

Ultrasonographic Evaluation of Placental Location in Third Trimester of Pregnancy in Relation to Fetal Weight.

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Abstract

Introduction :The placenta is regarded as a fetal organ. It provides an indirect link between the maternal circulation and that of the fetus. The placenta can be situated anywhere on the surface of the uterus. During pregnancy, the uterine site of placental implantation may be an important determinant of placental blood flow. Ultrasonography is the preferred technique for placental localization. Although placental location has been implicated in preterm birth, fetal malposition, and the development of preeclampsia ^{4-6,8-11}, its association with altered fetal growth is less clearly defined. Thus, this study has been planned in such a way that it targets to examine the relation between placental location and fetal weight.

Materials and methods: Women with uncomplicated, singleton pregnancy of more than 26 weeks, who gave their written informed consent, were taken as subjects. Total number of subjects were 100. Ultrasonography was done in the department of anatomy and also in department of Obs. and Gynae., KGMU.

Observations and Results: Fundal placenta was observed in 37%, anterior in 29%, lateral in 24% and posterior in 10% cases. Fetal weight was higher in cases of anterior placenta and lower in cases of lateral placenta.

Conclusion: A statistically significant association was observed between different placental locations and fetal weights in initial phase of third trimester while in rest of the third trimester an insignificant association was observed between the two variables..

Keywords: Fetal weight, Placenta, Placental location,.

I. Introduction

The placenta is regarded as a fetal organ. It provides an indirect link between the maternal circulation and that of the fetus and serves as the organ for exchange of nutrients, gases and waste products through diffusion. The well being of the fetus is affected by many factors but a healthy placenta is the single most important factor in producing a healthy baby. The placenta can be situated anywhere on the surface of the uterus. The front wall is called anterior. The back wall is called posterior. The side walls are called left lateral or right lateral. The top wall is called fundal [1].

Although the uterus receives most of its blood flow from the uterine artery, the blood flow is not uniformly distributed. During pregnancy, the uterine site of placental implantation may be an important determinant of placental blood flow [2-6].

Ultrasonography is the preferred technique for placental localization. If a woman comes for the first time at term, even then a preliminary ultrasound examination for placental location is mandatory. One of the reasons for repeating the examination at the beginning of the third trimester is to determine the location of the placenta if it was described as a placenta previa at the mid-pregnancy examination [7].

A placenta is described as previa when placental tissue partially or totally covers the internal cervical os; it is described as marginal when it is adjacent to the internal os but does not cover it, and it is described as low lying when the margin of the placenta is situated 2 cm or less from the internal os [7].

Although placental location has been implicated in preterm birth, fetal malposition, and the development of preeclampsia [4-6, 8-11], its association with altered fetal growth is less clearly defined. Thus, this study has been planned in such a way that it targets to examine the relation between placental location and fetal weight.

II. Materials and Methods

The present study was a prospective one, conducted in the Department of Anatomy, King George Medical University, Lucknow in collaboration with Department of Obstetrics and Gynaecology, Queen Mary's Hospital, King George Medical University, Lucknow. Women with uncomplicated, singleton pregnancy of more than 26

weeks, who gave their written informed consent, were taken as subjects. Total number of subjects were 100. The gestational age was confirmed by previous records of ultrasonography done in first trimester. Women having any type of Gynecological complications, Obstetrical complications and Medical complications were excluded because these complications could affect the weight of the fetus as well as the location of the placenta.

First of all, the subjects were explained about the examination to be done, its process and its aim. Detailed history and examination were done to rule out medical and surgical illnesses which could affect our study. After general physical and obstetric examination, they were taken for ultrasonographic examination.

2.1 Ultrasonographic examination

All ultrasound examinations were performed in the department of Obstetrics and Gynecology with model LOGIQ™ α 200 ultrasound machine and in the Department of Anatomy with the help of L&T Medical, Sonata (version 3.1) machine, with a curvilinear 3.5 –MHz transducer.

2.2 Position of placenta

To localize the placenta, the probe was placed over the abdomen perpendicular to the skin and placenta was traced starting from the suprapubic area up to the epigastrium. Same procedure was repeated on both the lateral sides as well as in midline. The placenta was identified as a hyper echoic area separated from fetus by a hypo echoic area of amniotic fluid.

When the distance of lower edge of placenta from the internal os was ≤ 3 cm, then the placenta was considered as in the lower uterine segment and its presence in the upper uterine segment was identified when the distance was more than 3 cm from the internal os [12].

2.3 Calculation of Fetal Weight

During scanning, the fetal weight was calculated by using following parameters - Biparietal diameter (BPD) , Abdominal circumference (AC) , Head circumference (HC) , Femur length (FL) and Effective fetal weight (EFW) (Shepherd) [13]. Adnexa were looked for the presence of any mass. Fetus was also seen for the presence of any major congenital anomaly.

Ultrasound films were saved, measurements were recorded and transferred to MS excel sheet. Data were analyzed using statistical software package, STATA 11.2 and the difference was considered to be significant if 'p' value was found to be < 0.05 .

III. Observations and results

One hundred pregnant women were recruited for the study. On the basis of their gestational age, subjects were divided into four groups. The observations regarding the location of the placenta were categorized under four major locations as fundal, anterior, posterior and lateral.

Out of total cases, 93 belonged to upper uterine segment (Fig. 1a, 1b, 1c and 1d) 7 cases belonged to lower uterine segment (Fig. 2) (Table-1).

Among upper and lower uterine segment placentation, fundal was present in 37 cases (37%), anterior (second most common) was present in 29 cases (29%), lateral placentation was seen in 24 cases (24%) and posterior (least common) was present in 10 cases (10%) (Table-2).

In Table-3, correlation of fetal weight was evaluated for different placental locations among four gestational age groups. In first gestational age group (26-30wks), mean \pm S.D. fetal weight was reported to be highest for anterior placentation (1483 \pm 321) and lowest for posterior one (1000 \pm 197). The values of fetal weights in second gestational age group were highest for posterior and lowest for lateral placentation. In rest two groups (34⁺-38wks and 38⁺-42wks), the highest fetal weight were in cases of anterior placentation and lowest were of lateral placentation. Though, the difference in fetal weights in different gestational age groups for various positions of the placenta is not statistically significant and no fetus was observed as suffering from IUGR, but in first gestational age group i.e., 26-30 wks, (p- value is < 0.05) the placental position is affecting the fetal weight statistically significantly. A common trend that can be noteworthy is that the fetal weights were higher for anterior placentation and lower for lateral ones.

IV. Discussion

Locating the position of the placenta is of utmost importance especially for the diagnosis of placenta previa. Even though it has a very low incidence, it is a life threatening condition. Only a few studies have reported the other aspects of placental position and according to these studies placental location might have implications for poor

pregnancy outcome including preterm birth [14], small for gestational age (SGA)[15], foetal malposition, malpresentation and the development of pre-eclampsia[16,17]. The site of implantation and resultant location of the placenta within the uterus are likely important determinants of pregnancy outcome. Theoretically, lateral placental location could contribute a higher risk of foetal intrauterine growth retardation (IUGR) [15].

In the present study, most of the placentae (93%) were located in the upper uterine segment. Appiah in 2009, also noted a higher incidence of upper uterine segment placentation [18]. In our study, among upper and lower placentation, the commonest site was fundal (37%) followed by anterior (29%), lateral (24%) and posterior (10%) respectively. Approximately similar findings were reported by Zia S. She observed the fundal location of placenta in 46%, anterior in 28% and posterior in 26% women [19].

Cooley et al. 2011, observed that anterior placentation was associated with intrauterine growth restriction while fundal with increased incidence of pregnancy induced hypertension [20]. A case-control trial conducted in the USA revealed that women with their placenta located in the fundus carry an increased risk of premature rupture of membranes with all the consequential adverse sequelae [19]. However, no such associations were observed in the present study.

We observed 7% incidence of lower segment placentation which is very much in accordance with that of Appiah, 2009, who quoted an incidence of 6.1 % [18]. Hertzberg, 1992, noted a zero percent incidence of placenta previa [21]. In the present study, central (complete) placenta previa was not noted.

Becker et al. 2001, found normal placental position, with the placenta not reaching the internal os in 98.9% cases. The incidence of 'low placental position', with the placenta reaching the internal os was 0.66% .In 0.49% cases, the placenta overlapped the internal os at 20-23 weeks [22]. Ghourab, 2001, found that out of 104 placentae, the lower placental edge was positioned over the internal os in 33 women (complete previa) and within 3 cm from it in 71 women (low – lying placenta) [23]. In the present study, out of 100 cases the low – lying placentae were noted in 7 cases and no placenta was noted reaching the internal os.

In the present study, though, we did not find any case of IUGR, but in the initial phase of third trimester , we found that the fetal weight has been affected by the placental location. In rest three gestational age groups, no significant correlation was noted between different locations of placenta and the fetal weight. Similarly, Devarajan K assessed the difference in newborn weight according to placental location and found no association between the groups [24]. Another prospect of the present study was that the fetal weights were found to be highest in cases of anterior placentation especially near term, while lowest in cases of lateral placentation. These findings are in congruence of the findings reported by Kofinas et al. [25] in 1989 and Kalanithi et al. [26] in 2007. These authors reported a 2.7 times higher risk of IUGR in association with lateral placental location. It has been postulated that when a placenta is centrally located in the uterus, there is low resistance in both uterine arteries. However, when the placenta is laterally located, this low resistance is limited to the uterine artery that is ipsilateral to the placenta's location, and collateral blood supply from the contralateral uterine artery may be less efficient [27]. These aberrations in blood flow have been demonstrated in other studies, and have been shown, in some instances, to be associated with IUGR and preeclampsia [25, 26].

V. Conclusion

From the present study, following points can be concluded:

1. In our population, the incidence of upper uterine placentation is more common than the lower uterine segment placentation.
2. Fundal location of placenta was the commonest one and then anterior, lateral and posterior in the descending order.
3. Though, no fetus suffered from IUGR, but in a particular gestational age group, the fetal weight was highest for anterior placentation and lowest in cases of lateral placenta.
4. We found a statistically significant association between different placental locations and fetal weights in initial phase of third trimester while in rest of the third trimester an insignificant association was observed between the two variables.
5. Though, we got a common trend that the fetus belonging to lateral placentation had lower weight, but this fact can not be used as the predictor of IUGR.

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Table -1: Distribution of segmental location of placenta in study population.

Location of placenta	No. of cases (n)	Percentage
Upper uterine segment	93	93
Lower uterine segment	07	07

Table -2: Prevalence of specific site of placental location.

Location of Placenta	Fundal	Anterior	Posterior	Lateral
(n)	37	29	10	24
%	37	29	10	24

Table-3: Distribution of Effective Fetal Weight (EFW) (Mean± S.D.) in different Gestational Age groups for each type of Placental location.

Gestational Age (Wks.)	EFW in Fundal Placenta (gms.) (Mean±S.D.)	EFW in Anterior Placenta (gms.) (Mean±S.D.)	EFW in Posterior Placenta (gms.) (Mean±S.D.)	EFW in Lateral Placenta (gms.) (Mean±S.D.)	p- value
26 ⁺ -30	1100±237	1483±321	1000±197	1321.3±284.15	0.040
30 ⁺ -34	2136±447	1920±215	2471	1914±223	0.234
34 ⁺ -38	2623±509	2754±339	2460±84.1	2414±190	0.172
38 ⁺ -42	2989±331	3084±530	-	2882±204	0.806

Figures

Fig.1: USG images for placental locations. a- Fundal, b- Anterior, c- Posterior, d- lateral. P- Placenta, UF- Uterine Fundus, UW- Uterine Wall, F- Fetus, AF- Amniotic Fluid, BP- Basal Plate, CP- Chorionic Plate (Red Arrow).

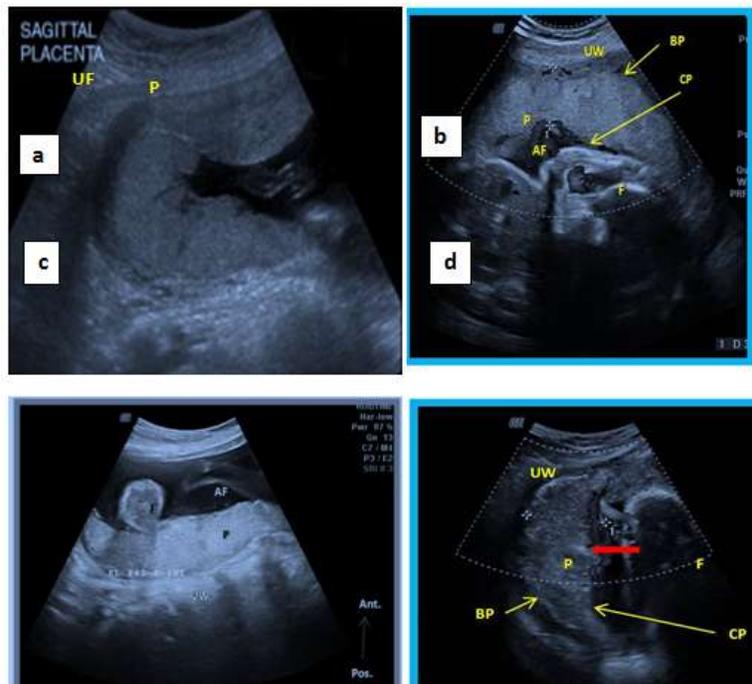


Fig.2: USG image for Lower uterine placentation.

CxC- Cervical canal, F- Fetus, P- Placenta, Cx- Cervix, Red arrow- Lower edge of placenta.

