Point of Care Ultrasound Cases

- The following are building upon the normal ULTRASOUND anatomy of the lung, learned in the SHB course.
- The students will go through the cases with their ultrasound facilitators, Dr. Lydia Sharp in room 360, Dr. Jason Palmatier in room 390, and Dr. Amy Kule in room 460 during the cardiac pathology US lab.
- Students should review the cases prior to the session and be prepared to answer questions regarding the history, PE, lab data, radiologic findings, clinical correlates, as well as the US scan during the lab session.
- Drs. Kule, Barbas and Sharp will be requesting volunteers to assist with answering questions during the US lab.
- Drs. Kule, Barbas and Sharp will also discuss the Point of Care Ultrasound findings with you during the session.

Ultrasound Videos

- Normal Pulmonary Ultrasound [review from last year]
  - www.youtube.com/watch?v=0dTTVQ6WsuU
- Abnormal Pulmonary Ultrasound (watch video to 5:53)
  - https://youtu.be/WOlz8mk6UhE?list=PLGEKJJ3ekUkya3wejrC1DzxcTXNf1T1B8
- Additional Abnormal Pulmonary Ultrasound (5:00)
  - https://www.youtube.com/watch?v=1DxJIIw47zw
- Pneumonia on Ultrasound (3:22)
  - https://www.youtube.com/watch?v=21ylm8IBuRA
Case 1 – History

• A 22-year old Male arrives to the Emergency Department by EMS after being stabbed by a knife during an altercation at a party. He reports feeling pain to his left upper back and shortness of breath.

• His PMHx and SurgHx are both negative.

• He denies any taking medications or having any drug allergies.

Case 1 – Physical Exam

• Vitals
  Temp 37.1  BP 108/73  HR 114  RR 24  O2 sat 94% on RA

• Physical exam
  • Constitutional: Moderate distress
  • Cardiac: Tachycardic, regular rhythm, no murmurs
  • Pulmonary: Absent breath sounds on left, hyperresonance on percussion; clear breath sounds on right. Tachypneic, mild respiratory distress
  • Skin: 2 cm linear wound to left mid-upper back

Case 1 – Workup

• What radiographic studies would you order on this patient?
Case 1 – CXR

• Describe the CXR findings in this patient.

https://radiopaedia.org/cases/pneumothorax

Case 1 – CXR

• What is your suspected diagnosis?

Case 1 – CXR

• Explain the cause behind these findings.
Case 1 – Lung Ultrasound

• As part of your eFAST (Extended Focused Assessment with Sonography in Trauma) exam, you obtain these findings.

Case 1 – Lung Ultrasound

• Describe and demonstrate how to perform a complete eFAST exam on the mannequin and state what you would be looking for.

Case 1 – Ultrasound

• What are the ultrasound findings of a normal lung?
Case 1 – Ultrasound

• What are the ultrasound findings of a pneumothorax?

Case 1 – Reassessment

• The nurse calls you back to reassess the patient as he appears to have deteriorated.

  • New vitals
    HR 142
    BP 74/43

  • PE
    • Neck: Right tracheal deviation, distended neck veins

Case 1 – CXR

• Describe the CXR findings.
Case 1 – CXR

• Explain the cause of this patient’s deteriorated condition.

Case 1 – CXR

• How would you manage this patient?

Case 1 – Recap
Case 2 – History

• A 52-year old male arrives by EMS to the ED after falling 10 feet from to top of a ladder. He states the ladder slid out from underneath him. He landed with his right upper back across the rungs of the ladder. His complaints include right sided chest and back pain, as well as shortness of breath.

• His PMH includes HTN and he is currently on lisinopril.

• He has no PSurgHx.

Case 2 – Physical Exam

• Vitals
  • Temp 36.4  BP 123/78  HR 134  RR 29  O2 sat 92% on RA

• Physical exam
  • Constitutional: Moderate distress
  • Cardiac: Tachycardic, regular rhythm, no murmurs
  • Pulmonary: Diminished breath sounds on the right, dullness to percussion; normal breath sounds on left
  • Chest: Subcutaneous emphysema on right

Case 2 – CXR

• Describe the CXR findings in this supine patient.
Case 2 – CXR

• What can cause these physical exam findings?
  • Vital Signs
    • T: 36.4 °C  BP 123/78
    • HR 134  RR 29
    • O2 sat 92% on RA
  • Cardiac
    • Tachycardic, regular rhythm, no murmurs
  • Pulmonary
    • Diminished breath sounds on the right, dullness to percussion; normal breath sounds on left
  • Chest
    • Subcutaneous emphysema on right

Case 2 – CXR

• How would this finding appear on ultrasound?

Case 2 – Ultrasound

• Describe and demonstrate how to assess for intrathoracic fluid using ultrasound.
Case 2 – Management

• What is the appropriate management for this patient?

Case 2 – Recap

Case 3 – History

• An 83-year old patient presents to the ED with altered mental status.
• She lives in a nursing home.
• The patient is moaning and is unable to provide any information. EMS conveys that the nursing home staff noticed a change from baseline yesterday, but did not comment on anything specific.

• Reviewing the nursing home records reveals a PMH including stroke with residual dysarthria, dementia, hypertension and diabetes mellitus.
Case 3 – Physical Exam

• Vitals
  • Temp 39.4°C BP 93/69 HR 113 RR 34  O2 sat 89% on room air

• Physical Exam
  • Constitutional: Cachectic, somnolent in moderate distress
  • Cardiac: Tachycardic, regular rhythm, normal S1 and S2, no murmur
  • Pulmonary: Tachypneic, rhonchi right lung field; no rhonchi, rales or wheezing to left lung field
  • Abdomen: Normal bowel sounds, soft, non-tender, non-distended
  • Neurology: AAOx0
  • Extremity: Contractured upper extremities

Case 3 – Workup

• What is your differential diagnosis?

• What radiologic studies would you order or perform on this patient?

Case 3 – CXR

• Describe the CXR findings performed on this patient.
Case 3 – CXR

• What is your suspected diagnosis?

Case 3 - CXR

• Explain the pathology behind these CXR findings.

Case 3 – Ultrasound

• As you read about this diagnosis, you find that X-ray is found to have a sensitivity ranging from 46-77%, while US has a sensitivity ranging from 93-100% (using CT scan as the gold standard).

• Armed with this information, you decide to perform a lung US.
Case 3 – Ultrasound (Left Lung)
• Describe the findings you see on the unaffected left lung. The probe is placed at the midaxillary line at the level of T8.

Case 3 – Ultrasound (Right Lung)
• The probe is placed on the right posterolateral lung field. Describe the findings you see on the affected right lung.

Case 3 – Ultrasound (Right Lung)
• Explain the cause of these findings.
Case 3 – Management

• What is the most appropriate management of this patient?

Case 3 – Limitations

• What are some limitations to using US when evaluating for pneumonia?
Case 3 – Recap

Define Point of Care Ultrasound. Summarize its Utility in Patient Care.

References

- https://radiopaedia.org/cases/pneumothorax-6
- https://lifeinthefastlane.com
- https://vimeo.com/10081525
- https://www.ultrasoundoftheweek.com