

Multivessel spectral Doppler assessment of fetal growth restriction - uterine, umbilical and fetal arterial and venous circulations

Maternal uterine, umbilical and middle cerebral arterial and quantitative umbilical venous Doppler are necessary to distinguish nonpathologic constitutional normal variants versus impaired placentation and its accompanying placenta related adverse obstetrical outcomes.

Umbilical arterial Doppler alone does not provide good differentiation between low risk SGA and high risk fetal growth restriction.

_third trimester abnormal uterine artery Dopplers are associated with more adverse perinatal outcomes - increased rates of C-section, SGA neonates, preterm delivery, low Apgars - in both low risk and high risk patients.

*Schwarzman. J Ultrasound Med 2013.

_abnormal uterine artery Doppler predicts fetal compromise despite normal umbilical arterial Doppler.

*Chang. Prediction of perinatal morbidity at term in small fetuses. British Journal OB/GYN. 1994; 101. 422 - 7.

*Espinoza. Ultras Obstet Gynec 2012.

_uterine artery Doppler screening of the high risk population identifies a subgroup of patients at significant risk for adverse pregnancy outcome.

*Scisnone. Am J Obstet Gynec 2009.

Uterine artery Doppler for stillbirth risk factor(s) - .

_uterine arterial Doppler is a requisite component to quantitative multifactorial risk assessment for stillbirth.

<https://fetalmedicine.org/research/assess/stillbirth>

A combination of biometric parameters with Doppler criteria of placental insufficiency (abnormal uterine arterial or fetal cerebral placental ratio CPR) offers a classification tool that correlates with the risk of adverse perinatal outcomes. For surveillance purposes, CPR is sensitive to reflect progression from diagnosis until term.

Umbilical venous flow UV flow ≤ 68 mL/min/kg identifies a population of fetal growth restriction at significant increased risk for emergency delivery for non--reassuring fetal status and increased risk for neonatal metabolic acidosis.

*Rizzo. Role of Doppler ultrasound at time of diagnosis of late onset fetal growth restriction in predicting adverse perinatal outcome: Prospective cohort study. Ultrasound Obstet Gynecol 2020; 55: 793-798.

*Figueras. Diagnosis and surveillance of late onset fetal growth restriction. Am J Obstet Gynec, 2018, Jan V218, p S790-S802.

*Morales-Rosello. Fetal cerebral redistribution: A marker of compromise regardless of fetal size. *Ultrasound Obstet Gynecol* 2015; 46:358 - 388.

*Flood. The role of brain sparing in the prediction of adverse outcomes in IUGR: results of multicenter PORTO Study. *Am J Obstet Gynecol* 2014;211:288.e1-5.

*Khalil. Value of third trimester cerebroplacental ratio and uterine artery Doppler indices as predictors of stillbirth and perinatal loss. *Ultrasound Obstet Gynecol* 2016;47:74 - 80.

*Figueras. Stage-based approach to the management of fetal growth restriction. *Prenatal Diagnosis*.2014,34,655-59.

*Evaluation of brain Doppler indices before labor induction discriminates small for gestational age at high risk for Cesarean delivery for nonreassuring fetal status and neonatal acidosis. *Obstetrics and Gynecology* 2011; 117:618-26.

*Added value of umbilical vein flow is a predictor of perinatal outcomes in term small for gestational age fetus. Parra-Saavedra. *Ultrasound Obstet Gynecol* 2013; 42:189 - 195.

*Association of Doppler parameters (quantitative umbilical venous; uterine, umbilical and middle cerebral arterial) with placental signs of underperfusion in late onset small for gestational age pregnancies. Parra-Saavedra. *Ultrasound Obstet Gynecol* 2014;44:330-337.

Isolated abnormal uterine artery doppler after 26 weeks - even in the low risk population - confers increased risk for preeclampsia, IUGR, preterm delivery, C-section and NICU admission.

* Ghi. *Ultrasound Obs Gynec* 2010.

* Schwarzman. *Jrnl Ultras Med* 2013.

Fetal growth restriction management:

Deliver at 38-39 weeks if normal umbilical artery Doppler and EFW 3 - 9%

Deliver at 37 w if normal UA Doppler and EFW < 3%

Deliver at 37 w if elevated UA Doppler:

Deliver at 33-34 if absent umbilical artery end diastolic flow

Deliver at 30-32 if reversed end diastolic flow

*Society for Maternal-Fetal Medicine Consult Series-diagnosis and management of fetal growth restriction. *Am J Obstet Gynecol* 2020. 223(4):B2-B17