ORIGINAL RESEARCH PAPER

Anatomy

KEY WORDS: Placental thickness, Tansabdominal Ultrasound, Gestational age, Last menstrual period.

AN ULTRASONOGRAPHIC STUDY OF PLACENTAL THICKNESS AND GESTATIONAL AGE IN SECOND & THIRD TRIMESTER

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ABSTRACT

The placenta is a sprightliness of fetus in utero, as it function for normal growth & development of fetus. So if the growth of fetus is compromised it can be detected by the measurement of placenta. The purpose of our study was to determine normal range of placental thickness & its correlation with gestational age in second & third trimester. 100 pregnant females between 14th to 38th week weeks of gestation referred from antenatal clinics the department of Radiodiagnosis in association with the department of Anatomy. Females aged below 35 years without any medical complications were included for routine antenatal ultrasound. Study was carried out on seimen Acuson 300 ultrasound machine using 3.5MHZ convex probe . The placental thickness was measured at the level of umbilical cord insertion in both longitudinal & transverse direction. The ultrasonic gestational age is determined by measuring the Biparital Diameter, Head Circumference, Abdominal Circumference & Femur Length. The mean value of the placental thickness along with the respective standard deviation were calculated for different gestational weeks and compared with gestational age statistically in order to find its correlation. The maximum mean placental thickness is 19.82±3.42 at 19th week of gestation & 38.9±0.04 at 38 th week of gestation with a significant positive correlation between placental thickness and gestational age r=0.82 & r= 0.79 in second and third trimester.Placental thickness can be used as an accurate sonographic indicator in assessment of gestational age due to its linear correlation.

INTRODUCTION - Accurate knowledge of gestational age is essential for best antepartum care & successful deliveries of the baby. The determination of gestation is common clinical problem, ultrasonography is most commonly used to estimate the gestational age by measuring the foetal dimensions[1] The gestational age is approximately of 280 days which is calculated from last menstrual period ,so the dating of pregnancy start even before the fertilization[2]. All the important clinical desicision like cesarean section, elective labour induction etc depend on the knowledge of gestational age. Nyberg &Finberg reported that the placental thickness parallels the gestational age[3]. Thick placenta are seen in hydrops fetalis ,perinatal infections, maternal diabetes, maternal anaemias. & thin placenta are seen in intrauterine growth retardation, preeclampsia, fetal infection & chromosomal abnormalities[4]. The studies reported by Mital et al have confirmed that the placental thickness as an indication of gestational age of fetus[5], it was observed that the placental thickness gradually increased from 15 mm at 11 weeks of gestation to 37.5mm at 38 th week of gestation the placental thickness almost coincide almost exactly with gestational age in week.

Many studies were designed to show relationship between placental parameters like volume, weight, area to asses the fetal growth. The growth of fetus and placenta depends upon amount of nutrient from mother to fetus via utero placental organ. Increased placental thickness is not diagnostic of any specific disorder but may contribute to the management of fetus at risk[6]. The gestational age is frequently over estimated or underestimated ,as many people are unaware of LMP & irregular menstrual cycle. So the aim of our study was to investigate placental thickness as parameter for estimating gestational age of fetus.

MATERIAL & METHOD - The present study was conducted on 100 pregnant females attending antenatal clinics in collaboration with department of Anatomy & Radio diagnosis from 20162017 after taking ethical committee clearance from institutional Ethical committee. All pregnant females aged between 15 and 35 years with known LMP & singleton pregnancy were included for routine antenatal ultrasound after their written informed consent .

Pregnant female more than 35years,twin pregnancy,diabetes, fetal hydrops with chromosomal anomaly, placenta previa & placenta abruptia were excluded.

TECNIQUE –

During scanning, the pregnant female was made to lie supine with abdomen protruding facing upward. The probe was placed on the skin & a layer of ultrasonic gel was applied to skin over pubic area. Two edges of the placenta were focused in a single ultrasonic fields both in transverse & longitudinal section , the probe was moved all over the localized placenta. A straight line was drawn over the localized placenta at the level of cord insertion up to the maternal surface of placenta in order to measure placental thickness.[7] (as shown in fig.1)

The ultrasonic gestational age is determined by measuring Biparital Diameter(BPD), Head Circumference(HC), Abdominal Circumference(AC) & Femur Length(FL) . The mean value of the placental thickness along with the respective standard deviation were calculated for different gestational ages from the 14th to 38th week. The findings were compared and statistically analysed using pearson's correlation between placental size and gestational age. All the data were collected by designed clinical data collection sheets containing all the variables of the study. Pearson's correlation analysis was used to establish the degree of relationship between placental thickness & gestational age .P values of less than 0.05 were considered statistically significant.

Fig-1 Showing measurement of placental thickness

OBSERVATIONS & RESULTS

In our study of 100 antenatal singleton pregnancies between 14th to 38th weeks belonging to second & third trimester were divided into five gestational groups . The mean values of placental thickness were taken along with standard deviation . The mean values of placental thickness shows increasing trends till 38 th wks of gestation thereafter decreased upto 42nd wks of gestation. In this study a large positive correlation between placental thickness & ultrasonic gestational age was observed with Pearson's

correlation value r =0.82 & r= 0.78 in second and third trimester as shown in fig no.2. The mean placental thickness shows statistical significance with ultrasonic gestational age with p value less than 0.05.

Table 1 Shows that the mean placental thickness is 19.82±3.42,26.21±1.03,27.52±0.3,35.65±3.28, **38.9**±0.04 at 14 -19 ,19-23,24-28,29-33 , 34-38 th week of gestation . The result of our study showed that there was a fairly linear increase in placental thickness with gestational age.

Table 2 Shows that the maximum mean placental thickness is 20.0 ± 3.89 & 32.5 ± 3.60 in second & third trimester. There was a significant positive correlation between placental thickness and gestational age in second and third trimester with degree of freedom 0.94 & 0.93 & p value is 0.04 & 0.002, This shows that in our study placental thickness is statistically more correlated with second trimester than third trimester.

Table no. 1 –Shows the distribution of placental thickness with gestational age

Gastational age (wks)	No. Of case (n)	Thickness in mm		Range	
		Mean	SD	Max	min
14-18	20	19.82	3.42	23.71	14.6
19-23	17	26.21	1.03	27.43	24.93
24-28	16	27.52	3.3	30.4	22.3
29-33	23	35.65	3.28	38.21	30.43
34-38	24	38.9	0.04	38.21	38.12

Table no. 2 - Shows the Correlation between gestational age & placental thickness

TRIMESTER		GESTATIONAL AGE IN (WKS)			PLACENTAL THICKNESS IN MM			(r) value	(p) value	(t) test	95% (CI)
S.NO		MEAN	SD	VARIANCE	MEAN	SD	VARIANCE	0.82	0.004*	4.90	0.94
1.	SECOND	20.0	3.89	15.16	23.73	4.11	16.94				
2.	THIRD	32.5	3.60	13.00	35.70	3.68	13.58	0.78	0.002*	3.94	0.93

***Statistically significant**

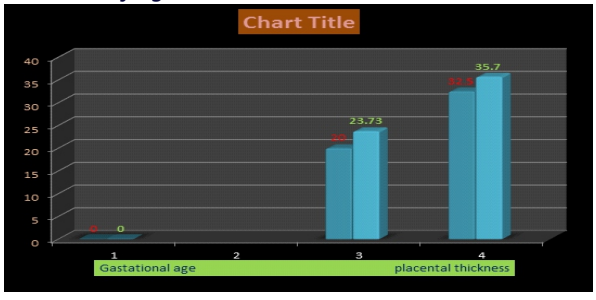

Figure 2- Bar diagram showing the Correlation between the gestational age and placental thickness.

DISCUSSION Determination of placental size is a part of overall assessment of intrauterine environment as placenta is mirror image of fetus reflecting the status of both mother & baby[8]. Any disease affecting mother & fetus shows great effect on placenta as it bears same stress & strain ,so various studies were done to deduce a relationship between placental thickness and gestational age. In our study mean placental thickness is 38.12±2.09 which are comparable with the findings of Habib et al & Dudley et al who also reported approximately similar placental thickness[9,10]. Hellman et al. & Grannum's et al in their study shows an increase in thickness of placenta with the progression of age upto 38th weeks & thereafter decreases,[11,12] similar to our study .In our study it was reported that the mean placental thickness increases with gestational age almost corresponds to gestational weeks as these findings were similar to jain et al 2001[13]. Karthikeyanet al reported significant correlation of gestational age with maximum mean placental thickness as 35.81 mm at third trimester[14].Appiah observed that there is no significant correlation between placental thickness & gestational age[15] (r= 0.09 , p >0.05) but our study shows significant correlation r= 0.82 & r= 0.78 ,p= 0.004 p=0.002 in second & third trimester. Cooley et al also suggested that antenatal ultrasound of the placenta may aid detection of placental disease & showed that placental thickness was less in pregnant female complicated by chorioamnionitis[16]. In present study the mean placental thickness at 26th week of gestation was 29.76 ±2.16 and 38th week of gestation was 38.12±2.09 nearly similar to the study conducted by C.C Ohagwu et al which revealed placental thickness at 26th week of gestation was 32.52±4.94 and placental thickness at 38th week was 42.49±5.79[17]. Our study showed a significant positive correlation between placental thickness and gestational age of fetus in second and third trimester similar to study done by Elachel et al[18] & Preeti et al[19] who also showed linear increase in placental thickness with gestational age throughout pregnancy. They also showed a higher percentage of thick placenta in birth weight at term above 4000gm or < than 2500gm. Anupma et al [20] also reported similar correlation between placental thickness gestational age. Thus it shows that increase in gestational age significantly influence the placental thickness.

SUMMARY & CONCLUSION-Placenta is responsible for amount of substance exchanged between fetus & mother , thus it appears as an accurate parameter in the assessment of gestational age due to its linear correlation. We therefore recommend that placental thickness may be used as an additional parameter for correlating gestational age during routine obstetric ultrasound scan in cases where LMP is not known & in detecting patients developing intrauterine growth retardation.

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