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Sonographic evaluation of the commonest sites of placental localization in pregnant women in Umuahia, Abia State

Obiozor AA

Department of Radiology, Federal Medical Centre, Umuahia, Abia State, Nigeria

Abstract

Background: The Placenta is an organ of pregnancy that provides nutrition, excretory functions and oxygen to the fetus.
Aim: The purpose of the study is to determine and provide information on the commonest sites of placental localization in pregnant women in their second and third trimesters in Umuahia, Abia state because there are few documented reports on the sonographic assessment of placental localization in Umuahia.
Methodology: Prospective study of pregnant women in their second and third trimesters was carried out trans- abdominally using an ultrasound scan machine with a 3.5 MHz transducer. Placental localization was classified into anterior, posterior, fundal and low-lying, Ultrasonography was used because it is non-ionizing, cheap and readily available. Exclusion criteria; pregnant women with a history of Caesarian section, uterine fibroids and multiple gestation.
Results: One hundred women between the ages of 20yrs and 42yrs with a mean age of 28.60±4.95 on their routine antenatal visit were used for the study. The women were in their second and third trimesters, and fetal gender distribution was 55 males and 45 females. Placental localization was classified into Anterior 44%, fundal 20%, posterior 30% and previa 3%.
Conclusion: Anterior placentation was the commonest, followed by posterior, then fundal with placenta previa being the least site of placental localization. There was no statistical significance between placental localization and maternal age, gestational age, fetal weight, gender, fetal presentation and heart rate. Evaluation for placental localization in the second and third trimesters is important to rule out placenta previa.

Keywords: Placental localization; Umuahia; ultrasound

Introduction

The Placenta is a fetal organ of pregnancy responsible for providing nutrition and oxygen to the fetus as well as excretory functions.1 Placenta can be attached to the endometrium anteriorly, posteriorly, fundally and in the lower uterine segments. When the placenta is attached to the lower uterine segments, it is called placenta previa. Placenta previa is classified into the following types:
I. Low lying placenta; here the placenta lies in the lower uterine segments but its lower edge does not abut the internal os (i.e. Lower edge 0.5-2.0cm from internal os).

Corresponding Author:
Dr. Obiozor, Anthony Ayaegbunam,
Department of Radiology, Federal Medical Centre, Umuahia, Abia State, Nigeria.

obizon6@gmail.com | +234 8037086629

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II. Marginal previa; here the placental tissue reaches the margins of the internal cervical os but does not cover it.
III. Partial previa; here the placenta partially covers the internal cervical os.
IV. Complete previa; here the placenta completely covers the internal cervical os

Sometimes, grade I and II are termed minor or partial while III and IV are termed major placenta previa.[7]

Embryology of the placenta

The placenta is formed from fetal and maternal components:[2]

Maternal components: Decidua placentalis is the inner portion of the placenta, which is formed by trophoblastic invasion of the endometrium.

Fetal component: Chorion frondosum is formed by an arterial plexus (branches of the umbilical artery), protruding into intervillous spaces as chorionic villi.

Gross anatomy

The placenta is discoid in shape; it normally lies along the anterior, posterior, fundal or inferior wall of the uterus.[3] The placenta at term weighs 470g and measures 22cm in diameter with a thickness of 2.0-2.5 cm.[4] Placental thickness is usually directly proportional to gestational age, to the extent that it can often predict the gestational weeks (e.g 21mm thickness at 21 weeks of gestation).

Due to the changing morphology of the placental substance with increasing gestation, the maturity grading of the placenta is conveniently done.

The umbilical cord typically inserts at the centre of the placental bulk

Variant anatomy of the placenta

The placenta may have variant anatomy.[3] Bilobed placenta, Succenturiate placenta, Placenta membranacea, and Circumvallate placenta.

Radiographic features

Ultrasound is the imaging modality of choice because it is readily available, non-ionizing and affordable. In ultrasound, the placenta appears as a uniform echogenic structure (Intermediate echogenicity) along the uterine wall with a deep hypoechoic band separating it from normal uterine myometrium. This retro placental hypoechoic band is vital to rule out implantation disorders and its normal appearance should not be confused with retro placental hematoma.[3]

There may also be multiple anechoic areas in the placenta representing vainous lakes.[5]

Other imaging modalities could have been used for imaging the placenta, like Magnetic Resonance Imaging (MRI) but MRI is not routinely used due to the tissue heating effect of it.[6]

History and etymology

Placenta is derived from the Greek word, "Plakus" meaning "flat cake".[3] This reflects its typical appearance. The placenta was noted by Aristole and Galen, but the term originates with fallopius who called it the "placenta uterina".

Materials and methods

This was a prospective ultrasound study of 100 healthy pregnant women in their routine antenatal visit in Umuahia Abia state Nigeria in the year 2022 between the ages of 20 and 42 years and in their second and third trimesters. Consent was obtained from the patients before the study, approval was given by the ethical clearance committee of Alpha clinics and diagnostic centre, Umuahia, Abia state Nigeria.

The sample size was calculated using the formula for estimating a population mean;[13] ; Sample size, N = Z2 δ 2 / ε2 N= Sample size Z= the abscissa of the normal curve (1.96). δ= Population standard deviation or variance (4.95). ε = Error range (0.97) $N = (1.96)^2 (4.95)^2 / (0.97)^2 N = 100$

Subjects were scanned using a digital real-time ultrasound system-model (CC-13E71-MT2) Siemens Machine (made in Japan) with a 3.5mmHz transducer. Each subject lies supine with their hands placed under the head to widen the area of study.

Placenta localization sites were Fundal, anterior, posterior and lower uterine (placenta previa). Data obtained was entered into Microsoft excel database and exclusively analyzed using Statistical Package for Social Sciences (SPSS) for beginners (SPSS INC. USA) version 20.0.

Students t-tests at 95% intervals, two-tailed "P" values less than or equal to 0.05 were considered statistically significant. Placental localization was correlated with gestational age, fetal weight and presentation.

Inclusion criteria were all healthy pregnant women in their second and third trimester. While exclusion criteria were patients with history of cesarean section, uterine fibroid and multiple gestations.

Results

Table I: Sociodemographics of study participants

Variable	Min	Max	Mean±SD	Median (IQR)
Age (years)	20.00	42.00	28.60±4.95	28.0 (25.0, 31.0)
Gender	n (%)			
Male	55 (55.0)			
Female	45 (45.0)			

Table 1 above shows that the women were aged between 20 and 42 years, with a mean age of 28.60±4.95. The gender distribution of the foetuses was 55 males and 45 females.

Table 2: Association between amniotic fluid index (AFI) and gender, presentation and placentation

	AFI			
Gender	Normal; n (%)	Polyhydraminos; n (%)	□²	p value/T
Male	53 (96.4)	2 (3.6)		1.000
Female	44 (97.8)	1 (2.2)		
Presentation	n (%)	n (%)		
Breech	17 (100.0)	0 (0.0)		
Cephalic	67 (95.7)	3 (4.3)		
Oblique Cephalic	3 (100.0)	0 (0.0)	□□□□□	0.857
Transverse	7 (100.0)	0 (0.0)		
Unstable	3 (100.0)	0 (0.0)		
Placentation	n (%)	n (%)		
Anterior	44 (97.8)	1 (2.2)		
Fundal	20 (95.2)	1 (4.8)	□□□□□	0.048*
Posterior	30 (100.0)	0 (0.0)		
Previa	3 (75.0)	1 (25.0)		

* = statistically significant

Table 2 shows the association between amniotic fluid index (AFI) and gender, foetal presentation and placentation, and only placentation showed a significant association (p = 0.048).

Table 3: Association between placentation and foetal presentation

	Placentation; n (%)					
	Anterior	Fundal	Posterior	Praevia	Chi-square	p-value
Breech	6 (13.3)	4 (19.0)	7 (23.3)	0 (0.0		
Cephalic	30 (66.7)	15 (71.4)	23 (76.7)	2 (50.0)		
Oblique Cephalic	2 (4.4)	1 (4.8)	0 (0.0)	0 (0.0)	20.615	0.056
Transverse	5 (11.1)	0 (0.0)	0 (0.0)	2 (50.0)		
Unstable	2 (4.4)	1 (4.8)	0 (0.0)	0 (0.0)		

Table 3 shows the association between foetal presentation and placentation, which was not statistically significant (p = 0.056).

Discussion

One hundred women between the ages of 20yrs and 42yrs with a mean age of 28.60±4.95 on their routine antenatal visit were used for the study. The women were in their second and third trimester, and the gender distributions of the fetuses were 55 males and 45 females. Placental localization was classified into anterior 44%, fundal 20%, posterior 30% and previa 3%, with the anterior placenta being the highest site of placentation in the study however this is in variance with the finding of Mumalet al;[8] where in their study, fundal placentation was the highest (37%) followed by anterior (29%) and posterior (10%). Cooley et al;[9] in 2011 observed that anterior placentation was associated with intrauterine growth restriction while fundal has a great incidence of pregnancy-induced hypertension while case-control trial conducted in USA revealed that women with their placenta located in the fundus carry an increased risk of premature rupture of membrane according to Zia.[10] but no such association was observed in this study. Placenta previa in this study was 3% which was similar to the findings of Appiah;[11] in 2009 who observed that low-lying placenta had an incidence of 6.1%. Hertzberg.[12] 2009 noted a zero percent incidence of placental previa. There is no positive correlation of placental localization with maternal age, gestational age, fetal weight, gender, fetal heart rate or fetal presentation in this study with p=0.056.

Conclusion

The following was observed in the studied population: Anterior placentation was the commonest, followed by posterior, then fundal with placenta previa the least. There was no statistical significance between placental localization with maternal age, gestational age, fetal weight, gender, fetal presentation and heart rate. All pregnant women should routinely be evaluated for placental localization, especially in the second and third trimesters as to rule out placenta previa and determine the outcome of pregnancy between caesarean section and those that will deliver per varginum.

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