

421 Comparison of umbilical vein flow with umbilical artery pulsatility index in fetal growth restriction



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OBJECTIVE: Umbilical vein flow (UVF) has been previously shown to be significantly reduced in fetal growth-restriction (FGR) fetuses with abnormal arterial pulsatility index (UA PI). The objective of this study was to assess the relationship between UVF and UA PI, middle cerebral artery pulsatility index (MCA PI), cerebroplacental ratio (CPR), fetal cardiac area (CA), and global sphericity index (GSI) in FGR fetuses to explore factors that may help distinguish between normal and pathologic FGR.

STUDY DESIGN: In a prospective cohort study of fetuses with EFW <10th percentile, the final ultrasound exam prior to delivery was used to obtain EFW, UA PI, MCA PI, CA, and GSI. Absolute UVF (mL/min) and weight-specific UVF (UVF/kg fetal weight) were calculated (vein area [πr^2] x time-averaged mean velocity of the umbilical vein [UVV; mm/s] x 60 seconds). Umbilical vein area normalized to fetal size (UVA/fetal weight [g]) was also evaluated. GSI was calculated from the ventricular end-diastolic four-chamber view (4CV). Measurements were obtained from the epicardial borders at the widest transverse diameter and the longest basal/apical length of the 4CV. CA was calculated using the same two measurements.

RESULTS: Compared to FGR fetuses with a normal UA PI, absolute UVF and weight-specific UVF were both significantly reduced in fetuses with an elevated UA PI. Weight-specific UVA was not associated with UA PI (Table 1). No significant association was seen between absolute or weight-specific UVF and MCA PI, CPR, CA, or GSI. Patient characteristics of the 66 fetuses included in the cohort are found in Table 2.

CONCLUSION: Both absolute and normalized UVF is reduced in FGR fetuses with a UA PI >95th percentile suggesting a strong relationship between placental arterial resistance and venous outflow to the fetus. Further, given the insignificant comparison between umbilical vein area with UA PI, this reveals that umbilical vein velocity is the driving factor in the link between decreased UVF and elevated UA PI. UVF measurements may be a useful objective parameter in distinguishing between normal and pathologic FGR. (Funded by the Perelman IUGR Study)

Table 3

Comparison	UA PI <95 th Percentile Mean +/- SEM (n=52)	UA PI >95 th Percentile Mean +/- SEM (n=9)	P value
Absolute umbilical vein flow (mL/min)	536.6 ± 23.1	402.6 ± 55.61	0.0233
Weight-specific umbilical vein flow (mL/min/kg)	249.5 ± 10.23	198.2 ± 20.17	0.0486
Weight-specific umbilical vein area (cm ² /kg fetal wt)	382.4 ± 6.80	156.1 ± 17.60	0.2361

*Mann-Whitney U tests were used to determine significant differences between groups. Significant findings p<0.05 represented with bold font.

Table 2

Characteristics	FGR w/ UA PI <95 th ile Mean +/- SD (n=46)	FGR w/ UA PI >95 th ile Mean +/- SD (n=8)	P-value
Average GA (at visit)	35.83 +/- 1.45	35.52 +/- 1.81	0.650
Average GA (at delivery)	37.75 +/- 1.05	37.37 +/- 1.14	0.357
Birthweight (Kg)	2.49 +/- 0.31	2.18 +/- 0.40	0.048
Birthweight Percentile	14 th	4 th	n/a

Abbreviation: GA = Gestational age. Mann-Whitney U tests used for statistical analysis. *Delivery information unavailable for 11/57 patients with UA PI <95th ile, and 1/9 with UA PI > 95thile.

422 Identifying barriers that delay treatment of obstetric hypertensive emergency



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OBJECTIVE: ACOG recommends acute-onset, severe hypertension be treated with first line-therapy (IV labetalol, IV hydralazine or PO nifedipine) within 60 minutes to reduce risk of maternal morbidity and mortality. Our objective was to identify barriers that lead to delayed treatment.

STUDY DESIGN: We identified 419 patients with discharge diagnoses of chronic HTN, gestational HTN or preeclampsia using ICD-10 codes and pharmacy database at an academic institution during the year 2017. 188 subjects (44.8%) experienced HTN emergency (systolic BP>160 or diastolic BP>110, confirmed 15 min apart). 41 were excluded for incomplete records, leaving 147 for analysis. A retrospective cohort study was performed comparing women with delay in first line therapy vs those treated under 60 min. We evaluated maternal characteristics, presenting symptoms and circumstances, timing of HTN emergency, gestational age at presentation, trend of maternal BP between first two severe readings, and administered medications. Parametric and nonparametric statistics were used with p<0.05 as statistically significant.

RESULTS: Of the 147 women, 79 (53.7%) had delayed treatment vs. 68 (46.3%) treated within 60 min. Presentation with initial BP in the non-severe range resulted in 3X the odds of having delayed treatment vs presenting with initial severe BP reading (OR=3.09, 95% CI:1.57-6.07). Absence of symptoms of preeclampsia resulted in 2.1X the odds of delayed treatment (OR=2.08, 95%CI:1.02-4.22). HTN emergencies between 10pm-6am were ~2.5X more likely to have delayed treatment vs those between 6am-10pm (OR 2.57, 95% CI: 1.00-6.60). Patients treated under 60 min had a lower gestational age at presentation 35.4±4wk vs those with delayed treatment 36.9±3.6wks, p<0.008. For every 1wk increase in GA at presentation, there was a 9% increase in the likelihood of delayed treatment (OR 0.91; 95%CI:0.83-0.99). A decrease in mean BP between first two consecutive severe BP readings showed a trend towards ~2X the odds of delayed treatment vs a rise in mean BP (OR=1.92, 95% CI: 0.98-3.79). No other differences were found between the groups.

CONCLUSION: Initial BP in non-severe range, absence of preeclampsia symptoms, presentation overnight, increasing gestational age at presentation, and decrease in mean BP in the two consecutive severe BP readings are barriers that lead to delay in treatment of obstetric hypertensive emergency.

Table 1. Predictors of Timely Treatment of Obstetric Hypertensive Emergency (<60 minutes)

	Treated within 60 minutes (n= 68)	Delayed or Inadequate Treatment (n= 79)	Odds Ratio (95% CI)*
Presenting BP in Severe Range (%)	40 (58.8%)	25 (31.7%)	3.09 (1.57-6.07)
Increase in Mean BP Between Consecutive Severe BP Readings (%)	39 (60.0%)	32 (43.8%)	1.92 (0.98-3.79)
Symptoms of Preeclampsia At Presentation	27 (39.7%)	19 (24.05%)	2.08 (1.02-4.22)
Time of HTN Emergency 10PM-6AM	7 (10.3%)	18 (22.8%)	2.57 (1.00-6.60)

*Reference category for odds ratio (OR=1.0) is delayed treatment >60 minutes