



ACEPAEMUS

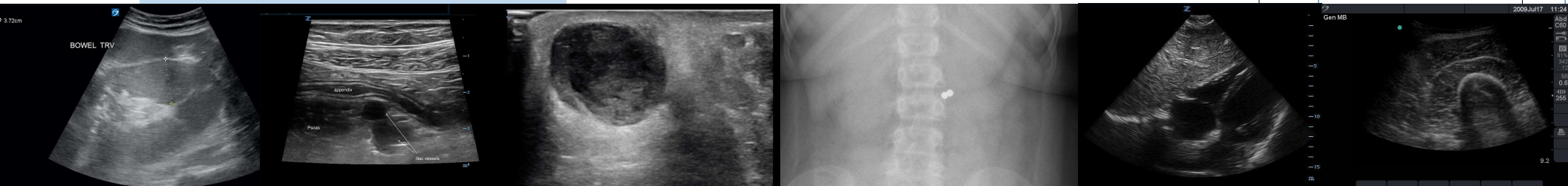
ADVANCED EMERGENCY MEDICINE ULTRASONOGRAPHY

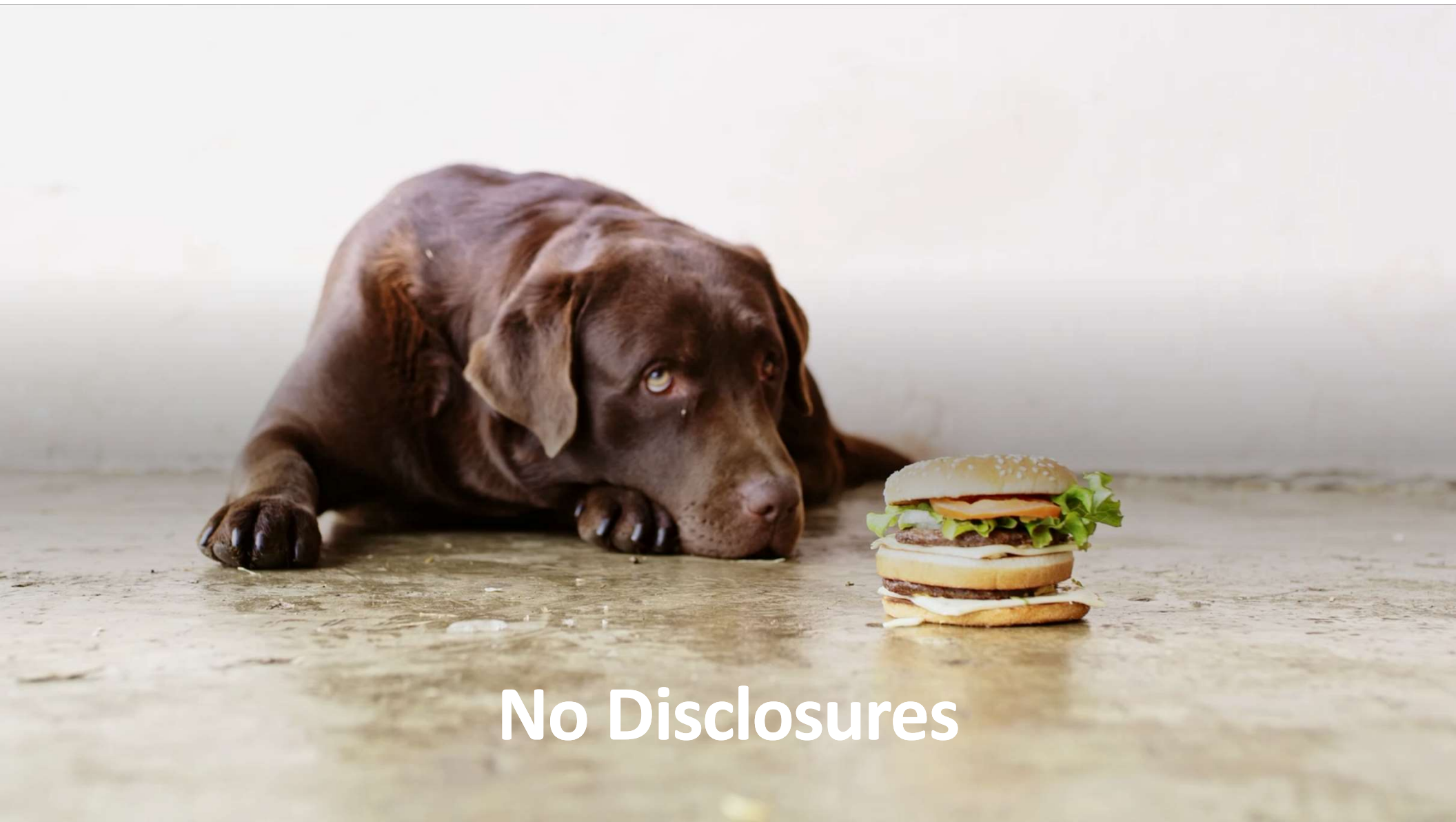
**Focused Practice Designation
Exam Review Course**

January 9, 2024

Basic Echocardiography

Petra Duran-Gehring, MD





No Disclosures

2023 Core Content

1.1.2 Cardiac

1.1.2.1 Basic

1.1.2.1.1 Cardiac arrest

1.1.2.1.2 Global left ventricular function

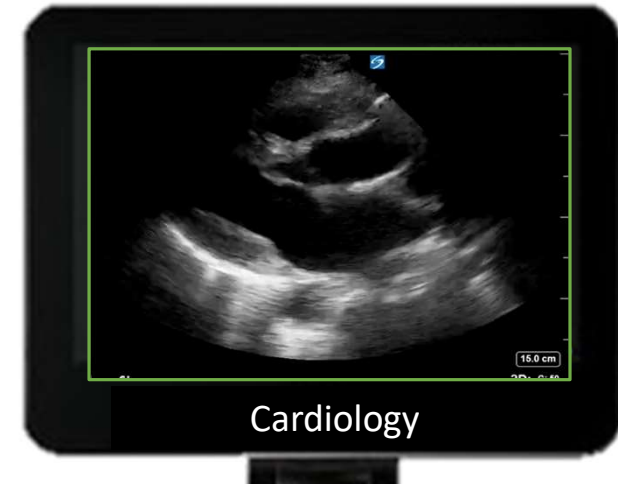
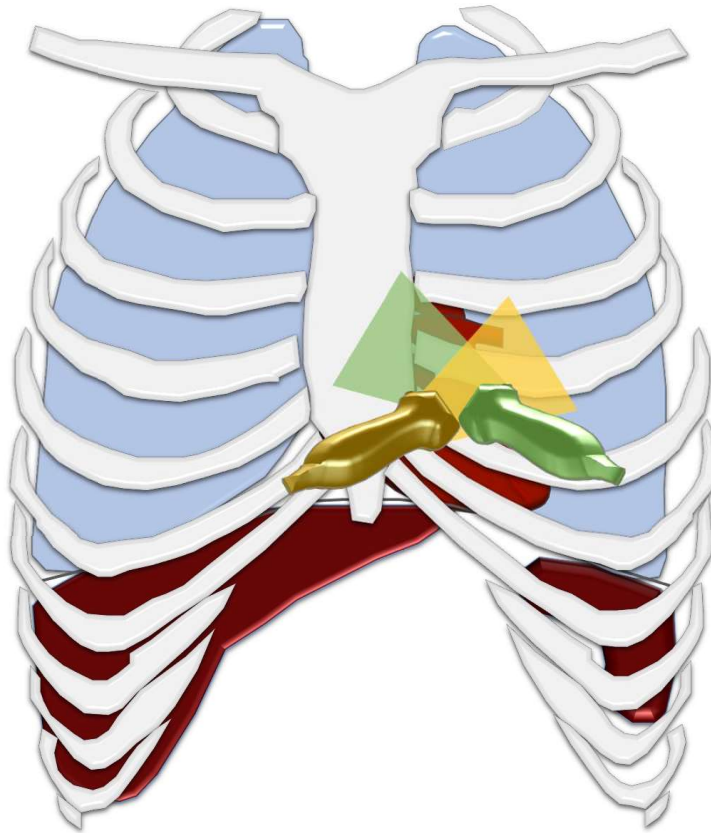
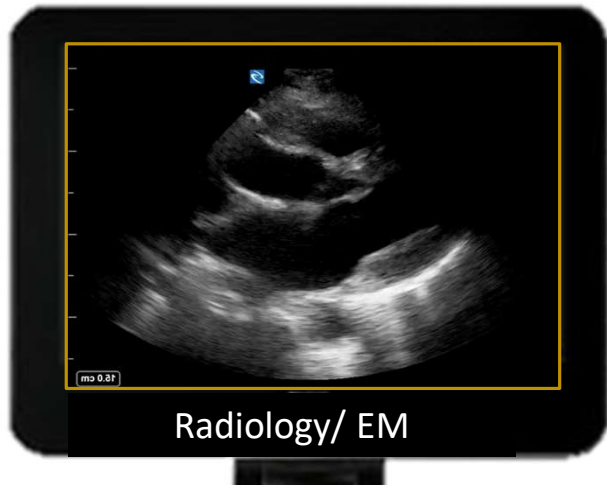
1.1.2.1.3 Global right ventricular size

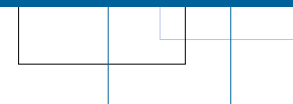
1.1.2.1.4 Pericardial fluid

1.1.2.1.5 Tamponade physiology

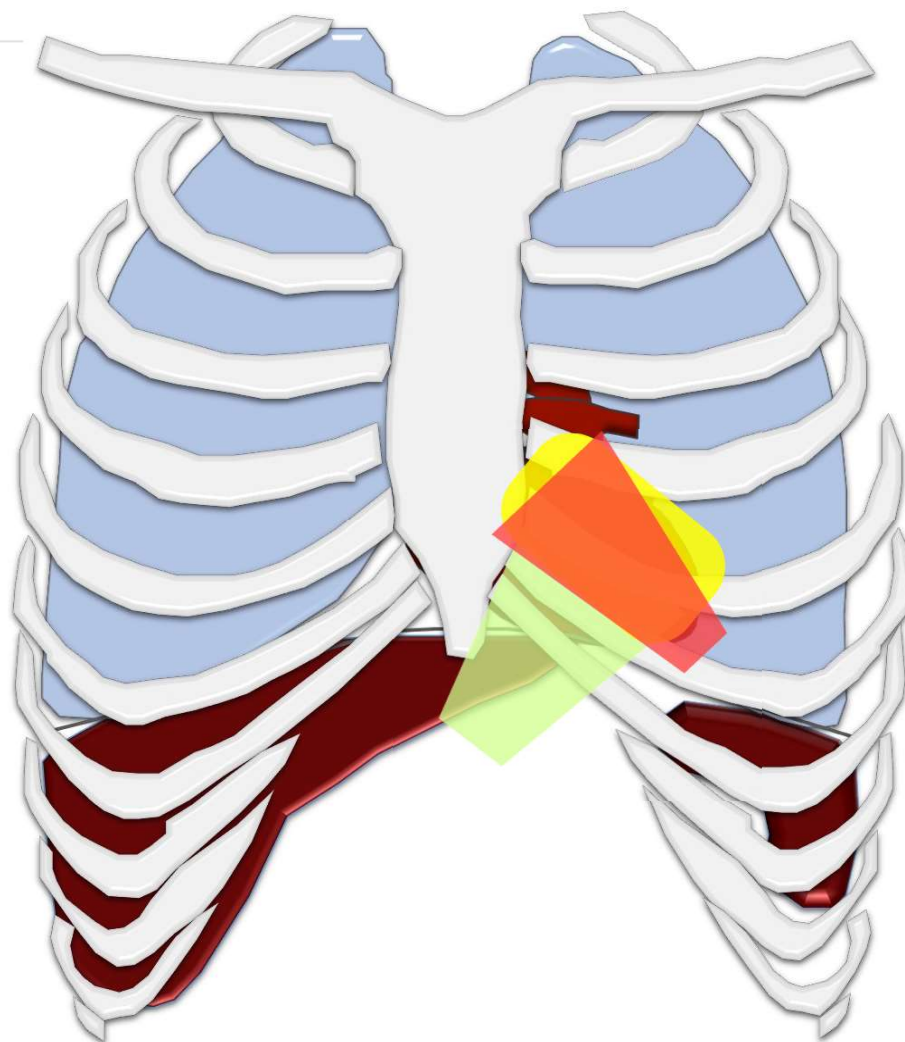
1.1.2.1.6 Inferior vena cava

Adhiikari S, et al. PMID: 37564703.



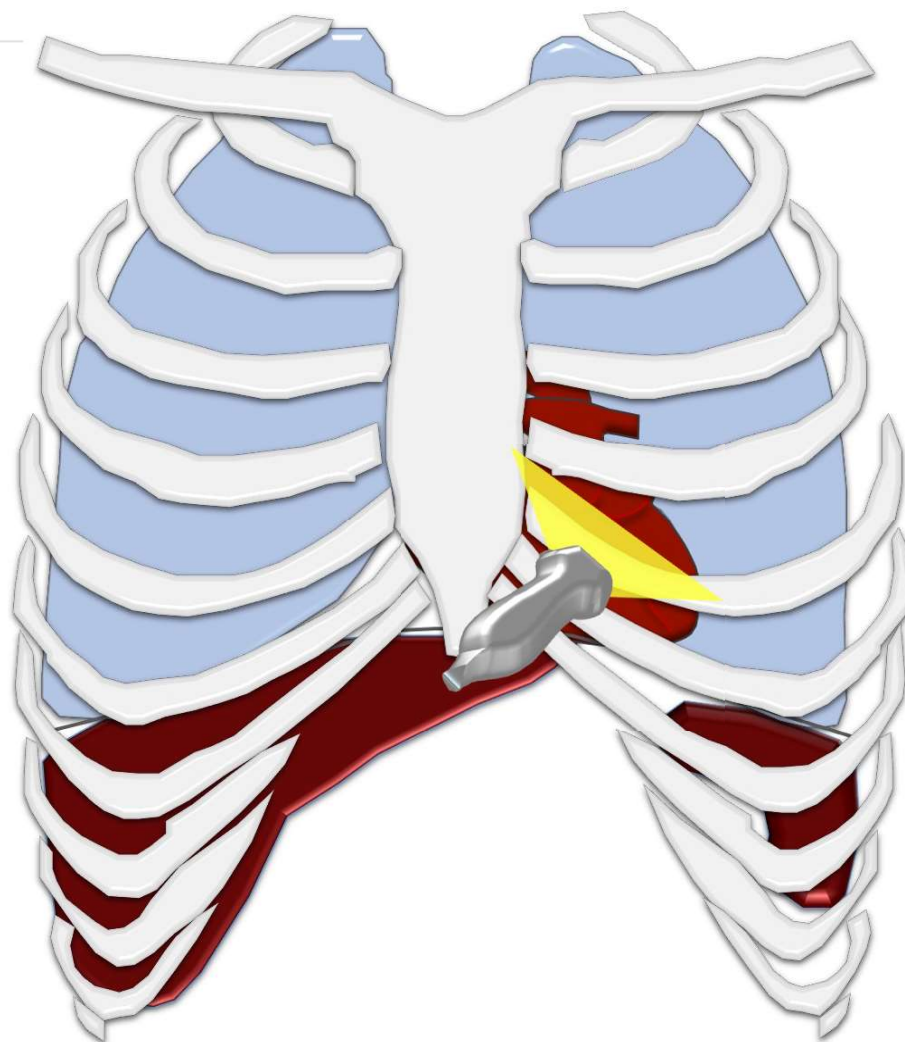


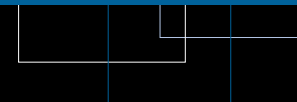
3 windows



6 views

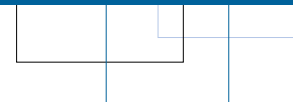
Parasternal Long



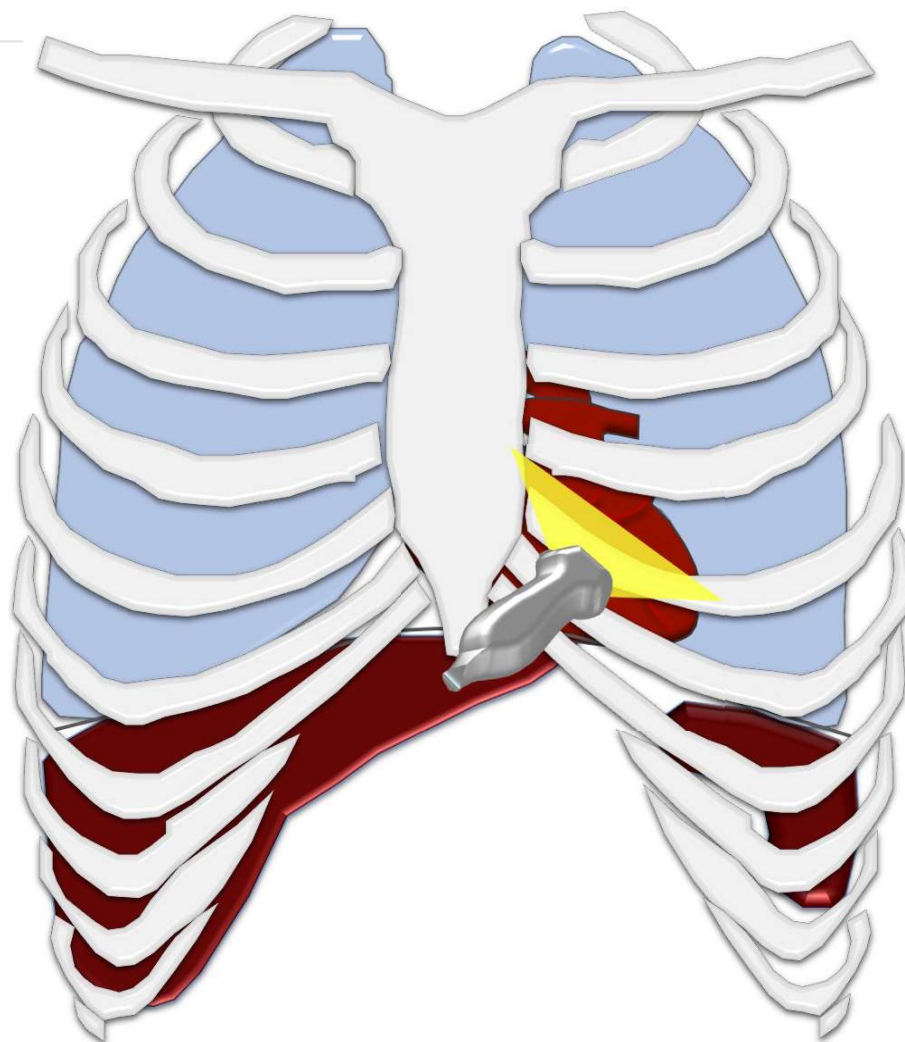


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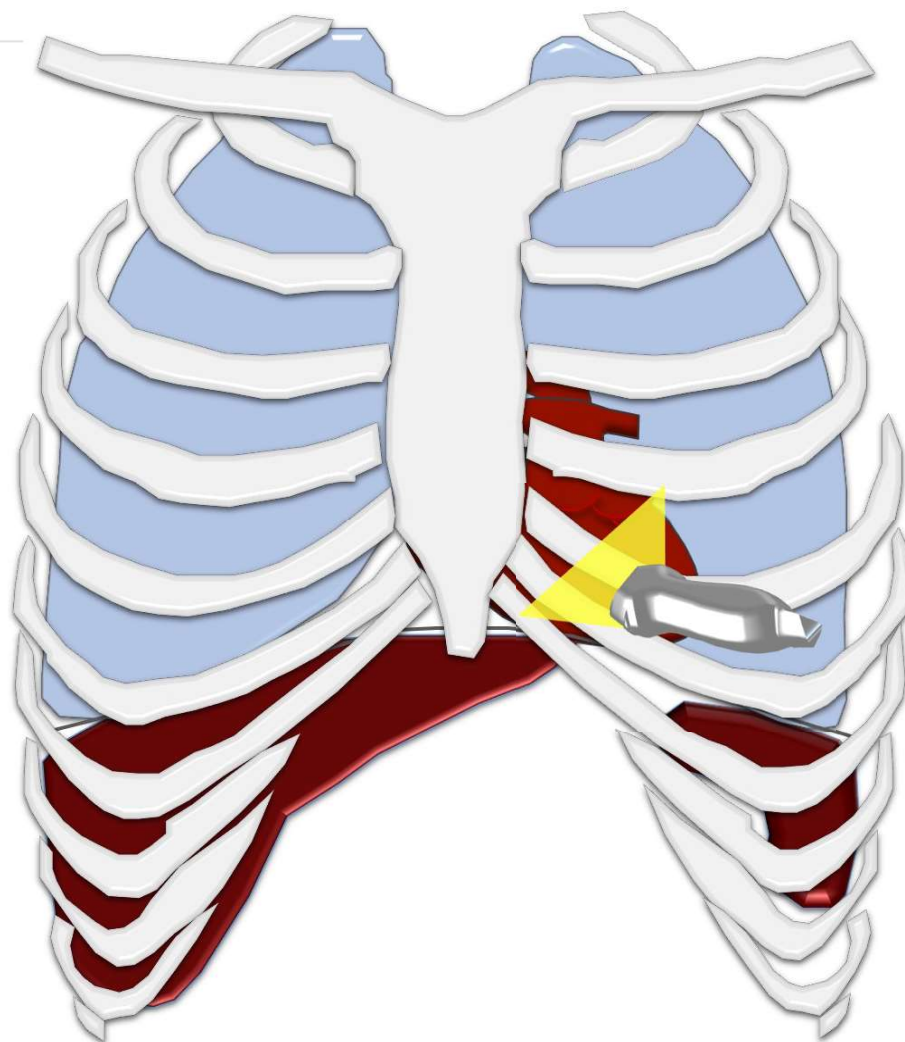


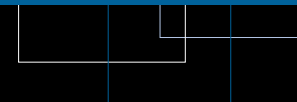


Parasternal



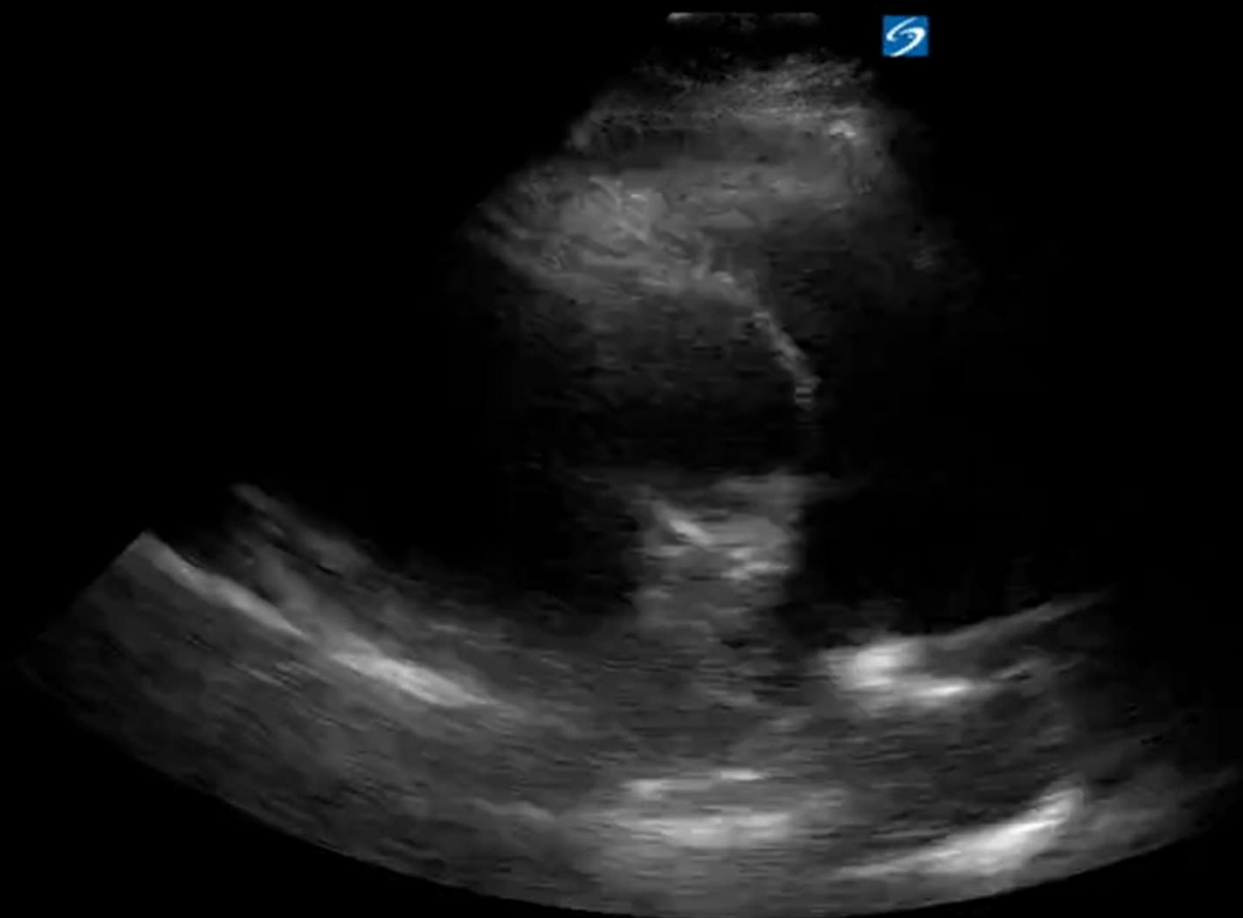
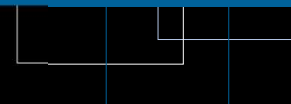
Parasternal Short

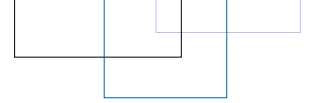




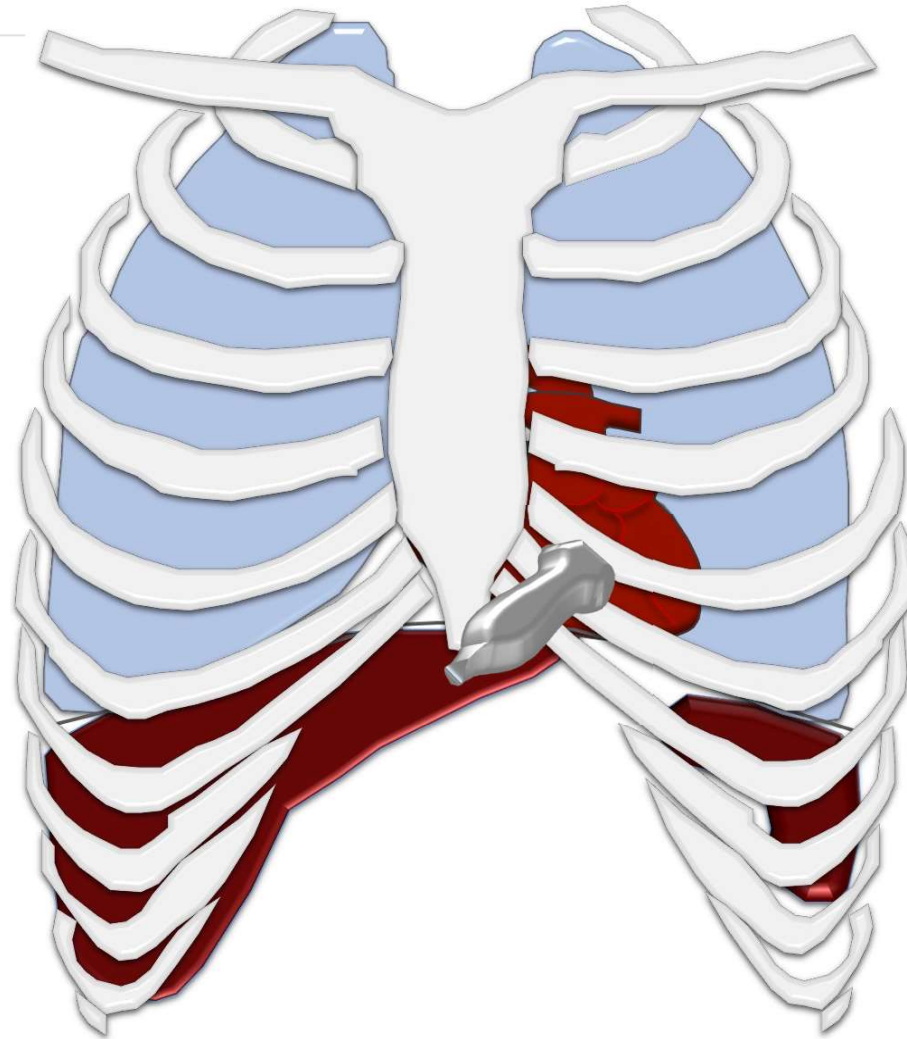
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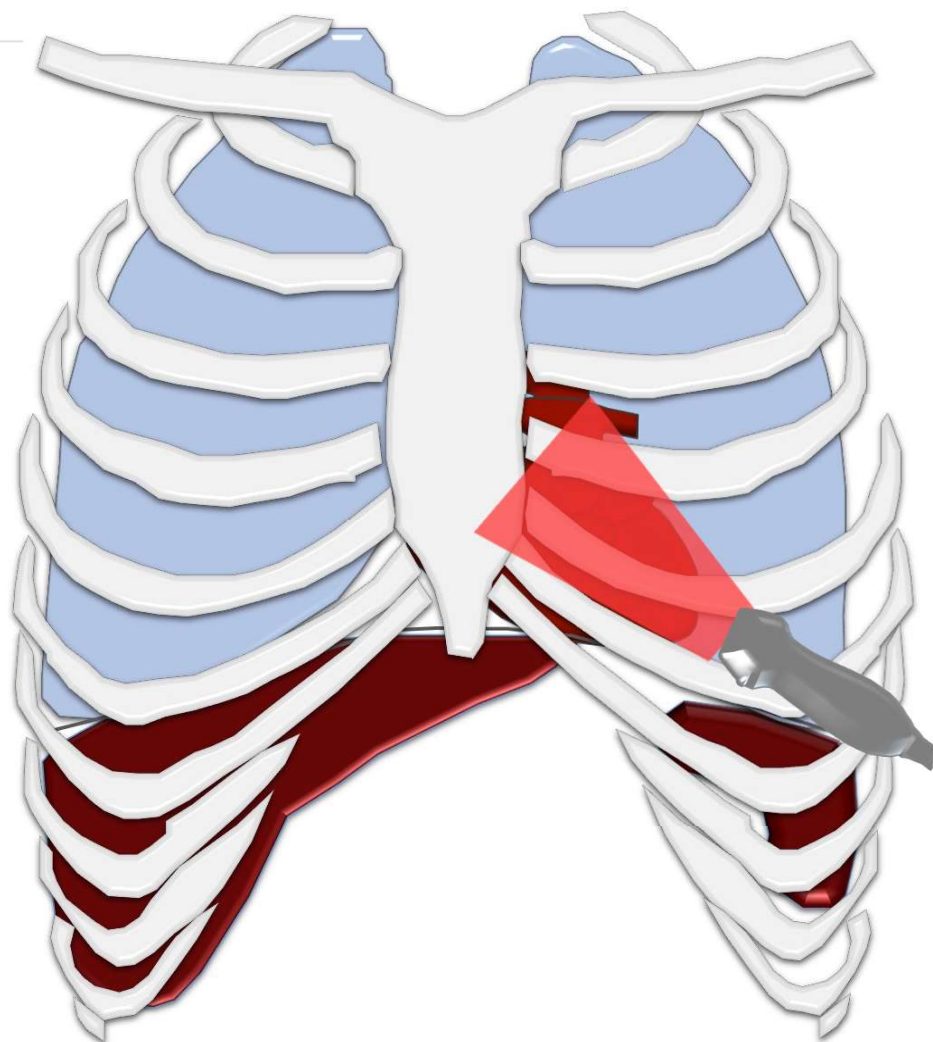


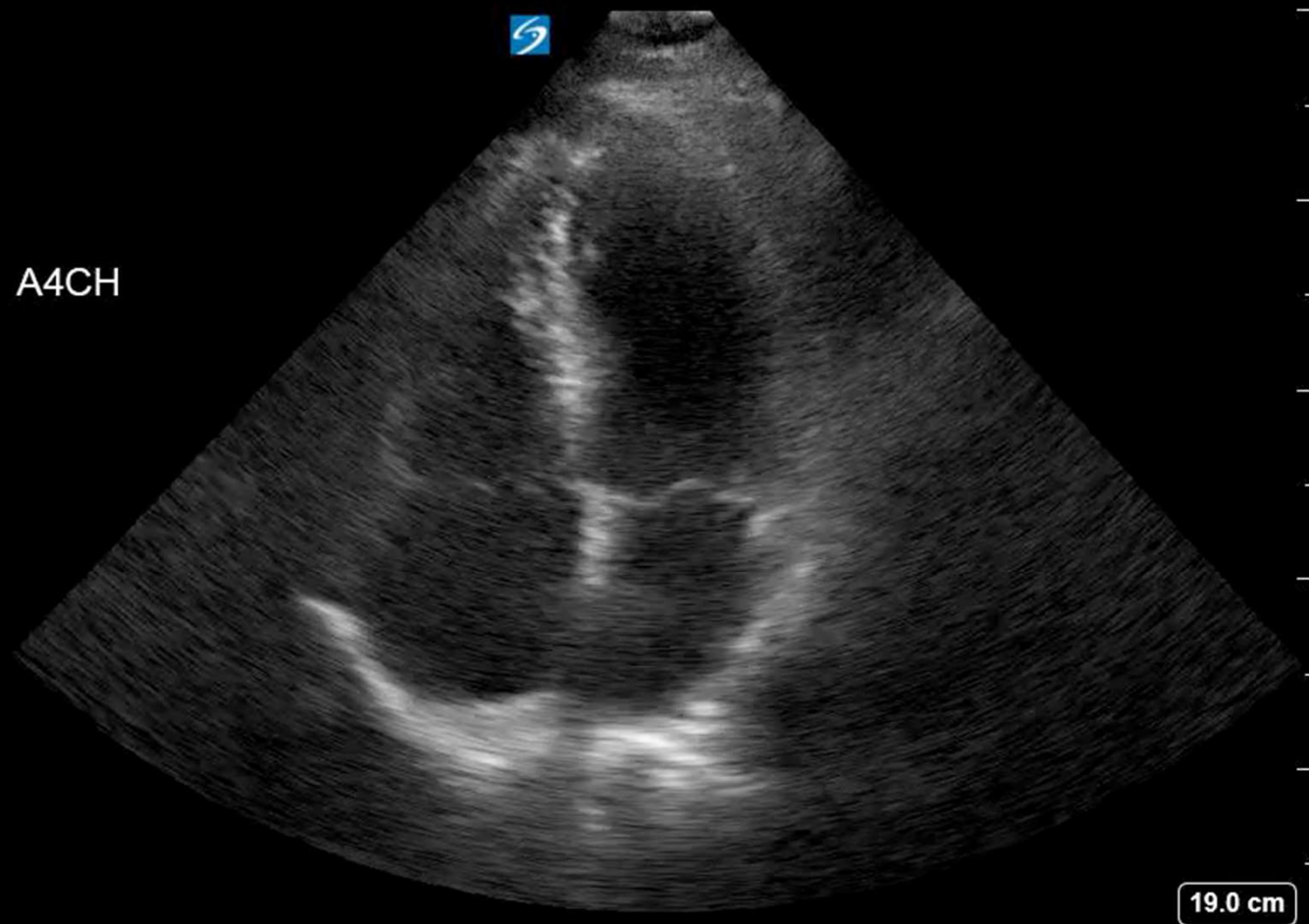


Parasternal

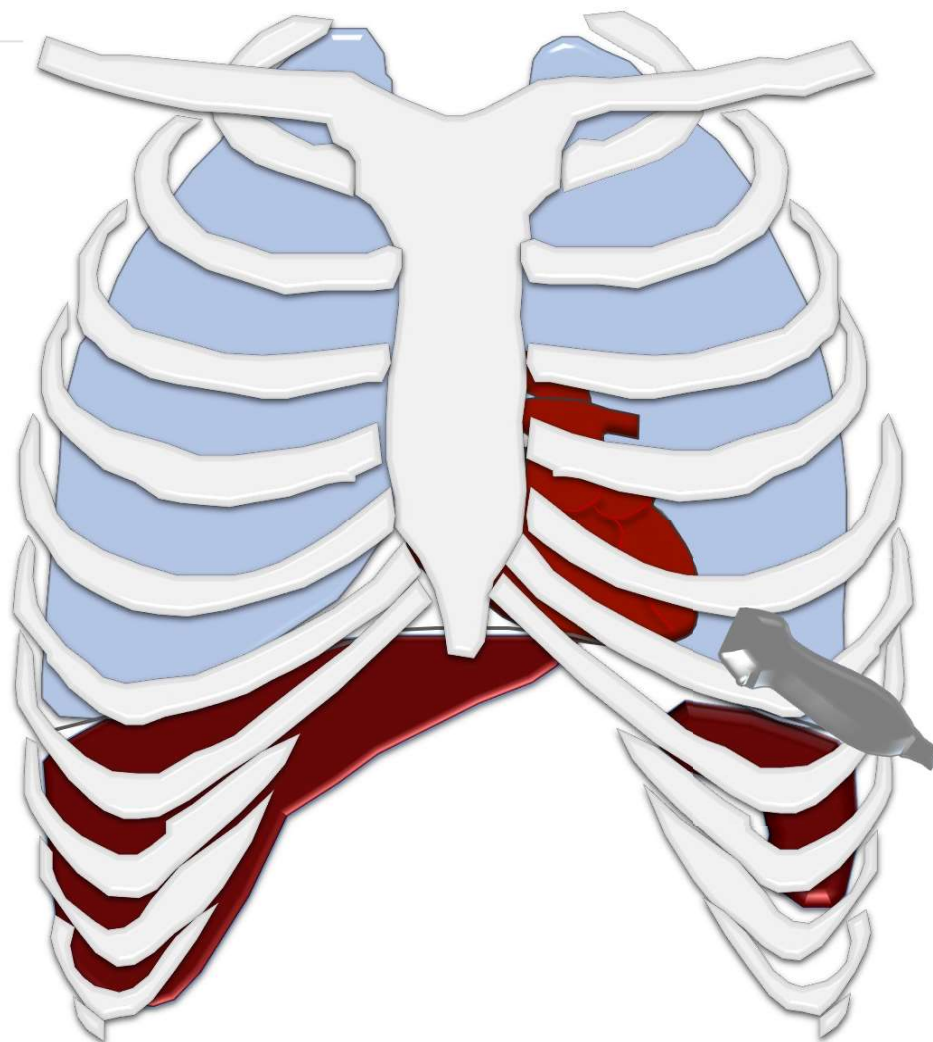


Apical 4 chamber

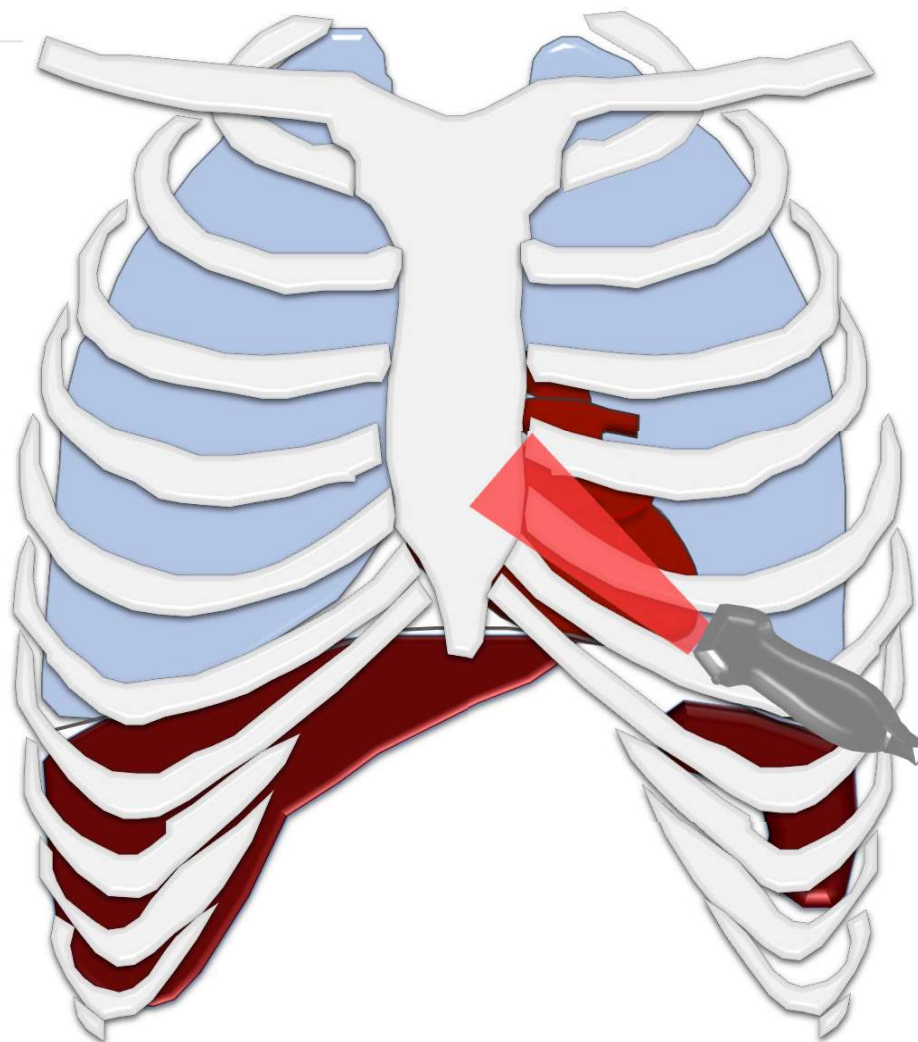


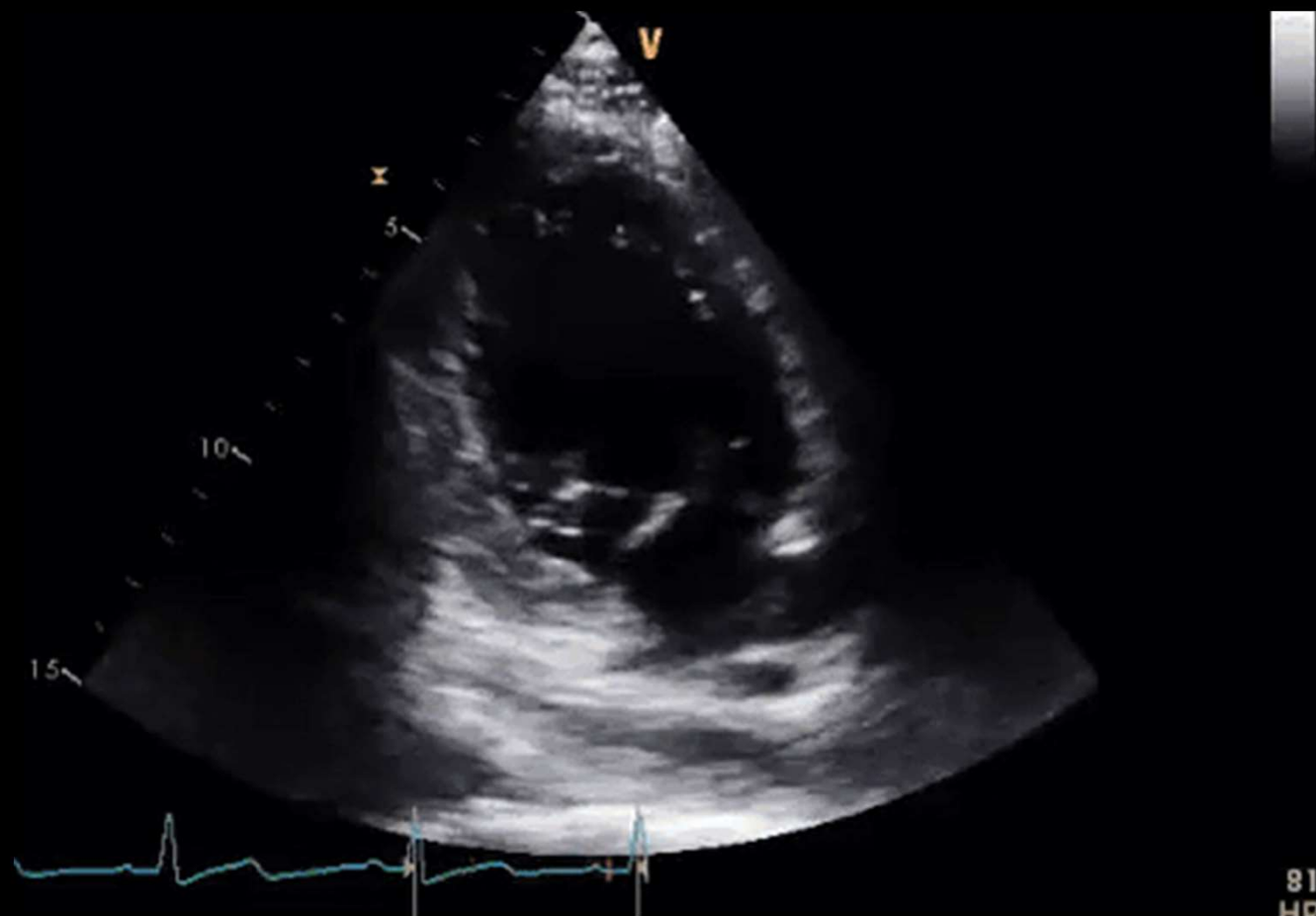


Apical

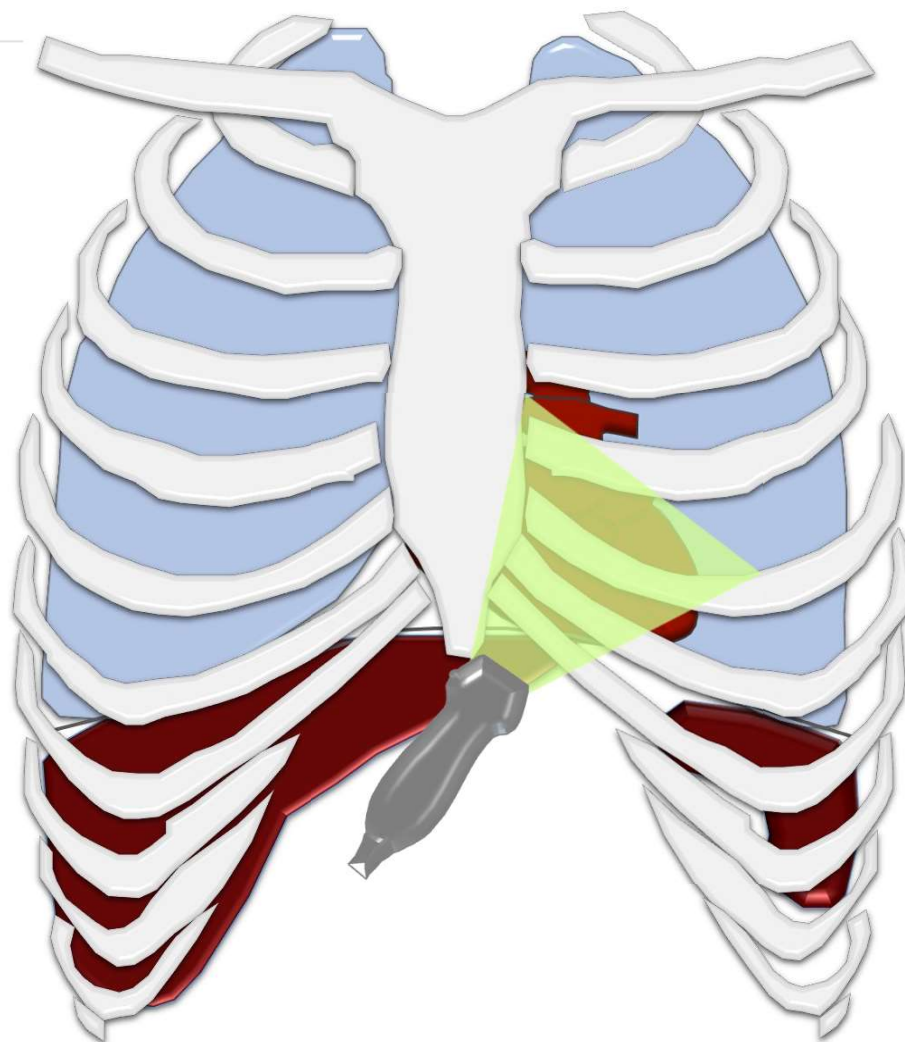


Apical 2 chamber





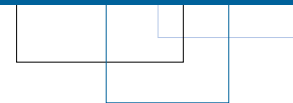
SUBX



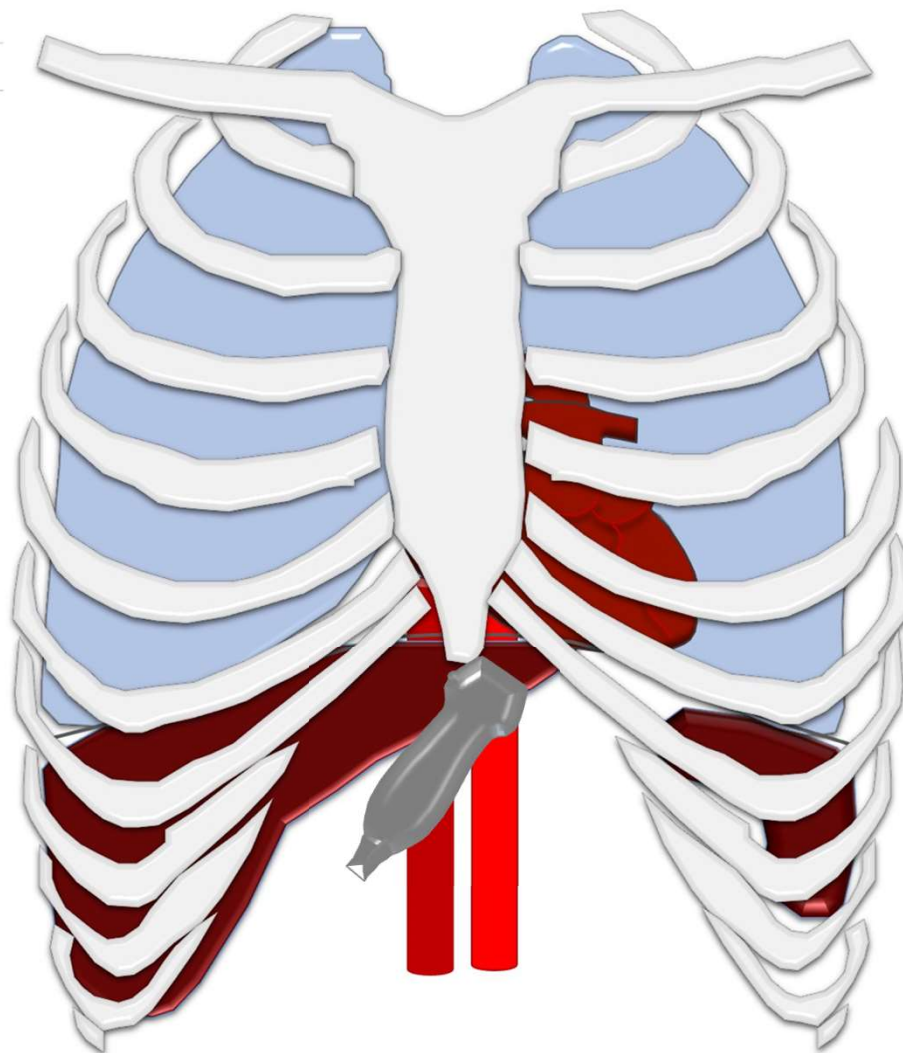
SUBX



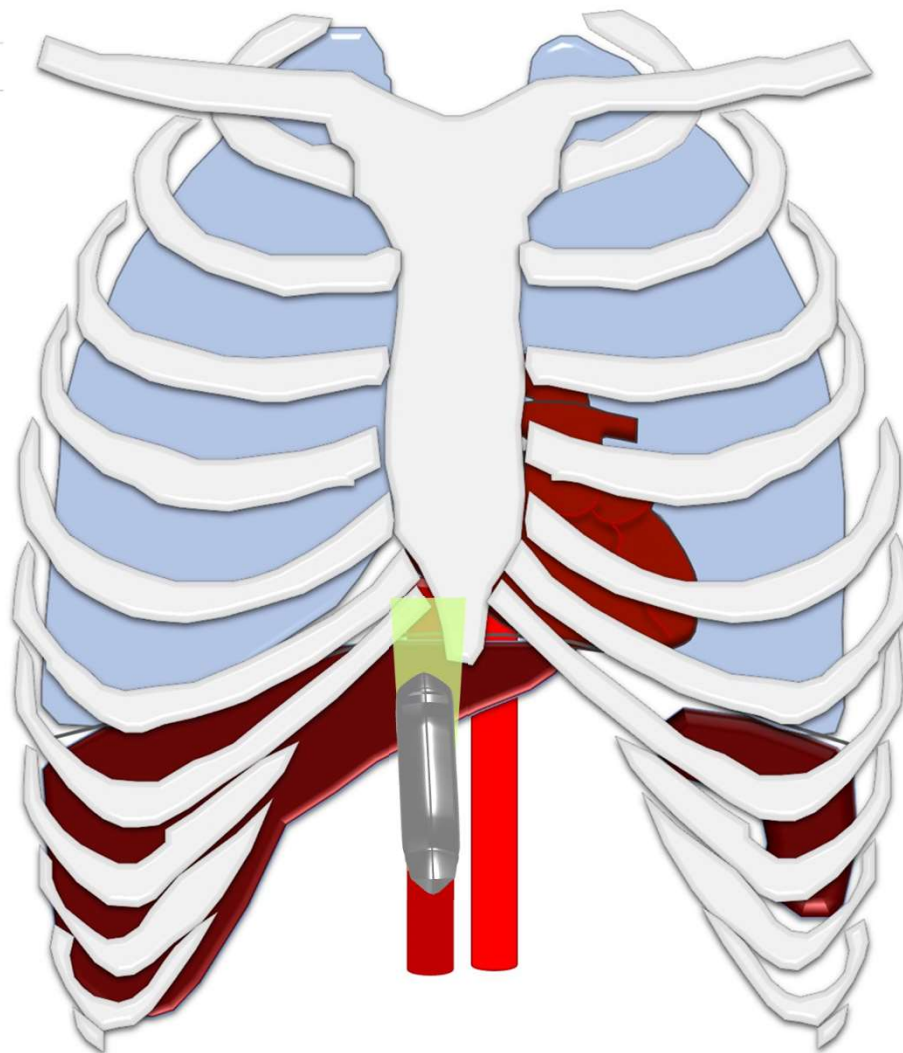
— Crd
· P21
· 
· 
· 93%
· MI
· 0.8
· TIS
· 0.7
·
·
· A 
· B 



SUBX





IVC

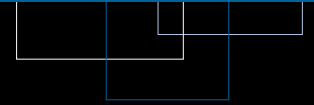


IVF|



- Crd
P21
· 
· 
55%
· MI
1.0
TIS
0.7

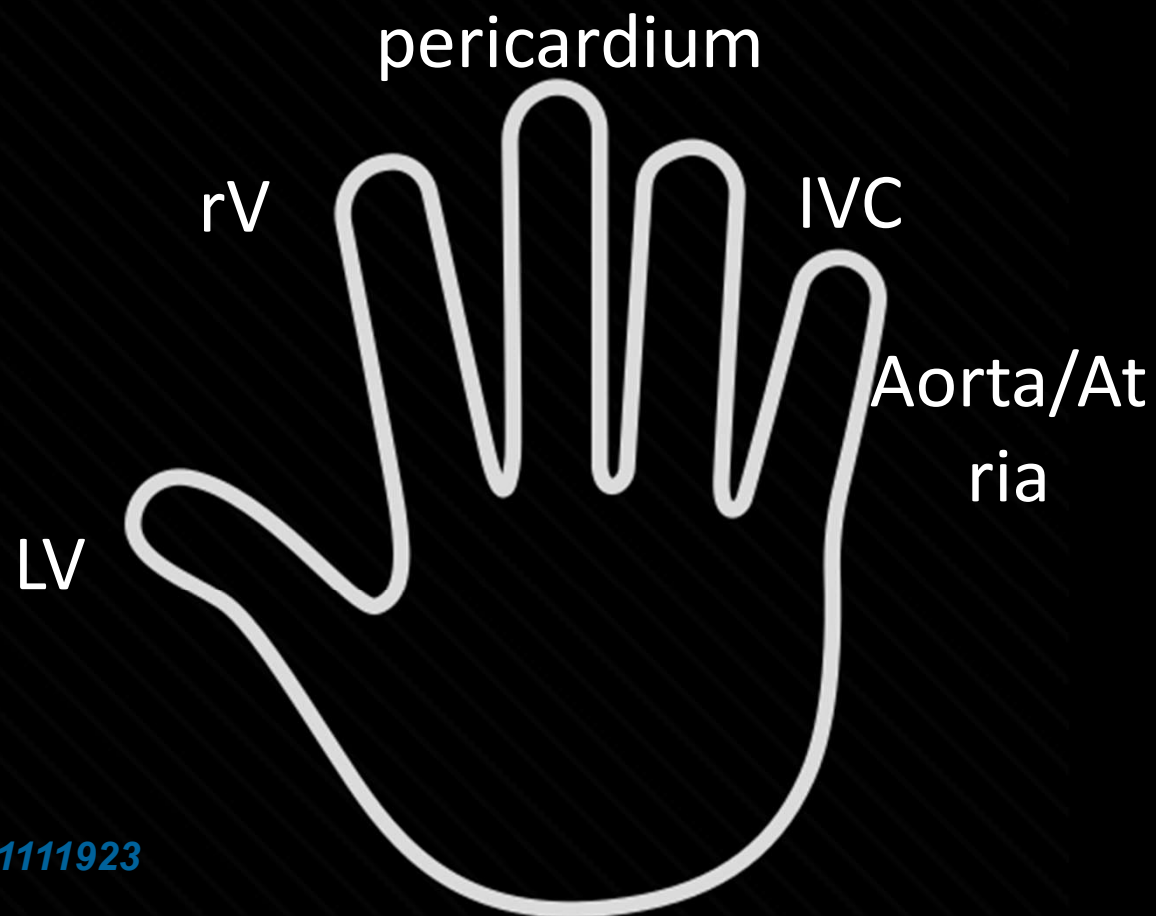
· A 
· B 

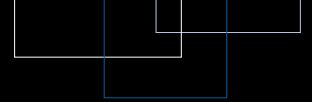


Focused Cardiac US Indications

- Cardiac trauma
- Cardiac arrest
- Hypotension/shock
- Dyspnea/SOB
- Chest pain
- Syncope
- Abnormal ekg
- Cardiomegaly on CXR
- AMS
- Sepsis
- Hypoxia
- Tachycardia

Labovitz AJ, et al. PMID: 21111923

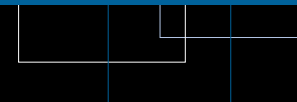




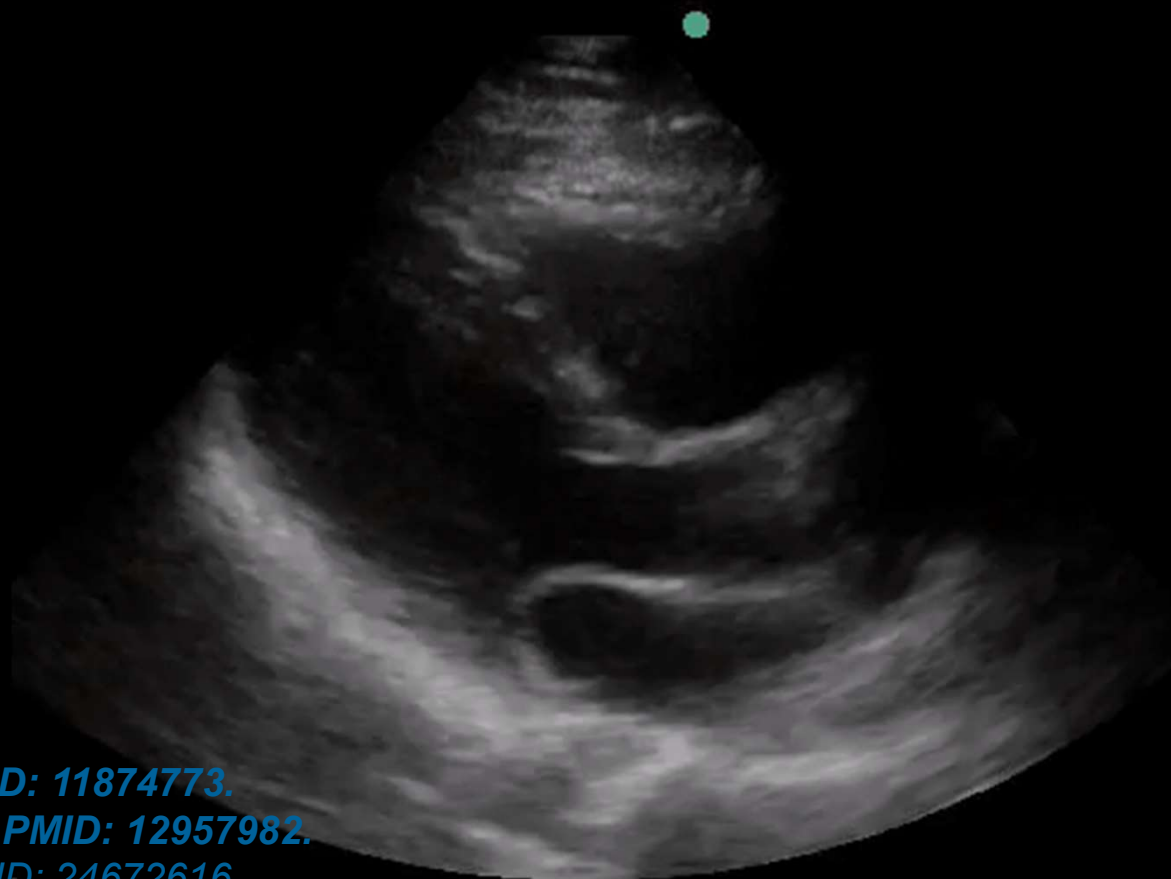
Which of the following is considered the gold standard for LVEF estimation?

- A.** EPSS
- B.** Eyeballing
- C.** Fractional shortening
- D.** Simpson biplane

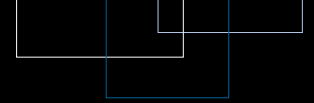




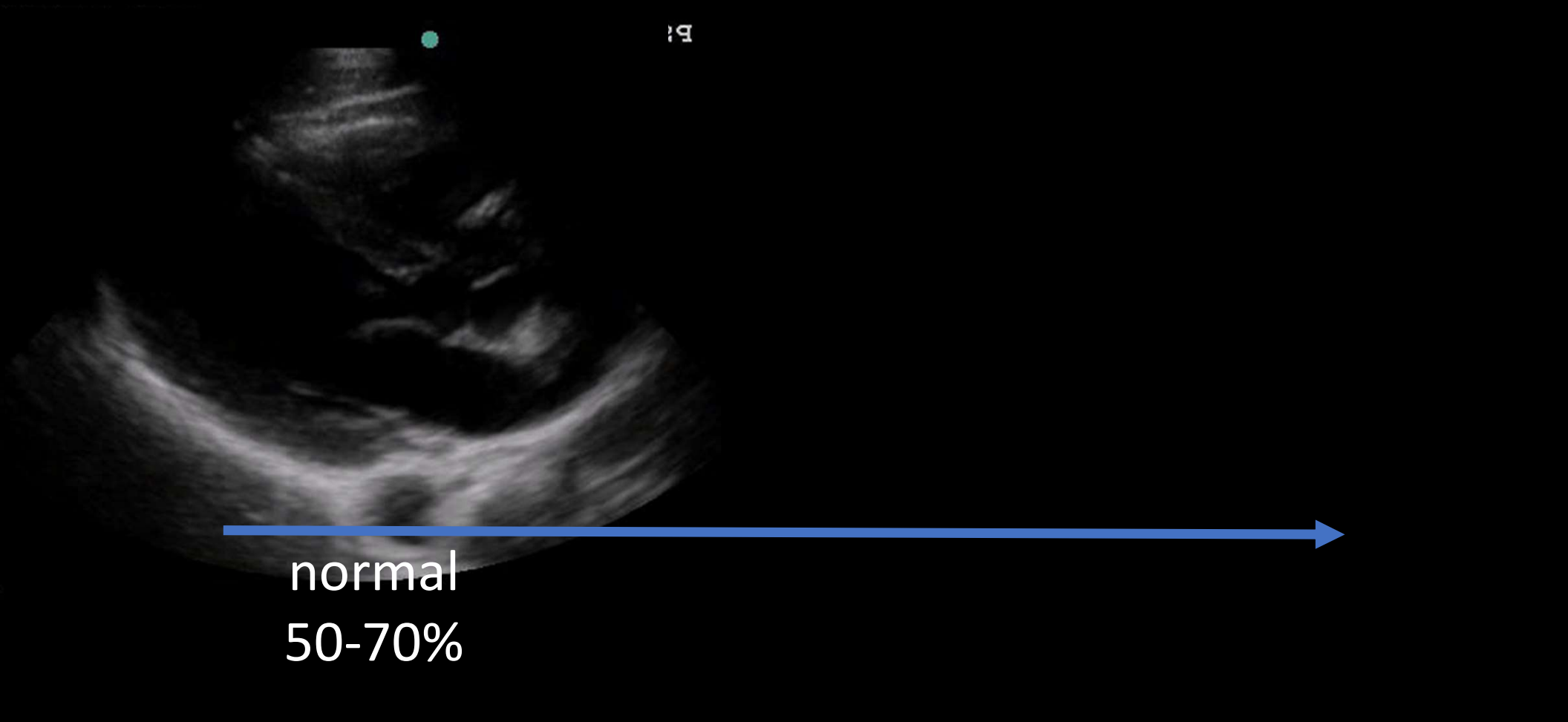
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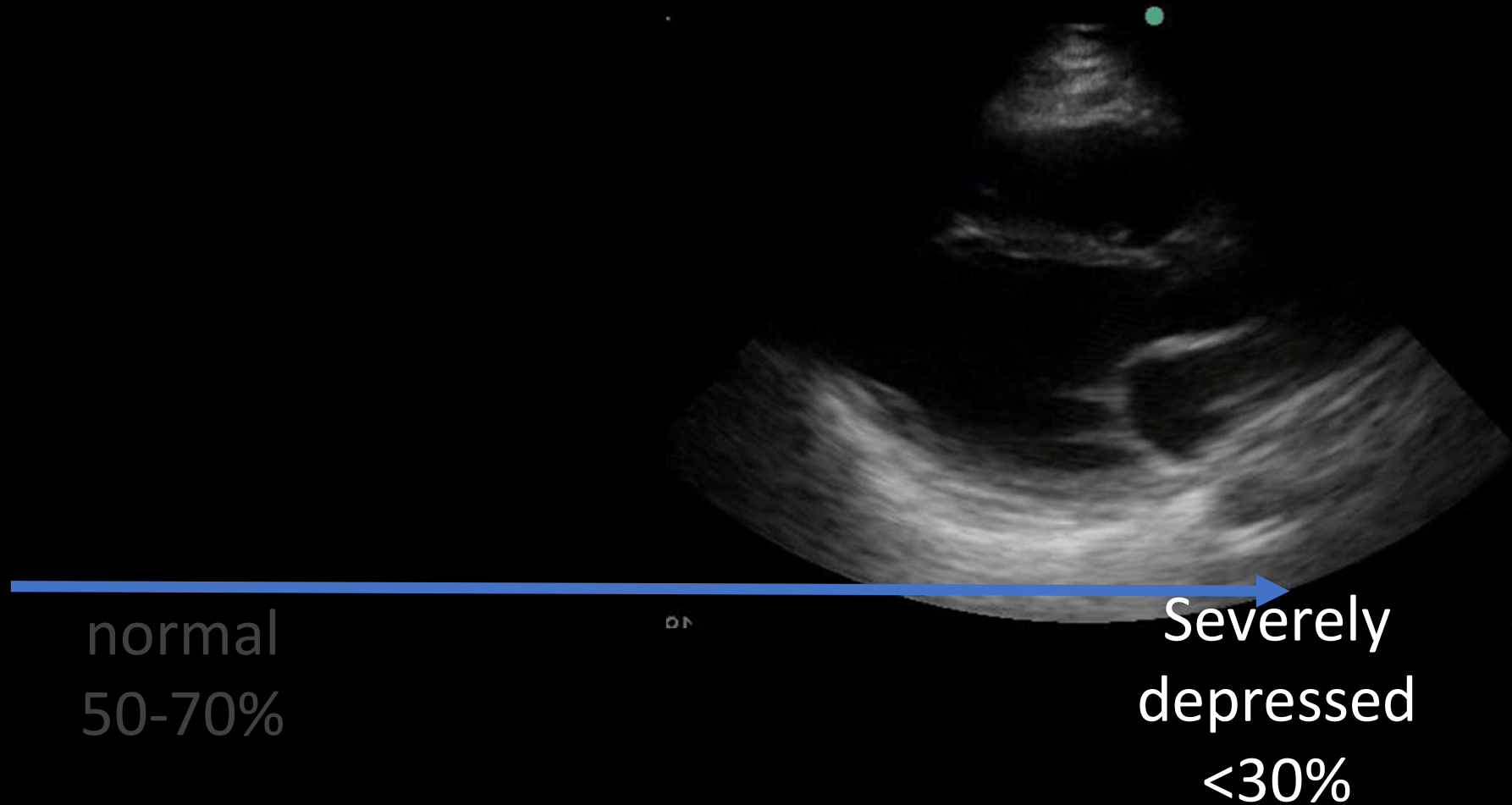
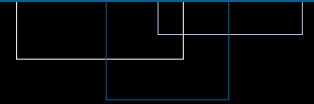


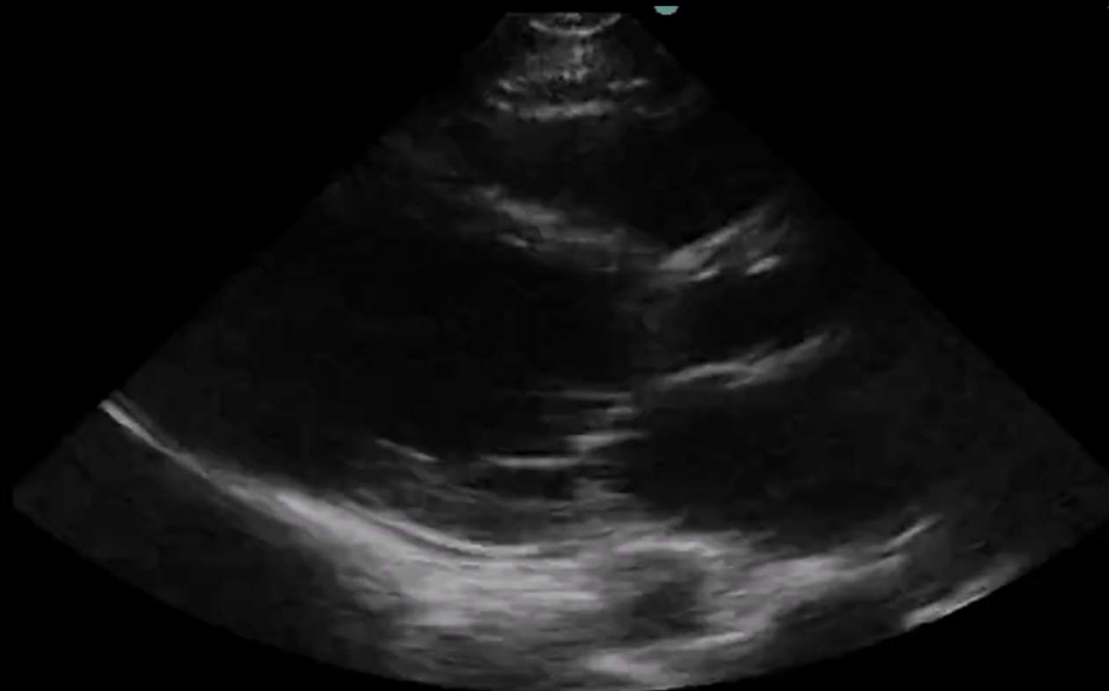
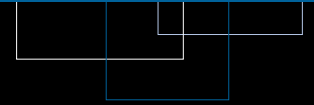
Moore CL, et al. PMID: 11874773.
Randazzo MR, et al. PMID: 12957982.
Unlüer EE, et al. PMID: 24672616



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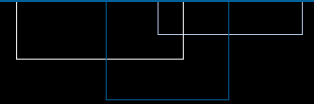




normal
50-70%

Depressed
30-50%

Severely
depressed
<30%



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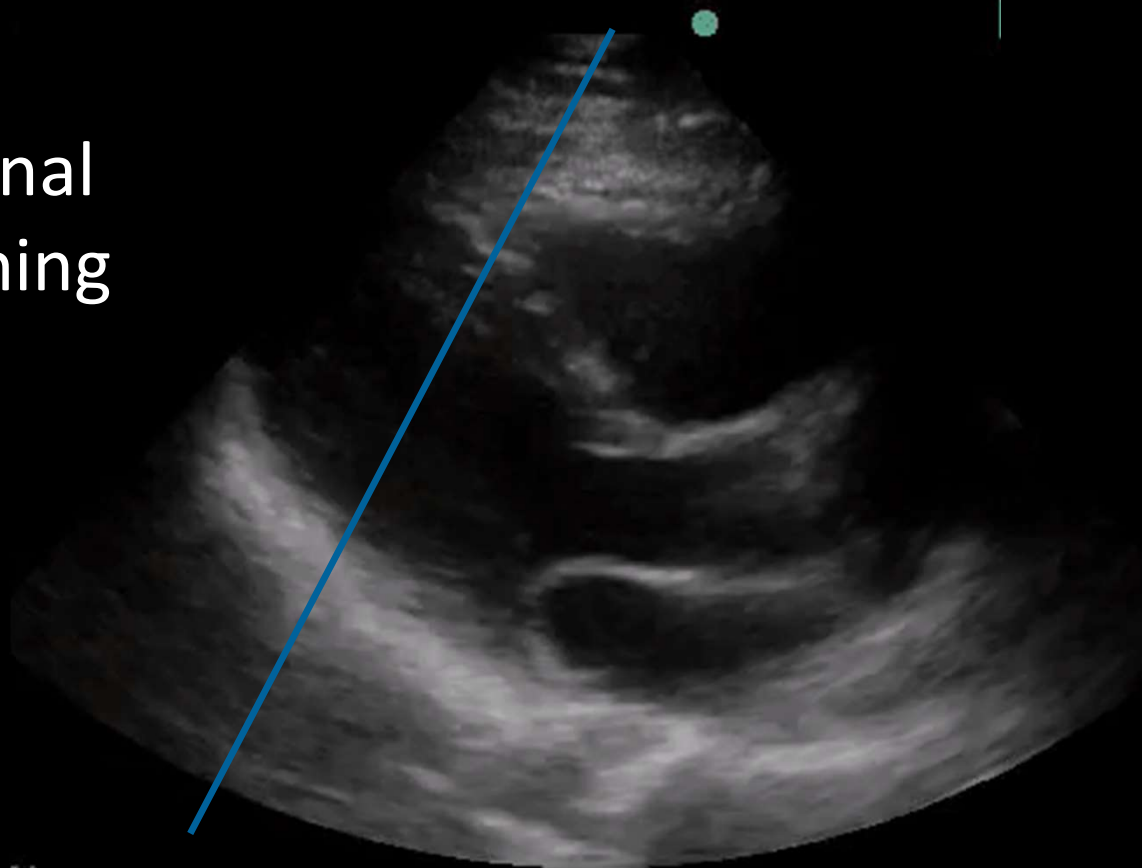
Hyperdynamic
>70%

normal
50-70%

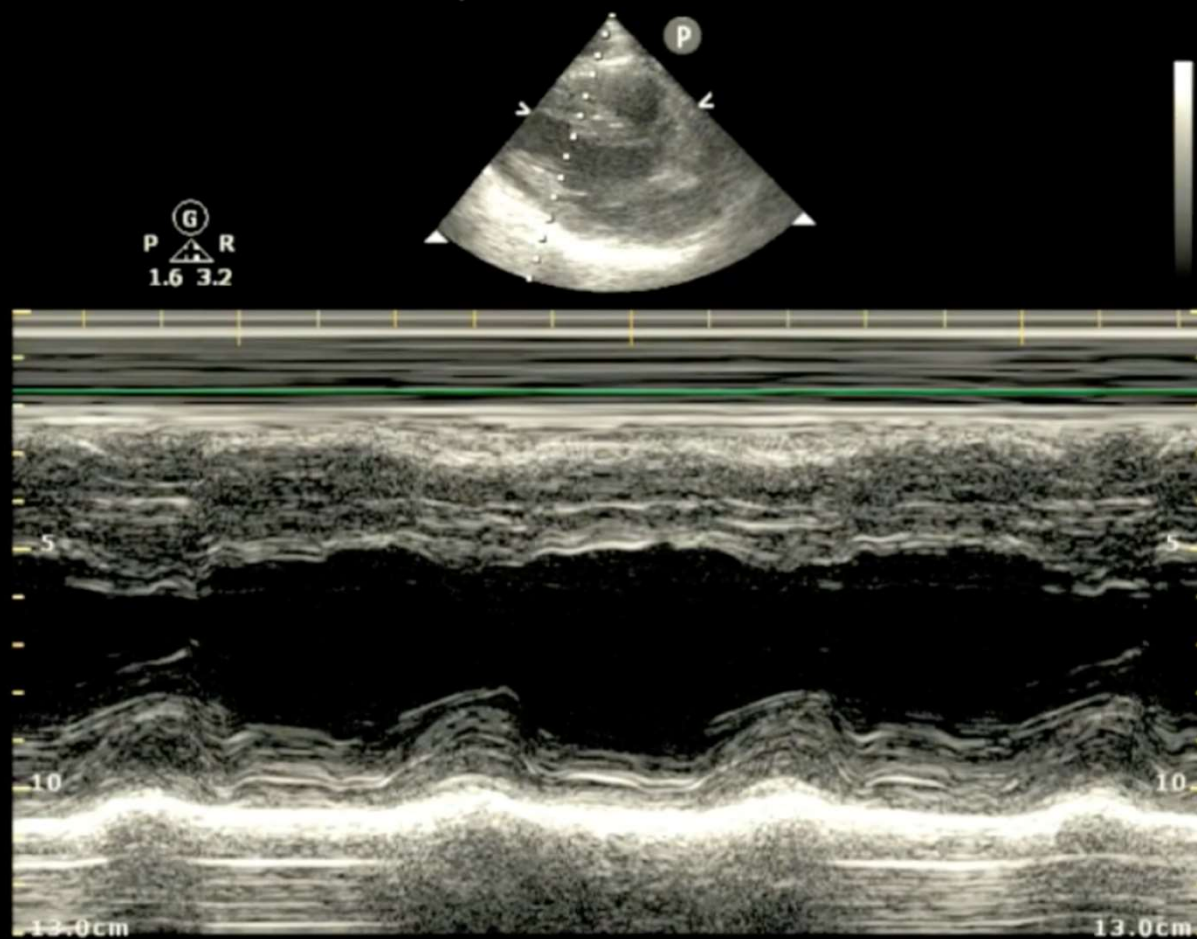
Depressed
30-50%

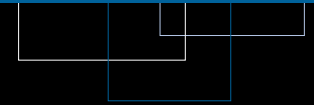
Severely
depressed
<30%

Fractional Shortening



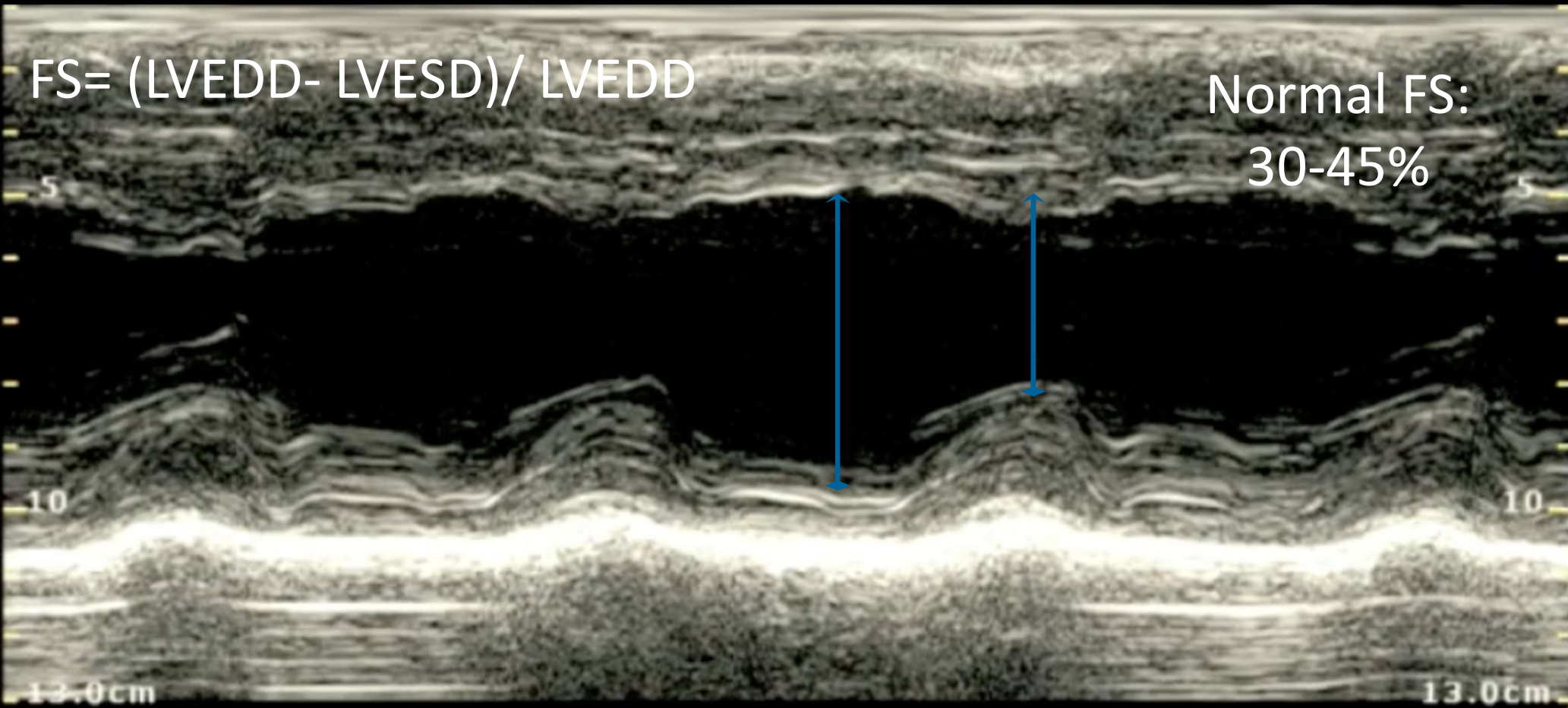
Weekes AJ, et al. PMID: 23197541.

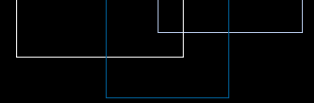




$FS = (LVEDD - LVESD) / LVEDD$

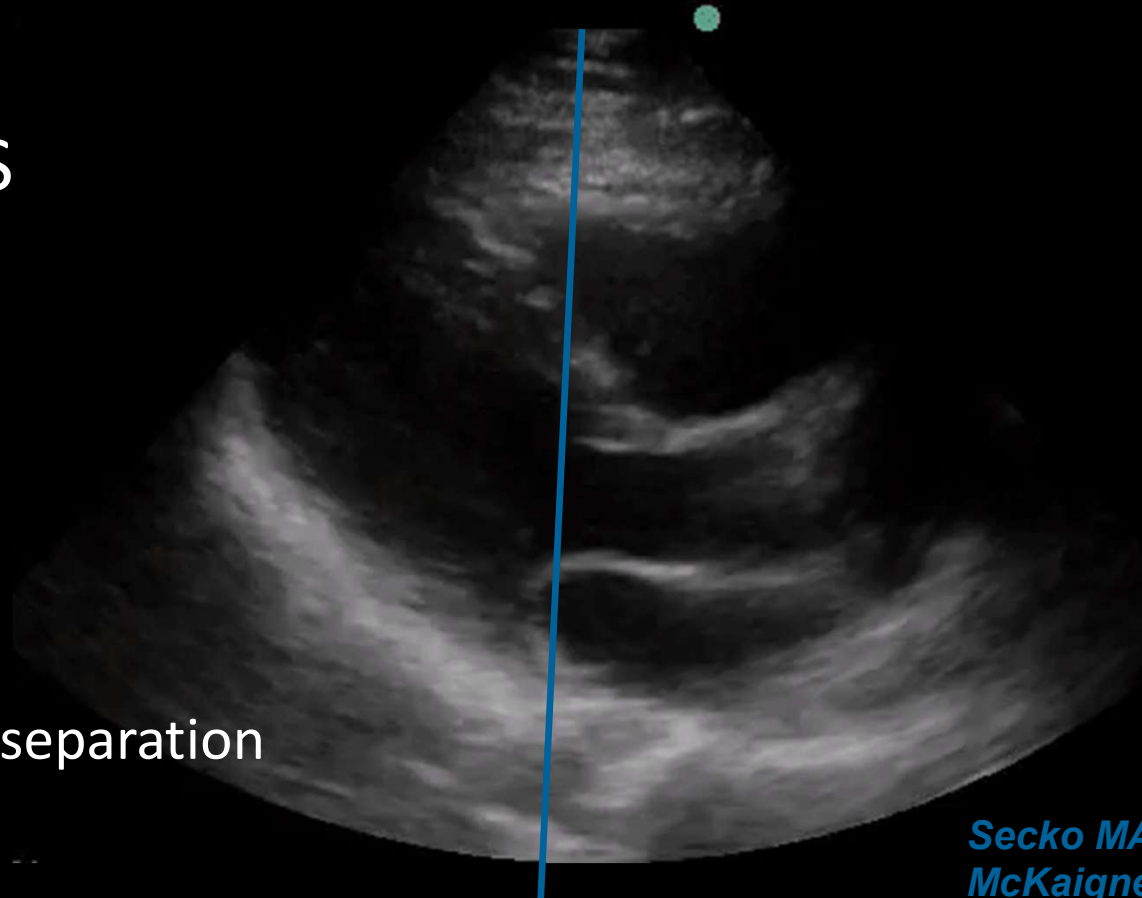
Normal FS:
30-45%



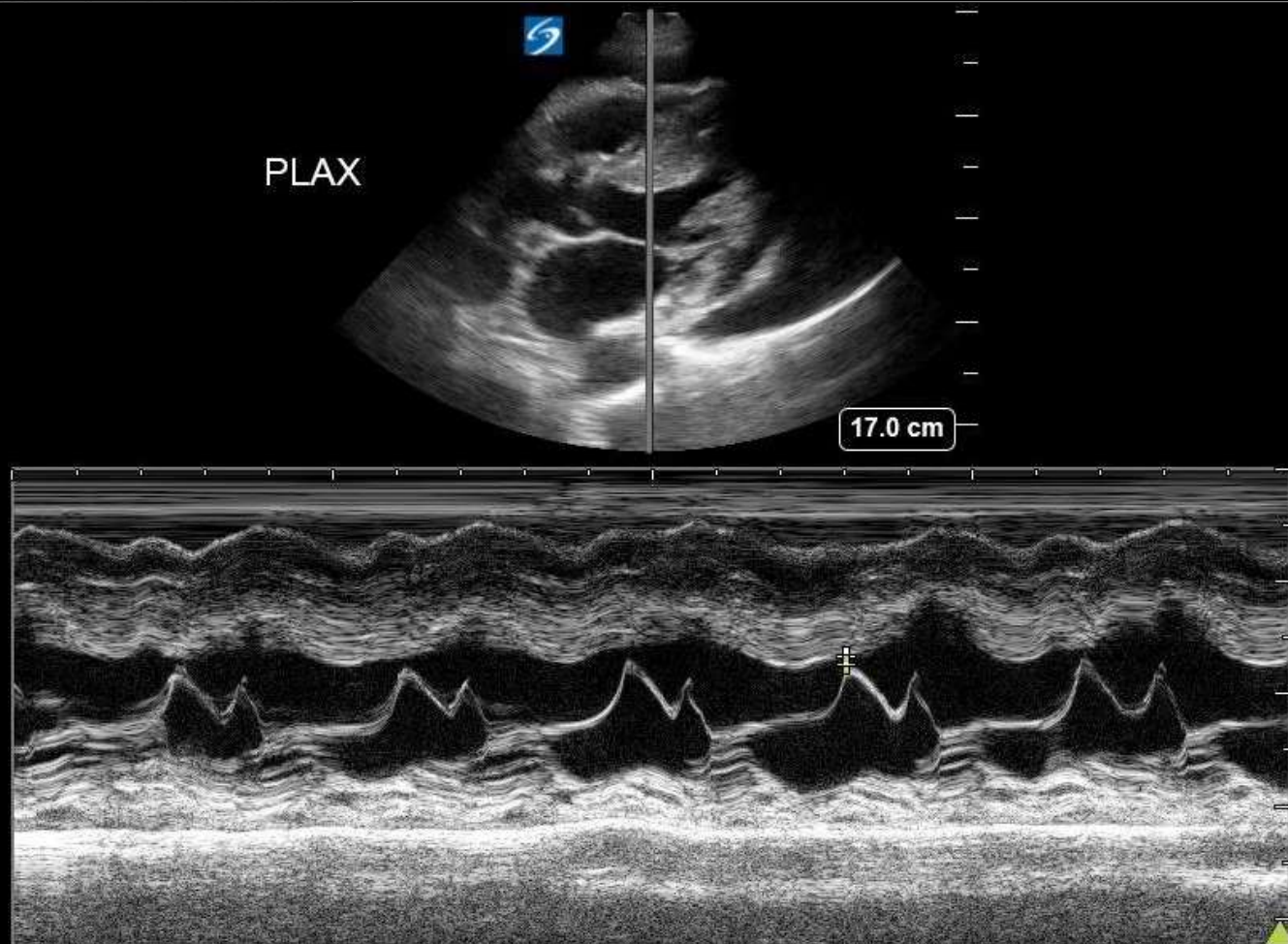


EPSS

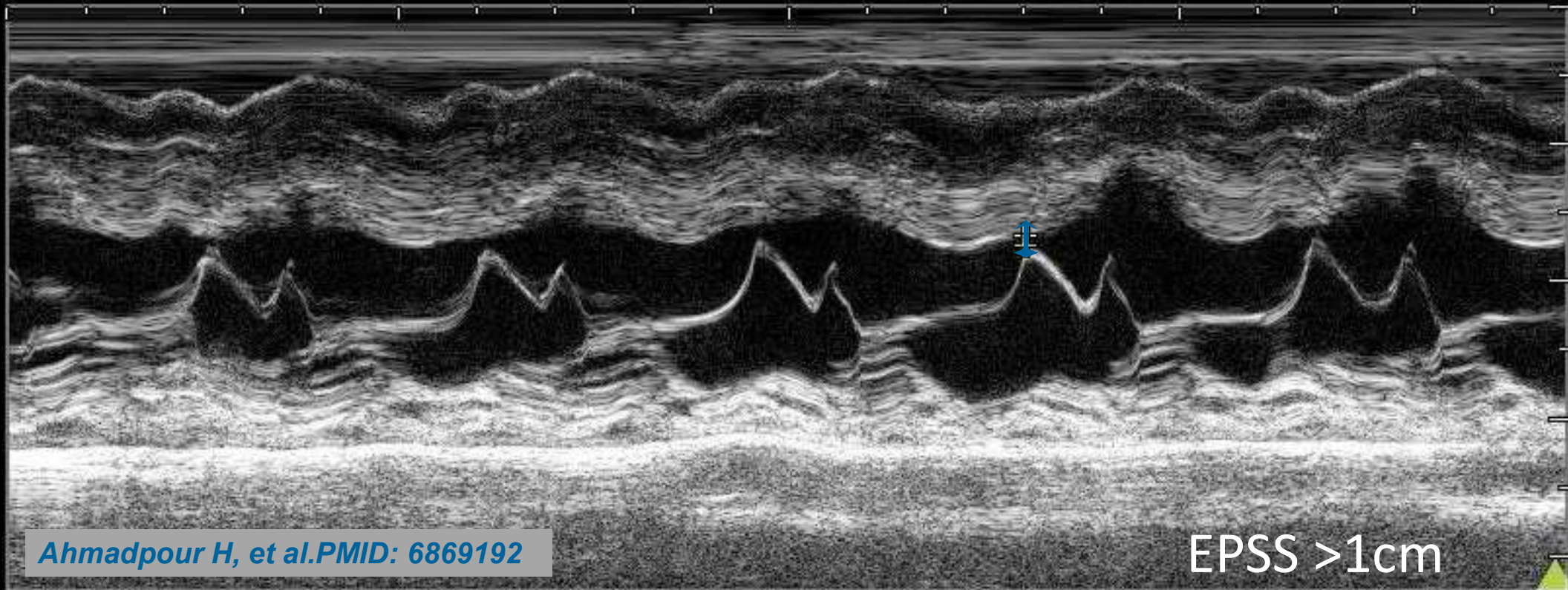
E-Point Septal separation



*Secko MA, et al. PMID: 22044429.
McKaigney et al. PMID: 24630604.*

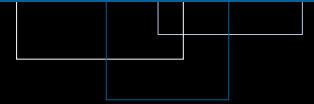


EPSS <7mm

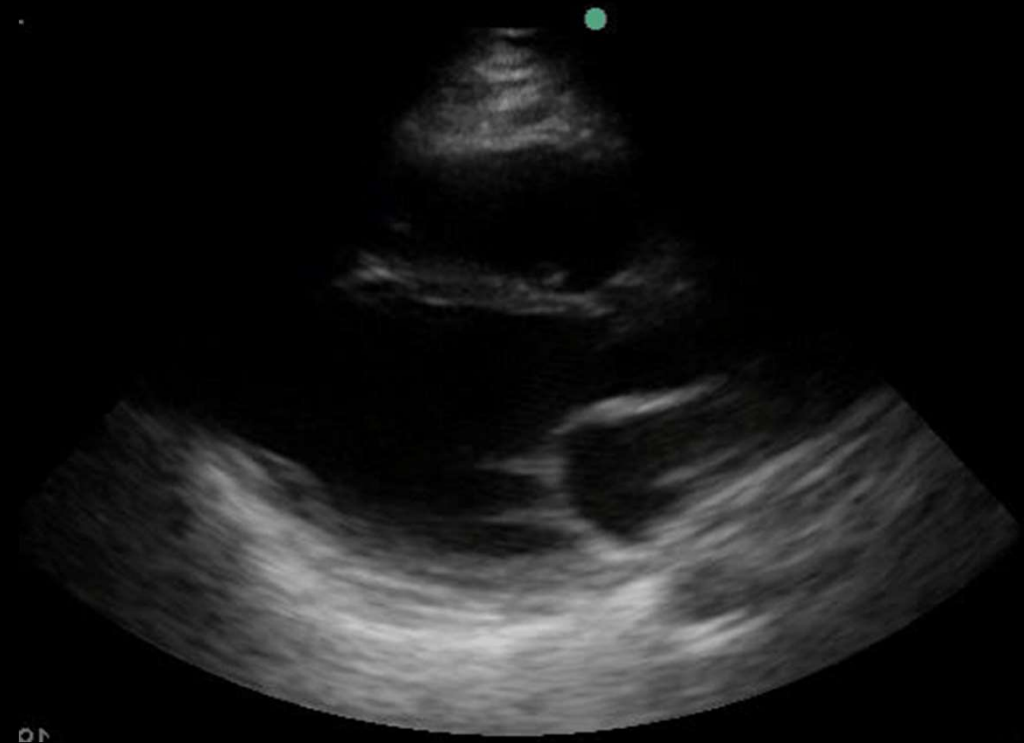


Ahmadpour H, et al. PMID: 6869192

EPSS >1cm



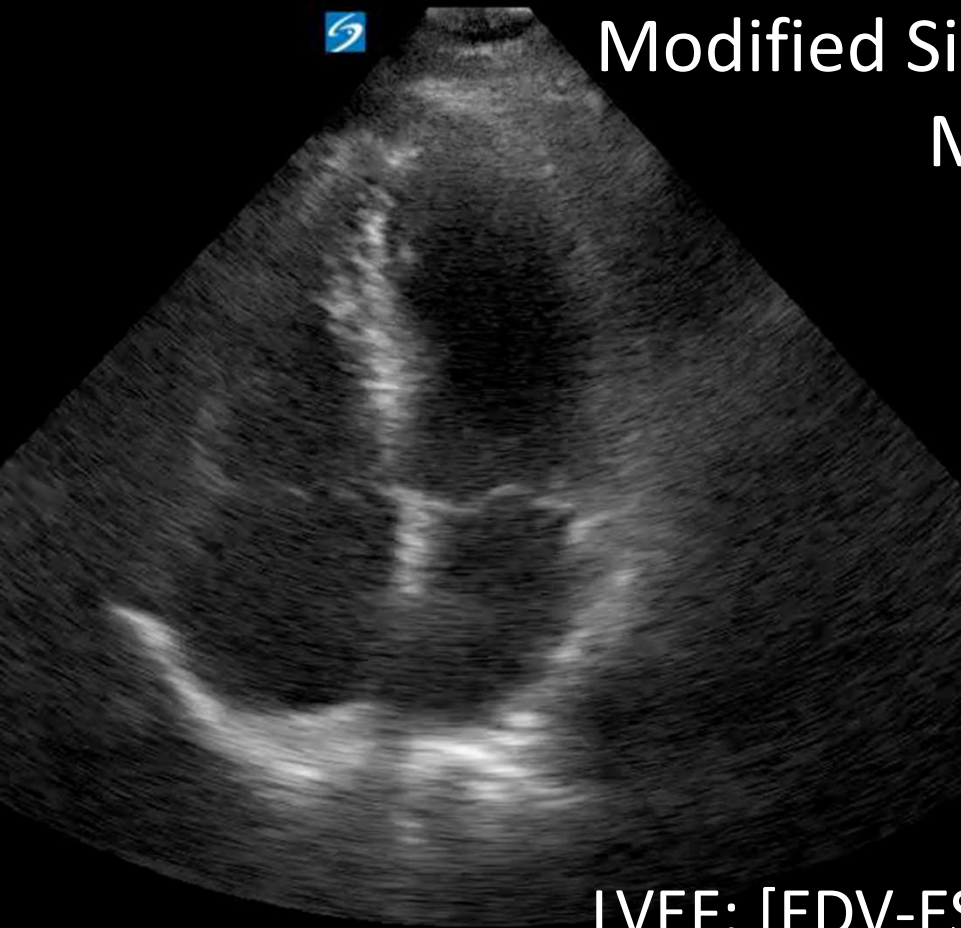
LVEF= 75.5- (2.5 x EPSS)



Silverstein JR, et al. PMID: 16377299.

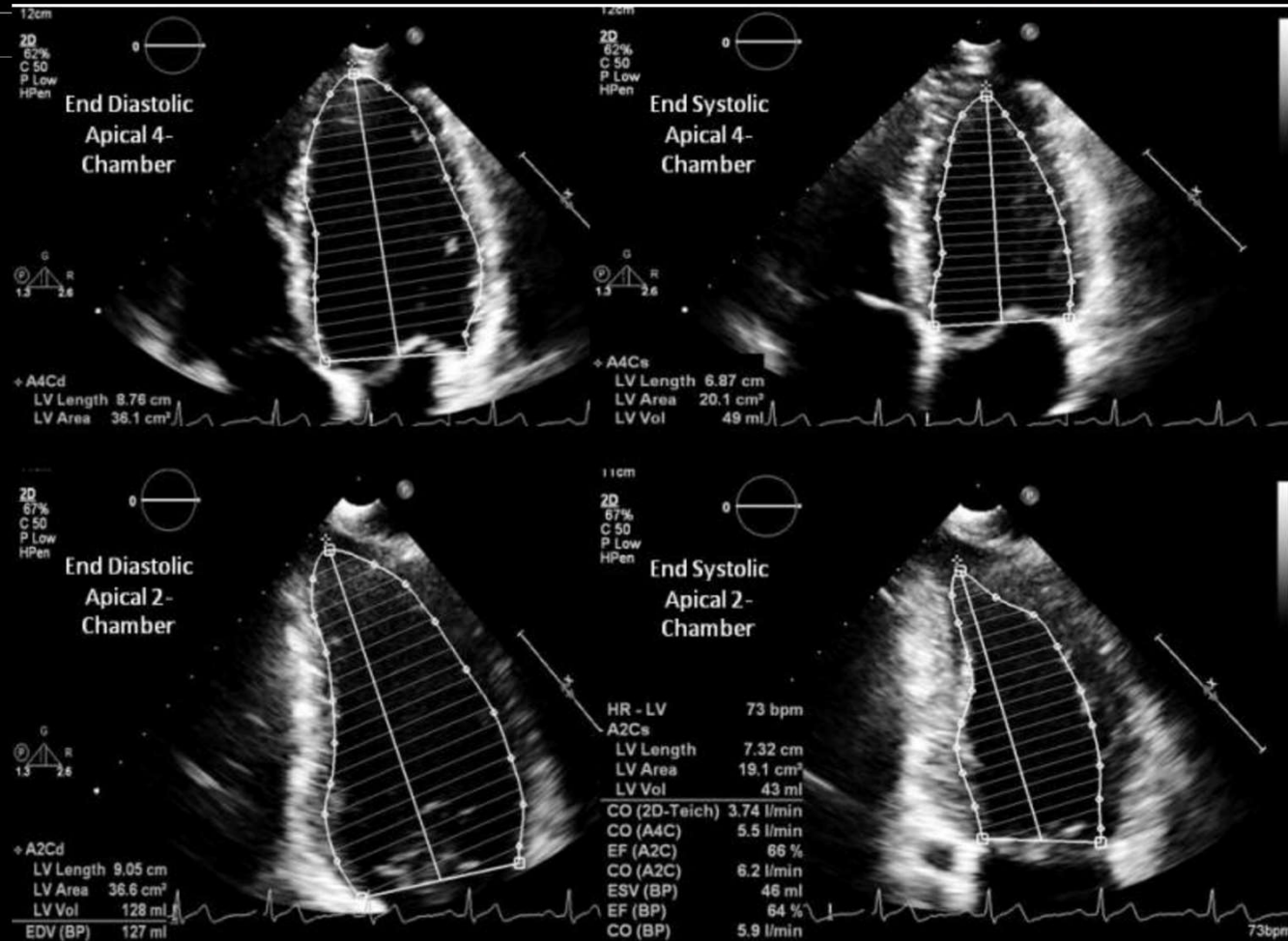


Modified Simpson (BIPLANE) Method



LVEF: $[(EDV - ESV) / EDV] \times 100$

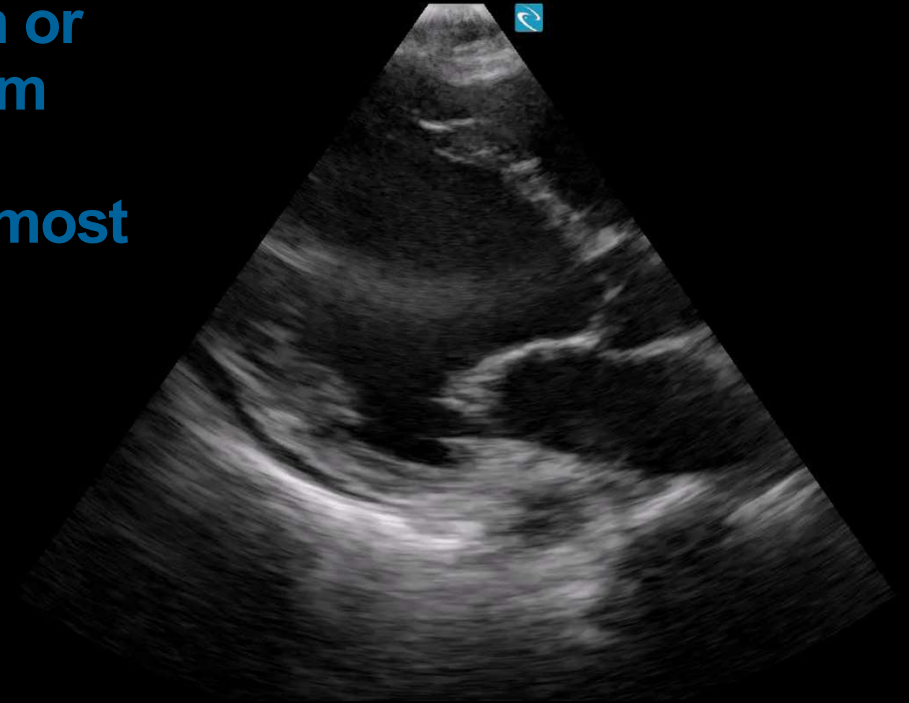
Modified Simpson (BIPLANE) Method

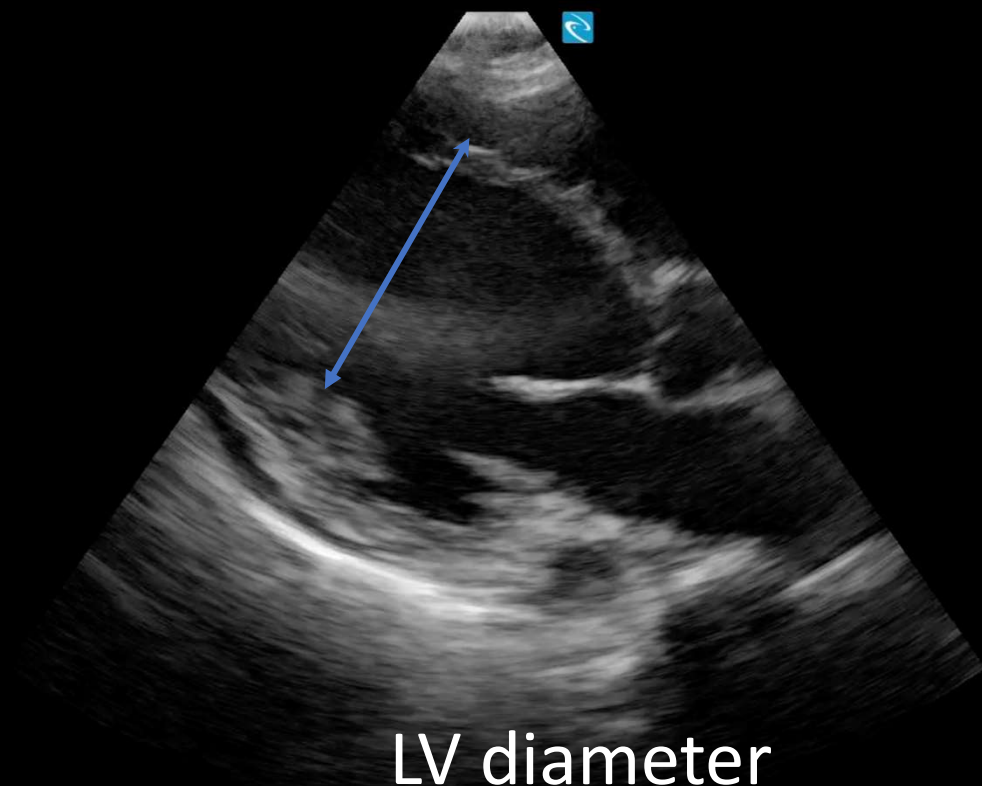
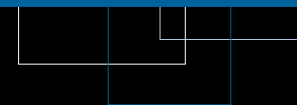


Kosaraju A, et al. PMID: 29083812.

24 y/o F presents to the ED with c/o shortness of breath gradually worsening x 3 days. She denies chest pain, cough or fever/chills. She is 10 days postpartum from a normal spontaneous vaginal delivery of her first child. What is the most likely diagnosis?

- A. aortic dissection
- B. cardiac tamponade
- C. new onset heart failure
- D. pulmonary embolism

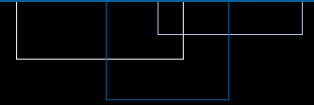




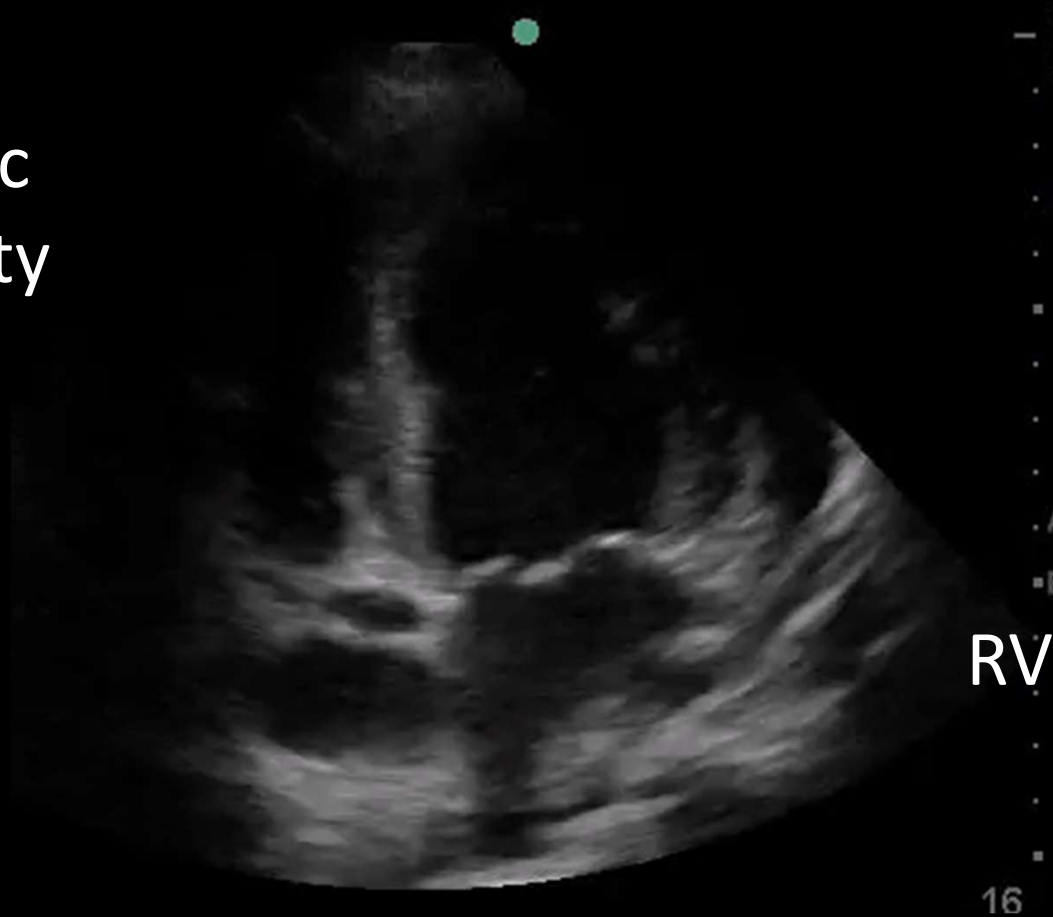
LV diameter
<5.2cm



LV thickness
<1.2cm

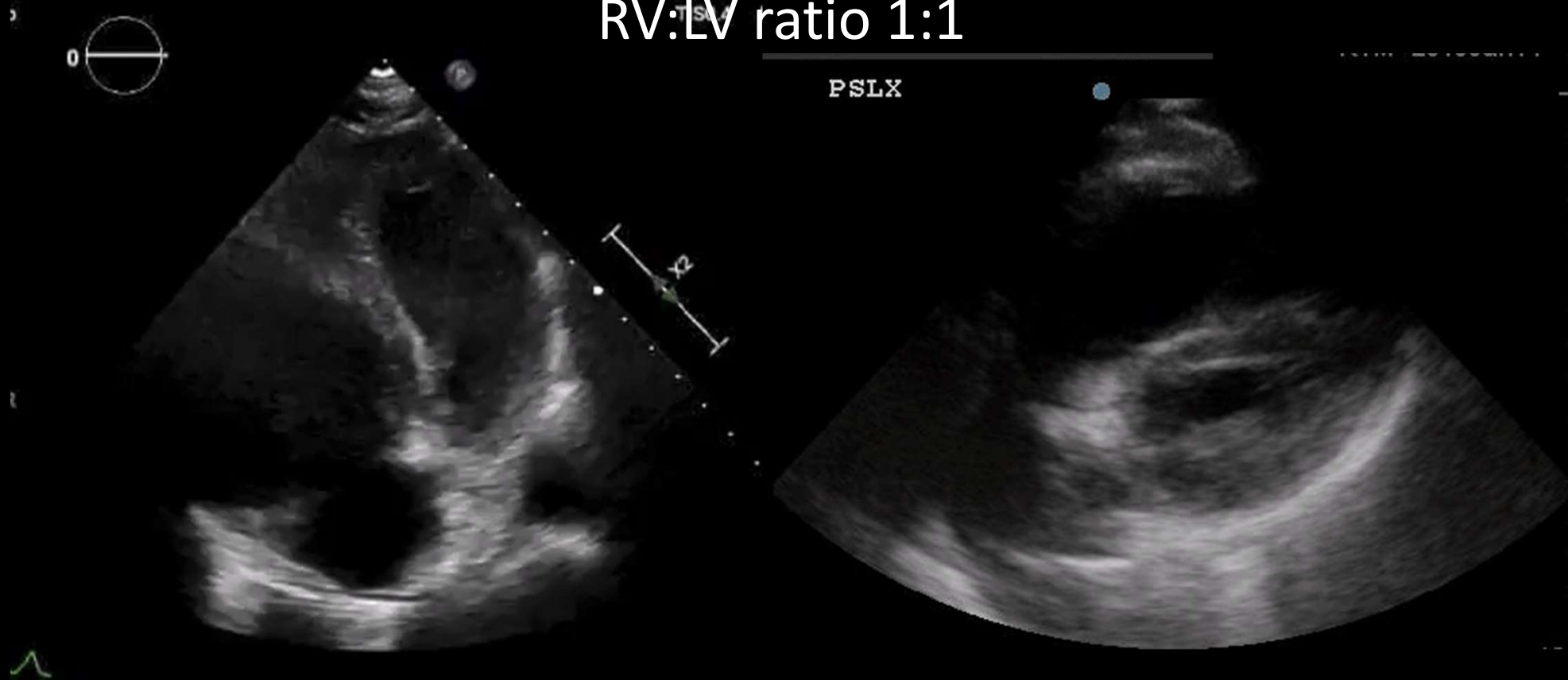


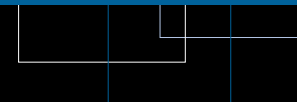
Symmetric
contractility



RV:LV ratio 0.6:1

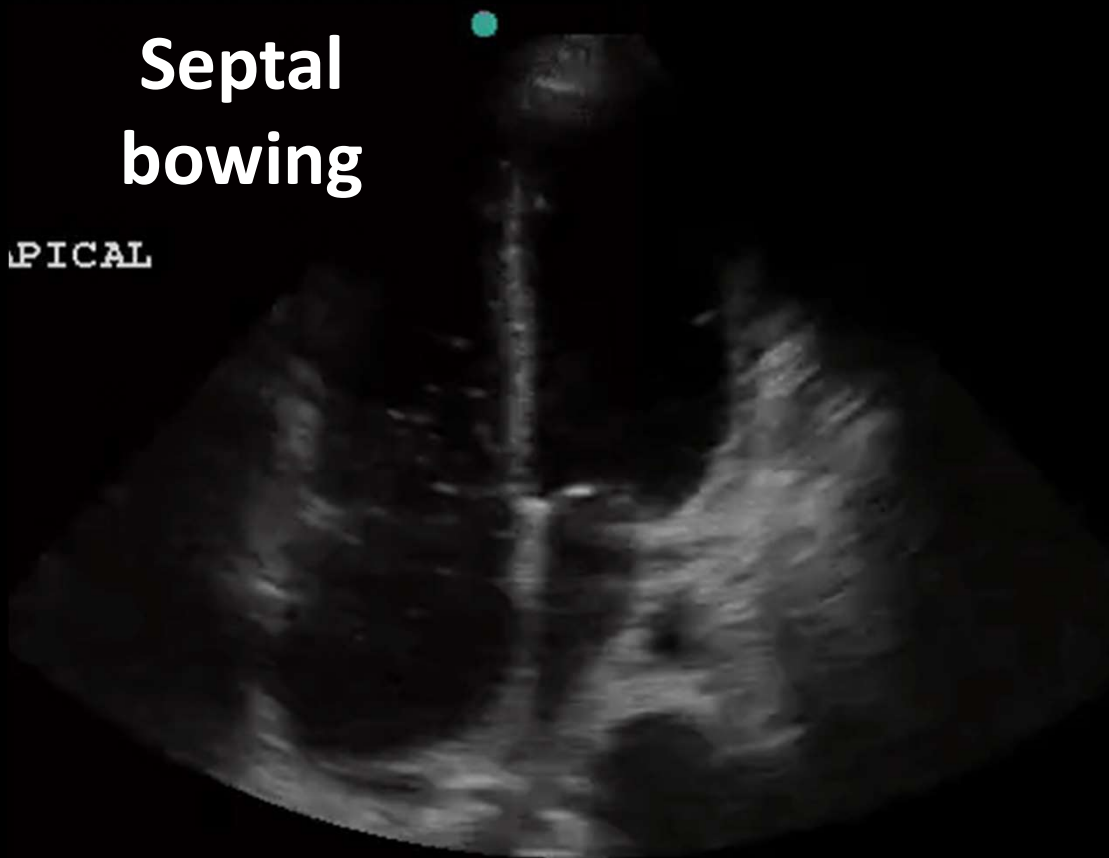
RV:LV ratio 1:1





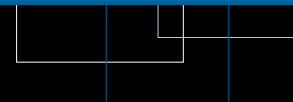
Septal bowing

APICAL

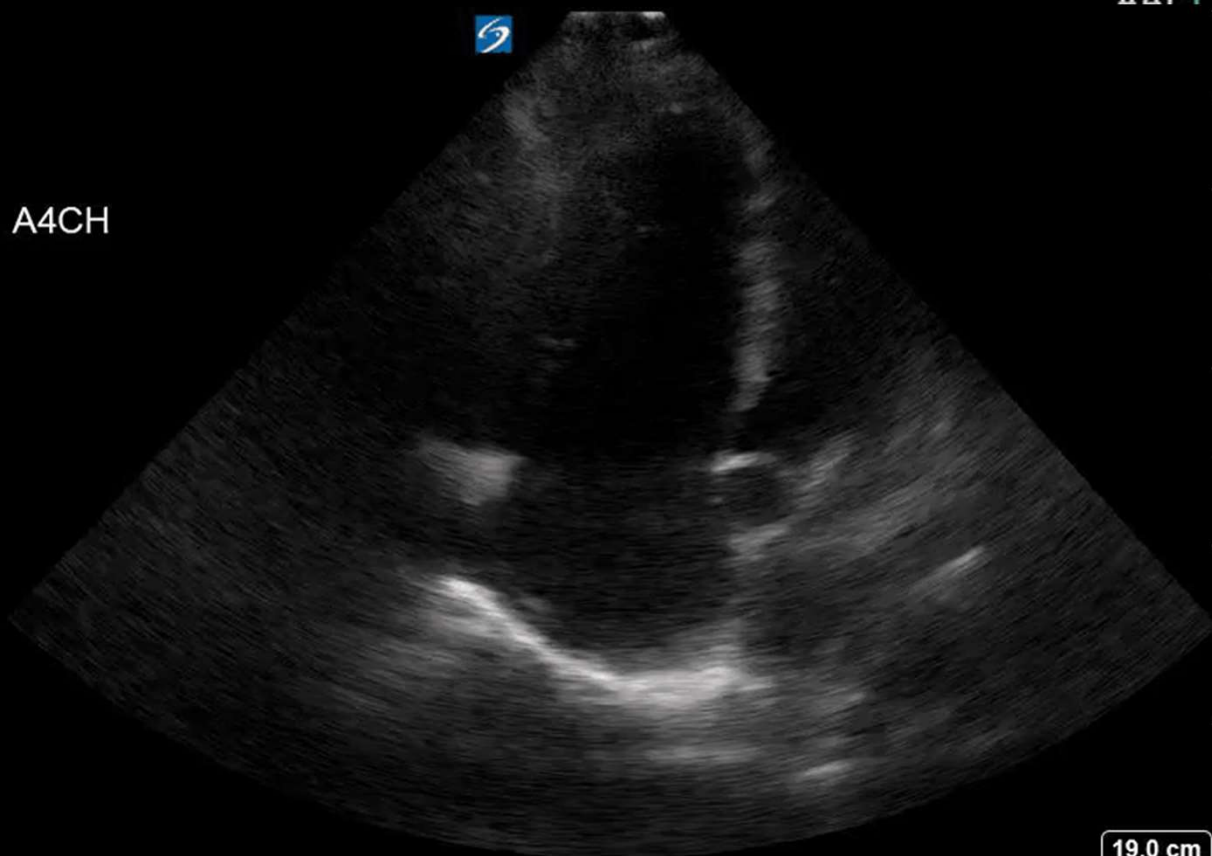


D sign





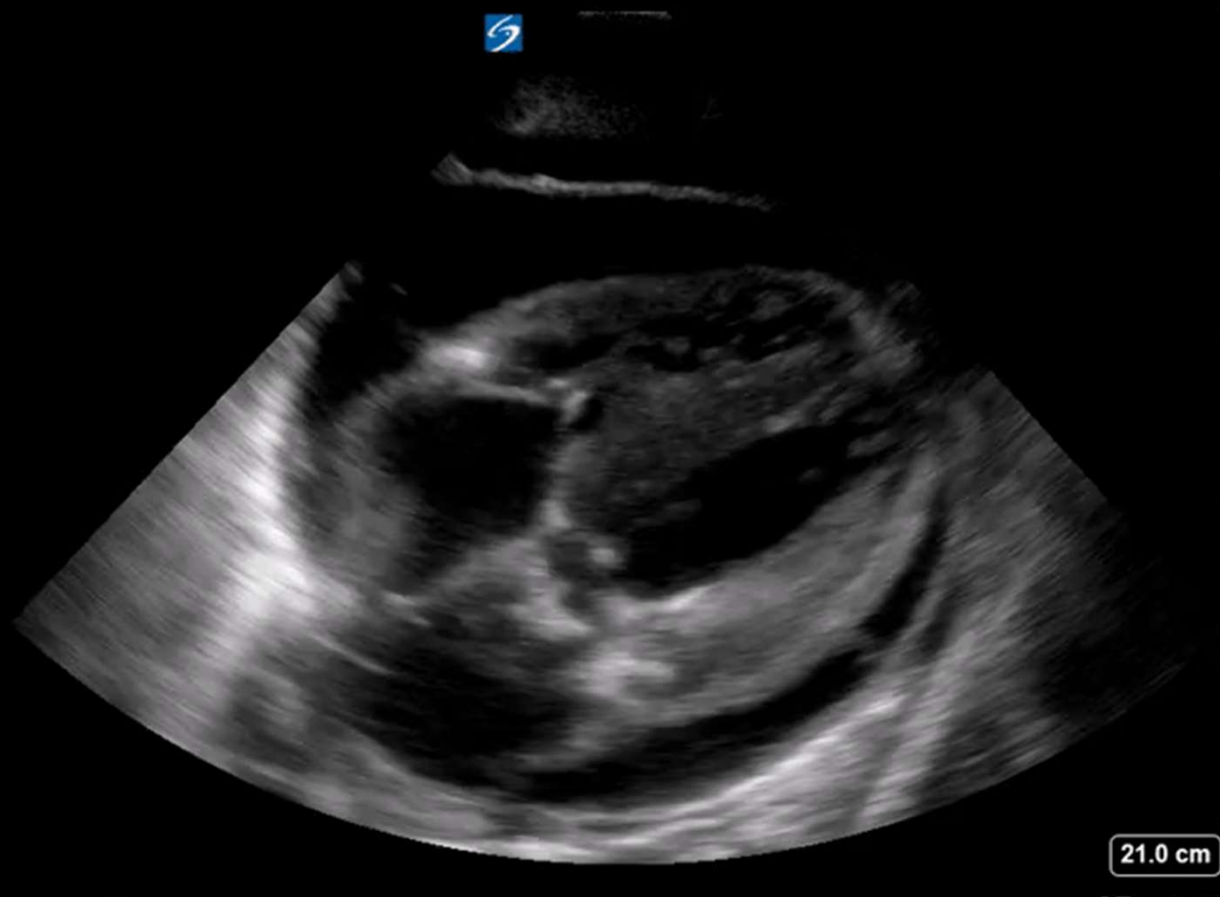
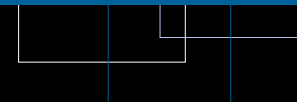
A4CH

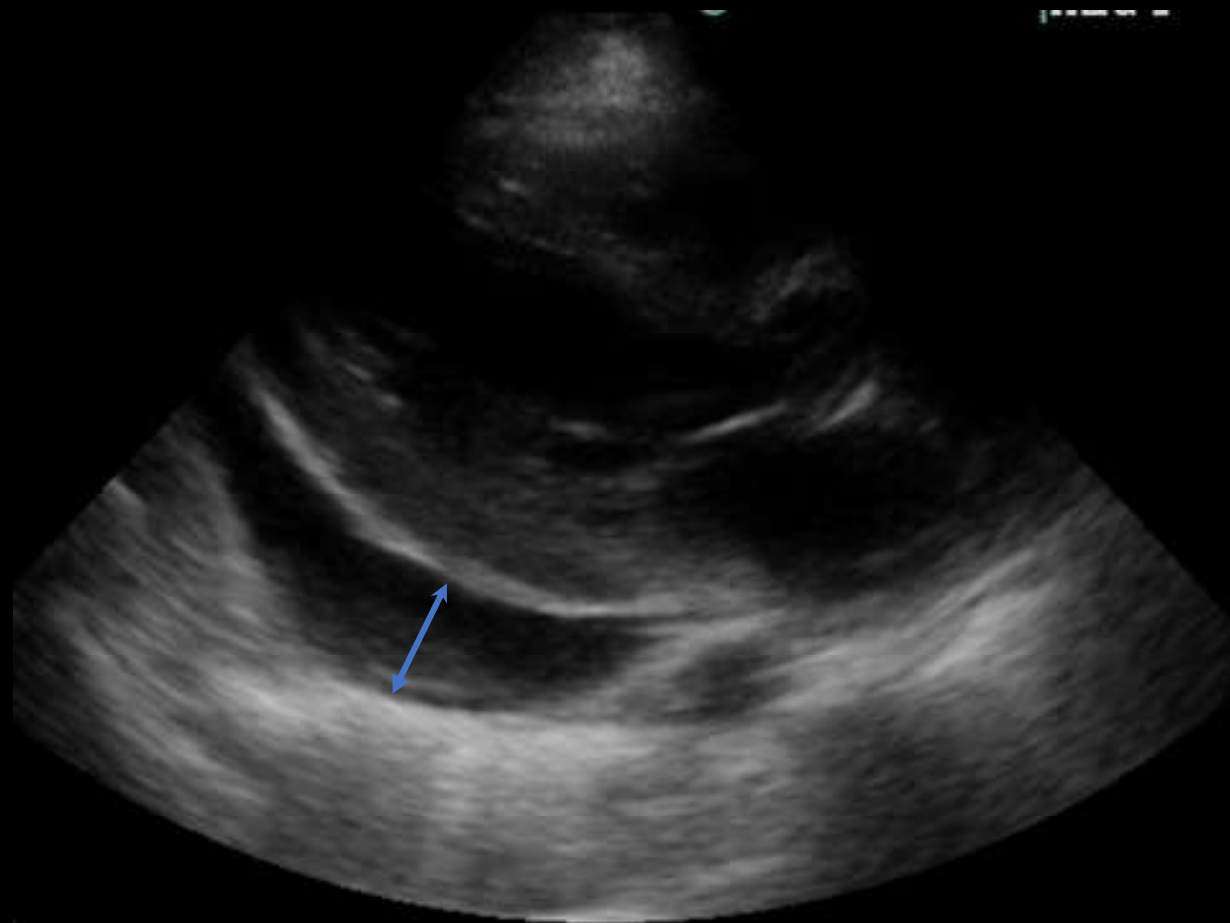
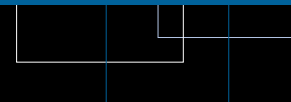


2401

19.0 cm





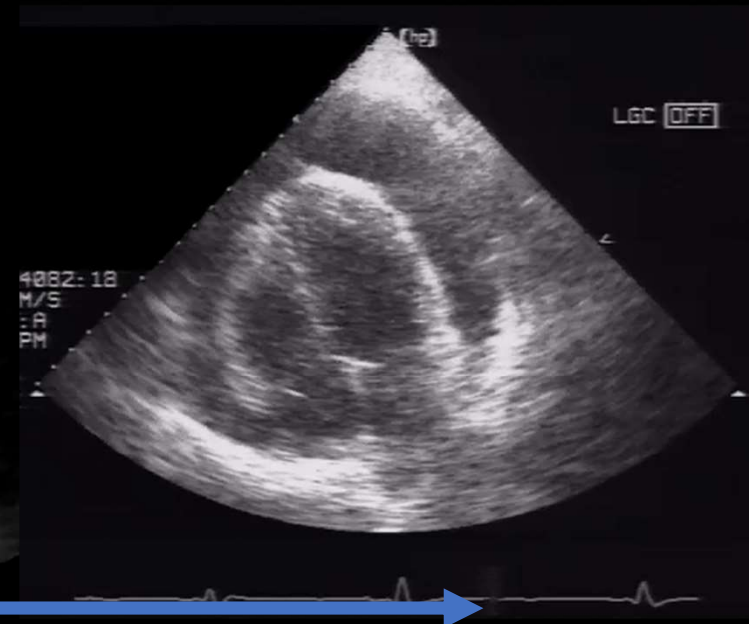




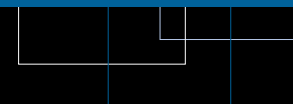
Small
<1cm



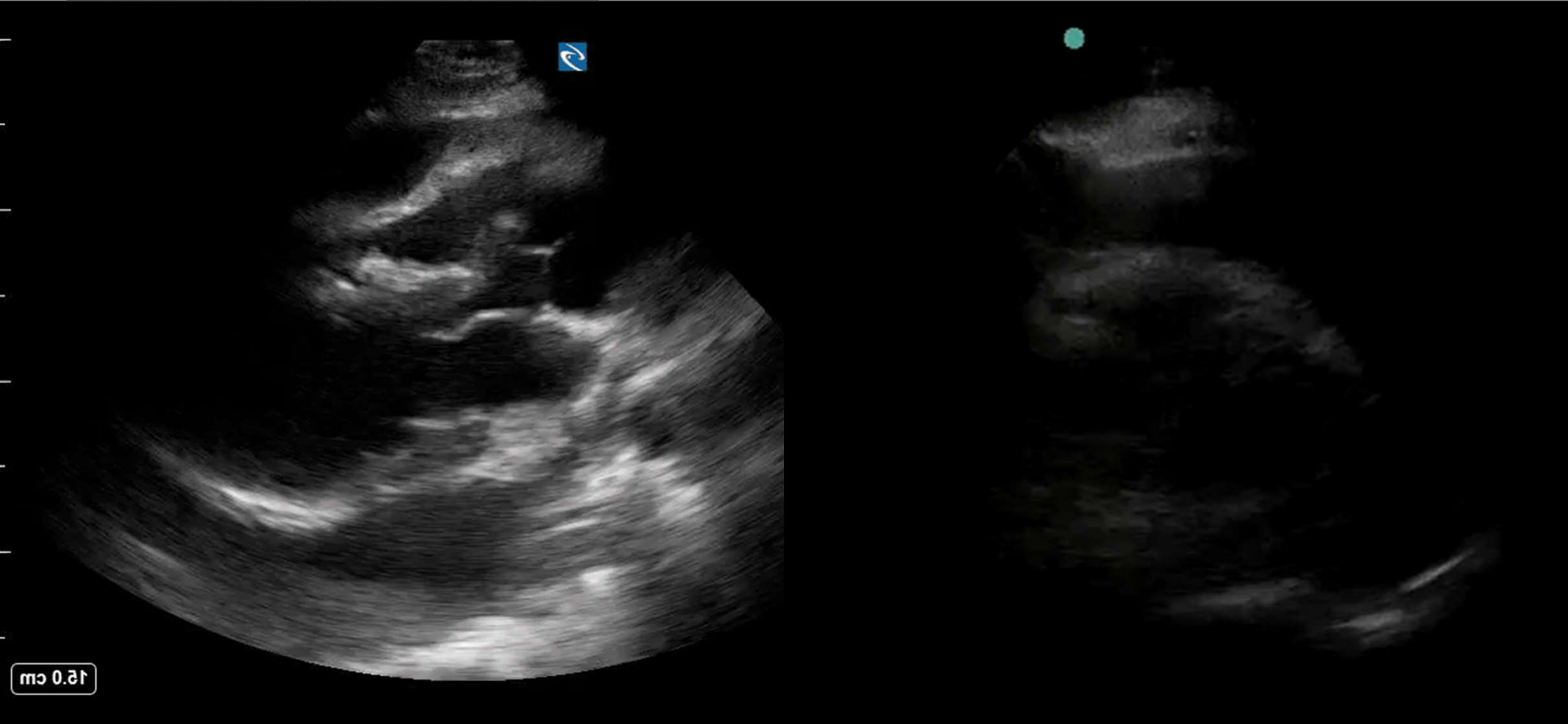
Moderate
1-2 cm



large
>2cm



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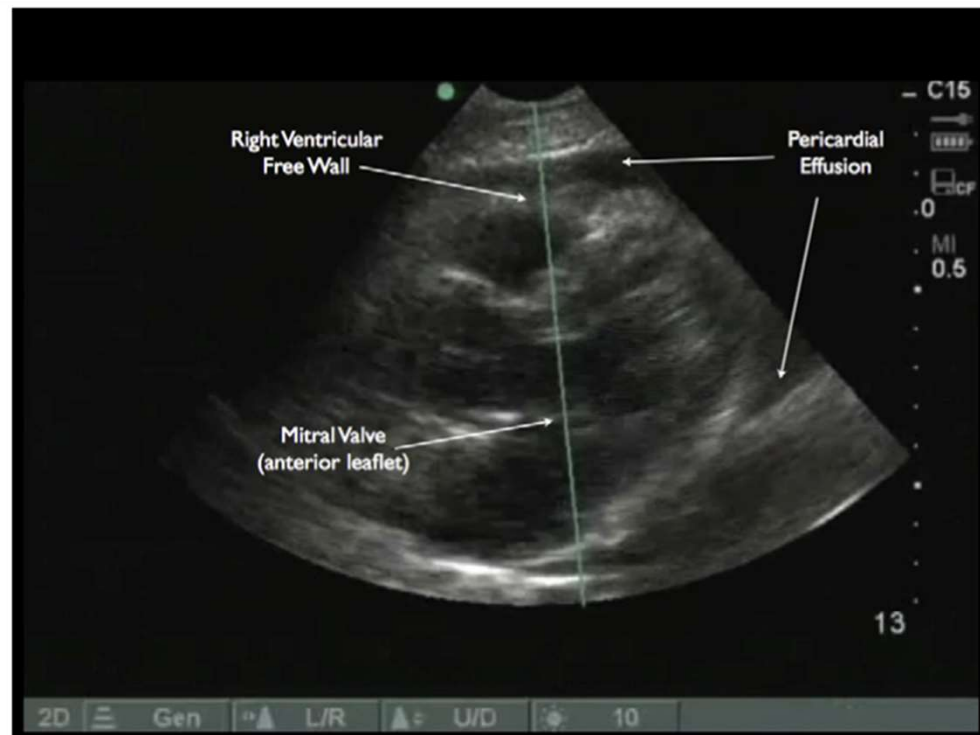
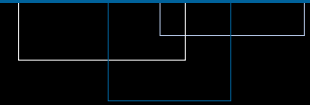


Fig. 1. Parasternal long image using radiology orientation.

Nagdev A, Stone MB. PMID: 21397379.

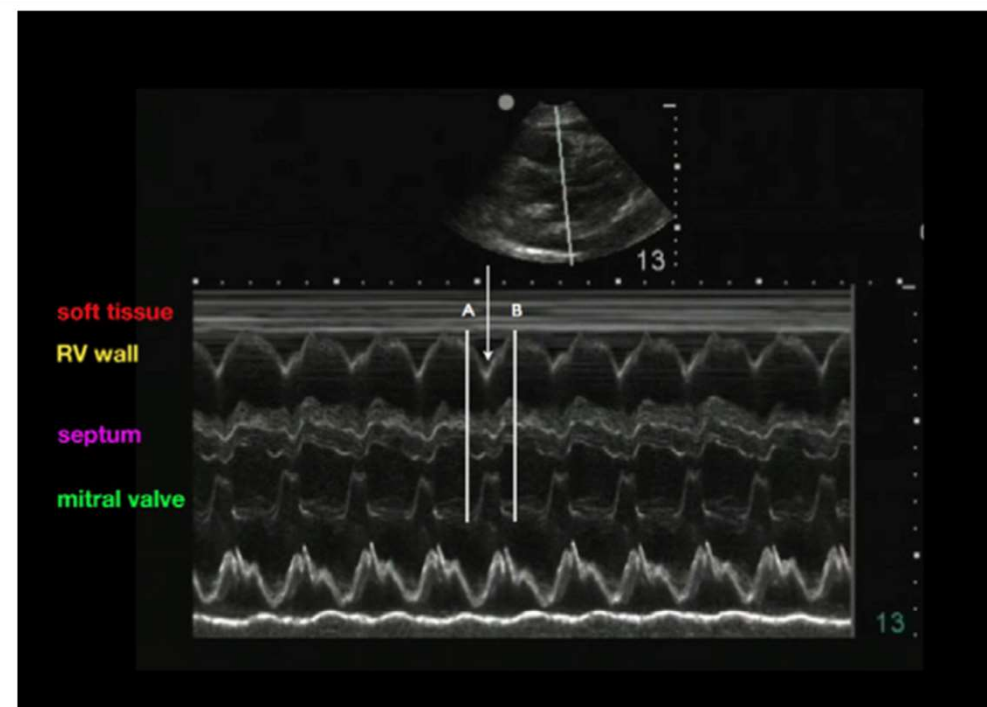


Fig. 2. M-mode image obtained from parasternal long orientation. Diastole, with associated mitral valve opening and right ventricular free wall collapse, occurs between the A and B. The arrow represents the abnormal posterior wall motion of the right ventricular free wall in early diastole.

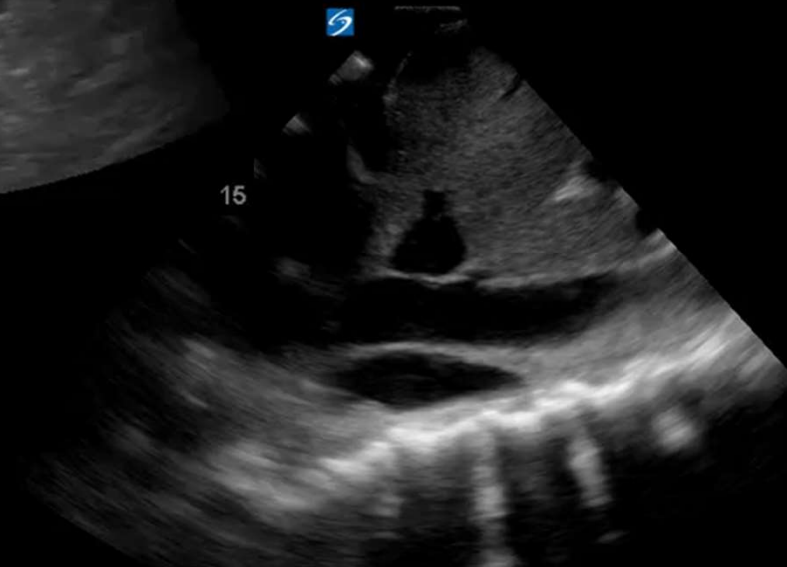
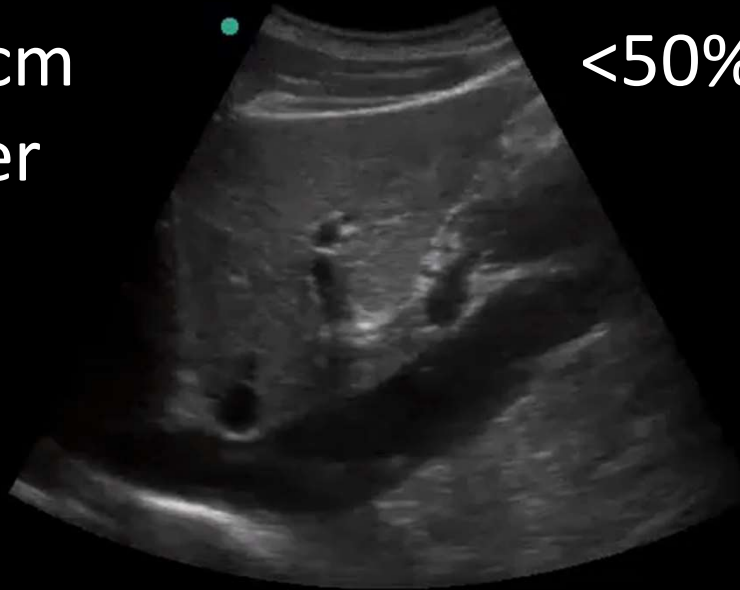
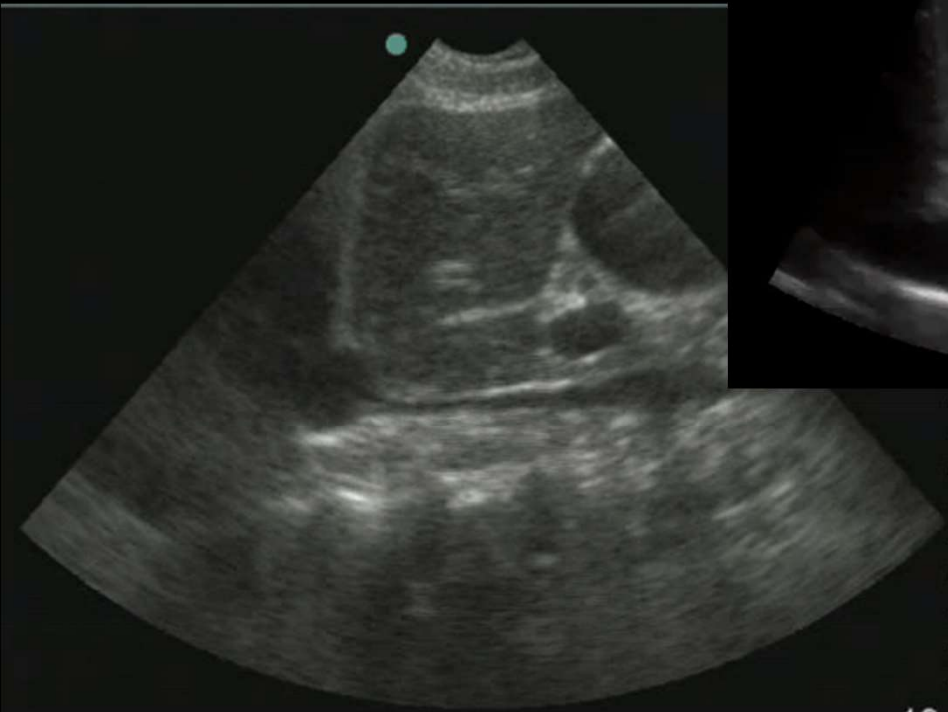
In which patient should the
Distensibility Index be used to
assess volume status instead of the
Caval Index?

- A. 65y/o COPD patient on NRBM
- B. 19y/o drug OD patient on ventilator
- C. 43y/o Asthmatic patient on duoneb
- D. 78y/o CHF patient on BiPAP



IVC <2.5cm
diameter

<50% collapsibility



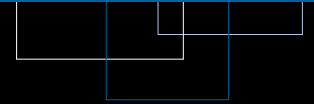
Caval Index= (Max -min diameter)/ Max
diameter

Distensibility Index= (Max -min diameter)/ Min diameter
X 100%

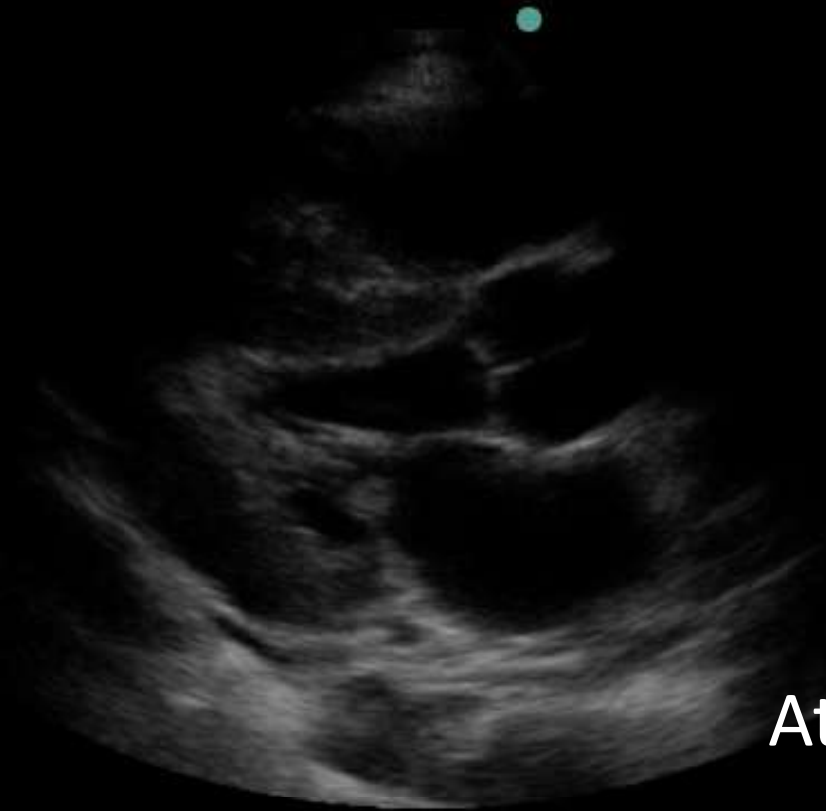
Vented patient

Nagdev AD, et al. PMID: 19556029.

Barbier C, et al. PMID: 15034650.

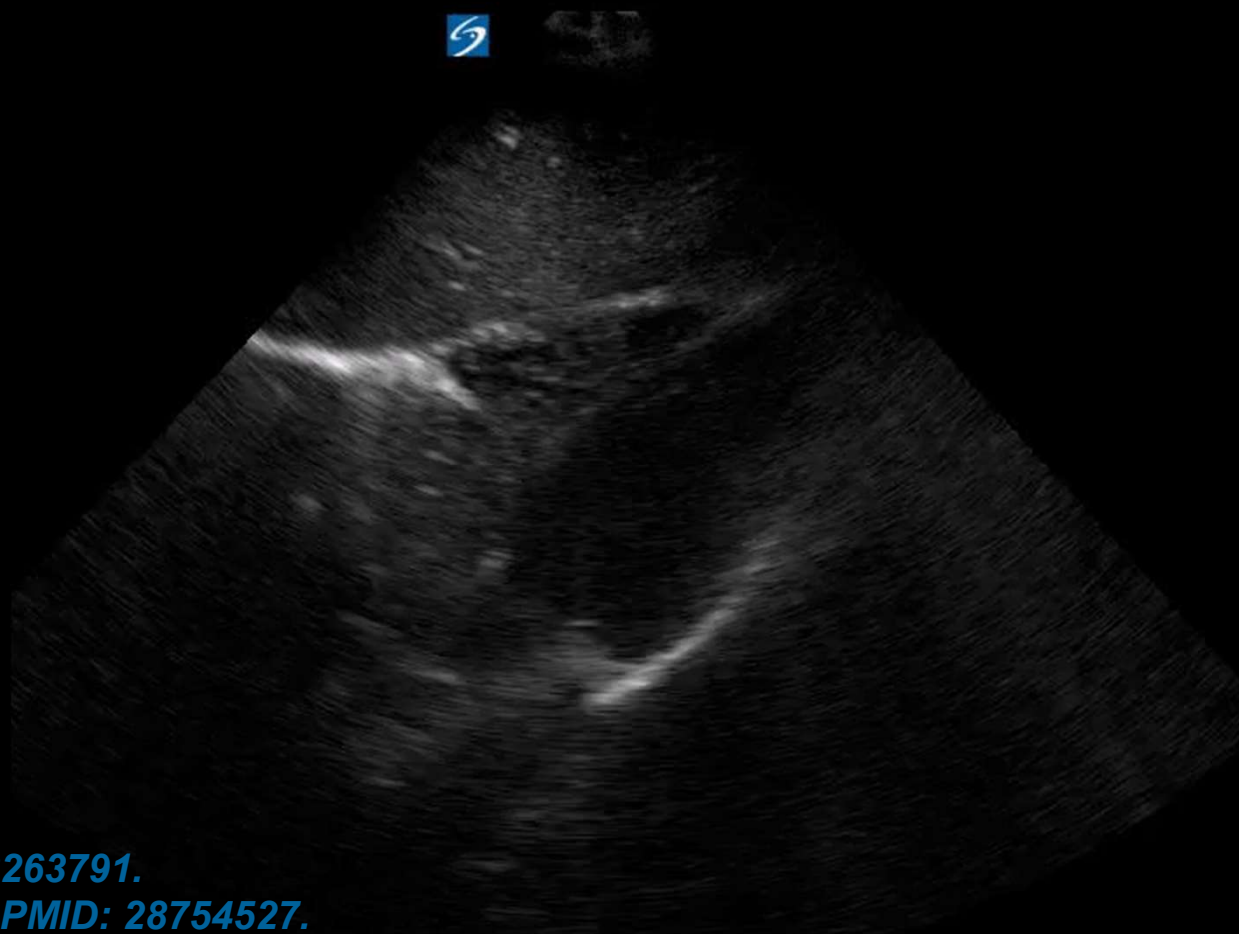


Thoracic aortic
root &
descending
aorta <4cm

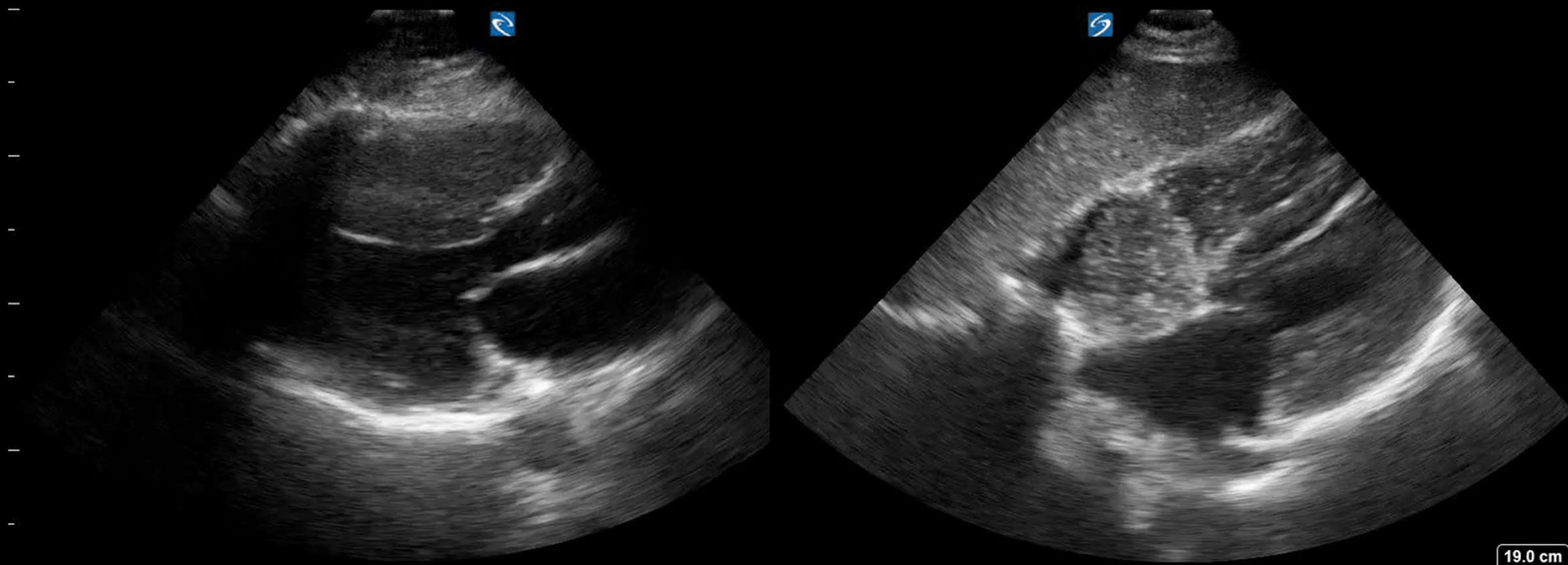
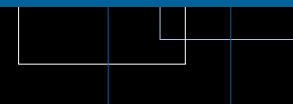


Atria diameter
<4cm

V Fib



Tsou PY, et al. PMID: 28263791.
Huis In 't Veld MA, et al PMID: 28754527.



Gaspari R, et al. PMID: 28916478.
Gaspari R, et al. PMID: 27693280

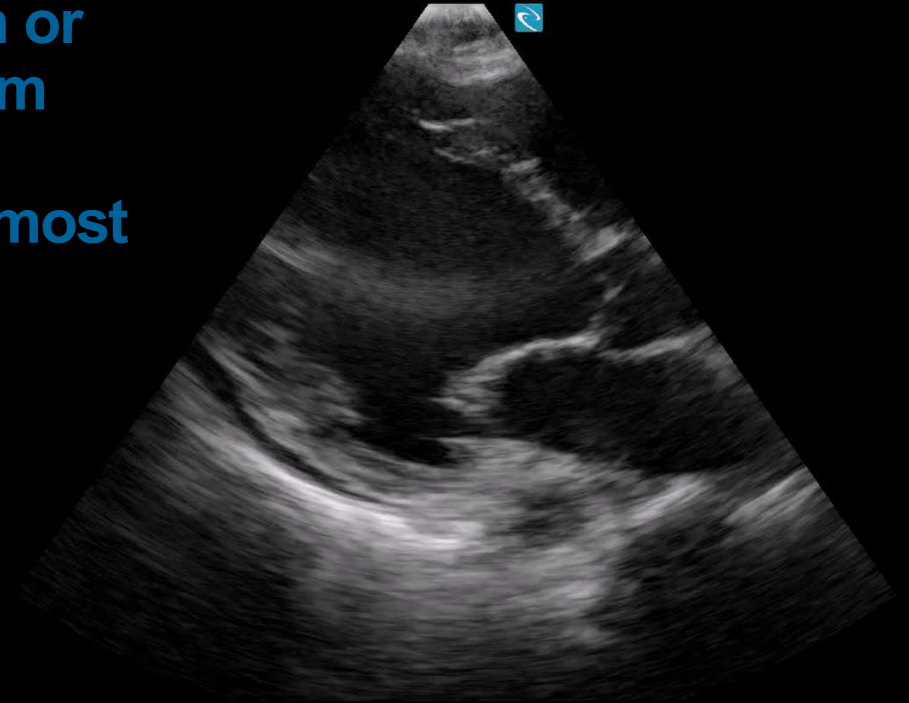
Which of the following is considered the gold standard for LVEF estimation?

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- B. Eyeballing
- C. Fractional shortening
- D. Simpson biplane**



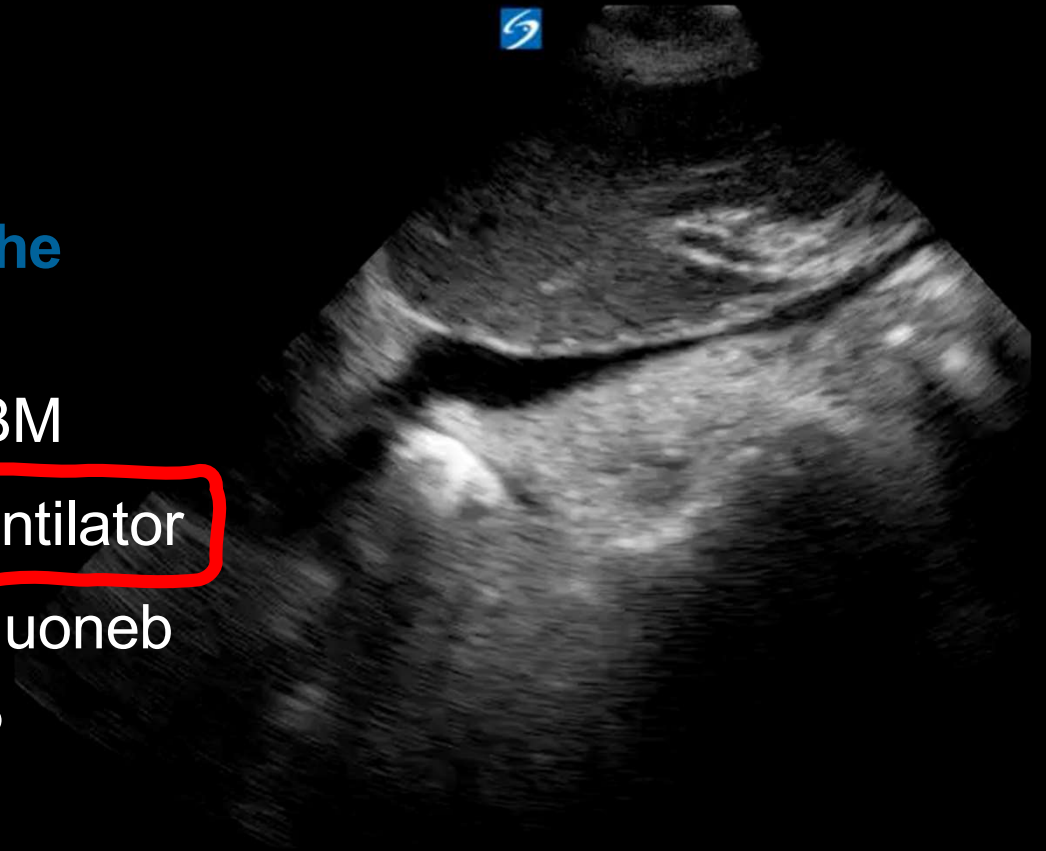
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assess volume status instead of the
Caval Index?

- A. 65y/o COPD patient on NRBM
- B. 19y/o drug OD patient on ventilator**
- C. 43y/o Asthmatic patient on duoneb
- D. 78y/o CHF patient on BiPAP





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