

Topic Discussion

- ✤ What is POCUS
- * Emergence of POCUS
- ✤ Interventional US
- Ultrasound Basics
- * Thoracic US, BLUE Protocol
- ✤ Critical Care ECHO
- ✤ FAST Exam
- Clinical Scenarios



So what do you do?

- Apart from obtaining IO/IV access and perform ACLS...
- We need to figure out what is the root cause:
 - * Too unstable of CT / VQ Scan
 - Cardiology fellow texts you "its not the heart"
 - Radiology doesn't do ECHO
 - * *#(%&@\$



What is POCUS?

- POCUS= Point of Care ultrasound, bedside ultrasound, critical care/ER ultrasound, clinician ultrasound
- * Answers the "Yes or No" questions
- * A rapid, patient-focused bedside ultrasound
 - * Initial scan usually includes Lungs/IVC/Heart and other affected areas
 - Following resuscitation- repeated as a more rigorous exam including Heart/Lungs/Abdomen/venous exam

Why POCUS?

- A disruptive technology that can potentially:
 - make a more rapid diagnosis
 - Improve procedure efficacy and safety
 - lower health care costs
 - improve patient satisfaction and outcomes
- An essential skill for future physicians
- The new "stethoscope"

Emergence of POCUS

- Allows the physician to directly move beyond a physical exam and spend more time evaluating a patient face to face.
- Finally removes the disconnect from imaging and clinical scenario beyond the ability of traditional ECHO or radiology.
- Budding usefulness in hemodynamical unstable patients from the ER-> GMF->ICU





Barriers

- Lack of POCUS training, uncomfortable to interpret US images without over-read by radiologist
- Limited or no access to US machine
- Clinical or hospital policy restrictions
- Cost and reimbursement concerns
- Time constraints



Limited ECHO vs POCUS

Limited ECHO

- 1. Exam only evaluates the heart
 - 2. Difficult windows
 - 3. Slow learning curve
- 4. If cardiac windows are not visibile=no information
 - 5. Takes several minutes

POCUS in Critical Care

- Covers the heart, lungs, IVC, veins
 Simple windows
 - 3. Rapid learning curve
- Useful even without good visualization of the heart
 Quick exam









Ultrasound Probe Selection

- Linear- High frequency probe (5-10 Hz)
 - * Limited to depth of approx. 6cm, higher resolution
- * Phased/Sector probe
 - * Produces a fan like image that wides with depth
 - Can be advantages between ribs



secto

lines

curved





Lung Artifact/Lung Signs

A Lines

- Horizontal regularly spaced hyper-echoic lines representing reverberations of the pleural line
- Present when ultra sounding air
 - * Normal Lung
 - Essentially ruling out fluid related pathology



Lung Artifact/Lung Signs

✤ B Lines

- Vertically oriented lines extending from the pleural surface to the maximum depth of the image
- ✤ A single B line may be normal
- Most common reason for multiple B lines is pulmonary edema
- Essentially differentiates airspace disease from pulmonary edema



Lung Artifact/Lung Signs

✤ Pleural Effusion

- U/S is a fast and effective way to diagnose a pleural effusion
- * Allows physician the ability to pursue small effusions
- * Appear Hypoechoic
- A pleural effusion evaluation should identify an anechoic space, anatomic boundaries (chest wall, diaphragm and lung), and dynamic changes related to breathing and cardiac motion



THI























Going back to our coding patient...

- ✤ 58 y/o M came to the hospital with worsening shortness of breath x 1 week
- * PMH of CHF, CAD, COPD, H/o DVT post treatment, and ETOH abuse
- PE: 99.8/108/24/ (88/58), 80% sat; Obtunded, distant heart sounds, minimal breath sounds, and benign abdomen.
- * You whip over the ultrasound









Summary

- Ultrasound is becoming more common place and expect to be part of your residency/fellowship training
- For thoracic ultrasound: Know how to identify: A line, B lines, Lung sliding and pleural effusions
 - To identify a PTX- look for the absence of lung sliding, a lines, lung point and barcode sign
- Basic critical care ECHO- to evaluated ejection fraction, right heart strain, IVC variability, pericardial pathology
 - > 5 basic views are Long and Short Parasternal, Apical, Subcostal and IVC
- **FAST** exam for abdominal pathology
 - 4 areas of interest include the perihepatic, perisplenic, pericardial and pelvic
- If you don't look you won't find anything

Questions? * Thank You.

References

Lichtenstein, D. A., & Mezière, G. A. (2008). Relevance of Lung Ultrasound in the Diagnosis of Acute Respiratory Failure. Chest, 134(1), 117–125. http://doi.org/10.1378/chest.07-2800

Lichtenstein DA et al. A bedside ultrasound sign ruling out pneumothorax in the critically ill. Lung Sliding. Chest 1995; 108: 1345 – 1348 Lichenstein D. et al. The Comet-tail artifact. An ultrasound sign of alveolar-interstitial syndrome. Am J Resp Crit Care Med. 1997; 156: 1640 - 1646 Lichtenstein D. The "lung point": an ultrasound sign specific to pneumothorax. Intensive Care Med 2000; 26: 1434 – 1440

Pichamuthu, K. (n.d.). ICU Sonography. Retrieved July 19, 2017, from http://www.criticalecho.com

Plummer, D. (1989). Principles of emergency ultrasound and echocardiography. Annals of emergency medicine, 18(12), 1291-1297.

Stamos TD & Soble JS. The use of echocardiography in the critical care setting in Crit Care Clinics (Acute Cardiac Care) 2001; 2: 253 – 270 Sloth E. Echocardiography in the ICU. Intensive Care Med. 2006; 32: 1283

Reardon, R., MD. (n.d.). Ultrasound in Trauma - The FAST Exam Focused Assessment with Sonography in Trauma. Retrieved July 19, 2017, from https://www.acep.org/sonoguide/FAST.html

Tiling, T., Bouillon, B., Schmid, A., Schweins, M., & Steffens, H. (1990). Ultrasound in blunt abdomino-thoracic trauma. Blunt multiple trauma: comprehensive pathophysiology and care. New York: Marcel Dekker, 415-33.