Association of Placental Localization at 16-24 Week and Pregnancy Outcome

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ABSTRACT

Introduction: The role of a simple ultrasonographic evaluation of the placenta and its localization in the 2nd trimester (16-24weeks) is of interest and easily available in most set-ups.

Aims and Objectives: To study the association of placental localization at 16-24 week and pregnancy outcome. To compare the incidence of PIH and IUGR in Unilateral placenta and that of preterm labour and still birth in Posterior placenta.

Materials and Methods: A prospective observational study was conducted over a period of 10 months at our hospital which is a tertiary level referral hospital. The placenta was graded as fundal, anterior, posterior or unilateral depending upon the maximum area of attachment (more than 3/4th) on USG. The subjects were followed up for the development of PIH, IUGR, preterm labour and PROM. A total of 450 patients were enrolled for the study of which 60 aborted and 55 were lost to follow-up. The number of patients who remained in the study was 335.

Results: Majority of cases of pre-eclampsia 48 (65.75%) developedederal placent in patients who had either right or left sided placental attachment i.e unilateral placenta. This association was significant (p- value=0.020) There were 3 still births in our study 2 (66.6%) of which had posterior placentas. Majority of IUGR babies 29 (56.68%) had unilateral placentas. The distribution of preterm births was such that 21 (61.7%) had posterior placentas and 2 out of 3 (66.66%) cases of still-birth had posterior placentas. The p-value however of these associations were not statistically significant, (p value= 0.401, 0.229, and 1) respectively.

Conclusion: Patients with Unilateral placenta have and increased risk of developing PIH.

Keywords: Placental localization, IUGR, Second trimester, Pregnancy outcome.

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INTRODUCTION

Pregnancy and its outcome are intriguing to the treating obstetrician and there is always an unmet need to find ways to protect the mother and foetus and predict any adversity. Newer modalities have therefore emerged over the years to monitor the antenatal women and provide early diagnosis and management of maternal and neonatal complication. Ultrasonography, Colour-doppler evaluation of utero-placental blood flow, Non-stress test, Bio-physical profile, and even MRI of the placental tissue are considered some of the non-invasive methods of diagnostic and prognostic value.

However the role of a simple ultrasonographic evaluation of the placenta and its localization in the 2nd trimester (16-24weeks) is of interest and easily available in most set-ups. The majority of women in India are from the rural background where the sophisticated diagnostic modalities for feto-maternal surveillance are either not available or not affordable. A second trimester ultrasound scan is usually available in most places and a lot of vital information can be obtained from it. Many workers have found a positive association between the location of placenta and the future development of complications viz pre-eclamsia, gestational diabetes mellitus, preterm labour in mother and IUGR and still-birth in fetuses.[1]

Uteroplacental circulation

The two uterine arteries are the major source of blood supply to the uterus and originate from the anterior division of internal iliac arteries. It passes anteriorly along the broad ligament following a very tortuous course. Each artery gives off numerous branches, which in turn give off the anterior and posterior arcuate arteries traversing the myometrium. The arcuate arteries give off numerous radial arteries, which reach endometrium to give off spiral arteries. The spiral arteries terminate in a capillary plexus in sub epithelial zone[2].

Maternal blood enters through the basal plate and is driven high up towards the chorionic plate by maternal arterial pressure before lateral dispersion occurs, after bathing the external microvillous surface of chorionic villi the maternal blood drains back through venous orifices in the basal plate and enters the uterine veins, maternal blood traverses the placenta randomly without preformed channels, propelled by maternal arterial pressure. The process of trophoblast invasion of the spiral arteries creates low resistance uteroplacental vessels, which can accommodate the massive increase in uterine perfusion over course of gestation. The number of arterial openings into the intervillous space becomes gradually reduced by cytotrophoblast invasion.

Placenta being a vital link between the mother and the growing foetus plays several roles for exchange of blood, nutrients, gases, drugs, hormones, excretory products etc. When the placenta is attached on any of the lateral wall the uteroplacental circulation has inadequate perfusion from the contra-lateral uterine artery. This has been postulated by various authors who have reported that the vascular resistance in the placental vascular bed is higher as a result of poor endovascular trophoblastic invasion in laterally localized placentas (North et al. 1994).[2]

MATERIAL AND METHODS

A prospective observational study was conducted over a period of 10 months at our hospital which is a tertiary level referral hospital. The women undergoing routine antenatal ultrasound scans in the department of radiology and antenataly registered at our hospital for safe confinement was selected.

Inclusion Criteria

- All women with uncomplicated singleton pregnancy attending the outpatient department.
- All willing for the study and follow-up at our hospital.
- Women at 16-24 weeks of pregnancy and willing for delivery at our institution.

The gestational age was determined by the accurate dating methods (last menstrual period in women with regular cycles and Crown –rump length in previous first trimester scans). Other methods of dating such as mean sac diameter were considered to be less accurate and corroborated with other more reliable methods and if none available then, foetal biometry in second trimester scan was used Biparietal diameter (BPD), head circumference (HC) abdominal circumference (AC), femur length (FL) and trans cerebellar diameter (TCD) measurements have been used to determine gestational age, however a number of investigations have shown that the use of multiple ultrasonic fetal parameters to calculate gestational age is more accurate than the use of any single parameter and second trimester ultrasound dating is significantly more accurate than even excellent menstrual dating.

Detailed history was taken to rule out any acute or chronic medical illnesses. Obstetric and gynecological examination was done to rule out any existing pathology. Routine antenatal serological and haematological testing was done with blood grouping and urine routine examination. These subjects were followed up for the development of PIH, IUGR, preterm labour and PROM.

Exclusion criteria

- Twin/multiple pregnancy
- Any maternal/fetal complication
- Medical/ surgical high risk
- Patients who were not sure of delivery at our institution/ planning to visit other hospital for delivery. (Many patients have a trend of registering at the hospitals close to their matrimonial homes but prefer to deliver at their maternal hometown where they shift in third trimester.)

Informed consent was taken and patients were enrolled for the study. Ultrasound examination involved the placental mapping and materno-fetal growth parameters done on a standard USG machine with a 3.5 Mhz linear probe at the radiology department of our hospital. The placenta was graded as fundal, anterior, posterior or unilateral depending the maximum area of attachment (more than 3/4th). Those which were predominantly implanted on the lateral walls i.e right or left were graded as Unilateral whereas the others were either predominantly on the anterior, posterior or fundal wall.

A total of 450 patients were enrolled for the study of which 60 aborted and 55 were lost to follow-up. The number of patients who remained in the study was 335. These were monitored during their antenatal period and subjected to a third trimester ultrasonography at 34-37 weeks before confinement. The obstetric and radiological data were evaluated for development of any feto-maternal complication. Early scan was advised if needed and colour-doppler, fetal assessment and need for induction judged and recorded. The outcome was studied. Baby birth weight, development of neonatal asphyxia, APGAR scores, need for NICU(Neonatal intensive care unit) and long term neonatal prognosis were the fetal parameters while development of pre-eclampsia, eclampsia, IUGR, GDM, preterm rupture of membranes, pretem labour, IUFD, or need for cesarean section were maternal parameters that were significant.

Table 1: Age-wise distribution

Age	No of patients	Percentage
</= 19 yrs	60	20.10%
20-29 yrs	162	48.35%
30-39 yrs	97	28.95%
>/= 40 yrs	16	4.77%

Table 2: Distribution of pregnancy outcome against placental localization.

Total n-335	ANTERIOR(n=63)	POSTERIOR (n=62)	FUNDAL (n=60)	UNILATERAL (n=150)
NORMAL(n=181)	42 (23.21%)	23 (12.71%)	46 (25.41%)	70 (38.68%)
PRE-ECLAMPSIA (n=75)	11 (15.07%)	10 (13.70%)	6 (8.22%)	48 (65.75%)
IUGR (n=51)	13 (31.71%)	6 (14.64%)	3 (7.32%)	29 (56.68%)
PRETERM(n=34)	7 (20.59%)	21 (61.7%)	4 (11.76%)	2 (5.90%)
STILL BIRTH (n=3)	0	2 (66.66%)	1 (33.33%)	0

Table 3: Shows Statistical analysis where CI is the confidence interval. & p-value of 0.05 is considered significant.

Test & CI for One Prsportion	Subjects	N (Total)	Sample	95% CI	P-value
Pre-eclampsia in Unilateral placenta	48	75	0.640000	(0.520898, 0.747678)	0.020
IUGR in Unilateral placenta	29	51	0.568627	(0.422453, 0.706545)	0.401
Preterm in Posterior placenta	21	34	0.617647	(0.435640, 0.778335)	0.229
Still birth in Posterior placenta	2	3	0.666667	(0.094299, 0.991596)	1.000

RESULTS

Age-wise distribution revealed that the majority of the patients belonged to the age group of 20-29 years. (48.35%) this is probably because the reproductive life is most active in this period. The youngest patient in our study was a seventeen year old and the oldest was 43 years old. Table 2 shows that the placental localization was such that the majority of cases of pre-eclampsia 48 (65.75%) developed in patients who had either right or left sided placental attachment i.e unilateral placenta. There were 3 still births in our study 2 (66.6%) of which had posterior placentas. Majority of IUGR babies 29 (56.68%) had unilateral placentas. The distribution of preterm births was such that 21 (61.7%) had posterior placentas and 2 out of 3 (66.66%) cases of still-birth had posterior placentas. In table 3 the tests of comparison was applied and the confidence interval determined. We tried to find an association between the most obvious parameters (placental location and majority cases with adverse feto-maternal outcomes. The association of pre-eclampsia and unilateral placenta was very strong with a 95% CI (0.520898, 0.747678) and a p value of <0.05. The value of p being p=0.020 and hence statistically significant. The association of IUGR with unilateral placenta however was not statistically significant with a p value of 0.401 and 95% CI ((0.422453, 0.706545) although it accounted for 29 (56.68%) cases. Preterm and still birth were also not found to be of statistical significance with posterior located placenta each with p values of 0.229 and 1 respectively.

DISSCUSSION

Our study revealed a positive association of unilateral placenta with development of pre-eclampsia. This is also reported by other workers. Kofinas et al[1] , in their study which was one of the earliest, have shown that in patients with unilateral placentas, the incidence of preeclampsia and intrauterine growth retardation was 2.8-fold and 2.7-fold greater than in patients with central placentas (p less than 0.03 and p less than 0.01). Among all patients unilateral placental location was more likely to be associated with abnormal artery flow velocity waveforms than central placental location (p less than 0.001). These findings are also comparable with Pai Murlidhar et al[3]. In his study, a total of 426 unselected singleton pregnant women were included of which 324 had centrally located placenta and 102 had unilateral placenta. A total of 71 women developed preeclampsia of which 52 had unilaterally located placenta At 34th week, the study showed that in cases of laterally localized placenta, there was 2.3 times more chance of developing preeclampsia. In a similar study by Fung et al.[4] evaluating relation of preeclampsia with placental location, lateral localisation was reported to have two times higher risk of preeclampsia (Fung et al., 2011). Antsaklis et al[5]. studied the placental location on the prediction of preeclampsia in low-risk nulliparous women, but reported no difference in preeclampsia with placental location (Antraklis et al. 2000)

In our study we could not find a statistically significant association of IUGR with unilateral placenta unlike Kofinas et al. This finding is similar to that reported by Liberati et al[6] 1997 who could not find a significant association between unilateral placenta and IUGR. However they also reported no significant association between unilateral placenta and PIH, which was positive in our study. Lucy E.G. Kalanithi et al[7] 2007, in a retrospective study of 67 patients with and 205 patients without IUGR concluded that IUGR pregnancies were nearly 4 fold more likely to have lateral placentation (odds ratio, 3.8, 95% confidence interval, 1.3-11.2) compared with anterior or posterior placentation. Shumaila Zia[8] 2013, in a study 474 cases concluded that there was no significant difference in mean birth weight in different placental location.

The present study also could not find any significant association between preterm labour and posterior placenta and still birth and posterior placenta. This was found to be inconsistent with a study done by Shulman et al[9] that shows significant association of posterior placenta and preterm labour. Similar results are found in study by Hadley et al.[10]

CONCLUSION

The results of the present study are comparable with most other studies done to determine the positive predictive value of laterally implanted placenta with development of PIH in previously uncomplicated pregnancies. We therefore recommend the liberal use of this easily available modality for early identification of adverse perinatal outcome and timely action.

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