Study on Types of Umbilical Cord Insertion in Normal and Intrauterine Growth Restriction

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Abstract

Background: Intrauterine growth restriction (IUGR) is said to be in neonates whose birth weight is less than tenth percentile of the average for gestational age. IUGR is associated with short and long-term complications which can severely impact quality of life. Placental size, weight and shape may vary within wide extreme values. Ability to transfer nutrients is related to placental size. Decreased placental surface area and size are associated with increased risk of IUGR. Umbilical cord is the key marker for intrauterine complications. It is one of the most important part of fetoplacental unit that transfer vital nutrients to fetus. This current study was taken to find out the difference in placental morphometric features and to find the correlation between placental and neonatal weight.

Materials and methods: This study included 100 samples which were equally divided into cases and controls. Placenta was collected after delivery and the data is measured quantitatively.

Results: Central insertion of umbilical cord observed in IUGR in our study was 40%, eccentric was 20%, marginal was 38%, velamentous insertion was 2% while furcate insertion observed was nil in our study.

Conclusion: Central and marginal insertion was prevalent in IUGR in our study. Types of cord insertion plays also plays role in transfer of nutrients. Vasculature being the most important factor the growth of fetus, any imbalance in it will alter the growth.

Keywords: intrauterine growth restriction, placental insufficiency, feto placental ratio, placental coefficient.

Introduction

Birth weight less than 10th percentile for gestational age is considered as intrauterine growth restriction (IUGR). In antenatally diagnosed IUGR, mortality in neonates is significantly increased in term and preterm neonates¹. It affects neonatal and maternal health around world which accounts about 5-10%²,³. IUGR causes includes fetal conditions, utero-placental and pre-uteroplacental conditions. One of the key risk factors for growth restriction is placental insufficiency. Lack of sufficient transplacental transport of nutrients and oxygen leads to IUGR

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which is a result of placental insufficiency. Increased perinatal morbidity and mortality are the causes of still birth, IUGR and low birth weight. When compared to normal weight babies low birth weight mortality is 20 times more. The efficiency with which nutrition and oxygen are transferred through the placenta is the most important factor in determining birth weight. Umbilical cord is the link between placenta and fetus which delivers nutrients and oxygen to developing fetus. Hence umbilical cord is essential factor for growth of fetus.

Materials and Methods

This a prospective case control study carried out in department of Anatomy, Koppal Institute of Medical Sciences (KIMS), Koppal, Karnataka after taking institutional ethical committee clearance (No. KIMSKoppal/IEC/37/2020-21). Informed consent was taken from the patients. All the normal and IUGR pregnancies were included in the study. Maternal age between 18-35 and gestational age between 34-41 weeks were included in our study. We excluded woman with diabetes, HIV, unknown gestational age and maternal age more than 35 years. After delivery, 100 placental samples were collected washed thoroughly under running tap water. Placenta was observed and various types of umbilical cord insertions were noted and photographed.

Results

Umbilical cord insertion to center of placenta is central insertion. In present study central insertion of umbilical cord was 56% in normal and 40% in IUGR. Cord attachment greater than 2 cm from placental margin is eccentric or lateral insertion. Eccentric attachment observed was 24%, 20% in control and cases respectively. Cord insertion less than 2 cm from placental margin is margin type. 16% marginal attachment was observed in normal placenta and 38% in IUGR placenta. Insertion of umbilical cord on fetal membrane is velamentous insertion. This type observed was 4% in normal while 2% in IUGR. We didn’t observe any furcate type in our study both in cases and control (Table-1).

<table>
<thead>
<tr>
<th>Insertion types</th>
<th>Normal N=50</th>
<th>Frequency (%)</th>
<th>IUGR N=50</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central</td>
<td>28</td>
<td>56%</td>
<td>20</td>
<td>40%</td>
</tr>
<tr>
<td>Eccentric</td>
<td>12</td>
<td>24%</td>
<td>10</td>
<td>20%</td>
</tr>
<tr>
<td>Marginal</td>
<td>08</td>
<td>16%</td>
<td>19</td>
<td>38%</td>
</tr>
<tr>
<td>Velamentous</td>
<td>02</td>
<td>4%</td>
<td>01</td>
<td>2%</td>
</tr>
<tr>
<td>Furcate</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

The most common type of cord insertion we observed in IUGR was central type (Image-1).

Second common type of insertion which was observed in IUGR in our study was marginal type (Image-2). Eccentric was third variety which was observed in our study (Image-3) while velamentous was least variety in our cases.

Image-1: Central insertion of umbilical cord

Image-2: Marginal insertion of umbilical cord


Velamentous insertion of 9 umbilical cords in B-mode combined with 3D Power Angio Doppler and color /Power Doppler through ultrasound was reported by Markov D et al. Ghomian N et al reported 60.9% of cords with velamentous insertion in IUGR and 39.1% with central insertion which is close to present study with 40% central type of cord insertion. General foetal abnormalities were only seen in a small percentage of cases where the cord was inserted incorrectly. Meeejus G et al observed 54.5% and 70.8% of central and velamentous insertion respectively. Londhe P S et al observed 1.8% and 8.5% of velamentous insertion in normal and IUGR which differ to our findings where velamentous type was 4% in normal and 2% in IUGR. Dhabhai MP and Gupta G in their study found 22% lateral type and 35% of marginal type cord insertion in IUGR placenta. Our findings are coinciding with the findings of the above authors where eccentric was 20% and marginal type was 38% in IUGR placenta. Kaur R and Sapkal U reported a velamentous insertion of cord with asymmetrical IUGR and PIH. Incidence of marginal insertion of cord was 7.2% and 9.45%. Manikanta Reddy V et al observed 0.9% velamentous insertion, 7.27% furcate, 16.63% marginal and 75.45% normal insertion. Possible causes of IUGR according to Fox & Maulik & Benirschke & Faye-Petersen & Salafia et al were circummarginate placentas, velamentous cord insertion, circumvallate placentas and placenta previa. Udainia A & Mehta CD found 4% marginal, 60% eccentric, 36% central insertion in control group. Saha RR et al observed 50% central, 30% Intermediate, 10% marginal & 10% velamentous insertion of cords. Circumvallate placenta with concentric cord insertion but no sign of velamentous insertion was reported by Dukatz R et al in a case report. Furcate insertion of umbilical cord is a rare abnormality. Kosian et al observed 0.16% furcate type of insertion which was linked to intrauterine fetal death in their study. In our study we didn’t observe any furcate type of insertion in our study.

**Conflict of interest:** None

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