Learning objectives

By the end of this activity, participants will be able to:

I. Describe basic functions of ultrasound and common indications
II. Identify basic abdominal US anatomy
III. Recognize classic ultrasound cases
Module Outline

I. Basics & Indications
II. Abdominal US Anatomy
III. Cases
IV. Wrap up/Questions
Ultrasound Basics

Uses sound waves
(don’t worry about the physics ... that’s my job!)

Pros
Real time
Non invasive
Portable
Non ionizing
Relatively lower cost vs CT/MRI
Ultrasound Basics

Cons
- Obese patients
- Can’t see through air or bowel
- Smaller field of view
- Operator dependent
- NPO for abdominal US

Safety
- Does not emit ionizing radiation BUT:
  - Produces heat
  - Can make tissues ‘cavitate’
Ultrasound Basics

Echogenicity - Amount of echoes an organ/structure has, ie the ability to return the signal in ultrasound examinations

A structure is echogenic if it has internal echoes, ie it is capable of reflecting sound waves. The term echogenic is used in comparison to other imaged/surrounding structures

Hyperechoic - brighter
Isoechoic - same
Hypoechoic - darker
Anechoic - black
Ultrasound Basics

Uses sound waves
(don’t worry about the physics ... that’s my job!)

Pros
Real time
Non invasive
Portable
Non ionizing
Relatively lower cost vs CT/MRI
Ultrasound Basics

POSTERIOR SHADOWING

- Hyperechoic structures reflect a majority of sound waves, leaving a dark shadow behind them.

POSTERIOR ENHANCEMENT

- Increased echogenicity posterior to a structure. Implies fluid containing such as a cyst.

Gallstone with shadowing

Ribs with shadowing

Hepatic cyst with enhanced transmission
Ultrasound Indications

- Characterize mass
- Fluid search/abscess
- RUQ or abdominal pain
- Jaundice
- Splenomegaly
- Flank pain
- AAA screening
- US-guided procedures

AND SO MANY MORE . . .
What’s Included?

ABDOMEN COMPLETE

- Pancreas (if visible)
- Liver
- Gallbladder
- Bile ducts
- Kidneys
- Spleen

RUQ US

- Some liver
- Gallbladder
- Bile ducts

AND THAT’S IT... ie order this for suspected GB pathology
Module Outline

I. Basics & Indications
II. Abdominal US Anatomy
III. Cases
IV. Wrap up/Questions
Liver Anatomy

Transverse

Longitudinal
Pancreas Anatomy
Spleen Anatomy

Diaphragm
Module Outline

I. Basics & Indications
II. Abdominal US Anatomy
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Case #1: 54yo right flank pain

Round anechoic lesion with imperceptible walls and posterior enhancement = Simple cyst
Case #1: 54yo right flank pain

Round anechoic lesion with imperceptible walls and posterior enhancement = Simple cyst

Renal simple cyst is very common finding

CYST requires:
- Anechoic
- Imperceptible walls
- Posterior enhancement
- No solid or vascular components
Case #2: History withheld

Multiple shadowing stones. Wall thickening, pericholecystic fluid = Acute cholecystitis. Normal on bottom for comparison.
Case #2: History withheld

Multiple shadowing stones. Wall thickening, pericholecystic fluid = Acute cholecystitis. Normal on bottom for comparison.

Acute Cholecystitis

Imaging findings:
- Gallstones
- Thickened GB wall
- Pericholecystic fluid
- Murphy’s sign
- +/- perforation
Case #3: 60yoM jaundice, history of hepatitis C

Heterogeneous hypoechoic liver mass. Ill defined
Case #3: 60yoM jaundice, history of hepatitis C

Hepatocellular CA

Differential includes primary liver tumor or metastasis.

Remember history of HCV, thus more likely HCC

Imaging findings:
- Hypo or hyperechoic liver mass
- Internal vascularity
- Can be ill defined
- Better characterized on MRI

Heterogeneous hypoechoic liver mass. Ill defined
Case #4: 45yoM midline pain hx of gallstones

Heterogeneous hypoechoic enlarged pancreas. Ill defined. Patient tender when scanning over this region = Acute pancreatitis
Acute Pancreatitis

Imaging findings:
- Enlarged pancreas
- Ill defined borders
- Peripancreatic fluid
- Hypoechoic on US

Pancreas often not well visualized on ultrasound (bowel gas)

Remember pancreatitis is clinical diagnosis!

CT can be helpful for complications
- Necrosis, fluid collections,
- Pseudocyst, walled-off necrosis

Case #4: 45yoM midline pain

Heterogeneous hypoechoic enlarged pancreas. Ill defined. Patient tender when scanning over this region = Acute pancreatitis
Case #5: 38yo cirrhosis

Points for pointing out the nodular liver! Anechoic fluid in the peritoneal spaces around the liver and right kidney = Ascites
Case #5: 38yo cirrhosis

US is EXCELLENT to search for & measure ascites/fluid
Can also use US guidance to drain ascites
Avoid bowel and other organs
BONUS Case #6: 80yo breast mass

US is EXCELLENT in biopsy & drainage procedure guidance, to include breast, thyroid, lymph node
Module Outline

I. Basics & Indications
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Think Back!

Sound waves - no ionizing rads

Hyper- iso- hypo- anechoic

Full abdominal US (Pancreas, liver, gallbladder, bile ducts, kidneys, spleen) VS. RUQ US (some liver, gallbladder, bile ducts)

Simple cyst: anechoic, imperceptible wall, posterior enhancement

CT for pancreatitis complications; US great for ascites and paracentesis
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Thank you!