

ABDOMEN DUPLEX ULTRASOUND HEPATIC/PORTAL

Patient Prep (recommended):

1. Patients are recommended to be NPO for 6 hours prior to an abdominal ultrasound examination.
 - a. If a patient has not been NPO (or tube feeding not stopped) for 6 hours, the technologist will scan the patient and document patient preparation.
 - b. Patients who are inadequately prepped may be required to undergo a second limited examination to view the organ that was unable to be imaged.
2. Patient may take water with medications up to exam time (small volumes only).

Survey:

- Perform a real-time survey of the Main Portal Vein, Right Portal Vein, Left Portal Vein, Main Hepatic Artery, Right Hepatic Artery, Left Hepatic Artery, Right Hepatic Vein, Mid Hepatic Vein, Left Hepatic Vein, Splenic Vein, and Inferior Vena Cava (IVC). The vessels are to be evaluated for the presence, direction and velocity of blood flow. Elevate for ascites.

Image Documentation:

- Each image must be labeled with the patient's full name, medical record number, accession number, initials of the imaging technologist, organ/area identification, scanning plane and patient orientation if different from supine.
- If an image of a structure is not well seen, take an image of the structure and annotate the purpose of the image (i.e. hepatic artery not well seen).

Guidelines for Abdomen Doppler Ultrasound Hepatic/Portal

PORTAL VEINS

1. All images of the vessels are obtained in the longitudinal plane.
2. Gray Scale images of:
 - a. Main Portal Vein
 - b. Right Portal Vein
 - c. Left Portal Vein
3. Document COLOR FLOW in the:
 - a. Main Portal Vein
 - b. Right Portal Vein
 - c. Left Portal Vein
4. Document DOPPLER FLOW VELOCITY utilizing angle correct in the vessel (angle should be $\leq 60^\circ$ with the angle cursor parallel to the vessel walls):
 - a. Main Portal Vein
 - b. Right Portal Vein
 - c. Left Portal Vein
5. Verify correct direction of flow in vessel along with spontaneity and phasicity. Document on the image if the flow is Antegrade or Retrograde.
6. Provide anterior/posterior (AP) diameter of Main Portal Vein.

HEPATIC ARTERY

1. All images of the vessels are obtained in the longitudinal plane.
2. Gray Scale images of:
 - a. Main Hepatic Artery
 - b. Right Hepatic Artery
 - c. Left Hepatic Artery
3. Document COLOR FLOW in the:
 - a. Main Hepatic Artery
 - b. Right Hepatic Artery
 - c. Left Hepatic Artery
4. Document DOPPLER FLOW VELOCITY utilizing angle correct in the vessel (angle should be $\leq 60^\circ$ with the angle cursor parallel to the vessel walls):
 - a. Main Hepatic Artery.
 - b. Right Hepatic Artery
 - c. Left Hepatic Artery
5. Verify correct direction of flow in vessel. Document on the image if the flow is Antegrade or Retrograde.

HEPATIC VEINS

1. All images of the vessels are obtained in the longitudinal plane.
2. Gray Scale images of:
 - a. Right Hepatic Vein
 - b. Mid Hepatic Vein
 - c. Left Hepatic Vein
3. Document COLOR FLOW in the:
 - a. Right Hepatic Vein
 - b. Mid Hepatic Vein
 - c. Left Hepatic Vein
4. Document DOPPLER FLOW in the:
 - a. Right Hepatic Vein
 - b. Mid Hepatic Vein
 - c. Left Hepatic Vein
5. Verify spontaneity and phasicity of flow in vessels.

Select the level before the hepatic veins drain into the IVC. There may be slight variations, but the three hepatic veins should be seen as they come into the IVC.

SPLENIC VEIN

1. All images of the vessel are obtained in the longitudinal plane.
2. Gray Scale image of Splenic Vein. This needs to be obtained posterior to the pancreas and at the splenic hilum.
3. Document COLOR FLOW in the Splenic Vein. This needs to be obtained posterior to the pancreas and at the splenic hilum.
4. Document DOPPLER FLOW in the Splenic Vein. This needs to be obtained posterior to the pancreas and at the splenic hilum.
5. Verify correct direction of flow in vessel along with spontaneity and phasicity.

IVC

1. All images of the vessel are obtained in the longitudinal plane.
2. Gray Scale image of IVC.
3. Document COLOR FLOW in the IVC.
4. Document DOPPLER FLOW in the IVC.
5. Verify spontaneity and phasicity of flow in vessel.

LIVER

1. Provide gray scale images of the liver in longitudinal and transverse plane.
2. The liver needs to be evaluated for size, shape and echotexture.

SPLEEN

1. Provide gray scale images of the Spleen in longitudinal and transverse plane.
2. Provide maximum length measurement of Spleen.

ASCITES CHECK

1. Provide images of the abdomen to assess for fluid.
 - a. RUQ
 - b. RLQ
 - c. LUQ
 - d. LLQ

Check for collateral vessels.

Vascular flow description of blood flow direction is based on the normal flow of blood to or from an organ. It is imperative that the technologist understands and know how the blood is following to or from an organ to provide accurate information. With a simple change of the transducer orientation or the angle of the doppler signal, can change the appearance of the blood flow to or from an organ. This can cause an error when describing the direction of blood flow.

Antegrade Blood Flow (Hepatopetal Flow) is normal blood flow towards the liver and is used to describe the normal blood flow direction in the portal and splenic veins.

Retrograde Blood Flow (Hepatofugal Flow) is abnormal blood flow away from the liver and is used to describe the abnormal blood flow direction in the portal and splenic veins.

Main Portal Vein - takes deoxygenated blood from the spleen and other abdominal organs into the liver. Normal blood flow of the main portal vein is ANTEGRADE FLOW which is toward the liver.

The splenic vein and the superior mesenteric vein joins to form the Main Portal Vein.

Right Portal Vein – is the right branch of the main portal vein. Normal blood flow of the right portal vein is ANTEGRADE FLOW which is toward the liver. Due to its unique angle and the relationship to the transducer, it can appear that there is retrograde flow which is away from the liver (wrong direction) in the right portal vein. Be mindful of this angle change.

Left Portal Vein - is the left branch of the main portal vein. Normal blood flow of the left portal vein is ANTEGRADE FLOW which is toward the liver.

Main Hepatic Artery – takes oxygenated blood to the liver with continued forward flow. Normal blood flow of the main hepatic artery is ANTEGRADE FLOW which is toward the liver.

Right Hepatic Artery – takes oxygenated blood to the liver with continued forward flow. Normal blood flow of the right hepatic artery is ANTEGRADE FLOW which is toward the liver. Due to its unique angle and the relationship to the transducer, it can appear that there is retrograde flow which is away from the liver (wrong direction) in the right hepatic artery. Be mindful of this angle change.

Left Hepatic Artery – takes oxygenated blood to the liver with continued forward flow. Normal blood flow of the left hepatic artery is ANTEGRADE FLOW which is toward the liver.

Hepatic Veins (Right, Mid and Left) - transports deoxygenated blood from the liver to the inferior vena cava (IVC). Normal blood flow of the hepatic veins is ANTEGRADE FLOW toward the heart.

Splenic Vein – transports deoxygenated blood flow from the spleen toward the liver. The splenic vein joins the Superior Mesentery Vein (SMA) and forms the Main Portal Vein. The normal blood flow in the splenic vein is ANTEGRADE FLOW due to it going to the liver. At the spleen, the splenic vein blood flow is below the baseline with doppler. Posterior to the pancreas, the splenic vein blood flow is above the baseline with doppler.

VESSEL	WAVE CHARACTERISTICS
Main Portal Vein	Antegrade (Hepatopetal) and continuous
Right Portal Vein	Antegrade (Hepatopetal) and continuous
Left Portal Vein	Antegrade (Hepatopetal) and continuous
Hepatic Artery (Main, Right and Left)	Antegrade (Hepatopetal) and pulsatile
Splenic Vein	Antegrade (Hepatopetal) and continuous
Hepatic Veins (Main, Right and Left)	Multiphasic

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