

# 5 Tips for a Liver Duplex

M. ROBERT DEJONG, RDMS, RVT, FSDMS, FAIUM  
 OWNER BOB DEJONG, LLC  
 AN ULTRASOUND EDUCATION COMPANY

## The Challenge of Liver Duplex

- Vessels are at different levels in the body
  - HV is shallow, MPV is deep
- Need to Doppler both arteries and veins in a study
- Need to Doppler vessels with different velocities
  - MPV and HA
- Vessels move with respiration
- Sonographer needs to constantly adjust the Doppler controls during the study
  - One "setting fits all" does not work

## Tip 1: Know Anatomy

## Portal Vein

Formed by the superior mesenteric and splenic veins

- Other tributaries include inferior mesenteric veins

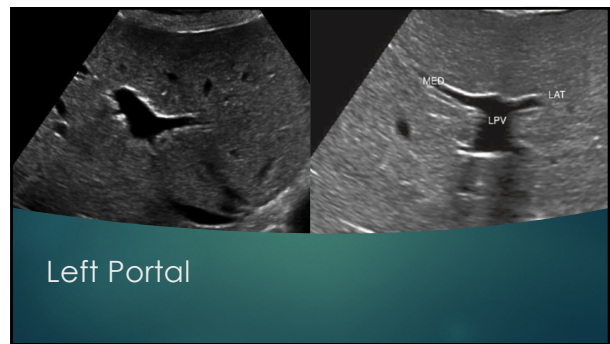
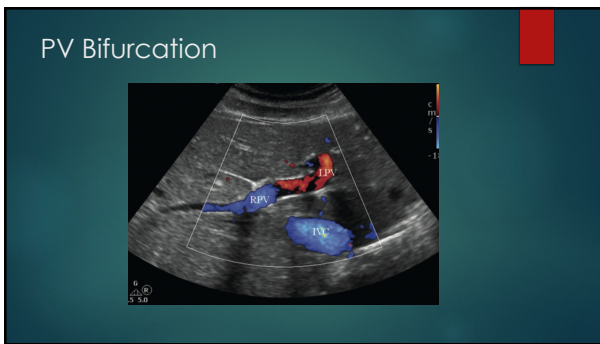
Separate system from systemic circulation

- Right lobe
  - Right portal
- Left lobe
  - Left portal
- Caudate lobe
  - Both left and right portal branches

## Portal Vein

- Branches course within hepatic segments
- Portal vein
  - Hepatopetal flow
  - Flow into liver
- Doppler signal
  - Continuous flow

## Right Portal



### Hepatic Artery

- Branch of celiac axis
- Low resistance signal
  - Good diastolic flow
  - Rt < 0.7
- Hepatopetal flow
  - Flows in same direction as portal
- Anterior to portal vein

### Hepatic Veins

- Course between segments - intersegmental
- Empty into the IVC
- Drains
  - Right lobe
  - Left lobe
  - Ca middle lobe drains directly into the IVC
- Phasic pattern due to close proximity to the heart
- Mostly below the baseline
- Hepatofugal flow
  - Away from liver

### "Portalized" Hepatic Flow

- Flow pattern is continuous like portal vein
- Pressure in liver always exceeds heart pressure
- Due to decreased compliance of liver parenchyma
  - Cirrhosis
  - Metastatic disease
- Hepatic veins themselves are normal

### Pulsatile PV and HV from CHF

### Tip 2: The Right Transducers

**Types**

- Curved linear array
- Subcostal
- Phased, sector / vector array
- Intercostal

**Frequencies between 2-8 MHz**



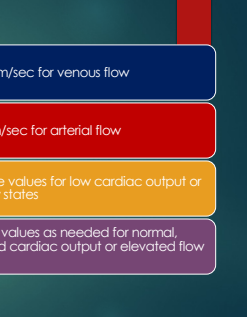
### Tip 3: Correct Color Velocity Scale

**10 - 20 cm/sec for venous flow**

**20-30 cm/sec for arterial flow**

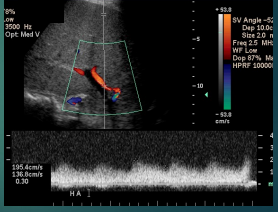
Decrease values for low cardiac output or slow flow states

Increase values as needed for normal, increased cardiac output or elevated flow states



### Why is there no flow in the portal vein?

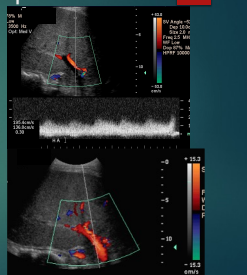
- Portal vein thrombosis
- Color gain too low
- Color velocity scale (CVS) too high
- Wall filter too high



### Why is there no flow in the portal vein?

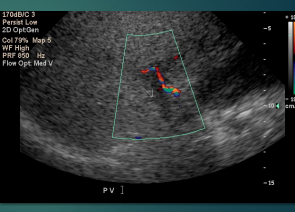
**Color velocity scale too high**

- At 53 cm/sec to eliminate aliasing in hepatic artery knocked out flow in portal vein



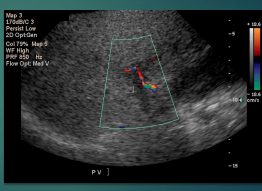
### Why is there no flow in the portal vein?

- Portal vein thrombosis
- Color gain too low
- Color velocity scale too high

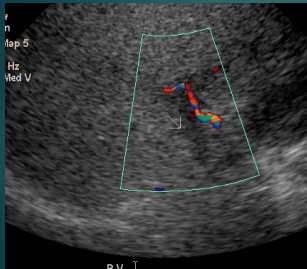


### This has to be PVT!!

- Cirrhotic liver
- Portal Vein filled in with echoes



### What sign suggests that this is not PVT?



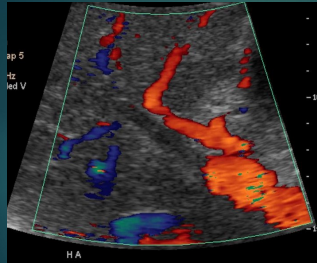
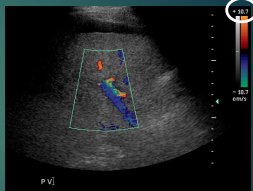
**Hepatic artery is normal in size**

### Rest of the Story

**Portal Vein hypertension**

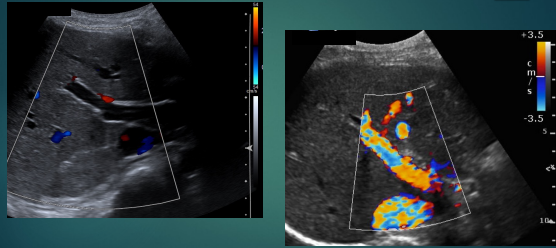
**Color Velocity Scale**

- 10.7 cm /sec
- Hepatic artery now aliasing
- Can see flow in portal vein




**HA starting to hypertrophy due to PVT and increased flow**

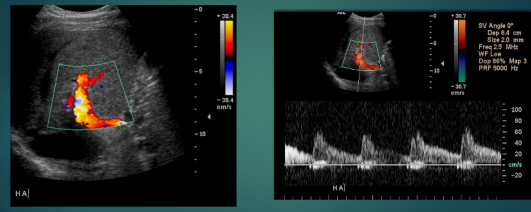
### Color Velocity Scale the Extremes



### Tip 4: Don't just trust color image



### HA compensating for missing PV flow



Tip 5:  
Understand how to determine flow direction

Which one is correct flow direction

Determining Flow in Splenic Vein

Evaluate the part closest to the spleen

What's your Diagnosis?

- Normal flow in the splenic vein
- Reversed flow in the splenic vein
- Collateral flow

Take off the blinders.  
Look at the whole picture.

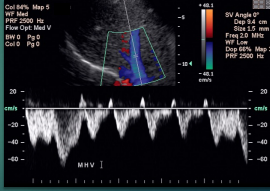
- Normal flow in the splenic vein
- Reversed flow in the splenic vein
- Collateral flow

Extra Tips

Increasing Color Gain

### General Technical Tips

- Keep color box width to area of interest
  - Improves color sensitivity
  - Keeps good frame rate
- Watch color velocity scale
  - Low for suspected thrombosis
- Check color gain
- Increase output power as needed



### Thank You



► bobdejong.rdms@gmail.com