



Weill Cornell Medicine

Hospital Medicine Point of Care Ultrasound
(HM POCUS) Program

Cardiac Image Optimization

Apical 4-Chamber View (A4)

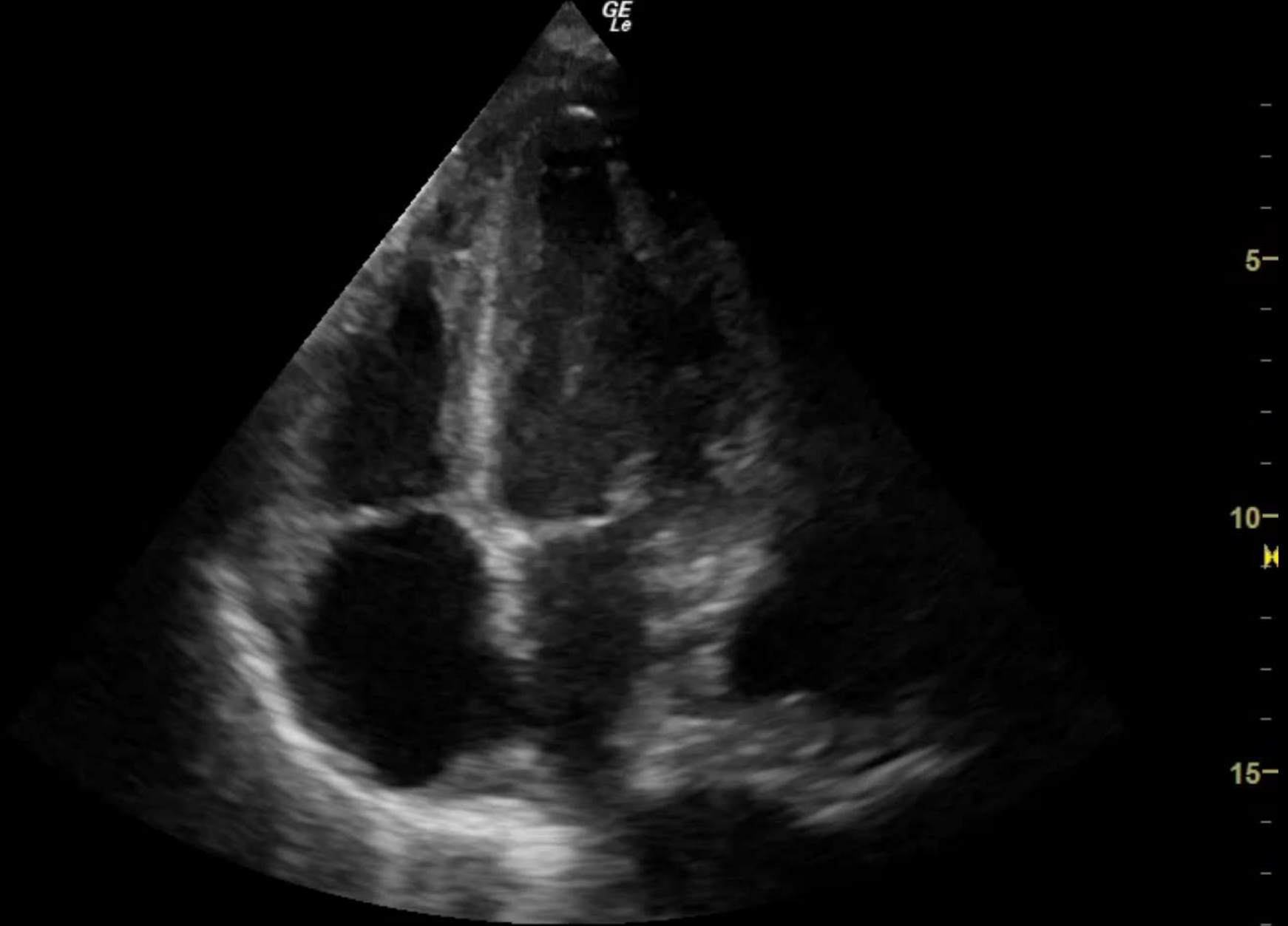


Image Optimization

- Equipment settings

Image Optimization

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 - Gain adjustment so that blood within the heart appears anechoic *everywhere*. Do not over-gain!

Image Optimization

- **Equipment settings**
 - **Gain** adjustment so that blood within the heart appears anechoic *everywhere*.
Do not over-gain!
 - **Endocardial definition**

Image Optimization

- **Equipment settings**

- **Gain** adjustment so that blood within the heart appears anechoic *everywhere*. Do not over-gain!
- **Endocardial definition**

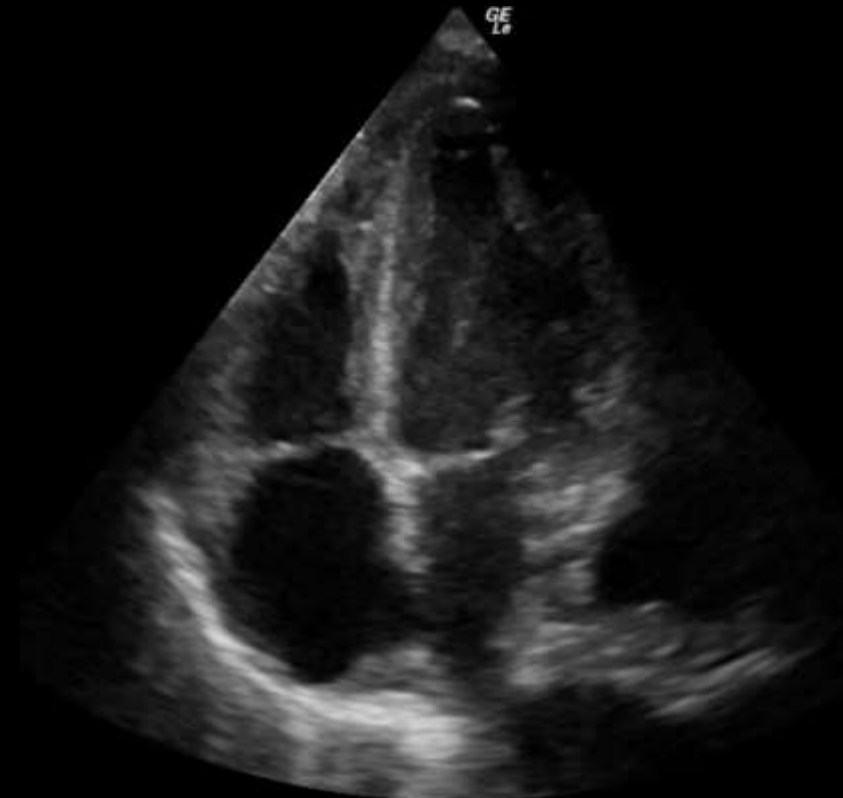
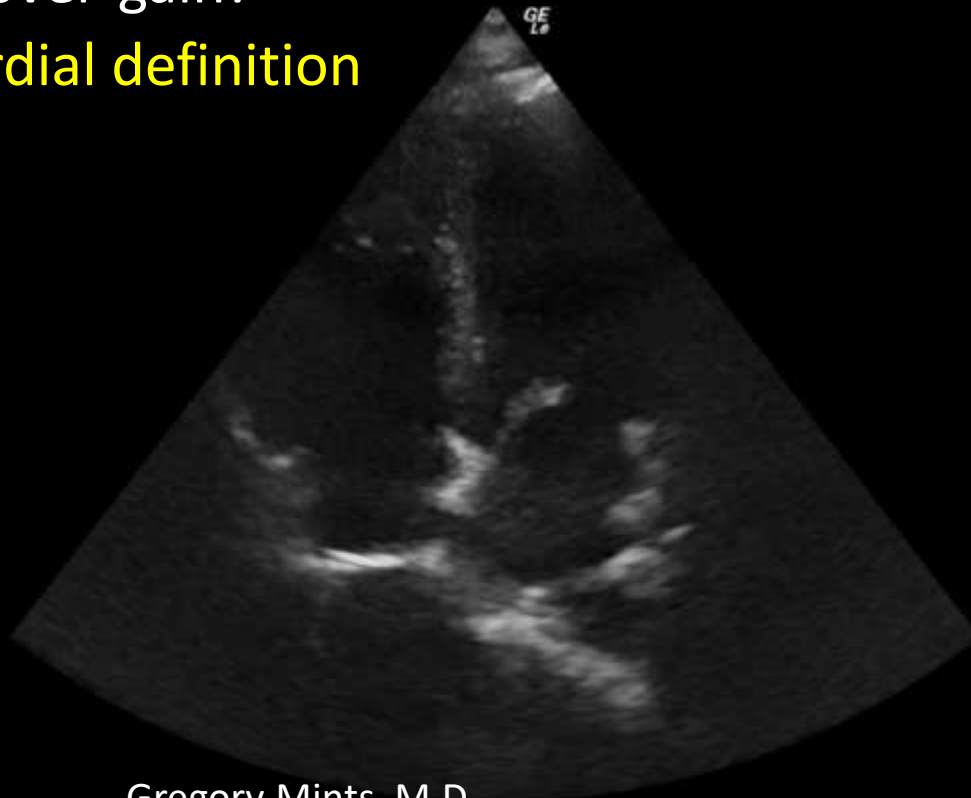


Image Optimization

- Equipment settings
- Probe position

A4

1. 4 chambers seen (2 atria, 2 ventricles)
2. LV apex is at the screen's midline
3. Septum is vertical (AV annuli – horizontal)
4. The heart is oblong (\approx oval), not round
5. Max RV diameter

Longs Axis

Short Axis

Vertical Axis

TRANSLATIONAL

SLIDING

SWEEPING

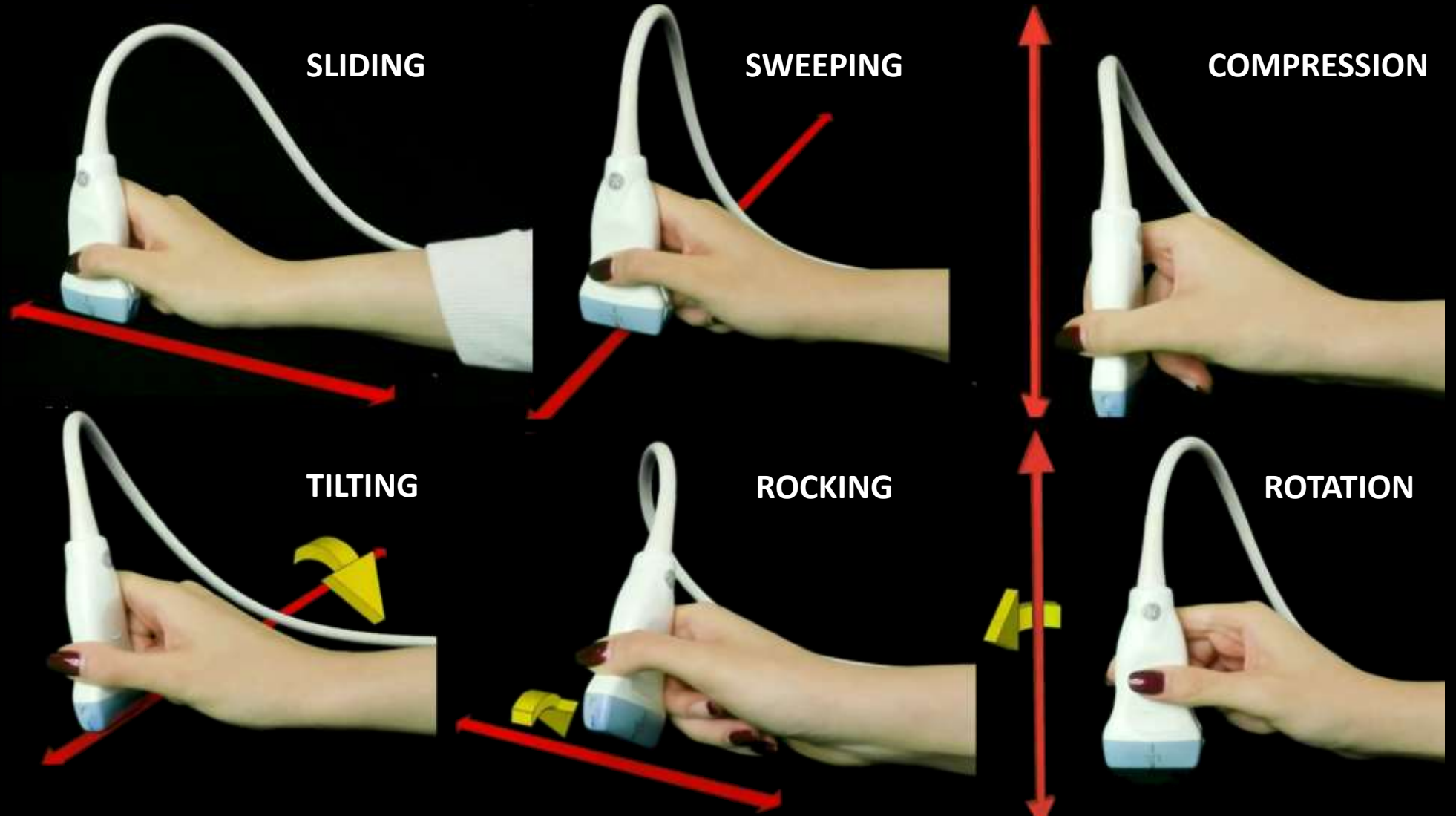
COMPRESSION

ROTATIONAL

TILTING

ROCKING

ROTATION



Longs Axis

Short Axis

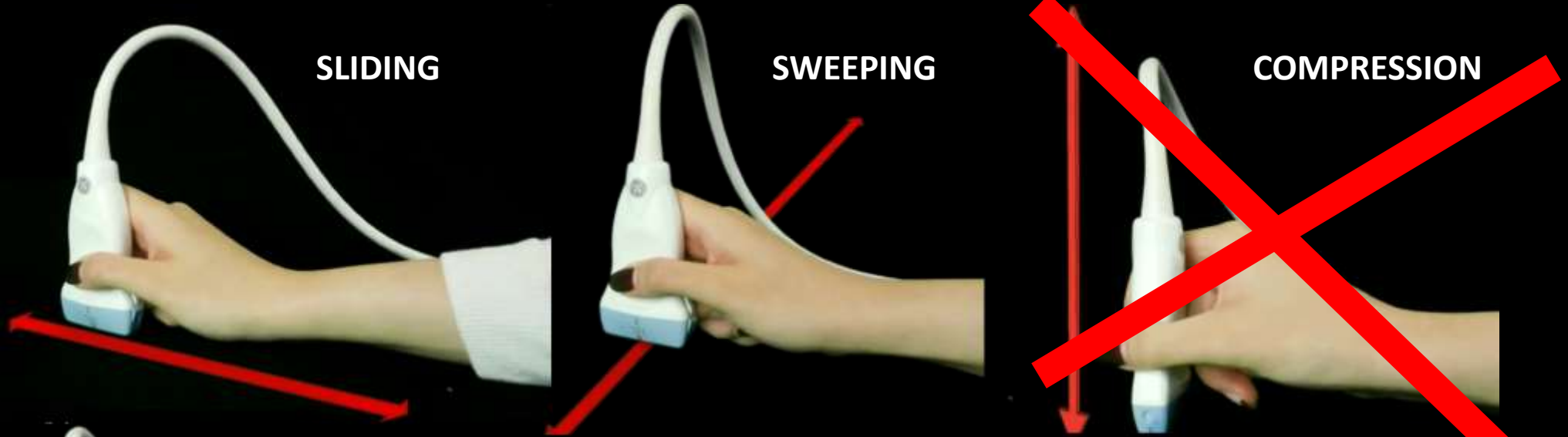
Vertical Axis

SLIDING

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TRANSLATIONAL



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ROCKING

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ROTATIONAL



Longs Axis

Short Axis

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TRANSLATIONAL

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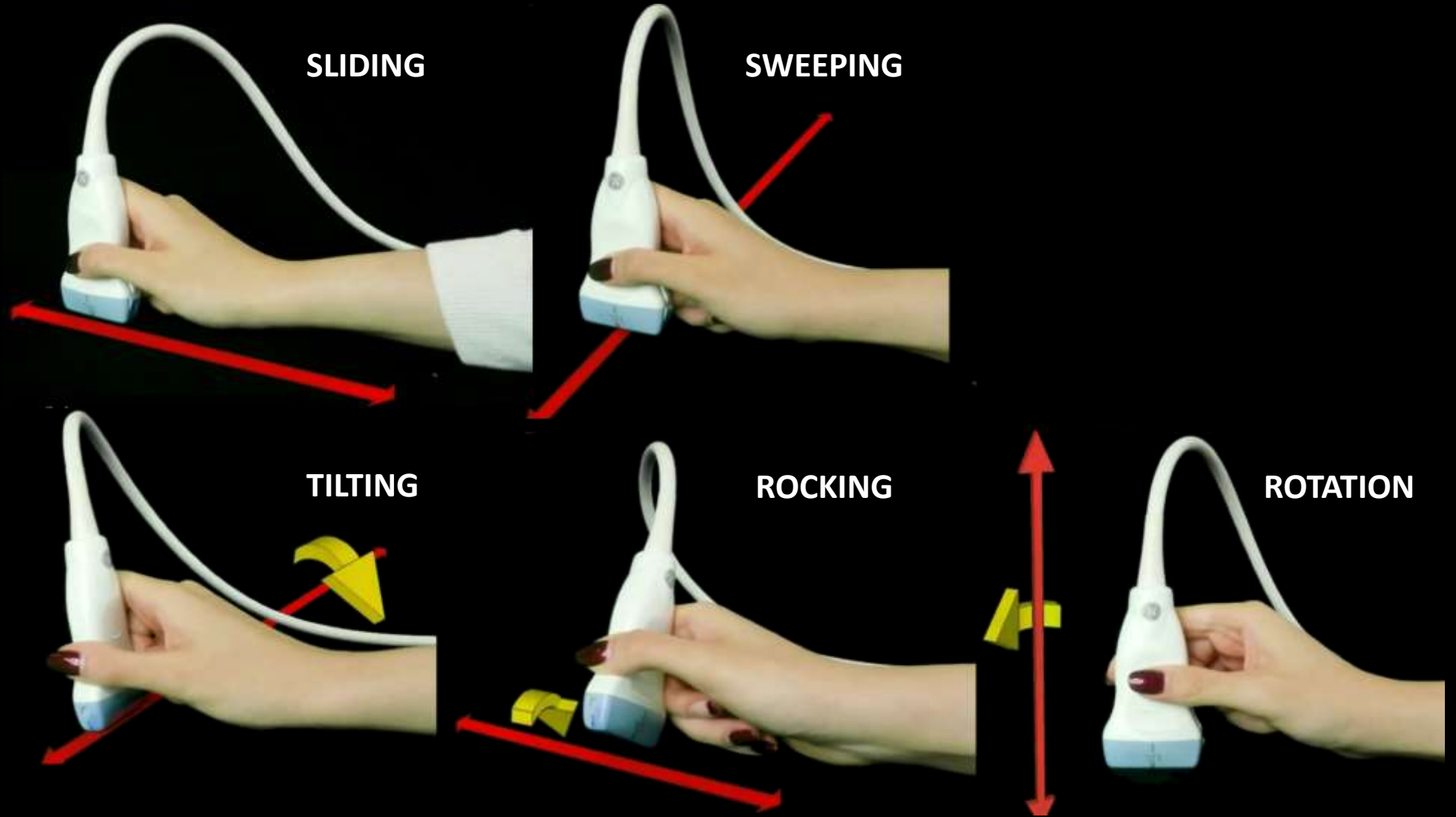
SWEEPING

ROTATIONAL

TILTING

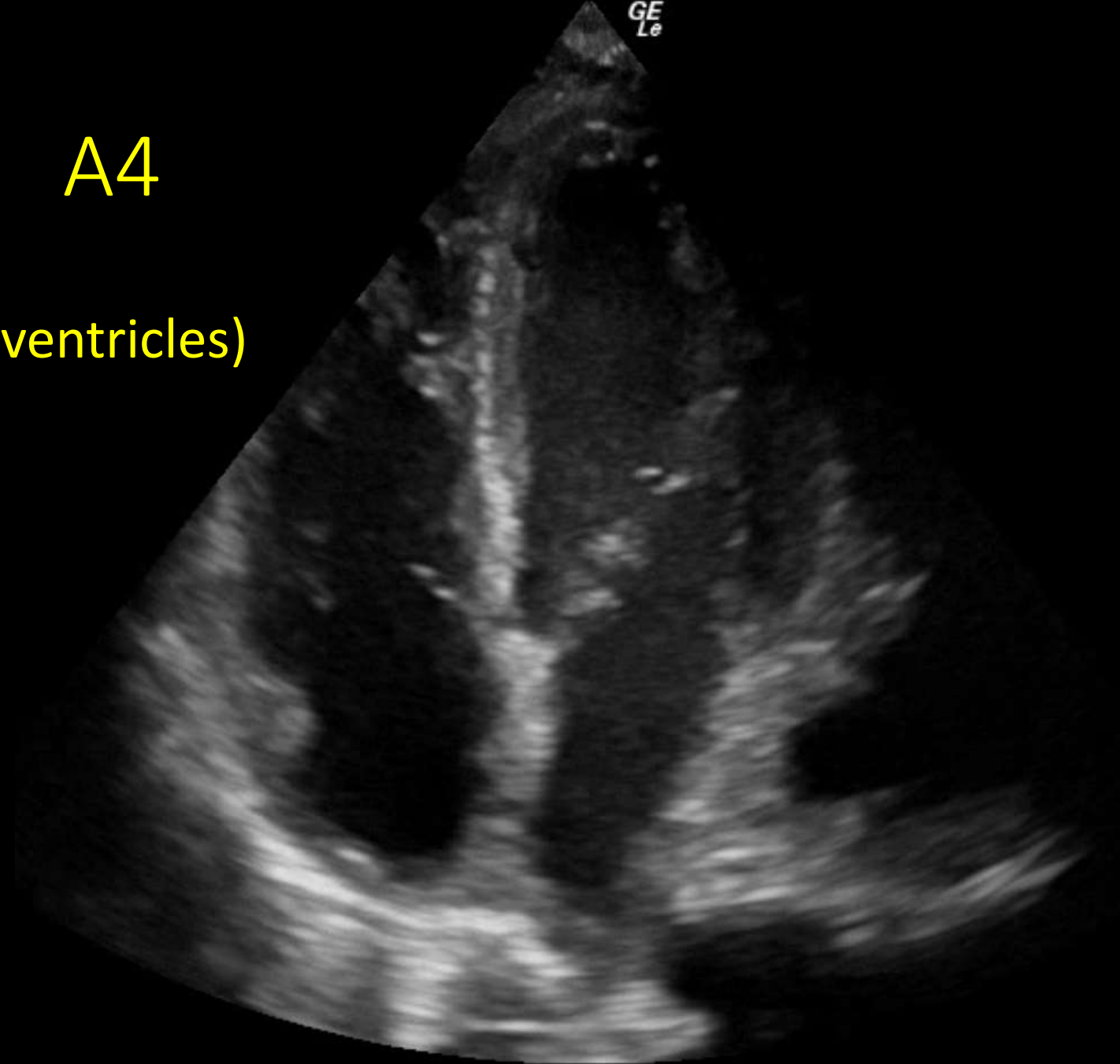
ROCKING

ROTATION



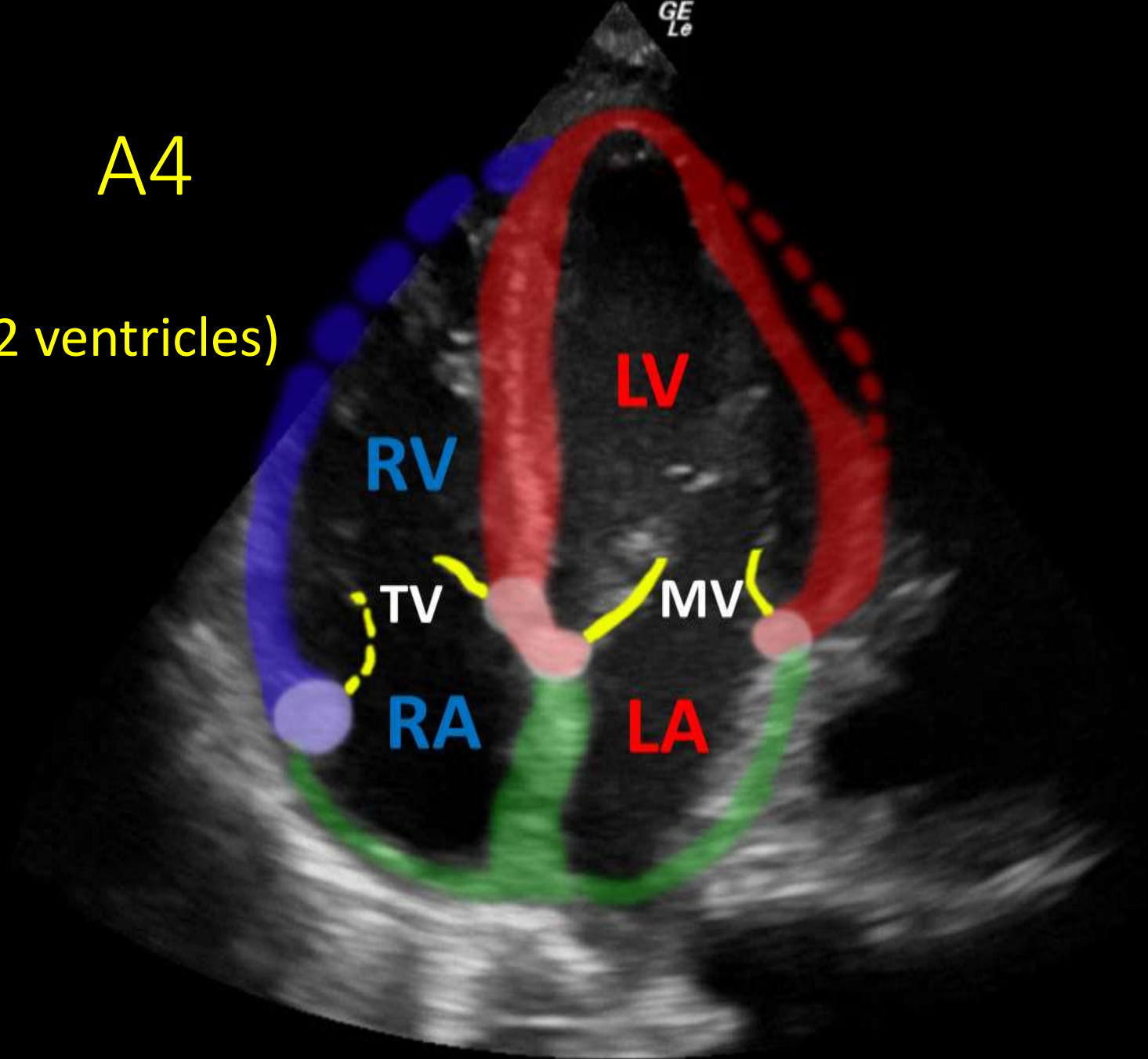
A4

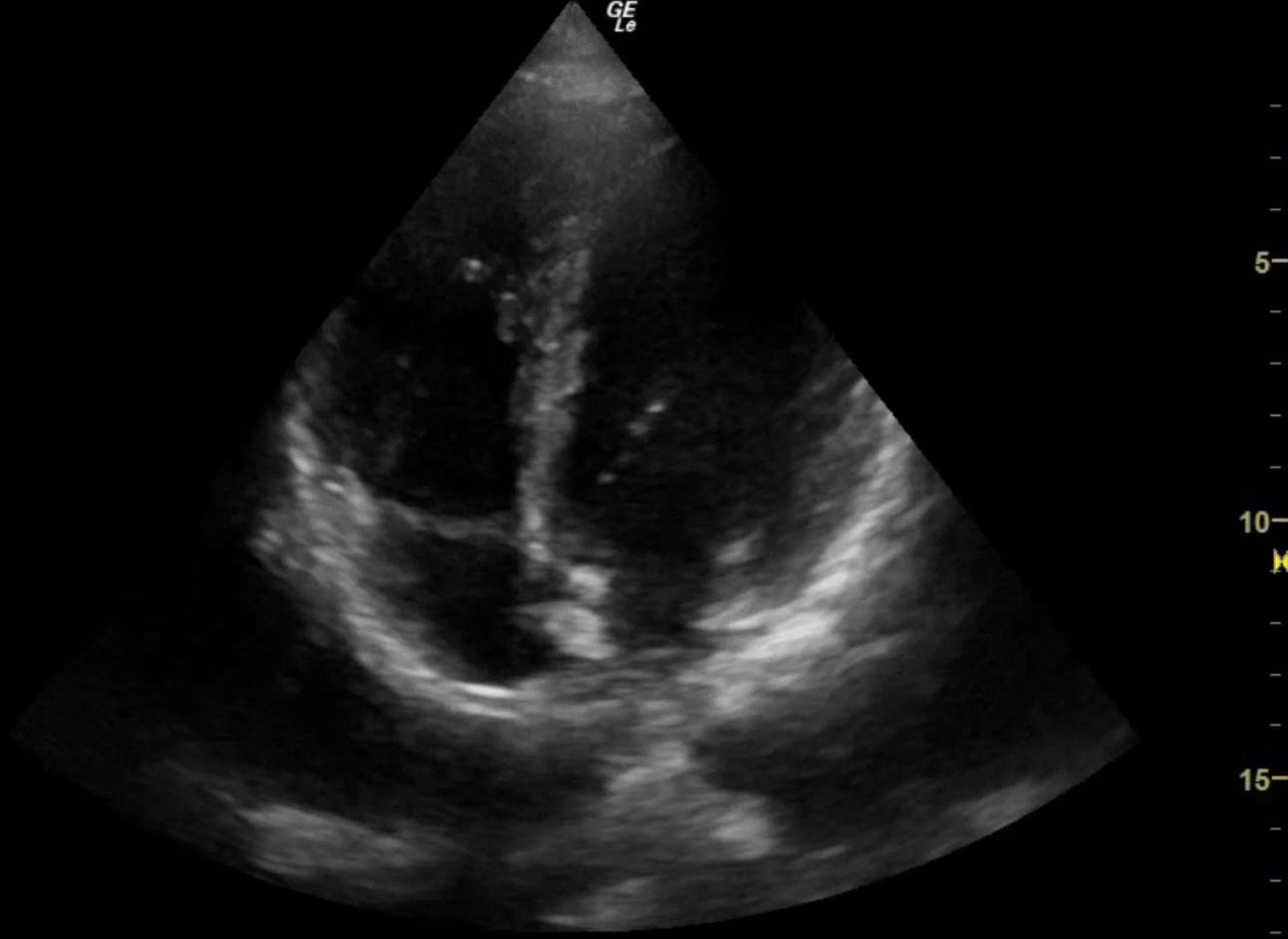
1. 4 chambers seen (2 atria, 2 ventricles)



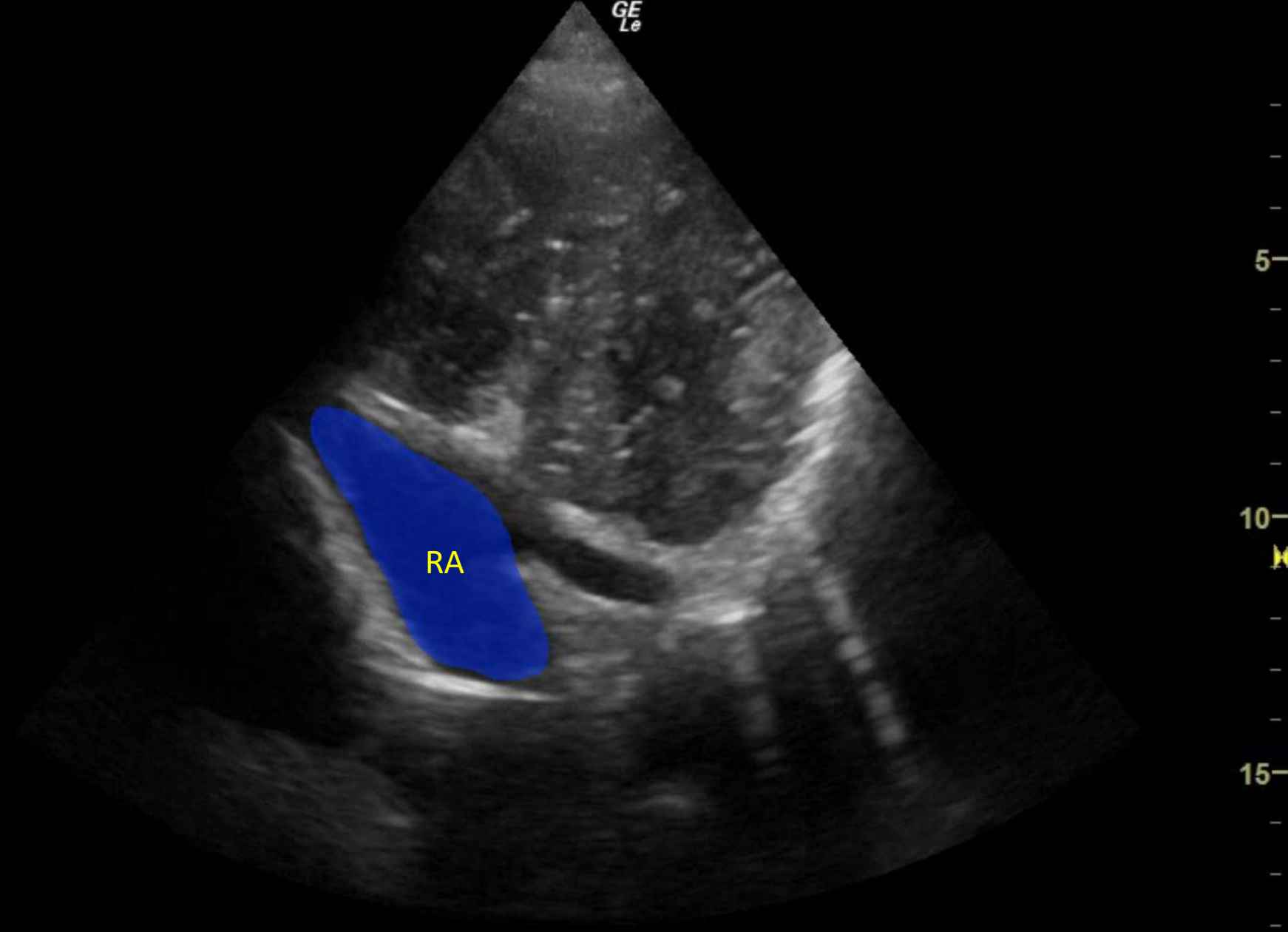
A4

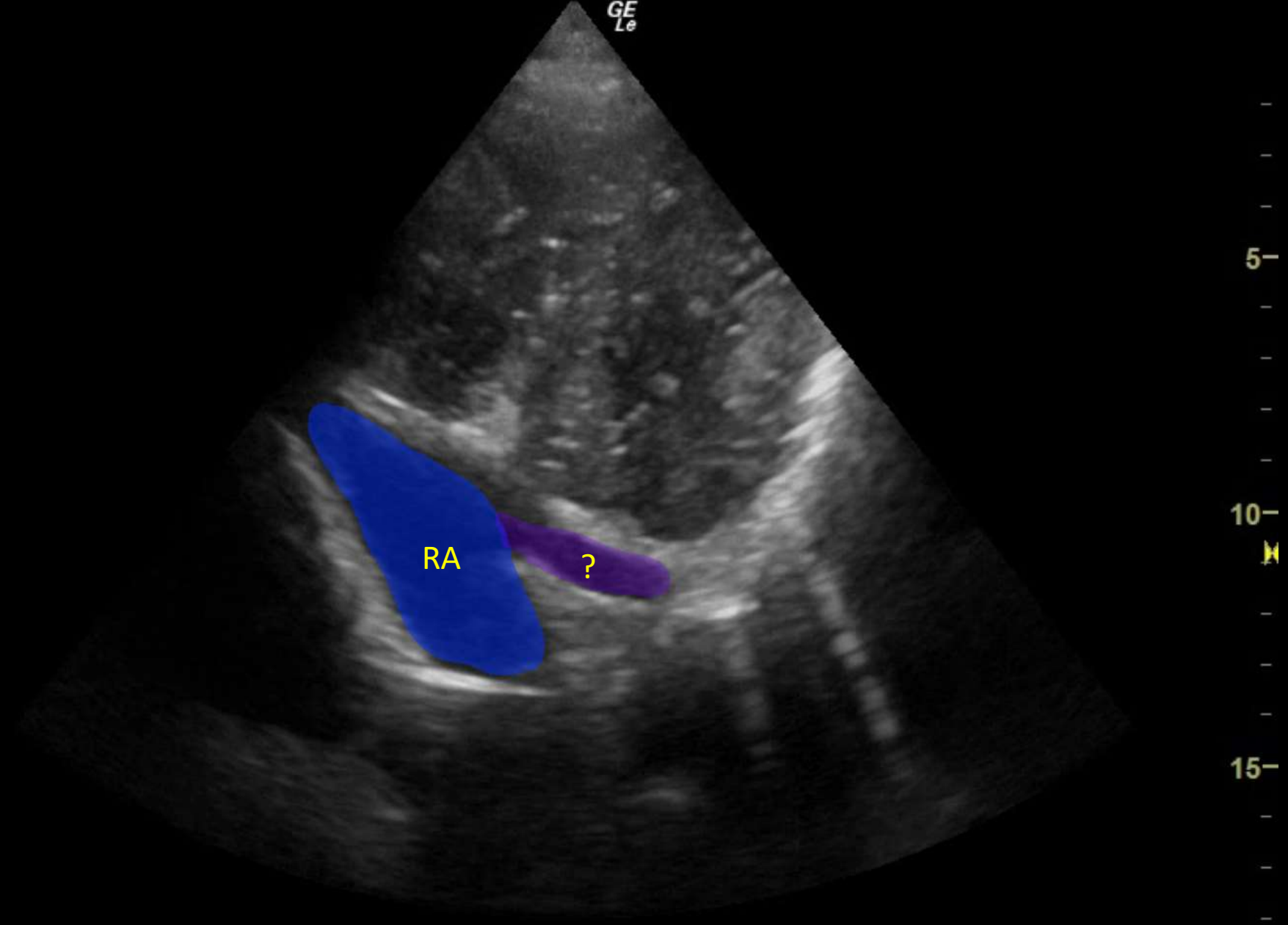
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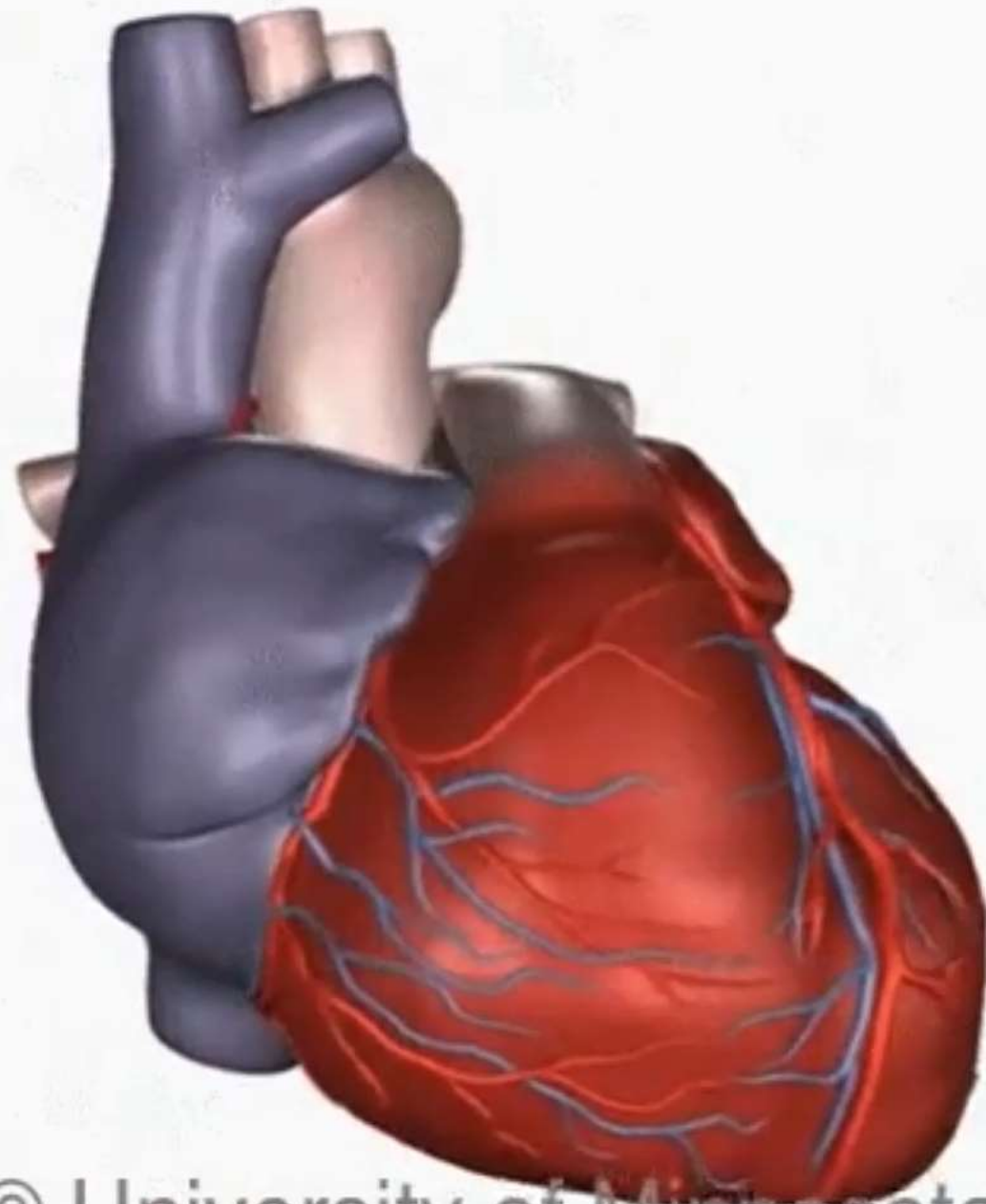








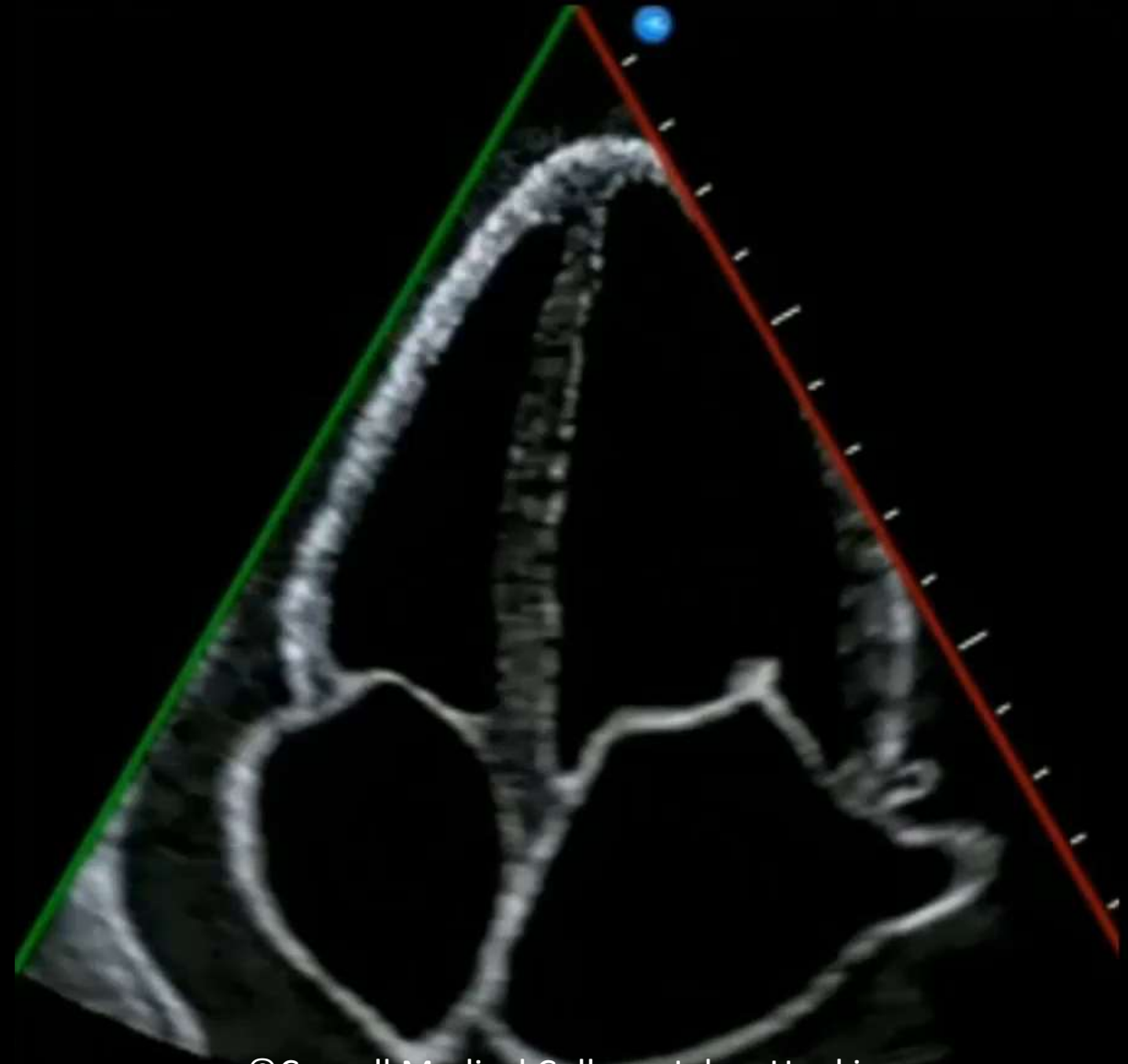
Coronary Sinus



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Coronary Sinus View – **tilted** Dorsally



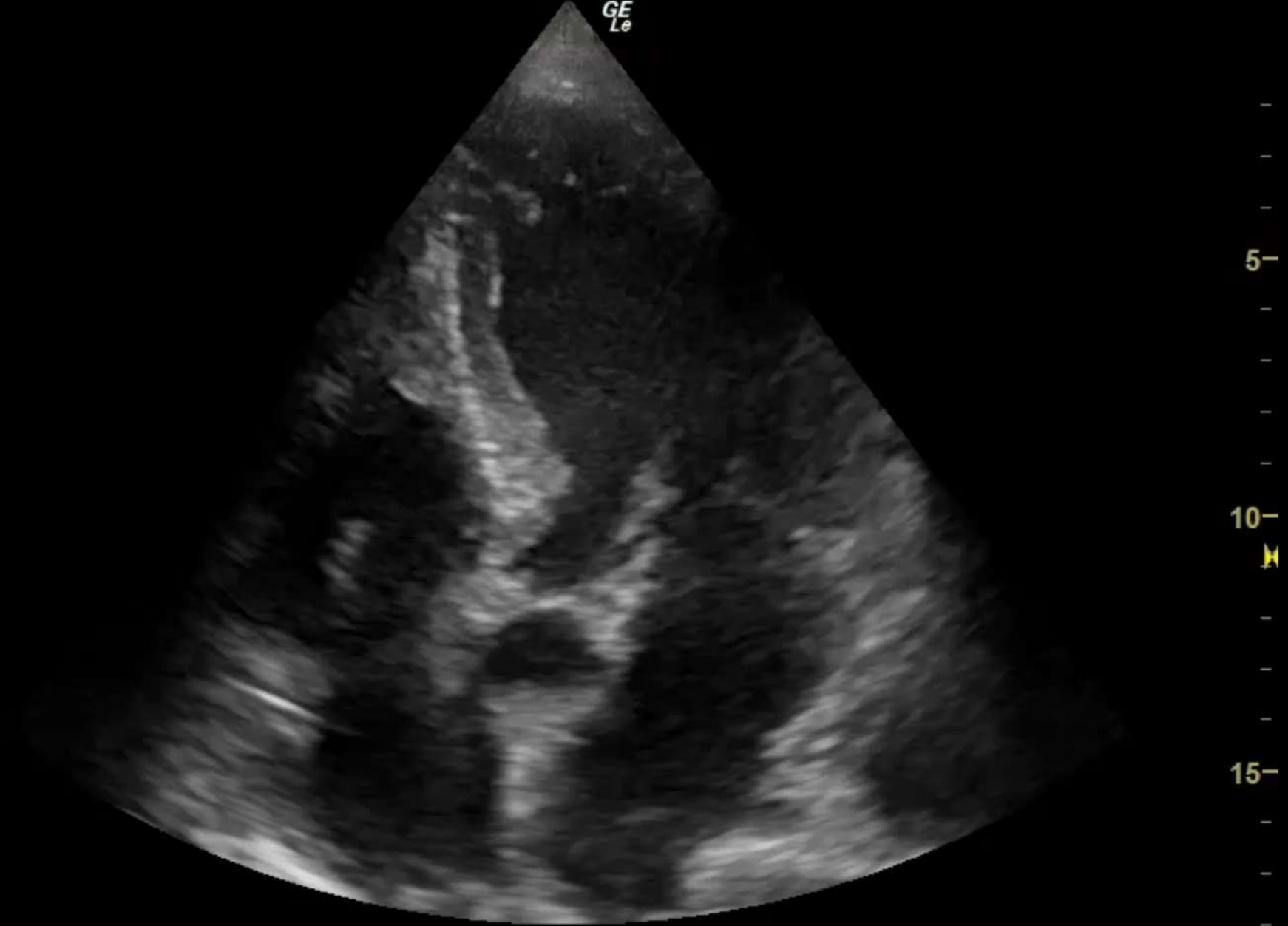
What would happen
with Ventral tilt?



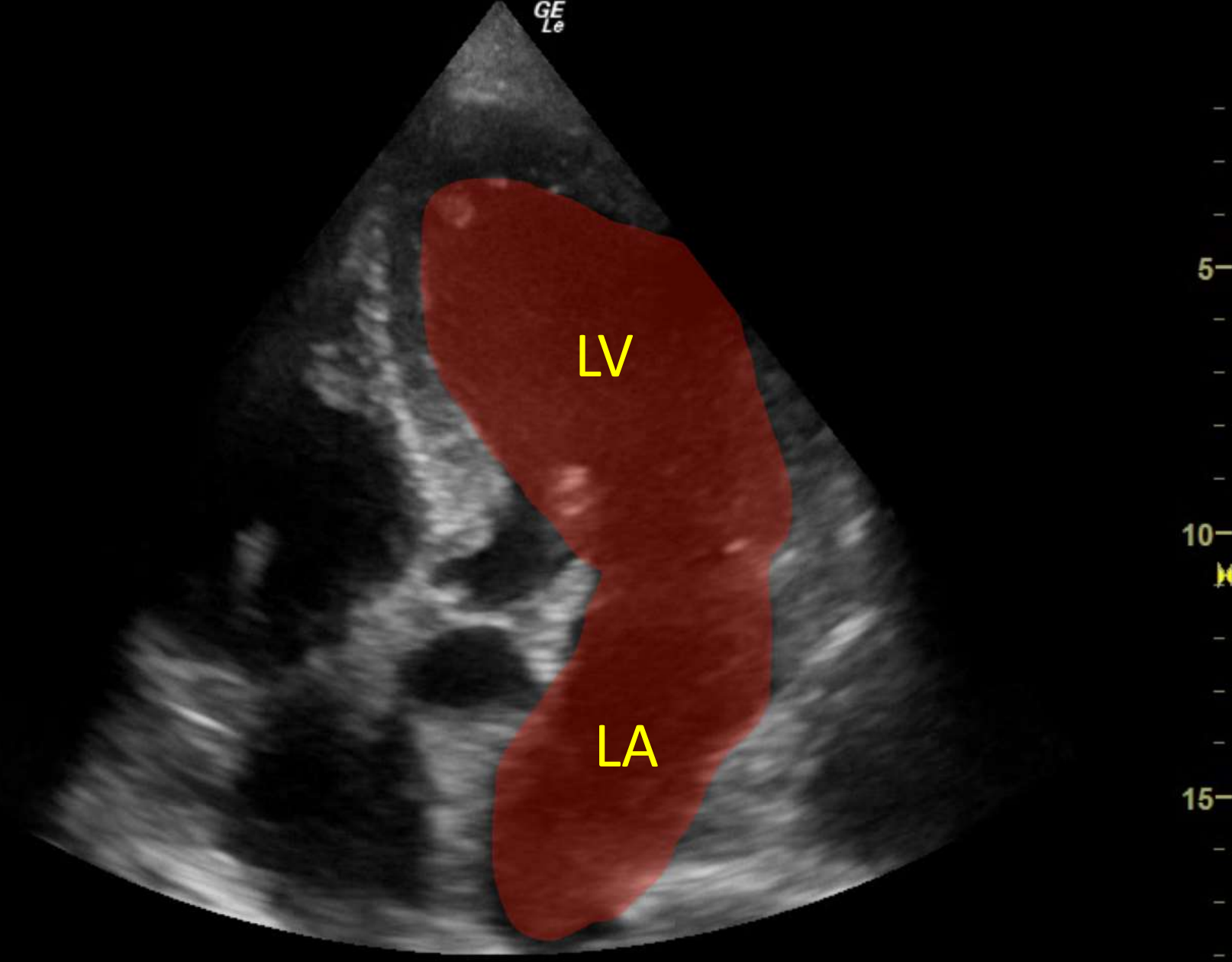
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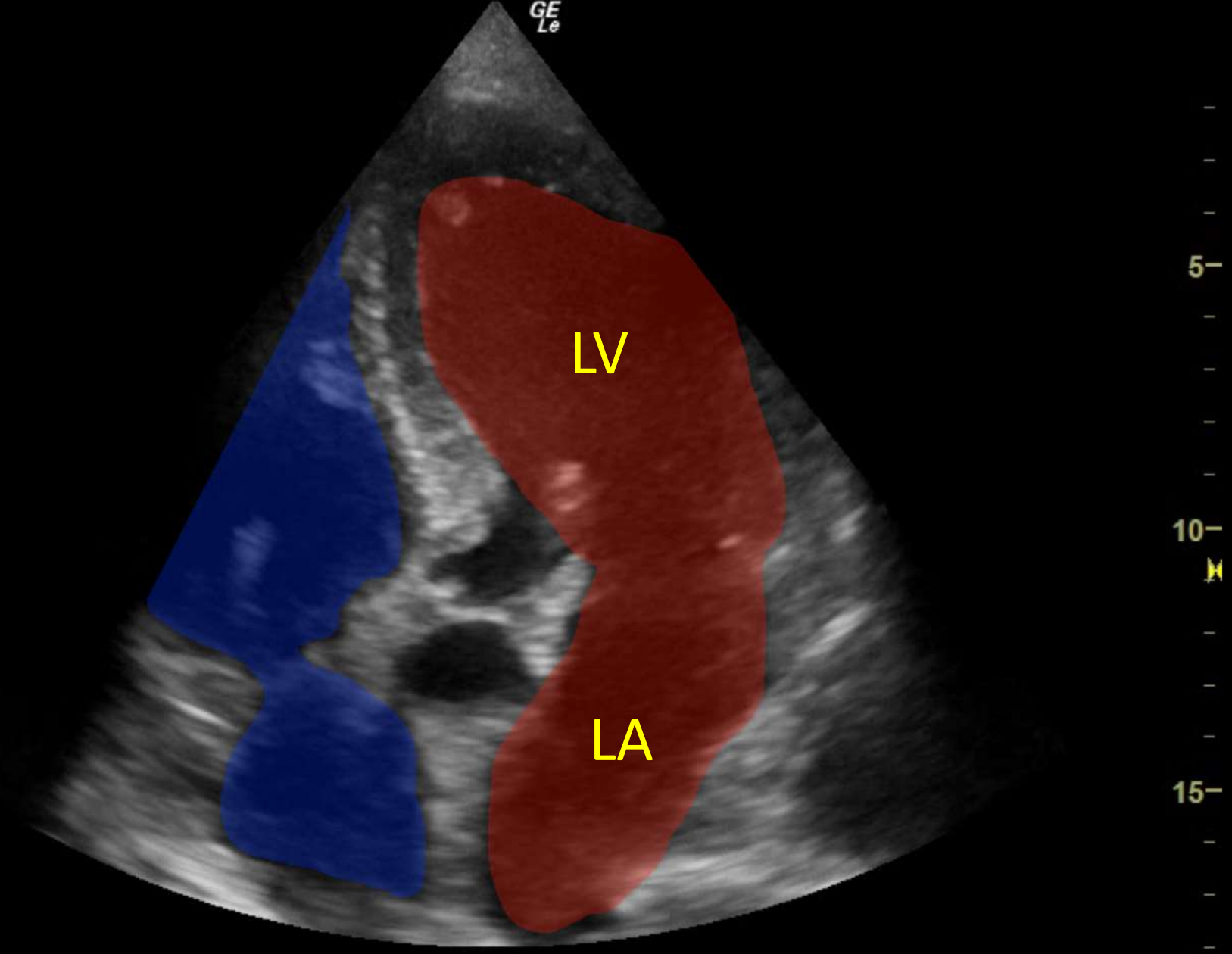


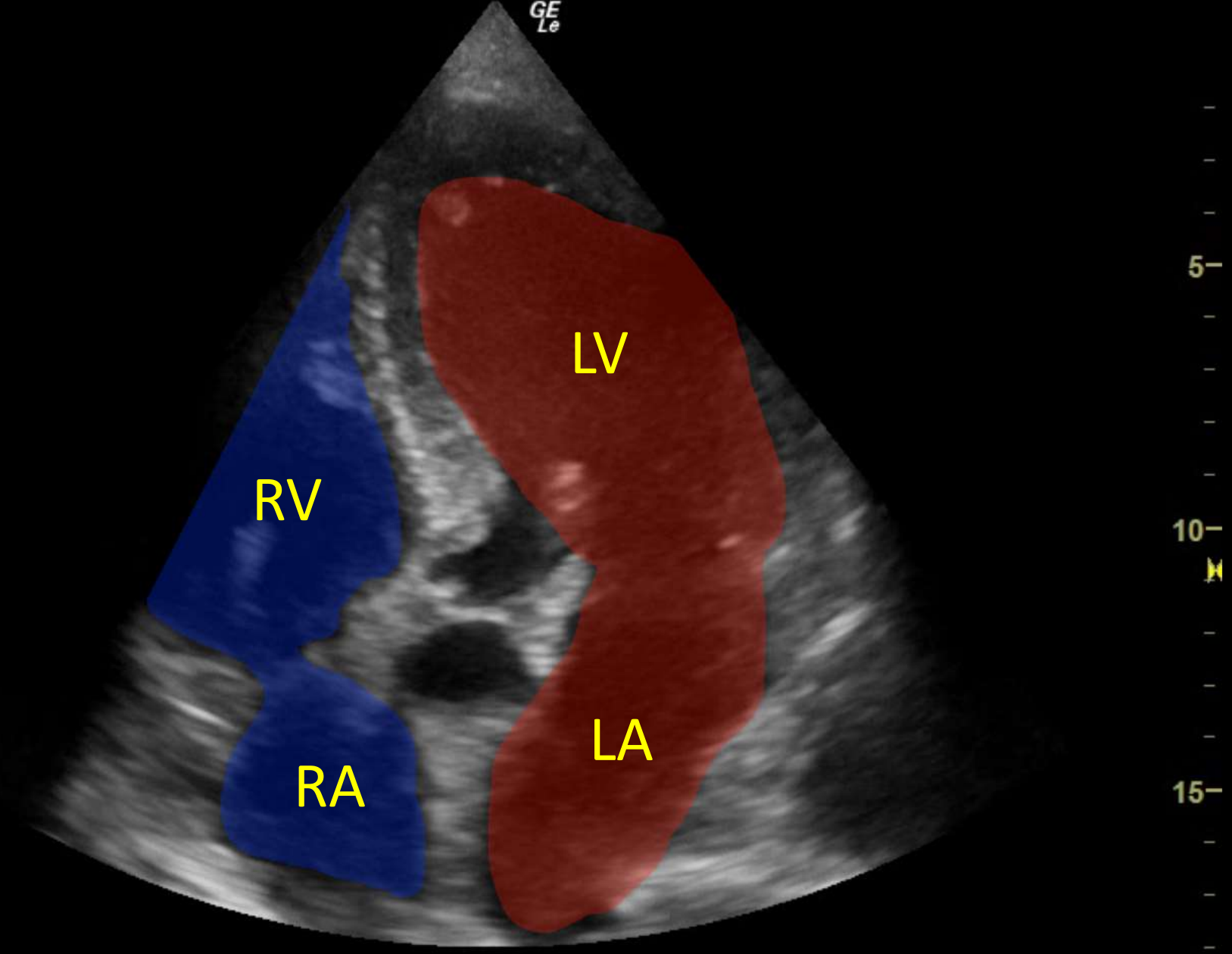


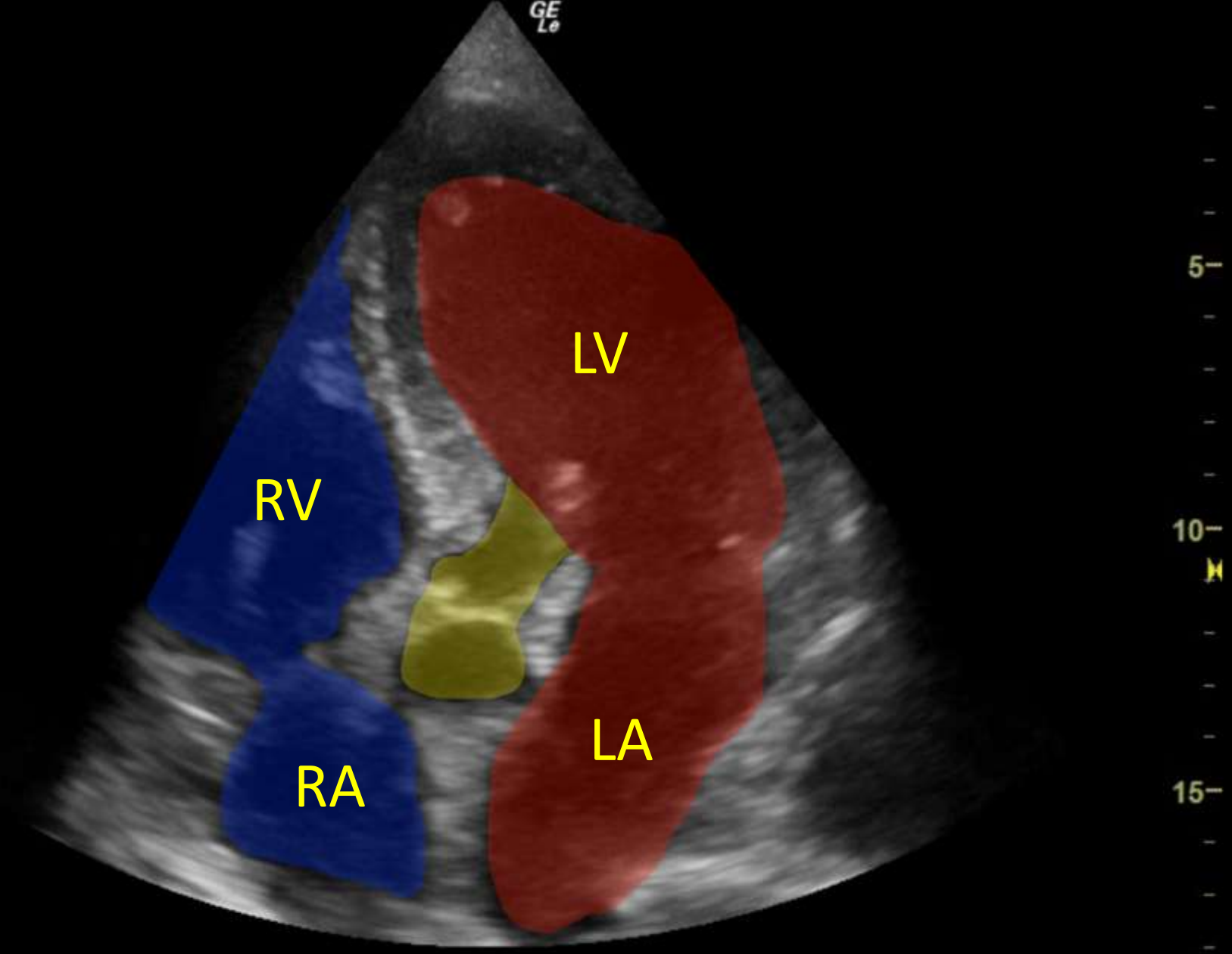


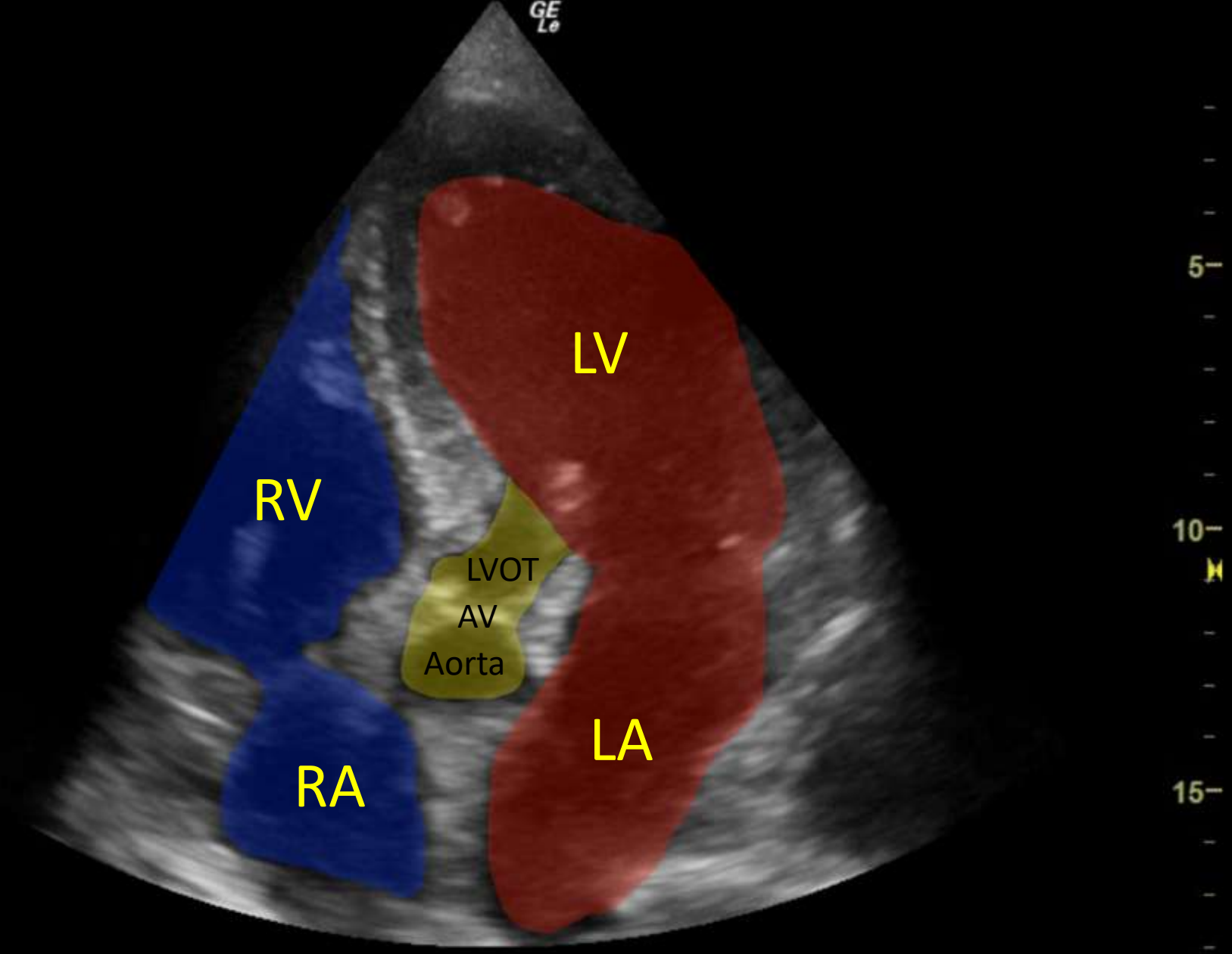




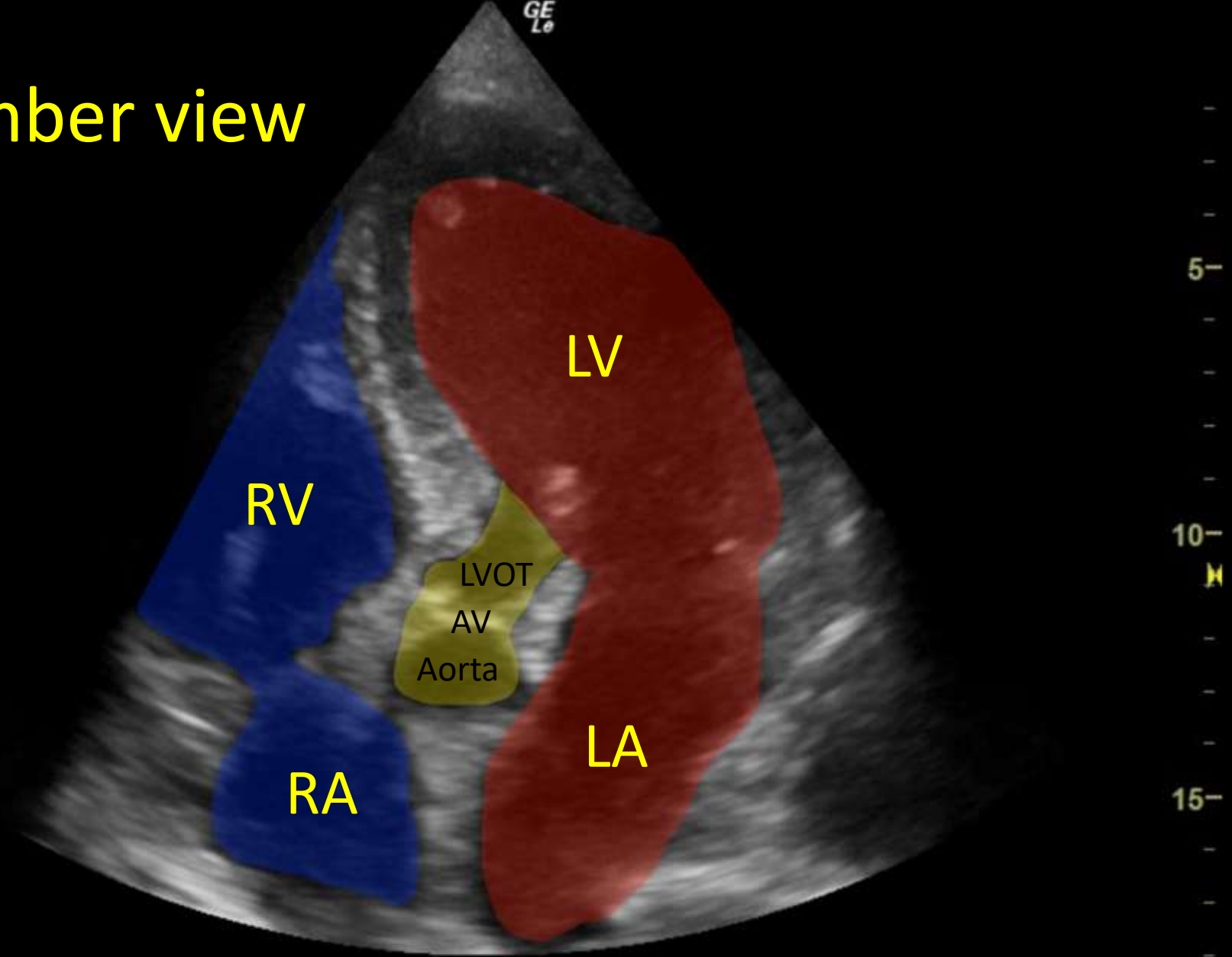




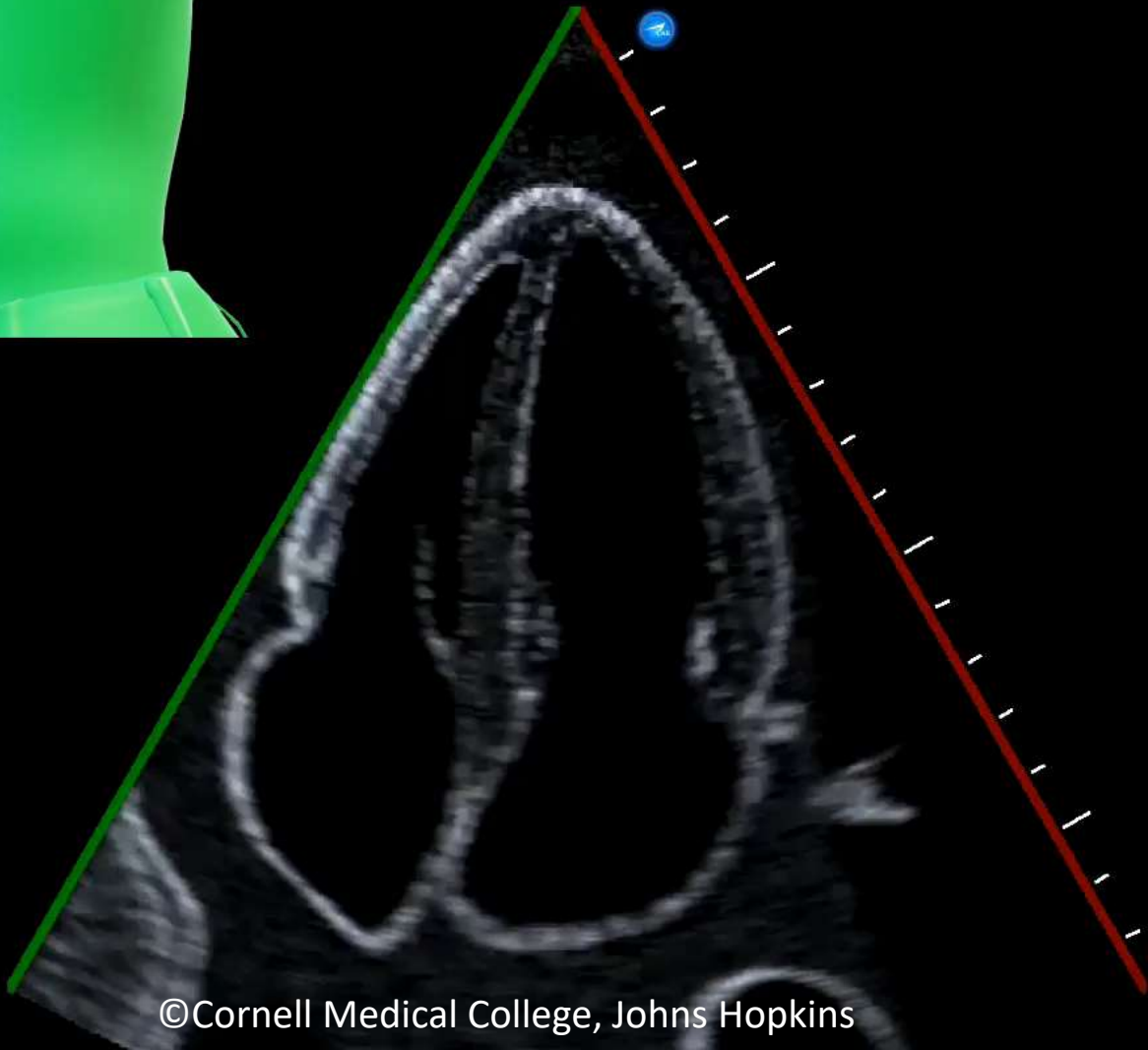




Apical 5-chamber view



A5 View – **tilted** Ventrally





Gregory Mints, M.D.

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A4

1. 4 chambers seen (2 atria, 2 ventricles)

A4

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- Tilted dorsally – Coronary Sinus View

A4

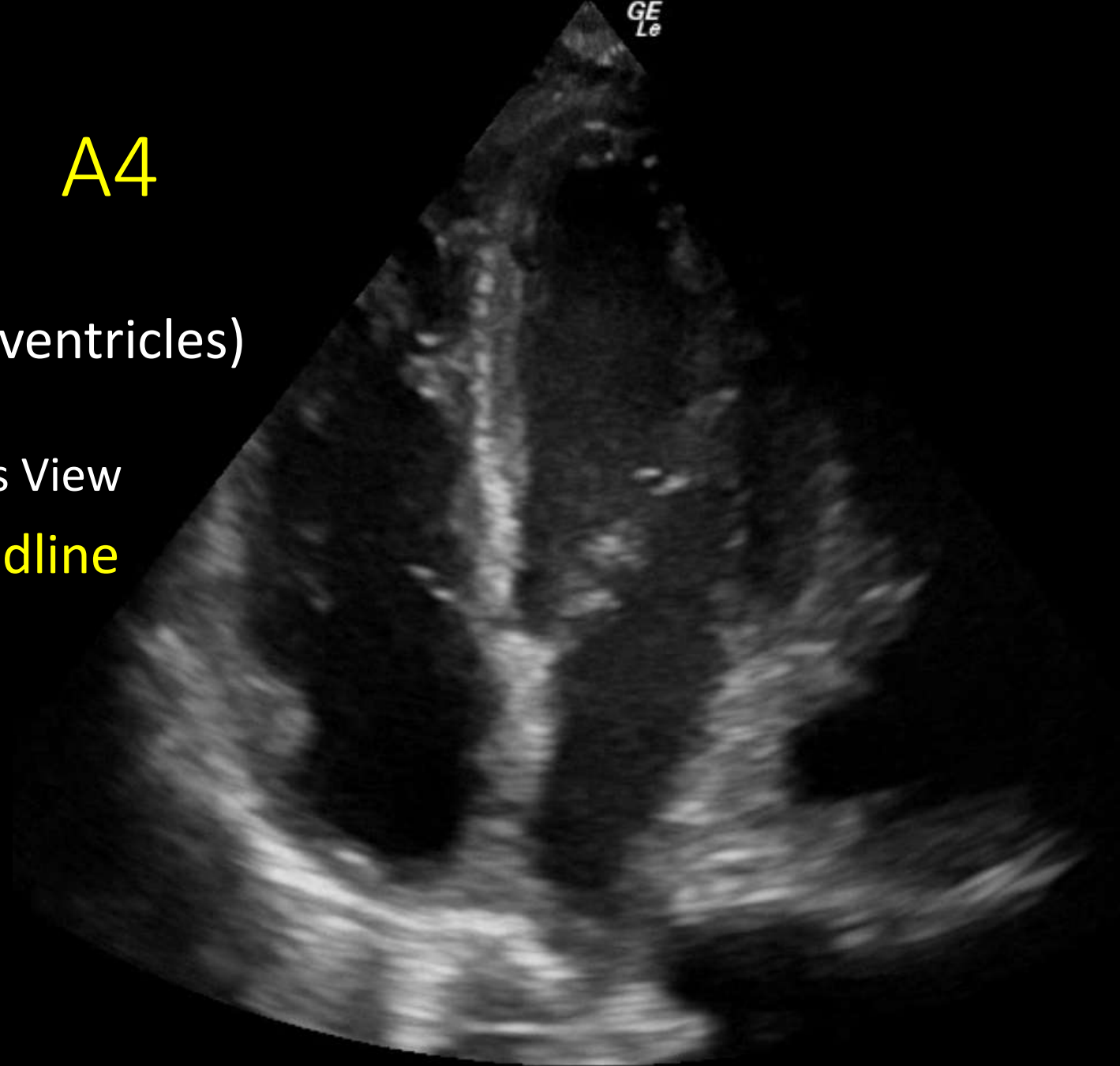
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A4

- tilt**
1. 4 chambers seen (2 atria, 2 ventricles)
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 2. **LV apex is at the screen's midline**

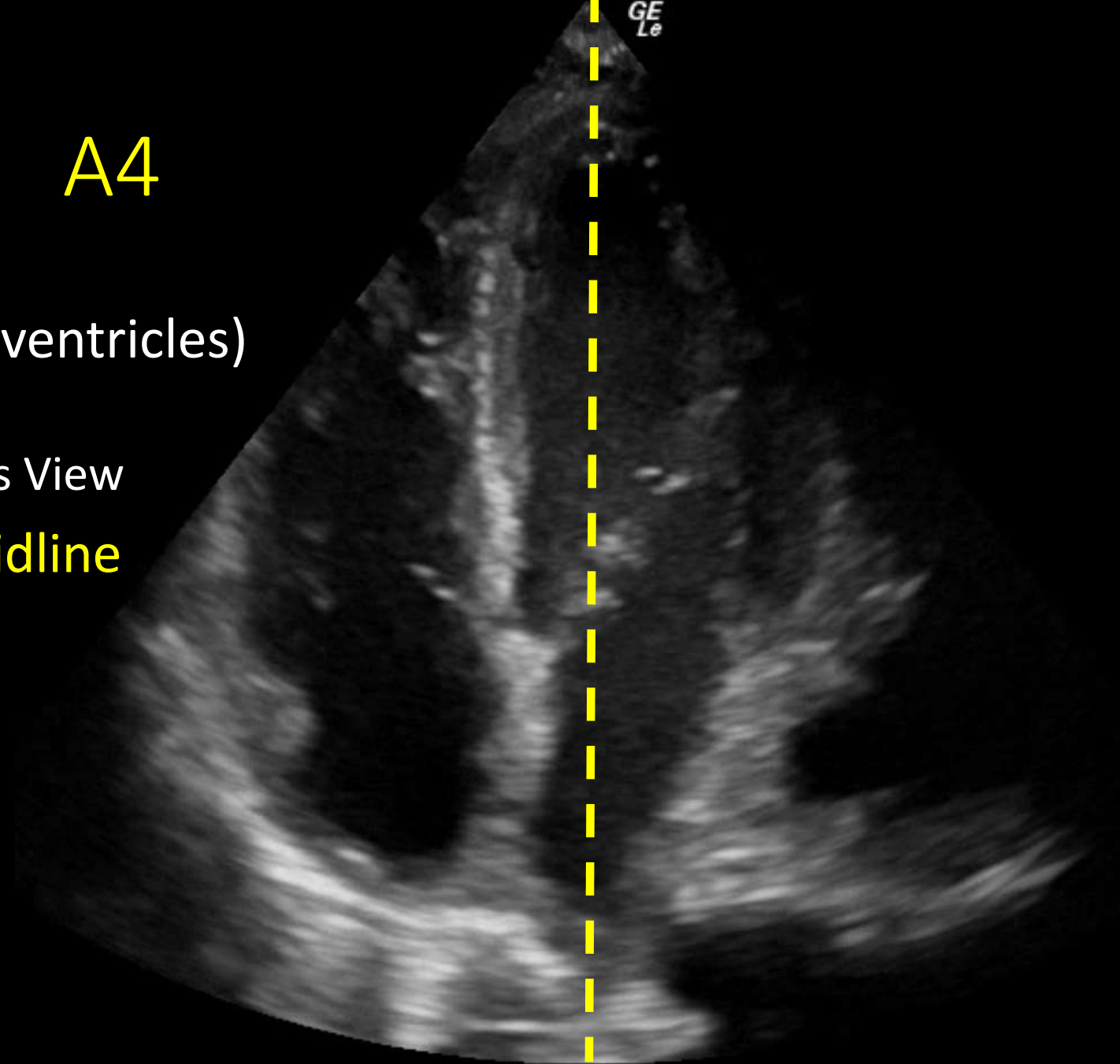
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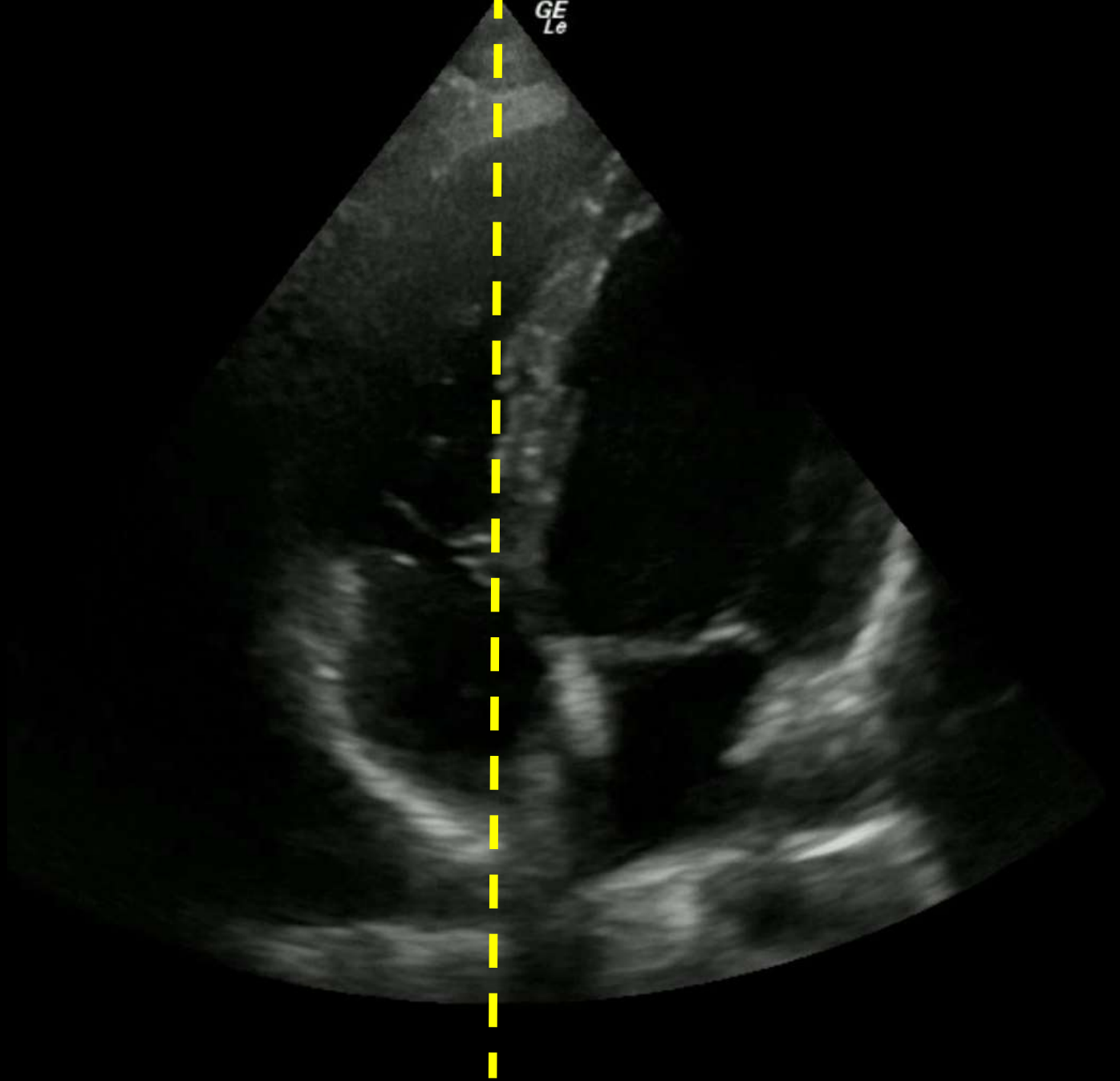


A4

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← Image needs to be moved this way



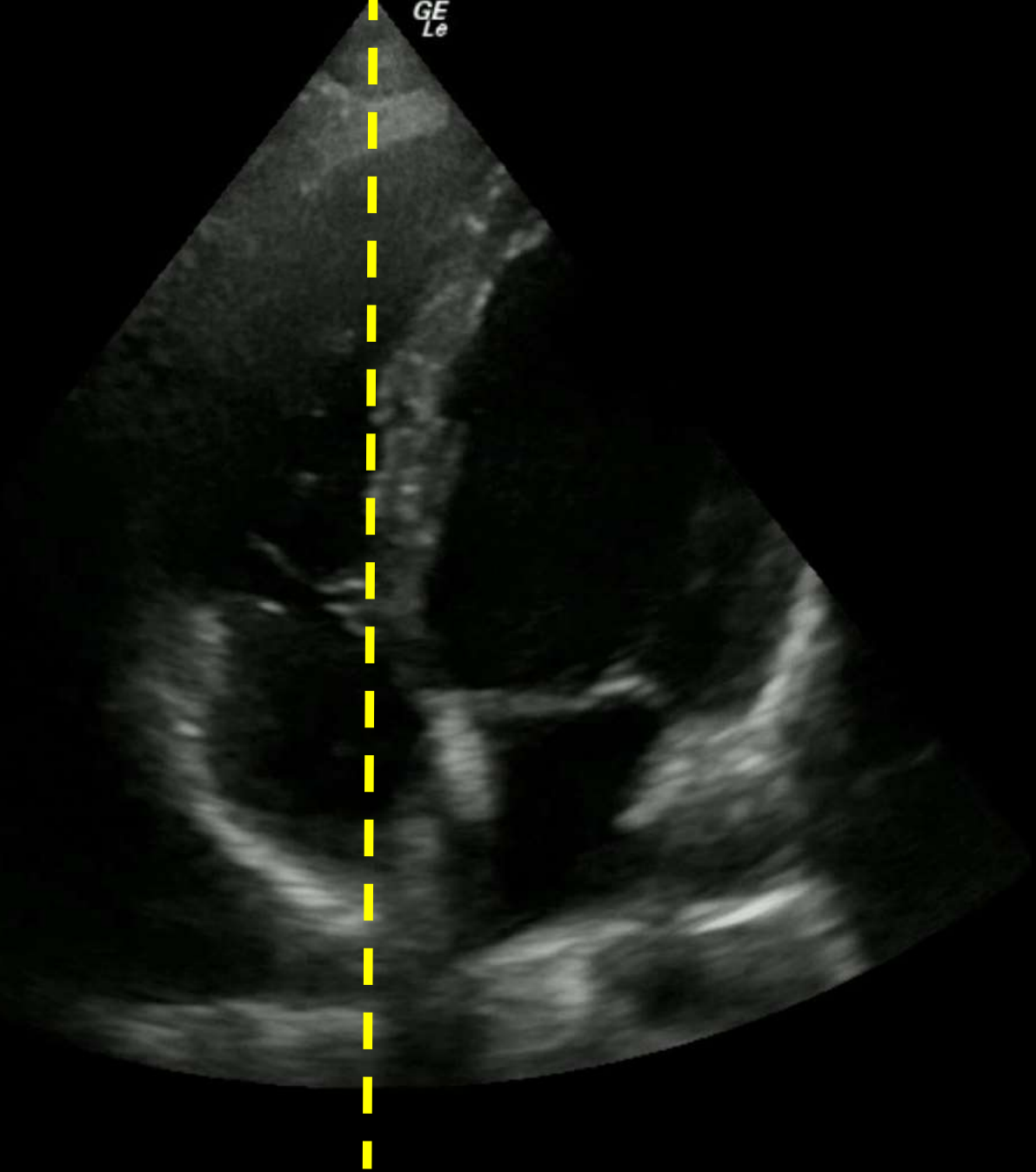
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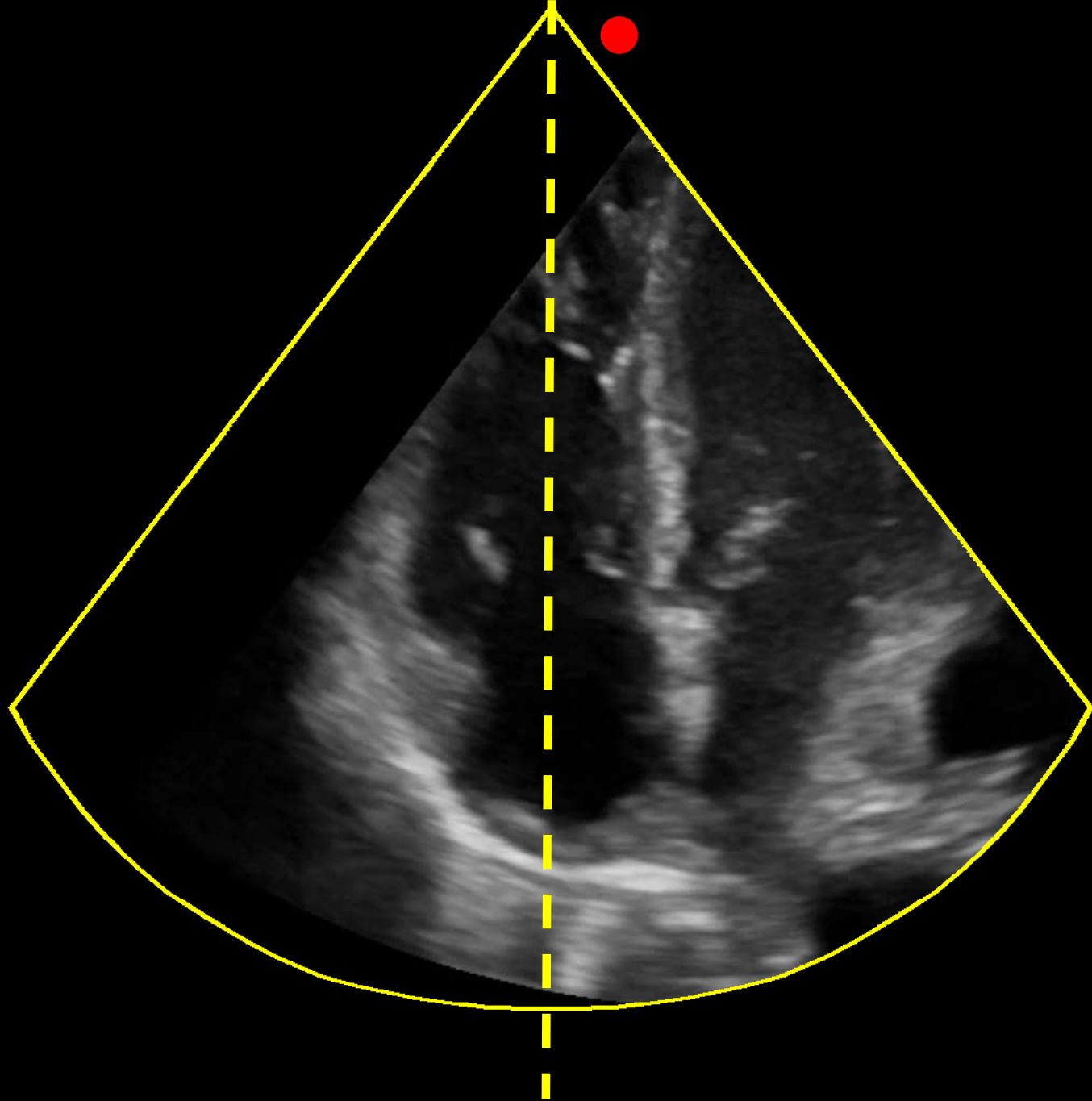


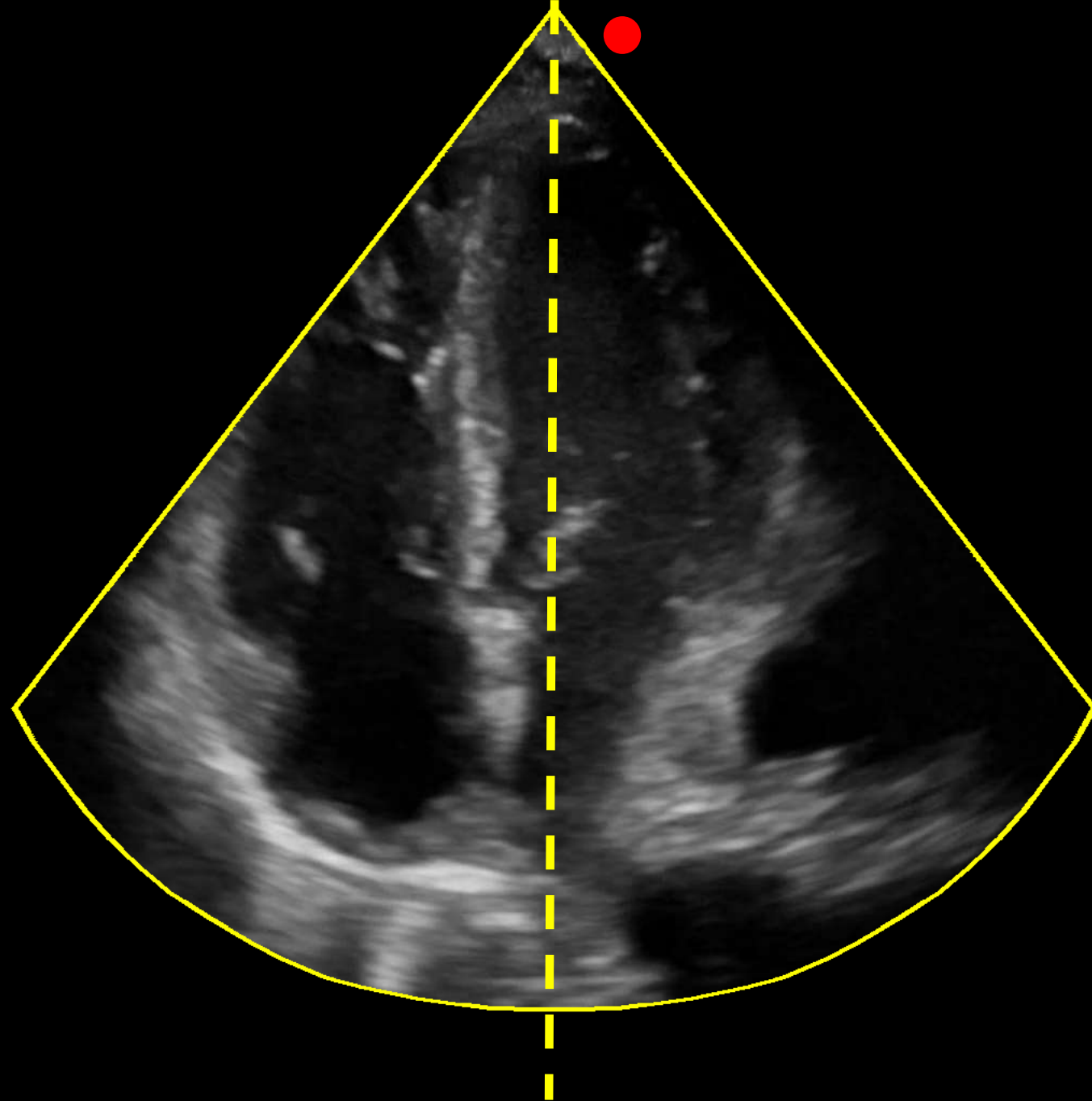
Movement is relative

→ Frame needs to be moved this way

Frame = Probe







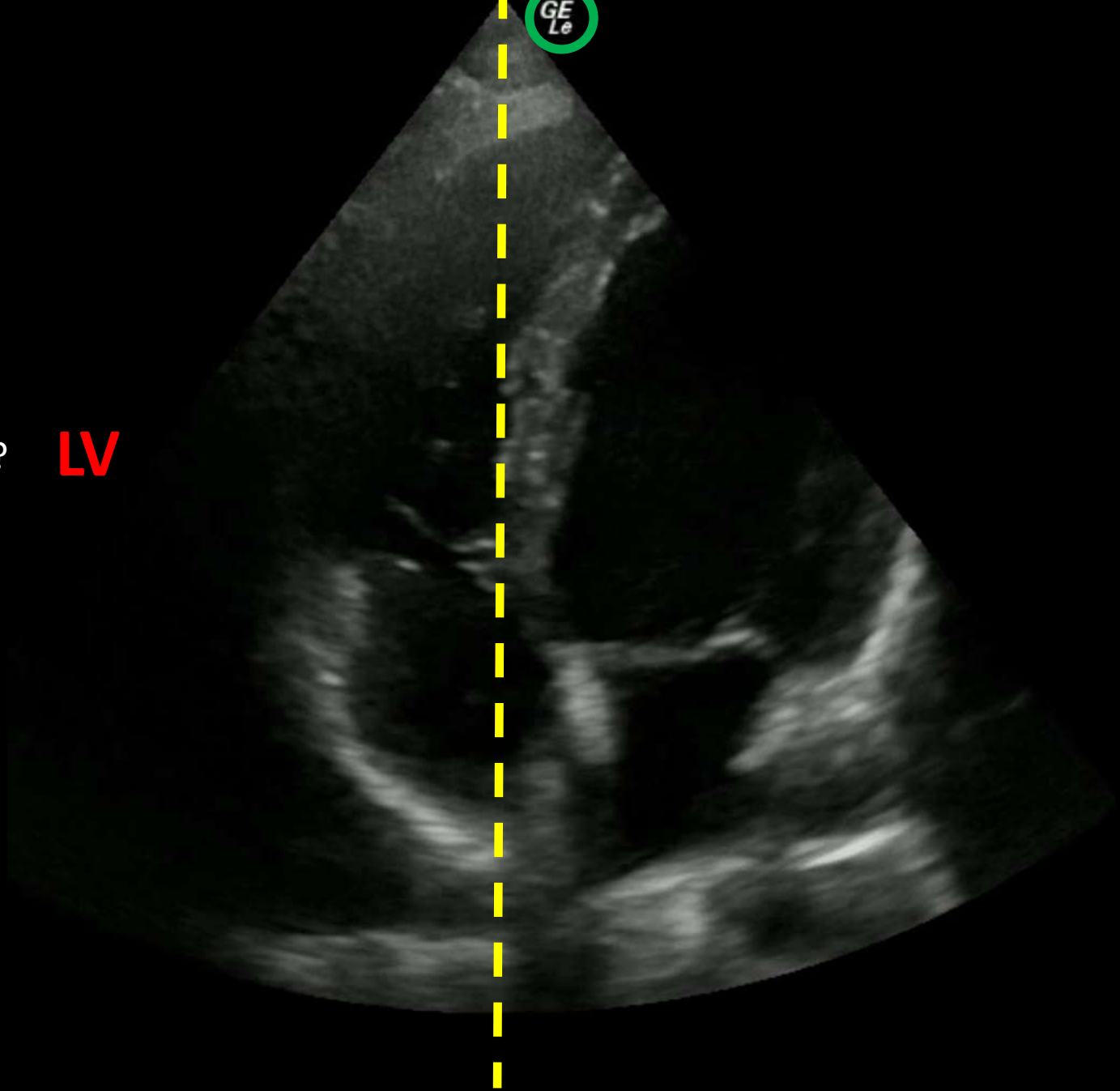
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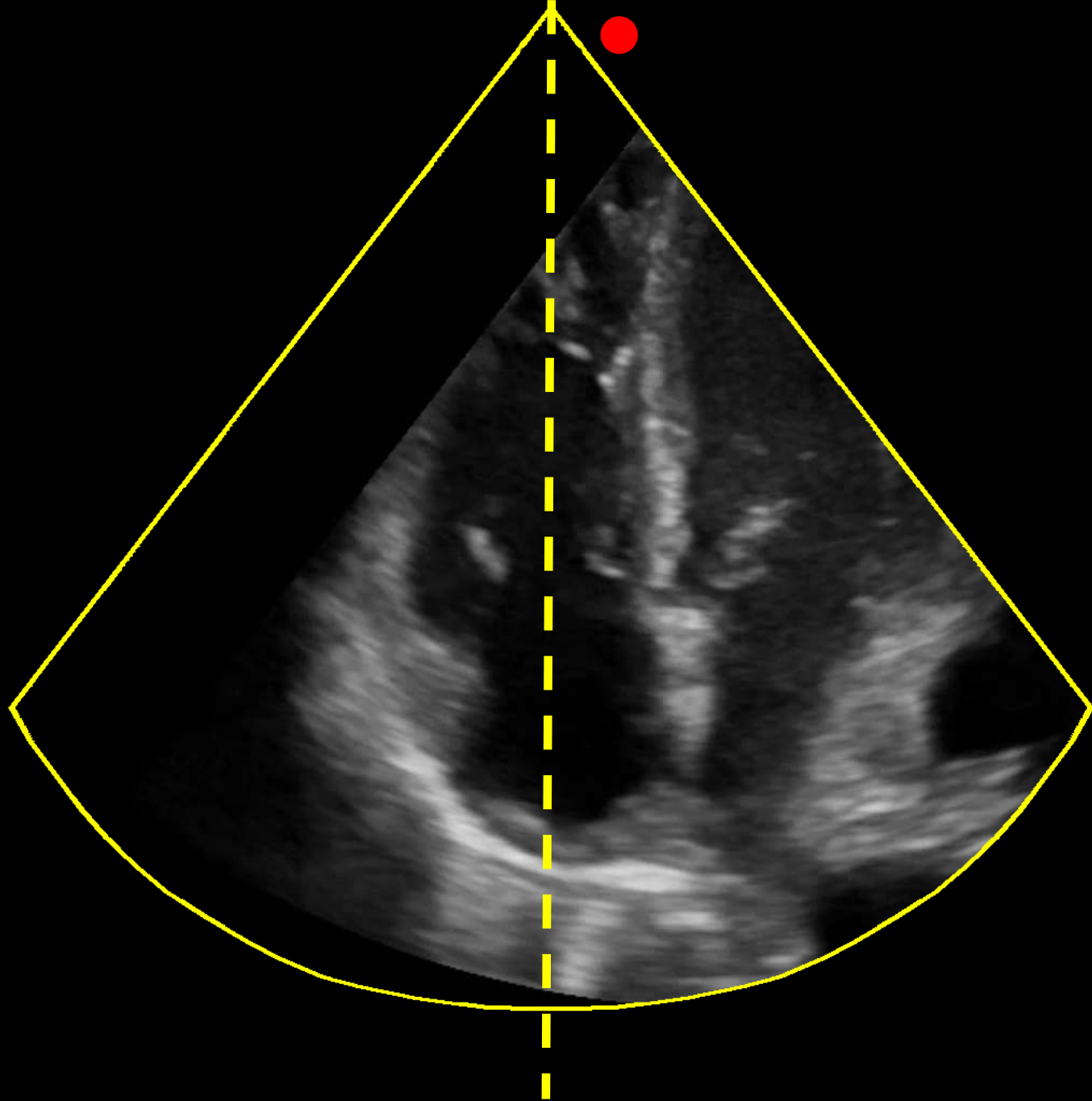
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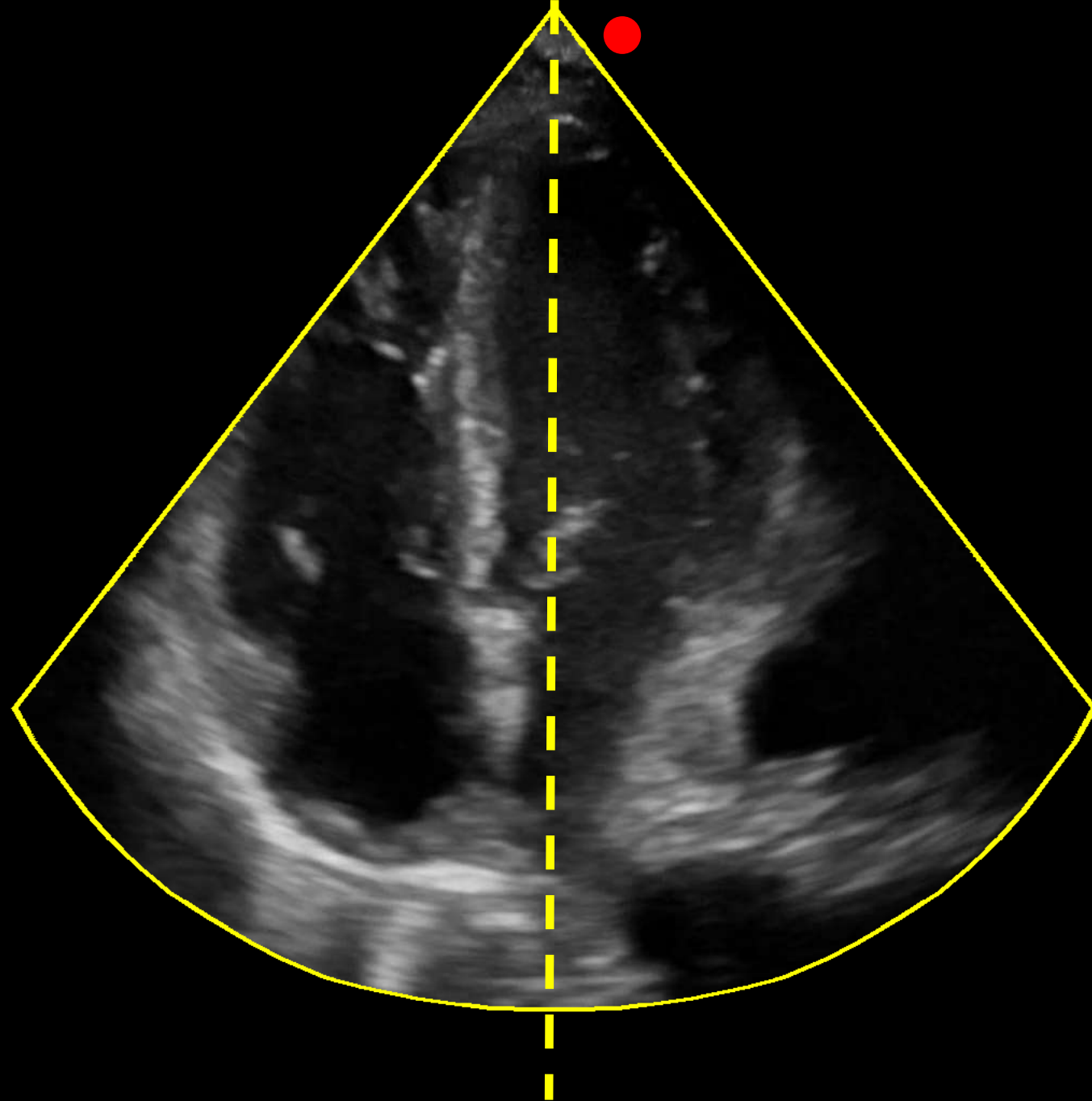
- What structure do you want to see more of? **LV**
- Slide towards the **LV**
- OR
- Slide towards the **DOT**

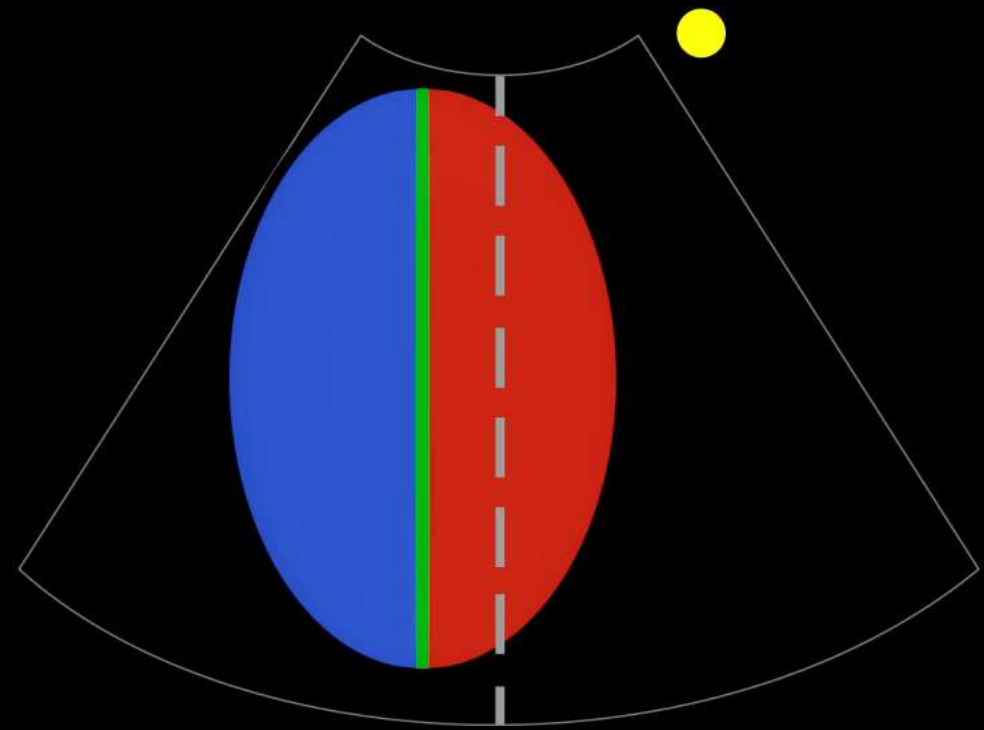
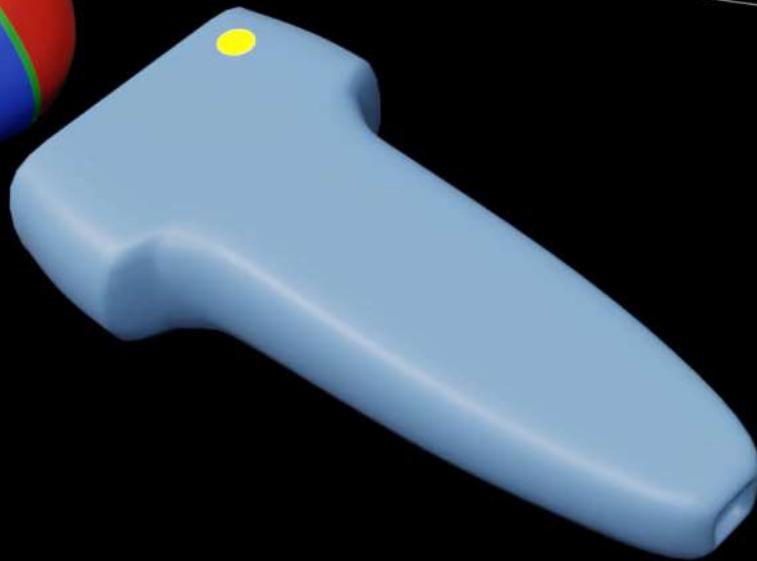
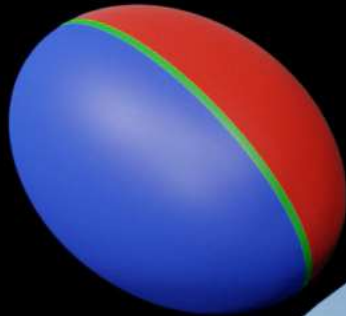
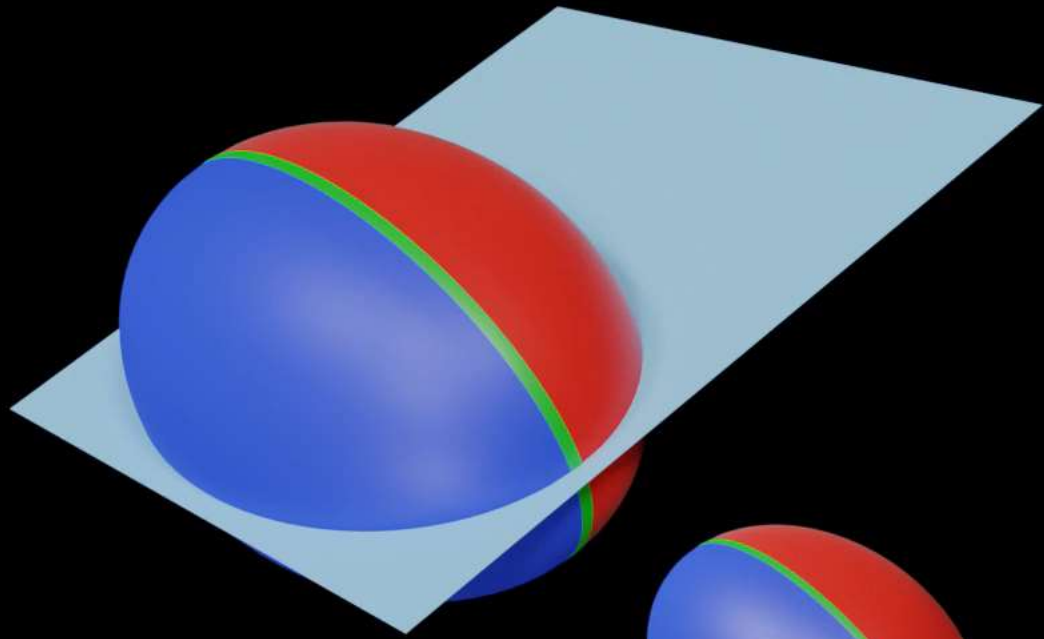
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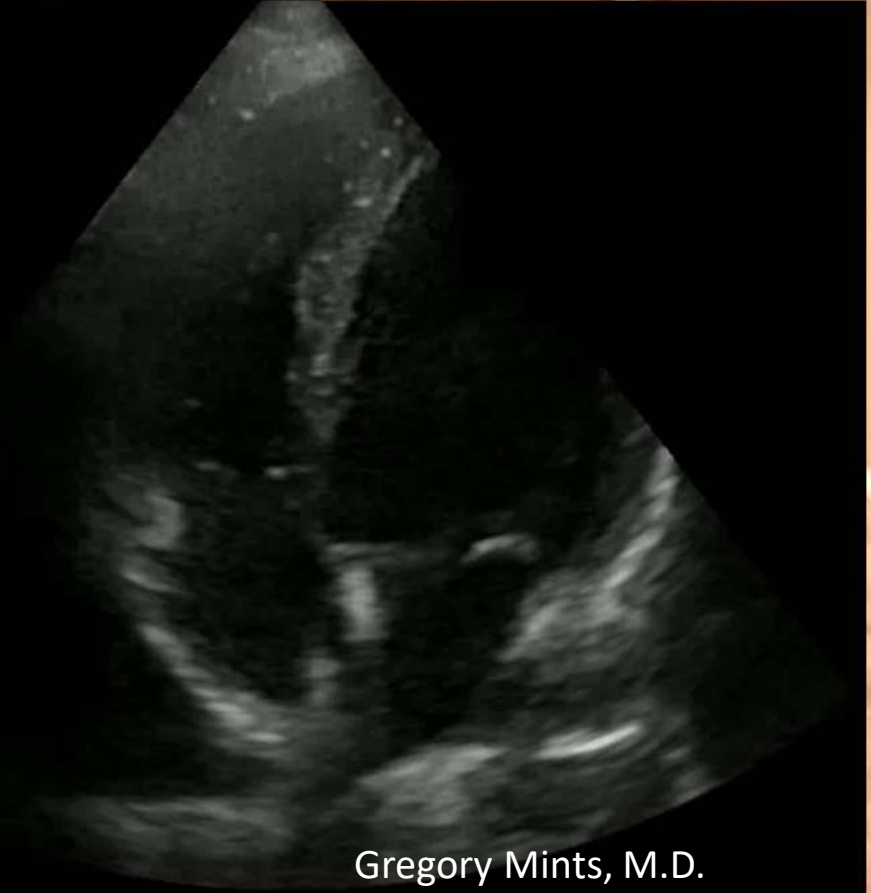
→ Probe needs to be moved this way











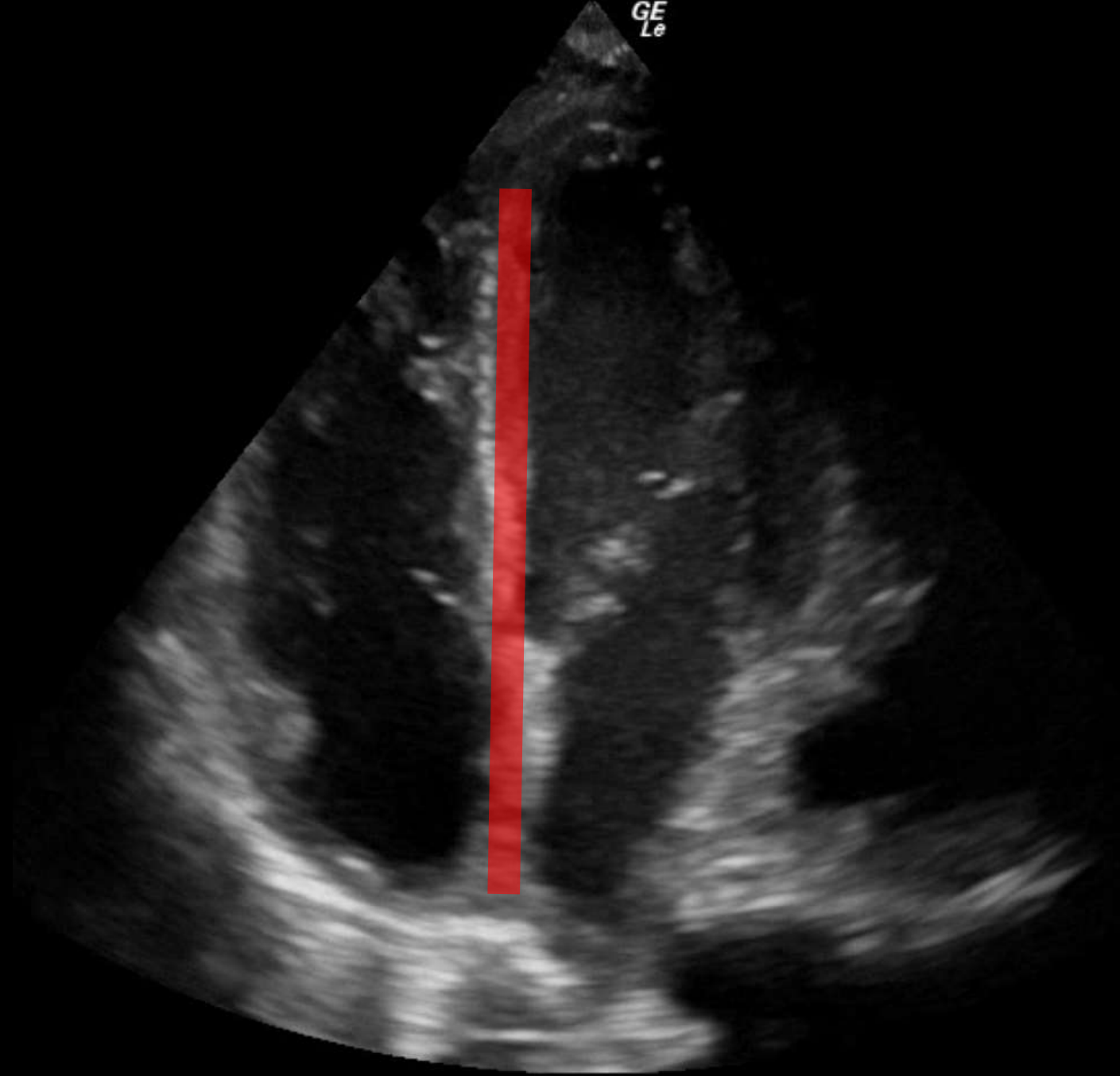
Gregory Mints, M.D.

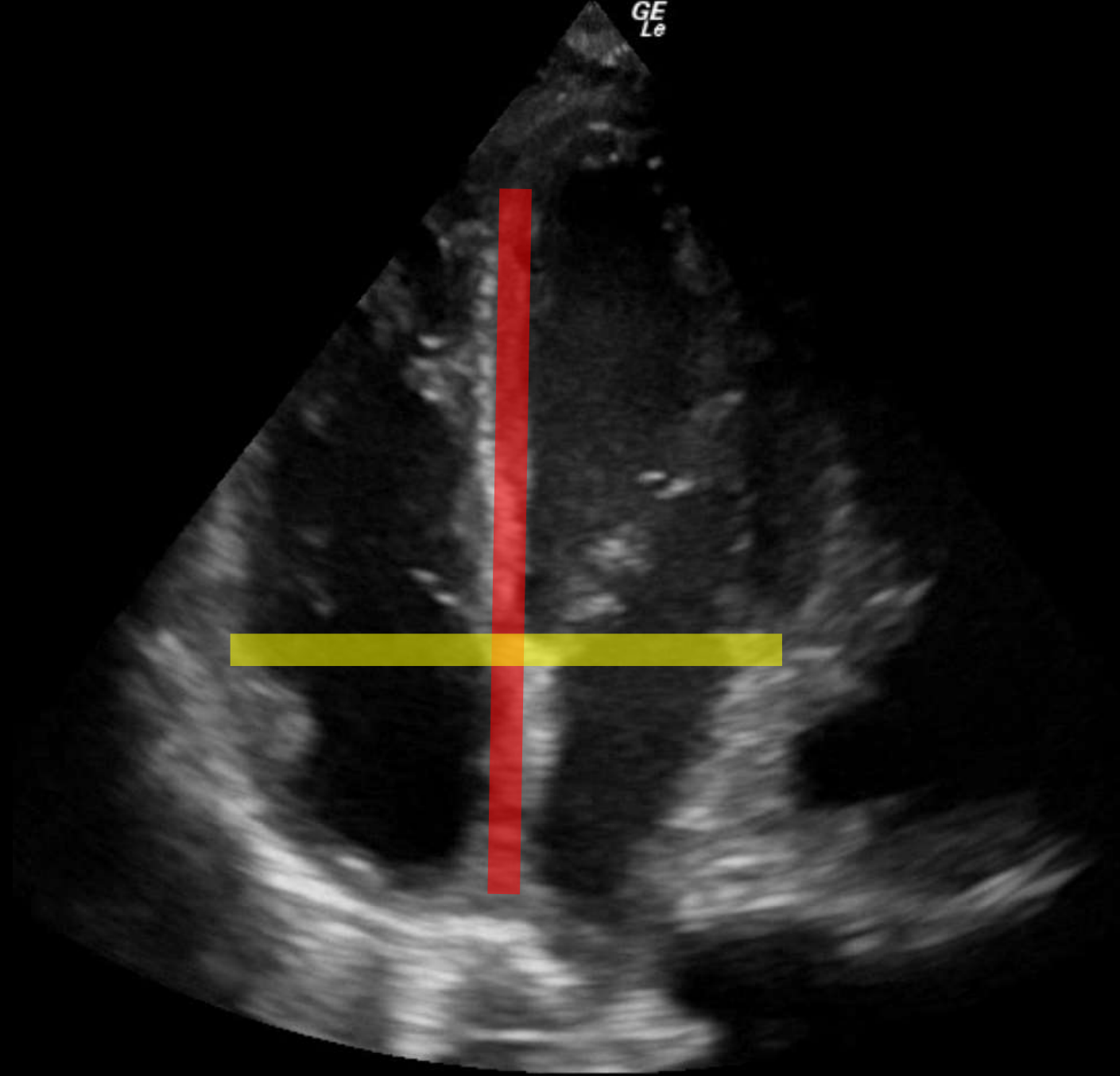
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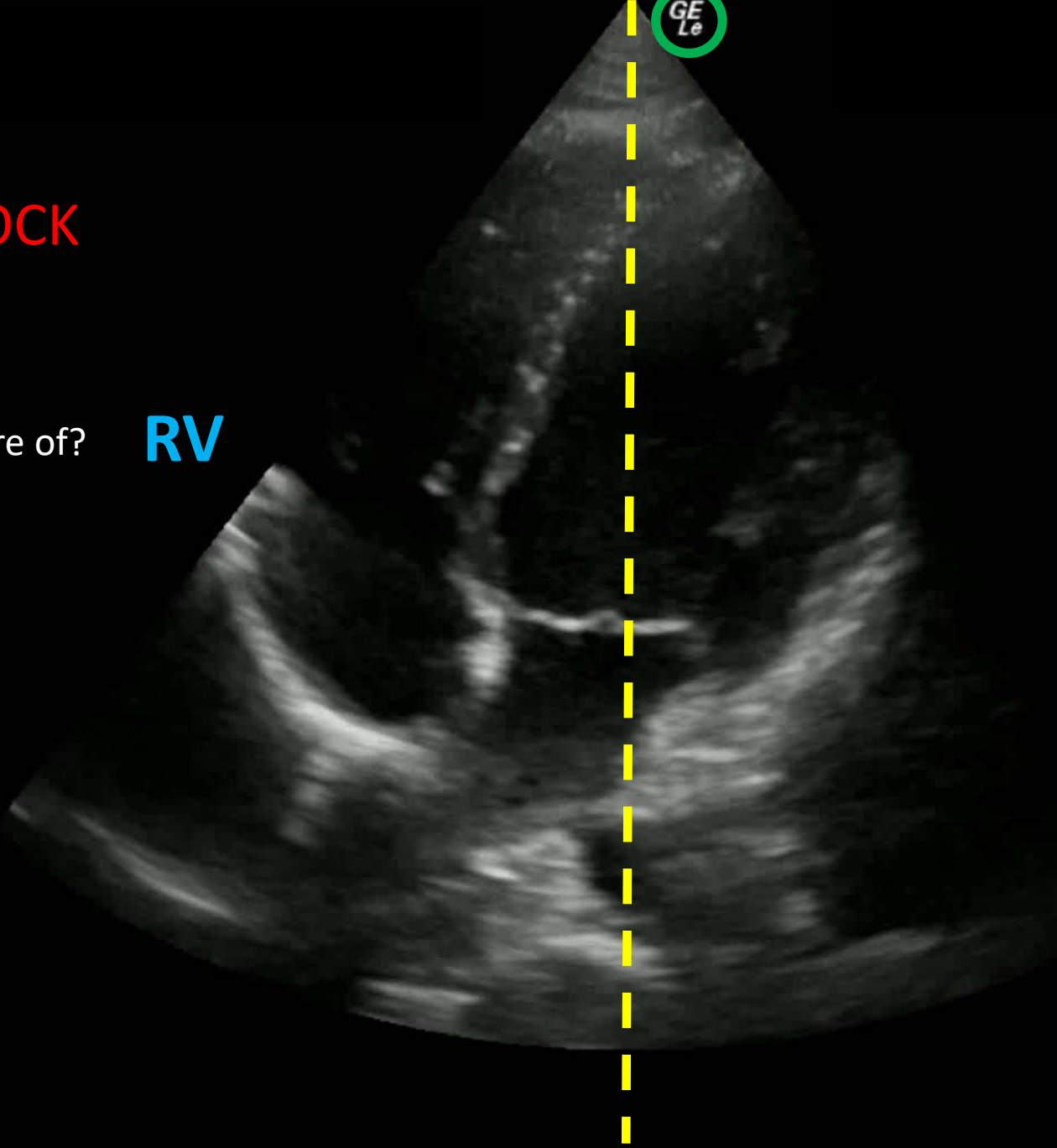
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GE
Le



ROCK

RV

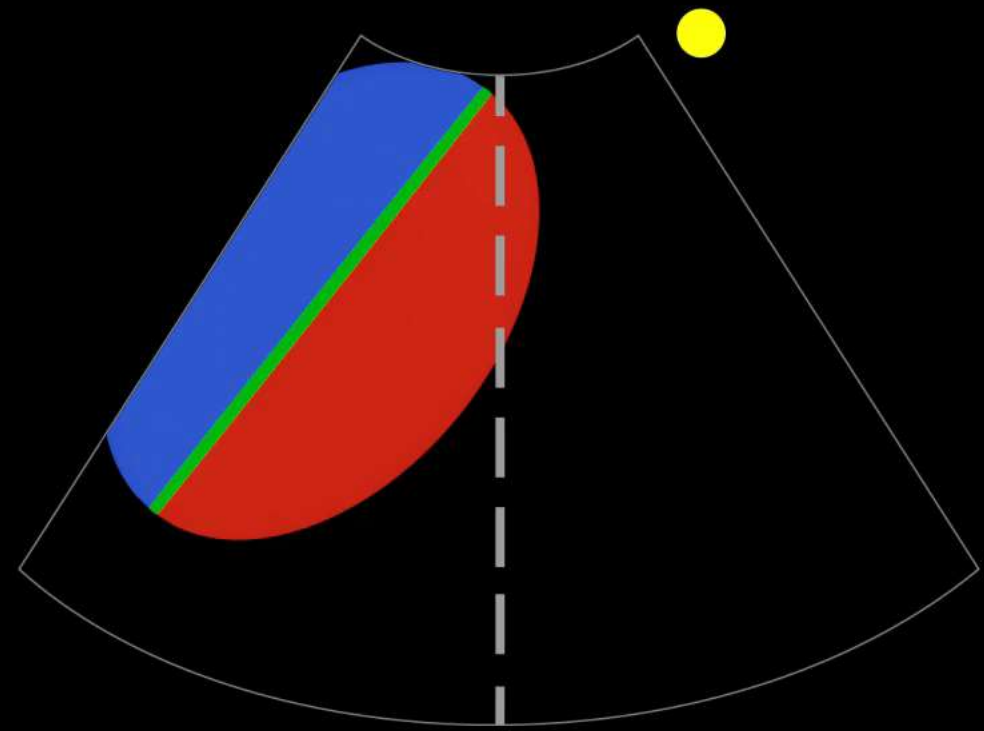
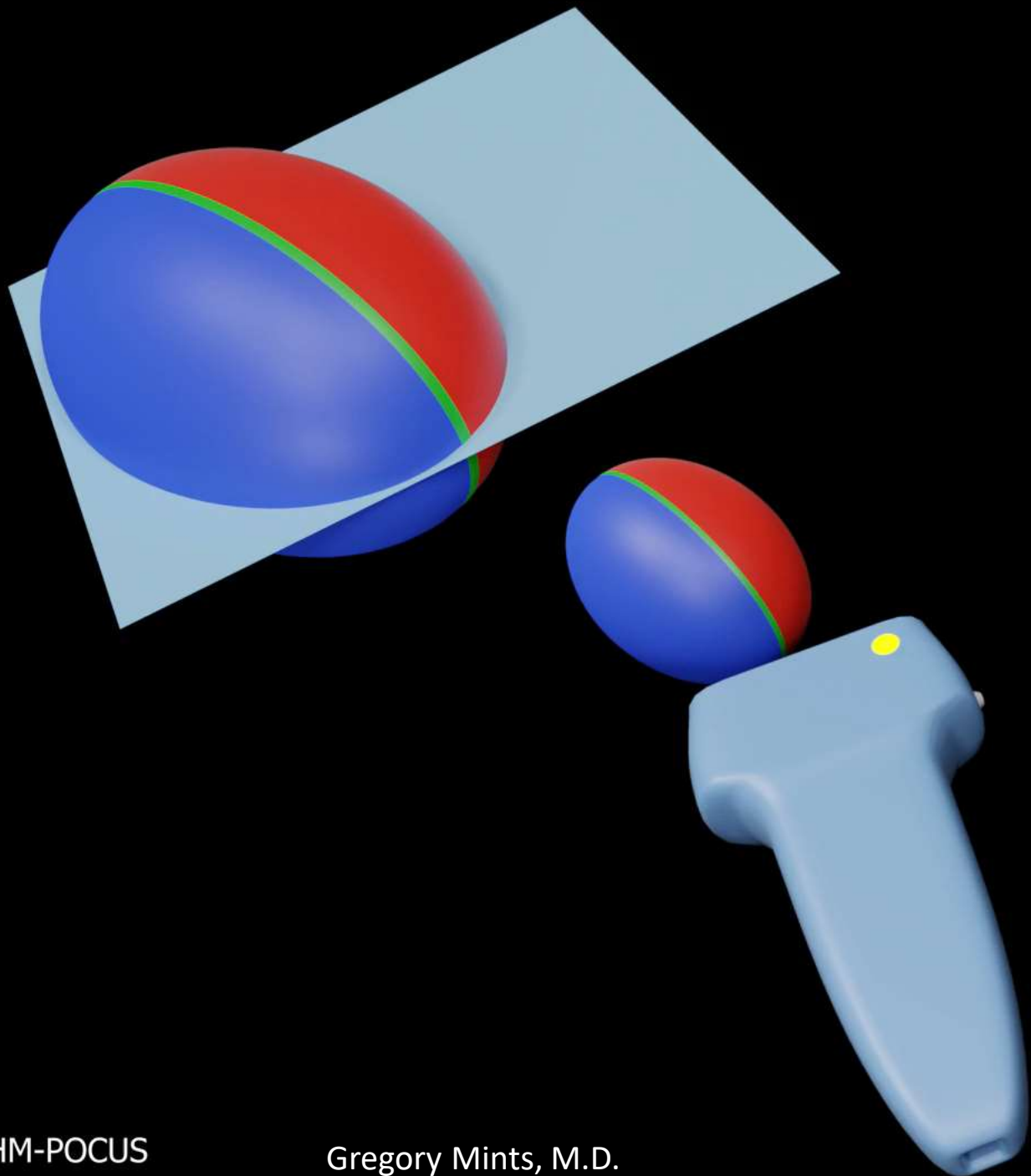
OR

DOT

How to correct this image?

In which direction?

- What structure do you want to see more of?
- Rock towards (= "look at") the **RV**
- OR
- Rock away from the **DOT**



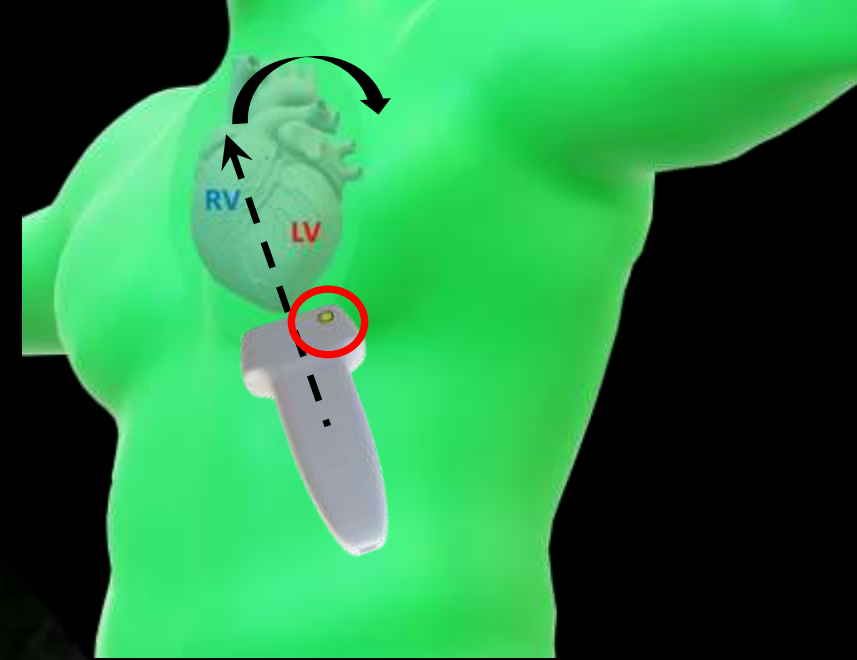
What chamber would u want to see more of?

LV

Rock ("look")
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OR

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towards the **dot**



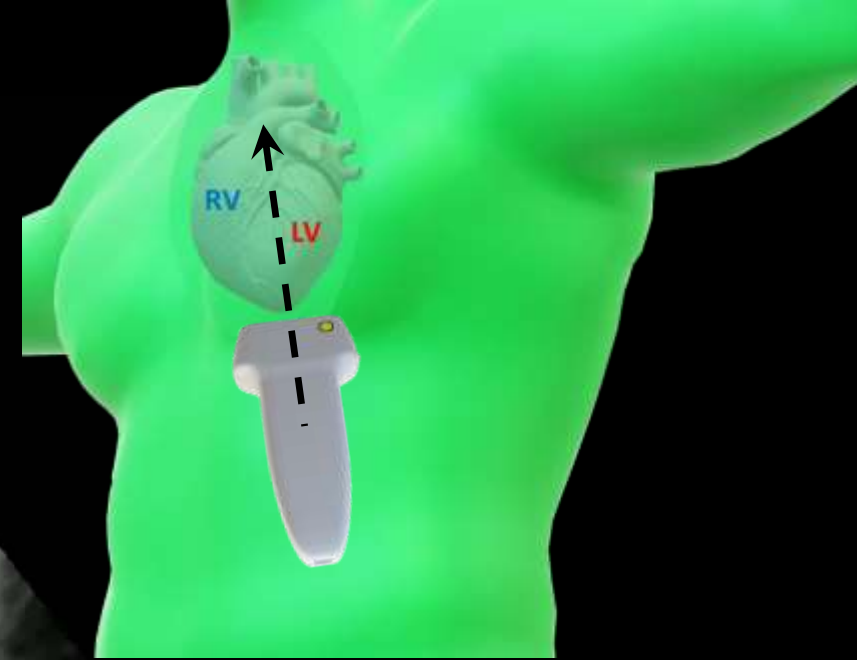
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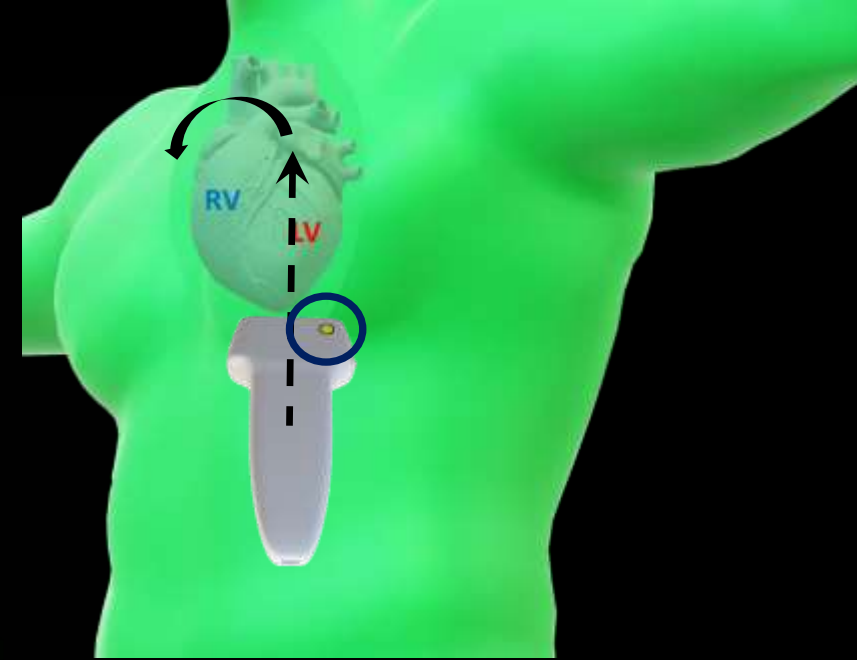
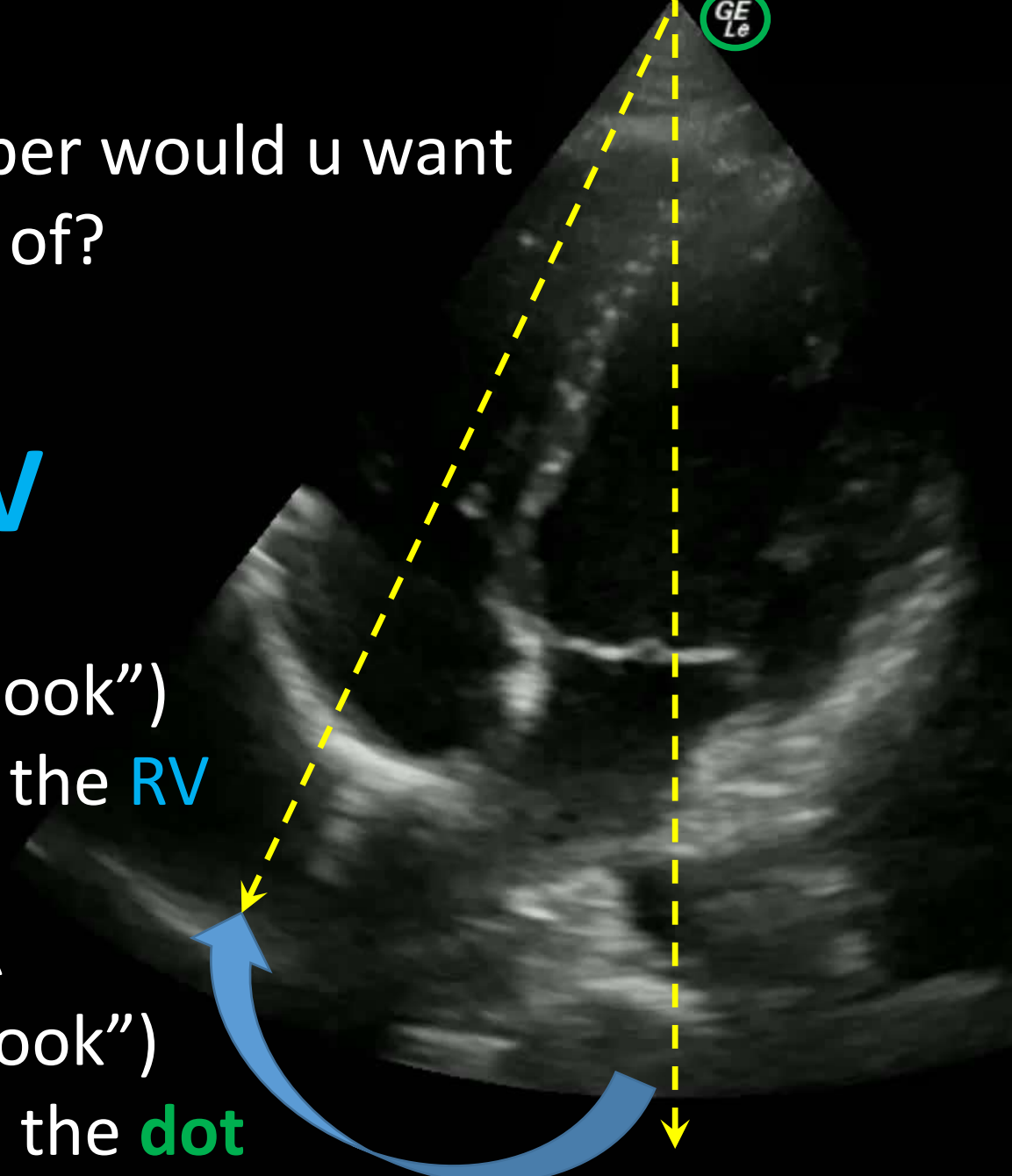
What chamber would u want to see more of?

RV

Rock ("look")
towards the **RV**

OR

Rock ("look")
Away from the **dot**



10-

15-

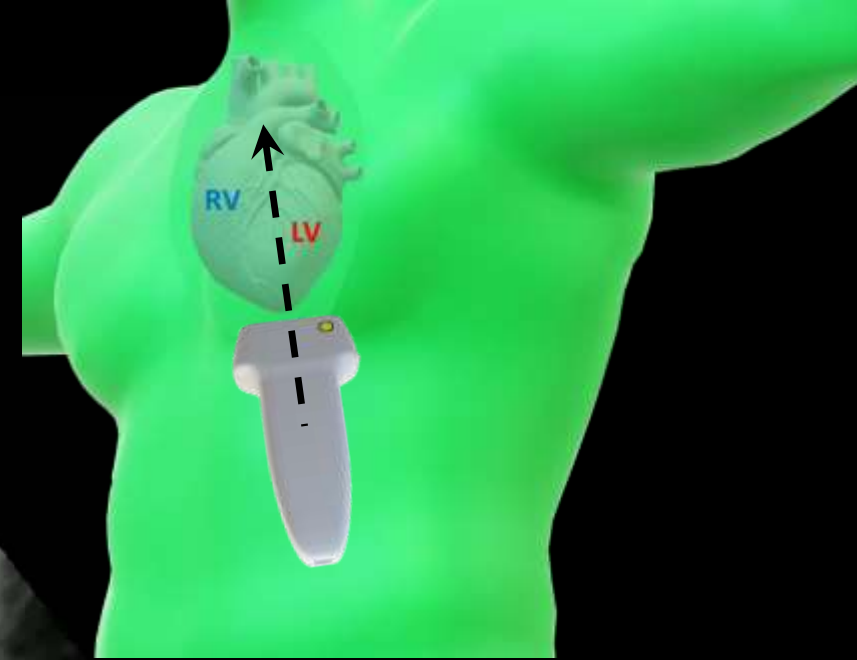
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Exercise 1

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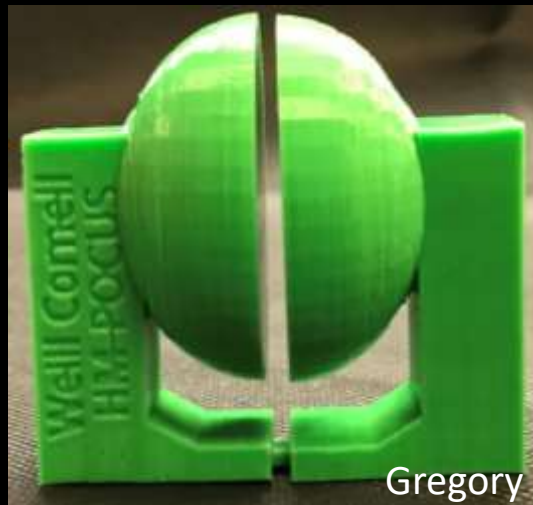
Find an ovoid phantom
(labeled clear container)



Exercise 1

Find an ovoid phantom
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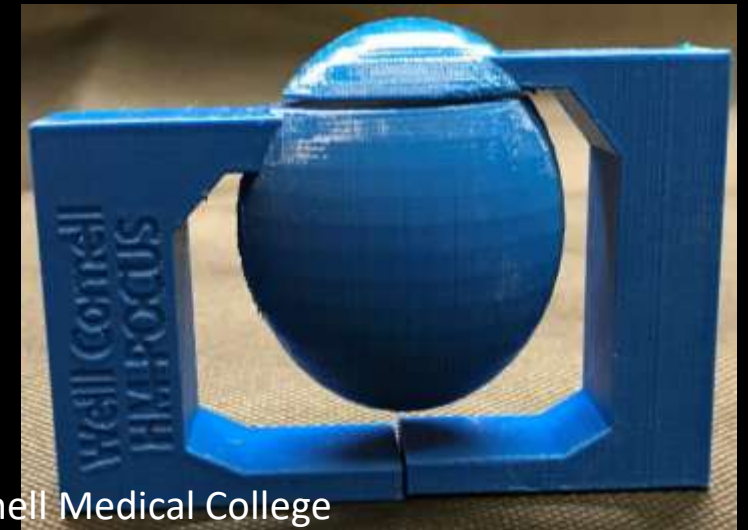
Find ovoid shapes
They will represent LV + LA



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Exercise 1

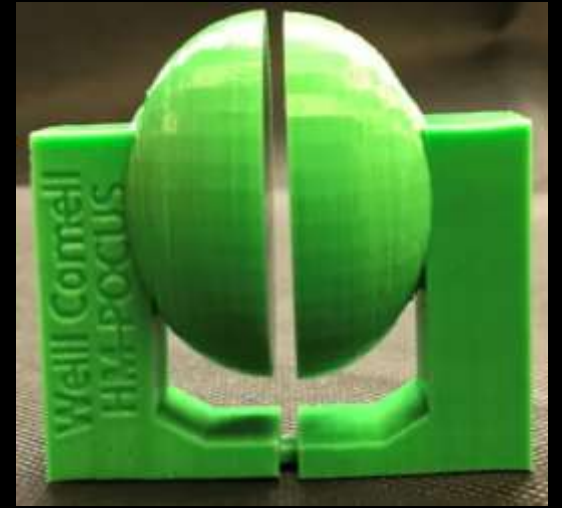
- Find a shape representing an apical 4-chamber view

Exercise 1

- Find a shape representing an apical 4-chamber view
- Scan the phantom and obtain a midline long-axis view

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- Find a shape representing an apical 4-chamber view
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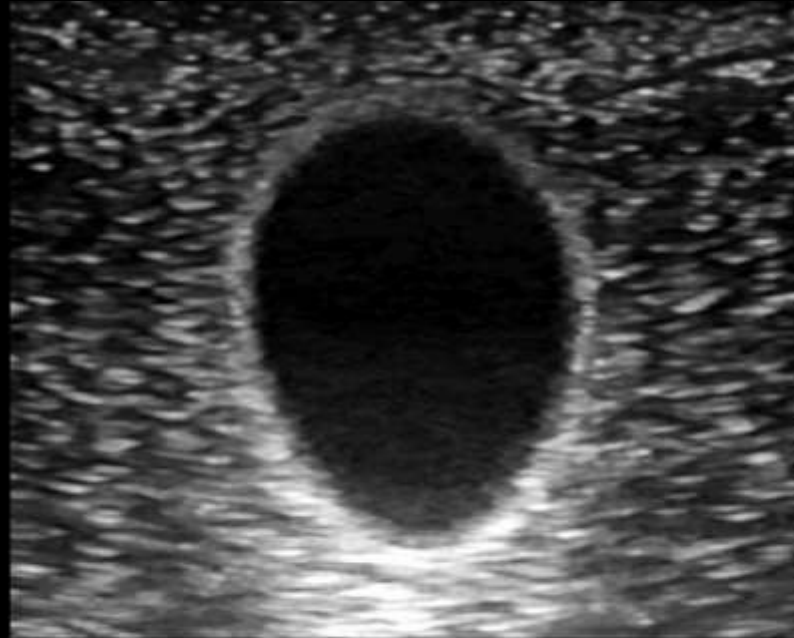


Exercise 1

- Switch scanners

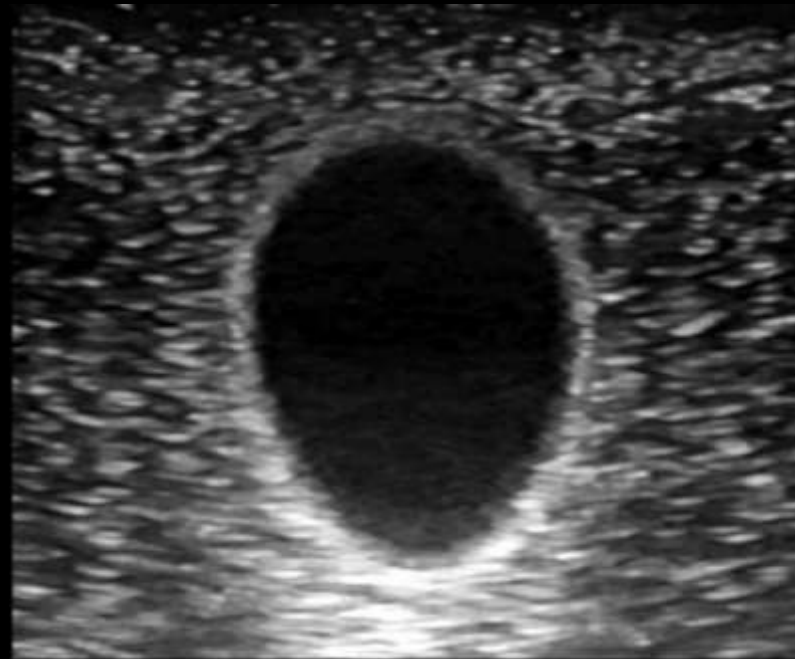
Exercise 1

- Switch scanners
- Obtain a long axis view of the shape



Exercise 1

- Switch scanners
- Obtain a long axis view of the shape
- Sweep until the shape disappears

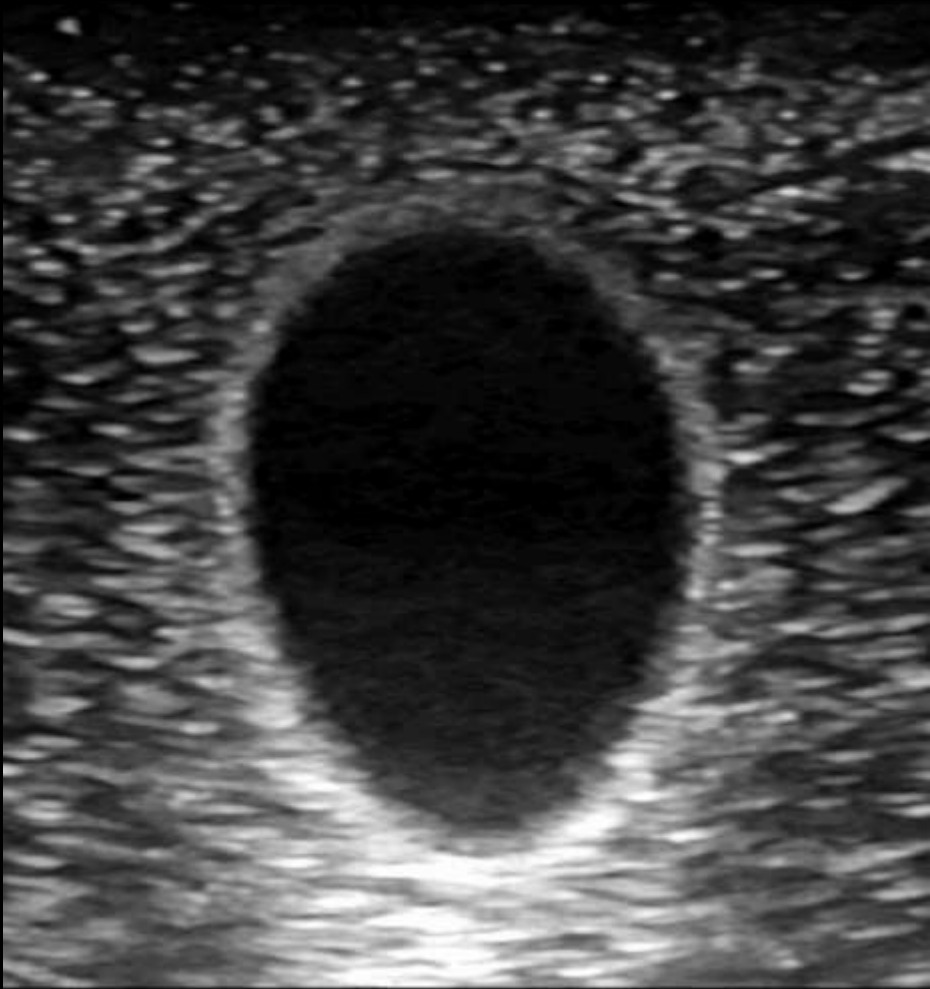


Exercise 1

- Switch scanners
- Obtain a long axis view of the shape
- Sweep until the shape disappears
- Stay in that position
- Tilt to obtain image the shape

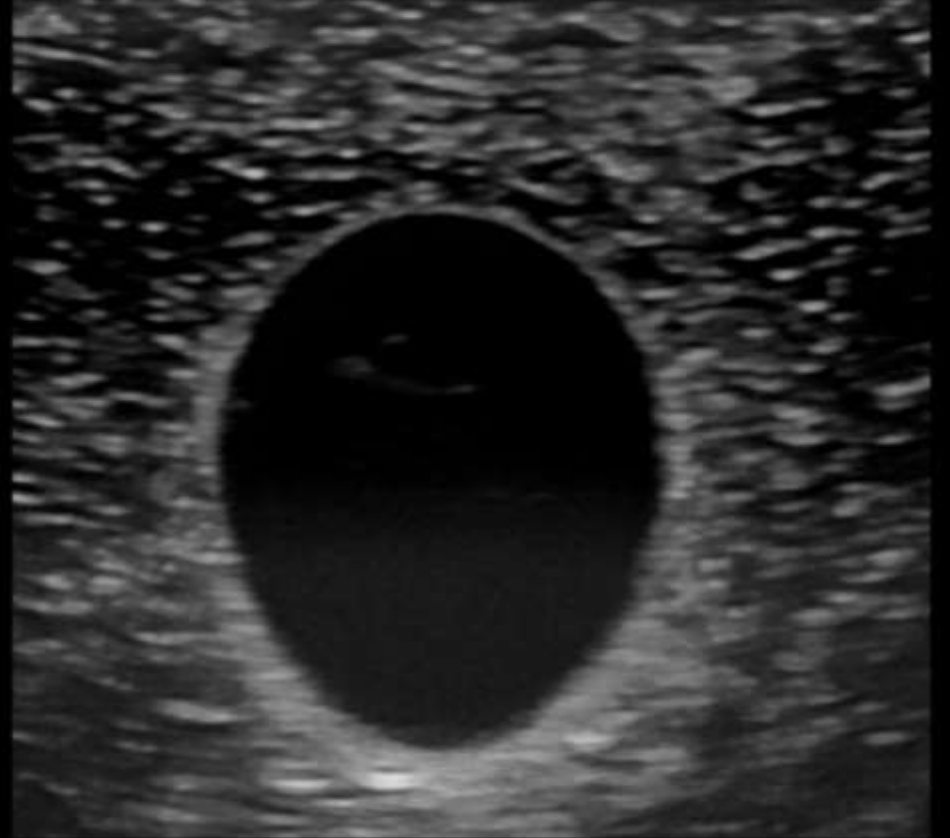


Exercise 1



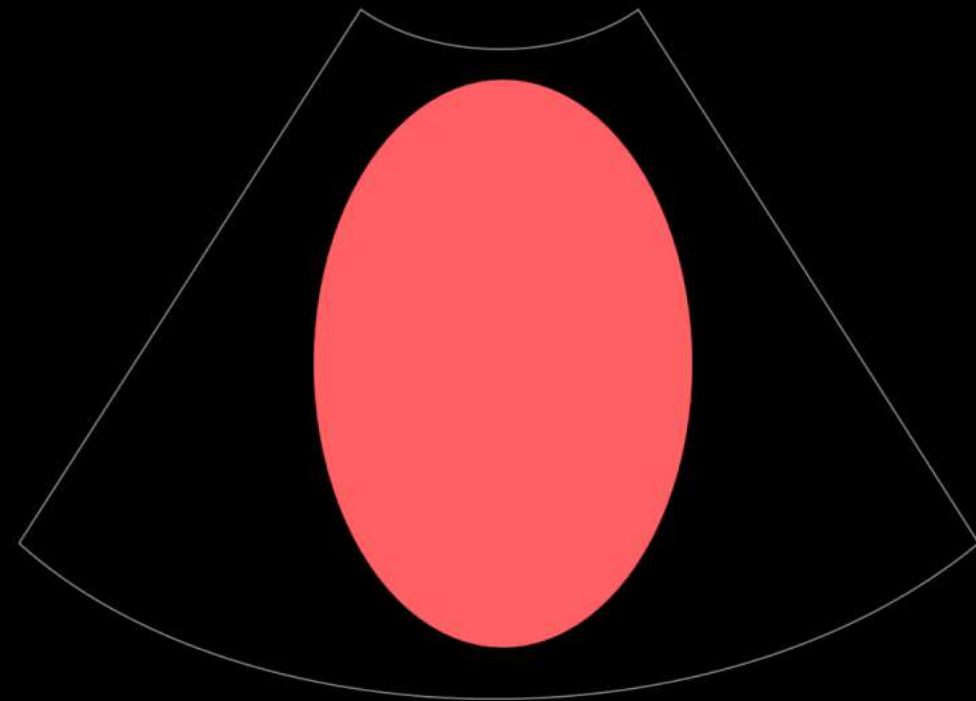
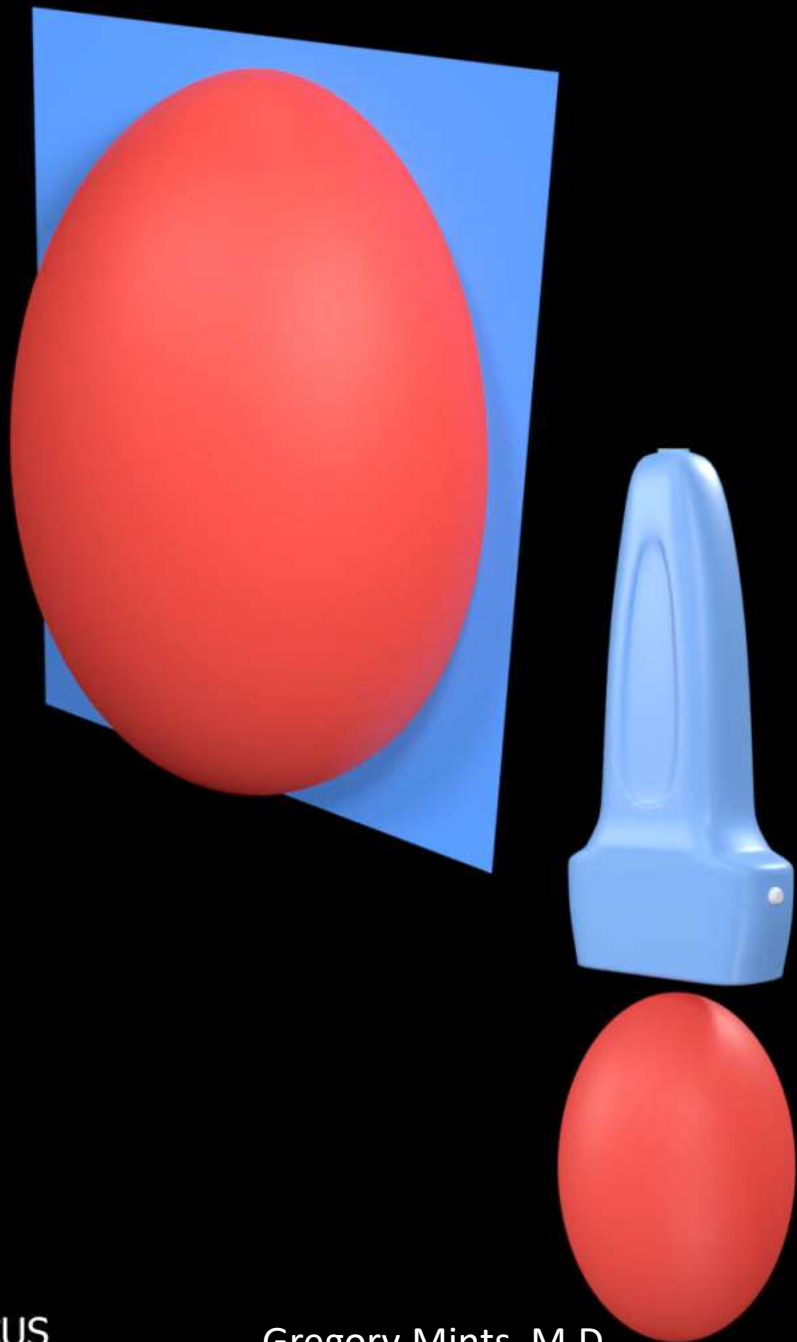
original

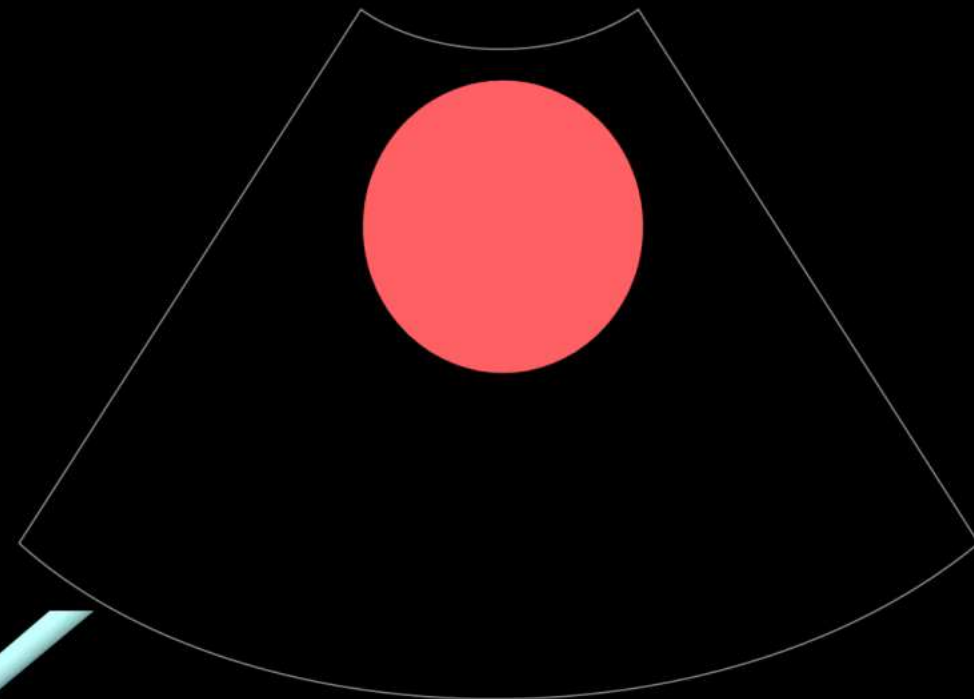
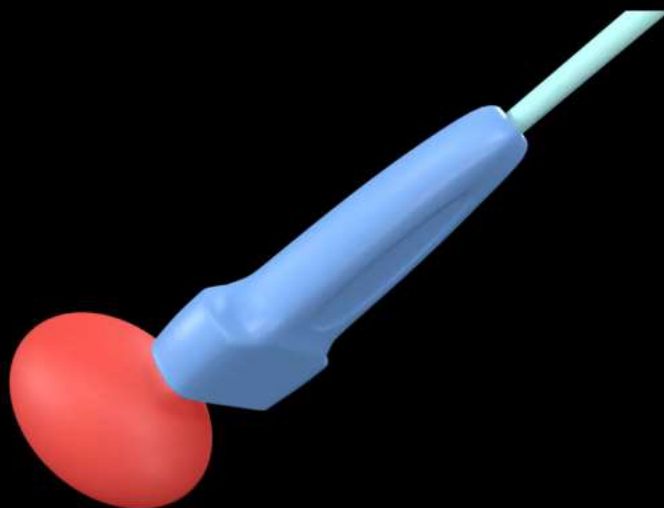
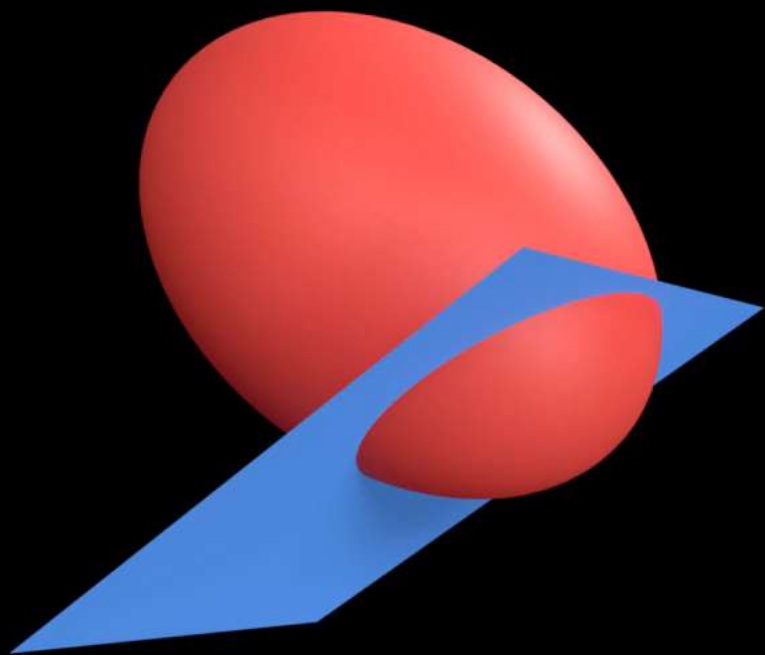
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slide + tilt

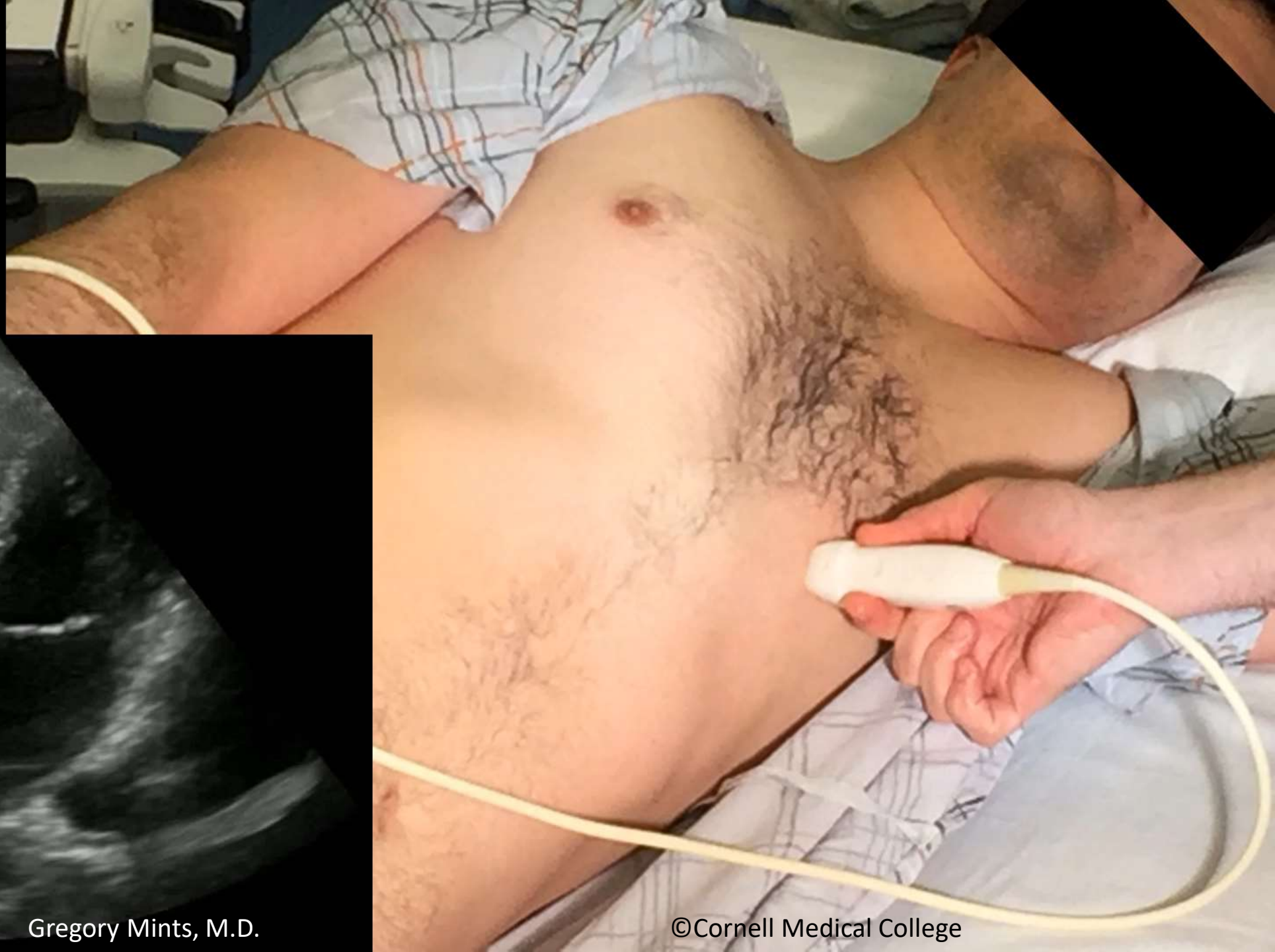
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slide 2. LV apex is at the screen's midline

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slide caudally
↓
tilt cranially 4. **The heart is oblong (≈ oval), not round**

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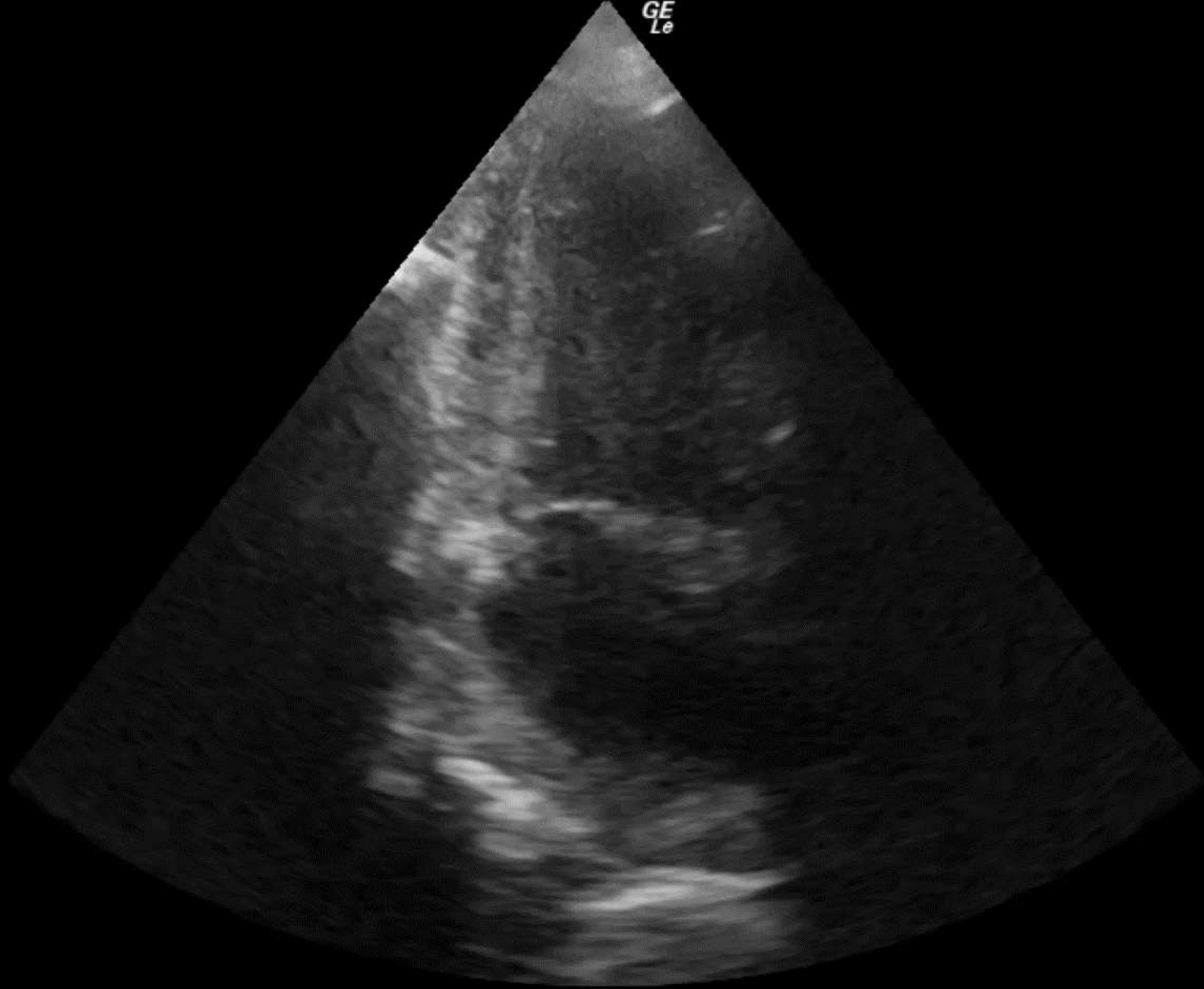
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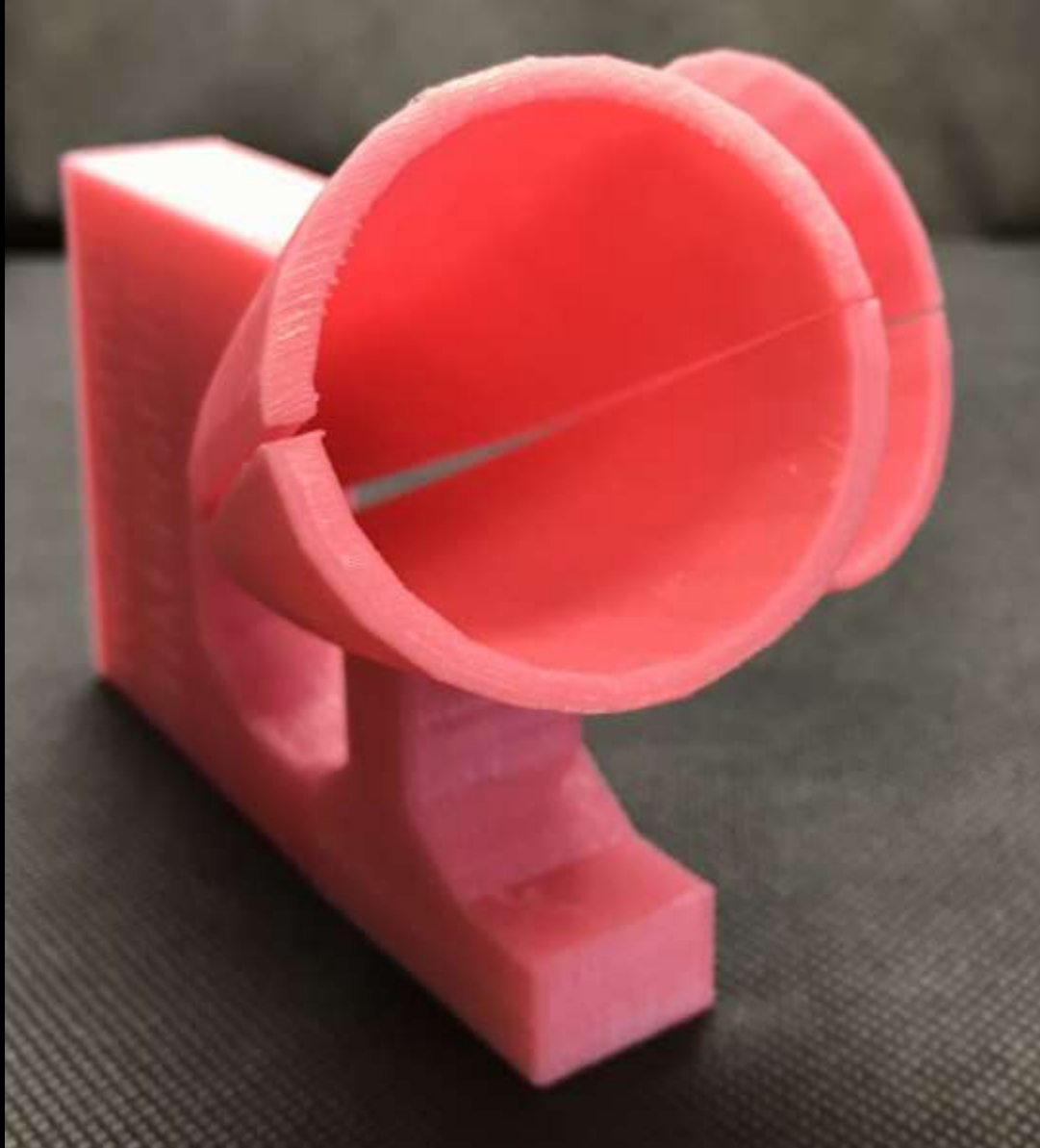
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5. **Max RV diameter**

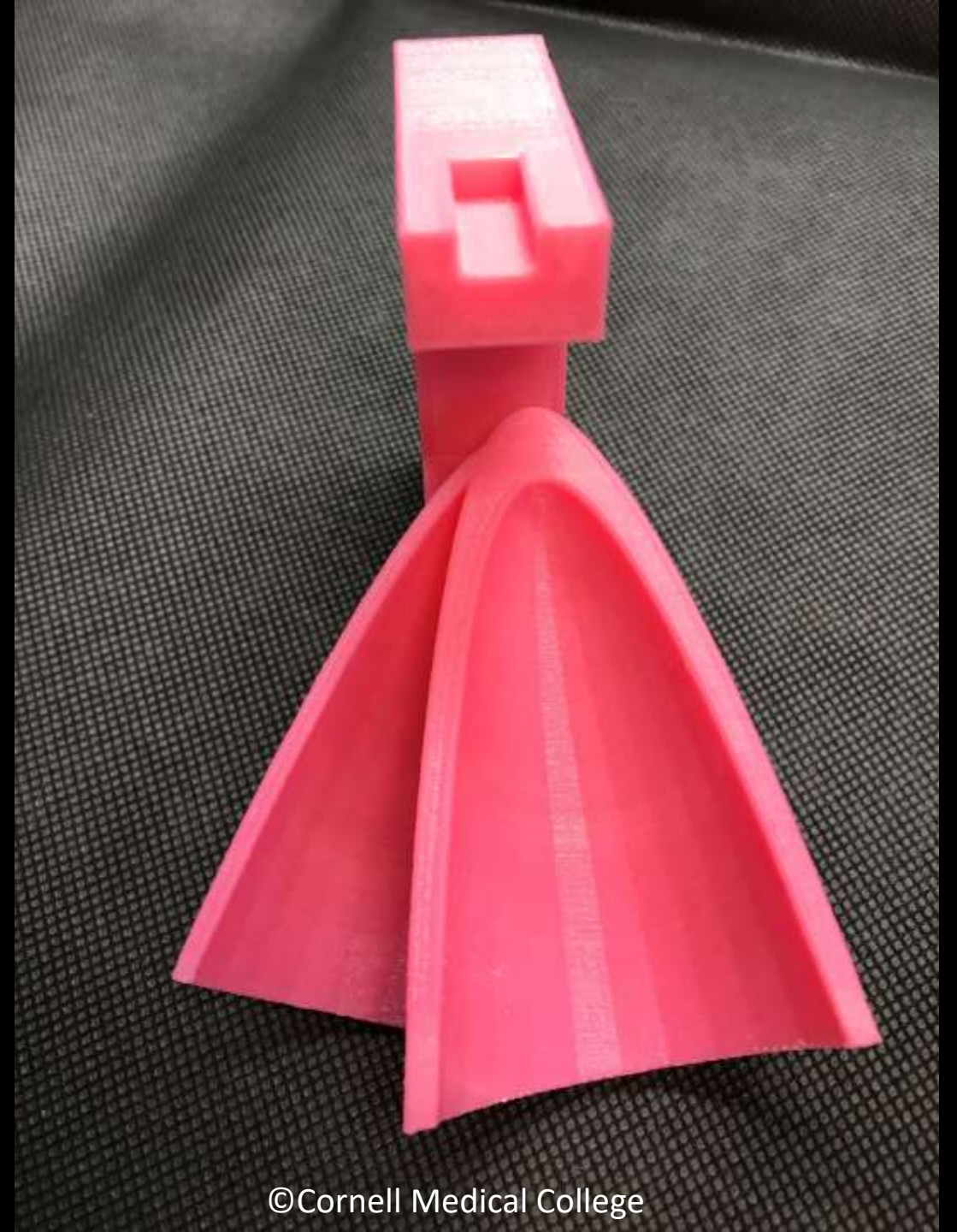




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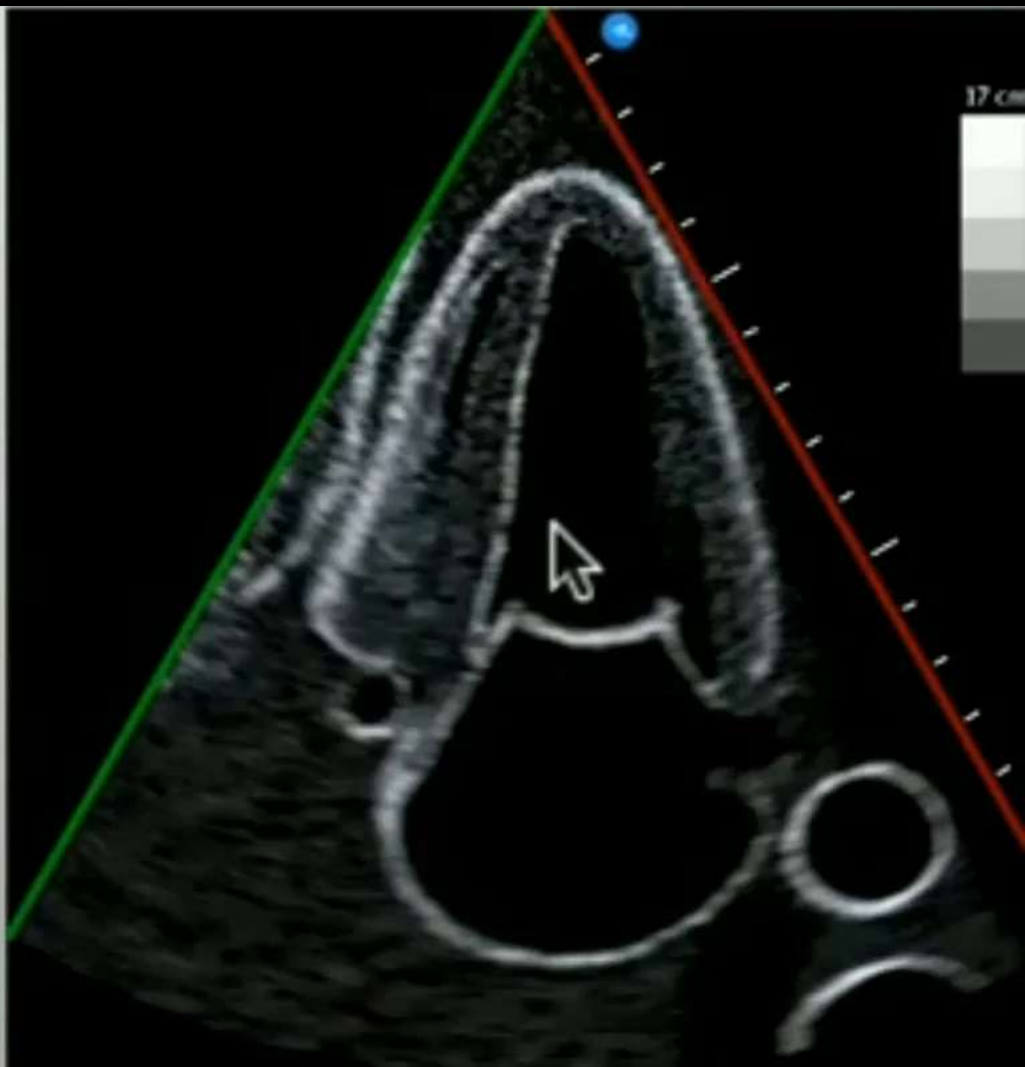
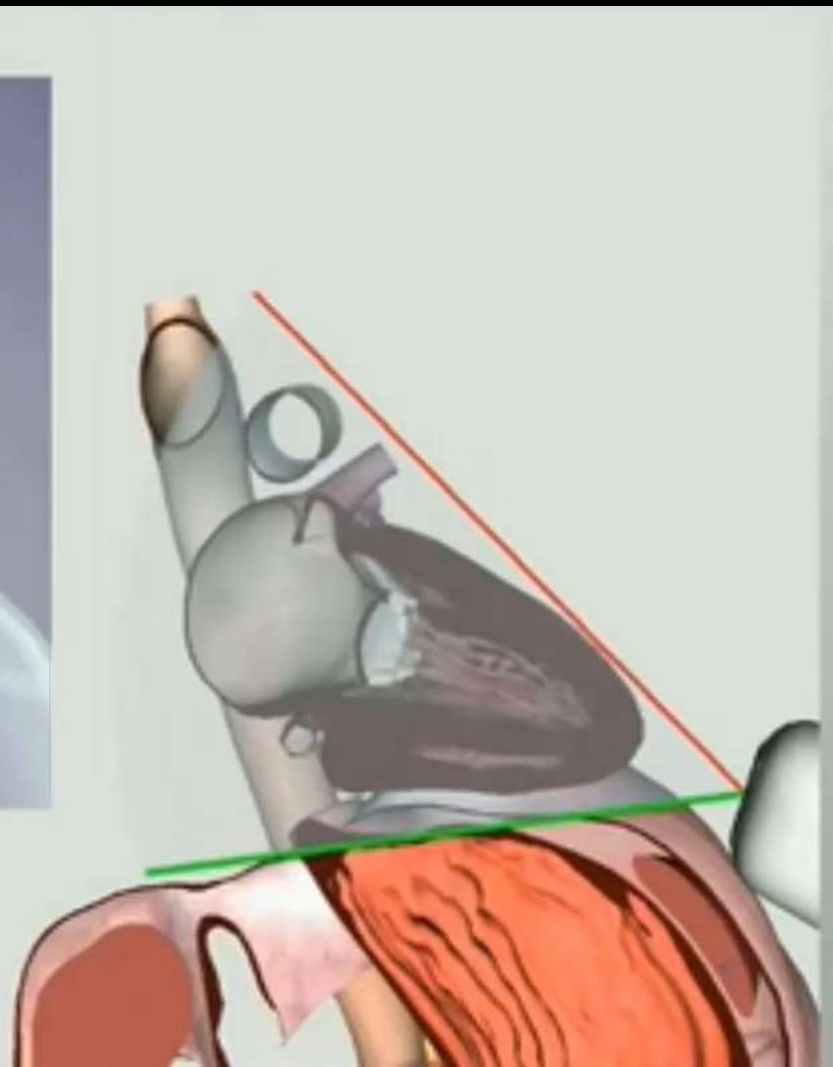
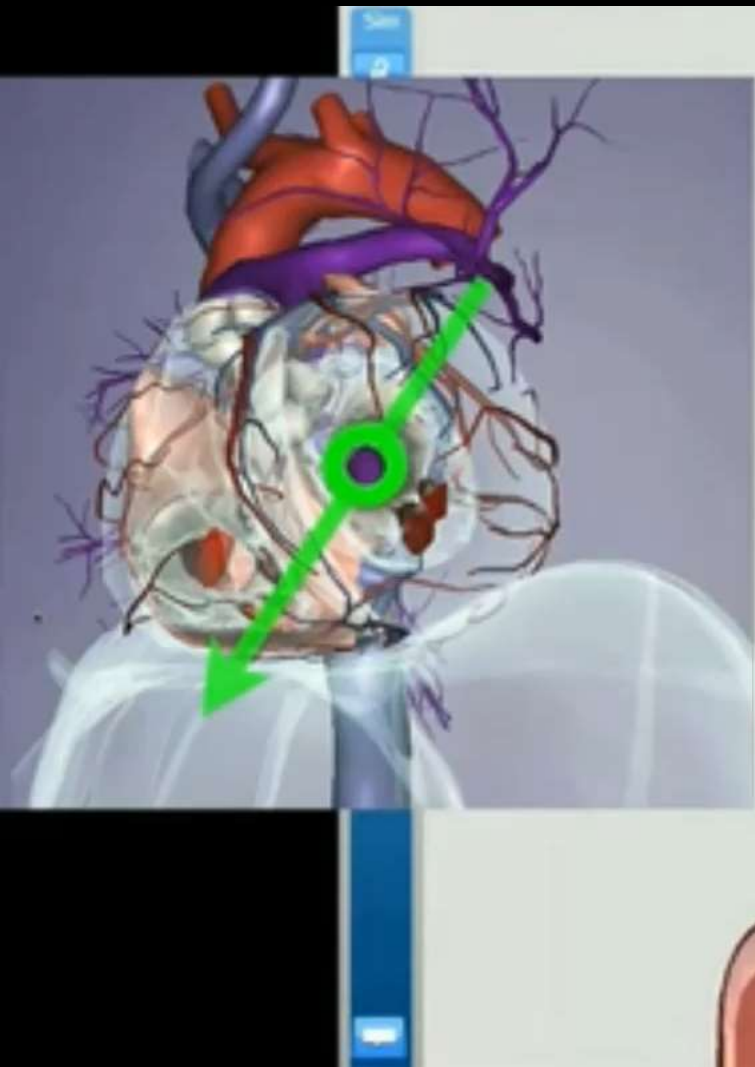
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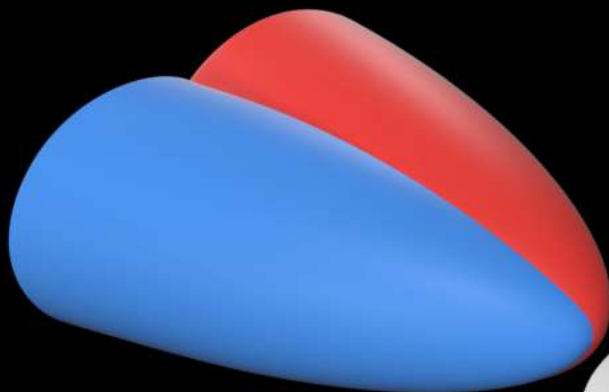
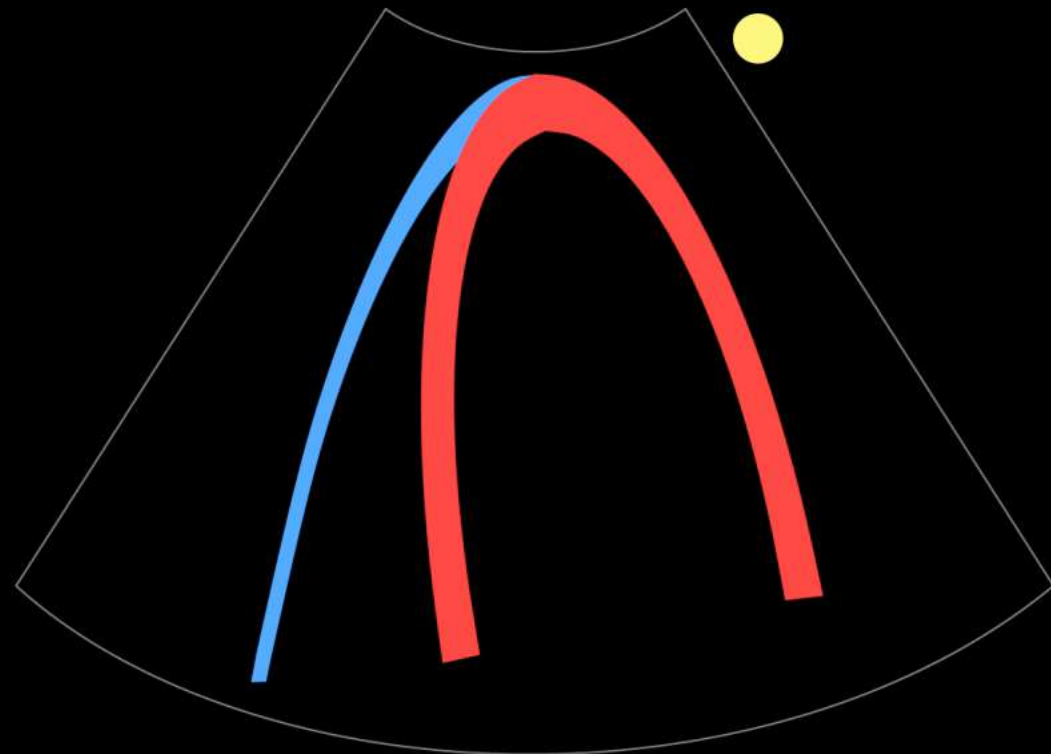
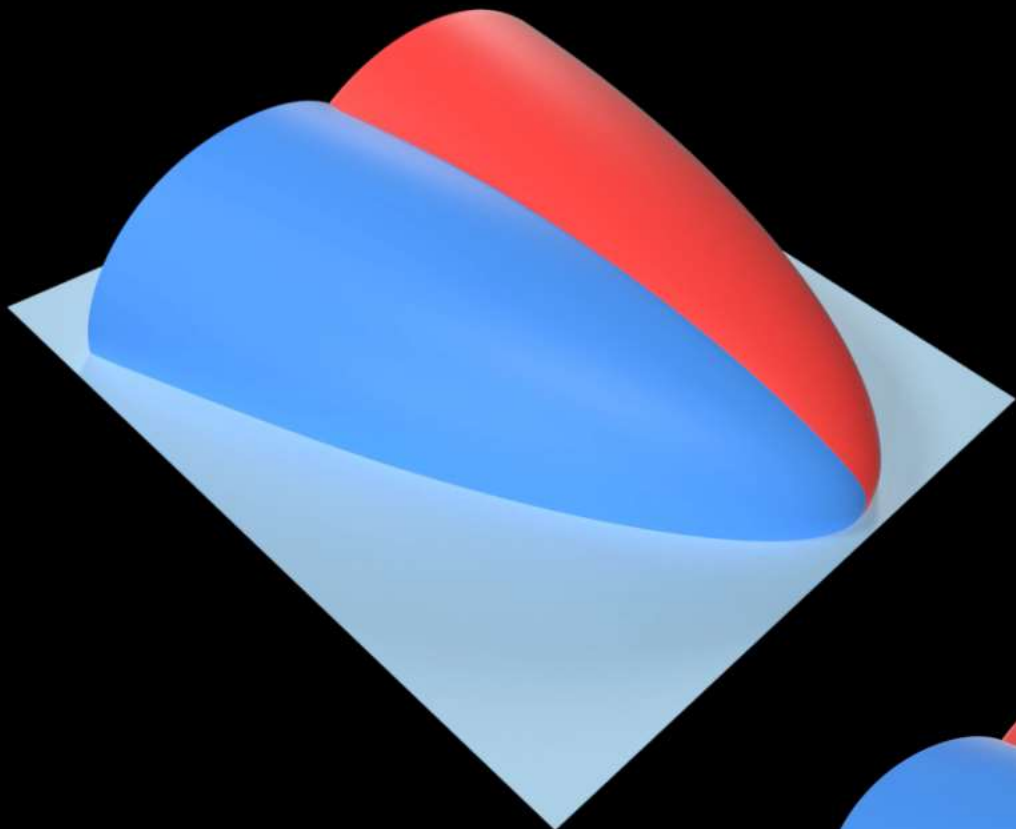


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slide caudally
↓
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5. **Max RV diameter**

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tilt

1. 4 chambers seen (2 atria, 2 ventricles)

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slide

2. LV apex is at the screen's midline

rock

3. Septum is vertical (AV annuli – horizontal)

slide caudally



tilt cranially

4. The heart is oblong (\approx oval), not round

rotate

5. **Max RV diameter**

A4

	Problem	Possible Cause	Solution
1	No atria	Coronary sinus view	Tilt to the ventrally
2	LVOT/Aorta visible	A5-view	Tilt to the dorsally
3	LV apex is not at the midline	Probe is not over LV apex	Slide
4	Septum is not vertical	Probe is rocked away	Rock
5	Round heart (ventricles ≈atria)	Probe is too high on the chest	Sweep down a rib space, Then tilt ventrally
6	No (or small) RV	A2-view	Rotate