**Hepatobiliary Ultrasound: Anatomy, Technique, Pathology**

**Objectives**
- Review anatomy and landmarks
- Scanning Technique: Gallbladder Evaluation
  - Transducer choice, orientation
  - Scanning: transverse and longitudinal views
  - Measurements: GB, anterior GB wall, CBD
- GB Pathology
- Liver Pathology
- Pitfalls and ‘Tricks of the Trade’

**RUQ: Normal Anatomy**
- Liver: used as acoustic window; ducts and vessels
- Biliary ducts: CBD
- Bowel: duodenum
- Kidney: retroperitoneal (posterior)
- GB: mobile, folds, contracts, anatomical variations

**Emergency Ultrasound: Gallbladder Location**
- General
- RUQ
- Subcostal
- Lies
- Posterior wall approximates duodenum

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NOTE: The gallbladder does not lie within a standard anatomic plane, and may be found in many different projections. Therefore, the long and short axis of the gallbladder may not lie within the longitudinal and transverse planes of the body.
RUQ: Abnormal

GB: Normal Anatomy

- GB length: 7-10cm; width 2-3cm
- Anterior GB wall: <4mm, linear echo
- CBD: <7mm, above portal vein
- Main Lobar Fissure (MLF): between GB and portal vein

Technique

- Patient Position:
  Supine or Left lateral decubitus
- Transducer:
  Curved, low frequency probe
- Indicator to patient’s right and then toward patient’s head (transverse / longitudinal view)
- Start at Xiphoid process and travel laterally along subcostal margin, flattening probe
- Once find GB: “fan” through it in two orthogonal planes

Technique

- Poor quality image: gas
  - Left lateral decubitus
- Thin patients: GB can be elongated, anterior, lower in abdomen
  - flatten probe along abdomen
- Obese patients: GB can be higher in abdomen
  - X minus 7 approach
Pathology: Gallstones

- Echogenic
- Shadow
- Mobile
- Single or multiple
- Varying sizes
Pathology: Gallstones

- WES sign
  - W - wall
  - E - Echo
  - S - Shadow

= contracted GB full of stones
Pathology: Cholecystitis

FINDINGS:

- Pericholecystic fluid
- Thickened GB wall
- Sonographic Murphy’s
- CBD Dilatation

Sludge
Pathology: Thick GB wall

Main etiology: CHOLECYSTITIS
• HTN
• renal disease
• multiple myeloma
• adenomyomatosis
• Tumors
• CHF
• hepatitis
• ascites
• alcoholic liver disease
• hypoproteinemia
• hypoalbuminemia
• pericholecystic

Pathology: Biliary Ducts

• Biliary ducts provide information regarding obstruction
• Common Bile Duct: located above portal vein
  • follow MLF to CBD
• Tip: Use Color Doppler box to differentiate biliary ducts from hepatic vessels

Finding the CBD...
Finding the CBD.....

Dilated Biliary Ducts

Pitfalls
- Mistaking Duodenum with GB
- Mistaking GB fold for stone/mass
- Gas Scatter - put patient in LLD
- WES sign - not knowing what you see when you see it

Tricks of the Trade: Scanning Tips
- Obtaining window - small liver, gas scatter, anterior GB can result in difficult visualization
  - patient positioning, flattening probe
- System controls - adjust Gain, Depth to maximize image quality
When you can’t find the Gallbladder.....

- Left Lateral Decubitus position
- Try between the ribs (X minus 7)
- Try RUQ of FAST view (transducer at midaxillary line; indicator toward head)
  - move probe anteriorly
  - kidney leaves view, GB comes into view

Other things you may see...

- Liver abscess
- Liver cysts
- TIPS
- free fluid
Summary

- Point-of-care ultrasound of the hepatobiliary system may aid in the care of emergency department patients
- Evaluation for gallstones and secondary features of cholecystitis may be facilitated by sonographic techniques and the appreciation of key pitfalls

References
