

Original Research

Assessment of Colour Doppler values for localization of placenta and uterine artery Doppler as predictors of preeclampsia

Ashish Kumar

Associate Professor, Department of Radio Diagnosis, Ventakeshwara Institute of Medical Sciences, Gajraula, Uttar Pradesh, India

ABSTRACT:

Background: We planned the present study for assessing the role of Colour Doppler values for localization of placenta and uterine artery Doppler as predictors of preeclampsia. **Materials & methods:** A total of 50 patients admitted to the ultrasound section were enrolled. The end point of the study was the development of preeclampsia and IUGR. Colour Doppler findings were assessed. All the data were entered in Microsoft excel sheet. Statistical analysis was done using diagnostic tests such as sensitivity, specificity and predictive values. **Results:** Significant results were obtained while assessing the distribution of placental location and incidence of IUGR. Sensitivity and specificity of Doppler in detecting IUGR was found to be 49% and 75.8% respectively. Overall accuracy of Doppler in detecting IUGR was 74.5 percent. **Conclusion:** Screening for placental location and uterine artery Doppler at 18-24 weeks is recommended for classify women in to high risk category for developing IUGR.

Key words: Colour, Doppler, Placenta

Received: 11 April, 2019

Accepted: 17 May 2019

Corresponding author: Ashish Kumar, Associate Professor, Department of Radio Diagnosis, Ventakeshwara Institute of Medical Sciences, Gajraula, Uttar Pradesh, India

This article may be cited as: Kumar A. Assessment of Colour Doppler values for localization of placenta and uterine artery Doppler as predictors of preeclampsia. J Adv Med Dent Scie Res 2019;7(6): 171-173.

INTRODUCTION

In normal pregnancy, placental trophoblast cells invade the inner third of the myometrium and migrate the entire length of the maternal spiral arteries what optimizes delivery of oxygen and nutrients to the fetus. In women who develop preeclampsia there is failure of trophoblast invasion of the uterine muscular wall with the result that the spiral arteries retain the muscle elastic coating and impedance to blood flow persists. Theoretically, a pathological increase in placental vascular resistance should be detectable by abnormal Doppler flow studies of the maternal uterine vessels, and this could offers the potential to detect women at risk for diseases like preeclampsia. The majority of research has centered on an elevation in the RI or PI, or the persistence of a uterine artery diastolic notch to detect the presence of increased uteroplacental vascular resistance.¹⁻³

Abnormal uterine artery Doppler studies in both the first and second trimesters have been shown to be associated with subsequent perinatal complications. For women with abnormal testing in the first trimester, the likelihood ratio (LR) for the development of preeclampsia is approximately 5,

while those with normal Doppler flow studies have an LR of 0.5. Similarly, an abnormal test carries an LR of 2 for fetal growth restriction, with an LR of 0.9 after a normal test result. Though this relationship persists with testing in the second trimester, the sensitivity may be lower.⁴⁻⁶Hence; under the light of above mentioned data, we planned the present study for assessing the role of Colour Doppler values for localization of placenta and uterine artery Doppler as predictors of preeclampsia.

MATERIALS & METHODS

The present study was planned for assessing the role of Colour Doppler values for localization of placenta and uterine artery Doppler as predictors of preeclampsia. A total of 50 patients admitted to the ultrasound section were enrolled. The end point of the study was the development of preeclampsia and IUGR. Colour Doppler findings were assessed. All the data were entered in Microsoft excel sheet. Statistical analysis was done using diagnostic tests such as sensitivity, specificity and predictive values. Chi- square test was used for assessment of level of

significance. P- value of less than 0.05 was taken as significant.

RESULTS

A total of 50 patients were analysed. Mean gestation age of the patients of the present study was 20.15 weeks. Mean age of the patients of the present study was 25.9 years. Out of 50 patients, IUGR was found to be present in 8 percent of the patients. Among the 41 patients with central placenta location, IUGR was

present in 3 patients while it was absent in 38 patients. Out of 9 patients with lateral placenta location, IUGR was found to be present in 1 patient while it was found to be absent in 8 patients. Significant results were obtained while assessing the distribution of placental location and incidence of IUGR. Sensitivity and specificity of Doppler in detecting IUGR was found to be 49% and 75.8% respectively. Overall accuracy of Doppler in detecting IUGR was 74.5 percent.

Table 1: Incidence of IUGR

IUGR	Number of patients	Percentage of patients
Present	4	8
Absent	46	92
Total	50	100

Table 2: Distribution of placental location and incidence of IUGR

Location of placenta	IUGR		
	Present	Absent	Total
Central	3	38	41
Lateral	1	8	9
Total	4	46	50
Chi- square value	42.5		
p- value	0.000 (Significant)		

Table 3: Efficacy of Doppler in detection of IUGR

Statistic	Value	95% CI
Sensitivity	49%	15.9% to 75.8%
Specificity	75.8%	71.9% to 92.4%
Accuracy	74.5%	68.4% to 78.4%

DISCUSSION

In a previous research, authors assessed the correlation between first-trimester uterine artery Doppler measurements and maternal serum levels of free β -hCG and pregnancy-associated plasma protein A (PAPP-A). Uterine artery mean resistance index (RI), pulsatility index (PI), and number of early diastolic notches. There were 401 uncomplicated pregnancies. In this group, free β -hCG and PAPP-A did not significantly correlate with uterine artery RI or PI (r values between -0.089 and 0.029 , all nonsignificant). Free β -hCG and PAPP-A levels did not significantly change with the number of notches. Uterine artery resistance and PAPP-A levels were independently correlated with birth weight. Preliminary evidence suggested that first-trimester uterine artery Doppler measurements do not correlate with maternal serum levels of free β -hCG and PAPP-A.^{7,8} Hence; under the light of above mentioned data, we planned the present study for assessing the role of Colour Doppler values for localization of placenta and uterine artery Doppler as predictors of preeclampsia.

In the present study, a= total of 50 patients were analysed. Mean gestation age of the patients of the present study was 20.15 weeks. Mean age of the patients of the present study was 25.9 years. Out of

50 patients, IUGR was found to be present in 8 percent of the patients. Among the 41 patients with central placenta location, IUGR was present in 3 patients while it was absent in 38 patients. Out of 9 patients with lateral placenta location, IUGR was found to be present in 1 patient while it was found to be absent in 8 patients. Significant results were obtained while assessing the distribution of placental location and incidence of IUGR. Agrawal P et al assessed the correlation between persistence of uterine artery notch and development of intrauterine growth retardation (IUGR) and pregnancy induced hypertension (PIH), and to see if doppler assessment can help identify high risk pregnancies. Fifty-three women, 38 primiparas forming Group I and 15 high risk pregnancies forming Group II underwent doppler evaluation around 24 weeks of gestation. They were followed up and the outcome noted. Eight of the 38 in Group I and nine of the 15 in Group II showed persistence of bilateral notch. Of these 17, nine (52.9%) developed IUGR with PIH, and eight (47.1%) had IUGR alone. Persistence of bilateral notch was more significant and majority of women with persistence of unilateral notch had a normal outcome. Uterine artery should be evaluated along with routine scan in all patients whenever possible

but in high risk patients uterine artery evaluation should specifically be done at 24 weeks.⁹

In the present study, sensitivity and specificity of Doppler in detecting IUGR was found to be 49% and 75.8% respectively. Overall accuracy of Doppler in detecting IUGR was 74.5 percent. Cnossen JS et al investigated the predictive accuracy of all uterine artery Doppler indices for both conditions in the first and second trimesters. They identified relevant studies through searches of MEDLINE, EMBASE, the Cochrane Library and Medion databases (all records to April 2006) and by checking bibliographies of identified studies and consulting with experts. Four of us independently selected studies, extracted data and assessed study validity. They performed a bivariable meta-analysis of sensitivity and specificity and calculated likelihood ratios. They identified 74 studies of pre-eclampsia (total 79,547 patients) and 61 studies of intrauterine growth restriction (total 41 131 patients). Uterine artery Doppler ultrasonography provided a more accurate prediction when performed in the second trimester than in the first-trimester. Most Doppler indices had poor predictive characteristics, but this varied with patient risk and outcome severity. An increased pulsatility index with notching was the best predictor of pre-eclampsia (positive likelihood ratio 21.0 among high-risk patients and 7.5 among low-risk patients). It was also the best predictor of overall (positive likelihood ratio 9.1) and severe (positive likelihood ratio 14.6) intrauterine growth restriction among low-risk patients. Abnormal uterine artery waveforms are a better predictor of pre-eclampsia than of intrauterine growth restriction. A pulsatility index, alone or combined with notching, is the most predictive Doppler index.¹⁰

CONCLUSION

Screening for placental location and uterine artery Doppler at 18-24 weeks is recommended for classify women in to high risk category for developing IUGR.

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