Correlation Between Placental Thickness in The Second and Third Trimester and Fetal Weight

ABSTRACT

Objective: The aim was to investigate relationship between placental thickness and fetal weights during second & third trimester.

Material Method: A study was conducted on 100 pregnant females between 13 weeks and 38 weeks of gestation referred from antenatal clinics to department of Radio diagnosis in association with the department of Anatomy from 2015-2016. All singleton pregnant women aged between 15 and 35 years for routine antenatal ultrasound were included. Patient more than 35 years, Twin pregnancy, diabetes, diagnosed cases of fetal hydrops pregnancy with chromosomal anomaly, placenta previa & placenta abrupta were excluded. The placental thickness was measured transabdominally by placing the ultrasound transducer perpendicularly to the plane of the placenta, at the level of umbilical cord insertion and mean reading was measured along with fetal weight at second and third trimester. Pearson's correlation analysis was used to establish the degree of relationship between placental thickness and birth weight. Placental thickness and gestational age was correlated and statistically analysed.

Result: The maximum mean placental thickness at 26th week is 29.76 ± 2.163 and at 38th week is 38.12 ± 2.09 mm was recorded. The mean gestational age was 36.9 ± 1.64 weeks. The mean placental thickness and fetal weight was significant positive correlation was found between placental thickness with weight (r = 0.61 and r = 0.57 respectively) No other data in population was available so this prompted us to conduct this study in which the placental thickness change could not predict low birth weight.

Conclusion: According to our study, birth weight has a positive relationship with both second and third trimester placental thickness. Obstetric ultrasonography should routinely measure placental thickness as it will indicate earliest sign of Intra-uterine growth rate (IUGR), however placental thickness change could not predict low birth weight.

Introduction

The role of obstetric ultrasonography has proven invaluable, in accurate pregnancy dating & detection of fetal anomalies. The placenta is a feto-maternal organ which provide physiological link between a pregnant woman & the fetus. The placenta develops from chorionic villi at the implantation site at about 3rd week of gestation and by 9th week, the diffuse granular echotexture of the placenta is clearly apparent at sonography. The placenta is discoid with a diameter of 15-25 cm & is approximately 3 cm thick and weighs about 500-600 grams. Placental thickness appears to be a promising parameter for estimation of gestational age of the fetus because of increase in placental thickness with gestational age.

A placental thickness of less than 2.5 cm in second trimester is usually associated with Intrauterine growth rate (IUGR). Very few workers have measured the placental thickness and correlated with the weight of fetus. In a research held in Nigeria, significant positive correlation were found between placental thickness and estimated fetal weight in second and third trimester (r = 0.61 and r = 0.57 respectively). No other data in population of Uttar pradesh state of India is available, so this prompted us to conduct this study in which the placental thickness is correlated with the weight of fetus.

Material Method

A study was conducted on 100 pregnant females between 13 weeks and 38 weeks of gestation referred from antenatal clinics to department of Radio diagnosis in association with the department of Anatomy from 2015-2016.

Inclusion criteria:
1. All pregnant women aged between 15 and 35 years for routine antenatal ultrasound.
2. Known last menstrual period.

Exclusion criteria
Patient more than 35 years, twin pregnancy, diabetic, diagnosed cases of fetal hydrops pregnancy with chromosomal anomaly, placenta previa & placenta abrupta.

Technique

Study was carried out on Seimens Acuson 300 machine with low frequency transducer 3.5 MHz convex probe. Patient was placed supine in position with arms above the head. Privacy of patient was maintained. Examination was carried out after consent of patient and after approval of medical ethical committee.

The placental thickness was taken at the level of umbilical cord insertion in the longitudinal direction and a mean reading was taken along with the fetal weight as shown in fig no. 1& 2. The placental thickness & fetal weight is then correlated. The mean value of the placental thickness along with the respective standard deviation is calculated for different gestational ages from the 13th to 39th week. The findings is compared and statistically analysed in order to find possible correlation between placental size and fetal weight.
RESULT
A study of 100 antenatal singleton pregnancies of 13th weeks to 38th weeks was conducted after the consent of ethical committee of medical college. The patients were observed for correlation of placental thickness with birth weight of fetus.

Table 1 shows that the mean placental thickness and fetal weight at 26th week of gestation was 29.76 ±2.16 and 879.50±59.15 recorded.

Table 2 shows that the mean placental thickness and fetal weight at 38th week of gestation was 38.12 ±2.09 and 3169.66±187.51 recorded. The result of our study showed that there was a fairly linear increase in placental thickness with fetal weight.

Table 3 shows that there was a significant positive correlation between placental thickness and fetal weight in second and third trimester. Regression analysis yielded a linear relationship between fetal weight and placental thickness as shown in graph no.1 & 2.

Table no. 1 Normal values of placental thickness & fetal weight in 50 pregnant women of second trimester

<table>
<thead>
<tr>
<th>S.No</th>
<th>EGA (WK)</th>
<th>No. of Measurements</th>
<th>Placental Thickness (MM)</th>
<th>Fetal Wt. (GM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>14</td>
<td>3</td>
<td>14.60 ± 0.17</td>
<td>50.66±8.33</td>
</tr>
<tr>
<td>2</td>
<td>15</td>
<td>7</td>
<td>19.24±1.59</td>
<td>65.28±17.18</td>
</tr>
<tr>
<td>3</td>
<td>16</td>
<td>4</td>
<td>19.73 ± 1.12</td>
<td>96.00±5.03</td>
</tr>
<tr>
<td>4</td>
<td>17</td>
<td>4</td>
<td>21.86 ± 0.96</td>
<td>157.90±53.23</td>
</tr>
<tr>
<td>5</td>
<td>18</td>
<td>3</td>
<td>23.71±0.07</td>
<td>226.33±40.99</td>
</tr>
<tr>
<td>6</td>
<td>19</td>
<td>3</td>
<td>24.93±2.87</td>
<td>247.00±19.97</td>
</tr>
<tr>
<td>7</td>
<td>20</td>
<td>3</td>
<td>25.37±1.65</td>
<td>293.33±51.31</td>
</tr>
<tr>
<td>8</td>
<td>21</td>
<td>2</td>
<td>27.43±0.37</td>
<td>325.00±35.35</td>
</tr>
<tr>
<td>9</td>
<td>22</td>
<td>2</td>
<td>28.93±2.87</td>
<td>346.50±146.35</td>
</tr>
<tr>
<td>10</td>
<td>23</td>
<td>2</td>
<td>26.80±3.53</td>
<td>361.00±26.22</td>
</tr>
<tr>
<td>11</td>
<td>24</td>
<td>2</td>
<td>22.30±0.56</td>
<td>748.00±21.77</td>
</tr>
<tr>
<td>12</td>
<td>25</td>
<td>6</td>
<td>26.32±2.63</td>
<td>750.00±20.25</td>
</tr>
<tr>
<td>13</td>
<td>26</td>
<td>4</td>
<td>29.76±2.16</td>
<td>879.50±59.15</td>
</tr>
</tbody>
</table>

Correlation of placental thickness........................
Discussion
Normal placental function and structure is necessary factor for the formation of a healthy foetus and consequently normal birth weight. Early detection of any pathology in placental villi helps obstetrician to consider prenatal care precisely. Several parameters were used to assess fetal growth in order to quantify intrauterine environmental adequacy and fetal well being. So it is clear that normal development of placenta during gestation is necessary for supporting healthy fetus, and impairment in its development may have profound effect on fetal development as placenta provides nutrients and oxygen to the fetus.

Various studies were done to deduce a relationship between placental thickness and gestational age. In present study placental thickness correlation with fetal weight is 0.79 similar to Clapp et al10, which showed significant correlation (>0.79) between placental growth rate and birth weight on forty singleton pregnant women. Similarly correlation of placental thickness with gestational age and fetal growth reported in research by karthikeyan et al. Cooley et al also suggested that antenatal ultrasound of the placenta may aid detection of placental disease. They showed that placental thickness was less in pregnant female complicated by chorioamninitis.

In present the mean placental thickness at 26 week of gestation was 29.76 ±2.16 and 38 week of gestation was 38.12±2.09 nearly similar to study conducted by C.C Ohagwu et al11 revealed placental thickness at 26th week of gestation was 32.52±4.94 and placental thickness at 38th week was 42.49±5.79. In present study there was a significant positive correlation between placental thickness and birth weight of fetus in second and third trimester. Regression analysis yielded a linear relationship between fetal weight and placental thickness similar to study of Maryam Afrahteh et al11 and Preeti et al. In our study linear increase in placental thickness was found to correlate with birth weight of fetus through out pregnancy similar to study conducted by Elachel et al13. They also showed a higher percentage of thick placenta in birth weight at term above 4000gm or < than 2500gm. Ultrastructural study of macara et al12 of placenta indicates that thickening of the basal Lamina and increase deposition of collagen and laminin together with congestion of the erythrocytes is the cause of limited oxygen transfer from intervillous space to growth retarded fetus.

Summary and Conclusion
The result of our study showed that placental thickness increased with fetal weight in fairly linear manner. This relationship suggest that placental thickness can be used as an indicator of fetal growth. Subnormal placental thickness for a particular gestational age may represent sign of intrauterine growth retardation. It is concluded from our study, that placental thickness helps in determination of normal growth of fetus in second and third trimester, so it can be used as an additional sonographic tool in correlating both gestational age and birth weight. Thus it should be recommended routinely during obstetric ultrasound.

References: