

Internal Medicine Point-of-Care Ultrasound: Epigastric (IVC and Aorta)

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Disclosure

- I have no financial disclosure or conflicts of interest with the presented material in this presentation.

PEARLS



P - Parasternal

E - Epigastric

A - Anterior lung; apical (cardiac)

R - RUQ

L - LUQ

S - Suprapubic

Lecture Outline

- Discuss beginner and advanced goals with POCUS
- Probe Orientation
- Normal Ultrasound Anatomy
- Pathology and Applications for the internist

Epigastric (IVC/aorta) View

- Beginner
 - Obtain adequate window of IVC and assess volume status
 - Identify both the aorta and IVC
 - Evaluate for AAA
 - Use the 4-chamber subxiphoid cardiac view to identify the RA transitioning to IVC short axis and obtain transverse epigastric view
- Advanced
 - Use this view to assess hepatic veins
 - Visualize right pleural effusions posterior to the diaphragm and can serve as a window for pancreatic pathology

Probe Orientation in Epigastric (IVC/aorta) Longitudinal View

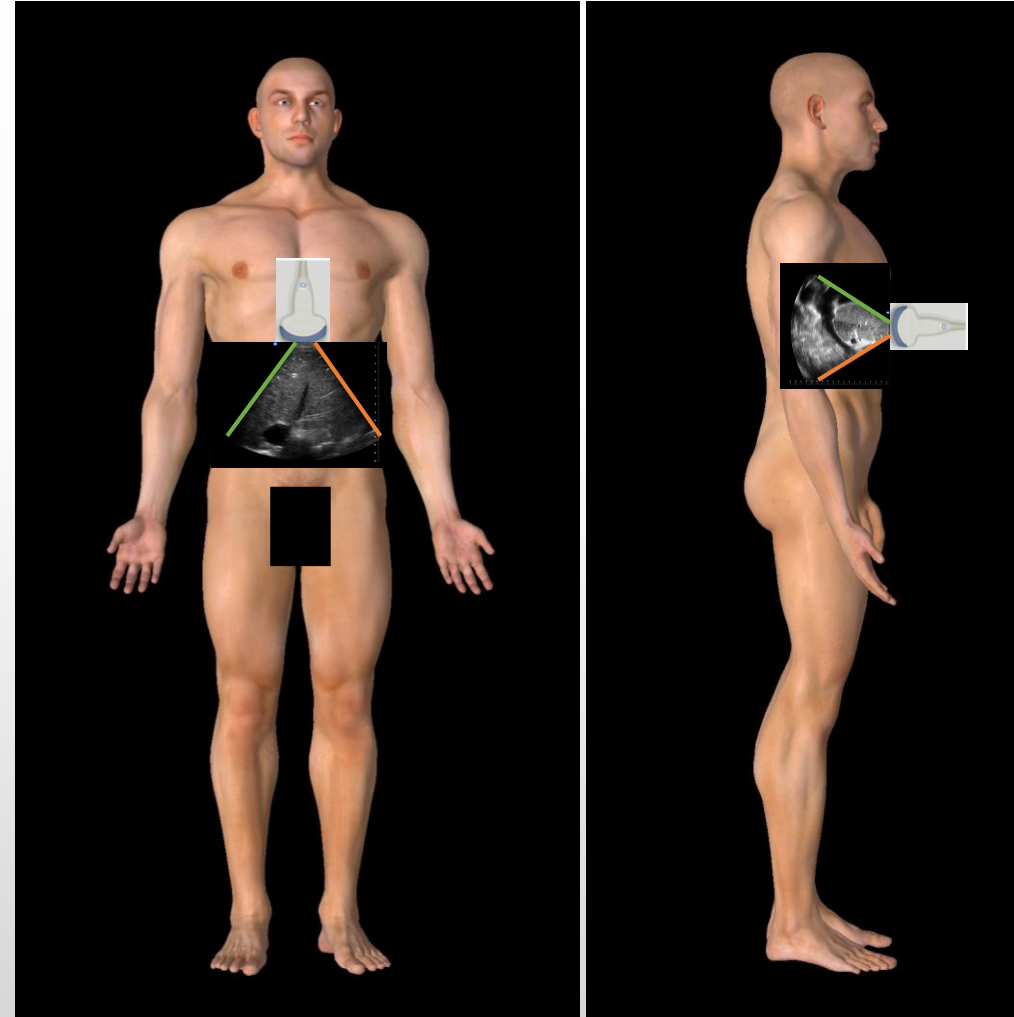
Probe: Phased-Array or Curvilinear

Preset: Cardiac or Abdominal

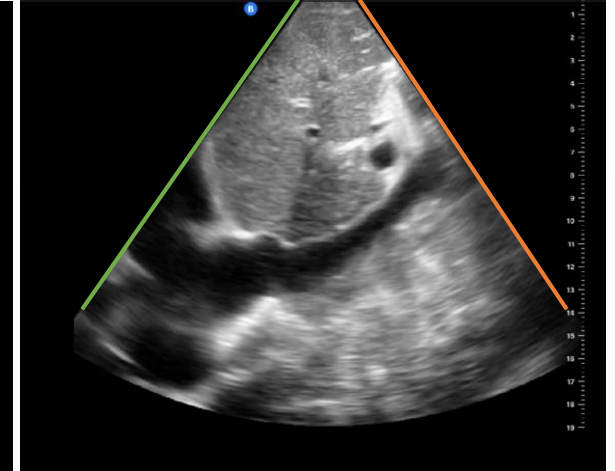
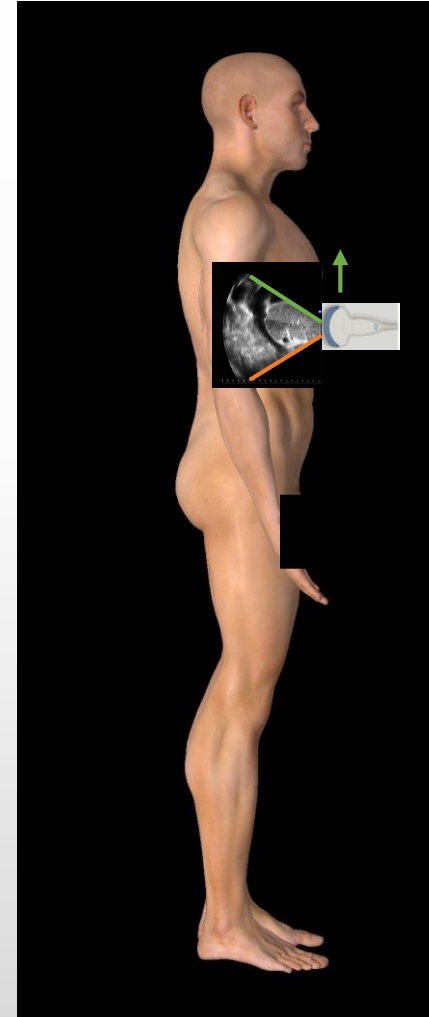
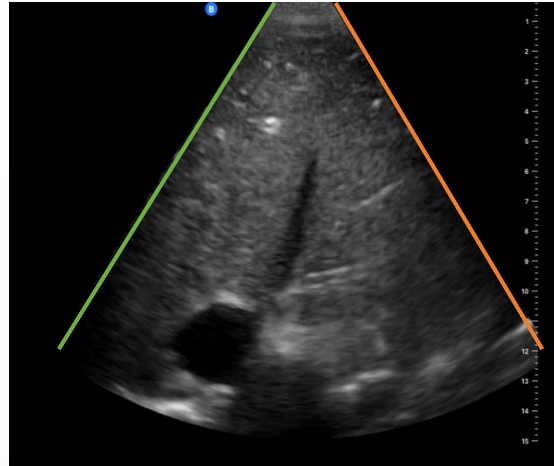
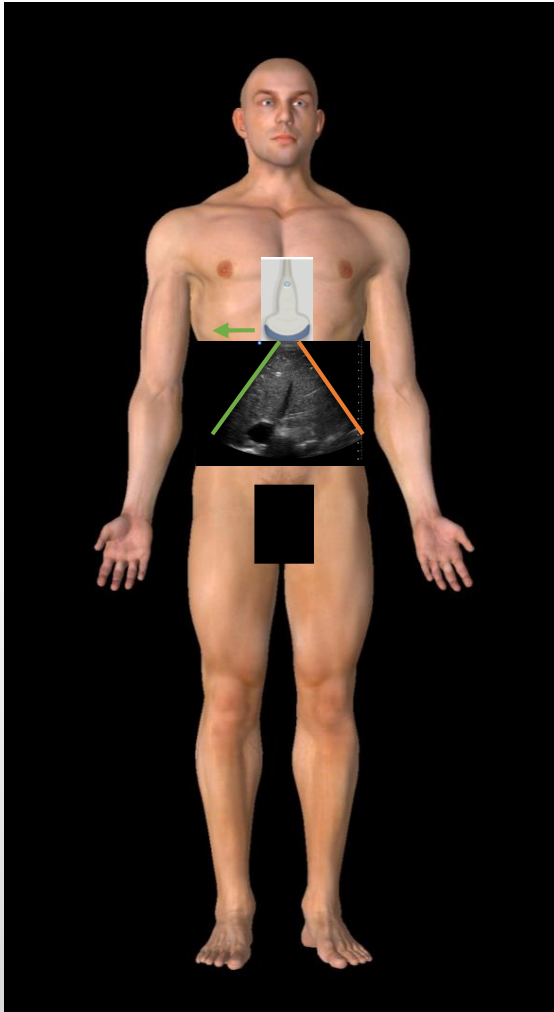
Probe location/marker (Longitudinal): Position the probe beneath the xiphoid process. Probe marker towards the patient's head. Keeping the right atrium in view, fan the probe to the patient's right to locate the largest diameter of the IVC. In standard anatomy, aorta should be located with fan to patient's left.

Measurement of the IVC should be 2 cm from the RA-IVC junction.

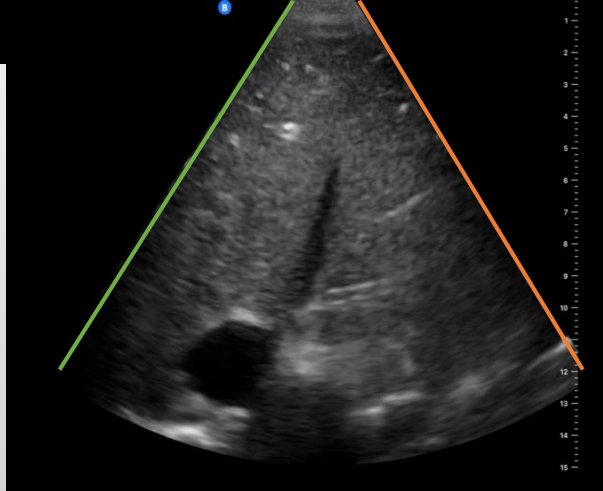
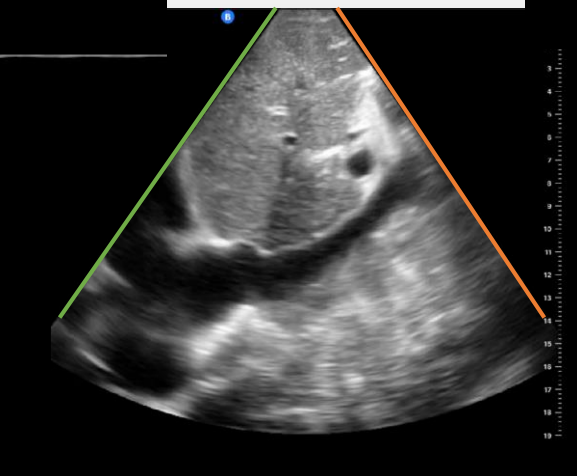
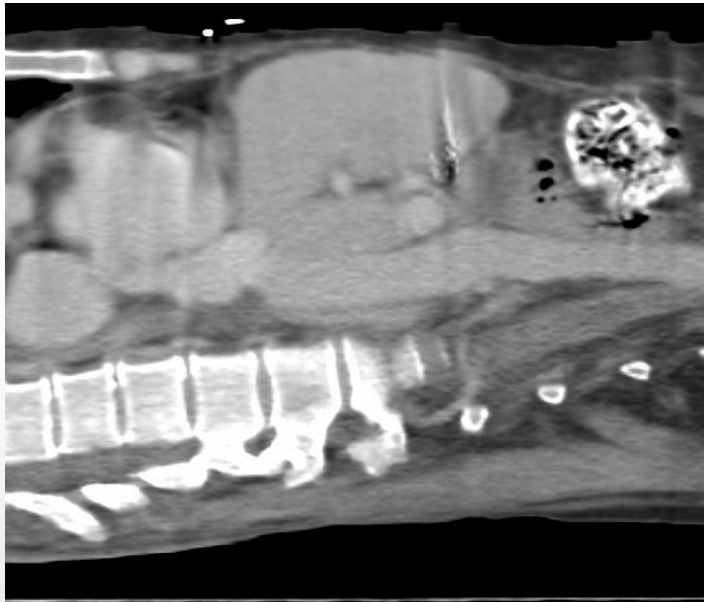
Probe location/marker (transverse): Position the probe beneath the mid-epigastric region with the orientation marker towards the patient's right. See spine at deepest point.

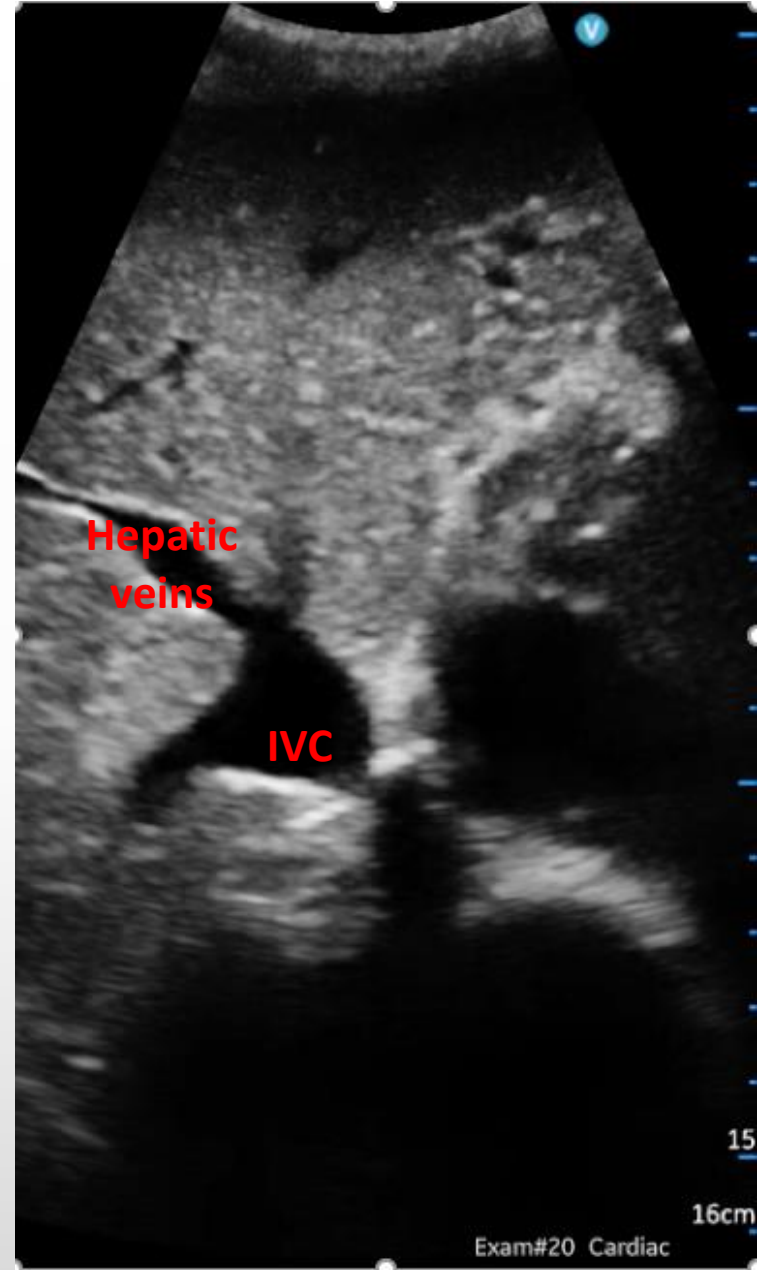
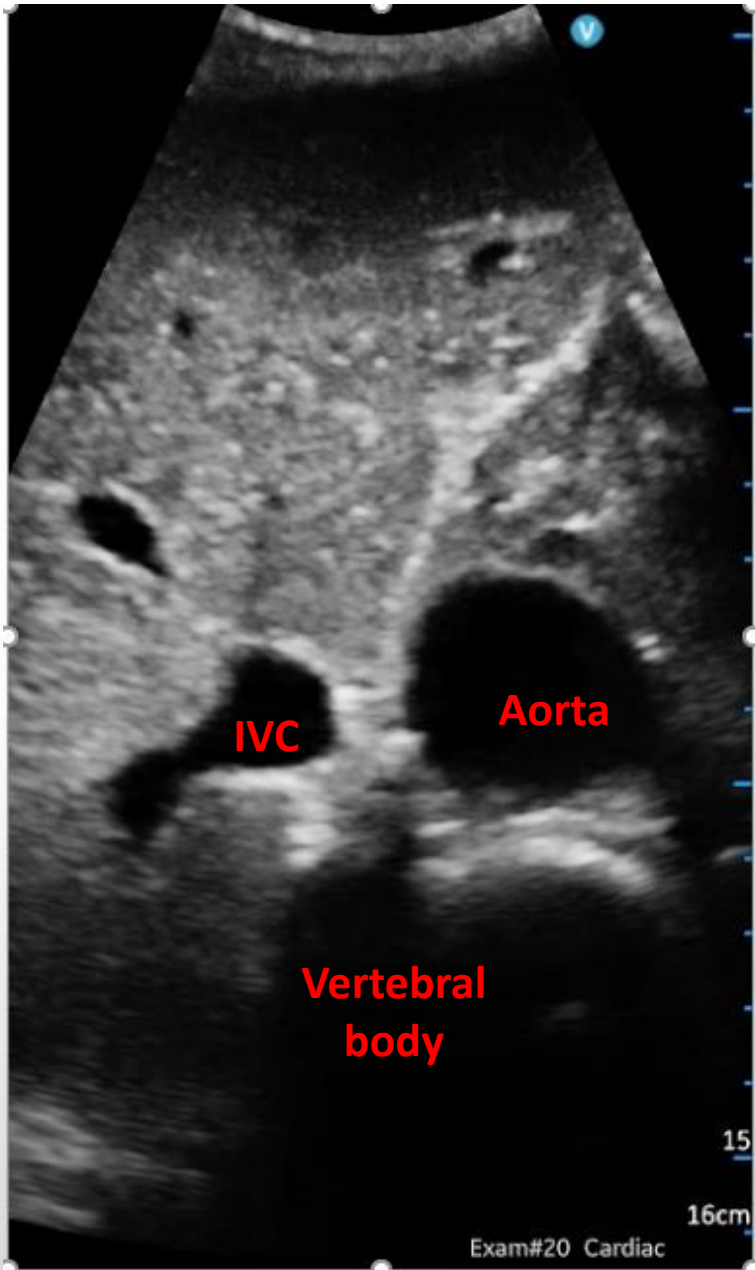


IVC in transverse and longitudinal axis

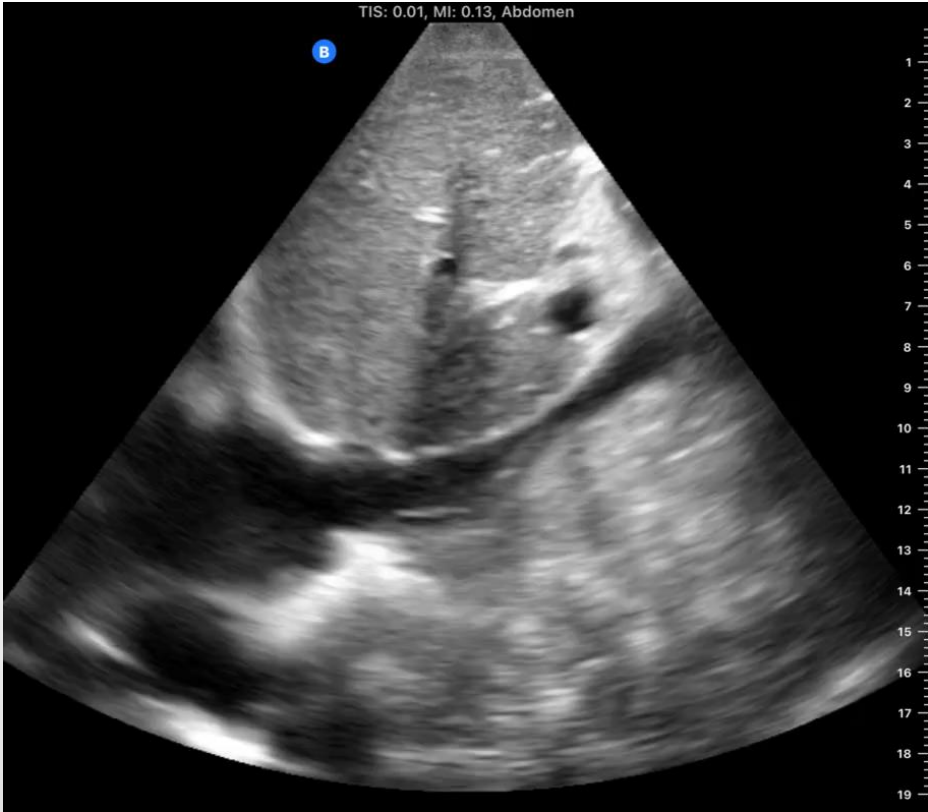
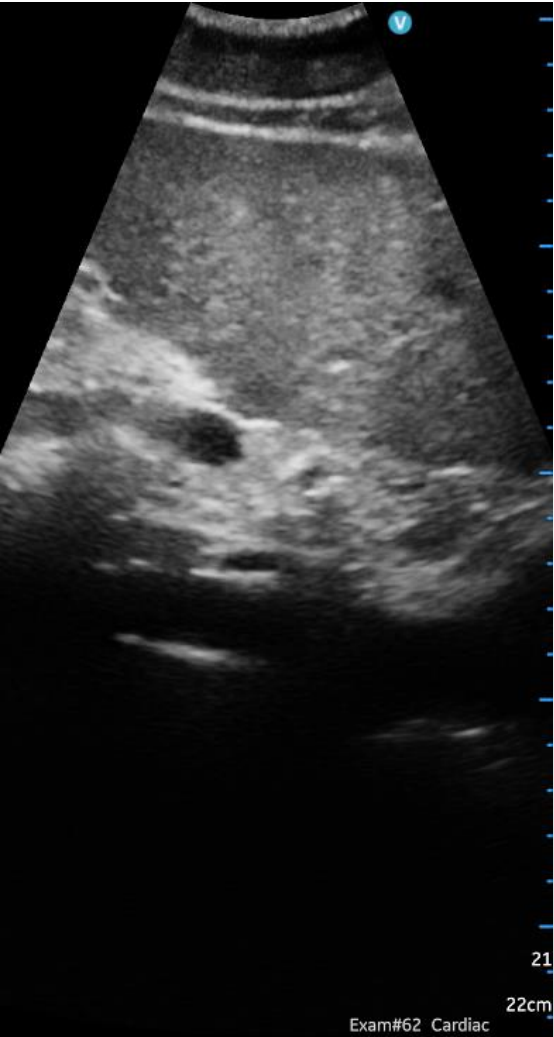


IVC





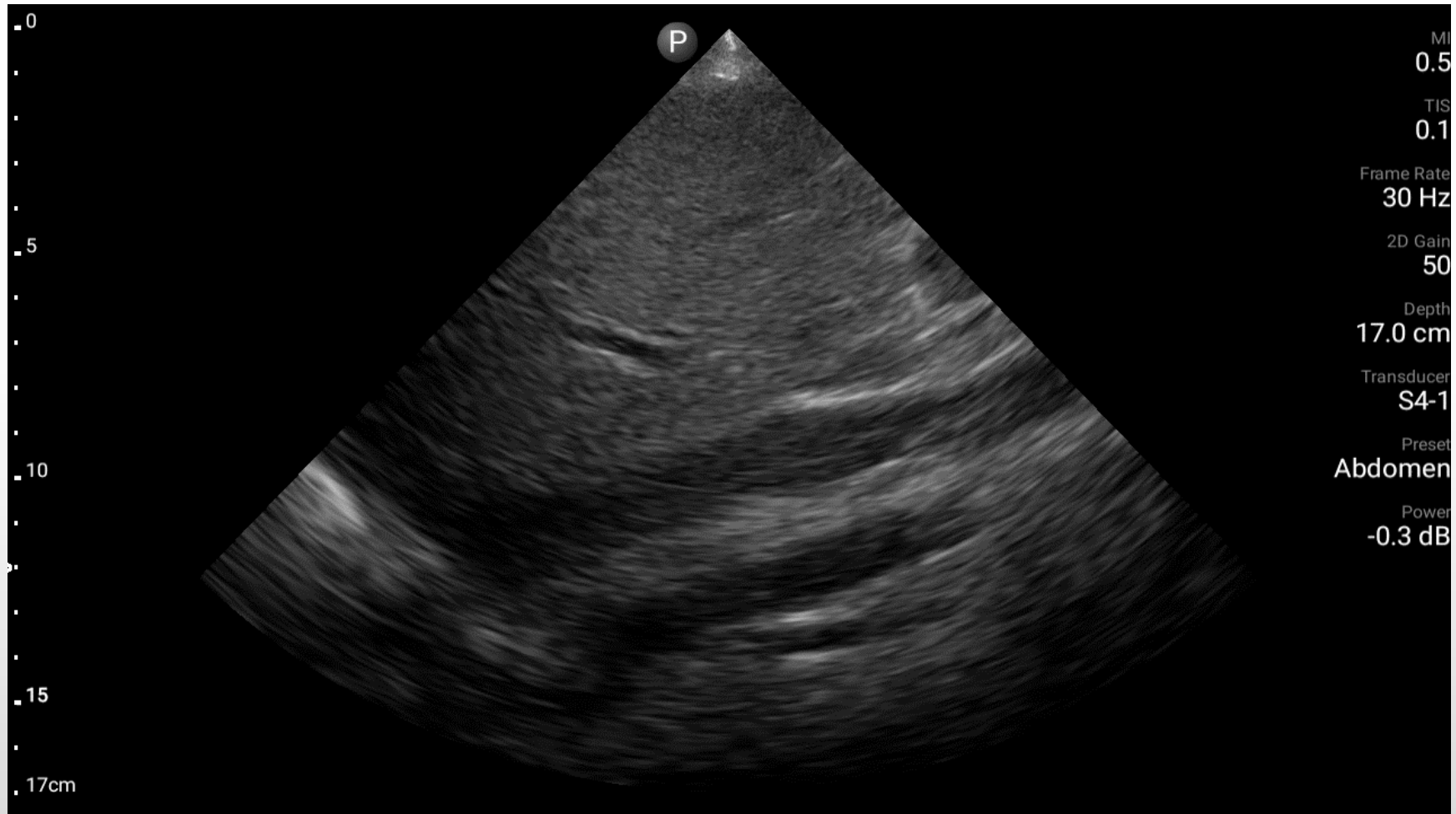
IVC/ aorta



Bonus (Advanced) Knowledge:

- If the subxiphoid view is unobtainable (COPD, ventilator, etc), longitudinal view of the IVC can also be obtained through the right lateral transabdominal coronal approach, also known as the “rescue view”.
 - The probe is placed in the right anterior to midaxillary line (similar to the placement for evaluating a pleural effusion). By scanning more anteriorly, the IVC can be visualized running next to the liver and crossing the diaphragm.



Rescue View



Assessing for IVC Collapsibility

- For spontaneously breathing patients, have them take a deep breath or “sniff” in after obtaining the IVC view.
 - The maximum IVC diameter will be seen during expiration
 - The minimum IVC diameter will be seen during inspiration
 - It is important to assess this 2cm from the RA-IVC junction.
- For ventilated patients, the positive pressure of the ventilator will have the opposite effect on the IVC.

IVC Diameter, Collapsibility and CVP

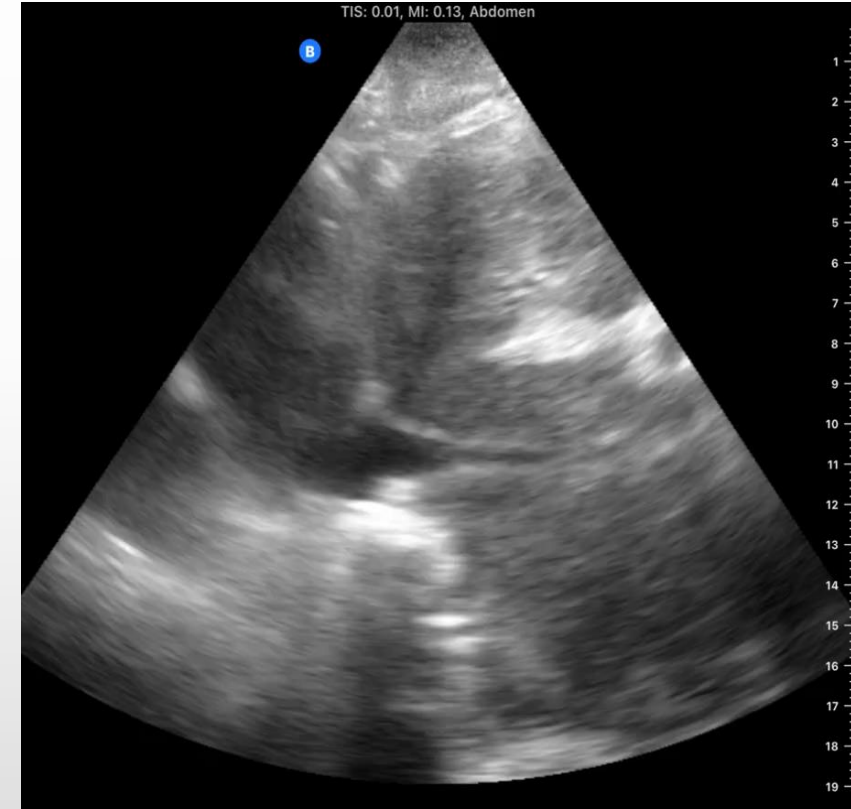


IVC Diameter (cm)	IVC Collapse (%)	CVP (mm Hg)
<2.1	>50	0-5
<2.1	<50	5-10
>2.1	>50	5-10
>2.1	<50	10-20

*measurement of the IVC alone cannot determine volume status

Volume Contracted

IVC Diameter (cm)	IVC Collapse (%)	CVP (mm Hg)
<2.1	>50	0-5
<2.1	<50	5-10
>2.1	>50	5-10
>2.1	<50	10-20



Pearls and Pitfalls

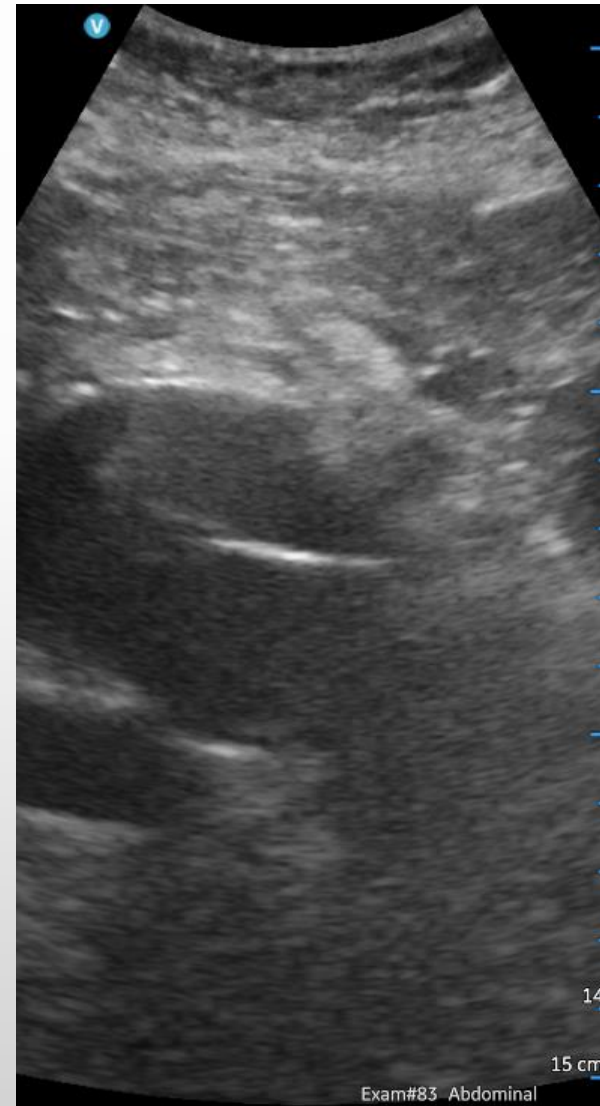
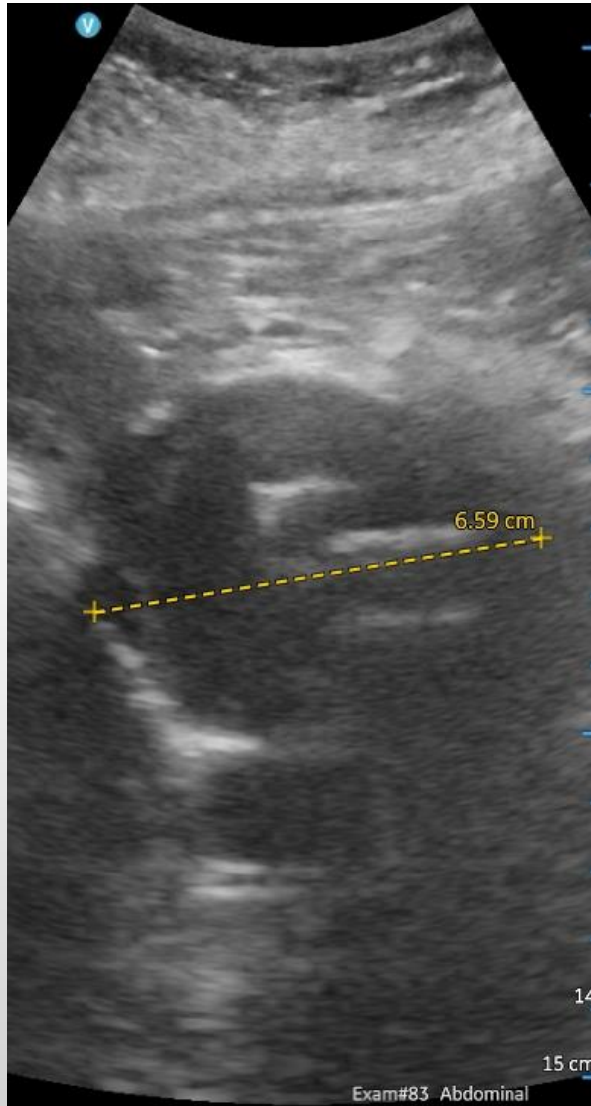
- Distinguish the AA from the IVC. Track the IVC to the RA after it transverses the liver. The aorta lies to the left of midline with thicker walls, is pulsatile and surrounded by fat.
- When assessing IVC diameter, be aware of the cylinder effect: off axis, oblique scanning leads to underestimation of max diameter
- Assess IVC diameter 2 cm from RA-IVC junction
- A dilated, non-collapsible IVC has high sensitivity for cardiac tamponade and can quickly rule out tamponade if the IVC collapses
- Use the IVC diameter and collapsibility to estimate CVP

Cases and pathology

Case 1

65 yo M presents to the resident clinic to establish care. During his preventative health screening you take into account his 40-pack year smoking history and order the appropriate low-dose screening CT chest. In addition, you decide to take a look at his abdominal aorta today in clinic before ordering an official US.

Abdominal aortic aneurysm



AAA and POCUS

- POCUS is a well-accepted imaging modality to detect AAA
- 30% of ruptured AAA go misdiagnosed
- POCUS has a high sensitivity (97.5%-100%) and specificity (94.1%-100%) for detecting AAA

Abdominal aortic thrombus



Plethoric IVC



References

- Soni NJ, Arntfield R, Kory P. *Point-of-Care Ultrasound*. Elsevier; 2020.
- Wagner, M., & Boughton, J. (2018). Pearls for an ultrasound physical and its routine use as part of the clinical examination. *Southern Medical Journal*, 111(7), 389–394.
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