

## General Ultrasound Abdominal Complete

### PURPOSE:

1. To determine the presence or absence of disease
2. To identify and quantify pathology, which may be present by evaluating echo characteristics, organs, and vessels for focal or diffuse abnormalities
3. To improve patient outcomes by identifying abnormalities and disease, categorizing severity, and planning for interventional and/or medical correction

### STATEMENT OF INDICATIONS: One or more of the following indications must be present

1. Cirrhosis or hepatic disease
2. Fluid collections
3. Gallstones
4. Metastatic disease
5. Obstructive symptoms of the biliary system
6. Aortic aneurysm
7. Pancreatitis
8. Hypertensive renal disease
9. Renal transplant
10. Mid-abdominal trauma
11. Abnormal diagnostic tests
12. Pain
13. Additional indications maybe used following ICD guidelines

### EQUIPMENT:

1. Real-time scanner using:
  - a) sector narrow near field
  - b) linear (straight or curved) transducers wide near field
2. Spectral Doppler
3. Color Doppler
4. Ultrasound acoustic gel
5. Appropriate patient drape
6. Towels
7. Appropriate cleaning solution for transducer

### PROCEDURE FOR ABDOMINAL ULTRASOUND:

1. Obtain complete patient history.
  - 1) Current and past symptoms
  - 2) Recent laboratory and other test results
  - 3) Relevant risk factors
  - 4) Patient NPO, as necessary
  - 5) Past surgeries
2. Enter patient data into real-time scanner
3. Select abdomen set up or other appropriate machine setting selection
4. Apply ultrasound gel to patient's abdominal region (RUQ)
5. With patient in a supine position begin scanning:

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- 1) AORTA:
  - a) In sagittal, view the proximal, mid, and distal aorta. Then transverse views documenting AP and transverse measurements.
- 2) PANCREAS:
  - a) Place the transducer just below the xiphoid process, and use the left lobe of the liver as an acoustic window. View the long axis of the body of the pancreas. The image should be oriented obliquely, as dictated by the patient anatomy, to show as much of the entire pancreatic anatomy as possible. Also identify the pancreas head, uncinata process, and tail.
  - b) Check pancreatic duct for dilatation and measure the diameter if dilated.
  - c) Include the superior mesenteric vein when viewing the pancreatic head, as well as the distal common bile duct.
  - d) Document the pancreatic tail. Check peripancreatic region for adenopathy, and/or fluid.
  - e) If bowel gas obstructs the view, administration of water may be helpful. Also, patient can hold breath to optimize visualization.
- 3) LIVER:
  - a) In sagittal, start midline and scan lateral (left of the patient), demonstrating the left lobe of the liver and its parenchyma, as well as the aorta, and body of the pancreas.
  - b) Scan back to midline, then angle to the right to visualize the right lobe of the liver, including the position of the IVC where it passes through the liver. Identify the main portal vein, common bile duct, and hepatic artery. Demonstrate as much of the dome of the liver as possible (adjacent to the diaphragm), the right hemidiaphragm, and right pleural space. Measure cephalo-caudal length of liver in the midclavicular line. Compare the echogenicity of the liver next to a longitudinal view of the right kidney and check for fluid in Morrison's Pouch.
  - c) Go back to midline and in transverse visualize the left lobe of the liver. At the cephalic margin of the liver demonstrate the confluence of the hepatic veins.
  - d) Continue angling left to view the left lobe with the left portal vein.
  - e) Move back to midline then scan toward the right visualizing the dome of the liver, portal vein, hepatic veins, and liver kidney interface.
  - f) The liver is best examined during held inspiration in order to bring it beneath the costal margin.
- 4) RIGHT KIDNEY:
  - a) In sagittal, visualize the right kidney in long axis to r/o hydronephrosis or masses. A maximum measurement of renal length should be documented. In transverse, visualize superior, mid, and inferior poles of the right kidney. Measure in the greatest transverse diameter.
- 5) GALLBLADDER AND BILIARY TRACT:
  - a) In sagittal with the patient in a supine position, view the gallbladder including the fundus, body and neck portions.
  - b) In transverse, do the same as above.

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- c) Change the patient's position to right lateral decubitus, left lateral decubitus, and view gallbladder in both longitudinal and transverse directions in order to evaluate the gallbladder and its surrounding areas thoroughly, especially if stones or sludge are observed.
  - d) Examine the gallbladder wall thickness, with measurements. Test for abdominal tenderness by applying transducer compression to help confirm pathology (Murphy's sign).
- 6) CBD:
- a) Identify CBD in its longitudinal dimension, documenting the proximal portions of the common bile duct. Measure the intraluminal diameter at its widest point.
  - b) In its longitudinal dimension, identify the distal portion of the common bile duct to include the pancreatic portion.
  - c) If calculi are identified in the gallbladder, careful examination of the ducts and pancreas should be made.
  - d) In transverse, identify the pancreatic head and the common bile duct.
- 7) Main Portal Vein:
- a) Identify Main Portal Vein in its longitudinal dimension. Measure the intraluminal diameter at its widest point.
  - b) Obtain color flow images to document flow
- 8) SPLEEN:
- a) Move the transducer to the left of the pancreatic tail and view the spleen in long axis and transverse demonstrating the splenic parenchyma.
  - b) Include splenic hilus, if possible. Putting the patient in left decubitus may be helpful.
  - c) Doppler may be used to determine the presence and direction of flow in the splenic vein and artery.
  - d) Splenic enlargement should be documented by measurement.
- 9) LEFT KIDNEY:
- a) Angle transducer medially and scan throughout the left kidney in long axis to rule out hydronephrosis or masses. A maximum measurement of renal length should be documented. Compare echogenicity of left kidney and spleen. In transverse, visualize superior, mid, and inferior poles of left kidney. Measure in the greatest transverse diameter.
- 10) IVC:
- a) Obtain color flow images to document flow

**SPECIAL STATEMENT REGARDING PROTOCOL:** This document is not meant to be a statement of standard. It is not meant to deter the professional sonographer from interrogating any disease or suspected pathology with whatever means they deem appropriate and necessary. It is understood that other additional views, Doppler sampling sites, color settings, velocity ratios and measurements etc., will be used in evaluating any pathologic or suspected pathologic condition.

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### EVALUATION AND DIAGNOSTIC CRITERIA

Real-time and Doppler evaluation and documentation, when indicated, should include but not be limited to:

1. GREAT VESSELS
  - a) Size and shape
  - b) Aortic aneurysm (AP>3.0 cm)
    - i) Fusiform
    - ii) Saccular
    - iii) Dissecting
  - c) Echo free
  - d) Tortuous
  - e) Internal echoes (thrombus or mass)
2. LIVER
  - a) Size and shape (Hepatomegaly > 18 cm cranial caudal mid clavicular line)
  - b) Focal or diffuse abnormalities (parenchyma echogenicity)
    - i) Anterior segment of right lobe
    - ii) Posterior segment of right lobe
    - iii) Medial segment of left lobe
    - iv) Lateral segment of left lobe
  - c) Fluid collection
  - d) Vessel characteristics
    - i) Diameter (compressed or dilated)
    - ii) Presence of clot
  - e) Mass
    - i) Location
    - ii) Size
    - iii) Cystic or Solid
3. GALLBLADDER AND BILIARY TRACT
  - a) Size and shape of gallbladder (normal is pear shaped and 10cm x 4cm)
  - b) Wall thickness (>3mm indicates pathology)
  - c) Abdominal tenderness to transducer pressure
  - d) CBD (dilated > 6mm) patient age and surgical history should be taken into consideration
  - e) Cholelithiasis (mobile, echogenic structures with posterior acoustic shadowing)
  - f) Presence of sludge
  - g) Masses
    - i) Location
    - ii) Size
    - iii) Cystic or solid
4. PANCREAS
  - a) Size and Shape
    - i) Focal or diffuse enlargement
    - ii) Contour (irregular outline)
  - b) Echogenicity (comparison to liver)
  - c) Calcifications with acoustic shadowing

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- d) Adenopathy and/or fluid in peripancreatic region
  - e) CBD (dilated >6mm)
  - f) Pancreatic duct (dilated >2.0mm)
  - g) Masses
    - i) Location
    - ii) Size
    - iii) Cystic or solid
5. **SPLEEN**
- a) Size and Shape (Splenomegaly is >12cm)
  - b) Echogenicity (uniform in texture)
  - c) Intraperitoneal fluid
  - d) Mass
    - i) Location
    - ii) Size
    - iii) Cystic or solid
6. **KIDNEY**
- a) Size and Shape (norm.10-12 cm in length)
  - b) Echogenicity
  - c) Perirenal fluid collection
  - d) Hydronephrosis
  - e) Renal calculi
  - f) Mass
    - i) Location
    - ii) Size
    - iii) Cystic or solid
7. **ABDOMINAL AORTA**
- a) Size and Shape (Aneurysm greater than 3 cm measuring outer wall to outer wall)
    - i) Fusiform
    - ii) Saccular
    - iii) Dissecting
  - b) Tortuous
  - c) Intraluminal Thrombus
  - d) Mass
    - i) Location
    - ii) Size
    - iii) Cystic or solid
8. **SIMPLE VS. SOLID MASS**
- a) Simple Cyst
    - i) Anechoic
    - ii) Good acoustic enhancement
    - iii) Thin, well-defined cyst wall
    - iv) Spherical shape
  - b) Solid Mass
    - i) Internal echoes (echoic)
    - ii) Lack of acoustic enhancement

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- iii) Poorly defined far wall
  - c) Doppler/Color Doppler should include but not be limited to:
    - i) The presence or absence of blood flow:
      - a) Internal in mass
      - b) External to mass
      - c) Laminar flow patterns
      - d) Normal vascularity
      - e) Turbulence and Mosaics
- 9. VENOUS DOPPLER - may be performed on the following sites:
  - a) IVC and Hepatic Veins
    - i) Triphasic curve
    - ii) Absence or presence of flow
    - iii) Flow reversal (Backward flow)
    - iv) Pulsatility
    - v) Compressed flow
  - b) Portal Veins
    - i) Pulsatility
    - ii) Direction (towards or away from liver)
    - iii) Variation of flow (respiration constant)
- 10. ARTERIAL DOPPLER - may be performed on the following sites:
  - a) Aorta
    - i) Biphasic flow pattern above renal arteries
    - ii) Triphasic flow pattern below renal arteries
    - iii) Turbulence
    - iv) Decreased or reversed flow
    - v) Holosystolic (throughout the entire systole)
    - vi) Pulsatility
  - b) Splenic Artery
    - i) Low resistance flow pattern
    - ii) Spectral broadening mid and distal portion
    - iii) Holosystolic waveform
  - c) Hepatic Artery
    - i) Low resistance flow pattern
    - ii) Holosystolic waveform

### GUIDELINES FOR CALLING PRELIMINARY REPORTS:

1. Reporting preliminary or technical findings is both desirable and necessary in clinical practice.
2. The sonographer may not make the preliminary nature of the report known to the referring physician unless directed to do so by the interpreting physician.
3. The technical findings must be interpreted within the above stated pre-established diagnostic criteria guidelines.
4. When to call the referring or interpreting physician with a preliminary report:
  - a) Primary malignant tumors
  - b) Cholecystitis

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- c) Cholelithiasis requiring immediate medical attention
- d) Obstruction of intrahepatic or extrahepatic ducts
- e) Hydronephrosis
- f) Renal calculi requiring immediate medical attention
- g) Splenomegaly
- h) Aneurysm (> 5cm)

### REFERENCES:

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4. SDMS GUIDELINES FOR ABDOMEN REVIEW. Revised 1994.
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6. Sanders, Roger. Clinical Sonography A Practical Guide. 1991, second edition