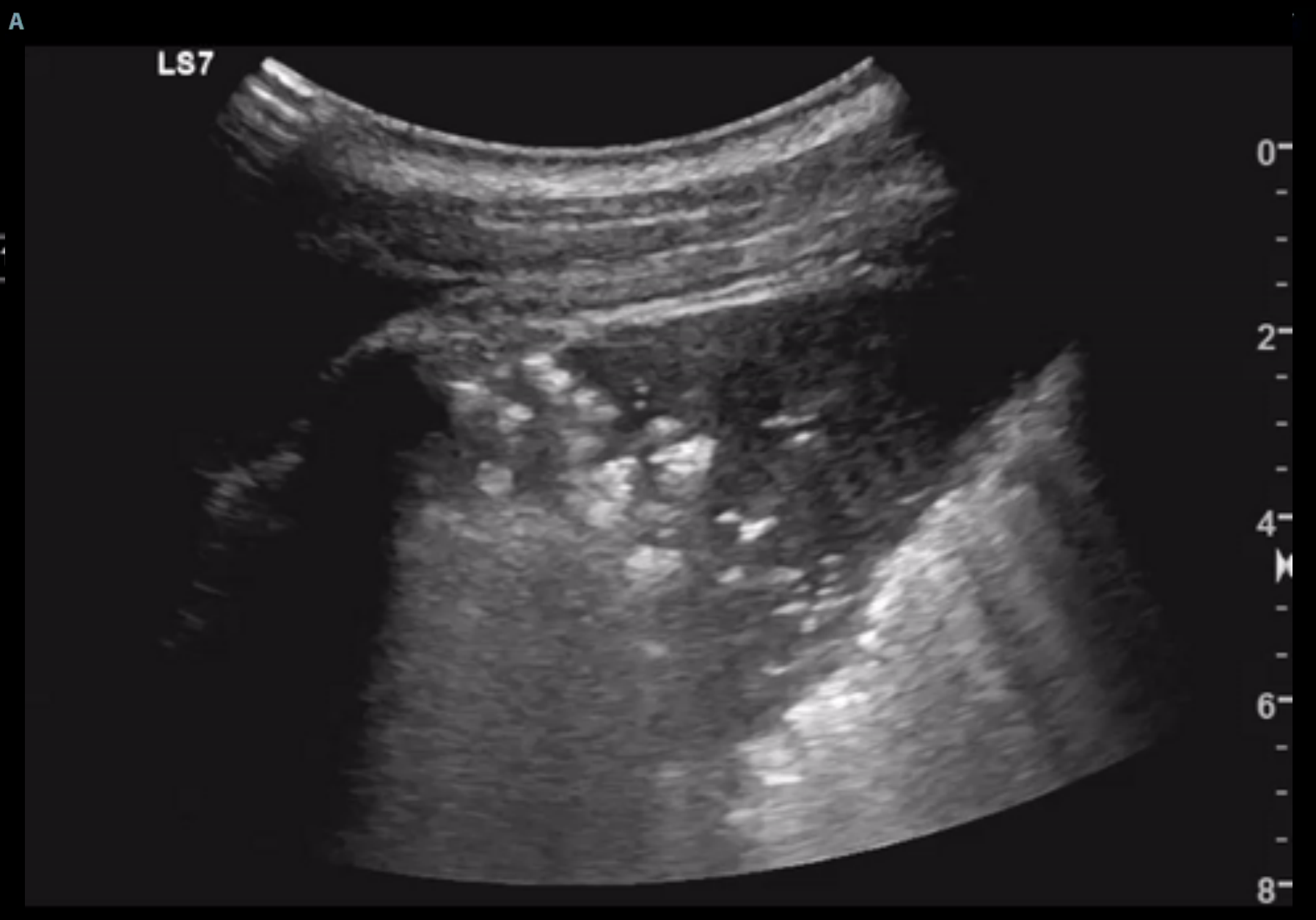
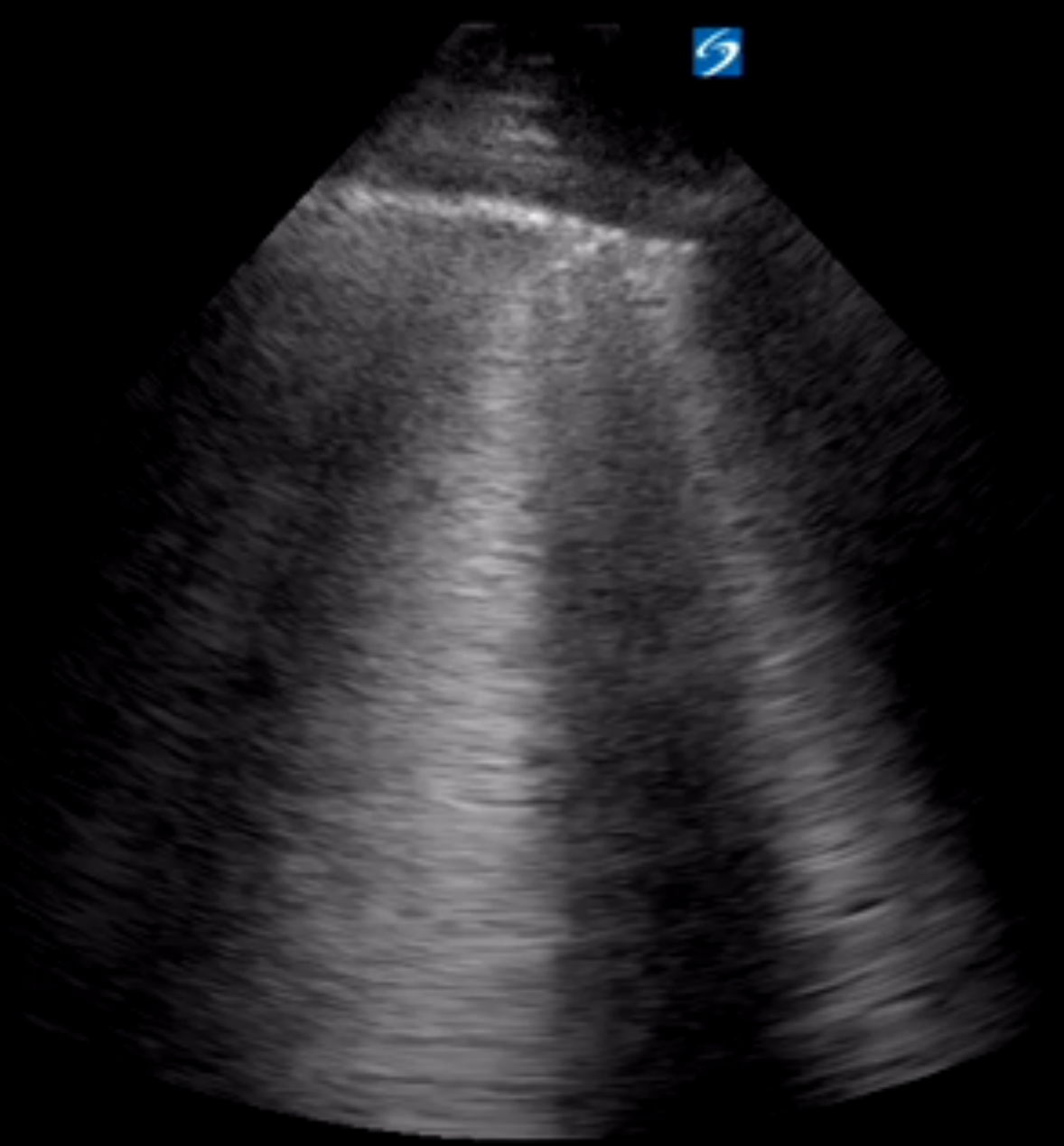
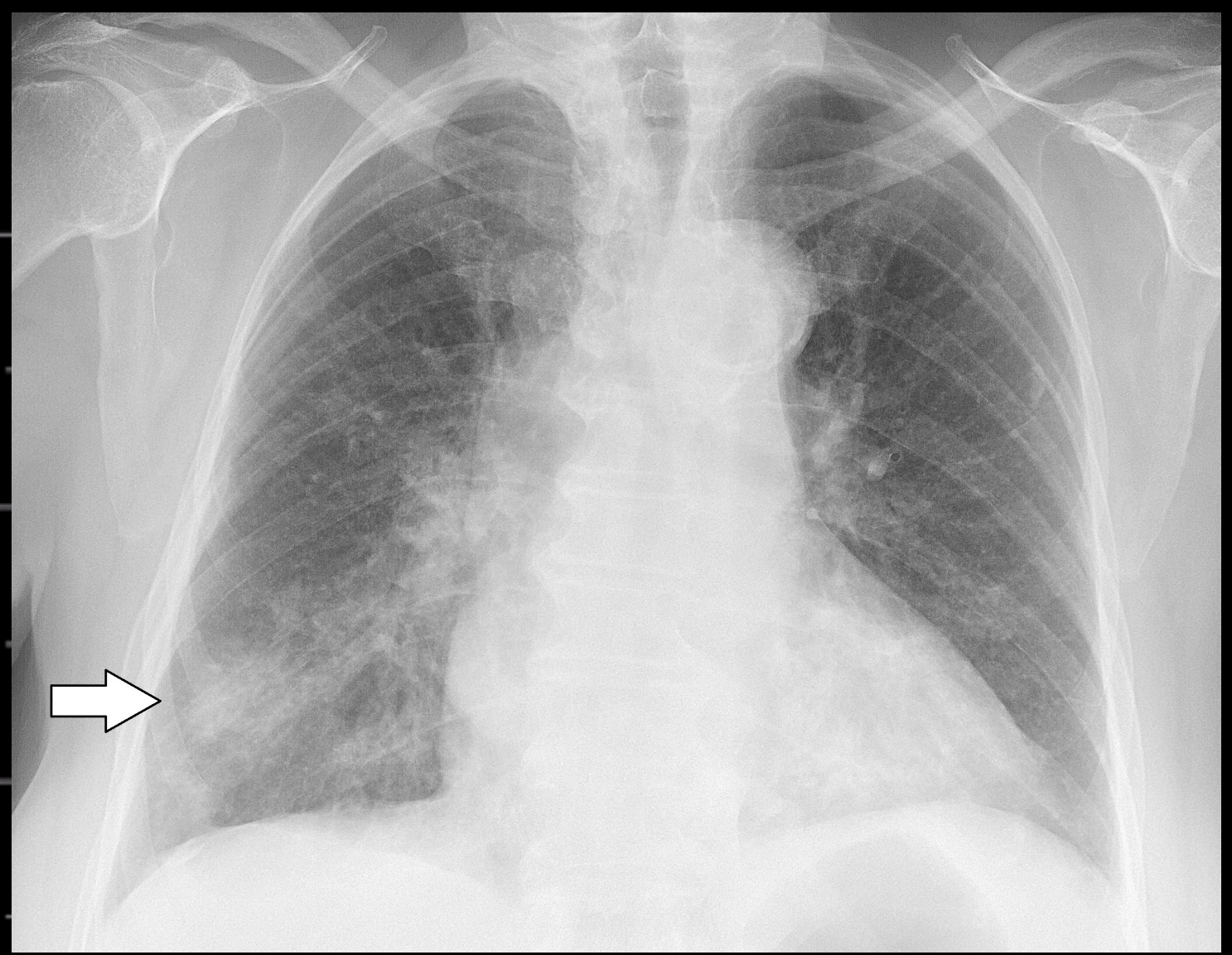


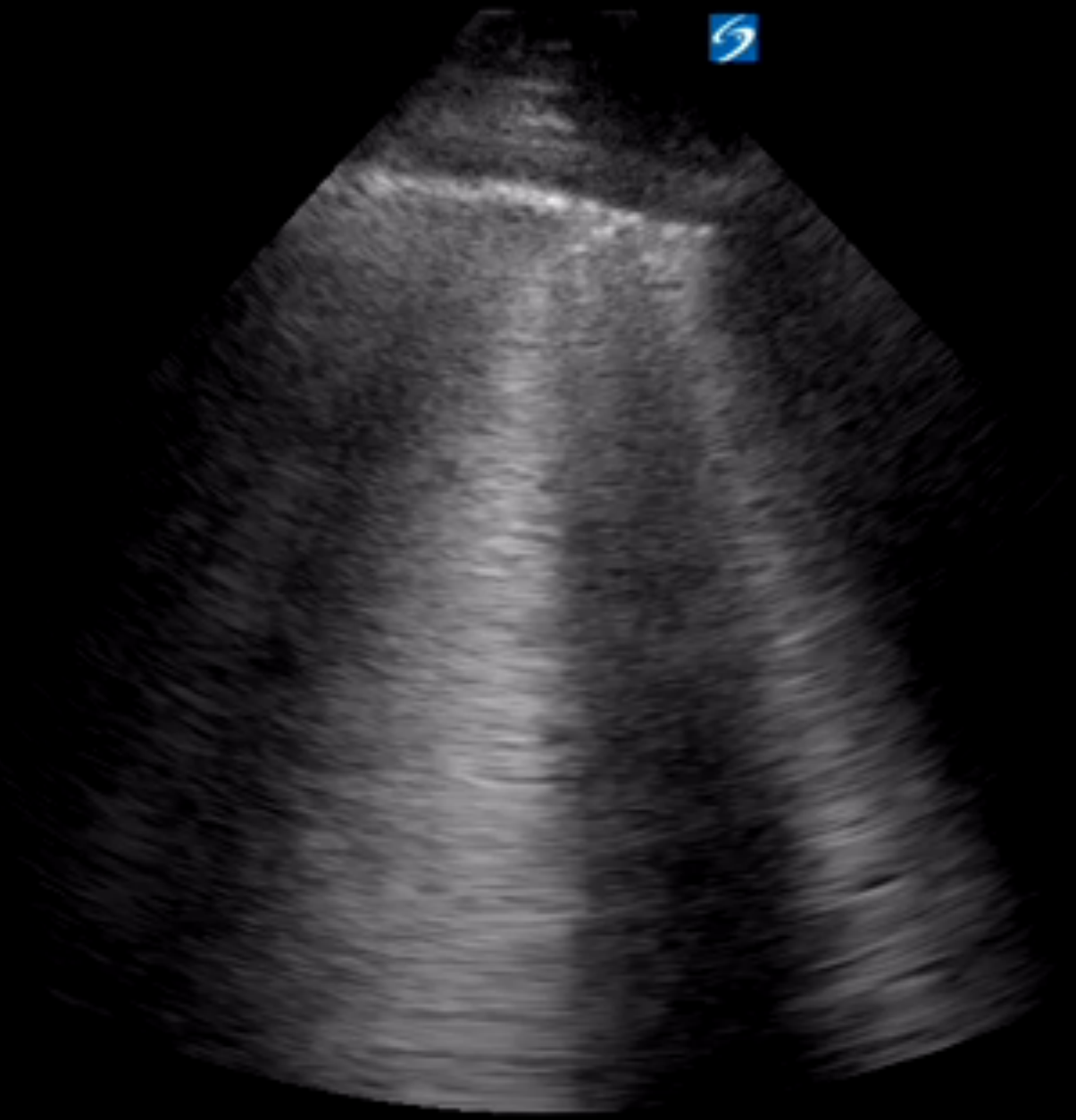
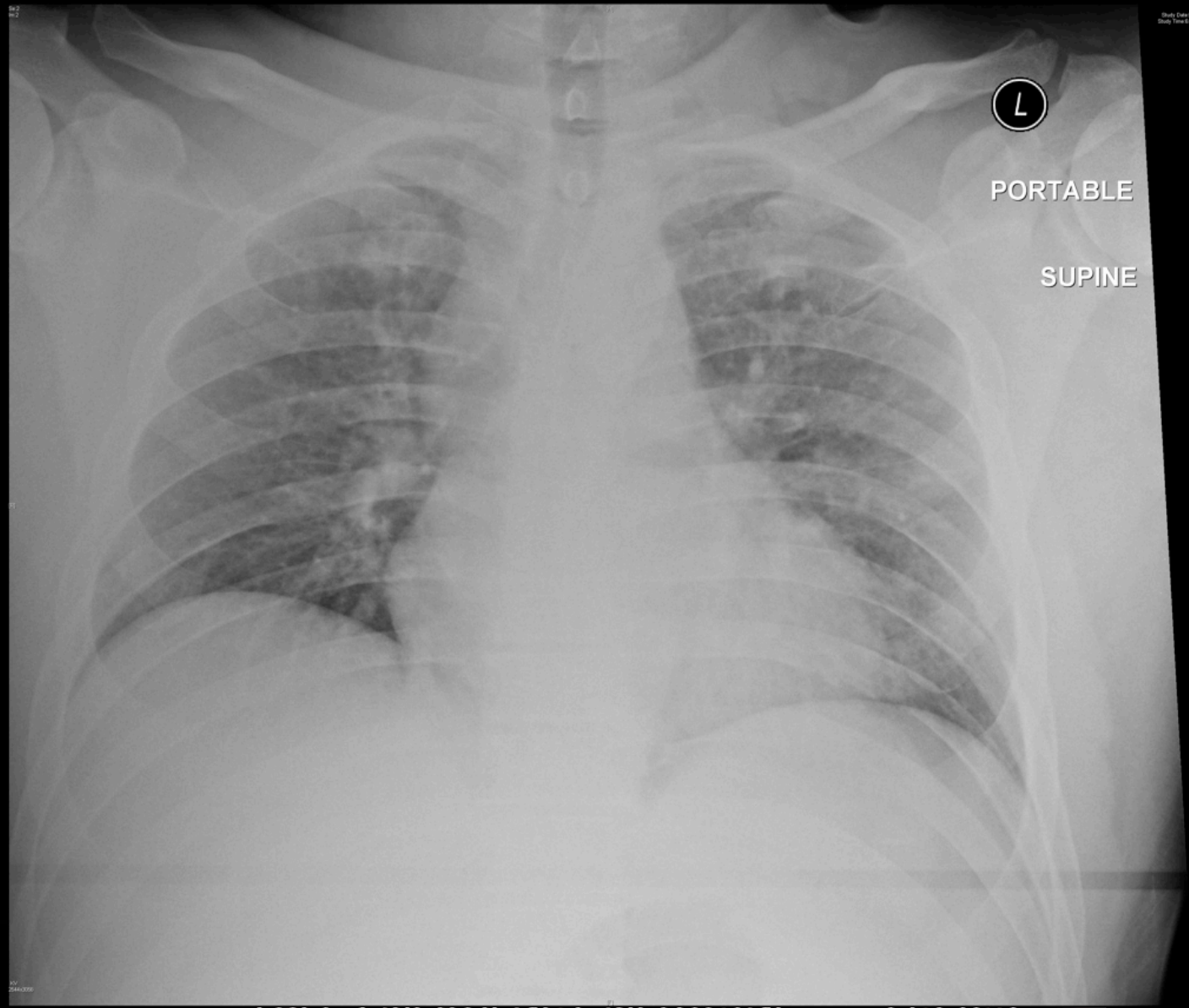
15.0 cm



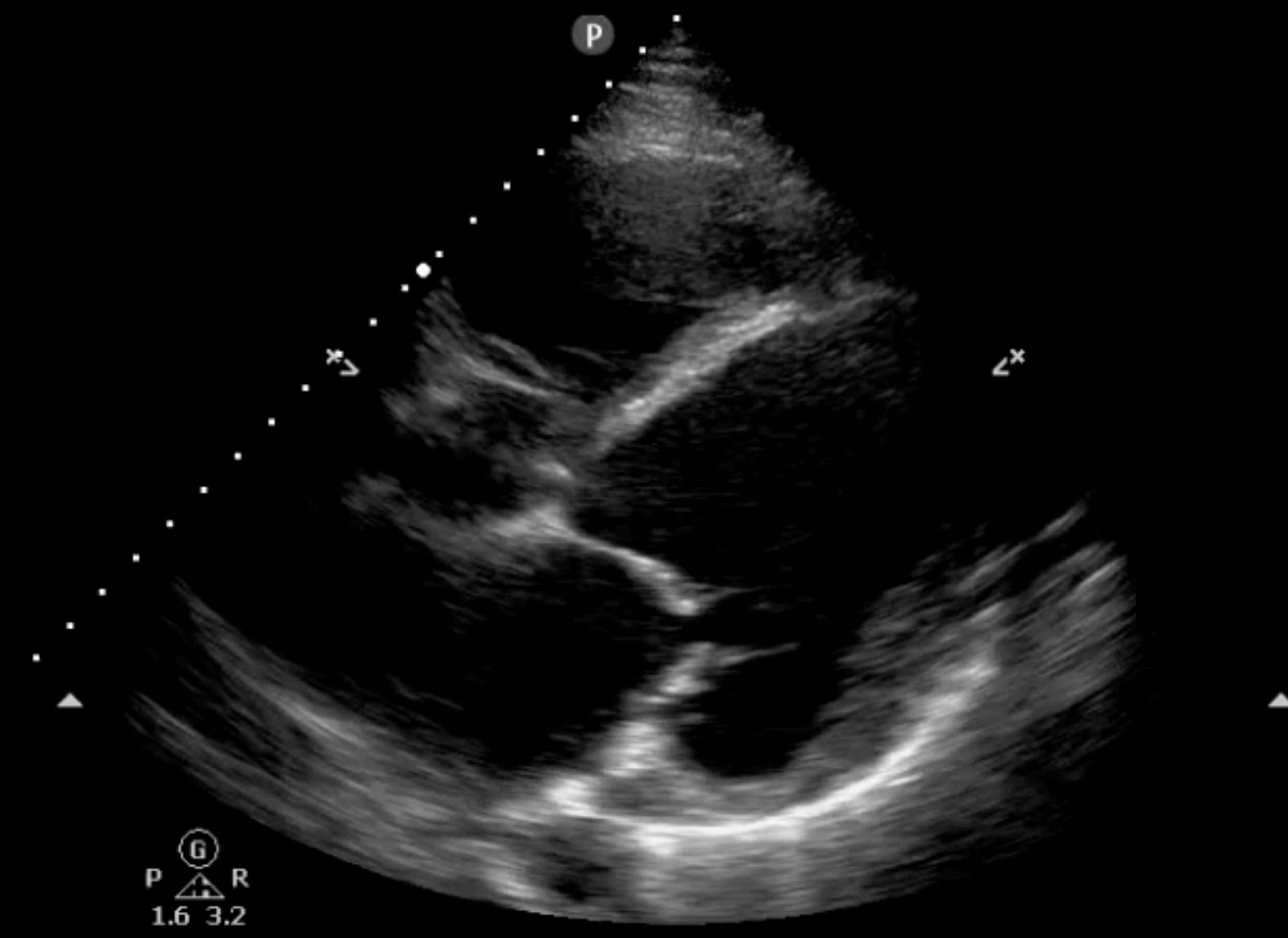


Ultrasound Demo Hide Done



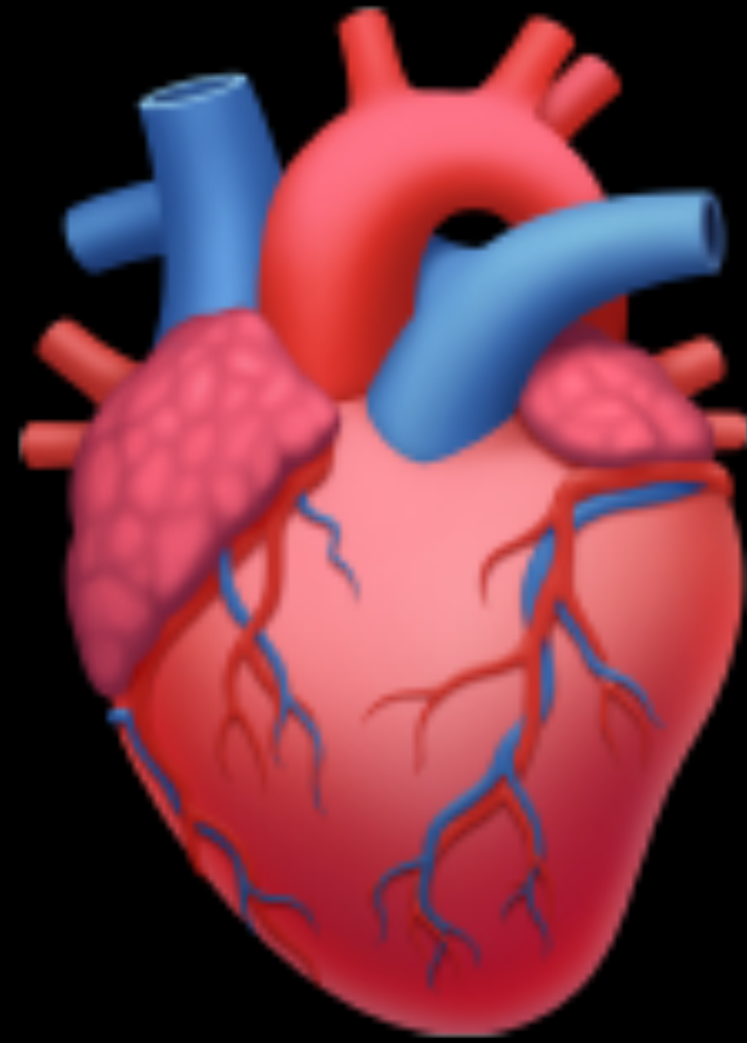


15.0 cm



15.0 cm

ⓐ  
P △ R  
1.6 3.2



AP 96.6% MI 1.4 TIS 1.1

**mindr** AP 96.6% MI 1.3 TIS 1.2 

**mindray**

M9

B  
F PH3.4  
D 17.0  
G 53  
FR 27  
DR 120  
iClear 4  
Echo Boo

M9

B  
F PH3.4  
D 19.0  
G 50  
FR 23  
DR 120  
iClear 4  
Z 1.10  
Echo Boost

15.0 cm

**Thank You!!**



