<u>Uterine artery Doppler and the universal screening for impaired placentation/placenta related adverse obstetrical outcomes</u>

More than 15% of pregnancies are affected by placenta related adverse obstetrical outcomes necessitating uterine artery Doppler to screen for impaired placentation.

Quantitative Preeclampsia Risk Assessment QPERA employing uterine arterial Doppler (CPT 93976) and mean arterial pressure MAP is necessary to identify impaired placentation and offer aspirin treatment for those at increased risk.

https://fetalmedicine.org/research/assess/preeclampsia/background
*Poon. From first trimester screening to risk stratification of evolving preeclampsia in second and third trimesters of pregnancy: comprehensive approach.Ultrasound Obstet Gynecol. 2020;55:5-12.

QPERA employing uterine arterial Doppler and MAP is an evidence based program which implements the national legislative and state wide initiative goals to minimize the preventable maternal mortality and morbidity conferred by hypertensive disorders of pregnancy.

2017 HR1318 -The Preventing Maternal Death Act.
New York State Perinatal Quality Collaborative and its' Maternal Preeclampsia Initiative
*Simpson. AJP Rep. Oct 2018. Safe Motherhood Initiative

The National Institutes of Child Health and Human Development state, "the placenta is arguably one of the most important organs given, not only for the health of a woman and the fetus during pregnancy, but also for the lifelong health of both."

Maternal gestational hypertensive disorders and their complications have ranked consistently as the primary cause of adverse maternal and neonatal outcome as the institution of prenatal care.
*Baschat. Ultrasound Obstet Gynecol 2015

Impaired placentation - leading to early onset/preterm preeclampsia, fetal growth restriction and abruption - is one of the leading causes of perinatal death.
*Poon. Prenatal Diagnosis 2014

Placenta related adverse obstetrical outcomes imprint upon the mother and fetus an increased lifetime risk for cardiovascular disease and diabetes.
Cain. Am J Obstet Gynecol. 2016

Preeclampsia and other hypertensive disorders of pregnancy occur in 5-8% of all pregnancies of women who have no known risk factors. https://www.preeclampsia.org/faqs
O36.512 - maternal care for known or suspected placental insufficiency.

Preeclampsia is a leading cause of maternal death worldwide. Preeclampsia is potentially life-threatening and affects 1 in 25 pregnancies in the United States.
*American Heart Association. April 2023.

More than 15% of pregnancies are affected by placenta related adverse obstetrical outcomes. Placental dysfunction - due to vascular and/or inflammatory pathophysiology - are considered to be the primary or significant contributor to The Great Obstetrical Syndromes, namely, preterm labor, preterm prelabor rupture of membranes, fetal demise, preeclampsia, and intrauterine growth restriction. These pregnancy complications may be responsible for both short- and long-term health outcomes.

In each trimester of pregnancy, multifactorial algorithms employing uterine artery Doppler, maternal blood pressure, biochemical markers and maternal demographics are the best available means by which to screen for impaired placentation and placenta related adverse obstetrical outcomes including preeclampsia and stillbirth. In the first and second trimester these algorithms are the best available means to determine which patients would best benefit from aspirin treatment.

Uterine artery Doppler is a validated non-invasive proxy for placenta ischemia due to impaired placentation and defective trophoblastic invasion - the pathogenesis of early onset preeclampsia and contributing factor to preterm preeclampsia. Uterine artery Doppler is a marker for defective remodeling of spiral arteries with consequent placental malperfusion and associated impaired fetal growth. Uterine artery Doppler is an essential component within the evidence based multifactorial Fetal Medicine Foundation algorithm optimizing personalized quantitative preeclampsia risk assessment in each trimester of pregnancy.

*Female Reproductive Dysfunction. Mastrolia. Endocrinology. 2020.
*Toward a new taxonomy of obstetrical disease: improved performance of maternal blood bile markers for the great obstetrical syndromes when classified according to placental pathology. Romero. AJOG. Oct 2022.
*Expert review. Preeclampsia and eclampsia: The conceptual evolution of a syndrome. Erez. AJOG. Feb 2022.
*Scazzoccchio. Ultrasound Obstet Gynecol 2017; 49:435 - 441.
*Mifsud. Placental pathology in early onset and late onset fetal growth restriction. Fetal Diagn Ther 2014;36:117-128
*Low-dose aspirin use during pregnancy. ACOG Committee Opinion No. 743. American College of Obstetricians and Gynecologists. Obstet Gynecol 2018;132:e44-52.
*The competing risk approach for prediction of preeclampsia. Wright. Am J Obstet Gynecol. July 2020
*From first trimester screening to risk stratification of evolving preeclampsia and second and third trimesters of pregnancy: comprehensive approach. Ultrasound Obstet Gynecol. Poon. 2020;55:5-12.

Clinical correlates of normal and abnormal uterine artery doppler

Normal mean uterine artery pulsatility index has a high negative predictive value >90% mitigating against the subsequent development of the following clinical expressions of impaired placentation / placenta related adverse obstetrical outcomes - early onset preeclampsia, PTD <36 weeks, IUGR, abruption, stillbirth, NICU admission - in both low risk and high risk populations.

*Ultrasound Obstet Gynecol. 2004 Jan;23(1):50-5. Harrington. The value of uterine artery Doppler in the prediction of uteroplacental complications in multiparous women.
*Obstetrics & Gynecology. 120(4):815-822, Oct 2012. Myatt. The utility of uterine artery Doppler velocimetry in prediction of preeclampsia in the low risk population.

Isolated abnormal uterine artery doppler after 26 weeks - even in the low risk AGA population - confers increased risk for placental weight <10%, placental histopathologies of primary vascular origin, increased risk for preeclampsia, decreased growth velocity, IUGR, less than expected EFW for genetic potential, preterm delivery, C-section, NICU admission and risk factor for stillbirth.

*Third trimester abnormal uterine artery Doppler findings are associated with adverse pregnancy outcomes. Shwarzman. J Ultrasound Med 2013; 32:2107-2113.
*Persistence of increased uterine artery resistances in the third trimester and pregnancy outcome. Ghi. Ultrasound Obst Gynecol. Nov 2010.