ABDOMINAL DOPPLER ULTRASOUND PROTOCOL FOR PORTAL HYPERTENSION (UABDL AND UORGDL)

****THIS WILL BE AN ABDOMEN LIMITED EXAM AND LIMITED DOPPLER EXAM WITH COLOR AND SPECTRAL DOPPLER EVALUATION OF THE PORTAL VEINS AND SPLENIC VEIN. IT WILL NOT INCLUDE HEPATIC ARTERIES OR HEPATIC VEINS****

****SEE SEPARATE PROTOCOL FOR FULL ABDOMINAL DOPPLER, EVALUATION OF TIPS, PORTAL VEIN THROMBOBSIS, AND PRE-LIVER TRANSPLANT EVAL.****

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.

DIAGNOSIS OF PORTAL HYPERTENSION INCLUDES:

- Low portal venous flow (<10cm/s)
- Hepatofugal portal venous flow
- Portosystemic collaterals or varices
- Recanalized umbilical vein
- Dilated portal vein
- Splenomegaly
- Ascites

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 2D IMAGES:

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

COLOR DOPPLER IMAGES- (Be sure to optimize your color image.)

- Color images of MPV, Right PV and Left PV showing direction of flow.
- Color image of the splenic vein at the pancreas showing direction of flow.
- Color image documenting any collateral or varies if present in periportal area, LUQ, epigastric region, or the presence of a recanalized umbilical vein.

SPECTRAL DOPPLER IMAGES: (Be sure to optimize your spectral doppler images.)

- Main, Right and Left Portal Veins - angle corrected velocity measurement.
  - MPV velocity is usually between 30-60cm/s, velocities less than <10cm/s indicate portal hypertension.
- Splenic vein at splenic hilum - angle corrected velocity measurement.

BILE DUCTS:

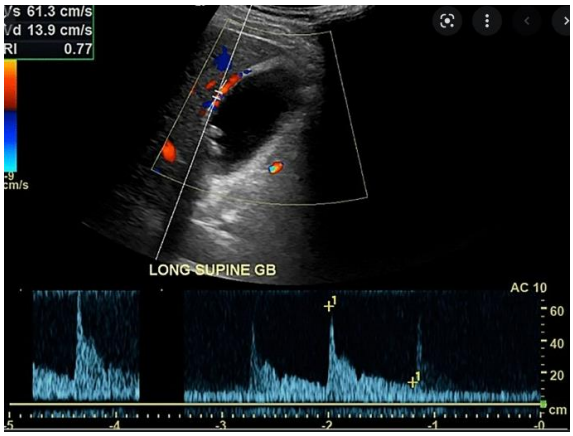
- Sagittal image of CBD and CHD with and without measurements in 2D and color doppler at the level of the porta hepatis. If dilated, follow CBD as distal as possible to look for stones/mass and measure as distal as possible as well.
- Document and measure any intrahepatic bile duct dilatation with 2D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

GALLBLADDER continued…:

- 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 UORGDL if cystic artery is sampled.



RIGHT KIDNEY:

- Sagittal image of right kidney in medial, middle and lateral views.
- Sagittal measurement of right kidney. Take cine only if abnormality is present.
- Transverse images of superior/mid/inferior right kidney.
- Color Doppler image of any mass or pelviectasis.

SPLEEN:

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

LOWER QUADRANTS:

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

NOTES-

1. If a patient is coming in for pain, please document within the indication section or the "other" 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 (label as "area of pain"). If this area is located where bowel is, take an image of the area with a linear transducer. When describing the pain, write "per patient, …" in the indication. Example: Per the patient, his pain is now in the RLQ and getting worse.
2. Cine clip of any abnormality.
3. Say "Not well seen" if structure is not well seen and include the reason why.
4. Any masses, cysts, stones or abnormalities should be measured in three dimensions and have a 2D picture and a color image documented.

ABDOMINAL DOPPLER ULTRASOUND IMAGE LIST – PHTN &PVT

IMAGE	MODE
Panc Trans H/B/T	2D
Panc Sag H/B/T	2D
Splenic Vein at panc	Color
Panc Duct if dilated	*2D +*
Left Liver Sag (medial portion)	2D
Left Liver Sag (lateral portion)	2D
Left Liver Sag M-L	Cine
Caudate Liver Sag	2D
Caudate Liver Trans	2D
Left Liver Trans (at hepatic vein)	2D
Left Liver Trans (at portal vein)	2D
Left Liver Trans S-I	Cine
LPV *without color*	2D
LPV *w/ color*	Color
LPV *velocity w angle correction*	Spectral cm/s
Right Liver Trans (at hepatic vein)	2D
Right Liver Trans (at portal vein)	2D
Right Liver Trans (at hepatic vein)	2D
Right Liver Trans S-I	Cine
Right Liver Sag/Rt Chest	2D
Right Liver Sag	2D
Right Liver Sag / RK	2D
Right Liver Sag L-M	Cine
MPV *without color*	2D
MPV *w/ color*	Color
PV confluence *without color*	2D
PV confluence *w/ color*	Color
MPV *velocity w angle correction*	Spectral cm/s
RPV *without color*	2D
RPV *w/ color*	Color
RPV *velocity w angle correction*	Spectral cm/s

IMAGE	MODE
GB Sag	
GB Wall w/measurement	2D+
GB Sag w/ color	Color
GB Trans	2D
GB Sag LLD	2D
GB Trans LLD	2D
GB length if r/o chole	*2D+*
Cystic duct if r/o chole	*Spectral*
CHD w/measurement and color	Color+
CBD w/measurement and color	Color+
Right Kidney Sag Mid	2D
Right Kidney Sag Mid w/ measurement	2D +
Right Kidney Sag Med	2D
Right Kidney Sag Lat	2D
Right Kidney Trans Sup	2D
Right Kidney Trans Mid	2D
Right Kidney Trans Inf	2D
Spleen Sag x2	2D x2
Spleen Sag w/ measurement	2D +
Spleen Trans	2D
Splenic Vein	Spectral cm/s
RLQ	2D
LLQ	2D
For cirrhosis/HCC screening: Capsule	*Linear*
MFI for lesions	*MFI*

PORTAL HTN ABDOMINAL DOPPLER PROTOCOL HISTORY

	Date	Changes made	By whom
Created	03/03/22	Created separate protocol	Renee Betit Fitzgerald
Updated	03/03/22	-Added color of SV at pancreas -Added Spectral of SV at hilum -Removed pelvis/bladder area images -Changed NPO requirement to 4 hrs	03/03/22 Protocol Meeting Attendees (Dighe, Lee, Kolokythas) (Document updated by Renee Betit Fitz)
Approved	3/14/22		Manjiri Dighe
Added	4/15/2024	Images lists	Renee Betit Fitzgerald