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

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## 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.

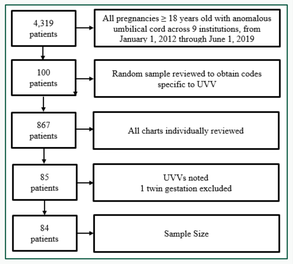
## AIMS

(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 cares 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 | Values |
|---|---|
| Mean age, years (range) | 31.6 (19.6-41.9) |
| Mean BMI at diagnosis, kg/m$^2$ (range) | 31.3 (21.3-44.0) |
| Mean gravidity (range) | 3.3 (1.0-14.0) |
| Mean gestational age diagnosis, weeks (range) | 32.4 (25.7-38.1) |
| Race, n (%) | |
| White | 62 (73.8) |
| African American | 12 (14.3) |
| Other | 10 (11.9) |
| Ethnicity, n (%) | |
| Hispanic | 18 (21.4) |
| Non-Hispanic | 66 (78.6) |
| Ever smoker, n (%) | 34 (40.5) |
| Substance abuse, n (%) | 15 (17.9) |

**Table 1.** Maternal Characteristics

| Comorbidities | Values |
|---|---|
| Pregestational diabetes, n (%) | 2 (2.4) |
| Gestational diabetes, n (%) | 13 (15.5) |
| Chronic hypertension, n (%) | 12 (14.3) |
| Gestational hypertension, n (%) | 8 (9.5) |
| Preeclampsia (includes severe), n (%) | 7 (8.3) |
| Eclampsia, n (%) | 1 (1.1) |

**Table 2.** Maternal Comorbidities

| Maternal/Neonatal Outcomes | Values |
|---|---|
| Gestational weeks at delivery (wk) | 36.8 (30.0-40.0) |
| Mode of delivery | |
| Vaginal, n (%) | 63 (75.0) |
| Cesarean delivery, n (%) | 21 (25.0) |
| Cesarean delivery for non-reassuring FHT, n (%) | 6 (7.1) |
| Planned induction, n (%) | 57 (67.9) |
| NICU admission, n (%) | 26 (31.0) |
| Mean APGAR score 1 minute (range) | 7.6 (1.0-9.0) |
| Mean APGAR score 5 minutes (range) | 8.5 (1.0-9.0) |
| Chromosomal abnormality, n (%) | 2 (2.4) |
| Intrauterine fetal demise, n (%) | 0 (0.0) |

**Table 3.** Pregnancy Outcomes

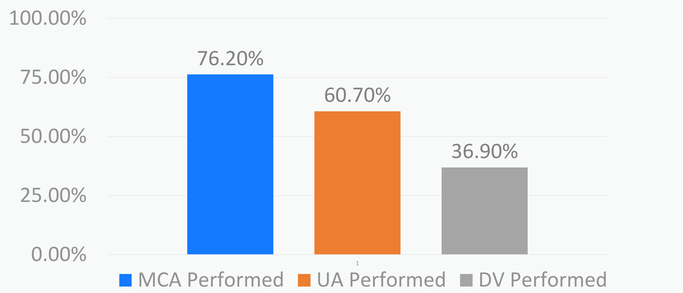



**Figure 1.** Summary of Dopplers Performed.
*Figure describes the percentage of patients with at least one MCA (n=64), UA (n=51), and DV (n=31) Doppler performed throughout pregnancy.*

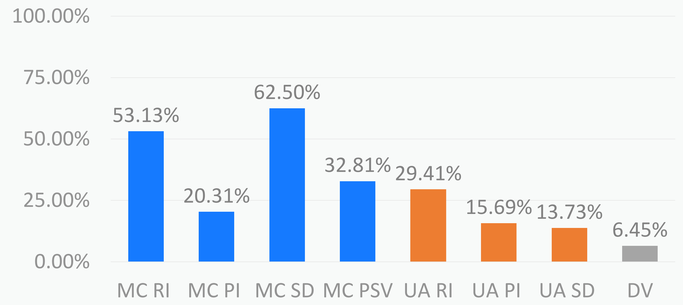



**Figure 2.** Abnormal Doppler Indices.
*Figure describes the percentage of at least one abnormal Doppler indices among those with al least one MCA, UA, or DV Doppler performed.*

- **Patients (n) with:**
  - **Growth ultrasound performed:** 78 (92.9%)
  - **Echocardiogram performed:** 10 (11.9%)
  - **BPP performed:** 84 (100.0%)
    - Normal: 69 (82.1%); Equivocal: 15 (17.9%); Abnormal: 0 (0.0%)
  - **Turbulence:** 4 (4.8%)
  - **Tricuspid 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
  - **Intrauterine 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 thrombus did not have any turbulence, tricuspid regurgitation, or abnormal BPPs.
- 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.

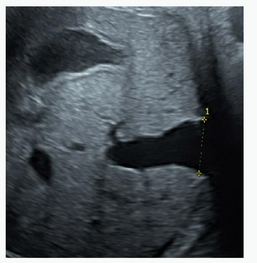


**Image 1.** UVV noted at 36 weeks measuring 16.7 mm

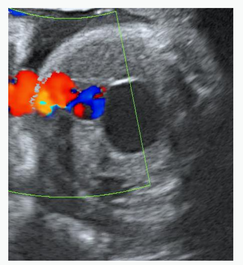


**Image 2.** UVV noted at 34 weeks measuring 16.5 mm with filling defect

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