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RESEARCH ARTICLE

PLACENTAL LATERALITY DETECTED BY USG AS PREDICTOR FOR THE DEVELOPMENT OF PREECLAMPSIA

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ABSTRACT

Objective: To find out whether placental laterality as determined by ultrasound can be used as a predictor for development of preeclampsia.
Methods: In this prospective study, a total of 200 singleton pregnant women attending the antenatal clinic were included. The location of the placenta was determined by ultrasound at 20-24 weeks of gestation. These 200 pts were divided into two groups with group A (100) having lateral placenta and group B (100) having central placenta. The location of the placenta was determined by ultrasound at 20-24 weeks of gestation. These patients were followed till term. The end point of the study was the development of the preeclampsia as per the ACOG criteria.
Results: Total of 200 patients were taken and allotted into two groups with group A comprising 100 patients with lateral placenta and group B of 100 patients with central placenta. Out of 100 patients with lateral placenta 39(39%) developed preeclampsia compared to 11% in patients with central placenta. This relationship was statistically significant (p value <0.005). The sensitivity and specificity of using placental laterality asscreeningtest were 78% and 59.33% respectively.
Conclusion: Placental laterality as determined by ultrasound at 20-24 weeks; is a simple yet reliable and cost effective screening test for prediction of development of preeclampsia.

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INTRODUCTION

The significance of placental localization in the uterine cavity has been studied extensively. Placental localization has been found to correlate with fetal position and presentation (Kian, 1963; Hoogland and deHaan, 1980), length of gestation (Harris, 1975), course of labour (Davydov *et al*., 1987), development of preeclampsia (Booth *et al*., 1962; Little and Friedman, 1964) and pregnancy outcome. Various methods have been used to localize placenta including manual exploration of the uterus, soft tissue x-ray and isotope placentography (Kian, 1963; Vrettos *et al.,* 1965; Townsend De and Swanson, 1969). In the last two decades USG has proved to be safest, easiest and more accurate method of detecting placental localization (Hoogland *et al.,* 1980). When 75% or more of placental mass was to one side of the midline, it was classified as unilateral right or left placenta. Exact etiology of preeclampsia is not known. The poorly perfused placenta may be the origin of various factors that gain access to maternal circulation and cause endothelial cell dysfunction. It is thought that decreased placental perfusion in preeclampsia is due to result from failure of the trophoblast to invade maternal spiral arteries (Walker, 1988). So if abnormal placentation is the fundamental cause of preeclampsia, its abnormalities can be used as screening test for development of preeclampsia simply by a non-invasive test.

It has been shown that there is significant association between lateral placenta and uterine artery resistance. It is possible that lateral placenta may disturb distribution of uterine artery blood flow and invasion of trophoblast into spiral arteries (Kofinas *et al.,* 1989).

Aims and Objective

To find out whether placental laterality determined by USG, can be used as a predictor for development of preeclampsia.

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MATERIALS AND METHODS

This study was conducted in the Department of Obstetrics and Gynaecology Govt. Medical College Srinagar over a period of one year from Feb 2013-Feb 2014. In this prospective study, a total of 200 singleton pregnant women attending the antenatal clinic were included after consent and counselling and willing for follow-up. At 20-24 weeks of gestation ultrasound was done for localisation of placenta. Group A comprising of 100 patients with lateral placenta (Study group) and Group B comprising of 100 patients (Control group) with central placenta were taken for the study.

Inclusion criteria

- Pregnant women with 20-24 weeks of gestation with singleton pregnancy and ready for follow-up.

Exclusion criteria

- Pregnant women less than 20 weeks of gestation.
- Pregnant women with chronic hypertension, multifetal pregnancy, uterine anomalies.
- Patient not willing for follow-up.

A detailed demographic history, obstetric history, history of hypertension, intrauterine death, and gestational diabetes mellitus were taken. General physical examination including weight, BP was done. Detailed obstetric examination was done. USG was done in all patients. The placenta was classified as central when it was equally distributed between the right and left side of the uterus irrespective of anterior, posterior or fundal position. When 75% or more of placental mass was to one side of the midline, it was classified as unilateral right or left placenta. These patients were observed till term for the development of preeclampsia as per the ACOG criteria.

Observations

The maternal characteristics like age, gravidity, and parity were compared in groups with centrally and laterally located placenta as shown in Table 1.

Table 1. The various characteristics

Characteristics	Group A	Group B	P value
Age (Years)	28±3.6	27.4±4.2	0.07
Nullipara	42	39	
Primipara	27	31	0.817
Multipara	31	30	

While recruiting there was no bias on low risk and high risk groups but at the end of the study we found 38 women with high risk factors in group A and 29 women with high risk factors in group B. The various risk factors were pregnancy with IUGR, Gestational diabetes mellitus, previous history of preeclampsia.

Table 2. Risk scoring

Characteristics	Group A	Group B	P value
Low Risk	62	71	
High risk	38	29	0.231

Table 3. Placental position and development of preeclampsia

Placental position	Development of Preeclampsia		P value
	Yes	No	
Lateral	39	61	<0.001
Central	11	89	

As obvious from the table patients with lateral placenta had significantly higher incidence of development of preeclampsia ($p<0.001$).

To see the effect of placental laterality in low risk and high risk groups the data was further analysed and it was found 38 women with high risk factors in group A and 29 women with high risk factors in group B.

Table 4. Placental position and development of preeclampsia in high risk groups

Placental Position	Yes(n)	No(n)	P value
Lateral	27/38	11	<0.001
Central	7/29	22	

Table 5. Placental position and development of preeclampsia in low risk groups

Placental position	Yes(n)	No(n)	P value
Lateral	17/62	45	0.131
Central	11/72	61	

As predicted from Table 4 and 5 placental laterality better predicted development of preeclampsia in high risk women than low risk women and the result is statistically significant(p value<0.001).

Table 6. Sensitivity and Specificity

Sensitivity	Specificity
78%(64.76-87.25)	59.33(51.33-66.87)

As depicted from the Table 6 placental laterality as a screening test for development of preeclampsia has sensitivity of 78%and specificity of 59.33%.

DISCUSSION

Preeclampsia is a complex syndrome involving multiple organs and still remains the main cause of maternal and perinatal mortality and morbidity. The search for an ideal predictive test and preventive measures still remains challenging. It has been shown that in humans both uterine arteries have a significant number of branches and each artery supplies the corresponding side of the uterus. Although anastamosis exists between the uterine arteries, there is no proof that these are functional. When the placenta is laterally located, uterine artery closer to the placenta has lower resistance than of the opposite one. In patients with centrally located placentas both uterine arteries demonstrate similar resistance (Booth *et al.,* 1962). When the placenta is located centrally, the uteroplacental blood flow needs are met by equal contribution from both uterine arteries. However when the placenta is laterally located, in majority of cases the uteroplacental blood flow needs are met primarily by one of the uterine arteries with some contribution from the other one

via the collateral circulation. The degree of collateral circulation may not be similar in all the patients and deficient contribution may facilitate the development of preeclampsia, IUGR or both. The significance of normal placentation for the cytotrophoblastic invasion is high and the cytotrophoblasts fail to adopt a vascular adhesion phenotype in preeclampsia. This may explain the reduced trophoblastic invasion in laterally situated placenta when the uteroplacental blood flow needs are met mainly by one side uterine artery. In our study, out of total 100 patients with lateral placenta, 39 developed preeclampsia whereas 11 out o 100 patients with central placenta developed preeclampsia (p value <0.005). This result is in accordance with Alpesh Patel *et al.,* 2012. Pai Muralidhar *et al.,* 2000 in their study had significant association of lateral placenta with the development f preeclampsia. In our study placental laterality determined by USG at 20-24 weeks as a screening test for the development of preeclampsia has the sensitivity of 78% and a specificity of 59.33%. This is in accordance with (PaiMuralidhar *et al.,* 2000).

Conclusion

As yet there is no practical, acceptable, and reliable screening test for preeclampsia that has been thoroughly tried and tested. In our study placental laterality has a sensitivity of 78%. Besides, it has a very good specificity 59.33%. Therefore it is a very useful cost effective and easy to perform non invasive test.

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