LIMITED ABDOMINAL ULTRASOUND EXAMINATION

(Right Upper Quadrant or Left Upper Quadrant)

POLICY: Limited abdominal ultrasound will be performed with an order from a physician or other qualified clinical practitioner. The examination will be supervised and interpreted by a radiologist or other licensed practitioner who is qualified by reason of training to understand the normal anatomy, pathophysiology of the abdomen, and integration of ultrasound with other imaging techniques to optimize the probability of detecting disease.

PURPOSE: To assess the anatomy of the abdomen and document normal and abnormal structures therein.

INDICATIONS: Limited ultrasound of the abdomen is indicated for patients with signs, symptoms, and/or laboratory evidence of hepatic, biliary, pancreatic, splenic, and/or enteric disease. This targeted examination is an appropriate study for patients with more specific abdominal complaints.

PATIENT PREPARATION: Outpatients should be fasting for a minimum of eight hours prior to abdominal ultrasound of the right upper quadrant. Non urgent inpatients should be fasting for at least six hours if possible. Emergency Room and acute patients can be examined without fasting. Patients should be instructed to take prescribed oral medication on their normal schedule with small sips of water. The preparation for patients receiving diabetic medication (oral or injectable) must be approved by the radiologist or nurse.

PROCEDURE: Each organ should be imaged in its entirety (e.g. longitudinal and transverse views) before imaging the next organ. When any measurement is performed, an image should be captured with and without measurements. The order of organ imaging will be (minimal number of images in parenthesis):

Right Upper Quadrant
- Liver (14 images)
- Gallbladder/bile duct (7 images, 1 cine sweep)
- Right kidney (5 images)

Left Upper Quadrant
- Spleen (3 images)
- Left kidney (5 images)

LIVER:
- The liver should be examined to investigate the entire contour, size [1], intrahepatic vascular and ligamentous anatomy [2,3], and parenchymal pattern [4,5].
- The examination can be performed in supine or decubitus positions, with respiration suspended at a level that optimizes images of the desired anatomy.
- The anterior subcostal approach should be employed when it feasible to do so. An intercostal approach can be used as an alternate or supplementary window when necessary.
- **Minimal stored images should include:**
  - three sagittal views of the liver to the right of the porta hepatis, labeled *Liver Long*; images should include the maximal cephalocaudad length of the right lobe measured from the diaphragm to its inferior tip in a
parasagittal plane, and the right kidney to allow comparison of the relative echogenicity of the two organs

- one sagittal view of the liver to include the main portal vein in the porta hepatis, labeled *Liver Long*
- one sagittal view of the liver to include the inferior vena cava, labeled *Liver IVC Long*
- one sagittal view of the lateral segment of the left lobe, labeled *Liver Long*
- one transverse view of the left lobe to include the left lateral contour of the liver and the fissure of the ligamentum teres, labeled *Liver Trans*
- one transverse view of the liver to include the venous confluence of the hepatic veins and the inferior vena cava, labeled *Liver Trans*
- one transverse view of the liver to include the main portal vein in the porta hepatis, labeled *Liver Trans*
- one transverse view of the liver to include color Doppler of a longitudinal segment of the main portal vein, demonstrating patency and direction of flow, labeled *Liver MPV Trans*
- three transverse views of the right lobe to demonstrate representative views of the superior, middle, and inferior thirds of the right lobe, including its lateral and posterior contours, labeled *Liver Trans*

- In the presence of cirrhosis, the patient is at risk for hepatocellular carcinoma (HCC). Therefore, in a patient with chronic hepatitis (potentially undiagnosed cirrhosis) or cirrhosis, the entire liver should be screened for the presence of a liver mass which could represent HCC, and the following cines should be obtained:
  - one sagittal cine of the entire right lobe of the liver, from the lateral right margin through the porta hepatis, labeled *Liver Long Rt-Lt*
  - one transverse cine of the entire right lobe of the liver, from the dome through the inferior margin, labeled *Liver Trans Sup-Inf*
  - one sagittal cine of the entire left lobe of the liver, from the porta hepatis through the lateral left margin, labeled *Liver Long Rt-Lt*
  - one transverse cine of the entire left lobe of the liver, from the superior margin through the inferior margin, labeled *Liver Trans Sup-Inf*
  - one image of the surface contour of the liver, obtained using linear transducer, labeled *Liver Surface Contour*

**BILIARY SYSTEM:**

- The gallbladder should be examined to consider stones [6,7], wall thickness and irregularities [8,9], pericholecystic structures, and tenderness to palpation with the ultrasound transducer (Murphy’s Sign) [10].
- The gallbladder must be examined with the patient in at least two different positions to assess the mobility of intraluminal objects (e.g. gallstones). In the presence of gallstones, multiple positions should be employed in order to differentiate mobile gallstones from gallstones lodged in the neck of the gallbladder.
- The intrahepatic branches of the bile ducts should be investigated in each lobe of the liver, and the extrahepatic segment of the bile duct examined through its entire course from the porta hepatis to the sphincter of Oddi [11,12], searching for enlargement or intraluminal objects (e.g. stones).
- **Minimal stored images should include:**
  - two longitudinal views of the gallbladder with the patient in a position that optimizes visualization of the gallbladder, labeled *GB Long*; images should include the neck and fundus of the gallbladder, as well as the gallbladder wall
• one longitudinal cine of the gallbladder, labeled GB Long
• one longitudinal view of the gallbladder with the patient in a different position (e.g. exaggerated left lateral decubitus, upright, prone/kneeling) focused on the most dependent segment of the gallbladder, labeled GB LLD (or Upright, Prone, etc.)
• one transverse view with the patient in a position that optimizes visualization of the body of the gallbladder, labeled GB Trans
• two views of the extrahepatic bile duct at the point of its maximal luminal diameter, labeled Bile Duct; color Doppler may be utilized to isolate the bile duct from surrounding vessels; images should include a measured maximal diameter

KIDNEYS:
• Examination of the kidneys should be performed to visualize the entire capsule. The kidneys should be imaged in a longitudinal and transverse planes (the transverse plane is perpendicular to the long axis). Observations should include the renal size [18,19,20], contour [21,22,23], intrinsic echogenicity of the kidneys [24], condition of the collecting structures [25], echogenicity of the kidneys relative to the liver and spleen [26,27], and perinephric spaces.
• Images of the kidneys should be sufficient enough to allow for assessment of the renal cortex, medulla (pyramids), and sinus.
  • If a renal cortical thickness is requested, measurements should be obtained at the superior, middle and inferior regions of the kidneys. The cortex should be measured at the thinnest point, from the peripheral surface of a renal pyramid to the renal capsule. The average value of these measurements should be reported.
• The kidneys should be examined in the orientation (e.g. sagittal, coronal) and patient position (e.g. prone, decubitus, or supine) that optimizes the definition of the entire renal capsule and maximizes the measured dimensions.
• In the presence of a dilated collecting system, the kidneys should be imaged after voiding the urinary bladder in order to demonstrate persistence of the dilatation.
• **Minimal stored images of the kidneys should include:**
  • two longitudinal views of each kidney with the maximal length measured, labeled Rt or Lt Kidney Long
  • one transverse view of the middle third of each kidney with the maximal anteroposterior and transverse diameters measured, labeled Rt or Lt Kidney Trans
  • one longitudinal view of the each kidney, with sufficient volume of liver or spleen, to allow comparison of the relative echogenicity of those organs to the kidneys, labeled Rt or Lt Kidney Long (if imaging of the liver and/or spleen has already satisfied this requirement, then additional images are not required)

SPLEEN:
• The spleen should be investigated to consider its size [1], entire contour, and parenchymal pattern.
• The spleen should be examined with the patient in any position that optimizes its visualization (e.g. supine, right lateral decubitus, upright).
• **Minimal stored images of the spleen should include:**
  • two longitudinal views, labeled Spleen Long; images should include the maximal length measurement and the left kidney to allow comparison of the relative echogenicity of the two organs
  • one view orthogonal to the long axis view, labeled Spleen Trans;
• if indicated, a volume measurement of the spleen may be obtained using three orthogonal dimensions: maximal length, height (perpendicular to the length) and width.

REFERENCES:

3. Sexton CC, Zeman RK. Correlation of computed tomography, sonography, and gross anatomy of the liver. AJR 1983; 141:711-718
18. Emamian SA, Nielsen MB, Pedersen JF, Ytte L. Kidney dimensions at sonography: correlation with age, sex, and habitus in 665 adult volunteers. AJR1993; 160:83-86