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RESEARCH ARTICLE

ROLE OF PLACENTAL LOCALIZATION AND UTERINE ARTERY DOPPLER AT 18-24 WEEKS AS PREDICTORS OF PREECLAMPSIA AND IUGR

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ABSTRACT:
INTRODUCTION : Hypertensive disorders in pregnancy continues to be a major cause for maternal and perinatal morbidity and mortality and cause around 15-20% maternal mortality and 20-25% perinatal mortality. Doppler examination of uterine arteries is a non-invasive tool that can be used to indirectly assess trophoblast development and uteroplacental perfusion.AIMS AND OBJECTIVES : To study placental location (lateralization) and uterine artery doppler and its comparison as a predictor of preeclampsia and IUGR. MATERIALS AND METHODOLOGY: The prospective observational study was conducted over a period of 12 months in 200 patients. The location of the placenta and Doppler study was done by measuring PI index between 18-24 weeks of gestation ultrasound at 18-24 weeks. The end point of the study was the development of preeclampsia and IUGR as per the ACOG criteria. RESULTS : The study showed 15 patients developed preeclampsia out of 30 lateral placentations, with chi-square value of 42.71 and p value of 0.000 which is statistically significant compared to preeclampsia incidence in central placentation and a significant association between abnormal Doppler study and development of preeclampsia, 61.54% patients with preeclampsia had abnormal Doppler study with a chisquare value of 32.29, p value of 0.00 CONCLUSION: The incidence of preeclampsia was higher in patients with lateral placentas with abnormal doppler study than central.
KEY WORDS : Placental localisation, uterine artery Doppler, PI index, Preeclampsia, IUGR.

INTRODUCTION:

Hypertensive disorders remain the most common medical complications during pregnancy and continues to be a major cause for maternal and perinatal morbidity and mortality and cause around 15-20% maternal mortality and 20-25% perinatal mortality.

Uterus receives most of the blood supply from uterine arteries- a branch of internal iliac artery. During pregnancy, the uterine site of placental implantation may be an important determinant of placental blood flow. Noninvasive doppler studies of uterine artery in second trimester reveal abnormal waveforms suggestive of defective uterine perfusion due to placental implantation when one artery is the dominant supply of the intervillous flow[1,2].

Doppler examination of uterine arteries is a non-invasive tool that can be used to indirectly assess trophoblast development and uteroplacental perfusion. Studies have been performed to assess the validity of uterine artery doppler examination as a screening tool for preeclampsia[3,4,5,6].

Studies in pregnancies with established preeclampsia or fetal growth restriction have shown that impedance of blood flow in uterine arteries is increased[7,8,9].

This has led to the idea of using doppler ultrasonography to assess the velocity of uterine artery blood flow as part of routine ultrasound screening which is measured as - Pulsatility index : Peak systolic flow minus end diastolic flow divided by mean flow: (A — B)/M.

AIMS AND OBJECTIVES :

1. To study placental location (lateralization) as a predictor of preeclampsia and IUGR.
2. To study uterine artery doppler as a predictor of preeclampsia and IUGR.
3. To compare lateral placentation and uterine artery doppler as predictors of preeclampsia and IUGR.

MATERIALS AND METHODS :

The prospective observational study was conducted at Public Health Centre, West Mambalam, Chennai (Obstetrics and Gynaecology Department) for a period of 12 months from December 2013 to November 2014. First 200 patients getting scan done at 18-24 week and whom we followed up till delivery.

The location of the placenta was determined by ultrasound at 18-24 weeks in all the 200 cases at the time of anomaly scan. The placenta was classified as central when it was equally distributed between the right and the left side of the uterus irrespective of anterior, posterior or fundal position. When 75% or more of the placental mass is to one side of the midline, it was classified as lateral placentation. After which all the patients were subjected to uterine artery doppler between 18 – 24 weeks of gestation.

Doppler study was done by measuring PI index between 18-24 weeks of gestation and was taken abnormal when the values were more than 95th percentile.

The end point of the study was the development of preeclampsia and IUGR as per the ACOG criteria. Birth weight < 10th percentile was taken as IUGR.

STATISTICAL METHODS :

Data analysis was done using SPSS software (Original **S**tatistical **P**ackage for the **S**ocial **S**ciences later modified to read **S**tatistical **P**roduct & **S**ervice **S**olution). Chi-square test was done to find out any significant statistical relation between the variables. In the above statistical tool the probability value **p<0.005** was considered to be significant.

RESULTS :

Majority of the patients were in the age group of 21-25 years, 61% of the study population. Both primigravida and multigravida were almost equally distributed in the study population, 51.50% and 48.50% respectively.

The study population had 15% of lateral placentation and 85% of central placentation. The present study showed 20% of population had abnormal doppler and 80% had normal doppler study. The incidence of preeclampsia in the study population was 13%, of which 7.50% mild and 5.50% severe preeclampsia respectively. The study population showed higher incidence of mild The study showed maximum number of patients developed preeclampsia between 35-40 weeks of gestation 53.85%.preeclampsia 57.69% in comparison to severe preeclampsia 42.31%.

The incidence of IUGR in the study population was 10%.

The present study showed 15 patients developed preeclampsia out of 30 lateral placentations, with chi-square value of 42.71 and p value of 0.000 which is statistically significant compared to preeclampsia incidence in central placentation (table 1).

Table 1. Distribution of placental location and preeclampsia:

Location of Placenta	**Preeclampsia**			
	Negative		**Positive**	
	N	**%**	**N**	**%**
Central	159	91.40	11	42.30
Lateral	15	8.60	15	57.70
Total	174	100	26	100
Chi-square	42.71			
p-value	0.000			
Significant	Significant			

The percentage of IUGR in central and lateral placentation were 85% and 15% respectively with chi-square value of 0.01 and p value 1.00 which is statistically not significant.
The present study showed a significant association between abnormal doppler study and development of preeclampsia, 61.54% patients with preeclampsia had abnormal doppler study with a chi-square value of 32.29, p value of 0.00 which is statistically significant.
The present study showed incidence of abnormal doppler in lateral placentation was 65.00% which is statistically significant compared to 35% in central placentation with chi-square 98.04 and p value 0.000.

Table 2. Distribution of patients with respect to placental location, doppler study and occurrence of preeclampsia:

Preeclampsia	**Placenta**							
	Central				**Lateral**			
	Doppler				**Doppler**			
	Normal		**Abnormal**		**Normal**		**Abnormal**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Negative	150	96.15	9	64.29	0	0	15	57.69
Positive	6	3.85	5	35.71	4	100	11	42.31
Total	156	100	14	100	4	100	26	100
Chi-square	21.56				4.62			
p-value	0.001				0.03			
Significant	Significant				Significant			

Table 3. Distribution of patients with respect to placental location, doppler study and occurrence of IUGR:

IUGR	Placenta							
	Central				Lateral			
	Doppler							
	Normal		Abnormal		Normal		Abnormal	
	N	%	N	%	N	%	N	%
Negative	13	8.33	4	28.57	0	0	3	11.54
Positive	143	91.67	10	71.43	4	100	23	88.46
Total	156	100	14	100	4	100	26	100
Chi-square	5.85				0.51			
p-value	0.02				0.47			
Significant	Significant				Not Significant			

The present study showed total 20 patients had low placental weight of which 17 patients had lateral placenta and 3 patients had central placenta which is statistically not significant.
The study showed, out of 20 patients with low placental weight, 7 patients had abnormal doppler study.

DISCUSSION :

In our study the incidence of lateral placentation was 15% which is comparable to the study done by Karthika Devarajan et al[10] who had the incidence as 16.5%.
The comparison of distribution of patients with respect to placental localization and occurrence of preeclampsia with other studies see table 4:

Preeclampsia	Present study		Kakkar Tania et al	
	Central	Lateral	Central	Lateral
Present	11(42.3%)	15(57.7%)	24(36.3%)	56(66.6%)
Absent	159(91.4%)	15(8.6%)	42(63.6%)	28(33.3%)

The incidence of IUGR in the present study population was 10% which was equally distributed among both study and control group which is comparable to the study done by Karthika Devarajan et al[10] who had incidence of IUGR as 10.9% and 9% in central and lateral placenta respectively.
In the present study 40 patients had abnormal doppler study of which 16 (40%) developed preeclampsia which is statistically significant and is comparable with study done by Yong won park et al 23 48% and albaiges g et al[5] 35.5%. Bhattacharyya Sanjoy Kumar et al[12] showed as high as 58% incidence of preeclampsia with abnormal doppler study.
The study shows a significant higher incidence of preeclampsia in lateral placentation with abnormal doppler study 93.75% which is in comparison with the study done by Dr Alpesh patel et al[11] which shows 84.61% (table 5).

Table 5: Distribution of patients with respect to abnormal uterine artery doppler and occurrence of preeclampsia in patients with laterally situated placenta:

	Preeclampsia positive	Abnormal Doppler study	
		Yes	No
Present study	16	15 (93.75%)	1
Dr Alpesh patel et al	13	11 (84.61%)	2

The study showed no significant relation between placental weight and preeclampsia which is in comparison with Eskild A et al[13] who concluded saying placental weight is not clearly associated with pre-eclampsia risk, suggesting that placental weight is not a useful indicator for the placental dysfunction in preeclampsia.

Hence we recommend, One step screening for placental location and uterine artery doppler study to be carried out along with anomaly scan at 18-24 weeks to classify women in to high risk category for developing preeclampsia.

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

The patients with lateral placentation and abnormal doppler study at 18-24 weeks can be started with prophylactic low dose aspirin to reduce the severity of preeclampsia.

CONCLUSION : The incidence of preeclampsia was significantly higher in patients with lateral placentation. The incidence of preeclampsia was significantly higher in patients with abnormal doppler study. The incidence of abnormal doppler study was higher in lateral placentation than central placentation. The incidence of preeclampsia was higher in patients with lateral placentas with abnormal doppler study than central lateral placentas with abnormal doppler study. There was no significant increase in incidence of IUGR either in lateral placentation or with abnormal doppler study.

REFERENCES :

1. Fleischer A, Schulman H, Farmakidis G, et al. Uterine artery Doppler velocimetry in pregnant women with hypertension. AM.J Obstet Gynaecol 1986:154:806-813.
2. Schulman H. Winter D, Farmakides G, et al. Pregnancy surveillance with Doppler velocimetry of uterine and umbilical arteries. AM J Obstet Gynaecol 1989:160:192- 196.
3. Campbell, S., J.M.F. Pearce, G. Hackett, T. Cohen Overbeek and C.Hernandez, 1986. Qualitative assessment of uteroplacental blood flow: Early screening test for high- risk pregnancies. Obstet Gynecol., 68: 649-53.
4. Prefumo, F., N.J. Sebire and B. Thilaganathan, 2004. Decreased endovascular trophoblast invasion in first trimester pregnancies with high-resistance uterine artery Doppler indices. Hum Reprod., 19: 206-209.
5. Albaiges, G., H. Missfelder-Lobos, C. Lees, M. Parra and K.H. Nico-laides, 2000. One stage screening for pregnancy complications by color Doppler assessment of the uterine arteries at 23 weeks'gestation. Obstet Gynecol., 96: 559- 564.
6. Papageorghiou, A.T., C.K. Yu, R. Bindra, G. Pandis and K.H. Nicolaides, 2001. Multicenter screening for pre-eclampsia and fetal growth restriction by transvaginal uterine artery Doppler at 23 weeks of gestation. Ultrasound Obstet Gynecol., 18: 441-449.
7. Graffin D. Cohen-Overbeek T, Campbell S. Fetal and uteroplacental blood flow. Clinical Obstetrics and Gynaecology 1983:10:565-602

8. Ducey J. Schulman H, Farmakides G, et al. A classification of hypertension on pregnancy based on Doppler velocimetry . Am J Obstet Gynaecol 1987:157:680-85.
9. Trudinger BJ, Giles WB, Cook CM. Uteroplacental blood flow velocity-time waveforms in normal and complicated pregnancy. Br J Obstet Gynaecol 1895:92:39-45.
10. Karthika Devarajan, MD, sari Kives, MD, MSc, FRCSC, Joel G. Ray, MD, MSc, FRCPC; Placental location and Newborn Weight J Obstet Gynaecol Can 2012;34(4) 325- 329.
11. Dr. Alpesh Patel, Dr. Suchitha dabhadkar, Dr, Vaishali Taralekhar, Dr. Girija Wagh; Placental Laterality and Uterine Artery Resistance for Prediction of Preeclampsia Indian journal Of Applied Research; November 2012 Volume : 2, Issue : 2 .
12. Sanjoy Kumar Bhattacharyya, Sarmila Kundu and Sankar Prasad Kabiraj. Prediction of Preeclampsia by Midtrimester Uterine Artery Doppler Velocimetry in High-Risk and Low- Risk Women. J Obstet Gynaecol India; Jun 2012; 62(3): 297–300.
13. Eskild A, Vatten LJ. Do pregnancies with preeclampsia have smaller placentas? A population study of 317688 pregnancies with and without growth restriction in the offspring. BJOG. 2010 Nov;117(12):1521-6. doi: 10.1111/j.1471-0528.2010.02701.x. Epub 2010 Sep 14.