Comparison of Doppler indices in patients with umbilical vein varix (UVV) to standard Doppler indices

Patricia Rivera, MD; Kayla Heslin, MPH1,2; Marie M. Forgey, DO,1,4,5 Jessica J. F. Kram, MPH1,2; Ryan Stone, MD1
1Department of Obstetrics and Gynecology, Aurora Sinai Medical Center, Milwaukee, WI; 2Advocate Aurora Health Research Institute, Milwaukee, WI; 3Center for Urban Population Health, Milwaukee, WI; 4Aurora University of Wisconsin Medical Group, Aurora Health Care, Milwaukee, WI; 5Clinical Adjunct Professor, Department of Obstetrics and Gynecology, University of Wisconsin School of Medicine and Public Health, Madison, WI; Honorary Associate, Department of Family Medicine and Community Health, University of Wisconsin School of Medicine and Public Health, Madison, WI; 6Department of Maternal Fetal Medicine, Aurora Sinai Medical Center, Milwaukee, WI;

CONTACT: Marie M. Forgey, DO; marie.forgie@ahh.org

INTRODUCTION

• UVV is a focal dilatation of the fetal umbilical vein (UV) and is defined as:
  More than 9 mm in diameter; or
  Ratio of more than 50% between dilated and more distal portion of the intrahepatic vein; or
  An UV diameter greater than 2 standard deviations above the gestational age mean.
• It can rupture or develop thrombosis leading to fetal death. The incidence is unknown and there is no consensus on antenatal management and fetal assessment.
• To our knowledge, no study has investigated testing outcomes of biophysical profiles (BPP) or Doppler studies.

AIMS

(1) To compare Doppler indices of patients with UVV to the 50th percentile of standard indices.
(2) To review BPP scores, describe maternal characteristics and comorbidities, review fetal abnormalities, and describe delivery and neonatal demographics.

METHODS

• Retrospective cases series
  study from 1/1/2012-6/1/2019.
  Extracted from the medical record:
  Maternal demographics/characteristics, ultrasound abnormalities, delivery outcomes, antenatal testing results and Doppler values.
• Reviewed umbilical (UA), middle cerebral artery (MCA), and ductus venosus (DV) Doppler values.
• Basic Descriptive statistics were conducted.

RESULTS

• Demographic characteristics, maternal characteristics, and maternal/neonatal outcomes are described in tables 1-3.

Demographic Characteristics

<table>
<thead>
<tr>
<th>Values</th>
<th>Mean age, years (range)</th>
<th>Mean BMI at diagnosis, kg/m² (range)</th>
<th>Mean gravidity</th>
<th>Mean gestational age diagnosis, weeks (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>31.6 (19.3-41.9)</td>
<td>31.3 (21.3-44.0)</td>
<td>3.3 (1.0-14.0)</td>
<td>32.4 (25.7-38.1)</td>
</tr>
</tbody>
</table>

Race, n (%)

<table>
<thead>
<tr>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>White 62 (73.8)</td>
</tr>
<tr>
<td>African American 12 (14.3)</td>
</tr>
<tr>
<td>Other 10 (11.9)</td>
</tr>
<tr>
<td>Hispanic 18 (21.4)</td>
</tr>
<tr>
<td>Non-Hispanic 66 (78.6)</td>
</tr>
</tbody>
</table>

Substance abuse, n (%)

<table>
<thead>
<tr>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ever smoker 34 (40.5)</td>
</tr>
<tr>
<td>Substance abuse 15 (17.9)</td>
</tr>
</tbody>
</table>

Table 1. Maternal Characteristics

Comorbidities

<table>
<thead>
<tr>
<th>Values</th>
<th>Pregestational diabetes, n (%)</th>
<th>Gestational diabetes, n (%)</th>
<th>Chronic hypertension, n (%)</th>
<th>Gestational hypertension, n (%)</th>
<th>Preeclampsia (includes severe), n (%)</th>
<th>Eclampsia, n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>2 (2.4)</td>
<td>13 (15.5)</td>
<td>12 (14.3)</td>
<td>8 (9.5)</td>
<td>7 (8.3)</td>
<td>1 (1.1)</td>
</tr>
</tbody>
</table>

Table 2. Maternal Comorbidities

Maternal/Neonatal Outcomes

<table>
<thead>
<tr>
<th>Values</th>
<th>Gestational weeks at delivery (wk)</th>
<th>Mode of delivery</th>
<th>Resuscitation</th>
<th>Umbilical umbilical vein/JS varix</th>
<th>Abnormal Dopplers:</th>
<th>Fracture</th>
<th>Family history</th>
<th>Mode of delivery</th>
<th>Gestational weeks at delivery (wk)</th>
<th>Mode of delivery</th>
<th>Gestational weeks at delivery (wk)</th>
<th>Mode of delivery</th>
<th>Gestational weeks at delivery (wk)</th>
<th>Mode of delivery</th>
<th>Gestational weeks at delivery (wk)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>36.8 (30.0-40.0)</td>
<td>Vaginal</td>
<td>Cesarean</td>
<td>MCA SD PSV UA RI DV</td>
<td>MCA performed</td>
<td>UA performed</td>
<td>DV performed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Pregnancy Outcomes

• Patients (n with):
  Growth ultrasound performed: 78 (92.9%) (10.11%)
  Echocardiogram performed: 10 (11.9%)
  BPP performed: 84 (100.0%)
  Normal: 69 (82.1%);  Equivocal: 15 (17.9%);  Abnormal: 0 (0.0%)
  NIPI/DPI: 72 (86.1%);  Abruption: 12 (14.3%)
  Turbulence: 4 (4.8%)
  Tricuجيد Regurgitation: 6 (7.1%)
  Abnormal Dopplers: MCA RI, SD, and PSV in nearly all patients; no abnormal UA or DV Dopplers
  Thrombus: 2 (2.4%)
  Abnormal Dopplers: All MCA Doppler values were abnormal in both patients; UA SD in 1 patient
  Intraterine growth restriction: 10 (11.9%)
  Abnormal Dopplers: MCA SD was the most frequently abnormal followed by the MCA RI
  At least one anatomic abnormality: 10 (11.9%)
  50% of patients with anatomic abnormalities had abnormal MCA SD


CONCLUSIONS

• Antenatal management is variable. Doppler abnormalities are common in pregnancies affected by UVV.
• Even so, no patient had an abnormal BPP and few required interventions such as indicated cesarean section due to poor fetal status.
• Those with thrombosis did not have any turbulence, tricuspid regurgitation, or abnormal BPs.
• The MCA Doppler was abnormal for majority of patients with clinically significant events.
• Given that the current testing strategy with BPP and Doppler studies was not effective for altering management or outcomes, further study is need to elucidate a more appropriate surveillance methodology.

REFERENCES