

ORIGINAL ARTICLE

**PLACENTAL THICKNESS AS A SONOLOGICAL PARAMETER FOR ESTIMATING
GESTATIONAL AGE**

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ABSTRACT

AIM: Evaluation of placental thickness as a parameter for estimating gestational age of the fetus & to assess the growth pattern of placenta with advancing gestational age; METHODOLOGY: Women referred for routine antenatal ultrasound from 11 to 40 weeks of gestational age were included in the study; RESULT: It was observed that the placental thickness gradually increased from approximately 11.4 mm at 11 weeks to 36.5 mm at 40 weeks of gestation. From 11 to 35 weeks of gestation, the placental thickness (in mm) almost matched the gestational age in weeks, thereafter from 36 to 40 weeks; the placental thickness was lower by 1-3 mm; CONCLUSION: The relationship between the placental thickness and gestational age is linear and direct; Placental thickness (in mm) measurement can be used as an important additional parameter for estimating gestational age along with other parameters especially from 11 to 35 weeks of gestation.

Keywords: Placental Thickness, Sonological parameters, Gestational Age

1. INTRODUCTION

The placenta is a fetal organ with important metabolic, endocrine and immunological functions and also it has a role in protecting the fetus from noxious agents.

Placental evaluation by ultrasonography has been used to characterize placental position and morphologic changes as the placenta matures, one additional ultrasonographic parameter frequently used to assess the placenta is placental size⁽¹⁾.

Currently the most effective way to date pregnancy is by the use of ultrasound. Placental thickness can be used as a new parameter to estimate the gestational age however total placental volume is probably the most accurate estimate of placental size, but volumetric measurement is too complicated and cumbersome for routine use, whereas the measurement of placental thickness is relatively simple and clinically useful.

2. MATERIALS AND METHODS

Prospective cross sectional study was conducted in 200 antenatal women of all gestational ages from 11 weeks to 40 weeks of gestation referred for routine antenatal ultrasound to Department of Radiology & Imaging Sciences,

Rajah Muthiah Medical College & Hospital, from Division of Obstetrics and Gynaecology. Patients with PIH, Diabetes mellitus, Poly/Oligohydramnios, IUGR, hydrops fetalis, congenital malformations, Multifetal pregnancy and with variations in insertions of umbilical cord like marginal or battledore placentas and velamentous insertions are excluded from the study.

The gray scale real time ultrasonographic examinations were performed using Siemens Acuson Antares & Siemens X300 ultrasound scanner using 3.5MHz convex array transducer.

The placental thickness in mm was measured at cord insertion site with transducer oriented perpendicular to both the chorionic and basal plates.

Cord insertion site is usually central but slightly eccentric position may be normal.

The ultrasonic appearance of the cord insertion appears either as hypoechoic areas closest to the chorionic plate with a v shape or as linear echoes emanating at right angles from the placental surface, placental thickness was calculated from the echogenic chorionic plate to placental myometrial interface.

The gestational age in first trimester from 11 to 13 weeks of pregnancy was determined by measuring CRL and calculations using Hadlock tables additional measurements

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are not more accurate than the CRL length in predicting age from 11 to 13 weeks and their use in conjunction with CRL does not further improve age estimation⁽⁸⁾.

The gestational age in second and third trimesters from 14 to 40 weeks of pregnancy was determined by composite fetal measurements of BPD, HC, AC, and FL gestational age was computed by the ultrasound machine based on Hadlock tables by using regression equations from combination of measurements (computation software package).

Patients were then categorized into two groups based on placental location^(2,3,4).

- Group I: Anterior and lateral placentas combined.
- Group II: Posterior and fundal placentas combined.

Correlation of mean placental thickness with calculated gestational age from 11 weeks to 40 weeks was obtained in each group separately.

3.DISCUSSION

For many years sonologists have approached the placenta as a 'static' feature in a dynamic system⁽⁵⁾.

All measurements of fetus were related to menstrual age, the placental thickness was judged as normal or abnormal based on a single "cut off "point whereas the present study data confirm that placental thickness is a function of age.

To determine a given placental thickness is normal or abnormal, normal placental thickness must be defined for each week of gestational age throughout pregnancy.

Abnormal thickening or thinning must be correlated with other estimates of pregnancy duration, the present study assessed the relationship of placental thickness (in mm) with sonographic gestational age (in weeks), study showed that the placental thickness (in mm) increases steadily with increasing gestational age (in weeks) in a linear fashion and almost matching the gestational age from 11-35 weeks of gestation, the rate of increase of placental thickness gradually diminished from 36-40 weeks and was less by 1-4 mm compared to gestational age (in weeks)⁽⁹⁾.

Significance of placental size: Certain diseases or abnormalities of the fetus can be detected through measurement of placental thickness.

Thin placenta is often a marker for a small for date fetus and a sign of growth restriction. It is also seen in patients with pre-eclampsia, chromosomal abnormalities and severe intra-uterine infection.

Thick placentas are associated with hydrops fetalis, diabetes mellitus and intrauterine infections. It is also associated with increased perinatal risk with increased mortality related to fetal anomalies.

Accuracy of placental thickness measurements: To obtain an accurate placental measurement, it's important to identify the placental-myometrial interface, when placenta is posterior, identification of this region is facilitated by the acquisition of images as free from acoustic shadowing from the fetus as possible.

When the placenta is anterior, proper transducer position and gain settings are important to minimize near field and reverberation artefacts correct identification of the placental-myometrial interface should also preclude the illusion of placental thickening induced by focal myometrial thickening.

Limitations : Accuracy of placental measurements depends on making a perpendicular scan of the placenta and care

should be taken in acquisition and interpretation of images to prevent spurious measurements

A method to estimate the thickness of the in-situ placenta from ultrasound images in a single dimension has its own limitation.

Cord insertion site on the placenta was difficult to image in normal term pregnancies, especially in posterior locations⁽⁷⁾.

MATERNAL AGE DISTRIBUTION

AGE IN YEARS	NUMBER OF PATIENTS	PERCENTAGE
<20	15	7.5%
20-25	93	46.5%
25-30	80	40.0%
>30	12	6.0%

Most of the antenatal women included in the study are in the age group of 20 -25 yrs.

DISTRIBUTION OF PLACENTAL POSITION

PLACENTAL POSITION	NUMBER OF PATIENTS	PERCENTAGE
Anterior	72	36.0%
Posterior	45	22.5%
Fundal	48	24.0%
Lateral	35	17.5%

In our study, anterior location of the placenta is found in 36% of the antenatal cases, in 24% of the cases in fundal position & in 22.5% & 17.5% of the cases in posterior & lateral position respectively.

STATISTICAL ANALYSIS - The data collected in this study is analysed statistically by computing the descriptive statistics viz., mean, and SD & 95% Confidence Interval were also calculated.

The correlation between gestational age & placenta thickness and gestational is computed.

The results are considered statistically significant whenever $p \leq 0.05$.

RELATIONSHIP BETWEEN GESTATIONAL AGE & PLACENTAL THICKNESS

The mean placental thickness with standard deviation and 95% confidence interval for each gestational age is calculated.

CORRELATION BETWEEN 11-35 WEEKS OF GESTATIONAL AGE AND PLACENTAL THICKNESS (mm)

	RANGE	MEAN	SD	t-value	Pearson correlation	P-value
Gestational Age (weeks) by USG	11-35	24.67	7.67	0.100	0.921	<0.001
Placental thickness (mm)	11-37	24.59	7.41			

At 11-35 weeks of gestational age there is no significant difference in mean between the gestational age (24.67±7.67) and placental thickness (24.59±7.41)

High degree of positive correlation between gestational age and placental thickness (r =0.921) which is significant (P<0.001).

GESTATIONAL AGE AND PLACENTAL THICKNESS (MM)

	RANGE	MEAN	SD	t-value	Pearson correlation	P-value
Gestational Age (weeks) by USG	36-40	37.30	.15	8.242	0.17	>0.235
Placental thickness (mm)	31-38	35.02	1.53			

After 35 weeks of gestational age there is a high difference in mean between gestational age (37.30±1.15) and placental thickness(35.02±1.53).

Poor positive correlation between gestational age and placental thickness(r =0.17, P>0.235) which is statistically not significant.

RELATIONSHIP BETWEEN GESTATIONAL AGE AND PLACENTAL THICKNESS FOR DIFFERENT PLACENTAL LOCATIONS:

Cases were categorized into two groups based on placental location.

Group 1: Anterior and lateral placentas combined.

Group 2: Posterior and fundal placentas combined.

	MEAN PLACENTAL THICKNESS	PEARSON CORRELATION WITH GESTATIONAL AGE
GROUP 1	24.98	r=0.9931
GROUP 2	25.36	r=0.9919

The relationship between placental thickness and gestational age in both the groups are similar in terms of Pearson correlation coefficient(r =0.9931 for group 1 & r=0.9919 for group 2)

The thickness of the placenta did not vary relative to the placental location.

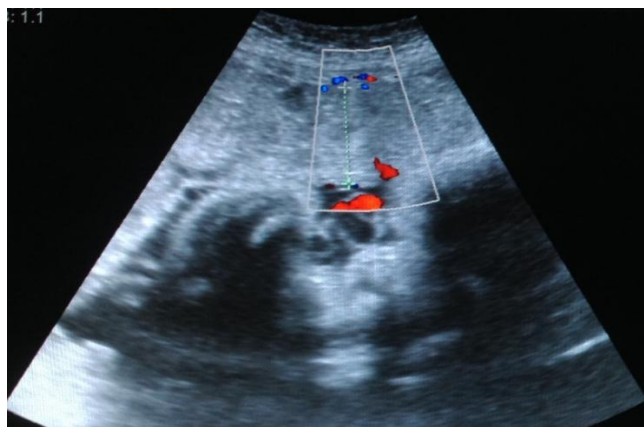


Figure 1 : Measurement of placental thickness in anteriorly located placenta.

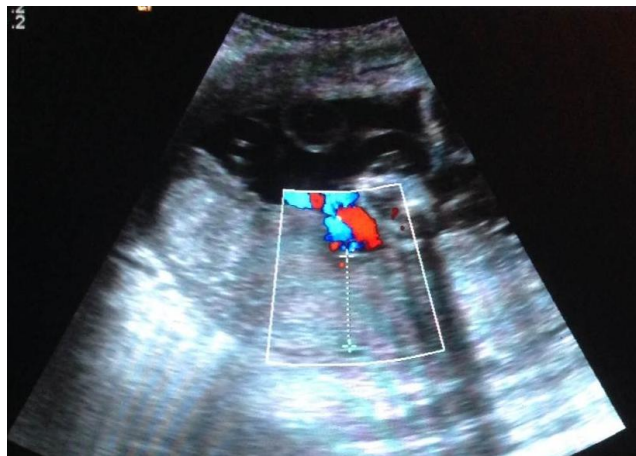


Figure 2 : Measurement of placental thickness in posteriorly located placenta.

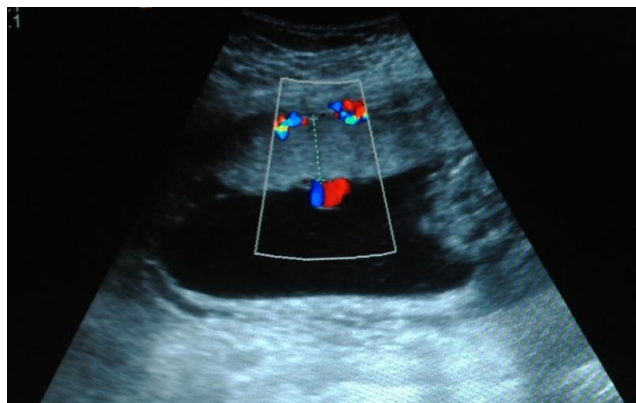


Figure 3: Measurement of placental thickness in a placenta at lateral position.

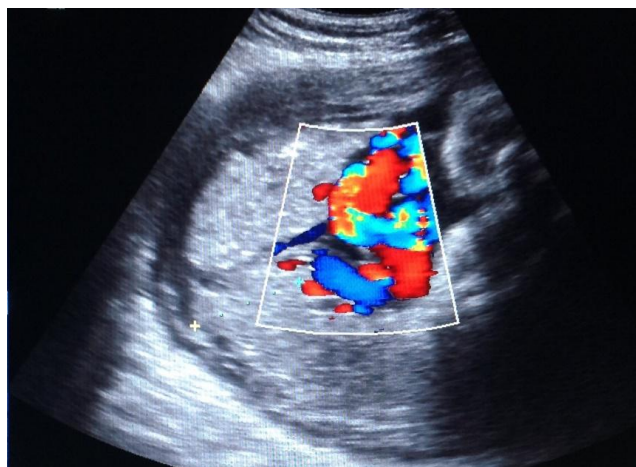


Figure 4 : Measurement of placental thickness in a placenta at fundal position.

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