Point of Care Ultrasound

- The following cases are building upon the normal ULTRASOUND anatomy of the abdomen learned in the SHB course.
- The students will go through the cases with their ultrasound facilitators, Dr. Jason Palmatier in room 360 and Dr. Lovett in room 390, during the GI pathology US lab.
- Students should review the cases prior to their 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. Palmatier and Lovett will discuss the Point of Care Ultrasound findings with you during the session.

Ultrasound Videos

- Gallbladder Ultrasound
  - https://www.youtube.com/watch?v=Xz-M6pILKfw

- Appendicitis Ultrasound
  - http://5minsono.com/Appy/
Case 1 – History

• **History:** A 46-year old female presents with 1 day of right upper quadrant abdominal pain, nausea, and vomiting. She reports the pain is exacerbated with eating and radiates to her back.

• **PMH:** Diabetes mellitus, type 2
• **PSurgHx:** C-section x 4
• **Medications:** Glipizide
• **Allergies:** NKDA

Case 1 – Physical Exam

• **Vitals:**
  - T 37.3  BP 114/64  HR 76  O2 sat 98% on RA

• **PE:**
  - Constitutional – Alert and oriented female. Obese
  - Skin – Normal
  - Cardiac – Regular rhythm, rate. No murmurs
  - Abdomen – Round, protuberant. Moderate right upper quadrant tenderness to palpation. No masses or organomegaly
  - Back – No CVA tenderness to percussion

Case 1 – Differential Diagnosis

• What is the clinical differential diagnosis?
Case 1 – Workup

• What diagnostic test is being performed?
• Why is this chosen as the initial imaging test over other studies?

Case 1 – RUQ Ultrasound

• Describe and demonstrate how to perform a biliary US scan on the mannequin and state what you would be looking for.
  • Probe selection?
  • Probe orientation?
  • Probe placement?
  • Patient positioning?

Case 1

• Identify these structures
  • Gallbladder
  • Main lobar fissure (MLF)
  • Portal vein
  • Common bile duct
  • Hepatic artery
  • Portal triad
Case 1 –
Describe normal characteristics of the gallbladder on US

Comment on length, width, wall thickness, contents, diameter of CBD

Case 1 –
As you perform a bedside exam, you obtain this image. Describe the findings.

Case 1 –
Describe the gross findings.
Case 1 – Describe the histologic findings

Case 1 – What is your diagnosis?

Case 1 – Risk Factors

• What factors increase the risk of developing this disease?
Case 1 –
Based on this patient’s history, what is the composition of these stones?

Case 1 –
What is the clinical significance of these stones?

Case 1 –
How would you manage this patient?
Case 2 – History

• Your next patient presents similarly to your last, but is febrile and tachycardic.

Case 2 –
Describe the findings seen on these images.

Case 2 –
What abnormal findings are found on ultrasound with this disease process?
Case 2 –
What maneuvers can assist in detecting pathologic findings in the gallbladder?

Case 2 –
What is the suspected diagnosis?

Case 2
• During the physical exam, a sonographic Murphy’s sign is elicited.

• What is the difference between the Murphy’s sign and sonographic Murphy’s sign?
Case 2 – Describe the findings.

Case 2 – How would you manage this patient?

Case 3 – History

- The 3rd patient you evaluate also complains of right upper quadrant abdominal pain, nausea, and vomiting. He also appeared jaundiced.

- A quick review of the patient’s record in EPIC reveals several ED visits for right upper abdominal pain secondary to biliary colic. He was discharged to home with instructions to modify his diet.

- He states the pain recurred 2 days ago and has not improved since onset.
Case 3 – Bedside US

- As part of your physical exam, you evaluate the right upper abdomen with bedside US. Describe the findings seen below.

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Case 3 – Describe the pathophysiology behind the development of this disease process

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Case 3 – Workup

- What lab tests could you obtain to assist in making this diagnosis and what would be the expected findings?

- What other imaging may assist with making this diagnosis?
Case 3 – What is your diagnosis?

Case 3 – Acute Cholangitis
• Acute cholangitis is a known complication of this disease. Explain the development of this progression.
  • What is Charcot’s triad?
  • What is Reynolds’ pentad?

Case 3 – Management
• How should this patient be managed?
Case 4 – History

- **History**: A 23-year old female presents with 2 days of initial mid-abdominal pain, but became more localized to the right lower quadrant. She admits to nausea and reports the pain is exacerbated with walking and the car ride to the ED was especially uncomfortable.

- **PMH**: Ovarian cysts
- **P SurgHx**: Tonsillectomy at age 8
- **P SocHx**: No tobacco use, social alcohol. Sexually active.
- **Medications**: Ethinyl estradiol and Norgestimate (Ortho Tri-Cyclen Lo)
- **Allergies**: NKDA

Case 4 – Physical Exam

- **Vitals**: T 37.8 BP 105/62 HR 87 O2 sat 99% on RA

- **PE**:
  - Constitutional – Alert and oriented female.
  - Skin – Normal
  - Cardiac – Regular rhythm, rate. No murmurs
  - Abdomen – Moderate right lower quadrant tenderness to palpation at McBurney's point. +Rovsing sign. +Rebound tenderness. No masses or organomegaly
  - Back – No CVA tenderness to percussion

Case 4 – Differential Diagnosis

- What is the clinical differential diagnosis?
Case 4 – Workup?

• What orders may help with the diagnosis of this patient’s symptoms?

Case 4 – Transducer Selection

• To expedite the workup, a bedside ultrasound is performed of the right lower abdomen.

• Explain your specific probe choice.

Case 4 – Appendix Landmarks

• Anatomically, what are some useful landmarks that may assist in locating the appendix?
Case 4 – Performing the US Scan

• Describe and demonstrate how to perform an appendix US scan on the mannequin.

Case 4 – Normal Appendix

• Describe what you would see on ultrasound with a normal appendix.

Case 4 – US Scan

• The probe is placed where the patient points on her abdomen where she experiences the most pain. Describe what is seen on the scan.
Case 4 – US Findings

• What other findings on US may point towards the diagnosis of appendicitis?

Case 4 - Management

• What is the management of this patient?

Case 4 - Limitations

• Discuss the limitations of ultrasound when evaluating the appendix.
Summary

- Summarize the utility of point of care ultrasound in the evaluation of a patient with right-sided abdominal pain.

References and Resources

- http://emergencyultrasoundteaching.com
- www.acep.org
- www.ultrasoundoftheweek.com
- www.vimeo.com
- www.hqmeded.com
- UptoDate