International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2020): 7.803

Placental Laterality as a Predictor for Development of Pre-Eclampsia

Dr. V. Divya[1], Dr. N. Sumathy[2], Dr. R. Vinitha[3], Dr. R. Uma Maheswari[4]

[1]MBBS, DNB OG, MNAMS, Assistant Professor, Department of Obstetrics & Gynaecology, Govt Rajaji Hospital, Madurai, Tamilnadu, India
Corresponding Author Email id: *divs.doctor[at]gmail.com*

[2]MD DGO, Professor, Department of Obstetrics & Gynaecology, Govt Rajaji Hospital, Madurai, Tamilnadu, India

[3]Junior Resident, Department of Obstetrics & Gynaecology, Govt Rajaji Hospital, Madurai, Tamilnadu, India

[4]Junior Resident, Department of Obstetrics & Gynaecology, Govt Rajaji Hospital, Madurai, Tamilnadu, India

Abstract: ***Background:*** ***Pre-eclampsia is one of the important causes of maternal mortality and morbidity. The objective of this study to find whether placental laterality as determined by ultrasound done between 18-24 weeks can be used as a predictor for the development of preeclampsia. Materials and Methods: This prospective study was conducted in Department of obstetrics and gynaecology attached to Madurai medical college, from September 2020-february 2021. One twenty pregnant women attending antenatal clinic both OPD and IP between 18-24 weeks of gestation without any high risk factors were subjected to ultrasound examination as a part of routine antenatal examination and placental location was determined. The women were divided into 2 groups : group A-with central placental location, group B-with lateral placental location. These cases were followed up for the development of preeclampsia. Results: Out of the 120 women studied 40 had central placenta (Group A) and 80 had laterally located placenta (group B). Out of the 80 with laterally located placenta 52 developed PIH. Out of 40 with centrally located placenta only 9 developed PIH. Out of the total 120 cases, 41 developed mild PIH (DBP 90-99mmhg). Of these 41 cases, 9 had centrally located placenta and 32 had laterally located placenta. 8 women developed moderate PIH (DBP 100-109mmhg) and all these have laterally located placenta. 12 women developed severe PIH (DBP≥110mmhg) and all these had laterally located placenta. No cases of eclampsia were reported. Conclusion: Placental laterality determined by ultrasonography at 18-24 weeks is a simple, reliable, cost effective screening test for development of pre-eclampsia.***

Keywords: preeclampsia, placental laterality, predictor ultrasonography

1. Introduction

Pre-eclampsia, is still the most common medical complication of pregnancy. Women with mild and moderate degrees of gestational hypertension can often be treated conservatively and be delivered at or near term with good perinatal outcome. However severe pre-eclampsia developing in late second or early third trimester is associated with a marked increase in perinatal morbidity and mortality.Pre eclampsia is a complex clinical syndrome involving multiple organ systems and still remains the principal cause of maternal and perinatal mortality and mortality. The search for an ideal predictive test and preventive measure remains challenging. In our study, we have made an attempt to analyse efficacy of placental location determined by ultrasonography done at 18-24 weeks in predicting women at risk of developing pre-eclampsia.

2. Methods

This study is conducted at government Rajaji hospital Madurai for a period of 6 months. All pregnant women at 18-24 weeks of gestation without any high risk factors are subjected to detailed history, general physical and systemic as well as obstetric examination at the time of admission. The location of placenta was determined by ultrasound at 18-24weeks in all selected women and followed subsequently for the development of preeclampsia.

The placenta was classified as central when it was equally distributed between the right and the left side of uterus irrespective of anterior, posterior or fundal position (Figure 1). When 75% or more of the placental mass was on the side of the midline, it was classified as unilateral right or left placenta. (Figure 2)

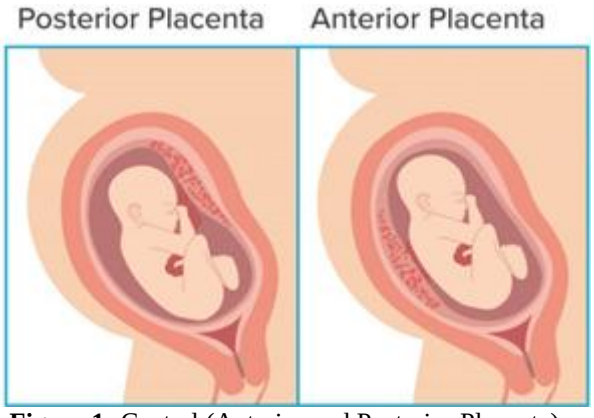

Figure 1: Central (Anterior and Posterior Placenta) - Schematic Diagram and USG Image

All women have to be followed throughout the pregnancy for the development of signs and symptoms of preeclampsia. Preeclampsia was diagnosed on the basis of ACOG criteria for preeclampsia and is defined as new onset hypertension (BP > 140 systolic and/or >90mmhg diastolic) occurring in

pregnant women after 20 weeks of gestation with proteinuria (defined as urinary excretion of > 0.3gm protein in 24 hrs).

Figure 2: Lateral Placenta- USG Image

3. Results

Out of the total 120 women, 43% (52) were in the age group 21-25 years and 43% (52) were in the weight group 56-60 kg

Table 1: Distribution of cases according to age

Age in years	n	%
≤20	21	17.5
21-25	52	43.3
26-30	44	36.6
31-35	3	2.5

Table 2: Distribution of cases according to weight

Weight in kg	n	%
≤55	5	4.16
56-60	52	43.3
61-65	31	25.8
66-70	24	20
71-75	8	6.66

Eighty (80%) cases had laterally located placenta, while forty (40%) cases had centrally located placenta on ultrasound examination done at 18-24 weeks of gestation. Out of the 80 women with laterally located placenta, 52 developed PIH, while 9 women out of the remaining 40 women with centrally located placenta developed PIH.

Table 3: Relationship between placental location & PIH

Placental location	N	PIH	NO PIH	Odds Ratio	95% CI
lateral	80	52	28	6.39	(2.50-10.98)
central	40	9	31		

So the risk of developing PIH was 6.39 times greater in females with laterally located placenta as compared to those with centrally located placenta.

Out of the total 120 cases, 41 developed mild PIH (DBP 90-99mmhg). Out of the 41 cases, 9 had centrally located placenta and 32 had laterally located placenta. 8 women developed moderate PIH (DBP 100-109mmhg) and all these have laterally located placenta. 12 women developed severe PIH (DBP>110mmhg) and all these had laterally located placenta. No cases of eclampsia was reported.

Table 4: Distribution of severity of PIH between different placental groups

Severity of hypertension based on DBP	Centrally located placenta	Laterally located placenta
Mild, n=41	9	32
Moderate, n=8	-	8
Severe, n=12	-	12

P value- 0.09

4. Discussion

Pre eclampsia is a complex clinical syndrome involving multiple organ systems and still remains the principal cause of maternal and perinatal mortality and mortality. The search for an ideal predictive test and preventive measure remains challenging

It has been shown that in humans, both uterine arteries have a significant number of branches and that each supply the corresponding side of the uterus. Although anastomoses between the two uterine arteries exist, there is no proof that they are functional. When the placenta is laterally located, the uterine artery closer to the placenta has lower resistance than the one opposite to it. In women with centrally located placenta, both uterine arteries have similar resistance and the uteroplacental blood flow needs are met by equal contribution from both uterine arteries. However, when the placenta is laterally located, in the majority of the cases, the uteroplacental blood flow needs are met primarily by one of the uterine arteries with some contribution from the other uterine artery via the collateral circulation. The degree of collateral circulation may not be the same in all the women and deficient contribution may facilitate the development of pre eclampsia, IUGR, or both. The significance of normal placentation for cytotrophoblastic invasion is high and the cytotrophoblasts fail to adopt a vascular adhesion phenotype in pre eclampsia. This may explain the reduced trophoblastic invasion in laterally situated placenta when the uteroplacental blood flow needs are mainly met by one side uterine artery.

In the present study, out of 120 women, 80 females had laterally located placenta and 40 had centrally located placenta. Out of the 80 women with laterally located placenta, 52 developed PIH. Out of the 40 with centrally located placenta only 9 developed PIH. So the risk of developing PIH was 6 times greater for the females with

laterally located placenta as compared to those with centrally located placenta.

5. Conclusion

From the above study, it is concluded that laterally located placenta on ultrasound done at 18-24 weeks is associated with increased risk of development of pre eclampsia. Females with laterally located placenta have a six times greater risk of developing PIH, so these pregnancies may require careful obstetric management to achieve a more favorable outcome and decrease the maternal and perinatal morbidity and mortality associated with pre eclampsia. It is a simple yet reliable and cost effective predictive screening test for development of pre eclampsia, and should be offered to all pregnant women attending antenatal clinic

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