How to Perform Optimal OB Doppler

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Technical Considerations

Middle Cerebral Artery

Zoom Image to see entire length MCA

Use color / power Doppler to identify circle of Willis

Spectral Doppler

Cursor
is used for optimal alignment between vessel axis & Doppler scan line
“Angle of Insonation”

Angle correction
only used to measure velocity

Sample Volume
determines the location and area that the pulsed wave Doppler listens for a returning signal
Angle of insonation should be zero

Where do We Need to Sample the MCA-PSV?

The proximal MCA, 2 mm after its origin from the internal carotid artery, had the best intraobserver and interobserver variability.


Place Doppler gate close to the origin in the ICA

Caution! – “Technical Considerations”

- Maternal abdominal pressure alters fetal cerebral blood flow


Scanning Techniques

- Circle of Willis is enlarged
- Color box is placed around the MCA
- MCA is zoomed
- Insonate at 0 degrees
- Place Doppler gate close to the origin in the ICA
- 2mm sample volume
- 0-50 pass filter

MCA Waveforms in Small For GA

The diastole in B is higher than in A. The pulsatility index is lower in B. This suggests that in B, there is a cerebral vasodilatation with increased cerebral blood flow. This is called the "brain sparing effect." 


Umbilical Artery Doppler

Abs? or reversed EDF
– 80x ↑ in perinatal mortality
Thorston & Lilford, 1995

UA Doppler significantly reduces IUFD
Drum, 1995: 8 studies, 6038 pts
Clair et al, 1992: 527, 720, 333, 833 pts
Ahrlem et al, 1995: 12 studies, 30% reduction in perinatal death

Umbilical Artery Doppler

Sample site may effect cord indices
– Highest resistance, near the fetal abdomen
– Lowest resistance, near the placental end

Mid cord

RI 0.68
PI 1.17

Near placenta

RI 0.64
PI 1.00

Near fetus

RI 0.83
PI 1.66

How to Obtain An Optimal Cord Doppler?

Sample site may effect cord indices
– Highest resistance, near the fetal abdomen
– Lowest resistance, near the placental end
Frame Rate

- Depends primarily on the selection of the depth and the number of lines in the image
When is Umbilical Artery Doppler Abnormal?

- If diastolic flow is absent or reversed after 18 to 20 weeks
- If the S/D ratio is greater than 3.0 after 30 weeks gestation

4.0 at 20 weeks, 3.0 at 30 weeks, and 2.0 at 40 weeks

Umbilical Vein

Normal

Continuous forward flow without pulsations is established by 12 weeks of gestation

Abnormal

Pulsations are always seen at 8 weeks of gestation, but gradually decrease from 9 weeks of gestation onwards

Umbilical Vein – Clinical Utility

- FGR due to placental insufficiency
- Twin to twin transfusion syndrome
- Nonimmune fetal hydrops
- Congestive heart failure
- Fetal arrhythmia
Ductus Venosus

- (S) filling of RA during ventricular systole
- (D) filling of RA during ventricular diastole
- (A) RA contraction

Waveform reflects pressure gradient between right atrium & umbilical vein

Ductus Venosus – Clinical Utility

- The reversed “A” or “S” wave has high sensitivity for fetal cardiac failure
  - Placental insufficiency
  - Heart failure associated with hydrops
  - End stage anemia
  - Twin to twin transfusion (volume overload)
The uterine artery is sampled immediately after its origin from the hypogastric as it crosses the external iliac artery.

**Normal**
- Gradual Disappearance of the Notch
- Increase in diastolic flow
- PI at 18 to 22 wks are typically < 1.4

Espinoza et al J Ultrasound Med 2010; 29:1103-1115

**Abnormal**
- Notch at 25 weeks implies incomplete trophoblastic invasion and is predictive of preeclampsia and/or delivering a growth restricted fetus

Espinoza et al J Ultrasound Med 2010; 29:1103-1115
Aardema et al Ultrasound Obstet Gynecol 2000; 16: 630-634
Harrington et al Ultrasound Obstet Gynecol 1996; 7: 182-188
Bower et al Br J Obstet Gynecol 1993; 100: 989-994
Thank You