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The Impact of Placental Location on Early Fetal Growth

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Abstract

Objective: In this study it is aimed to determine the impact of the placental placement of the fetus on the biometric parameters assessed during 11-14 th gestational weeks in singleton pregnancies.

Methods: According to the study including criteria, 1615 pregnant women were evaluated. The median maternal age was 29.0±4.6 years. 54% of pregnant women were nulliparous and the rest 46% was multiparous. Median pregnancy number was 1.0±1.06. Median sonographic pregnancy week was 12.57±0.63 weeks. Fetal placental placement was 50.2% anterior, 41% posterior, 5.3% lateral and 3.5% fundus. The analysis done separately for 11 0-11 6; 12 0-12 6; 13 0 -13 6 week intervals showed no statistically significant difference between groups of placental locations in terms of in terms of biometric measurements.

Results: We retrospectively assessed spontaneous pregnancies screened between 2004 – 2010 having no uterine or anatomical abnormalities, systemic disease and family history of genetic diseases. Prenatal ultrasound biometry parameters like biparietal diameter (BPD), head circumference (HC), abdominal circumference (AC), femur lenght(FL) and crown-rump length (CRL) were evaluated. Fetuses were divided into groups according to placental location and whether groups differ in terms of biometric values was investigated. The effect of placement of the placenta on biometric values were evaluated separately for 11 0-11 6; 12 0-12 6; 13 0 -13 6 week intervals.

Conclusion: There is no significant effect of the placental placement of the fetus on the biometric parameters assessed during 11-14 th gestational weeks in singleton pregnancies.

Keywords: Placenta, biometri, fetus, ultrasonography, localization, growth.

Plasentel Yerleşimin Erken Fetal Büyümeye Etkisi

Amaç: Gebeliğin 11-14.haftasındaki tekil gebeliklerde elde edilen biyometrik parametrelere plasenta yerleşiminin etkisinin var olup olmadığının araştırılması amaçlanmıştır.

Yöntem: Birinci trimester taraması 2004 - 2010 yılları arasında yapılmış olan, sistemik hastalığı veya ailevi genetik hastalığı olmayan, spontan gebelik öyküsü bulunan, uterin veya fetal anatomik anomali saptanmayan gebeler retrospektif olarak değerlendirmeye alındı. Biparietal Çap (BPD), Baş çevresi (HC), Karın çevresi (AC), Femur uzunluğu (FL) ve Baş-Popo Mesafesi (CRL) gibi prenatal ultrasonografik biyometri parametreler değerlendirmeye alındı. Fetuslar plasenta yerleşimine göre gruplara ayrılarak gruplar arasında biyometrik değerler açısından farklılık olup olmadığı araştırıldı. Biyometrik değerlere plasenta yerleşiminin etkisi 11 0-11 6; 12 0-12 6; 13 0 -13 6. haftalar için ayrı ayrı değerlendirildi.

Bulgular: Çalışma kriterlerine uygun 1615 gebe değerlendirmeye dahil edildi. Ortanca anne yaşı 29.0±4.6 yıl saptandı. Ortanca gebelik sayısı 1.0±1.06 bulundu. Gebelerin %54'ü nullipar ve %46'sı multipar idi. CRL'ye göre ortanca sonografik gebelik haftası 12.57±0.63 hafta idi. Fetusların plasenta yerleşimi %50.2 anterior, %41 posterior, %5.3 lateral ve %3.5 fundus idi. Yapılan değerlendirmede 11 0-11 6; 12 0-12 6; 13 0 -13 6. haftalar için gruplar plasenta yerleşimine göre parametreler karşılaştırıldığında anlamlı fark saptanmadı.

Sonuç: 11-14.hafta tekil gebeliklerde prenatal ultrasonografik değerlendirme ile elde biyometri parametrelerine plasenta yerleşiminin etkisi mevcut değildir.

Anahtar Sözcükler: Plasenta, biyometri, fetus, ultrasonografi, lokalizasyon, büyüme.

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Introduction

In the present clinical practice, ultrasonographic fetal examination and evaluation of chromosomopathy is performed in the first trimester. This approach helps early detection of probable malformations of fetus and guiding to treatment if possible, thus it serves reduction in the general health expenses. Therefore, the determination of the standard measurement values obtained in the first trimester ultrasonography and their alterations related to maternal, fetal or environmental factors is important for the assessment of these measurements.[1-3]

In this study we aimed to determine the impact of the placental location of the fetus on the biometric parameters assessed during 11-14 th gestational weeks in singleton pregnancies.

Methods

We retrospectively assessed spontaneous pregnancies screened between 2004–2010 without the uterine or anatomical abnormalities, systemic disease and family history of genetic diseases. Prenatal ultrasound biometry parameters like biparietal diameter (BPD), head circumference (HC), abdominal circumference (AC) and crown-rump length (CRL) were evaluated for the ones matching inclusion and exclusion criteria above. As previously described in the literature, fetuses were divided into groups according to their placental location, namely as anterior if the main part of placenta lies close to the anterior wall of the uterus; posterior if the main part of placenta lies close to posterior wall; lateral if the main part of placenta lies close to lateral walls and fundal if the main part of placenta lies at the fundus.[4] Whether groups differed in terms of biometric values was investigated. The effect of location of the placenta on biometric values were evaluated separately for 11 0-11 6; 12 0-12 6; 13 0 -13 6 week intervals.

Anova test was used for the evaluation of mean values between groups. The statistical analyses were done with SPSS for Windows version 14.0 (SPSS Inc, Chicago, IL, ABD). The value of $p < 0.05$ was considered as statistically significant.

Results

According to the study including criteria, 1615 pregnant women were evaluated among 1725 pregnancies evaluated in the first trimester. The median maternal age was 29.0±4.6 years. . Median pregnancy number was 1.0±1.06. Fifty-four percent of pregnant women were nulliparous and the rest 46% was multiparous. Median sonographic pregnancy week was 12.57 ± 0.63 weeks.

Fetal placental location was anterior in 50.2%, posterior in 41%, lateral in 5.3% and fundus in 3.5%. The comparisons of the groups according to the demographics like median maternal age, median number of pregnancies and median gestational week are shown in the table 1. Among groups there was found no statistical significant differences in the median maternal age, median number of pregnancies and median gestational week. The comparative analysis of the biometric measurements of the

Table 1. Demographics of groups based on placenta location (Median ± S.D).

Placenta Location	Anterior	Posterior	Lateral	Fundus	p
Maternal Age	29.0 ± 4.6	29.0±4.7	30.0±3.8	30.0±3.9	0.184
Number of Pregnancies	1.0±0.92	1.0±1.21	1.5±0.67	1.0±0.50	0.126
USG gestational week	12.57±0.64	12.57 ±0.63	12.57±0.55	12.50±0.56	0.604

groups done separately for 11 0-11 6; 12 0-12 6; 13 0 -13 6 week intervals is shown in the Table 2. The analysis showed no statistically significant differences between groups of placental locations in terms of biometric measurements.

Discussion

It is important to know the normal patterns of all measurements done in the first trimester ultrasonographic scanning and their alterations according to the maternal and fetal factors in order to assess these measurements in the proper way.[1-3] Thus, in our study the effect of placental location on the ultrasonographic measurements done in the first trimester was studied retrospectively. Limited numbers of studies on this subject are present in the literature.

Woods et al suggested that placental location had no effect on the babies` weights in a study which evaluated 940 term babies at birth.[5] In another study of Woods et al, they suggested no effect of placental location on both newborn babies` weights and newborn babies` heights.[6] In that study, also it was suggested that babies with fundal location of placenta had larger head circumference in comparison with the other locations. Distinctively our study included earlier intrauterine period and it suggested no effect of placental location on the measurements of first trimester ultrasonography including biparietal diameter, head circumference, abdominal circumference and crown-rump length. In our study, mean biparietal diameters of the fetuses with fundal location of placenta were smaller compared to the other sites in the 11th and 12th gestational weeks but this difference was not statistically significant. Though Woods' finding related to the larger head circumference of term babies with fundal placenta was not confirmed in our study for an earlier life period of fetus, whether this difference occurs later in fetal life should be sought by further comparative studies done throughout the whole period of fetal development. In the study of Sto?kov et al which followed 289 pregnancies after determination placental location in the third trimester, it was suggested that location of placenta had no effect on birth weights and heights of the babies.[7]

Our study includes the measurements which are done in the first trimester. Other three studies included the measurements of the term babies done after birth. However, in all studies the measurements of fetuses or babies were not affected by the location of placenta (except

Table 2. Fetal biometrics according to the localization of placenta.

Gestational Week		Biparietal Diameter (mm)	Head Circumference (mm)	Abdominal Circumference (mm)	Femur Length (mm)	CRL (mm)
11 0-11 6 Week	Anterior (n=187)	18.31±1.71	69.88±5.69	55.03±4.56	5.54±1.05	53.75±4.37
	Posterior (n=153)	18.18±1.72	69.61±6.09	54.79±4.68	5.56±1.10	53.67±4.39
	Lateral (n=11)	18.36±1.50	68.80±5.43	55.60±3.50	6.08±1.12	52.00±3.82
	Fundus (n=11)	17.45±1.21	67.27±4.56	52.81±4.83	5.47±0.91	50.82±3.84
12 0-12 6 Week	Anterior (n=439)	21.11±2.00	79.56±6.19	63.67±5.67	7.54±1.53	63.14±4.93
	Posterior (n=359)	21.16±1.93	79.37±6.54	63.88±5.81	7.49±1.58	63.10±4.62
	Lateral (n=60)	20.98±1.68	79.17±6.44	63.92±6.25	7.10±1.23	62.12±3.63
	Fundus (n=38)	20.16±1.75	76.81±5.51	61.85±5.69	6.94±1.37	61.50±4.57
13 0-13 6 Week	Anterior (n=168)	24.38±2.09	90.88±7.14	74.21±6.29	10.09±1.85	74.13±5.45
	Posterior (n=137)	24.09±2.23	89.87±7.10	73.10±6.23	9.83±1.93	73.68±5.81
	Lateral (n=13)	24.12±1.42	88.73±6.67	72.55±6.63	10.30±1.46	73.46±4.71
	Fundus (n=7)	24.28±1.60	91.00±6.32	72.71±9.76	10.17±2.14	73.28±3.94

larger head circumference of the babies with fundal placenta in the study of Woods). As a result, it can be concluded that the measurements related to the growth of the fetuses are not affected by the location of placenta starting from the first trimester to birth. During the development of placenta, chorion villuses migrate to the locations where the blood flow is appropriate and this phenomena is explained by the tropotrophism theory.[8,9] It seems that unless blood flow to the placenta is not appropriate, the first localization of placenta does not have an important effect on the fetal growth. In addition, in case of placenta previa the birth weights are lower and this situation is rather attributed to preterm birth.[10] In another study, though there was found no difference in terms of birth weight and chest circumference in births of 28-32th weeks, there was significant difference in the births after 33th weeks in cases of placenta previa.[11] Also it has been shown that the restriction of intrauterine growth of preterm newborns without anomalies is frequently symmetrical and is mainly attributed to abnormal uteroplacental or feto-placental blood flow.[12]

Conclusion

As a conclusion, blood flow to the placenta rather than placental location seems to be more important for the fetal growth. Our present preliminary study suggests that the location of placenta does not affect the fetal growth in terms of biometric parameters. More detailed studies on this subject might be helpful for further understanding.

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