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Original Research Article

Association of placental laterality with pre-eclampsia

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ABSTRACT

Background: The aim of this study was to observe association between placental laterality and pre-eclampsia in pregnant women.
Methods: In this retrospective study, hospital records of 300 pregnant patients who were admitted in our hospital with mild or severe pre-eclampsia between January 2019 to February 2021 were analysed.
Results: Ultrasonography performed on these pregnant women between 18 and 24 weeks revealed that 177 (59%) had a lateral placenta and 123 (41%), a central placenta, indicating that pre-eclampsia occurred more frequently in patients with a lateral placental position. Also, pre-eclampsia occurred more frequently in primigravida (first-time moms) than in multigravida (second or subsequent pregnancies), with 132 (44%) primigravida, 106 (35%) second gravida and 62 (21%) multigravidas.
Conclusions: This study revealed that the majority of pre-eclampsia patients had placentas that were positioned laterally, indicating a correlation between the two.

Keywords: Pre-eclampsia, Lateral placenta, Central placenta

INTRODUCTION

Pre-eclampsia is one of the commonest medical conditions complicating pregnancies. However, at the same time it seems to be one of the most preventable and manageable complications if predicted/diagnosed on time. Preeclampsia is thought to complicate 2-8% of pregnancies globally.[1,2]

Several tests have been proposed to identify women at risk of developing preeclampsia. Some of these tests, like the cold pressor test, the isometric hand grip exercise, and the roll over test, are dependent on the presence of specific pathophysiological changes that take place in preeclampsia. Other tests such as the measurement of urinary calcium or plasma fibronectin are based on the presence of biochemical alterations peculiar to this disease. An increased diastolic blood pressure or increased second trimester mean arterial pressure just predicts gestational hypertension, not preeclampsia which is associated with maximal perinatal morbidity and mortality.[3,4]

There is no accepted gold standard for any of the preeclampsia risk assessment tests. Preeclampsia has also been linked to the ultrasonography localization of the placenta at 18 to 24 weeks of pregnancy. In numerous studies, lateral placentation has been used as a predictor of preeclampsia with varying degrees of success. Placental position, uterine artery resistance, and unfavourable outcomes including pre-eclampsia and intrauterine growth restriction (IUGR) are all significantly correlated. In the women with centrally located placenta, both uterine arteries demonstrate similar resistance. The uterine artery next to the placenta exhibits less resistance than the one across from it when the placenta is positioned laterally. In laterally located placenta, the utero placental blood flow needs are to be met primarily by one of the uterine arteries

with some contribution by the other uterine artery via collateral circulation.[5,6] The level of collateral contribution may vary from woman to woman, and inadequate collateral contribution promotes the onset of pre-eclampsia, IUGR, or both.

The objective of our study was to observe placental laterality using ultrasonography at 18-24 weeks of gestation and its association with pre-eclampsia in subsequent weeks of pregnancy.

METHODS

This retrospective study was conducted in Skims Medical College, Srinagar in which hospital records of 300 patients who had pre-eclampsia between January 2019 to February 2021 were analysed.

Inclusion criteria

Pregnant patients who were admitted to the ward with mild or severe pre-eclampsia were included, regardless of their parity or manner of pregnancy termination.

Exclusion criteria

Pregnant women with chronic hypertension, uterine anomalies, epilepsy, diabetes, renal disease, thyrotoxicosis, connective tissue disorder, recurrent pregnancy loss, deep vein thrombosis/thrombophilic disorders, history of smoking/alcohol/drug addiction, were excluded from the study.

All the cases were subjected to detailed history, general physical, and systemic as well as obstetrical examination at the time of their antenatal visit and at the time of admission. The location of placenta was determined by ultrasound at 18–24 weeks in all these women.

Pre-eclampsia was diagnosed on the basis of the American Congress of Obstetricians and Gynaecologists criteria for pre-eclampsia. The patients were treated according to the severity of the diseases.

Statistical analysis

Statistical analysis was done using IBM statistical package for the social sciences (SPSS) Statistics for Windows from IBM Corp. (released 2020, Version 27.0. Armonk, NY, USA). Categorical variables were shown in the form of frequencies and percentages.

RESULTS

In this study, we analysed hospital records of 300 pre-eclampsia patients who were admitted to our hospital. Ultrasonography performed on these individuals between 18 and 24 weeks revealed that 177 (59%) had a lateral placenta and 123 (41%), a central placenta, indicating that pre-eclampsia occurred more frequently in patients with a lateral placental position (Table 1).

Table 1: Placental location of patients.

Placental location	n	Percentage (%)
Lateral placenta	177	59
Central placenta	123	41

Additionally, 170 (57%) of the 300 women had severe pre-eclampsia while 130 (43%) had mild pre-eclampsia. Out of 170 severe pre-eclampsia cases, 50 (29%) had a central placenta and 120 (71%) had a lateral one. Out of 130 mild pre-eclampsia cases, 56 (47%) had a lateral placenta and 74 (53%) had a central placenta, showing that individuals with a lateral placental position were more likely to develop severe pre-eclampsia (Tables 2 and 3).

Table 2: Severity of pre-eclampsia in patients.

Pre-eclampsia severity	n	Percentage (%)
Severe	170	57
Mild	130	43

Table 3: Relation between placental location and pre-eclampsia severity.

Placental location	Severe pre-eclampsia, n (%)	Mild pre-eclampsia, n (%)
Lateral	120 (71)	56 (47)
Central	50 (29)	74 (53)

Pre-eclampsia occurred more frequently in primigravida (first-time moms) than in multigravida (second or subsequent pregnancies), with 132 (44%) primigravida, 106 (35%) second gravida and 62 (21%) multigravidas (Table 4).

Table 4: Relation between parity and pre-eclampsia.

Parity	n (pre-eclampsia)	Percentage (%)
Primigravida	132	44
Second gravida	106	35
Multigravida	62	21

Additionally, 195 (65%) of the patients, or the bulk of cases, were between the ages of 30 and 40, indicating a higher occurrence in this age range than in other age ranges.

The mode of delivery in the majority of women i.e., 245 (82%) was a caesarean section, and the rest 55 (18%) of the women delivered through vaginal route.

The birth weight of most of the babies was more than 2.5 kg i.e., in 210 (70%), and babies weighing less than 2.5 kg were 90 (30%). Out of these 90 with birth weight less than

2.5 kg, 70 (78%) had lateral placenta showing that patients with lateral placental location had higher chances of IUGR. Out of 300 patients, only 15 (5%) had gestational diabetes.

DISCUSSION

Pre-eclampsia is one of the leading causes of maternal and also perinatal mortality and morbidity. We thus need a test that could predict high risk of developing PE in pregnancy, so that prophylactic therapy could be started early. An ideal screening test should be simple, reproducible and inexpensive, with a high sensitivity and positive predictive value, and it should also be easy to perform and non-invasive. Pre-eclampsia has complicated pathophysiological features, and its root cause is yet unclear. Reduced uteroplacental blood flow is one of the fundamental abnormalities in patients with this syndrome. It has not yet been determined if this is the cause or outcome.

In our study, we found 59% of women had lateral location whereas 41% of women had central location of placenta. This result is in accordance with Kofinas et al who came to the conclusion that women with unilateral placentas had a 2.8-fold higher incidence of pre-eclampsia than women with centrally positioned placentas.[6] The results of the present study were also comparable to those of Muralidhar et al.[7] A total of 426 randomly chosen singleton pregnant women were involved in his study. Of the 426 women, 324 had unilateral placentas and 102 had centralised placentas. A total of 71 women developed pre-eclampsia of which 52 (74%) had unilaterally located placenta. The association was determined to be statistically significant, p=0.0001.

This result differed from research conducted by Bhalerao et al who found 26.1% i.e., less percentage of women had lateral location of placenta compared to 73.8% women who had central location of placenta.[8] Similarly, study by Jani et al have showed 20% of women had lateral placenta and 80% of women had lateral placenta.[9]

Despite extensive clinical trials, up to date, no therapeutic approaches are available for either treatment or prevention of pre-eclampsia. Anti-hypertensive drugs, corticosteroids for lung maturation or magnesium sulphate to prevent from eclampsia (RCOG Guideline No. 10 (A) are to prevent the worsening of the symptoms and can thus temporize over the short term to allow for safe delivery with a more mature foetus. The only cure of pre-eclampsia is delivery of placenta and baby. There is a 5 to 70% chance of developing pre-eclampsia again. Women who had severe features of pre-eclampsia and were delivered before 30 weeks' gestation having the highest risk up to 70 percent in future pregnancies. Women with pre-eclampsia without severe features have only 5 percent chance of developing pre-eclampsia.

In this study the number of babies born with birth weight less than 2.5 kg was 90 (30%), whereas those born with birth weight more than 2.5 kg was 210 (70%). Of those with birth weight was less than 2.5 kg, 78% had lateral placentas whereas only 60% women with laterally located placenta had babies with birth weight more than 2.5 kg. This finding was found to be statistically significant with p value of <0.001. This finding was similar to studies done by Kofinas et al which showed a 2.7 times increased risk of IUGR in women with laterally located placenta as compared to centrally located placenta.[10] Similarly, studies conducted by Kalanithi showed a 3.8 increased risk of IUGR in women with laterally located placenta as compared to centrally located placenta.[11] In contrast studies by Liberati et al and Magann et al found no significant association between placental location and birth weight.[12,13]

Limitations

This study had the drawback of being a retrospective analysis of cases.

CONCLUSION

This study revealed that the majority of pre-eclampsia patients had placentas that were positioned laterally on ultrasound done at 18 to 24 weeks, indicating a correlation between the two. Also, pregnant women who were primigravida with lateral placental location are at more risk of developing severe pre-eclampsia. Additionally, a correlation between IUGR and placental positioning was observed, with higher incidences of laterally placed placentas being observed.

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