How to Perform Optimal OB Doppler

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Technical Considerations

Middle Cerebral Artery

Zoom image to see entire length MCA

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
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.

In microcephaly and holoprosencephaly, the shape of the circle of Willis may be distorted.

- The anterior artery is part of the malformation and the circle is not closed.

Caution! — “Technical Considerations”

- Maternal abdominal pressure alters fetal cerebral blood flow.

Scanning Techniques
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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


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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"


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PI (angle independent index)
Decreased pulsatility index
- Fetal hypoxemia
- Fetal hypertension
PSV (an angle close to zero degrees is needed)
Increased peak systolic velocity is due to an elevated left cardiac output associated with increased placental vascular resistance
- Fetal anemia


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Middle Cerebral Artery

Middle Cerebral Artery

PSV ≥ 1.5 MoM
- associated with high risk of fetal anemia
PSV ≤ 1.50 MoM
- associated with mild anemia or no anemia

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Diastolic notching & reversed end diastole
“Tricuspid regurgitation, Aortic dissection, heart failure, IUGR fetuses”

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Umbilical Artery Doppler

Absent? or reversed EDF
- 80X ↑ in perinatal mortality
Thornton & Lilford, 1990

UA Doppler significantly reduces IUFD
Decon, 1995; 8 studies, 5838 pts
Oelen et al 1995; 2683 cases
Allison et al, 1995; 12 studies, 38% reduction in perinatal death

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How to Obtain An Optimal Cord Doppler?

Sample site may affect cord indices
- Highest resistance, near the fetal abdomen
- Lowest resistance, near the placental end

Umbilical Artery Doppler

Velocity Scale - Controls PRF (the rate at which the transducer is pulsed per second)

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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 Artery Notching

Cord Abnormalities

- Cord entanglement
- True knot in cord
- Cord stricture
- Velamentous insertion
- Tight nuchal cords
Umbilical Artery Notching

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)

Thank You