



LATERAL LOCATION OF PLACENTA AND ITS CORRELATION IN PREGNACY INDUCED HYPERTENSION

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ABSTRACT

Patients who develop Pregnancy Induced Hypertension (PIH) have placentation abnormality as the initial event. The musculo-elastic media of the spiral arteries in the myometrium are retained due to the failure of secondary trophoblastic invasion which leads to decreased choriodecidual blood flow and establishment of relative ischemia in the placental bed. This causes an imbalance in the levels of antioxidants and oxidants. **Objectives:** To find out whether placental laterality, as determined by ultrasound, can be used as a predictor of development of pre-eclampsia. **Methodology:** Case Control Study for 200 patients was done for 1 year duration from June 2015 to May 2016. All patients attending AVBRH OPD of OBS AND GYN at Sawangi, fitting into the inclusion criteria, with written, informed and valid consent were included in the research. Placental location via ultrasound was studied from 20-24 weeks of gestation and the patients were closely followed up. Patients who developed PIH, were analysed for the association with placental lateralisation. **Results:** Out of 200 antenatal patients, 100 patients developed preeclampsia in 2nd trimester. Out of these 100 preeclampsia patients, 4(4%) had unilateral location of placenta and 48(48%) had central and 48(48%) had fundal placenta. **Conclusion:** No significant association between position of placenta and pregnancy induced hypertension could be claimed through our study. Speculations of laterality of placenta being an early predictor of preeclampsia were not to be the case in our set up.

KEYWORDS: placenta, lateralisation, ultrasound, predictor, ischemia, pre-eclampsia.

INTRODUCTION

Placenta is an important topic of research for many anatomists, embryologists and obstetricians, due to its role in the intrauterine development of life.

Placenta is a potent endocrine, immunologic and metabolic organ besides being responsible for the nutrition, respiration and excretion of the foetus.

Placenta and umbilical cord are the essential organs functioning to support growth of foetus and interacts with two individuals - mother and foetus. The placenta and umbilical cord remains connected to the uterus till the baby is out of the womb.

In modern obstetrics, PIH is one of the commonest causes of maternal and foetal morbidity and mortality. Due to some extent, Preeclampsia is postulated as a pathology present in placenta^[1] Non-invasive doppler velocimetric studies of the uterine arteries in the second trimester reveal that abnormal wave forms indicating defective uterine perfusion is primarily a consequence of

placental implantation when one uterine artery is the dominant supply of the intervillous flow.^[2,3] The placenta is located laterally in majority of patients with abnormal flow velocity waveforms.^[3] Patients who develop Pregnancy Induced Hypertension (PIH) have placentation abnormality as the initial event. The musculo-elastic media of the spiral arteries in the myometrium are retained due to the failure of secondary trophoblastic invasion which leads to decreased choriodecidual blood flow and establishment of relative ischemia in the placental bed. This causes an imbalance in the levels of antioxidants and oxidants.

AIMS AND OBJECTIVES

The aim of the study is to evaluate relationship between placental location and occurrence of PIH.

To find out whether placental laterality, as determined by ultrasound, can be used as a predictor of development of pre-eclampsia.

MATERIALS AND METHODS

All patients attending AVBRH OPD of OBS AND GYN, fitting into the inclusion criteria, with written, informed and valid consent were included in the research. Patients with chronic diseases complicating pregnancy, multiple gestation, previous sections and uterine anomalies are to be excluded.

Study Design- Case Control Prospective Study for 200 patient was done for 1 year duration.

Inclusion Criteria

Patients with singleton pregnancy, 100 women with BP $\geq 140/90$ mm of Hg and 100 women with BP $< 140/90$ mmHg.

Patients with previous history of preeclampsia, eclampsia.

Exclusion criteria

Patients with chronic hypertension, patients with multiple gestation, Patients with diabetes mellitus, Patients with uterine anomalies and Patients with previous caesarean section.

RESULTS

In our study, out of the total of 200 women, 41% (82) were in the age group 21-25 years (Table 1) and 58% (116) were in weight group of 56-60 kg (Table 2). This was similar to most of the other studies carried out in the past.^[4,8]

Table 1 – Age Of Study Subjects

Age in years	PIH			
	YES (N=100)		NO(N=100)	
	No(n)	%	No (n)	%
<20	3	3	1	1
21-25	39	39	43	43
26-30	36	36	32	32
31-35	22	22	24	24

Table 2- Weight Of Study Subjects

Weight in kgs	PIH			
	YES(N=100)		NO(N=100)	
	No(n)	%	No (n)	%
<55	9	9	7	7
56-60	56	56	60	60
61-65	15	15	18	18
66-70	17	17	14	14
71-75	3	3	1	1

2.5% (5) had laterally located placenta ($p < 0.05$), while 46.5% (93) had central, 33% (66) had fundoanterior and 18% (36) had fundoposterior placenta on ultrasound examination done in second trimester of gestation (Table 3).

Table 3- Placenta Position

Placenta Position					
Placental position	PIH				P value
	YES(N=100)		NO(N=100)		
	No(n)	%	No (n)	%	
Central	48	48	45	45	>0.05; NS
Fundo-Anterior	29	29	37	37	>0.05; NS
Fundo-Posterior	19	19	17	17	>0.05; NS
Lateral	4	4	1	1	<0.05: S

Out of the 5 women with laterally located placenta, 4 developed PIH, while out of the remaining 195 subjects with central or fundal placenta, 96 developed PIH (table 3). Out of the total 100 PIH subjects 58% (58) developed mild PIH (DBP 90-99 mmHg). Out of these 58, 55 had centrally/fundal located placenta and 3 had laterally

located placenta (table 4 and 5). This showed that no association could be pointed out between the location of placenta and the presence or absence of PIH in contrast to other previous studies in which a majority of PIH patients had laterally located placenta and a majority of normotensive women had central/fundal placenta.^[4,8,9]

Table 4- Distribution According To Severity Of Hypertension in PIH subjects

Severity of hypertension based on DBP(mmHg)	No(n)	%
Mild(90-99)	58	58
Mod(100-109)	40	40
Severe(>110)	2	2

40 women developed moderate PIH (DBP 100-109 mmHg). Out of these 40 cases, 39 had fundal/centrally located and 1 had laterally located placenta (table 5). 2

women developed severe PIH (DBP>110mmHg) and both of them had fundal/centrally located placenta. No cases of eclampsia was reported (table 5).

Table 5- Distribution Of Severity Of PIH Between Different Placental Groups

Severity of HTN based on DBP	Centrally/fundally located(N=96)		Laterally located (N=4)		P value
	No (n)	%	No (n)	%	
Mild	55	57.29	3	75	P<0.05; S
Moderate	39	40.62	1	25	P<0.05; S
Severe	2	2.08	0	0	P<0.05; S

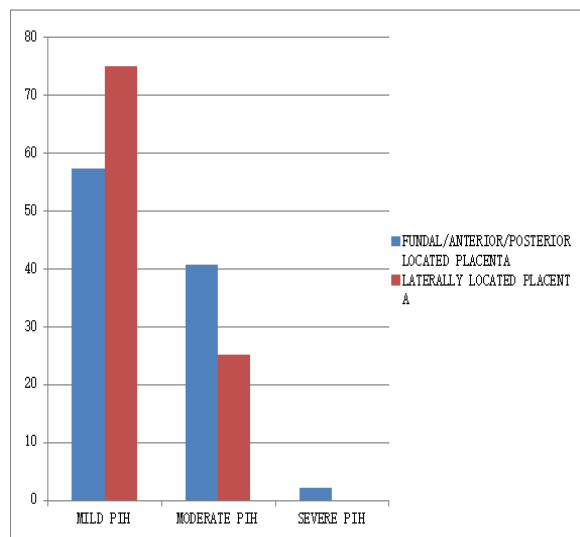


Fig 1- Distribution of Severity of PIH between Centrally and Laterally Placed Placenta

DISCUSSION

The placenta is arguably one of the most studied but least understood organ in the human body according to a recent study carried out in the University of Pennsylvania. We may know its functions but the exact mechanism is still not completely understood. The placenta plays a crucial role during pregnancy. Various factors can affect the health of the placenta during pregnancy, some modifiable and some not; examples being maternal age, premature rupture of the membranes, high blood pressure, twin or other multiple pregnancy, blood-clotting disorders, previous uterine surgery, previous placental problems, substance abuse, abdominal trauma.

A major challenge in modern obstetrics is early identification of pregnancies at high-risk of early onset preeclampsia and undertaking the necessary measures to improve placentation and reduce the prevalence of the disease.

Preeclampsia is the disease of placenta.^[12] The majority of women who develop preeclampsia, are only diagnosed once they have developed the full-blown manifestations of the condition, by which time treatment options are limited. Rather than being a separate condition, preeclampsia has been previously described as the

extreme end of a maternal systemic response engendered by pregnancy itself.^[14] There is substantial evidence showing placentation abnormality as one of the initial events seen in patients who are destined to develop PIH subsequently.^[9, 10]

A detailed ultrasonography for fetal anatomy is now routinely performed on the majority of pregnant women in the western countries and in many other industrialized nations. Besides the evaluation of fetal anatomy, an assessment of the uterine placental implantation site and its relationship to the internal cervical os is noted.

Location of placenta, as potential predictor dates back 1st to Kofinas et al^[4], Pai M et al^[8] and Anuja V Bhalerao et al^[9] in which they all have reported 2-5 times high risk of development of laterally located placenta. So it is the likelihood of abnormal uterine artery waveforms in lateral placentas.^[4,8,9] When placenta is central, there is low resistance in both uterines. When placenta is lateral, the uterine artery close to the placenta has lower resistance than the opposite side. The placental blood flow needs are met with one of the uterine arteries and some contribution from the other side uterine artery via collateral circulation. The degree of collaterals may be deficient facilitating development of preeclampsia and for normal cytotrophoblastic invasion normal placentation is essential.

The study by Shivamurthy et al^[12] states that lateral location of placenta was more common (52%) with gestational age of 16-24 weeks. As gestational age increased, higher incidence of fundal location (52%) was observed. Mean gestational age for fundal location was 25.6 years, which was higher compared to lateral location, with mean age of 24.4 years.

This difference was found to be significant in their study.

In the study carried out by Anuja V Bhalerao et al^[9] a total of pregnant women developed preeclampsia, of whom 73.23% had laterally situated placenta which seemed to be a significant relation ($p<0.05$). This coincided with Pai M et al (73%) and Kofinas et al (74%).

Pai et al^[8], Anuja V Bhalerao et al^[9] Gonser M et al^[13] studies show that women with lateral placenta have a 2.7,

2.8, 3.1 times more risk of developing preeclampsia respectively.

Tania et al^[15] also showed that out of the 84 women with laterally located placenta, 56 (66.6%) developed PIH, while 24 women (36.3%) out of the remaining 66 women with centrally located placenta developed PIH. The risk of developing PIH was five times greater in the females with laterally located placenta as compared to those with centrally located placenta.

Magann et al^[11] study in contrast to the other mentioned studies showed that the risk of developing preeclampsia was not increased in this investigation by the site of placental implantation.

The findings of our study were supported by few other previously conducted studies. Devrajan K et al^[16] found no association between occurrence of preeclampsia and placental location, similar to Liberati et al^[10] and Magann et al.^[11] Contro E et al^[17] also concluded that patients with unilaterally abnormal uterine artery pulsatility, but normal mean PI, do not seem at increased risk for obstetric and perinatal complication, irrespectively of placental location.

CONCLUSION

Though many studies have speculated that the presence of preeclampsia can be predicted early by screening all pregnant women during their second trimester for the location of placenta, our study gives us reason to believe that further research of this relationship to its sensitivity and specificity as a screening tool is the need of the hour.

Although there was 4 fold increase in number of lateral placenta seen in hypertensive women then to normotensive in other studies, our study did not show the results to that extent of already documented few studies wherein, it was approximately 75% higher with lateral placenta. Our study indicates that there is no statistically significant association between laterally located placenta with hypertensive or normotensive women during pregnancy, but further studies must be carried out to either prove the speculations of other studies to be right or wrong, and if proven to be right, those patients would potentially benefit from prophylactic pharmacological interventions to improve placentation.

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