

Correlation of Ultrasonographic Estimated Placental Thickness with Gestational Age and Fetal Weight in Late Second and Third Trimester

Sumit Gupta¹, William Masih²,
Parul Gupta³

¹Assistant Professor, Dept of Anatomy, Government Medical College, Kota, Rajasthan, India.

²Professor, Department of Anatomy, Government Medical College, Kota, Rajasthan, India.

³Private Practitioner and Consultant Gynaecologist, Kota, Rajasthan, India.

Date of Submission: 22-07-2017

Date of Acceptance: 20-08-2017

Date of Publishing: 12-09-2017

ABSTRACT

Background: The aim of this study was to find out relationship of placental thickness, measured at the level of the umbilical cord insertion, with ultrasonographic estimated gestational age and fetal weight in late second and third trimester of pregnancy. **Methods:** A total of 450 pregnant females (24th to 39th weeks of pregnancy) ultrasound were observed over a period of one year. Placental thickness was measured at the level of umbilical cord insertion. They were divided into two groups for data analysis, Group A (outcome fetal weight < 2500 gms, n=102) and Group B (outcome fetal weight ≥ 2500 gms, n=348). The mean values of placental thickness were calculated and the birth weight of newborns were also noted. **Results:** After statistical analysis of data, a positive correlation was observed between placental thickness and ultrasonographic gestational age in both group. The placental thickness was found to be lower in newborns having birth weight less than 2500gms. **Conclusion:** Placental thickness can be used as a predictor of the gestational age and fetal weight outcome and it acts like a mirror, reflecting the statuses of both the mother and the foetus. So, the placental thickness should be observed routinely during the late stages of obstetric ultrasound.

Keywords: Transabdominal ultrasonography, placental thickness, gestational age, trimester, fetal weight.

INTRODUCTION

The placenta is a fetal organ which provides the physiological link between pregnant woman and the fetus. The placenta is highly vascularized organ and its main functions are to exchange of metabolic, gaseous products between maternal and fetal blood stream and production of hormones.^[1]

The placenta develops from the chorionic villi at the implantation site at about the 5th week of gestation and by the 9th or 10th weeks of the diffuse granular, echotexture of the placenta is clearly apparent at sonography.^[2]

It is usually 2-4 cm thick and weighs about 600 grams. It is technically defined as the apposition or fusion of fetal organs to maternal tissue for the purpose of physiologic exchange.^[3]

The placenta thickness appears to be promising parameter for estimation of gestation of intra uterine fetus age. This is due to increase in placental thickness with gestational age.^[3]

Several studies have reported an increase the placenta thickness with gestational age. The Studies reported by

Name & Address of Corresponding Author

Dr Sumit Gupta,
Assistant Professor,
Deptt. Of Anatomy,
Govt. medical college,
Rangbari, Kota-324005

Arfa A et al, Jain A et al. and Mital et al. have confirmed the placenta thickness as an indication of gestational age of fetus.^[4-6]

It was observed that the placenta thickness gradually increased from 11 weeks of gestation to 39 weeks. From the 22nd week to the 35th week of gestation the placental thickness coincide almost exactly with the gestational age in weeks.^[7]

The aim of this study is to establish relationship that serial evaluation of placental thickness in second and third trimester could help to determine normal development and functional placenta and a good parameter to access of fetal growth and birth weight.

MATERIALS AND METHODS

A prospective study was done on n= 450 antenatal women who were attended the sonography center for routine antenatal ultrasonography after ruling out maternal diseases. The ultrasonography machine which was used was Philips clearvue 350, with the use of a 3.5 MHz convex array transducer.

The inclusion criteria were as follows

1. Singleton pregnancies, 24th - 39th weeks.
2. A history of regular menstruation.

The exclusion criteria were as follows

1. Maternal Disease
 - a. Gestational Diabetes.
 - b. Hypertension (Systemic hypertension and Pregnancy induced hypertension)
 - c. Anaemia
2. Foetal anomalies.
3. Placenta previa, placental anomalies and poor visualization of the placenta
4. Multiple pregnancies.
5. Irregular menstrual periods.

Their earlier investigations like report of fetal anomaly scan, quadruple test were observed carefully and the transducer scan was also performed to determine the foetal anomalies if there was any. The gestation age was determined by measuring the biparietal diameter, the abdominal circumference, the crown rump length, the head circumference and the femur length. The placental thickness was measured at the level of the umbilical cord insertion perpendicular to the uterine wall; the maximum thickness was noted in the cross section. The subjects were in the supine position with a full urinary bladder while they underwent the ultrasonography.

Subsequently, the fetal outcome was assessed and correlated with the outcome variables of postpartum fetal weight (categorizing into groups of baby weights < 2,500 and > 2,500 g).

Data was statistically analyzed by SPSS software. Data were analyzed for normal distribution using the Kolmogorov Smirnov test. “t”-test was applied to compare the difference between the mean of the two groups. Relationship between two parameters was measured by Pearson’s correlation coefficient. A “p” value ≤ 0.05 was considered significant.

RESULTS AND DISCUSSION

Total 450 pregnant women were scanned in their late second and third trimester of pregnancy and they were tabulated in sonographic estimated gestational age and mean placental thickness [Table 1].

Accurate determination of gestational age has become important for deciding the appropriate time for termination of the pregnancy as well as to monitor the fetal growth during the entire period of pregnancy⁸. In addition to the routine fetal biometry parameters, various studies were done trying to deduce a relationship between the placental thickness and gestational age and the estimated fetal weight.^[5,6,9]

Table 1: Showing the mean placental thickness according to the gestational age in both groups

USG gestational age (weeks group)	Group B n=348	Mean placental thickness(cm s)	Group A n=102	Mean placental thickness(cm s)
24-27	70	2.66	11	2.38
28-31	68	2.99	18	2.72
32-35	126	3.35	60	3.18
36-39	84	4.05	13	2.78

A fairly linear increase in mean placental thickness with gestational age was observed in correlation analysis studies conducted to determine the relationship between placental thickness and gestational age¹⁰. The value of the mean placental thickness increased with advancing gestational age, almost matching from the 22nd to the 35th week and 27 to 33 weeks in two separate studies conducted in India.^[5,6] Significant positive correlations between placental thickness and estimated fetal weight in the second and third trimesters ($p < 0.05$) in a non-IUGR group were also demonstrated⁹. A positive correlation, with increasing placental volume with increasing gestational age, was also observed, but it remained reduced in the growth-restricted fetuses.^[11] The usefulness of this relationship between placental thickness and growth parameters is that subnormal placental thickness for a gestational age may be the earliest indication of fetal growth retardation.^[10] In our study, a significant positive correlation is seen between placental thickness and the ultrasonographic gestational age in days in both groups.

A lower mean placental thickness at 36 weeks of gestation was observed in the < 2,500 g group as compared to the > 2,500 g group in a study conducted in Saudi Arabia.^[12]

Normal placental function and structure is a necessary factor for the formation of a healthy fetus and consequently normal birth weight.^[12] Early detection of any pathology in the placental bed and villi helps obstetrician to consider prenatal care precisely.^[13] The rate of placental growth appears to be an important determinant of birth weight. Several aspects of placental growth including volume, weight, and plate area were investigated in different researches in order to find their correlation with fetal anthropometry.^[14] Correlation of placental thickness with gestational age and fetal

growth was also reported in a research by Karthikeyan et al.^[15]

An enlarged placenta (placentomegaly) is suspected if the PT is > 40 mm at term and if it is associated with gestational Diabetes mellitus, intra uterine infections, hydrops foetalis, anaemia and α -thalassaemia.^[16] So, an increased PT for that GA should raise a suspicion about the possible disease conditions.

Sonographic measurement of placental thickness is a relative simple and clinically useful way to detect 'early warning signs' which could be done in any unequipped obstetrician center. Cooley et al.^[17] suggested that antenatal ultrasound of the placenta may aid detection of placental disease. They showed the placental thickness in the second trimester was less in pregnant women complicated by chorioamnionitis.^[17]

Recently, investigators are trying to increase detection rate of early sign for impaired placentation by combination of ultrasound findings with placental hormones such as human chorionic gonadotrophin (hCG), progesterone and pregnancy associated placenta protein A (PAPP-A).^[18]

CONCLUSION

Placental thickness measured at the level of umbilical cord insertion can be used as a sonographic indicator in the assessment of gestational age in singleton pregnancies. Therefore, it can be used as an additional sonographic parameter in correlating gestational age in cases where last menstrual period is not known and in detecting patients developing intrauterine growth retardation.

REFERENCES

- Sadler TW; Langman's medical embryology. 9th edition, Baltimore, MD: Lippincott Williams and Wilkins, 2004:117- 148.
- Spirt BA, Gordon LP; Sonography of the placenta. In Fleischer AC, Manning FA, Jeanty P, Romero R editors; Sonography in obstetrics and gynaecology: principles and practice. 5th edition, Connecticut, USA: Appleton and Lange, 1996: 173-202.
- Hoddick WK, Mahony BS, Callen PW, Filly RA; Placental thickness. J Ultra Med., 1985; 4(9): 479-482.
- Arafa A, Alrashid Rahim; The Correlation between Placental Thickness and Fetal Age among the Pregnants in Sudan Scholars Journal of Applied Medical Sciences (SJAMS), 2014; 2(1D):395-398
- Jain A, Kumar G, Agarwal U, Kharakwal S; Placental thickness: a sonographic indicator of gestational age. Journal of Obstetrics and Gynaecology of India, 2001; 51: 3: 48-49.
- Mital P, Hooja N, Mehndiratta; Placental thickness: a sonographic parameter for estimating gestational age of the fetus. Ind J Radiol Imag., 2002; 12: 4: 553-554.
- Dudley NJ, Fagan DG, Lamb MP; Ultrasonographic placental grade and thickness Associations with early delivery and low birthweight. British Journal of Radiology, 1993; 66(782): 175-177.
- Cunningham FG, Leveno KJ, Bloom SL, et al. In ultrasonography and Doppler, Williams obstetrics. 22nd ed. New York: McGraw Hill; 2005. p. 389-90.
- Abu PO, Ohagwu CC, Eze JC, et al. Correlation between placental thickness and estimated fetal weight in Nigerian women. Ibmosina J Med Biomed Sci. 2009;1(3):80-85.
- Ohagwu CC, Abu PO, Udoh BE; Placental thickness: A sonographic indicator of gestational age in normal singleton pregnancies in Nigerian women. Internet Journal of Medical Update, 2009; 4(2): 9-14.
- Damodaram M, Story L, Eixrach E, et al. Placental MRI in intrauterine fetal growth restriction. Placenta. 2010;31(6):91-498. doi: 10.1016/j.placenta.2010.03.001
- Habib AF. Prediction of low-birth weight infants from ultrasound measurement of placental diameter and placental thickness. Ann of Saudi Med. 2002;22(5-6):312-314.
- Tongsong T, Boonyanurak P. Placental thickness in the first half of pregnancy. J Clin Ultrasound. 2004;32(5): 231-4.
- Azpurua H, Funai EF, Coraluzzi LM, Doherty LF, Sasson IE, Kliman M, et al. Determination of placental weight using two-dimensional sonography and volumetric mathematic modeling. Am J Perinatol. 2010;27(2): 151-5.
- Karthikeyan T, Subramaniam RK, Johnson WMS, Prabhu K; Placental Thickness & its Correlation to Gestational Age & Foetal Growth Parameters- A Cross Sectional Ultrasonographic Study. J Clin Diagn Res., 2012; 6(10): 1732-1735.
- Callen PW, editor. Ultrasonography in Obstetrics and Gynaecology. 5th ed. Philadelphia: Elsevier, a division of Reed Elsevier India Limited; 2002. pp. 225-65. Chapter 7 – USG evaluation of foetal biometry & abnormal growth
- Cooley SM, Donnelly JC, Walsh T, McMahon C, Gillan J, Geary MP. The correlation of ultrasonographic placental architecture with placental histology in the low-risk primigravid population. J Perinat Med. 2013 Mar 21:1-5
- Suri S, Muttukrishna S, Jauniaux E. 2D ultrasound and endocrinologic evaluation of placentation in early pregnancy and its relationship to fetal birthweight in normal pregnancies and pre-eclampsia. Placenta. 2013 Jun 8

Copyright: Academia Anatomica International is an Official Publication of "Society for Health Care & Research Development". This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

How to cite this article: Gupta S, Masih W, Gupta P. Correlation of Ultrasonographic Estimated Placental Thickness with Gestational Age and Fetal Weight in Late Second and Third Trimester. Acad. Anat. Int. 2017;3(2):49-51.

Source of Support: Nil, **Conflict of Interest:** None declared.