1. What is the role of abdominal ultrasound (US) in patients with cystic fibrosis?
   A. Surveillance US is not necessary because cystic fibrosis liver disease (CFLD) can be detected and followed by physical and liver biochemical examinations alone
   B. US can detect CFLD before physical and liver biochemical changes occur
   C. Acoustic radiation force impulse (ARFI) elastography of hepatic fibrosis in patients with CFLD shows decreased tissue stiffness while ARFI elastography of the pancreas in CF patients with pancreatic insufficiency shows increased tissue stiffness
   D. Liver biopsy is often performed before abdominal ultrasound and therefore the diagnosis of CFLD is already known at the time of imaging

Correct Answer: B

Rationale: Changes of CFLD can be seen on US before cirrhosis is clinically evident. Hepatic lesions tend to be focal and can progress to multilobular biliary cirrhosis therefore liver function can be preserved in early disease and biopsy may result in sample error. A heterogenous hepatic parenchymal pattern may be related to an increased risk of cirrhosis. Similar to other diseases that cause liver fibrosis, ARFI elastography shows increased stiffness of liver fibrosis associated with CFLD. ARFI elastography of the pancreas in CF patients with pancreatic insufficiency shows decreased tissue stiffness compared with those without pancreatic insufficiency.

References:

2. A diagnosis of biliary atresia is most likely when which of the following is seen on ultrasound?
   A. Gallbladder length 2 cm with no triangular cord sign
   B. Gallbladder length 1.4 cm with no triangular cord sign
   C. Gallbladder length 1.4 cm and positive triangular cord sign
   D. Gallbladder length 2 cm with contraction following feeding

Correct Answer: C
**Rationale:** In Mittal et al’s prospective study of infants younger than 3 months of age with conjugated hyperbilirubinemia who had abdominal US, the triangular cord sign was always associated with an abnormal gallbladder morphology and had a 97.1% specificity for biliary atresia. A negative cord sign and normal gallbladder morphology had a negative predictive value of 91.9% for biliary atresia. A negative cord sign with an abnormal gallbladder had a sensitivity of 60% and a specificity of 85.5% for biliary atresia.

**References:**


**Liver Doppler Including Imaging of Liver Transplants**
*Sara M. O’Hara, MD, FAIUM, FAAP*

3. **Hepatic venous waveforms may be abnormal (not the typical triphasic variety) in which conditions:**
   - A. Congenital heart disease
   - B. Liver transplant rejection
   - C. Peri-operative liver transplant with graft swelling
   - D. IVC / right atrial anastomotic stricture
   - E. All of the above

**Correct Answer:** E

**Rationale:** All of these factors can cause an abnormal hepatic venous waveform.

**Reference:**


4. **Which are TRUE of vascular complications in pediatric liver transplants:**
   - A. Occur in hepatic artery more than other vessels
   - B. Are more frequent when portal vein diameter > 3mm
   - C. Occur earlier in the post-operative period
   - D. Are not associated with high graft failure/loss
   - E. Both answers a & c

**Correct Answer:** E
Rationale: Second question answer “e” is correct. Hepatic arterial events are more common than other vascular problems. Portal vein diameter LESS THAN 3 mm is associated with higher complication rate. Vascular complication occur earlier in post-op period in pediatrics than in adults. Vascular complication ARE associated with high graft failure rates.

Reference:

Abdominal Masses
Andrew Phelps, MD

5. Which of the following tumors is predominantly cystic?
   A. Hemangioma
   B. Hepatoblastoma
   C. Mesenchymal hamartoma
   D. Embryonal sarcoma

Correct Answer: C

Rationale: Mesenchymal hamartoma is the most common cystic liver tumor of infancy. Hemangioma and hepatoblastoma are solid. Embryonal sarcoma can have cystic spaces, but is predominantly solid.

Reference:

6. Which of following conditions can mimic a tumor?
   A. Adrenal hemorrhage
   B. Cystitis
   C. Ovarian Torsion
   D. All of the above

Correct Answer: D

Rationale: In multiple pediatric diseases, non-neoplastic disease states may mimic neoplasia. It is important to be aware of this so as to avoid unnecessary biopsy or surgery.

Reference:
Liver Ultrasound Elastography - An Introduction
Daniel J. Podberesky, MD

7. Which specific type of elasticity is measured during US elastography?
   A. Young’s modulus
   B. Shear modulus
   C. Bulk modulus
   D. Dynamic modulus

Correct Answer: A

Rationale: US elastography measures tissue elasticity by evaluating the speed of applied propagating shear waves in the targeted tissue. Tissue elasticity can be measured in a variety of ways. In US elastography, the specific physical property that is being measured is the Young’s modulus, which is defined as the ratio of linear stress to strain. It is the force required to stretch (or compress) a material along one axis. The Pascal (Pa) is the unit of Young’s modulus. Option B is not correct. Shear modulus is measured during MR elastography. It is defined as an object’s response to shear stress. It is also measured in Pascals (Pa). Options C and D not correct. Bulk modulus and dynamic modulus are physical properties which currently do not have medical imaging applicability clinically.

References:

8. Which of the following ultrasound elastography methods does not provide an image along with its stiffness/shear wave velocity measurement?
   A. Acoustic radiation force impulse (ARFI) ultrasound
   B. Transient elastography (Fibroscan)
   C. Shear wave elastography
   D. Strain elastography

Correct Answer: B

Rationale: All of the listed techniques, with the exception of transient elastography (Fibroscan) provide a sonographic image. Fibroscan is M-Mode ultrasound only.

Reference:
9. What does the FAST exam performed in the Emergency Department used to evaluate for?
   A. Cholecystitis and its complications
   B. Free intraperitoneal fluid, pleural effusion, and pericardial effusion
   C. Aortic aneurysm and peri-aortic fluid
   D. Pneumonia and parapneumonic effusions

Correct Answer: B

Rationale: Answer is B. Focused Abdominal Ultrasound for Trauma (FAST) was started in the mid-1990s as a rapid less than 5 minute examination to detect free intraperitoneal fluid, and as an effort to reduce or eliminate the use of more invasive diagnostic peritoneal lavage that was then the diagnostic standard. The detection of free intraperitoneal fluid in the setting of blunt abdominal trauma would be presumed to represent hemoperitoneum, probably from solid organ injury, and thus would indicate that further imaging evaluation or surgery was indicated. Over time, the FAST exam expanded to include evaluating for pericardial fluid and for pleural effusion, that would indicate thoracic injury and/or potential causes of hemodynamic instability. The evidence about the value of FAST in the hemodynamically stable patient is inconclusive, but there is probably utility in hemodynamically unstable patients in helping to direct and prioritize treatment. Regardless, it has become a routine part of the trauma assessment in many centers.

Answers A, C, and D are not correct. Ultrasound is a valuable tool in the evaluation of all of these conditions that may be associated with fluid collections. However the FAST exam is used specifically for fluid related to traumatic injuries, and not to other conditions.

References:
10. Which statement regarding point of care ultrasound (POCUS) is true?

A. Is now used in many subspecialties, including pediatrics
B. Is a topic increasingly included on specialty board exams
C. Has led to ultrasound training in increasing numbers of medical schools
D. Is often taught by emergency department physicians or clinical subspecialists
E. All of the above

Correct Answer: E

Rationale: The answer is E. With the recognition of the value of ultrasound in basic bedside diagnosis and the miniaturization, improved performance, and decreased cost of handheld ultrasound systems, clinician performed point of care ultrasound has increased markedly over the last decade. In many parts of the world clinician performed ultrasound has been a practice for years, but in the United States this is a relatively new phenomenon. There are still issues regarding appropriate scope of care, training and competency assessment, credentialing, billing, and medicolegal concerns, but the perceived advantages to patient care mean that none of these concerns are slowing point of care ultrasound. Many specialties routinely incorporate ultrasound into their care and training curricula (e.g. emergency medicine, sports medicine, critical care, rheumatology, hospital medicine, physical medicine and rehabilitation, among others) and include ultrasound topics in their board examinations. Undergraduate medical education is increasingly incorporating the use of ultrasound into the curriculum of anatomy, physiology, and clinical diagnosis and it is likely that the next generations of medical students will graduate with basic understanding and proficiency of ultrasound. Radiologists are sometimes involved in these educational efforts, but more often undergraduate medical students are being taught by emergency medicine and other clinical specialists.

References:


