

Evaluation of USG findings and Colour Doppler values for localization of placenta and uterine artery Doppler as predictors of preeclampsia in 18-24 weeks of gestation: An observational study

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Abstract

Background: The present study was planned for evaluating USG findings and Colour Doppler values for localization of placenta and uterine artery Doppler as predictors of preeclampsia in 18-24 weeks of gestation. **Materials & methods:** 50 patients were scanned at 18-22 week and were followed up till delivery. The location of the placenta and uterine artery Doppler was determined by ultrasound at 18-22 weeks in all the cases at the time of scan. The end point of the study was the development of preeclampsia and IUGR. Grey scale ultrasound and colour doppler was performed. Any co-relation of radiological findings with clinical and surgical findings will be documented and analysed. All the data were entered in Microsoft excel sheet. **Results:** Mean gestational age was 21.8 weeks. In 82 percent of the cases, placenta was of central location while in the remaining 18 percent of the cases, it was of lateral location. Pre-eclampsia was present in 10 percent of the patients. Significant results were obtained while correlating Doppler findings with occurrence of pre-eclampsia. **Conclusion:** By recognising the high risk patients & anticipating preeclampsia patients can be supervised more closely to reduce the morbidity and improve the outcome of pregnancy.

Keywords: Colour Doppler, USG findings

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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[1-3]By definition, preeclampsia occurs after 20 weeks of gestation. Development of hypertension and proteinuria before the 20th week of gestation suggests underlying renal disease rather than preeclampsia. 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

normal Doppler flow studies have an LR of 0.5[4-6].Hence; under the light of above mentioned data, we planned the present study to establish the role of USG findings and Colour Doppler values for localization of placenta and uterine artery Doppler as predictors of preeclampsia in 18-24 weeks of gestation.

Materials & Methods

The present study was conducted with the aim of establishing the role of USG findings and Colour Doppler values for localization of placenta and uterine artery Doppler as predictors of preeclampsia in 18-24 weeks of gestation. 50 patients were scanned at 18-22 week and were followed up till delivery. The location of the placenta and uterine artery Doppler was determined by ultrasound at 18-22 weeks in all the cases at the time of scan. The end point of the study was the development of preeclampsia and IUGR. Grey scale ultrasound and colour doppler was performed. Any co-relation of radiological findings with clinical and surgical findings will be documented and analysed. All the data were entered in Microsoft excel sheet.

Results

Mean gestational age was 21.8 weeks. In 82 percent of the cases, placenta was of central location while in the remaining 18 percent of the cases, it was of lateral location. Pre-eclampsia was present in 10 percent of the patients. Significant results were obtained while correlating Doppler findings with occurrence of pre-eclampsia.

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testing in the first trimester, the likelihood ratio(LR) for the development of preeclampsia is approximately 5, while those with

Table 1: Distribution of cases according to gestational age

Gestational age (weeks)	Number of cases	Percentage of cases
18	8	16
19	9	18
20	6	12
21	7	14
22	8	16
23	8	16
24	4	8
Total	50	100

Table 2: Distribution of cases according to placental location

Location of placenta	Number of cases	Percentage of cases
Central	41	82
Lateral	9	18
Total	50	100

Table 3: Incidence of Pre-eclampsia

Pre-eclampsia	Number of patients	Percentage of patients
Present	5	10
Absent	45	90
Total	50	100

Table 4: Distribution of patients in relation to Doppler study and occurrence of pre-eclampsia

Pre-eclampsia	Doppler Normal findings	Doppler abnormal findings	Total
Negative	42	3	45
Positive	3	2	5
Total	45	5	50
Chi- square value	51.26		
p- value	0.00 (Significant)		

Discussion

During normal pregnancy, the villous cytotrophoblast invades into the inner third of the myometrium, and spiral arteries lose their endothelium and most of their muscle fibers. These structural modifications are associated with functional alterations, such that spiral arteries become low-resistance vessels, and thus less sensitive, or even insensitive, to vasoconstrictive substances. Pre-eclampsia is a multisystem disorder that complicates 3%–8% of pregnancies in Western countries and constitutes a major source of morbidity and mortality worldwide. Overall, 10%–15% of maternal deaths are directly associated with pre-eclampsia and eclampsia. Some epidemiological findings support the hypothesis of a genetic and immunological etiology. The risk of pre-eclampsia is 2-fold to 5-fold higher in pregnant women with a maternal history of this disorder [7–10]. Hence; under the light of above mentioned data, we planned the present study to establish the role of USG findings and Colour Doppler values for localization of placenta and uterine artery Doppler as predictors of preeclampsia in 18–24 weeks of gestation. In the present study, mean gestational age was 21.8 weeks. In 82 percent of the cases, placenta was of central location while in the remaining 18 percent of the cases, it was of lateral location. Razieh DF et al evaluated the predictive value of Doppler investigations of the uterine circulations during 14–16 weeks of gestation with regard to the development of preeclampsia and/or IUGR in study population. This prospective observational study was carried out at university hospital. All 456 pregnant women referred to hospital from October 2011 to October 2012, ultrasound sonography was done at 14–16 weeks of gestation. In all Doppler measurements, the mean peak systolic (S) to end-diastolic (D) ratio of 3–5 cardiac cycle was computed by electronic capilers and the RI calculated as (S-D/S). A total of 456 pregnant women with mean age of 26.8±5.3 years were recruited during the study. The uterine artery RI at 14–16 weeks was significantly higher in 27 women subsequently developed preeclampsia (mean RI=0.7526±0.039) than in 429 pregnancy with a normal outcomes (mean RI=0.6440±0.059, P=0.001). The uterine artery RI also was significantly higher in 36 women developed IUGR (RI=0.7244±0.04730) compared with 420 women with normal

pregnancies (RI=0.6505±0.06043, P=0.001). RI=0.69 to predict preeclampsia and RI=0.7 to predict IUGR as mentioned are optional cut-off value for RI of the uterine artery in their study which were congruent with other studies [11]. In the present study, Pre-eclampsia was present in 10 percent of the patients. Significant results were obtained while correlating Doppler findings with occurrence of pre-eclampsia. Woschitz MC et al evaluated the prognostic role of uterine artery Doppler for pre-eclampsia in high-risk patients. Because of the higher prevalence of new onset of disease in a high-risk population, a better performance could be expected in this special group. This retrospective study compares uterine artery Doppler to predict pre-eclampsia in patients with a history of pre-eclampsia and also in patients with chronic hypertension, both with high-risk to develop recurrent, superimposed or new onset pre-eclampsia. Doppler measurements of uterine arteries were performed every 4 weeks in the 1st and 2nd trimester. Pre-eclampsia occurred in 33% of current high-risk pregnancies. The best performance of pre-eclampsia was provided by bilateral notching plus increased PI ≥ 2.5, both in the 1st and 2nd trimester. In the 1st trimester the specificity was 81% (95% CI: 58–95) in the Prior PE group and 95% (95% CI: 74–100) in the C. H. group. In the 2nd trimester the sensitivity was 97% (95% CI: 86–100) in the Prior PE group and 100% (95% CI: 93–100) in the C. H. group. Sensitivity was very low in the 1st and 2nd trimester. Their results showed, that the negative predictive value of uterine artery Doppler works well even in a high risk group [12].

Conclusion

By recognising the high risk patients & anticipating preeclampsia patients can be supervised more closely to reduce the morbidity and improve the outcome of pregnancy.

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