

Point of Care Ultrasound



Recap - Technique

- 4 Basic Steps
- 1. Optimize image
- 2. Image in short and long axis

Use landmarks to orient

- 3. Recognize artifact, specifically anisotropy
- 4. Characterize pathology

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Transducer Handling

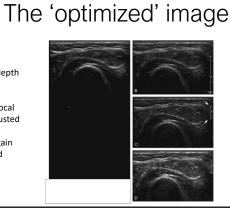
- Hold between thumb and fingers
- End of transducer near heel of hand
- · Stabilize with heel of hand



A to B - depth adjusted

B to C - focal zone adjusted

C to D - gain increased



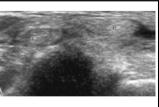
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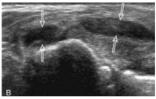
Artifacts

Not all bad



- beam not perpendicular to tissue of interest
- mainly tendons & ligaments
- become hypoechoic or anechoic
- · can be advantagious





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Shadowing

- beam reflected, absorbed, or refracted
- can extend deep to bone, calcification, foreign body
- requirement for cholelithiasis dx

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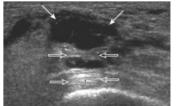
Refractile shadowing

• at edge of some structures

• foreign body or torn tendon

Increased Through Transmission

- occurs when imaging fluid or soft tissue rumors
- deeper soft tissue appears hyperechoic
- also called "posterior acoustic enhancement"

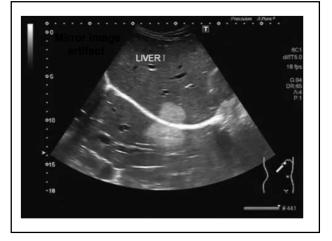


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Consequential Questions of Clinical Medicine

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- · Asthma/COPD exacerbation
- Pneumonia
- · Cardiogenic pulmonary edema
- Pulmonary embolism

The Dyspnea Dilemma and Volume Status

Fast, Heart, Lung and IVC

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This

versus

This



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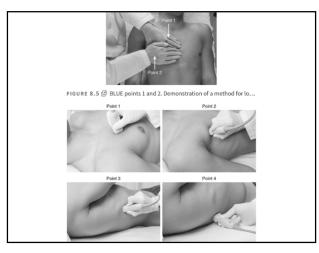
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Efficacy

	LUS	Chest X-ray
Interstitial Syndrome	94%	46%
Consolidation	100%	38%
Effusion	100%	65%
Pneumothorax	88%	52%

Blue Protocol

- 4 point hemithorax exam
- Examines a total of 8 interspaces
- 90% accuracy diagnosing respiratory failure



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First - Lung

- · Air is enemy of ultrasound
 - no transmission
- · That's why gel or water immersion is used

Lung

 Fortunately, just as diaphragm is a strong reflector of ultrasound (mirror image artifact)



 In fact, lung ultrasound is more properly referred to as pleural ultrasound





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Pleura

 Together, parietal and visceral pleura provides bright echogenic shadow and potential of multiple, equally-spaced echogenic reverberating shadows deep into the lung.



Pleura

- When seen, underlying lung will be normal on X-ray and CT.
- Does not exclude asthma or COPD



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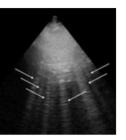
Pleu<u>ra</u>

- These parallel, repetitive reflections are called 'A' lines.
- Only one is needed to signify normal lung.



Pleura

- · So what is abnormal?
- Fluid distending the inter-lobular septae - inters syndrome
 - Consolidation
 - Effusion
- · All can be detected



23

Pleura - interstitial syndrome

- 3 or more 'rockets' are called 'B' lines and signify inter-lobular fluid distension
- One one side, questionably pneumonia
- · Two sides, pulmonary edema

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There

Pleural shifting or "ants marching"

100% exclusion of pneumothorax

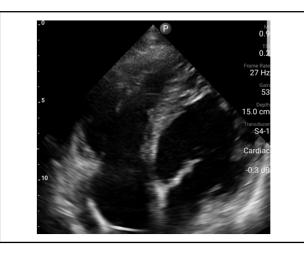
Effusion/Atelectasis



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What's Left

- Cardiac Contractility
 Hyperdynamic
 Normal
 Reduced
 Severely reduced
- Ejection Fraction
 Greater or Lesser than 40%
- Volume Status



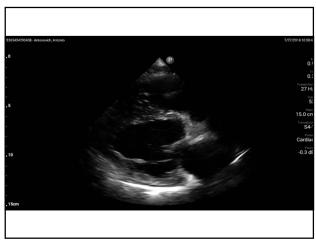
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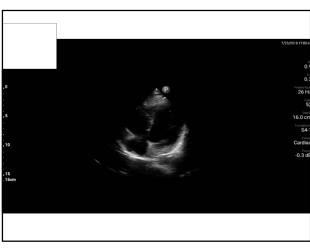
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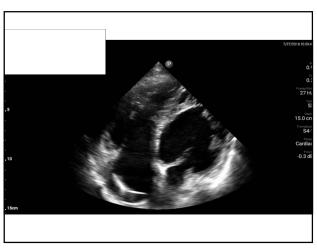


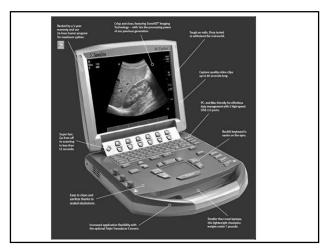
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