

Original Research Article

Placental thickness and its ultrasonographic correlation with estimated fetal weight

A.V.N. Suseela¹, B V V Ch Satyavani^{2*}, G. Rama Devi³

^{1,2}Post Graduate, ³Assistant Professor

Department of Obstetrics and Gynecology, Govt. Victoria Hospital, Andhra Medical College, Visakhapatnam, Andhra Pradesh, India

*Corresponding author email: dr.avn.suseela@gmail.com

	International Archives of Integrated Medicine, Vol. 7, Issue 2, February, 2020. Copy right © 2020, IAIM, All Rights Reserved. Available online at http://iaimjournal.com/
	ISSN: 2394-0026 (P) ISSN: 2394-0034 (O)
	Received on: 11-01-2020 Accepted on: 19-01-2020 Source of support: Nil Conflict of interest: None declared.
How to cite this article: A.V.N. Suseela, B V V Ch Satyavani, G. Rama Devi. Placental thickness and its ultrasonographic correlation with estimated fetal weight. IAIM, 2020; 7(2): 23-28.	

Abstract

Introduction: Placenta supplies oxygen and all the necessary elements for the growth and development of the fetus. It is historically documented that placental weight is one fifth of the fetal weight and abnormally thin or thick placenta is associated with increased incidence of perinatal morbidity and mortality. Objective of present study was to correlate the relationship between placental thickness with estimated fetal weight.

Materials and methods: The present study was a prospective observational study and included 250 pregnant women with known last menstrual period, history of regular menstruation, singleton pregnancy and aged between 20-30 years. After Institutional Ethics committee approval, all women enrolled in study were observed for age, parity, past medical events and demographic data at first antenatal visit. All women were provided an informed written consent and underwent ultrasound evaluation of placental thickness at 36-40 wks.

Results: Neonatal outcome was good in women with normal placental thickness (10th - 95th percentile) at 36 weeks. 76% of cases were of age group between 20-30 years. 52% of cases in this study were primigravida. Most of the cases had normal placental thickness (76%).

Conclusion: Placental thickness measured at the level of umbilical cord insertion can be used as an accurate sonographic indicator in the assessment of fetal weight because placental thickness should be measured in addition to biometric parameters in antenatal women undergoing ultrasound.

Key words

Placental thickness, Ultrasonography, Fetal weight, Correlation.

Introduction

Adequate fetal growth and subsequent normal birth weight depends on the efficient delivery of nutrients from the mother to the fetus. Placental thickness is the easiest placental dimension to measure, Placental thickness of 2.5 cm to 3.75 cm is taken as normal. A placental thickness of ≥ 4 cm is regarded as abnormal [1]. It is documented that placental weight in a normal pregnancy at term is about one-fifth of the fetal weight. placental thickness is the simplest measurement of placental size. Measurement of placental thickness has to be taken perpendicularly at the level of umbilical cord [2]. Thick placenta seen in Rh-ve pregnancy, GDM, Anemia, TORCH infections, Hydrops fetalis, Fetal macrosomia [2].

Thin placenta is seen in Preeclampsia, IUGR, Chorioamnionitis, Placenta membranacea [2]. Placental thickness tends to gradually increase with gestational age in a linear fashion. sonographically, this can be seen to approximate 1 mm per week and the thickness of placenta can be used to approximate gestational age. Anterior placentas are ~ 0.7 cm thinner than posterior or fundal placenta [3]. Placenta is visible by 10 weeks gestation at transabdominal ultrasound, color Doppler imaging used to detect intervillous blood flow by 12-14 weeks, Between 12-16 weeks, chorion and amnion fuse. By 15 weeks, placenta is well formed. Placenta may show a few a few focal sonographic lucencies with slow flow, called venous lakes [4].

The normal function of placenta reflects on normal fetal weight and subsequent normal birth weight [5].

Materials and methods

It was a prospective observational longitudinal study. Total 250 cases were studied from August 2018 to July 2019. This study was done in the Department of Obstetrics and Gynecology of

Government Victoria Hospital in collaboration with Department of Radio diagnosis and Pediatrics. All patients were provided an informed written consent after they were fully instructed about the investigation.

All recruited women were observed at the 1st trimester screening at antenatal clinic and assessed for baseline demographic and obstetric data including age, parity and past medical events. All pregnant women underwent ultrasound evaluation of placental thickness at 36-40 weeks of gestation.

Inclusion criteria

- All Singleton pregnancies
- Gestational age between 36-40 weeks.
- Gestational age confirmed from history of regular menstrual cycles and Dating scan.

Exclusion criteria

- Multiple pregnancies.
- Pregnant women with POG < 36 weeks.
- History of Irregular cycles.
- Patient with uncertain and unreliable dates.

Ultrasound was done antenatally for all cases in between 36-40 weeks period of gestation. The patient was scanned with a moderately distended bladder in supine position. The placental site was determined in two-dimensional real-time mode by means of a transabdominal 3.5 MHz volume transducer. Placenta, fetus and amniotic fluid were studied for all cases. Placental thickness was noted. After delivery both placenta and baby were examined.

Measurement of placental thickness

The placental thickness was taken at the level of umbilical cord insertion in longitudinal direction, perpendicular to the basal and chorionic plates in the mid position of placenta. The myometrial and sub placental veins were excluded in the

measurements. Placental thickness depends on amount of fetal blood, maternal blood and placental tissue. Placental thickness as obtained by ultrasonography and correlated with fetal parameters such as femur length (FL), biparietal diameter (BPD), head circumference (HC) and the abdominal circumference (AC) was used to predict Estimated fetal weight using Hadlock equation. Oligamnios may cause apparently high value of placental thickness.

Results

76% of cases were of age group between 20-30 years. Mean age of cases in this study was 24 years (Table – 1). 52% of the cases in this study were primigravida (Table – 2). Mean placental thickness in this study was 3 cm. 76% of cases had normal placental thickness. Thin placenta was found in 20 cases (8%). Thick placenta was found in 40 cases (16%) as per Table - 3. 45 cases had IUGR (18%) as per Table - 4. When normal and abnormal placental thickness were correlated with birth weight, P value was <1.001 (Table – 5). Causes of thick placenta were as per Table – 6.

Table – 1: Distribution of cases according to age.

Age in years	No. of cases
<20	40 (16%)
20-30	190 (76%)
>30	20 (8%)

Table – 2: Distribution of cases according to parity.

Parity	No. of cases
Primi	130 (52%)
G ₂	95 (38%)
G ₃	25 (10%)

Table – 3: Distribution of cases according to placental thickness.

Placental Thickness	No. of cases
<2.5 cm	20 (8%)
2.5-3.75 cm	190 (76%)
>3.75 cm	40 (16%)

Table – 4: Distribution of cases according to Birth weight.

Birth weight	No. of cases
<2.5 kg	45 (18%)
2.5-3.5 kg	195 (78%)
>3.5 kg	10 (4%)

Table – 5: Relation between placental thickness and birth weight.

	Placental thickness <2.5cm	Placental thickness 2.5-3.75 cm	Placental thickness >3.75 cm
Birth weight <2.5 kg	20	5	20
Birth weight 2.5-3.5 kg	0	180	15
Birth weight >3.5 kg	0	5	5

Table – 6: Cause of thick placenta.

Causes	No. of cases
Idiopathic	18
Rh iso immunization	9
GDM	7
Non immune Hydrops	3
Fetal Anomalies	3

Discussion

Placenta is an essential organ for exchange of nutrients and metabolites between mother and fetus, provides gas exchange, excretory, endocrine and immune support for the developing fetus [6].

Placenta has an influence on fetal birth weight and abnormalities of placental growth may precede abnormalities in fetal growth. As the placenta is the first organ to manifest changes of disease in pregnancy, so its changes can be used to predict many of fetal maternal complications [6].

P.O Abu, Ohagwu C C, Ezefz, et al. from Nigeria in 2009 conducted a study to investigate

the relationship between PT and EFW. In his study max PT was 45.10 mm. In my study max PT was 45.10 mm [7].

M. P, Dombrowski, et al. in Detroit, USA in 1992 studied the association between thick placenta and perinatal outcome [8].

76% of cases are of age group between 20-30 years. Mean age of cases in this study is 23 yrs. There is no significant correlation between age and placental characters. 52% of cases in this study are primigravida.

In this study, 3.75 cm taken as cut off for thick placenta, 2.5 – 3.75 cm was taken as normal placental thickness and >3.75 cm was considered as thick placenta. Mean placental thickness in our study is 3.10 cm. Most of cases have normal placental thickness (76%). Thin placenta was found in 20 cases (8%). Thick placenta was found in 40 cases (16%).

Among cases with thick placenta, cause was not found in 18 cases. Rh isoimmunization was seen in 9 cases, GDM was noted in 7 cases, Non immune hydrops seen in 3 cases. There was significant positive correlation between placental thickness and EFW in the 2nd and 3rd trimester, in the study of P. O. Abu [7]. In our study when normal and abnormal PT are correlated with Birth weight, P value is < 0.001.

Among 45 cases with intra uterine growth restricted babies thin placentae was seen in 20 % cases. Thick placenta with intra uterine growth restricted babies may be due to placental hypertrophy secondary to chronic hypoxia in the fetus.

In our study we found that placental parameters have very important influence on perinatal outcome. This concludes that placental examination during ultrasonography is an essential tool to assess the perinatal outcome.

T. Karthikeyan, et al. [9] stated that Placenta is closely related to the fetus and the mother, it acts

like a mirror reflecting the status of both mother and the fetus. Kulman and Warsoff stated that a PT of <2.5 cm at term, was associated with IUGR.

La Torre, et al. [10] opined that at no stage of the pregnancy placental thickness exceeded 4 cm indirectly, thus indicating the cut off value for the upper limit.

In their study which was done on normal singleton pregnancies, the mean PT of the corresponding gestational weeks was 23.23 mm.

Habib, et al. [11] in their study, said that the PT was 2.2 cm at 36 weeks in the fetus which weighed <2500 gm. They concluded that PT was a predictor of LBW infants.

Nasreen Noor, et al. [1] stated that Placental thickness appears to be a promising parameter for estimation of weight of the fetus because of increase in placental thickness with advancing gestational age. The Pearson's correlation coefficient between the two was 0.982, proving the significant positive correlation between PT and EFW. This as the PT increases, the EFW increases.

Nasreen, et al. [1] there is linear correlation and strong positive correlation between PT and EFW, which is a very important component of antenatal care. Therefore it can be used as an additional sonographic tool in assessing fetal weight.

Adhikari R, et al. [12] observed that EFW is dependent on PT which is similar to their observations.

Afrakhteh M, et al. [13] observed a significant positive correlation between PT and EFW in 2nd and 3rd trimester which is coherent with their study.

Placental thickness and estimated birth weight have a significant high positive correlation in both the trimesters as noted by Abu Po, et al. [7].

Khairy S. Ismail, et al. [14] in their study found that every 1 cm increase in PT increase fetal weight by 0.888 kg. The study found there is no correlation between b/w PT and maternal age. The study also found there is no correlation b/w PT and BMI.

Kashika Nagpal, et al. [2] stated that placental thickness is the simplest measurement of placental size and can be measured at any center equipped with ultrasound machine.

Schwartz, et al. [15] in 2010-2011 studied two dimensional sonography in Philadelphia between 18-24 weeks and found that mean PT and PD were significantly smaller in SGA infants.

Ahn K H in 2017 [16] published that the higher placental thickness to estimated fetal weight ratio at 18-24 weeks gestation was associated with small for gestational age infants.

Elsafi Ahmed, et al., [17] studied ultrasonographic placental thickness in 53 Sudanese pregnant women in 2nd and 3rd trimester. They concluded that thickness of <25 mm during third trimester is less than normal and might be an indicator of IUGR and thickness of >45 mm was considered thicker than normal.

Li, et al. in 2015 [18] demonstrated sonographic PT as one of the cost effective screening tool for detecting α – thalassemia major fetuses.

Future studies could include interventions to see role of nutritional, life style factors and anticoagulants on placental thickness and fetal outcome.

Limitations

- We measured the placental thickness only once in each subject during the study in between 36 – 40 weeks.
- The sample size was small and there was only a single observer, there was a chance for an observer bias (inter

observer variability), an instrumental bias etc.

Conclusion

In our study, we observed that placental parameter like placental thickness has influence on perinatal outcome. In countries like ours with poor resources, scan features of placenta along with baby and AFI may help improving perinatal outcome. Serial recordings of placental thickness during antenatal period help in better prediction of fetal prognosis.

Future studies with large sample are required to identify high risk cases based on placental thickness.

Fetal Doppler studies may be needed in cases with IUGR babies with thin placenta to decide when to terminate pregnancy. Subnormal placental thickness for a particular gestational age may be the earliest sign of intrauterine growth retardation. Measurement of placental thickness should therefore be carried out routinely during obstetric ultrasound. Sonographically identified abnormal placenta should alert the clinician to the possibility of compromised perinatal outcome and the need for evaluation of coexisting fetal anomalies and maternal disease.

Examination of the placenta in pre and postnatal period gives us a clue about fetomaternal complications and is essential for protecting the attending physician in the event of medico-legal cases due to abnormal fetomaternal outcome.

References

1. Nasreen Noor, Akaniksha Jain, Shazia Parveen. Ultrasonographic measurement of placental thickness and its correlation with EFW. IJRCOG, 2018 Jan; 7(1): 287-290.
2. Kashika Nagpal, Pratima Mittal, Shabnam Bhandari Grover. Role of ultrasonographic placental thickness in prediction of fetal outcome. A

- prospective Indian Study. *The Journal of Obstetrics and Gynecology of India*, 2018; 68(5): 349-354.
3. Dr Mark Thurston, Dr Yuranga, Weerakkody. *Radiopaedia.org* 2019.
 4. Shaimaa Fadl, Mariam Moshiri, Corinne L. Fligner, Douglas S. Katz, Manjiri Dighe. Placental imaging: Normal Appearance with review of pathologic findings. *Radiographics*, 2012; 37(3).
 5. Maryam Afrakhteh, Aida Moeini, Morteza Sanei Taheri, Hamid Reza Haghghatkhah. Correlation between placental thickness in the second and third trimester and fetal weight. *Rev. Bras Ginecol. obstet.*, 2013; 35(7).
 6. K. Kanaka Seshu, et al. Study of placental thickness and other morphological features on ultrasonography and their correlation with perinatal outcome, 2013, p. 1-90.
 7. Ohagwu C C, Abu P O, Effiong B. Placental thickness: A sonographic indicator of gestational age in normal singleton pregnancies in Nigerian women. *Internet J Med update*, 2009; 4(2): 9-14.
 8. Dombrowski M P, Wolfie H M, Salch A, Evans M E.O., Brien J. The sonographically thick placenta: A predictor of increases perinatal morbidity and mortality. *Ultrasound Obstet Gynecol.*, 1992; 2: 252-5.
 9. T. Karthikeyan, Ramesh Kumar Subramaniam, K Prabhu. Placental thickness and its correlation to gestational age and Fetal parameters. A cross sectional ultrasonographic study. *JCDR*, 2012 Dec; 6(10): 1732-1735.
 10. La Torre R, Giovanni Nigro, Manuela Mazzocco M., Best Stuart P. The Ultrasonic changes in the maturing placenta. *Am J Obstet and Gynecol.*, 1979; 42: 915.
 11. F.A. Habib. Prediction of LBW infants from u/s measurement of placental diameter and placental thickness. *Ann Saudi Med.*, 2002; 22: 312-4.
 12. Adhikari R, Deka P K, Tayal A, Chettri P K. Ultrasonographic evaluation of placental thickness in normal singleton pregnancy for estimation of gestational age. *Int J Med Imaging*, 2015; 3(6): 143-7.
 13. Ichiro Miwa, Masakatsu sase, Kazuyuki veda. A thick placenta: A predictor of adverse pregnancy outcomes. *Springer plus*, 2014 Jul; 3: 353.
 14. Khairy S Ismail, Abd Allah Mahgoub, A. kunna, Hassan Allkhehr, Suad Einor Mohamed, Umbeli Tana. Estimation of placental thickness in third trimester to determine fetal weight in Sudanese women 2016. *Res Rep Gynaecol Obstet.*, 2017; 1(2): 9-11.
 15. Schwartz N, Wang E, Parry S. Two dimensional sonographic placental measurements in the prediction of small for gestational age infants. *Ultrasound Obstet Gynaecol.*, 2012; 40(6): 674-9.
 16. Ahn K H, Lee J H, Cho G J, et al. placental thickness to estimated foetal weight ratios and small for gestational age infants at delivery. *J Obstet Gynaecol.*, 2017; 20: 1-5.
 17. Elsafi Ahmed Abdulla Balla, Magdolein Siddi Ahmed. Caroline prediction of fetal growth by measuring the placental thickness using ultrasonography. *J Gynecol Obstet.*, 2014; 2(2): 26-31.
 18. Li X, Zhou Q, Zhang M, et al. Sonographic markers of fetal α – thalassemia major. *J Ultrasound Med.*, 2015; 34(2): 197-206.