

ESTIMATION OF GESTATIONAL AGE BY ULTRASONOGRAPHIC MEASUREMENT OF PLACENTAL THICKNESS

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ABSTRACT

BACKGROUND: The gestational Age (GA) is frequently over or under estimated, as the conventional estimation is based on the Last Menstrual Period (LMP). Some patients either do not know the date of LMP occurrence or give an inaccurate date. So, ultrasonography was used to estimate gestational age by fetal biometry. Due to some drawbacks in the above indicated parameters, placental thickness (PT) was studied as a new parameter for estimating gestational age. **AIM:** To estimate the gestational age by ultrasonographic measurement of placental thickness. **MATERIALS AND METHODS:** A prospective observational study was conducted on 90 normal antenatal women. Clinical assessment of GA by fundal height palpation was done. A transabdominal scanner (3.5 MHz transducer) was used to rule out the foetal anomalies and the fetal biometry, placental localisation and PT were taken. **RESULTS:** The maximum mean PT in the 1st, 2nd, 3rd trimesters were 11.50 mm, 28 mm, 35.5 mm respectively. The correlation between PT and the other foetal parameters was investigated by Pearson's correlation analysis. The values were expressed as mean + standard deviation. The statistical tests had a p value of < 0.01 , which indicated statistical significance. There was a strong positive correlation between PT and GA, with the correlation coefficient values for the menstrual, clinical, ultrasound gestational age being $r=0.98, r=0.98, r=0.97$ respectively. **CONCLUSION:** It is observed that the relationship between the PT and GA is linear and direct. PT measurement (in mm) can be used as an important additional parameter for estimating GA along with other parameters from 11 to 35 weeks of gestation after which it decreases. It is also observed that there is no significant difference in PT with advancing gestation based on implantation site.

Keywords: Gestational age, Placental thickness

1. INTRODUCTION

Proper assignment of expected date of delivery is necessary to obtain and appropriately interpret laboratory tests, to plan and execute therapeutic maneuvers, to determine the optional management in certain difficult situations like intrauterine growth restriction, gestational diabetes and Rh disease and to anticipate whether to allow for a spontaneous normal delivery or to plan elective delivery at term. It is also useful in scheduling of invasive procedures.

The patient's menstrual history is considered adequate for the purpose of establishing EDD, only if LMP was normal in duration, amount of flow, if prior menstrual periods came at regular intervals and if the patient did not use oral

contraceptives with in 3 months of a last period.¹ Unfortunately, approximately, 30% of patients do not fulfill these criteria, making estimation of EDD based on LMP unreliable.

Ultrasonography is a commonly used parameter to estimate the gestational age by measuring the fetal dimensions like the Crown Rump Length (CRL), Bi-Parietal Diameter (BPD), the Head Circumference (HC), the Abdominal Circumference (AC), the Head Circumference (HC), the Femur Length (FL). There are some drawbacks in the above indicated parameters in estimating the gestational age and so there is a need of another parameter for supplementing the gestational age estimation with minimal error.

Few authors have studied the role of placental thickness as a new parameter for estimating gestational age. It was observed that the placental thickness gradually increased from 15mm at 11 weeks of gestation to 37.5mm at 39 weeks.

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From the 22nd week to the 35th week of gestation, the placental thickness coincides almost exactly with the gestational age in weeks²

The purpose of the study is to evaluate placental thickness as a parameter to estimate gestational age and to establish a relationship between placental thickness and clinical assessment of gestational age, menstrual age and ultrasonographic estimation of gestational age by other parameters. This study is also aimed to see if there is a difference of placental thickness with respect to placental location.

2.MATERIALS AND METHODS:

The study was conducted on 90 normal antenatal women in the period 2013 – 2016 in the department of Obstetrics and Gynecology, Rajah Muthiah College and Hospital. 30 patients under each trimester is taken.

Patients with regular menstrual cycles with known dates of last menstrual period, without any medical or obstetrical complications were included. After obtaining consent, fundal height was determined by palpation and the gestational age was clinically assessed. A transabdominal scanner (3.5 MHz transducer) was used to determine the foetal anomalies if there was any. The gestation age was determined by measuring the CRL, BPD, AC, HC and FL. The placental thickness was measured at the level of the umbilical cord insertion or at its midposition; the maximum thickness being noted in the cross section(Fig.1). The location of the placenta was categorised into two groups, Antero-Lateral or Postero-fundal and the same was noted. The subjects were in the supine position with a full urinary bladder while they underwent the ultrasonography.

The statistical analysis was performed by using SPSS 21 and Excel 2007. The ethical committee clearance was obtained from Rajah Muthiah Medical College and Hospital, Annamalai University, Chidhambaram, India. An informed consent was obtained from the subjects before starting with the study.

3.RESULTS

In our study we analysed 90 uncomplicated pregnancies of more than 10 weeks gestation till term. Placental thickness was measured and the mean values of placental thickness along with respective standard deviation were calculated for different gestational ages from 11th week to 40th week. It was observed that the placental thickness gradually increased from 1.1 cms at 11 weeks of gestation to 3.5 cms at 40 weeks of gestation.

In our study upto 19 weeks of gestation the mean placental thickness was slightly higher than the gestational age by 0.1-0.4 cms. From 20 weeks to 35 weeks of gestation the placental thickness almost matched the gestational age in weeks. Thereafter the placental thickness was lower by 0.1 to 0.2 cms.

There is a statistically significant correlation between placental thickness and menstrual gestational age

($r=0.98$),(Fig.2)($P<0.01$),clinical gestational age ($r=0.98$), (Fig.3)($P<0.01$),ultrasound gestational age ($r=0.97$), (Fig.4)($P<0.01$). It is observed that there is no significant difference in placental thickness with advancing gestation based on implantation site.

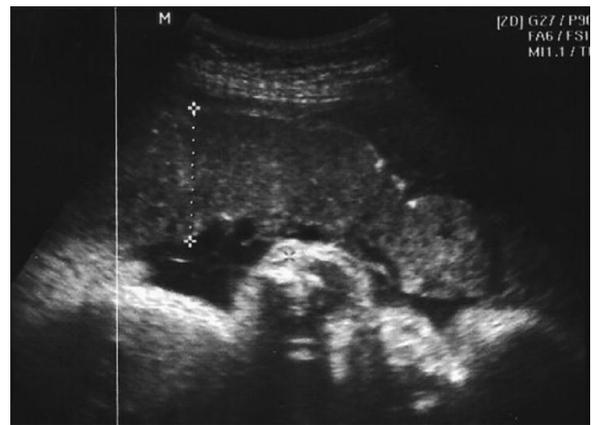


Fig. 1 Measurement of fetal placental thickness



Fig.2 Relationship between menstrual gestational age and Placental Thickness

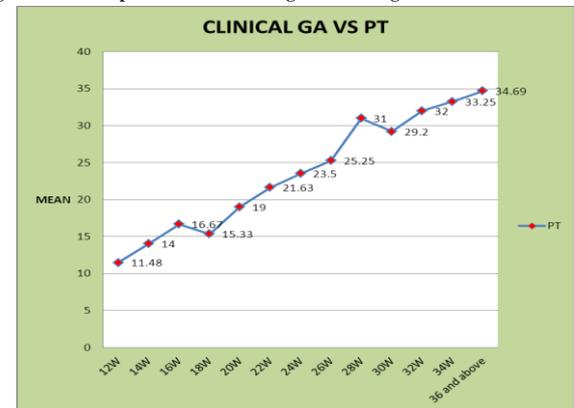


Fig.3 Relationship between clinical gestational age and Placental Thickness

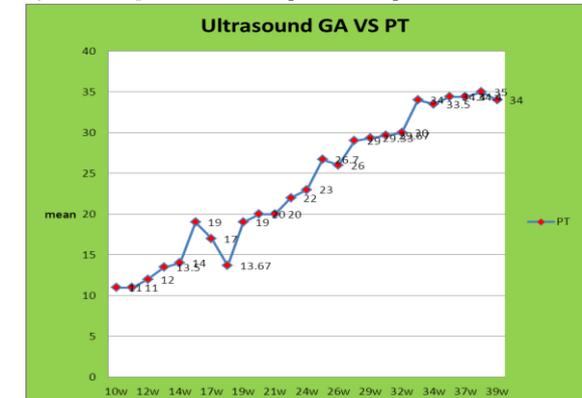


Fig.4 Relationship between ultrasound gestational age and Placental Thickness

RELATIONSHIP OF PLACENTAL THICKNESS WITH MENSTRUAL GA, CLINICAL GA, AND USG GA

Pearsons correlation	'r' value	Significance
Menstrual gestational Age	.988	.001
Clinical gestational Age	.980	.001
USG gestational Age	.979	.001

4.DISCUSSION

Knowledge of gestational age is important to the obstetrician because it can affect clinical management in a number of important ways. Upto 50% of mothers who claim to know their obstetric dates with certainty, in fact have more than 2 weeks in error when gestational age is calculated with ultrasound. Clinical dating is not 100% accurate. Even a patient with reliable clinical criteria should have a real time ultrasound examination for confirmation. The methods commonly used involves measurement of CRL, BPD, HC,AC, & FL. These are supposed to be more predictive of estimated date of confinement but fetal biometric estimates of age are less accurate as pregnancy progresses and are not accurate in determining gestational age in third trimester. Hence this study is conducted to find how accurate is placental thickness in estimating gestational age especially in the second and third trimester.

The normal placenta increases in volume throughout gestation. The thickness of placenta can be measured sonographically at the mid placenta perpendicular to the plane of the placenta. The results obtained are in a mean thickness in mms approximately equal to menstrual age in weeks.

Our study results are consistent with observations made by Mittal et al 2002³, Anupama Jain 2001⁴ who reported the mean placental thickness increased with advancing gestation and almost matches from 22 to 35 weeks.

In our study there is no significant difference in placental thickness with advancing gestation based on implantation site similar to the observation of Hoddick et al⁵ and unlike Durnwald et al⁶ study in which placental thickness of posterior and fundal placenta in the third trimester was greater than anterior placenta.

Habib FA⁷ framed a warning limit of placental thickness of 2 cms at 36 weeks gestation as a predictor of LBW infants and subsequent IUGR. In our study none of the cases at 36 weeks had placental thickness of less than 2cms.

Elchalal et al⁸ analysed sonographically thick placenta (> 4cms or > 90th percentile) is associated with increased perinatal mortality and morbidity like fetal anomalies, small for gestational age infants, large for gestational age infants at term. In our study none of the cases had placental thickness of more than 4cms.

Since the above said studies were all cross sectional studies, it is unwise to declare that placental thickness can be used as a reliable predictor of the gestational age. But there is a scope to venture into this segment and to come out with a refinement after taking up multicentre longitudinal studies with several large samples.

5.CONCLUSION:

Since there is statistically significant correlation between placental thickness and gestational age, placental thickness can be used as a reliable parameter in late second and third trimester for calculating gestational age when exact duration of pregnancy is not known. In abnormal placental thickness for the corresponding gestational age, the disease conditions which cause an increased or decreased placental thickness should be addressed. It can also be used as a prognostic value in identifying subsequent occurrence of IUGR. So in some exceptional cases, when normality of any one of the fetal biometric parameters is in doubt, gestational age can be assigned by placental thickness.

6.ACKNOWLEDGEMENT:

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