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ULTRASONOGRAPHIC ASSESSMENT OF PLACENTAL THICKNESS AND PLACENTAL LOCATION IN THIRD TRIMESTER SCAN

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ABSTRACT

Background: Placenta being an important organ and its measurement always had prospect of being important marker for feto-maternal health. The aim of the study was sonographic estimation of placental thickness, measured at the level of the umbilical cord insertion and study the placental thickness values and location. **Methods**: In this study, total 296 patients were included. The study was conducted on pregnant women with pregnancy between 28 weeks to 40 weeks who were unequivocal about the LMP. The antenatal subjects attending the antenatal clinic at Kamla Nehru State hospital for mother and child and IGMC Shimla were enrolled for the study. All antenatal mothers with known LMP at their antenatal visit between 28- 40 weeks of gestation irrespective of their prior scans, who satisfied the inclusion and exclusion criteria were subjected to ultrasonographic examination. The placental thickness was measured and recorded. **Results**: We observed that mean placenta thickness was 3.66±0.92 cm and placental thickness below 10th percentile was considered as abnormally thin placenta (4.95 cm). We observed that 28 patients had abnormally thin placenta while 30 patients had abnormally thick placenta. Fundo-anterior location seen in 35% patients. **Conclusion**: This study concludes that sonographic measurement of placental thickness is an easy tool which can be used in pregnancy to depict variation in placental thickness measurement. Fundo-anterior as most common placental location.

KEYWORDS: Placental Thickness, obstetric sonography, placental location.

I. INTRODUCTION

The placenta is the vital organ for promoting and maintaining pregnancy and normal fetal development.[1] It aids in transport of essential nutrients. Term placenta is about 23 cm in diameter and 2.0 to 2.6 cm thick. It generally weighs approximately 470 g, with an average volume of 500 mL.[2] Adequate fetal growth and subsequent normal birth weight depends on the efficient delivery of nutrients from the mother to the fetus via normally functioning utero-placental organ.[3] It is clear that normal development of placenta during gestation is necessary for supporting of a healthy fetus.[4] Placental size is a reflection of health and size of the fetus. The human placenta develops with the principal function of providing nutrients and oxygen to the fetus. Adequate fetal growth, development and subsequent normal birth weight depends on the efficient delivery of nutrients from the mother to the fetus via normally function in utero-placental organ. The placenta develops from chorionic villi at the implantation site at about fifth week of gestation and by then in the tenth week, it is clearly apparent at sonography as diffuse granular ehotexture.[5] It is typically 2-4 cm thick and weighs around 600 grams at full term.[6] Ultrasound measurement of placental thickness is a relatively simple, reproducible and a clinical useful way, which has been used for more than two decades. Most of the placental growth occurs in the third trimester. Goldenberg et al.[7] stated that the birth size was only predicted in the third trimester by fetal ultrasound measurements. Many studies were retrospective or cross-sectional in design and could not truly show the relationship between placental measurements and fetal outcome.[8,9] It seems reasonable that evaluation of placental thickness in second and third trimester could help to determine normal development and placental functions and deserves to be a good predictor of fetal growth and birth weight. As a general rule, the placental thickness in millimeters should be equal to the gestational age in weeks ±10 mm. Placental thickness less than 2.5 cm at term is associated with intrauterine growth retardation of the fetus, preeclampsia, prematurity, fetal malformation or trisomy, small for date fetus and neonatal polycythemia.[10,11] An enlarged placenta (placentomegaly) is suspected if the placental thickness is >4cm thick at term and if it is associated with

gestational diabetes mellitus, intrauterine infections, hydrops foetalis and alpha- thalassaemia type.[10,12,2] This prediction of growth restricted pregnancies from placental size is based on the fact that diminished placental size precedes fetal growth restriction.[13] Obstetric ultrasonography offers the tools to estimate assess placental size. Placental thickness is the easiest placental dimension to measure, yet little is known about the "normal" placental thickness as measured by sonography. Placental thickness is very much related to fetal development and may be a key in perinatal outcome. So, this study was focused on ultrasonographic assessment of placental thickness and its location. The placenta can be situated anywhere on the surface of the uterus. The front wall is called anterior. The back wall is called posterior. The side walls are called left lateral or right lateral. The top wall is called fundal. If the leading edge of the placenta remains within 2 cm of the internal os over the course of the pregnancy, this frequently leads to an abdominal delivery because of the unacceptably high risk of hemorrhage with a vaginal delivery.[14] When the placenta is implanted in the more normal places (anterior, posterior, fundal or lateral) there are rarely any complications due to normal bloody supply, however if the placenta is located at the bottom on your uterus (placenta previa) there are relatively more fetal and maternal complications.

II. MATERIAL AND METHODS

This observational cohort study was conducted in the department of radiodiagnosis at IGMC Shimla and Deptt. Of obstetrics and gynaecology at Kamla Nehru Hospital for mother and child, Shimla over a period of one-year w.e.f 1st July 2018 to 30th June 2019. The study was conducted on pregnant women with pregnancy between 28 weeks to 40 weeks who were unequivocal about the LMP. The antenatal subjects attending the antenatal clinic at Kamla Nehru State hospital for mother and child and IGMC Shimla were enrolled for the study irrespective of the parity. The research procedure was in accordance with the approved ethical standards of Indira Gandhi Medical College and Hospital, Shimla, Ethics Committee. An informed written consent was taken from all participants (Appendix I) and cooperation was requested for the study.

Study Design: Observational Cohort Study.
Study location: This was a tertiary care teaching hospital based study done in Department of Radio-diagnosis, Indira Gandhi Medical collage Shimla, Himachal Pradesh, India and Kamla Nehru Hospital for mother and child Shimla.
Study duration: July 2018 to June 2019.
Sample size: 296 patients.

A detailed history was taken to check following inclusion and exclusion criteria, and all the participants underwent a thorough general physical and detailed obstetrical examination, and findings were recorded on predesigned patient proforma.

Inclusion Criteria
1. Singleton uncomplicated pregnancies with confirmed LMP.
2. Gestation between 28 to 40 weeks.

Exclusion Criteria
1. Gestational diabetes
2. Anemia
3. Foetal anomalies
4. Multiple pregnancies
5. Irregular menstrual cycles
6. Last menstrual period not known
7. Chorioamnionitis
8. Maternal infections
9. Hydrops fetalis

All antenatal mothers with known LMP at their antenatal visit between 28- 40 weeks of gestation irrespective of their prior scans, who satisfied the inclusion and exclusion criteria were subjected to ultrasonographic examination. The placental thickness was measured and recorded. Ultrasonographic examination was performed in the Kamla Nehru State Hospital and IGMC Hospital and performed using a 3.5MHz convex transducer on Logiq P6(GE) machine. This scan was performed with optimally filled bladder with the mother in the supine position.

Placental thickness was measured in millimeters at the level of umbilical cord insertion in its longitudinal direction and the mean of 3 readings was taken (mean=R1+R2+R3/3) and were recorded. While measuring the thickness of placenta, the calipers were perpendicularly placed. Measurement was done when uterus was fully relaxed at level of cord insertion. delivery.

Statistical analysis
Data were presented as frequency, percentage.

III. OBSERVATIONS AND RESULTS

The aim of the study was sonographic estimation of placental thickness, measured at the level of the umbilical cord insertion and study the placental thickness values and placental location. A total of 296 patients were included in the study over the period of one year in Department of Radiodiagnosis, Indira Gandhi Medical College (IGMC), Shimla (Himachal Pradesh). Results of the study are described as follows:
Placental thickness We observed that mean placenta thickness was 3.66±0.92 cm and placental thickness below 10th percentile was considered as abnormally thin placenta (4.95 cm). We observed that 28 patients had abnormally thin placenta while 30 patients had abnormally thick placenta.

Table 1: Placental thickness.

	n	%
Abnormally thin placenta	28	9.46
Normal placenta	238	80.14
Abnormally thick placenta	30	10.14

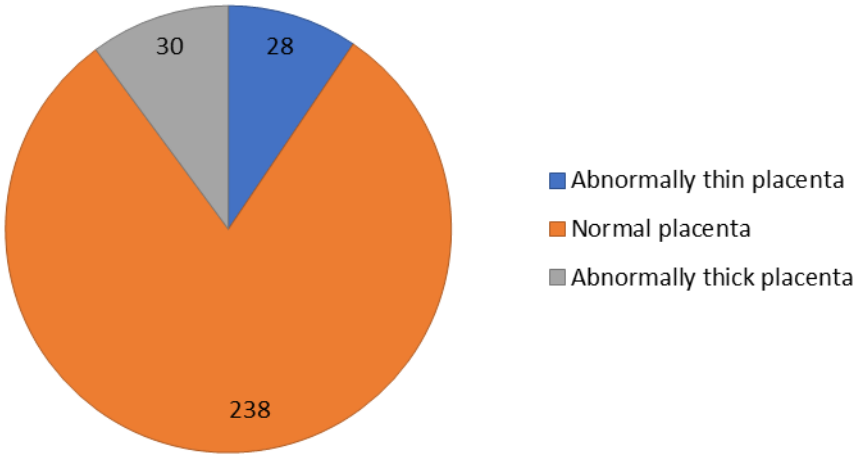

Figure 1: Placental thickness.

Placental location

It was observed that fundo-anterior was the most common placenta location in 35% cases followed by fundo-posterior (26.69%).

Table 2: Placental location.

Placental Location	N	%
Anterior and Upper	66	22.30
Body Left Lateral	49	16.55
Fundo anterior	102	34.46
Fundo posterior	79	26.69

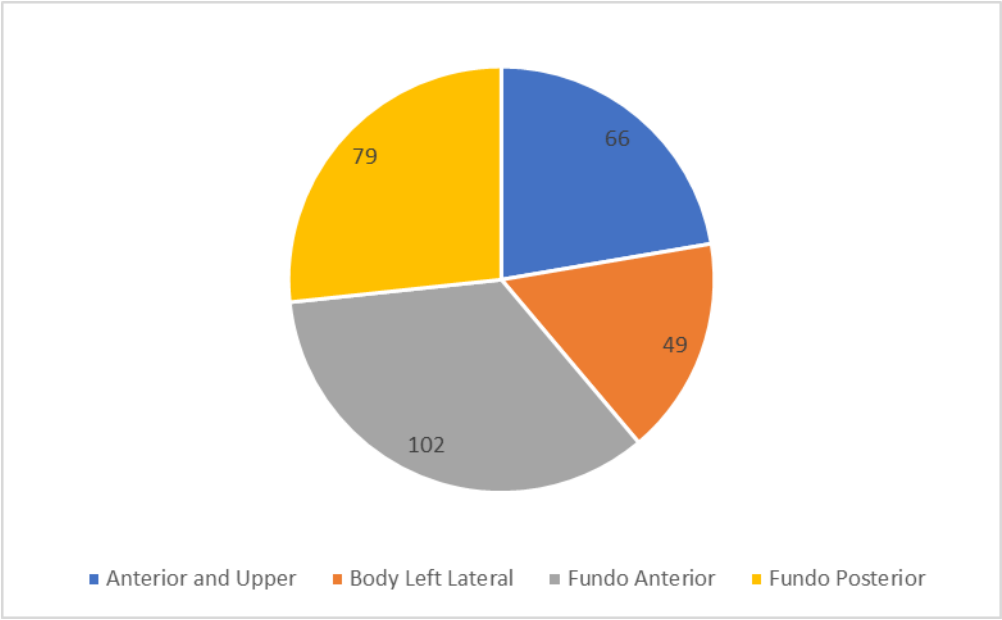

Figure 2: Placental location.

IV. DISCUSSION

The placenta is a complex yet an important organ with multiple functions. A normally functioning placenta is required for normal fetal growth and development. It has been historically documented that placental weight in a normal pregnancy at term is about one-fifth of the fetal weight.[15] The placental measurement such as placental thickness must reflect the nutritional status of the fetus and the fetal outcome. Placental thickness is the simplest measurement of placental size. The placenta, a highly vascular fetal organ, maintains the feto-maternal circulation via its connection: the umbilical cord. A normally functioning placenta is critical for normal fetal growth and development. The size of placenta increases during fetal growth period to allow it to carry out its vital functions. If the fetal growth is compromised it is due to the abnormal functioning of the placenta which can be detected by the abnormal placental measurements.[16] Placental thickness is very much related to fetal development and may be a key in perinatal outcome. According to Sadler et al., (2004), at term placenta is 36 approximately 3 cm thick and measures 15-25 cm in diameter.[17] Small placentas are associated with preeclampsia, chromosomal abnormalities, severe maternal diabetes mellitus, chronic fetal infections and intrauterine growth restriction.[18] The placentas over 4 cm thick at term have been observed in conditions like diabetes mellitus, perinatal infections and hydrops fetalis (both immune and non-immune). The incidence of perinatal morbidity and mortality was considerably higher among gravida with thick placenta, related to higher rates of fetal anomalies and higher rates of both small for gestational age and large for gestational age neonates at term.[19] We observed mean placental thickness was 3.66±0.92 cm. 10% and 9.5% patients had abnormally thick and thin placenta respectively. In the study by Nagpal et al, mean placental thickness at 32 and 36 weeks were 33.45 ± 1.62 and 35.7 ± 2.08 mm30 respectively. Thin placenta can be due to preeclampsia, intrauterine growth restriction and chorioamnionitis. Mathai et al. in 2013 studied the correlation of placental thickness in 498 subjects with ultrasonographic gestational age and fetal outcome by dividing them into two groups—Group A (outcome fetal weight 2500 g, n = 376). They found a positive correlation between placental thickness and ultrasonographic gestational age in both groups.[20] They also concluded that placental thickness in Group A between 26 and 27 weeks and 30 and 31 weeks had lower mean values of 2.48 ± 0.063 cm (p value < 0.05) and 2.76 ± 0.552 (p value = 0.05) as compared to 3.04 ± 0.25 and 3.13 ± 0.183 cm in Group B. Balla et al. studied ultrasonographic placental thickness in 53 Sudanese pregnant women in second and third trimesters.[21] They concluded that thickness of less than 25 mm during third trimester is less than normal and might be an indication of intrauterine growth restriction and thickness of more than 45 mm was considered thicker than normal, which might be an indication of maternal diabetes, hypertension, fetal hydrops and other abnormalities. Normal values of placental thickness in normal singleton fetuses were in range of 25–45 mm in the 3rd trimester, and between 18 and 24 mm, in the second trimester.[22] Li et al. in 2015 demonstrated sonographic placental thickness as one of the cost-effective screening tool for detecting α-thalassemia major fetuses.[23] Normal placental thickness in Indian women was found to be 30.1-36.7 mm at 32 weeks and at 31.1– 39.9 mm at 36 weeks in our study. The definitive placenta is clearly visible on ultrasound from approximately 9 - 10 weeks of gestation, when it demonstrates a uniformly granular echogenic pattern. Ultrasonography (US) enables the evaluation of the placenta and the detection of placental abnormalities using different parameters such as placental thickness and volume or special techniques like three-dimensional (3D) power Doppler. Recent studies have focused on 3D measurement of placenta to predict the adverse pregnancy outcome; however, this technique is relatively new, needs complex clinical setting and gives conflicting results regarding its reproducibility in measuring placental thickness. Ultrasound measurement of placental thickness is a relatively simple, reproducible and clinically useful way, which had been used for more than two decades.

V. CONCLUSION

The sonographic measurement of placental thickness, at the level of cord insertion site is relatively convenient and is clinically useful. This study concludes that ultrasonographic measurement of placental thickness is an easy tool which can be used in pregnancy to depict variation in placental thickness measurement. Also this study highlighted the various placental location in third trimester scans with fundo-anterior as most common location.

REFERENCES

1. Addai FK. Association of histologic component volumes of shed human placentae with placental index and gestational age of neonates, and haemoglobin genotype of mothers. West African Journal of Anatomy, 1997; 5: 21–22.
2. Afodun AM, Ajao MS, Enaibe BU. Placental Anthropometric Features: Maternal and Neonate Characteristics in North Central Nigeria. Advances in Anatomy, 2015; 2015: 790617.
3. 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: 151-5.
4. Salafia CM, Zhang J, Miller RK, Charles AK, Shrout P, Sun W.Placental growth patterns affect birth weight for given placental weight. Birth Defects Res Clin Mol Teratol, 2007; 79: 281-8.
5. Elsayes KM, Trout AT, Friedkin AM, Liu PS, Bude RO, Platt JF, et al. Imaging of the placenta: a multimodality pictorial review. Radiographics, 2009; 29: 1371–91.

6. Filly R, Hoddick WK, Mahony BS, Callen PW, Filly RA et al. Placental thickness. J Ultrasound Med., 1985; 4: 479–82.
7. Goldenberg RL, Cliver SP, Neggers Y, Copper RL, DuBard MD, Davis RO, et al. The relationship between maternal characteristics and fetal and neonatal 45 anthropometric measurements in women delivering at term: a summary. Acta Obstet Gynecol Scand, 1997; 165: 8-13.
8. Elchalal U, Ezra Y, Levi Y, Bar-Oz B, Yanai N, Intrator O, Nadjari M. Sonographically thick placenta: a marker for increased perinatal risk–a prospective cross-sectional study. Placenta, 2000; 21: 268-72.
9. Clapp JF 3rd, Rizk KH, Appleby-Wineberg SK, Crass JR. Second-trimester placental volumes predicts birth weight at term. J Soc Gynecol Investig, 1995; 2: 19-22.
10. Spirt BA, Gordon LP. Sonography of the placenta. In: Fleischer AC, Manning FA, Jeanty P, Romero R, editors. Sonography in obstetrics and gynaecology: principle and practice. Appleton & Lange, 1996; 173-202.
11. Sadler TW. Longman's medical embryology. 9 th edition. Baltimore, MD: Lippincott Williams and Wilkins, 2004; 117-48.
12. Benirschke K, Kaufmann P. Pathology of the human placenta. 2 nd edition. NewYork: Springer-Verlag, 1990.
13. Kuhlmann RS, Wars of Ultrasound of the placenta. Clin Obstet Gynecol, 1996; 39: 513-34.
14. Bhide A, Prefumo F, Moore J, Hollis B, Thilanganathan B. Placental edge to internal os distance in the late third trimester and mode of delivery in placenta previa. *BJOG*, 2003.
15. Woods L, Perez-Garcia V, Hemberger M. Regulation of Placental Development and Its Impact on Fetal Growth-New Insights From Mouse Models. Front Endocrinol (Lausanne), 2018; 9: 570.
16. Salavati N, Smies M, Ganzevoort W, Charles AK, Erwich JJ, Plösch T, et al. The Possible Role of Placental Morphometry in the Detection of Fetal Growth Restriction. Front Physiol, 2019 8; 9: 1884.
17. Sadler T. Third month to birth. The fetus and placenta Lang man's Medical Embryology, 9th ed.: Lippincott Williams & Wilkins; 9th Bk & Cdr edition (March 26, 2003); 2003.
18. Mital P, Hooja N, Mehndiratta K. Placental thickness: a sonographic parameter for estimating gestational age of the fetus. Ind J Radio Imag., 2002; 12(4): 553- 54.
19. Grannum PA, Berkowitz RL & Hobbins JC. The ultrasonic changes in the maturing placenta and their relation to fetal pulmonary maturity. Am J Obstet Gynecol, 1979; 133(8): 915-22.
20. Mathai BM, Singla SC, Nittala PP, Chakravarti RJ, Toppo JN. Placental thickness: its correlation with ultrasonographic gestational age in normal and intrauterine growth-retarded pregnancies in the late second and third trimester. J Obstet Gynaecol India, 2013; 63(4): 230–233. 50
21. Balla EAA, Ahmed MS, Ayad CE, et al. Prediction of fetal growth by measuring the placental thickness using ultrasonography. J Gynecol Obstet, 2014; 2(2): 26–31.
22. Adhikari R, Deka PK, Tayal A, Chettri PK. Ultrasonographic evaluation of placental thickness in normal singleton pregnancy for estimation of gestational age. Int J Med Imaging, 2015; 3(6): 143-7.
23. Li X, Zhou Q, Zhang M, et al. Sonographic markers of fetal α-thalassemia major. J Ultrasound Med., 2015; 34(2): 197–206.