

A Prospective Study to Assess Placental Location by Ultrasonography at 18-24 Weeks of Pregnancy and its Relationship with Development of Hypertensive Disease of Pregnancy

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ABSTRACT

Background: Preeclampsia is best described as a pregnancy specific syndrome that can affect virtually every organ system. In this light of these observations we designed a prospective study to find out whether the lateral location of placenta as seen by ultrasound at 18-24 week of gestation can be used to predict the development of preeclampsia. The aim of our study is whether we can use the location of placenta sonographically as a screening tool for preeclampsia and IUGR, as it is the cost-effective, non-invasive and safe method.

Materials & Methods: A hospital based prospective study done on 80 pregnant woman who attended antenatal outdoor at 18 to 24 week of gestation in Department of Obstetrics and Gynecology, S.M.S. Medical College and Associated Group of Hospitals, Jaipur. . A total of 80 cases were studied, till we get 40 cases in each group and were followed till delivery. GROUP A (Lateral placenta): Patients is classified lateral if equal to more than 75% of placenta was found on one side of midline. & GROUP B (Central placenta): Placenta was classified as central, if between the right and left side of uterus, irrespective of being anterior, posterior or fundal.

Results: Our study showed that the maximum cases are found in age group 21-25 years in both groups. Out of 40 cases only one case was found to develop eclampsia in group A whereas

no such case was found in group B. The distribution of cases according to the Apgar score 25.00% in group A had Apgar <7 as compared to 12.50% in group B, although p value was not significant.

Conclusion: We concluded that detection of placental site during routine ultrasonography is very simple, doesn't need an expert radiologist and can be done even by obstetrician.

Keywords: Pre-eclampsia, Pregnant women, Placenta, Doppler Ultrasonography.


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INTRODUCTION

Hypertensive disorders of pregnancy represent the most common medical complications of pregnancies. It complicates 5-10 percent of all pregnancies and together they are one of the deadly triad along with hemorrhage and infection that contribute greatly to maternal morbidity and mortality. New onset hypertension during pregnancy termed gestational hypertension is followed by signs and symptoms of preeclampsia is identified in 4-5 % of all pregnancies.¹

World Health Organization (WHO) systematically reviews maternal mortality worldwide and in developed countries 16% of maternal death were attributed to hypertensive Disorders.² Conditions like gestational hypertension, preeclampsia, eclampsia majority of these conditions are preventable. This has led to the interest in screening. Screening the deliberate examination of substantial segments of the population in search for disease at its

earlier stage, is a logical extension of the role of preventing medicine. Preeclampsia is best described as a pregnancy specific syndrome that can affect virtually every organ system. It is a multisystem disorder characterized by high blood pressure and significant proteinuria in the urine of a pregnant woman. There is a significant association between placental location, uterine artery resistance and adverse outcome of pregnancy such as preeclampsia and IUGR. When the placenta is located laterally to the uterine artery, the artery close to placenta has lower resistance than the one opposite to it. In laterally located placenta the uteroplacental blood flow needs are primarily met by one of the uterine artery with some contribution by other uterine artery and the collaterals. The degree of collateralization may not be same in all women and this deficient contribution facilitates the development of preeclampsia and IUGR or both.

The development of Doppler ultrasound in the 1960's was a major breakthrough replacing angiography as the only available method to study circulatory changes. In 1983, when Campbell et al^{1,3} first used Doppler to assess the uteroplacental circulation, he found that the impedance of flow in the uterine arteries decrease with gestation in normal pregnancies (reflecting the trophoblastic invasion of the spiral arteries). In contrast it was noted that in preeclampsia the uteroplacental circulation had high resistance. Multiple studies have since shown that Doppler may be useful in identifying pregnancies at increased risk for impaired placentation.⁴ The majority of studies have focused on "high risk" populations although some had a broader approach. A high risk patient with abnormal uterine artery Doppler study has a six fold higher likelihood of developing preeclampsia than a patient with normal Doppler⁵. The effectiveness of uterine artery Doppler in a low risk population has a poor to moderate predictive value.⁶ In this light of these observations we designed a prospective study to find out whether the lateral location of placenta as seen by ultrasound at 18-24 week of gestation can be used to predict the development of preeclampsia. The aim of our study is whether we can use the location of placenta sonographically as a screening tool for preeclampsia and IUGR, as it is the cost-effective, non-invasive and safe method.

MATERIALS & METHODS

A hospital based prospective study done on 80 pregnant woman who attended antenatal outdoor at 18 to 24 week of gestation in Department of Obstetrics and Gynecology, S.M.S. Medical College and Associated Group of Hospitals, Jaipur

Inclusion Criteria: Pregnant Women at 18-24 Week of Gestation

- With singleton pregnancy.
- Attending antenatal clinics at 18 to 24 weeks of gestation.
- Normotensive pregnant women.
- Patient giving consent for study.

Exclusion Criteria

- Pregnant women having uterine abnormalities.
- Pregnant women with diabetes, hypertension, renal disease, collagen vascular disease.
- History of smoking.
- non cooperative patient

Methods

Pregnant women who attended antenatal outdoor and ready for follow up will be enrolled in the study. All antenatal patients were assessed in study until we got 40 cases with lateral and 40 cases with central placenta and they were also be available for follow up. These 80 cases were enrolled in the study.

All the pregnant women who attended antenatal outdoor were studied. A complete history was taken regarding previous pregnancy and present pregnancy as well. At first visit detailed history was taken regarding age, parity, residence, socioeconomic status, past obstetrical history, LMP, EDD, past and present medical history (history of hypertension, diabetes, preeclampsia, antepartum hemorrhage).

General physical examination was done to note pallor, pedal edema, weight and blood pressure. Arterial BP was measured by sphygmomanometer in sitting position by placing cuff on right arm. Per abdominal examination was done to record fundal height, lie, presentation and fetal heart sound. Symphysio fundal height was also be noted. Patients were called at monthly interval till 28 weeks, every fortnight till 37 weeks and weekly till 40 weeks.

Blood investigations, complete blood count, liver function test, renal function test and urine albumin levels were done at time of first visit, at term and whenever clinically indicated. USG was done in all the pregnant women of gestational age 18 -24 weeks attending ANC clinic and were divided into two groups depending on the site of placental location.

A total of 80 cases were studied, till we get 40 cases in each group and were followed till delivery.

Group A (Lateral placenta)

Patients is classified lateral if equal to more than 75% of placenta was found on one side of midline.

Group B (Central placenta)

Placenta was classified as central, if between the right and left side of uterus, irrespective of being anterior, posterior or fundal.

All women within both the groups, were followed to see the development of maternal complications like preeclampsia, eclampsia, APH, IUGR, preterm deliveries and outcome of pregnancy in terms of mode of delivery, any complications during labour, and neonatal outcome in terms of birth weight, Apgar score, still birth and intrauterine deaths.

Table 1: Distribution of cases according to Age

Age Group (in years)	Group A		Group B	
	No.	%	No.	%
≤20	6	15.00	3	7.50
21-25	29	72.50	25	62.50
26-30	4	10.00	9	22.50
>30	1	2.50	3	7.50
Total	40	100.00	40	100.00
Mean±SD	23.15±2.51		23.80±3.15	

Chi-square = 4.219 with 3 degrees of freedom; p = 0.320

Table 2: Distribution of cases according to color Doppler in third trimester on the basis of uterine artery indices

Color Doppler	Group A		Group B		p value	Significance
	Mean	SD	Mean	SD		
RI	0.85	0.41	0.55	0.06	p<0.001	S
PI	1.18	0.37	0.88	0.27	p<0.001	S
S/D	3.10	0.61	2.77	0.09	p<0.001	S

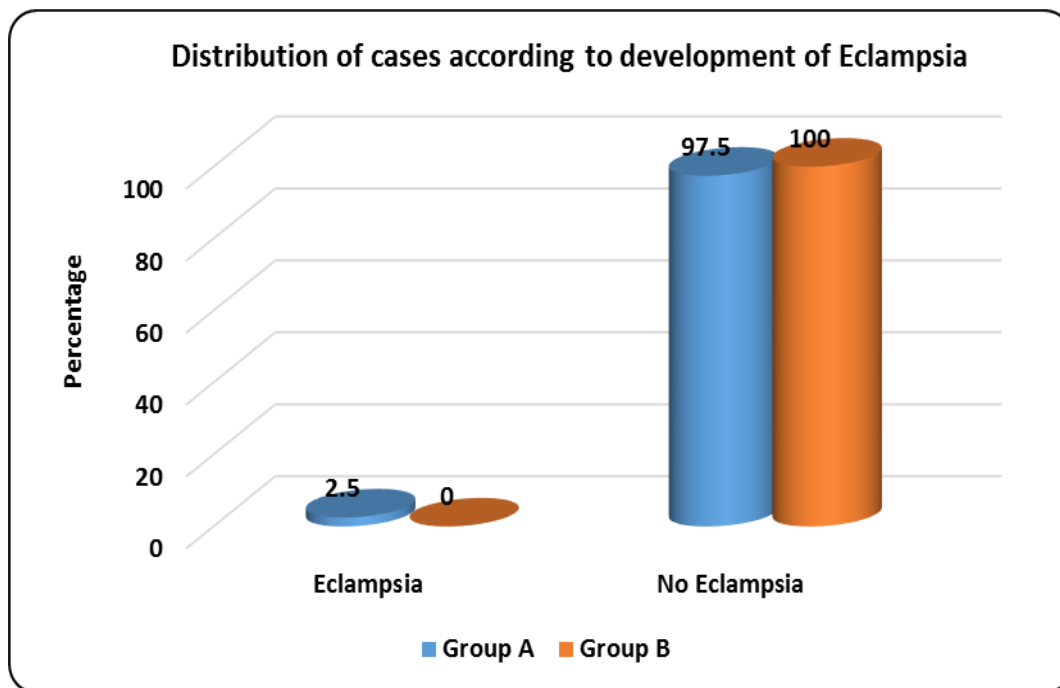


Table 3: Distribution of cases according to Development of IUGR

IUGR	Group A						Group B					
	No.	%	Color Doppler				No.	%	Color Doppler			
			Abn		N				Abn		N	
			no	%	no	%			no	%	no	%
IUGR	7	17.50	6	15	1	2.5	6	15.00	4	10	2	5
Normal	33	82.50	-	-	-	-	34	85.00	-	-	-	-
Total	40	100.00					40	100.00				

Chi-square = 0.000 with 1 degree of freedom; p = 1.000

Table 4: Distribution of cases according to Mode of Delivery

Mode of Delivery	Group A		Group B	
	No.	%	No.	%
LSCS	12	30.00	10	25.00
Vaginal	28	70.00	30	75.00
Total	40	100.00	40	100.00

Chi-square = 0.000 with 1 degree of freedom; p = 0.001

Table 5: Distribution of cases according to foetal outcome

Foetal outcome	Group A		Group B		
	No.	%	No.	%	
Alive	NICU admission	8	20	3	7.50
	Mother side	28	70	36	90.00
IUD	3	7.50	1	2.50	
SB	1	2.50	0	0.00	
Total	40	100.00	40	100.00	

Chi-square = 2.120 with 2 degrees of freedom; p = 0.346

Table 6: Distribution of cases according to neonatal outcome on the basis of Apgar Score

Apgar Score	Group A		Group B	
	No.	%	No.	%
≥7	26	65.00	34	87.50
<7	10	25.00	5	12.50
Total	36		38	

Chi-square = 1.624 with 1 degree of freedom; p = 0.203

RESULTS

Our study showed that the maximum cases are found in age group 21-25 years in both groups (table 1). The mean value of RI is more in group A (0.85) as compared to group B (0.55) and p value is significant & the mean value of PI in group A is 1.18 and 0.88 in group B 0.88 and the difference is statistically significant. Similarly mean value of S/D ratio in group A is 3.10 while in Group B it is 2.77 which is also significant (table 2).

Out of 40 cases only one case was found to develop eclampsia in group A whereas no such case was found in group B. It shows the antenatal care helps to avoid development of severe complication of pregnancy induced hypertension (graph 1).

The incidence of IUGR was more in group A (17.5%) than group B (15%), though the p value is statistically insignificant. Colour Doppler changes were also seen in most of the IUGR cases in both the groups (table3). The number of caesarean section was more in group A as compared to group B. P value is significant(0.001) (table 4).

Our study showed that the no. of live issues were higher in group B (97.50%) as compared to Group A (90%). Number of NICU admission is higher in group A (20%) as compared to group B. Number of IUD and SB is higher in group A (10%) (table 5).

The distribution of cases according to the Apgar score 25.00% in group A had Apgar <7 as compared to 12.50% in group B, although p value was not significant (table 6).

DISCUSSION

Hypertensive disease of pregnancy (HDP) continues to be a major obstetrics problem in present day health care practice. It affects not only maternal health but also puts fetal development at risk.

In our study the mean age of cases was 23.15+/-2.51 years in group A and 23.80+/-3.15 years in group B. Both groups were comparable. Most of the patients were in age group 20-25 years in both the groups similar to previous studies.⁷⁻¹²

USG color Doppler was used to correlate the location of placenta with development of uterine artery resistance and higher values of RI and S/D ratio to signify it. The mean value of RI in group A was 0.85 and was 0.55 in group B. The difference was significant. Mean S/D ratio was 3.07 in group A and 2.77 in group B, difference was significant. Same was noticed in levels of PI as well, difference was significant (p>0.05), same as previous study.¹³⁻¹⁶ The number of cases who developed APH were more in group A(20%) as compared to group B(5%), but difference was not statistically significant (p>0.05).¹⁷⁻¹⁹ The reason might be that ours was prospective and small study whereas others was retrospective.

A correlation was found between development of IUGR and laterally located placenta. Number of IUGR babies were more in group A (17.50%) compared to group B (15%). Studies which have been conducted previously found same association.^{11,13,17,18,20-22} When placenta is placed laterally the main supply is only maintained by unilateral uterine artery and decreased supply to contralateral uterine artery leads to more chances of growth retardation in fetus.

In this study, induction was more common in group A (27%) than group B(16%). Indication of Induction was HDP and IUGR. So chances of development of both IUGR as well as preterm deliveries were more in group A, similar to previous studies conducted.^{15,23}

Number of caesarean sections were more in group A (30%) than group B(25%). Number of caesarean section done for non-reassuring foetal heart rate were more in Group A (40%) than Group B (30%).

No. of elective caesareans were also more in group A (25%) than group B (8%) due abnormal color Doppler waveforms and were designated to be IUGR, to reduce foetal mortality and morbidity and to handover a healthy baby. In lateral located placenta, the blood supply is met by unilateral uterine artery, so the required amount of blood and oxygen does not reach the foetus leading to foetal distress.¹⁹

Third stage complications like postpartum haemorrhage is more in group A (10%) than group B(2.5%).⁸

The foetal outcome was better in group B (97.50% live birth) than group A (90% live birth). Though statistical not significant. In previous studies the difference was more (live birth 78%). The reason could be good antenatal and intrapartum care in our set up which is tertiary centre.¹⁷ Number of NICU admissions were more in Group A (20%) than Group B (8%).

In the group A 10% had Apgar zero, 25% had Apgar <7, & remaining 65% had good Apgar score >7. In the group B 2.5% had Apgar zero, 12.50% had Apgar <7, & remaining 87.50% had good Apgar score >7.^{19,22}

More cases of foetal distress were reported in group A due to compromised blood flow maintained by single uterine artery, chances of birth asphyxia was also more in group A leading to low Apgar score. This indicates that if placenta is located laterally chances of low birth weight and poor neonatal outcome increases as reported by other studies^{19,22,24} conducted before.

CONCLUSION

We concluded that detection of placental site during routine ultrasonography is very simple, doesn't need an expert radiologist and can be done even by obstetrician. In spite of that if any antenatal complications develops, patient can be referred to higher centre which have caesarean section and color Doppler facility along with NICU set up. Our study is small; large multicentric studies are required for endorsement of our suggestions.

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