ABDOMINAL COMPLETE ULTRASOUND PROTOCOL (UABDC)

PATIENT PREP: NPO at least 4 hours. Exceptions can be made for urgent and ER exams. Include in the report that the patient was not NPO for exam when relevant.

**A limited/focused exam may be done for the area of concern only in the following circumstances:
(If this occurs, billing code to be used is UABDL)

- Inpatient: If other imaging has been performed within last 72 hours, a limited area of concern ultrasound may be done as long as there are no other findings are mentioned in report that should be evaluated. Examples: Eval renal mass, eval for cholecystitis, eval for Portal HTN with recent abdominal ultrasound.
- ER Patient: Perform full protocol unless order specifically states "Limited Abd to Eval xxx"
- Outpatient: Perform full protocol regardless of recent prior imaging.

**When screening for HCC is requested, the following should be added to the exam:

- Linear images of the capsule of LHL to show degree of nodularity
- Spleen images with measurement of size
- LIRADS should be completed in Viewpoint report. See additional info for LIRADS below.

**When rule out cholecystitis is requested, or patient is being seen for RUQ pain and has findings suspicious for cholecystitis, the following should be added to the exam:

- Cystic artery (add billing code UORGDL)
- GB length measurement

**Organ donor and recipient screenings:

- Pre-liver or kidney transplant donation screening: Complete abdomen, no extra images required
- Pre-renal transplant recipient screening: Complete abdomen, no extra images required
- Pre-liver transplant recipient screening: Perform spectral dopplers of liver vessels if requested. See abdomen doppler protocol.

**If a patient is coming in for pain, document within the indication section what the current status of pain is. For instance, how long the patient has had pain, if it's getting worse or better, and where exactly the pain is. Always take an image where the patient is hurting the most, labeled as area of pain. When describing the pain, write "per patient, …" in the indication. Example: Per the patient, his pain is now in the RLQ and getting worse.

**"Not well seen" to be stated if structure is not able to be completely evaluated. Include the reason why in relevant section of the report.

**Any masses, cysts, stones or abnormalities should be measured in three dimensions and have a 2D picture and a color image documented.

**Cine clips to be added as needed for any abnormality seen.

IMAGES TO OBTAIN

ABDOMINAL AORTA

- Sagittal image of proximal, mid, and distal aorta with measurements (outer to outer).
- Transverse image of proximal, mid and distal aorta.
- Document any AAA in three dimensions, 2D and color Doppler.
- Document the iliac arteries sagittal and transverse if AAA is seen. Measure in sagittal.

IVC

- Sagittal image of superior IVC.

PANCREAS

- Transverse image of head, body (showing splenic vein) and tail.
- Sagittal image of head, body and tail.
- Transverse image of head showing porto-splenic confluence.
- Document and measure pancreatic duct if visible.
- Take image of "Pancreas Area" if not well seen.

LIVER

Left lobe – subcostal/epigastric approach

- Transverse images:
  - Left hepatic vein confluence into IVC
  - Left lobe visualizing dome of liver
  - Left lobe with left portal vein
  - Cine clip sweeping through LHL in transverse from superior to inferior
- Sagittal images:
  - Left lobe with left portal vein and ligamentum teres.
  - Left lobe with hepatic vein
  - Cine clip sweeping through LHL in sagittal from medial to lateral

Caudate lobe – subcostal/epigastric approach

- Sagittal image of the caudate lobe.
- Transverse image of the caudate lobe.

Right lobe - subcostal or intercostal approach

- Sagittal images:
  - Right lobe to visualize dome of liver
  - Right liver with middle hepatic vein draining into IVC
  - Main interlobar fissure with gallbladder and CHD and MPV
  - Right lobe and right portal vein.
  - Right hemidiaphragm to assess for pleural effusions and ringdown.
  - Right lobe showing echo texture between liver and right kidney.
  - Right lobe and right kidney documenting approximate liver size. Measurement of length of the liver is not needed unless requested.
  - Cine clip sweeping through RHL in sagittal from medial to lateral
- Transverse images:
  - Right lobe showing right and middle hepatic veins.
  - Right lobe at right portal vein.
  - 2D image through MPV
  - COLOR image of MPV showing patency and direction of flow
  - Right lobe and right kidney.
  - Cine clip sweeping through RHL in transverse from superior to inferior

LIVER CAPSULE -FOR HCC SCREENING ONLY

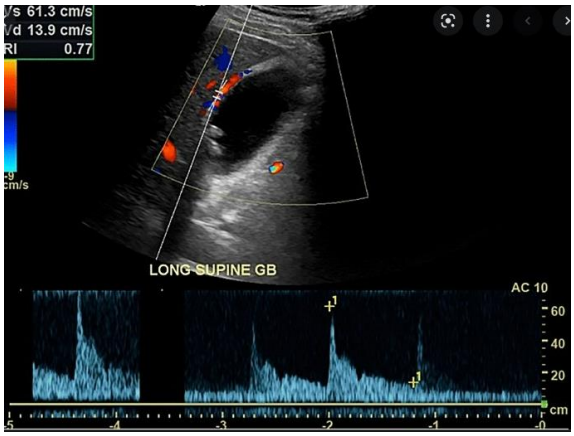
- Image of contour of liver capsule taken with linear transducer to assess for nodularity, preferably of the left lobe.

BILE DUCTS:

- Sagittal image of CBD and CHD with and without measurements in 2D and color doppler at the level of the porta hepatis. If dilated, follow CBD as distal as possible to look for stones/mass and measure as distal as possible as well.
- Document and measure any intrahepatic bile duct dilatation with 2D and color imaging.

GALLBLADDER

- Sagittal image of gallbladder.
- Transverse image of gallbladder.
- Measurement of gallbladder wall in sagittal section only. Do not include liver surface. If liver edge is edematous, try to measure free GB wall. Normal wall thickness is <3mm.
- Take image and cine through GB if there is any abnormality (stones, polyp, adenomyomatosis.) Take color image of any mass seen.
- LLD POSITION: Transverse and sagittal image of gallbladder with patient in LLD position to check for stones/polyps and mobility.
- If evaluating for cholecystitis, or if suspicious GB findings such as thickened wall or distension:
    - Evaluate for Murphy's sign and include in the report.
    - Gallbladder length measurement. Normal <8cm
    - Color doppler of gallbladder wall to access for hypervascularity
    - Spectral doppler velocity of the cystic artery which can be seen within wall of anterior gallbladder.
        - Normal velocity <40cm/s
        - If artery cannot be visualized, include color doppler of area and comment in report that it could not be seen.
        - Add code UORDGL if cystic artery is sampled.



RIGHT KIDNEY

- Sagittal image of right kidney in medial, middle, and lateral views.
- Sagittal measurement of right kidney.
- Transverse images of superior/mid/inferior right kidney.
- Demonstrate hydronephrosis or pelviectasis with a color image of the renal pelvis if present.
- **IF RENAL STONES ARE PRESENT:**
    - Measure renal stones in one largest dimension.
    - Demonstrate acoustic shadowing if possible.
    - Image with color to look for twinkle (can still be a stone if no twinkle shows).
- **IF HYDRONEPHROSIS, PELVIECTASIS, OR DILATED URETER PRESENT:**
    - Patient should void bladder and images should be taken to reassess degree of dilation with 2D and color images.

SPLEEN

- Sagittal and transverse images through spleen
- Sagittal length measurement of spleen
- Sagittal image through left hemidiaphragm and spleen to assess for pleural effusion and ringdown.
- Echo texture between spleen and left kidney.
- Color Doppler image of any abnormality.

LEFT KIDNEY

- Sagittal image of left kidney in medial, middle, and lateral views.
- Sagittal measurement of left kidney.
- Transverse images of superior/mid/inferior left kidney.
- Demonstrate hydronephrosis or pelviectasis with a color image of the renal pelvis if present.
- **IF RENAL STONES ARE PRESENT:**
    - Measure renal stones in one largest dimension.
    - Demonstrate acoustic shadowing if possible.
    - Image with color to look for twinkle (can still be a stone if no twinkle shows).
- **IF HYDRONEPHROSIS, PELVIECTASIS, OR DILATED URETER PRESENT:**
    - Patient should void bladder and images should be taken to reassess degree of dilation with 2D and color images.

BLADDER

- Urinary bladder in sagittal and transverse planes.
- If bladder stones or debris are seen, demonstrate mobility by rolling patient.
- Demonstrate ureteral jets within bladder if hydronephrosis or dilated ureter is seen. (Observe for up to 5 mins).

LOWER QUADRANTS:

- Document RLQ and LLQ (to check for ascites).

ADDITIONAL IMAGES TO OBTAIN AS NEEDED

AREA OF PAIN:

- Additional images in the area of pain using the curvilinear or linear transducer as need. Label images “Area of pain.”

HCC SCREENING:

- Image of contour of liver capsule taken with linear transducer to assess for nodularity, preferably of the left lobe.
- Spleen length and 2D images.
- LI_RADS for HCC screening:
  Viewpoint report should include
    1. LI-RADS visualization score:
        A. No or minimal limitations
        B. Moderate limitations
        C. Severe limitations
    2. LI-RADS observation description -Any mass seen should be referred to as an “observation” in the report with a description of the appearance. Do not label with the term mass.

REPORTING EXAMPLE FOR LIVER SECTION WITH LIRADS:

LIVER:
Normal size, normal shape and contour, increased echogenicity.
LI-RADS visualization score A: no or minimal limitations
LI-RADS observations:
1- Hypoechoic observation in LHL measuring 0.7 x 0.4 x 0.9 cm
2- Cystic/anechoic observation in LHL measuring 0.7 x 0.5 x 0.3 cm

US LI-RADS® v2017 CORE

Screening or surveillance US in patient at high risk for HCC

US category

US-1	Negative
US-2	Subthreshold
US-3	Positive

Category	Concept	Definition
US-1 Negative	No US evidence of HCC	No observation **OR** Only definitely benign observation(s)
US-2 Subthreshold	Observation(s) detected that may warrant short-term US surveillance	Observation(s) < 10 mm in diameter, not definitely benign
US-3 Positive	Observation(s) detected that may warrant multiphase contrast-enhanced imaging	Observation(s) ≥ 10 mm in diameter, not definitely benign **OR** New thrombus in vein

US visualization score

A	No or minimal limitations
B	Moderate limitations
C	Severe limitations

Score	Concept	Examples
A. No or minimal limitations	Limitations if any are unlikely to meaningfully affect sensitivity	Liver homogeneous or minimally heterogeneous Minimal beam attenuation or shadowing Liver visualized in near entirety
B. Moderate limitations	Limitations may obscure small masses	Liver moderately heterogeneous Moderate beam attenuation or shadowing Some portions of liver or diaphragm not visualized
C. Severe limitations	Limitations significantly lower sensitivity for focal liver lesions	Liver severely heterogeneous Severe beam attenuation or shadowing Majority (>50%) of liver not visualized Majority (>50%) of diaphragm not visualized

PRE-LIVER OR KIDNEY TRANSPLANT DONATION SCREENING:

- Complete Abdomen, no extra images required

PRE-RENAL TRANSPLANT RECIPIENT SCREENING:

- Complete Abdomen, no extra images required

PRE-LIVER TRANSPLANT RECIPIENT SCREENING:

- Perform spectral dopplers of liver vessels if requested. See ABDOMEN DOPPLER PROTOCOL.

ABDOMINAL COMPLETE PROTOCOL HISTORY

	Date	Changes made	By whom
Updated	07/09/21		Becky Marion
Updated	10/6/22	ADDED: -Limited exam section when prior imaging within 72 hours - Cine sweeps of liver -LHL image w LHV -LI-RADS section -Cystic artery and gallbladder length for R/O chole cases and RUQ pain w suspicious GB findings REMOVED: -TRV IVC image	Protocol Meeting 10/6 Attendees: Manjiri Dighe Shaun Bornemeier Dalene Edden Katie Toth Becky Marion Renee Betit Fitz