

EP14.03 Can fetoplacental Dopplers predict placental pathology in small for gestational age pregnancies?

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Introduction

We aimed to assess the relationship between various fetoplacental Doppler parameters with specific placental histologic abnormalities in pregnancies with small-for-gestation age (SGA) fetuses.

Methods

This was a prospective cohort study of singleton pregnancies complicated with SGA/fetal growth restriction (FGR). Multivariable logistic regression was used to determine odds ratios and 95% CI for the relationship between fetoplacental Dopplers parameters [Abnormal umbilical artery (UA) - pulsatility index (PI) >95th centile, absent and/or reverse end-diastolic velocity; middle cerebral artery (MCA) PI <5th centile; cerebroplacental ratio (CPR) PI<5th centile; umbilical vein flow (UV-Q)<5th and <10th centiles; mean uterine artery (MeanUtA) PI>95th centile; ductus venosus (DV) pulsatility index for veins (PIV)>95th centile and umbilico-cerebral ratio (UCR)] and specific placental histological abnormalities classified based on the Amsterdam Placental Workshop Group Consensus criteria: maternal vascular malperfusion (MVM), fetal vascular malperfusion (FVM), villitis of unknown etiology (VUE), chronic histiocytic intervillitis (CHI) and delayed villous maturation (DVM).

Results

Among 377 SGA pregnancies included in this study, 159 (42.2%) were early FGR, 138 (36.6%) late FGR and 80 (21.2%) SGA (not fulfil Delphi criteria). MVM was present in 142 (37.7%) placentae, VUE in 54 (14.3%), DVM in 21 (5.6%), FVM 15 (4.0%) and CHI in 4 (1.1%). Abnormal UA PI, MCA PI <5th centile, CPR PI<5th centile, UV-Q <5th and <10th centiles, MeanUtA PI>95th centile, DV PIV>95th centile, PVIV, UCR and CPUR were significantly associated with higher odds of MVM in all cohorts but not for FVM, DVM and VUE in FGR infants. Abnormal UA, CPR PI <5th centile, Mean UtA >95th centile and CPUR were also associated with increased odds of VUE in whole population (Table 1). All Doppler parameters had low predictive metrics for placental abnormalities.

Conclusion

Although fetoplacental Dopplers and umbilical vein flow were significantly associated with the odds of MVM all were poorly predictive limiting clinical utility for this indication.

Table 1. Logistic Regression models of the association between ultrasound Dopplers and placental histopathological diagnoses in the all SGA and FGR population cohorts.

SGA				ALL FGR			
Diagnosis	Doppler	OR (95% CI)	p-value	Diagnosis	Doppler	OR (95% CI)	p-value
MVM	Umbilical Vein Flow	0.99 (0.99-1.00)	0.02	MVM	Umbilical Vein Flow <5 th centile	3.05 (1.59-5.85)	0.001
	Umbilical Vein Flow <5 th centile	3.44 (1.87-6.34)	<0.0001		Umbilical Vein Flow <10 th centile	3.64 (2.06-6.46)	<0.0001
	Umbilical Vein Flow <10 th centile	3.74 (2.22-6.30)	<0.0001		Umbilical Artery PI	16.71 (6.65-42.00)	<0.0001
	Umbilical Artery PI	26.36 (10.73-64.79)	<0.0001		Umbilical Artery PI >95 th centile	3.73 (2.29-6.08)	<0.0001
	Umbilical Artery PI >95 th centile	4.50 (2.85-7.10)	<0.0001		Abnormal Umbilical Artery	3.87 (2.38-6.30)	<0.0001
	Abnormal Umbilical Artery	4.67 (2.97-7.36)	<0.0001		MCA PI	0.37 (0.18-0.76)	0.01
	MCA PI	0.28 (0.14-0.55)	0.0003		MCA PI <5 th centile	4.32 (2.47-7.57)	<0.0001
	MCA PI <5 th centile	5.08 (2.99-8.63)	<0.0001		CPR PI	0.23 (0.13-0.40)	<0.0001
	CPR PI	0.17 (0.10-0.29)	<0.0001		CPR PI <5 th centile	3.55 (2.18-5.76)	<0.0001
	CPR PI <5 th centile	4.89 (3.09-7.73)	<0.0001		Mean Uterine Artery PI	8.90 (4.53-17.49)	<0.0001
	Mean Uterine Artery PI	10.18 (5.36-19.36)	<0.0001		Mean Uterine Artery PI >95 th centile	3.73 (2.29-6.08)	<0.0001
	Mean Uterine Artery PI >95 th centile	4.50 (2.85-7.10)	<0.0001		PIV >95 th centile	1.94 (1.03-3.68)	0.04
	PIV	3.34 (1.29-8.66)	0.01		PVIV	3.18 (1.06-9.53)	0.04
	PIV >95 th centile	2.27 (1.25-4.13)	0.01		UCR	9.89 (3.82-25.56)	<0.0001
	PVIV	3.80 (1.35-10.71)	0.01		CPUR	0.43 (0.30-0.60)	<0.0001
FVM	PIV >95 th centile	3.41 (1.12-10.45)	0.03	FVM	No significance		
	Uterine Artery PI	0.35 (0.13-0.95)	0.04	DVM	No significance		
VUE	Umbilical Artery PI >95 th centile	1.93 (1.08-3.46)	0.03	VUE	No significance		
	Abnormal Umbilical Artery	1.87 (1.05-3.36)	0.03				
	CPR PI	0.52 (0.30-0.90)	0.02				
	CPR PI <5 th centile	1.90 (1.06-3.41)	0.03				
	Mean Uterine Artery PI >95 th centile	1.93 (1.08-3.46)	0.03				
	CPUR	0.72 (0.54-0.95)	0.02	CHI	Umbilical Vein Flow	0.96 (0.93-0.99)	0.02
CHI	UCR	1.79 (1.03-3.12)	0.04		Umbilical Artery PI	1.63 (1.05-2.53)	0.03
					CPR PI	0.07 (0.01-0.56)	0.01
					PIV	102.47 (2.09-5018.26)	0.02
					PVIV	21.86 (1.89-252.93)	0.01
					UCR	1.85 (1.10-3.11)	0.02
					CPUR	0.33 (0.14-0.76)	0.01

OR – Odds ratio; () represents 95% Confidence Intervals; SGA – Small for gestational age; FGR – Fetal growth restriction; MVM – Maternal vascular malperfusion; FVM – Fetal vascular malperfusion; VUE–Villitis of unknown etiology; DVM – Delayed Villous Maturation; CHI - Chronic histiocytic intervillitis; PI – Pulsatility index; MCA – Middle cerebral artery; CPR – cerebroplacental ratio; PIV – Pulsatility index for vein; PVIV – Peak velocity index for vein; UCR - Umbilicocerebral ratio; cpur - .