

## Second Trimester Uterine Artery Doppler in the Evaluation of Multiparous 'High-Risk' Patients

**INTRODUCTION:** This project investigates the association between midtrimester mean maternal uterine artery resistive index and pregnancy outcome in multiparous patients with a past obstetrical history of uteroplacental vascular insufficiency and its spectrum of clinical expressions.

Mean uterine artery resistive index is a Doppler measurement that reflects the placental impedance at the level of the maternal spiral arteries.

The study population is multiparous patients who had prior pregnancies with hypertension, preeclampsia, abruption, SGA/IUGR, spontaneous premature rupture of membranes, preterm labor/delivery, HELLP.

A total of 124 patients responded who met the above pretest conditions.

The disease outcome studied is defined as:

- Delivery less than 38 weeks with preeclampsia and/or SGA
- Delivery of SGA 38-40 weeks without preeclampsia and/or NICU admission

Preeclampsia greater than 38 weeks was not defined as a disease outcome because many researchers feel that the underlying insult for late onset preeclampsia is unlikely to be a disorder of maternal-fetal spiral artery transformation.

An abnormal uterine artery Doppler result is defined as a mean resistivity index greater than 0.60 that persists on at least one followup uterine artery Doppler after the initial mid trimester exam. "Late transformers" – those patients whose mean uterine artery resistive index was initially greater than 0.6 but became normal (less than 0.6) on followup studies - were classified as normal uterine artery Doppler results.

True positive cases were defined as those that delivered less than 38 weeks gestational age, neonatal weight less than the 10th percentile for gestational age up through 40 weeks, preeclampsia less than 38 weeks with the last uterine artery Doppler mean resistive index greater than 0.60.

True negative was defined as a delivery greater than 38 weeks of an AGA newborn without preeclampsia whose last mean uterine artery resistive index was less than 0.60.

A true negative designation was also given to uncomplicated SGA newborns delivered after 38 weeks unassociated with preeclampsia and/or NICU admission with the last uterine artery Doppler mean resistive index measurement being less than 0.60.

False positive result is defined as delivery after 38 weeks of an AGA neonate in association with the last mean uterine artery resistive index of greater than 0.60.

A false negative result is defined as the last mean uterine artery resistive index less than 0.60 with birth of an SGA newborn less than 40 weeks and any delivery less than 38 weeks in association with hypertension, preeclampsia, abruption, SPROM.

Total number of patients in study group, 220. Total number of patients responding to telephone interviews, 124.

- True positive 33 patients
- True negative 65 patients
- False positive 16 patients
- False negative 10 patients
  
- Sensitivity - true positive divided by true positive plus false negative – 77%
- Specificity - true negative divided by true negative plus false positive – 80%
- False Positive rate – false positive divided by disease-free patients – 20%
- False negative rate – false negative divided by diseased patients – 23%

Negative predictive value is the probability of not having the disease with a negative test result - true negative divided by true negative plus false positive – 87%.

Positive predictive value is the probability of having the disease given a positive test result - true positive divided by true positive plus false positive – 67%.

HVRA's current investigation is similar in target population and methodology to the study by Harrington - Ultrasound in Obstetrics and Gynecology 2004 January; 23(1):50-55. The value of uterine artery Doppler in the prediction of uteroplacental complications in multiparous women.

HVRA's current investigation results roughly approximate those of Harrington. Harrington's use of uterine artery Doppler at a cutoff resistive index of 0.55 yielded –

- Sensitivity – 81%
- Specificity – 89%
- Positive predictive value – 71%
- Negative predictive value – 93%

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