



CORRELATION OF ABNORMAL UTERINE ARTERY DOPPLER IN THE SECOND TRIMESTER OF PREGNANCY WITH MATERNAL AND FETAL OUTCOME.

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ABSTRACT

Introduction: Maternal – fetal circulation can be studied non-invasively by using doppler which can be used as a screening tool for fetal and maternal disease. Morphological changes in the uterine vasculature can be demonstrated by colour and pulsed doppler studies. The majority of the studies on uterine artery doppler have focused on a high risk population. The effectiveness of the uterine artery doppler to predict pre eclampsia or FGR in a low risk population has been shown to have a low to moderate predictive value. Also the criteria for normal and abnormal uterine artery doppler continue to vary with no well accepted definition.

Aim: To find out the correlation between abnormal uterine artery doppler in the second trimester of pregnancy between 18-22 weeks, with the subsequent development of pre eclampsia and FGR.

Materials and methods: This is a prospective cohort study carried out in the Department of Obstetrics and Gynecology for a period of one year. Antenatal patients in the age group of 18-35 years, between 18-22 weeks of gestation, who were included in the study underwent a uterine artery doppler. They were followed up until delivery. SPSS software was used to analyze the data.

Results: 193 Obstetric patients in the age group 18-35 years were evaluated with uterine artery doppler. 77.7% had normal doppler indices. In the abnormal doppler group, 81.4% were in the high risk category and 48.8% of those with abnormal dopplers developed pre eclampsia and 34.9% with abnormal dopplers developed FGR.

Conclusion: Patients with abnormal uterine artery doppler indices in the second trimester of pregnancy, had an 18 times increased risk of developing pre eclampsia and a 6 times increased risk of developing FGR when compared to those with normal doppler indices.

KEYWORDS : Uterine artery doppler, pre eclampsia, FGR

INTRODUCTION:

The uterine artery doppler has the potential for screening for complications of impaired placentation. First and second trimester uterine artery doppler assessments have high predictive values for the prediction of pre eclampsia and FGR. Studies have shown that, in pregnancies complicated by pre eclampsia or FGR, fetal and uterine artery doppler indices relate to placental bed biopsy and histopathology. Wide range of specificity and sensitivity were found in studies that correlated doppler velocimetry with clinical outcomes. Clinical disease has multi factorial pathophysiology. All the same, high resistance findings on doppler velocimetry are signs of defective placentation.

We conducted this study to find out the correlation between abnormal uterine artery Doppler between 18-22 weeks of pregnancy with the subsequent development of pre eclampsia and FGR.

MATERIALS AND METHODS :

This prospective cohort study was conducted in Government medical college Trivandrum for a period of 1 year. 193 antenatal patients in the age group 18-35 years and between 18-22 weeks were included in the study. The study population was divided into high and low risk groups. All primi gravidas and multi gravidas with a previous history of pre eclampsia or FGR were considered high risk. All multi gravidas with no previous history of pre eclampsia or FGR were considered low risk. All the cases underwent uterine artery doppler between 18-22 weeks. The doppler indices studied were Resistance Index (RI), Pulsatility Index (PI) and the presence or absence of diastolic notch in the uterine arteries bilaterally. Presence of an early diastolic notch, unilateral or bilateral after 18 weeks, RI > 0.60 with or without notches, and a PI > 1 were considered abnormal.

All patients were followed up for the development of pre eclampsia, FGR, abruption, HELLP syndrome and other complications. The parameters considered at delivery were, gestational age at delivery, induction rates, mode of delivery, birth weight, fetal outcome including in born nursery admissions.

RESULTS:

193 pregnant women were evaluated with a uterine artery doppler at 18-22 weeks. 150(77.7%) had normal doppler indices and 22.3% had abnormal doppler values.

In the abnormal doppler group, 81.4% belonged to the high risk group, whereas in the normal doppler group, only 46.7% were in the high risk category.

Table 1. Doppler indices in the high and low risk groups

Doppler	High risk	Low risk	Total
Abnormal	35(81.4%)	8(18.6%)	43
Normal	70(46.7%)	80(53.3%)	150
Total	105(54.4%)	88(45.6%)	193

RR 1.74; p value = 0.00011

48.8% of patients in the abnormal doppler group developed pre eclampsia, whereas only 2.7% of the patients in the normal doppler group developed the disease. RR = 18.31, p 0.000

Doppler	Pre eclampsia		Total
	Yes	No	
Abnormal	21 (48.8%)	22 (51.2%)	43
Normal	4 (2.7%)	146 (97.3%)	150
Total	25 (12.8%)	168(87.2%)	193

52.3% of patients with abnormal doppler indices developed severe pre eclampsia when compared to 25% of those with normal doppler indices.

Table 3: Development of FGR

Doppler	FGR		Total
	Yes	No	
Abnormal	15 (34.9%)	28 (65.1%)	43
Normal	8 (5.3%)	142 (94.7%)	150
Total	23 (11.9%)	170 (88.1%)	193

RR = 6.54, p = 0.000

In the abnormal doppler group, 34.9% of patients developed FGR, whereas only 5.3% of patients in the normal doppler group had FGR. HELLP syndrome developed in 1 patient, abruption in 2 and gestational hypertension in 11 patients.

21% of patients in the abnormal doppler category had pre term labour (either spontaneous or induced) when compared with 4% with normal doppler values.

Patients with an abnormal uterine artery doppler had a 2.71 times increased risk of cesarean delivery. Fetal distress and abnormal umbilical artery doppler were the major indications for cesarean in this group.

25.6% of patients with abnormal uterine artery doppler had low birth weight babies when compared to 9.35% in patients with normal doppler indices. Patients in the abnormal doppler group had a 11.74 times increased risk of having very low birth weight babies (1.6-2 kg) and 2.29 times increased risk of having low birth weight babies (2.1-2.5 kg) when compared to the normal doppler group.

DISCUSSION:

A large number of studies have investigated the potential of a second trimester uterine artery Doppler study as a screening tool for pre eclampsia and FGR.^{4,5} Small for date babies secondary to FGR are at high risk for poor perinatal and long term outcomes than those with normal growth. Deteriorating fetal status often occurs secondary to maternal conditions like pre eclampsia and this can be predicted in such cases by early antenatal testing modalities.

The present study showed that high risk patients had nearly two times increased risk of having abnormal uterine artery doppler waveforms in the second trimester when compared to the low risk group. Patients with abnormal doppler indices had an eighteen times increased risk for developing pre eclampsia than those with normal dopplers. Studies by Zimmermann et al and Kurdi et al also reported correlation between abnormal Doppler indices and pre eclampsia^{6,7}. Several studies have shown that abnormal Doppler indices provide a better prediction of the more severe types of pregnancy complications⁸. In our study also, severe pre eclampsia developed in 52.3% of women with abnormal doppler indices, but only in 25 % of patients with normal doppler studies.

Patients with abnormal doppler indices had a six times increased risk of developing FGR than those with normal doppler findings. The study by Campbell et al also showed a similar correlation⁹. These women also have a two times increased risk of having a cesarean delivery than those with normal indices. When distribution of birth weights in the different doppler groups was considered, the patients with abnormal Doppler indices were found to have a eleven times increased risk of having babies who weighed less than 2 kg and a two times increased risk of having babies who weighed between 2- 2.5 kg.

The present study has shown results on par with that already published, with a highly significant correlation between abnormal doppler indices and the development of pre eclampsia and FGR which were the main outcomes studied.

CONCLUSION :

Abnormal uterine artery waveforms in the second trimester of pregnancy are associated with adverse maternal and fetal outcomes. Hence the study of the doppler waveforms in the uterine arteries at the time of the 20 week anomaly scan, may be of use in determining the type and level of ante natal care that is offered to the women.

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