



## Association between Placental Thickness and Gestational Age

Authors

**Dr Patsy Varghese<sup>1</sup>, Dr Lakshmi BS<sup>2</sup>**

<sup>1</sup>Additional Professor, Dept. of Obstetrics and Gynecology, Govt. Medical College, Trivandrum

<sup>2</sup>Assistant Professor, Dept. of Obstetrics & Gynecology, Govt. Medical College, Trivandrum

### Abstract

**Background:** *The placenta is an organ with important endocrine, metabolic and immunologic functions. Placental formation begins in the later half of second month of pregnancy and is completed by the fourth month. Maximum growth of placenta is attained at term. Several sonographic parameters of the fetus are used to assess gestational age. Placental thickness measured at the level of umbilical cord insertion can be used as a parameter to estimate the gestational age of fetus.*

**Objective:** *The present study was conducted to assess the relationship of placental thickness and gestational age.*

**Materials and Methods:** *100 antenatal patients with gestational age between 16 - 40 weeks who attended the outpatient department for antenatal checkup were included in the study. Using ultrasound scan, placental thickness was measured at the level of insertion of umbilical cord.*

**Results:** *Between 20 to 32 weeks of gestation, there is almost perfect correlation between placental thickness and gestational age.*

**Conclusion:** *Placental thickness in millimeters correspond to the gestational age in weeks between 20 and 32 weeks. Placental thickness can be used as another parameter for determining gestational age in case of unknown dates in the later half of second trimester.*

**Keywords:** *Gestational age, placental thickness, Ultrasound.*

### Introduction

Human placenta is hemochorioendothelial in nature. Placenta is a discoid organ and at term it measures 15-20 cm in diameter, 2-4 cm in thickness and weighs about 500 gm. The volume of placenta increases from 170 ml at 28 weeks of gestation to 720 ml at 39 - 42 weeks. The area of normal fetomaternal interface ranges from 3.4 sq.m at 28 weeks to 12.6 sq.m at term. Placental weight corresponds to 1/5 of fetal weight at term.

The simplest, most cost effective and non invasive procedure for studying placenta is sonography.

The developing placenta can be observed by transvaginal ultrasound as early as from 5 weeks of gestation. The early placenta is homogenous and mildly hyperechoic relative to myometrium because of villous proliferation and maternal blood bathing the villi. This homogenous pattern persists until morphologic ageing patterns like intervillous thrombosis and calcification develop in the late second trimester. The basal plate of the placenta can be recognised by adjacent prominent veins that drain the placental parenchyma. The margin of placenta with the myometrium is

sharply defined by a network of vascular channels at the placental myometrial junction referred to as the sub-placental complex. Recognition of this placental interphase is important to distinguish placenta from focal myometrial contractions and fibroids.

Thickness of placenta is measured at the insertion of cord or at midplacenta perpendicular to the plane of placenta. The mean thickness of placenta rarely exceeds 4 cm. Macroscopic calcifications are seen in the placenta in third trimester. Calcium deposits are seen primarily in the basal plate and septa, but it can also be seen in the subchorionic and perivillous spaces. More than 50 % of placentae show calcification after 33 weeks.

Placental thinning can occur due to severe pre eclampsia, intrauterine growth retardation, chromosomal abnormalities, intrauterine infection, and pre conceptional diabetes. Placentomegaly can be with heterogenous echotexture as in molar pregnancy, triploidy or placental haemorrhage or with homogenous echotexture as in gestational diabetes, anaemia, or hydrops fetalis.

This study was conducted to find out whether placental thickness corresponds to gestational age in weeks so that it can be used as another parameter to assess gestational age in patients with uncertain dates.

### Materials and methods

This study was conducted in the Department of Obstetrics and Gynaecology, Govt. Medical College, Trivandrum. This is a cross sectional study and analysis is done by statistical regression and other correlation parameters. 100 antenatal patients with gestational age between 16 and 40 weeks who attended the outpatient department for antenatal checkup were included in the study. Patients with complications like pre eclampsia, gestational diabetes, intrauterine growth retardation, hydramnios and multiple pregnancy were excluded from the study.

### Results

Of the 100 cases, 74 cases had anterior placenta and the rest 26 cases had posterior placenta.

The mean value for placental thickness at each gestational age was calculated and the standard deviation found out.

**Table 1.** Placental thickness and gestational age

| Gestational age in weeks | Mean (mm) | Standard deviation | N  |
|--------------------------|-----------|--------------------|----|
| 16                       | 17.5      | 0.71               | 2  |
| 17                       | 19.1      | 1.1                | 4  |
| 18                       | 20.3      | 2.4                | 2  |
| 19                       | 21.8      | 0.8                | 5  |
| 20                       | 21.6      | 1.1                | 5  |
| 21                       | 21.7      | 0.7                | 6  |
| 22                       | 22.1      | 0.2                | 3  |
| 23                       | 23.3      | 0.3                | 2  |
| 24                       | 24.9      | 0                  | 1  |
| 25                       | 25        | 0.3                | 4  |
| 26                       | 25.9      | 0.3                | 3  |
| 27                       | 26.6      | 1.1                | 4  |
| 28                       | 28.8      | 0.6                | 3  |
| 29                       | 28.3      | 0.4                | 2  |
| 30                       | 30.5      | 0                  | 1  |
| 31                       | 30.8      | 0.3                | 2  |
| 32                       | 32.5      | 0.5                | 3  |
| 33                       | 31.2      | 1.2                | 2  |
| 34                       | 33.3      | 3.8                | 2  |
| 35                       | 32.4      | 1.2                | 10 |
| 36                       | 32.4      | 2.2                | 8  |
| 37                       | 32.2      | 1.8                | 10 |
| 38                       | 32.3      | 1.2                | 6  |
| 39                       | 31.9      | 1.4                | 4  |
| 40                       | 32.8      | 2.3                | 5  |

Placental thickness showed a linear relationship to gestational age till 32 weeks. To study the relationship between gestational age and placental thickness, coefficient of correlation was computed between gestational age and placental thickness. There was good overall correlation of 0.95 when all the observations were included.

**Table 2.** Gestational age and placental thickness - Coefficient of correlation

| Gestational age    | Coefficient of correlation |
|--------------------|----------------------------|
| Up to 20 weeks     | 0.78                       |
| 20 - 32 weeks      | 0.98                       |
| More than 32 weeks | 0.01                       |

Up to 20 weeks and between 20 to 32 weeks, the p value for coefficient of correlation is <0.01. After 32 weeks this relation does not exist. This shows

that between 20 - 32 weeks, there is almost perfect correlation between placental thickness and gestational age.

### Discussion

Sonologic assessment of gestational age is most accurate in the first trimester when it can be calculated within 2 - 3 days. Usual measurements taken for assessing gestational age are CRL in first trimester and BPD, FL and AC in second and third trimester.

Previous studies have reported that placenta grows in a linear fashion with gestational age. The placental thickness in mm is found to be almost equivalent to the gestational age in weeks<sup>[1]</sup>.

The present study was conducted to assess the relationship between placental thickness and gestational age and to find out whether it can be used as another parameter to assess gestational age when clinical data is insufficient. Multiple pregnancy was excluded from the study as over distension of uterus will cause apparent thinning of placenta. In gestational diabetes, placental thickness can vary with the glycaemic control and gives rise to a bigger placenta if blood sugar is not controlled. In preeclampsia and intrauterine growth retardation, there is placentomalacia and this may affect the observations.

It was observed that placental thickness increased as gestational age advanced. Before 20 weeks placental thickness was found to be more than gestational age in weeks by 1.5 - 3 mm. After 32 weeks, it was found to be less than gestational age by 3 - 4 mm.

Grannum and Hobbins studied placenta in detail using ultrasound. They reported that placental thickness can be determined sonographically and it will vary as a function of gestational age<sup>[2]</sup>. Hoddick et al also found average placental thickness in mm to be roughly equivalent to gestational age in weeks<sup>[3]</sup>. Nyberg and Finberg also reported as a rule of thumb placental thickness parallels gestational age<sup>[4]</sup>.

Anupama Jain et al found that up to 25 weeks, the placental thickness was slightly more than period

of amenorrhoea and after 33 weeks it was slightly lower by 1-3 mm . They found that there was perfect correlation between 26 - 33 weeks<sup>[5]</sup>. Mital P et al studied the relationship between placental thickness and gestational age and whether this can be used as another parameter to assess gestational age. They reported that from 22 to 35 weeks of gestation, placental thickness almost matched gestational age in weeks<sup>[6]</sup>. The observations of the present study was consistent with this as a linear relationship was found between placental thickness and gestational age.

### Conclusion

Placental thickness in mm corresponds to the gestational age in weeks between 21 and 32 weeks. Placental thickness can be used as another parameter for determining gestational age in case of unknown dates in the latter half of second trimester.

### References

1. Wolf H, Oosting H , Treffers PE . A longitudinal study of the relationship between placental and fetal growth as measured by ultrasonography . Am.J. of Obstet & Gynaecol. 1989;Vol.161,1140.
2. Grannum PAT , Hobbins JC. Radiol. Clinics North Am. 1982;Vol.20,353.
3. Hoddick WK, Mahoney BS, Callen PW, Filly RA.Ultrasound Med. 1985;Vol. 4,479.
4. Nyberg DA, Finberg HJ. The placental membranes and umbilical cord ; Diagnostic ultrasound of fetal anomalies. St. Louis Mosby year book ;1990;623-675.
5. Jain A, Kumar G, Agarwal U, Kharakwal S. Placental thickness - A sonographic indicator of gestational age. J. of Obstet & Gynaecol of India. 2001; Vol.51,48-49.
6. Mittal P, Hooja N, Mehndiratta K. Placental thickness - A sonographic parameter for estimating gestational age of fetus. Ind. J. of Radiol. Imag. 2002; Vol.12:4,553-554.