Original Article

Placental Thickness in Second and Third Trimester: Its Mean Value in our Local Population and Variables affecting it

Kaukab Naeem Syed[1], Shahla Zamir[2], Nuzhat Naz[3], Aamir Afzal[4]

[1,3]Postgraduate Resident, dept. of Radiology, PIMS, [2]Associate Professor Dept. of Radiology PIMS, [4]Biostatistician, Fauji Foundation Medical University, Islamabad

***Address of Correspondence**: Dr.Kaukab Naeem Syed, Postgraduate Resident, dept. of Radiology, Pakistan Institute of Medical Sciences, Islamabad*
kaukabn@yahoo.com

Abstract

Objective: The purpose of the current study was to evaluate the mean placental thickness in centimeters in the second and third trimester. It was also aimed to assess the effects of placental location, gestational age, gravidity and parity on the thickness of placenta with the hypothesis that these would have a significant impact on placental thickness.

Study Design: A cross sectional observational study

Place and Duration: It was conducted for a period of 2 months at Radiology department of Maternal and Child Health Centre, (MCHC) PIMS.

Methodology: A total of 185 patients were enrolled for the study. A standardized method for measuring placental thickness was developed in which it was measured perpendicular to the uterine wall and at the level of umbilical cord insertion.

Results: A total of 167 patients were included in the study who presented for routine antenatal scanning. Mean placental thickness was calculated to be 2.86±1.80 cms in our local population. 47% of placenta were located anteriorly. Various predetermined variables were noted to have a significant impact on placental thickness.

Conclusion: Placental thickness is surely effected by the gestational age, parity and gravidity of the patient, as well as by the location of the placenta.

Keywords: Gestational age, parity, placenta, placental location.

Introduction

A vital foetal organ that develops a physiological link between mother and the fetus is the placenta. Placenta, after being visible at around 9-10th weeks of gestational age, is evaluated for its position, number any pathology as well as for its thickness. The recommended way of measuring placental thickness is to take its longitudinal length at the point of insertion of the umbilical cord, where its depth is measured in the anteroposterior direction.

It starts developing around 5th week from the chorionic villi and is sonographically visible around 10th week.[1] Nutrient transfer is the key role that the developing placenta has to play for the growing fetus. Not only does it have to be healthy but also properly positioned for a normal uneventful pregnancy. [2]

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Ultrasound plays a pivotal role in the monitoring of pregnancy through all the trimesters. Placenta, after being visible at around 9-10th weeks of gestational age, is evaluated for its position, number (in case of twin gestation), any pathology (Haemorrhage, tumour etc.) as well as for its thickness. The recommended way of measuring placental thickness is to take its longitudinal length at the point of insertion of the umbilical cord .[3,4]

Placental thickness reflects the overall in-utero environment of the fetal well-being. It is the easiest way of assessing fetal as well as maternal health status. It is undoubtly affected in either of fetal or maternal health issues whether it be fetal anomaly or maternal medical problems.[5]

Various studies have been presented in the literature commenting upon the range of placental thickness, normal being considered to be between 2 - 4 cm. A study conducted by Mumal et al, concluded mean placental thickness to be in the range of 3.9 +/- 1.1 cms. Gestational age was also correlated with the placental thickness in this study which showed a linear relationship in second and third trimester.[5]

Mean placental thickness calculated in another study conducted by Anna et al came out to be 2.4cm. Also the position of the placenta was considered to be a factor affecting the apparent thickness of placenta with posterior and fundal placenta thicker than the anteriorly lying placentas. Hence according to this research, placental thickness can be out of this normal range based on its location [4].

However no significant number of studies have been presented in the literature evaluating the affect of gravidity / parity on the placental thickness. Also little is known about the normal range of placental thickness in our local population. Placental thickness being easiest measurement for the placenta, can play a vital role in screening for the fetal anomalies or maternal complications during 2nd or third trimester. However, initially the normal range needs to be determined for our local setup.

The purpose of the current study was to evaluate the mean placental thickness in centimeters in the second and third trimester sonographically. It was also aimed to assess the effects of placental location, gestational age, gravidity and parity on the thickness of placenta with the hypothesis that these would have a significant impact on placental thickness.

Methodology

A cross sectional observational study was conducted for a period of 2 months (1 June 2015 till 30 July 2015) at Radiology department of Maternal and Child Health Centre, (MCHC) PIMS.A total of 185 patients were enrolled in the study. All singleton pregnancies, whether primi- or multigravida were included. Patients with gestational age of 20 weeks till 39 weeks were involved. Multiple gestations, pregnancies with known or suspected fetal anomalies, and patients with placental tumours / haemorrhages were excluded from the study.

Toshiba Aplio 200 was used for ultrasound evaluation of the fetal wellbeing with curvilinear transducer probe (5 MHz). Informed consent was taken from all the patients. A standardized method for measuring placental thickness was developed in which it was measured perpendicular to the uterine wall, in the anteroposterior direction and at the level of umbilical cord insertion. Average of three measurements were taken to avoid chances of any mistake. Also the measurements were taken by a single operator who was a trainee radiologist (Fellowship program) with experience of at-least 2000 supervised as well as unsupervised scans.

After the detailed assessment of the foetus for any anomaly, parameters measured other than placental thickness included BPD (biparietal diameter), and FL (femur length). Besides these, placental location, expected date of delivery and sonographically determined gestational age were also calculated. The variables taken down in proforma were patient age, gravidity, parity, gestational age by dates, known medical illness, and any positive family history

Data was entered and analyzed in SPSS version 17.0. Frequency and percentage were calculated for qualitative variables like placental location. Mean and SD were calculated for quantitative variables like age, placental thickness, parity, gravida, BPD and FL. Pearson correlation (r) was used to measure the correlation of placental thickness with various predefined variables(placental location, gestational age, parity , gravidity). $p < 0.05$ was taken as level of significance.

Results

Out of the total 185 enrolled patients, 09 patients (4.8%) were excluded from the study as they had twin/multiple gestation.5 patients (2.7%) were excluded from the study as they were seen to have some form of congenital anomaly (2 patient had non communicating hydrocephalus, 1 patient had CCAM, 1 patient with cystic hygroma, 1 patient duodenal obstruction).04

patients (2.1%) were excluded from the study as they were diagnosed to have placental haemorrhage (marginal and retroplacental).

Final study was carried out on the rest of 167 patients. Age range of patients presenting to the antenatal scanning room of MCHC was from 16 to 40 years with a mean age of 25.74+4.20.

Various placental locations identified in the patients were anterior 79(47%), posterior 69 (41.3%), lateral (right/left) 06 (3.2%), fundal 08 (4.8%), fundoanterior 03 (1.8%) and fundoposterior 03 (1.8%) as shown in Figure no. 1.

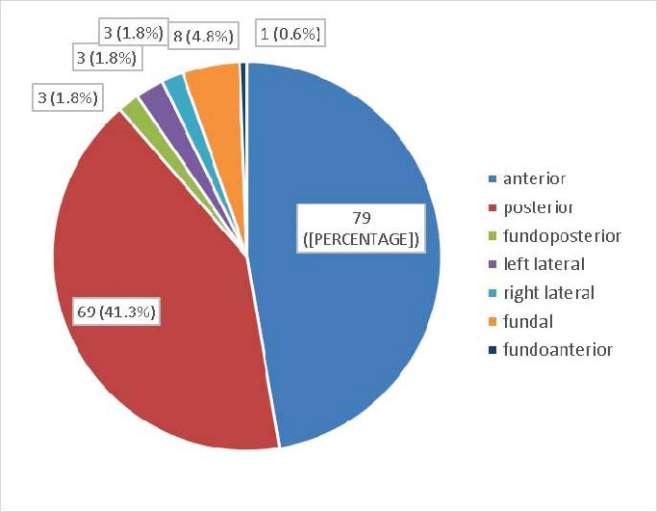

Figure 1:- Various Placental Locations

In the study, mean placental thickness (cm) was calculated to be 2.86+1.80. Minimum thickness was seen to be 1.2cm in a primigravida female of 24 years who presented at 24 weeks of gestational age. Placenta was posteriorly located in this patient. Maximum placental thickness was noted to be 4.8cm in a 24 year old multigravida female (G5P4) who presented at 28 weeks of gestational age with a fundal location of placenta.

Range of the gestational age of the patients presented to the antenatal scanning room was from 20.0 – 39.4 weeks with mean gestational age of 25.48+3.69. Mean and standard deviation of Biparietal diameter and Femur length were 25.35+4.24 and 25.41+3.74 respectively, as shown in table no. I

Table I. Mean values for various variables considered in study

	Minimum	Maximum	Mean±SD
Age (years)	16	40	25.74±4.20
Gravida	01	09	2.61±1.58
Parity	0	5	1.21±1.24
BPD	22.1	39.5	25.35±4.24
FL	19.4	39.4	25.41±3.71
Gestational Age (wks)	20.0	39.4	25.48±3.69
PL thickness(cms)	1.2	4.8	2.86±1.80

A significant linear correlation was identified between placental thickness and gestational age of the patient (r=0.161, p-value=0.038) in their second and third trimester. Parity was seen to be highly correlated (r=0.092) with the placental thickness. Also an acceptable correlation was noted between placental thickness and the gravidity of the patient (r=0.057).

Mean placental thickness (cm) was compared with location of placenta by using Kruskal Wallis test which showed significant results (p-value 0.000), as shown in table no. II.

Table II. Placental thickness in relation to its location

	PL. Thickness			P-value
	Minimum	Maximum	Mean±SD	
Anterior	**1.7**	**3.10**	2.81±2.42	
Posterior	1.2	4.20	2.66±0.76	
Fundoposterior	2.80	4.00	3.20±0.69	
Left lateral	3.50	3.20	3.50±1.45	
Right lateral	1.80	4.40	3.06±1.30	
Fundal	2.60	4.80	4.03±0.84	0.000*

The result calculated in current study showed the anterior placentas to be thicker than posteriorly placed placenta and fundal placentas being the thickest of all (table III).

Table III. Mean values for variable

		PI thickness	Gravida	Parity	Abortions	BPD	FL	GA
PI thickness	Pearson Correlation	1	.057	.092	-.027	.101	.162*	.161*
	Sig. (2-tailed)		.465	.236	.728	.192	.036	.038
	N	167	167	167	167	167	167	167
Gravida	Pearson Correlation	.057	1	.852**	.618**	-.047	-.104	-.101
	Sig. (2-tailed)	.465		.000	.000	.548	.179	.195
	N	167	167	167	167	167	167	167
Parity	Pearson Correlation	.092	.852**	1	.129	-.016	-.059	-.059
	Sig. (2-tailed)	.236	.000		.096	.833	.451	.449
	N	167	167	167	167	167	167	167
BPD	Pearson Correlation	.101	-.047	-.016	-.049	1	.790**	.800**
	Sig. (2-tailed)	.192	.548	.833	.528		.000	.000
	N	167	167	167	167	167	167	167
FL	Pearson Correlation	.162*	-.104	-.059	-.096	.790**	1	.993**
	Sig. (2-tailed)	.036	.179	.451	.219	.000		.000
	N	167	167	167	167	167	167	167
GA	Pearson Correlation	.161*	-.101	-.059	-.089	.800**	.993**	1
	Sig. (2-tailed)	.038	.195	.449	.255	.000	.000	
	N	167	167	167	167	167	167	167

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Discussion

A vital organ of gestation is the placenta which maintains a physiological link between the mother and the fetus. It not only needs to be healthy in terms of thickness but also requires proper location so that fetus can acquire all the vital nutrients through it. It will not be an exaggeration if we label it as the mirror image of maternal and fetal well being,

Many studies in literature have commented upon the abnormal thickness of placenta being related to either fetal or maternal ill being. It has been clearly documented that large placentas should lead to the suspicion for maternal diabetes whether gestational or not.[6]. Study conducted by Jeelani et al concluded that the placentae from diabetic mothers were significantly thicker than those in the control group.[7] Milan et al also came to the conclusion in their study that besides other ultrasound markers, placental thickness also invariably reflects the status of maternal diabetes.[8.] Hence to be sure of adequate placental thickness appropriate for a particular gestational age, knowledge of mean placental thickness at a specific gestational age of a certain population plays a pivotal role.

According to Karthikeyan et al, mean placental thickness in females of India presenting in their second and third trimesters for routine antenatal scanning is 2.3cm and 3.5cm respectively [9] Unadjusted overall mean placental thickness given by Anna J lee et al was 2.4cm (SD, 7.29) [4] This is in lieu with the conclusion of the current study where the mean placental thickness in second and third trimester regardless of the location of placenta was found to be 3.2cm. Another study done by Ezra et al showed that placentae which were found to be thicker sonographically were associated with higher perinatal risk and increased chances of mortality related to fetal anomalies.[10]

Placental thickness is also shown to be correlated well with the gestational age in the literature .[3] This is also supported in the current study where it was witnessed that there was a linear correlation between the gestational age of the patient and the placental thickness. Anna et al also described the correlation between the placental location and its thickness

.According to their study, anteriorly located placentas are thinner (approximately 7mm) than posterior or fundal placentas.[4]

No significant evidence was seen demonstrating the relationship between placental thickness and patient's gravidity and parity. In the current study both showed plausible relationship with the placental thickness (parity with r= 0.092 and gravidity with r = 0.057)

Conclusion

Mean placental thickness calculated in our local population was seen to be 2.86+1.80 cm. It varied considerably with its location, fundal and anteriorly placed placentas being thicker than the rest. Thickness also correlated well with the gestational age of the patient, her parity and gravidity.

Recommendations: Further studies should be carried out to further probe the affect of parity on the placental thickness while including larger number of patients. This will help in avoiding errors while interpreting placental thickness.

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