

Placenta Thickness and Its Maturity in Terms of Gestational Age Based On USG:

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Abstract

Placental thickness and its usefulness in diagnosing the gestational age have been long commented. Many studies have been done to understand the relationship. But never has it been done in the local population. This study helps us to understand the relationship between the thickness and the maturity in terms of the gestational age. This study puts in a sincere effort to be of immense help to the local radiologists, obstetricians and embryologists.

Keyword: Placenta, Maturity, Gestational age.

INTRODUCTION:

The placenta (Greek 'Plakuos' meaning 'flat cake') is an organ that connects the developing fetus via the umbilical cord to the wall of uterine cavity to allow nutrient uptake, thermo-regulation, waste elimination, endocrine, immunological functions and gas exchange via the mother's blood supply; and to produce hormones which support pregnancy(1). Placentas are a defining characteristic of placental mammals, but are also found in marsupials and some non-mammals with varying levels of development(2). Imaging modalities like sonography is remains the non- invasive modality of choice for the evaluation of placenta(3). Role of USG in Placental evaluation is to detect the abnormalities of placenta like if placenta is small, it can be due to toxemia, chromosomal abnormality, intra uterine growth retardation and large placenta can be due to maternal anemia, diabetes mellitus, triploidy(4). The parameters to be assessed using USG are size of the placenta, site of attachment of placenta, retroplacental area, cord(5). The measurements of placental thickness play important role in diagnosing placental abnormalities. Abnormal placental measurement can detect improper functioning of placenta. Placenta is approximately 2 to 2.5cm thick and 15 to 20cm in diameter. If the diameter is 18cm with thickness of 2cm at 36weeks implies low birth weight neonates(4). Placental thickness is being used as the parameter for estimating gestational age. True assessment of gestational age is an important part of obstetric examination, can be effectively calculated using ultrasound. The prenatal sonographic parameters are fetal crown-rump length (CRL), biparietal diameter (BPD), head circumference (HC), femur length (FL) and abdominal circumference (AC), are taken for the evaluation of the fetus(5). Formula for gestational age-

$$GA = -0.0007(CRL)^2 + 0.1584(CRL) + 5.287$$

$$GA = 39.1 + 2.1(BPD)$$

Easy and simplest parameter for detecting placental and fetal health is placental thickness. Normal placenta is required for normal fetal growth. Increase or decrease in the size of the placenta tells normal fetal growth or compromised fetal growth respectively. Variations in the size of placenta is detected by the abnormal placental measurement(6). Collective proofs towards the prediction of placental thickness for estimating gestational age are helping guide for the obstetricians to take measurement of placental thickness as a routine parameter in pregnant females. Placental thickness is well taken as diagnostic tool for various pathological events in placenta. The measurement of

placental thickness can also contribute to management of fetus at risk. Thickness of placenta is found to be decreased in IUGR and pre eclampsia. There are evidences supporting the importance of measurement of placental parameters using Ultrasonography (7).

Modality of choice for placental measurements remains Ultrasound.

Aims and Objectives:

To study the thickness and its maturity in terms of gestational age based on USG.

Materials and Methods:

This study was done in the Department of Radio-diagnosis, Kanachur Institute of Medical Sciences, Mangalore.

This study was done from Jan 2019 to Sept 2020.

This is a cross-sectional study. One hundred and one cases were included in the study. Women included represented at different weeks of gestation.

Inclusion Criteria:

- Atleast three Women represented in each week of gestation.

Exclusion Criteria:

- Patients who were known to have congenital anomalies when anomaly scan was conducted.
- Patients with gestational diabetes.
- >38 weeks.

Procedure: The TVS scan was conducted and the mean placental thickness that corresponds to each week of gestation is reported.

Statistical Analysis: Only descriptive statistics.

Results:

Table 1: Age Distribution of the subjects.

| Number | Mean age | Standard deviation |
|--------|-------------|--------------------|
| 60 | 24.26 years | ±2.36 years |

Table 2: Mean Thickness in 1st trimester of pregnancy (12th and 13th week)

| Gestational week | Number of Subjects | Mean thickness |
|------------------|--------------------|----------------|
| 12 th | 3 | 14.98±0.42 |
| 13 th | 4 | 16.74±0.78 |

Table 3: Mean Thickness in 2nd trimester of pregnancy (14th and 26th week)

| | | |
|------------------|---|------------|
| 14 th | 3 | 17.98±0.23 |
| 15 th | 5 | 18.76±0.56 |
| 16 th | 3 | 20.34±0.67 |
| 17 th | 4 | 21.98±1.73 |
| 18 th | 3 | 22.76±1.17 |
| 19 th | 3 | 23.17±0.67 |
| 20 th | 3 | 24.11±0.12 |
| 21 st | 3 | 24.98±0.62 |
| 22 nd | 5 | 25.06±1.87 |

| | | |
|------------------|---|------------|
| 23 rd | 4 | 25.76±1.23 |
| 24 th | 3 | 25.87±1.87 |
| 25 th | 5 | 26.89±2.11 |
| 26 th | 6 | 29.98±3.22 |

Table 4: Mean Thickness in 3rd trimester of pregnancy (27th and 38th week)

| | | |
|------------------|---|------------|
| 27 th | 3 | 30.73±1.27 |
| 28 th | 4 | 32.98±1.23 |
| 29 th | 3 | 32.76±1.17 |
| 30 th | 5 | 34.87±0.89 |
| 31 st | 4 | 35.82±0.84 |
| 32 nd | 3 | 34.82±0.89 |
| 33 rd | 4 | 35.89±0.65 |
| 34 th | 5 | 34.52±0.26 |
| 35 th | 3 | 36.89±0.65 |
| 36 th | 3 | 37.89±0.7 |
| 37 th | 4 | 36.58±0.57 |
| 38 th | 3 | 39.89±0.24 |

DISCUSSION:

Fetal growth and early termination of pregnancy can be estimated accurately using placental thickness. Timely assessments helps in detecting proper growth of fetus and any associated abnormality before they become clinically evident and thereby early termination of pregnancy in whichever cases required. The placenta is a materno-fetal organ with important metabolic, endocrine, thermo regulation and immunological functions. Placental formation starts a little later than the fetus, from the 13thday onwards and is usually completed by 4th month. Placenta assumes a relatively homogeneous pebble grey appearance between 8 & 20 weeks of pregnancy. It grows throughout pregnancy. It reaches its maximum growth at term. Placenta is primarily a fetal organ and its size is a reflection of fetal health and size. Placenta is identified in sonography as early as eight weeks of pregnancy. The thickness of placenta corresponds to the gestational age in weeks. Suseela et al (2020) measured placental thickness at the level of umbilical cord insertion stating that this parameter can be most accurate indicator of fetal growth on ultrasound(1).

The relationship between the placental thickness and gestational age was found to be linear. The thickness increases with gestational age till 35 weeks and thereafter the rate decreases from 36 weeks onwards. Placental thickness is an additional parameter for precisely measuring gestational age. Placental thickness variation was not based upon the location of the placenta. These were the findings by Kaushal et al (6) (8) (9). Baghael et al concluded that the placental thickness was associated with fetal outcome. This implies if it is below 10th percentile, then this is associated with IUGR(2). Study on fetal growth and gestational age done by Karthikeyan et al summarized placental thickness as predictor of gestational age. The subnormal placental thickness for the Gestational age should be checked for associated clinical conditions(3). Placental thickness and gestational age corresponds well

during 2nd and 3rd trimester of fetal life(5). The thick placenta is associated with adverse pregnancy outcomes(4). Thin placenta was found correlated with low APGAR score and morbidity(6). Placental thickness was found to well correlate with femur length during 12th to 24 weeks of gestation(8). Hafner et al (2001) has proved the presence of small volume placentae in the first trimester who progressively had high resistance. Dopplers in their second trimesters. This relationship could be used in the early identification of abnormal trophoblast invasion. Placental volume measurements correlate well with chromosomal anomalies also(10). Dombrowski et al (1992) stated that polyhydramnios may falsely decrease and oligohydramnios may falsely increase placental thickness measurements. Careful consideration of these variations must be known to the clinician. Further studies are required to quantify and correct these variations(11). The linear correlation and statistical compatibility of placental thickness in estimation of gestational age makes it an alternate parameter for gestational age and fetal weight estimation(12). There is a linear and direct relationship between PT and GA. PT can be an important additional parameter for estimating GA, especially from 13-35 weeks of gestation and when the duration of the pregnancy is unknown or uncertain (7).

Conclusion:

This study was conducted to understand the relation between the placental thicknesses to the corresponding gestational age which is given by the USG machine itself. This study intends to be of immense help to the budding radiologists and also embryologists.

Authors Role:

Dr Desmond David Joachim Dcuuz: Chief investigator.

Dr Shishirkumar C Naik: Research methodology, compiling of data and investigator.

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