Gallbladder/Bile Ducts Ultrasound

I. Patient Preparation

a. NPO 6-8 hours prior to the exam for adults, adolescents and school-age children
b. NPO for 4 hours prior to the exam for children under the age of 5.

II. Equipment

a. Performed with real-time scanner using a sector or curved linear transducer with frequencies ranging from 3.5 MHz to 5.0 MHz, higher frequencies often necessary for children and infants. On occasion, large patients may require a lower frequency of 2.5 or 1 MHz.
b. Linear transducer with and without standoff pad may be necessary for additional superficial areas of concern or superficial intraperitoneal pathology.
c. Matrix x-plane and volumetric gray scale and/or power/color 3D evaluation can be employed.

III. Procedure Protocol

a. For **any** masses seen in any organ, use Power Doppler to assess for blood flow. All lesions should be demonstrated in gray scale with and without measurements, with imaging directed to evaluate the borders, echogenicity, size, mobility, through transmission, compressibility, vascularity as needed. Additional maneuvers such as Valsalva and compression should be employed if necessary.
b. Different patient positions (e.g., supine, oblique, prone, decubitus, standing, sitting) should be documented if needed to evaluate for mobility of intraabdominal mass (i.e., gallstones, fixed intraabdominal mass versus mobile intraabdominal mass) or to evaluate the abdominal wall (i.e., ventral abdominal hernia).
c. If any area cannot be visualized due to bowel gas or surgical removal, etc., please note on image "region of" or "fossa"
    i. Gallbladder
        1. Image the gallbladder neck, body and fundus in the Sagittal and Transverse planes with the patient supine and left lateral decubitus positions. The gallbladder may also be evaluated with the patient sitting up. **Note: You may image the parts of the GB in combination (ie. Neck/body or body/fundus together).
        2. The gallbladder wall thickness should be measured in the Transverse plane using an AP measurement (normal $\leq$ 3 mm thickness).
        3. Assess for focal gallbladder tenderness (+Murphy's sign), gallstones (measure largest one), gallbladder sludge, pericholecystic fluid and gallbladder polyps.
        4. Gallbladder considered dilated if length >10 cm (in adults).
        5. Assess the area around the GB for any abnormality including pericholecystic fluid, inflammation, varices, and adenopathy.
        6. Reverbation artifact within the anterior wall can be minimized using a higher frequency probe or reducing transducer pressure.
        7. Inspiration/expiration and/or abdomen distension (puff out stomach to distend abdomen) may improve visualization.
    ii. Biliary Tree
        1. Image the bile duct anterior to the portal vein in the porta hepatis. Measure AP at the largest diameter (normal extrahepatic common duct AP diameter $\leq$ 6mm, can add 1mm for each decade greater than age 60, for example, patient age 70 use 7mm cutoff, patient age 80 use 8mm cutoff). If the duct narrows after a dilation, measure both areas.

2. If duct is dilated, follow as far distal as possible. It may be necessary to turn patient to a LLD position. Evaluate for reason of dilation (pancreatic head mass, choledocholithiasis, etc.)
3. The intrahepatic and extrahepatic bile ducts should be evaluated for dilatation, wall thickening, intraluminal findings, pneumobilia, and other abnormalities.
4. Intrahepatic biliary dilatation present if intrahepatic bile duct diameter >2mm.
5. The intrahepatic ducts can be evaluated by obtaining views of the liver demonstrating the right and left branches of the portal vein. Doppler may be used to differentiate hepatic arteries and portal veins from bile ducts. Intrahepatic bile ducts are better visualized on deep inspiration.
6. Oblique plane with patient in left decubitus position to minimize obscuration by overlying bowel gas to assess common hepatic/bile duct. Harmonic imaging allows better visualization of the dilated ductal wall and its content.