A PRELIMINARY STUDY ON THE MORPHOLOGICAL VARIATIONS IN THE UMBILICAL CORD OF SUNDANESE.

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ABSTRACT

The umbilical cord connects the developing embryo-fetus to the placenta. the importance of the umbilical cord that the unknown soldier during pregnancy but it does not raise people’s attention to it is not detached, but do not know him except his name.

The general objectives of this study are to identify and describe the length, insertion, and persistence anomalies of the umbilical cord macroscopically. Study was carried out in Khartoum state, Omdurman city. Study done on A total of 246 infants with their umbilical cords Female 108 Male 138 in period between October and November 2010.

Result on length mean was 60.5 cm. On diameter of umbilical cord 1 cm with Std. Attachment to placenta was found in two categories but still normal insertion. Knots of umbilical cord two similar cases of true knots were observed about 0.8 % of samples.

Conclusions: The length have little difference between male and female. The diameter is about 1 cm. The attachment of the cord mostly central rather than to be peripheral. True knots of the umbilical cord are uncommon.


INTRODUCTION:

The human umbilical cord, which is also sometimes referred to as the funiculus umbilicalis or birth cord, connects the developing embryo/fetus to the placenta and literally acts as a ‘life line’ supplying the fetus with oxygen and nutrients that support its growth and development throughout the duration of pregnancy. The umbilical cord originates from the same zygote as the fetus, comprising remnants of the yolk sac and allantois. It develops during the fifth week of pregnancy and replaces the yolk sac as the provider of the nutrients that are required by the developing embryo/fetus. The exterior surface of the cord is dull white in colour and moist, and normally comprises two umbilical arteries and one umbilical vein which are continuous with the blood vessels in the chorionic villi of the placenta. These vessels are encased in a protective, gelatinous substance known as Wharton’s jelly (a form of connective tissue), which is covered by amnion(Tiran D et al 2003). In some cases, examination of the umbilical cord will reveal that there are only two blood vessels present - one vein and one artery. This is an important observation and can be suggestive of congenital anomalies in up to 25% of pregnancies(Hill LM et al 2001) however, it may also prove to be an entirely harmless characteristic. The umbilical cord is attached to the placenta which transfers oxygen, nutrients and waste products, such as carbon dioxide (CO2) to and from the maternal blood circulatory system without any direct contact between fetal and maternal blood(Cunningham FG et al 2005).
operate differently from what would normally be expected, with the umbilical vein providing the fetus with a supply of oxygenated blood and nutrients (which it carries to the fetal heart), and the umbilical arteries carrying away the deoxygenated and nutrient-depleted blood. The only other example of this within human physiology occurs with the pulmonary veins and arteries which connect the lungs to the heart. In the full-term healthy neonate the cord has a spiral twist and is normally around 50-60 cm in length, with a diameter of approximately 1-2 centimeters (although this diameter reduces significantly once the cord inserts itself into the fetal surface of the placenta). The length of the umbilical cord enables the baby to pass down the birth canal and deliver vaginally without any traction being applied to the placenta. Where the umbilical cord is of an above average length, although not of clinical significance, there is an increased risk that it could become wrapped around the fetal body/neck, prolapse, or become knotted (known as a true knot). A ‘true knot’ results from active fetal movements, where the fetus moves through a loop of its cord, so that it literally forms a knot, which can be clearly seen on examination of the cord at birth. The obstetric concern where the cord becomes knotted or is compressed, relates to the potential for the blood vessels to become blocked and deprive the fetus of sufficient oxygen in uterus, especially during labour and birth (Collins JH and Collins CL 2000, Sørnes T 2000, Vance ME 2009). By contrast, a ‘false knot’ is caused by varicosities of the umbilical vessels and/or insignificant lumps of Wharton’s jelly that cause additional twists and protrusions on the surface of the cord. A cord may also be distinctly short, or relatively shortened due to the extent of spiraling present; a cord that is less than 30 cm in length is considered to be abnormally short (Cunningham FG et al 2005). Where this is the case, it can be associated with fetal growth restriction, congenital malformations, early separation of the placenta from the uterine wall, fetal distress and in the worst case, fetal death (Krakowiak P et al 2004). A number of abnormalities can affect the umbilical cord. The cord may be too long or too short. It may connect improperly to the placenta or become knotted or compressed. Cord abnormalities can lead to problems during pregnancy or during labor and delivery. In some cases, cord abnormalities are discovered before delivery during an ultrasound. However, they don’t discover until after delivery when the cord is examined directly. This study outlines the most frequent cord abnormalities in Sudanese.

Material and Methods

Umbilical cord specimens were obtained from 246 newborn of both sexes born at Omdurman new (Alsaudi) and Alshaikh Mohammed Ali Fadol hospitals of obstetrics gynecology during October and November 2010. The length of the umbilical cord was measured by using flexible tape measure sewing Shanghai Zhiliang Metal Product Co., Ltd China. The diameter of umbilical cord was measured by using vernier calipers Model NO.1053 made of carbon steel and was made in China, with thumb lock. By inspection the attachment of the cord to the maternal placenta and infant anterior abdominal wall was reported. Each specimen appeared congenital and or abnormal was reported and photographed from different angles.

Study Area:

Study was carried out in Omdurman new (Alsaudi) and Alshaikh Mohammed Ali Fadol hospitals of obstetrics gynecology, which they located in Khartoum state, Omdurman city, Althawra. The hospitals receive mean of 800 deliveries monthly 150 of them are cesarean. There are 13 consultants of obstetrics and gynecology, 6 clinical pharmacists, 31 registrars, 15 medical officers, 36 midwives, and 65 house officers. The capacity of the hospitals is about 150 beds, 20 waiting beds and 4 for normal delivery. The study was done in period between October and November 2010. A total of 246 infants (both sexes) with their umbilical cords according to the following equation formula:

\[ n = \frac{t^2 \times p(1-p)}{m^2} \]

\( n \) = required sample size.
\( t \) = confidence level at 95% (standard value of 1.96).
\( p \) = estimated prevalence of umbilical cord measurement in target area.
\( m \) = margin of error at 5% (standard value of 0.05).

Data analysis:

Data was analyzed by statistical package for social science (SPSS). Data will be displayed by tables and histogram.

Results

The study was carried out among 246 infants, 108 females and 138 males, table (1). All infants were looked healthy and their weight ranged from 2 to 4.18 kg with mean 3.01 and stander deviation 0.426, Figure (1).

Length of umbilical cord:

The length of the cord was ranged between 36 to 107 cm, with mean 60.5 cm and Std. Deviation 11.9. The mean in males was 61.3 cm with Std. Deviation 13.07 and females mean was 59.5 with Std. Deviation 10.17, figure (2).

Diameter of umbilical cord:

The diameter of the cord was ranged between 0.7 to 1.5 cm.
<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>108</td>
<td>43.9</td>
</tr>
<tr>
<td>Male</td>
<td>138</td>
<td>56.1</td>
</tr>
<tr>
<td>Total</td>
<td>246</td>
<td>100</td>
</tr>
</tbody>
</table>

**Table (1):** Sex frequencies

![Image](image1.png)

**Figure (1):** Weight VS sex.

...cm, with mean 1 cm and Std. Deviation 0.16188. The mean in males was 1 cm with Std. Deviation 0.18997 and females mean was 0.9 cm with Std. Deviation 0.11691, table (2).

**Attachment of umbilical cord to placenta:**

The attachment of the cord to the placenta was normal in all samples of the study and divided into:

- Central in which the cord inserted at the centre of the placenta at the fetal side, table (3).
- Eccentric in which the cord inserted near the centre of the placenta at the fetal side, table (3).

The central insertion was most frequent about 69.5 %; while the eccentric was the remainder 30.5 %.

**Knots of umbilical cord:**

In this study two similar cases of true knots were observed about 0.8 % of samples; with no noted problems occurrence, the weight and external features of the both infants were normal, figure (3).

**Discussion:**

**Length of umbilical cord:**

The length of the umbilical cord at birth average (Ente G and Penzer PH 1991) and ranged from 36 to 107 cm in the present study. The mean length of the cord is 57.4 cm (Moessinger A. C, et al 1982) and 50 cm (Meyer WW et al 1978). In the present study the mean was 60.5 cm. Short cords (below 40 cm) occur only in 6 % of cases (Ente G and Penzer PH 1991) and 5 % less than 35 cm (Stefos T et al 2003) comparing with 1.2 % in the present study; since the cord must be sufficiently long at least 32 cm as to allow the fetus to exit safely from the uterus (Ente G and Penzer PH1991). No cases of long cords...
Figure (2): Length of umbilical cord.

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Minimum</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>0.9</td>
<td>0.11691</td>
<td>0.8</td>
<td>1.2</td>
</tr>
<tr>
<td>Male</td>
<td>1.0</td>
<td>0.18997</td>
<td>0.7</td>
<td>1.5</td>
</tr>
<tr>
<td>Total</td>
<td>1.0</td>
<td>0.16188</td>
<td>0.7</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Table (2): Diameter of umbilical cord.

were found in the present study, since the cord may be as long as 300 cm (Ente G and Penzer PH 1991, Moessinger A. C, et al 1982, Heifetz SA. 1996).

Diameter of umbilical cord:

The diameters of the cord at delivery around 1.7 cm (Benirschke, K et al 2000), 2 cm (Meyer WW et al 1978) and 3 cm (Stefos T et al 2003) while the mean of diameter in the present study was 1 cm with Std. Deviation about 0.16; which is less than diameters reported above.

Attachment of umbilical cord to placenta: In the present study the attachment of umbilical cord to placenta was found in two categories but still normal insertion. With velamentous insertion, the umbilical cord inserts into the chorion laeve at a point away from the placental edge, and the vessels pass to the placenta across the surface of the membranes between the amnion and the chorion. One percent of singletons have velamentous insertion; however, this condition occurs in almost 15% of monochorionic twins and is common in triplets (Lopriore E et al 2007).

Knots of umbilical cord:

The incidence of umbilical cord knot reported as 7 / 2000 (0.3%) (Chasnoff IJ et al 1977), 563 / 56092 (1%) (Naeye RL 1992), 6/1,115 (0.5%) (McLennan H et al 1988), 57/4650 (1.2%) (Blickstein I et al 1987), 180/17,190 (1%) (Spellacy WN et al 1966), 84/8365 (1%) (Ragucci N and Morandi C 1969), 115/61,810 (0.2%) (Scheffel T and Langanke D 1970), 51/5080 (1%) (Sopracordevole F and Perissinotto MG 1991), and 135/45,310 (0.3%) (Lundgren AT and Boice WA 1939). In the present study 2/246 (0.8%). Low percentage of stillbirths infant with cord
Table (3): Attachment of umbilical cord to placenta.

<table>
<thead>
<tr>
<th>Categories</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central</td>
<td>171</td>
<td>69.5</td>
</tr>
<tr>
<td>Eccentric</td>
<td>75</td>
<td>30.5</td>
</tr>
<tr>
<td>Total</td>
<td>246</td>
<td>100</td>
</tr>
</tbody>
</table>

Figure (3): Knotted umbilical cord.

knots was reported as 1/7 (14%) (Chasnoff IJ et al. 1977), 19/563 (3.4%) (Naeye RL 1992), 2/52 (4%) (Blickstein I et al. 1987), 10/180 (5%) (Spellacy WN et al. 1966), 8/85 (10%) (Scheffel T and Langanke D 1970), 1/51 (2%) (Sopracordevole F and Perissinotto MG 1991), 6/216 (2.7%) (Sørnes T 2000), and 4/48 (2%) (there was also 1 neonatal death) (DiTerlizzi G and Rossi GF 1955). In the present study 2/2 (100%) which is differ from studies above.

Conclusions:
The length of the umbilical cord in Sudanese is about 60.5 cm with little difference between male and female. The diameter of the umbilical cord in Sudanese is about 1 cm. The attachment of the cord mostly central rather than to be peripheral. True knots of the umbilical cord are uncommon, but may occur. True knots may not interrupt the fetus up to birth. I think it need more studies on histological structure of umbilical cord of Sudanese because there is no literature on it.

REFERENCES