Original Article

Nuchal cord and its outcome: a retrospective analysis

Singh Gurneesh¹, Dasgupta Ellora²

¹Department of Obstetrics and Gynaecology, Military Hospital, Amritsar Cantt. Amritsar -143 001. ²Department of Obstetrics and Gynaecology, N.C. Jindal Institute of Medical Care and Research, Hisar -125 005

Abstract

Objectives: To study the effect of nuchal cord on mode of delivery, complications and fetal outcome. Methods: A retrospective study was carried out in 690 deliveries including 136 with nuchal cord, in a one year from period July 2005 to June 2006. Their mode of delivery, complications and fetal outcome of the nuchal cord group were compared with the rest of the deliveries (the control group). Nuchal cord group was subdivided into loose nuchal cord (cord could easily be uncoiled before complete delivery of the baby) group and tight nuchal cord (cord was needed to be clamped and cut before delivery of the baby) group. The mode of delivery and fetal outcome were compared between these subgroups also. Results: The nuchal cord group did not have any significant difference in the mode of delivery or fetal outcome compared to the control group. However the subgroup having tight cord around the neck had significantly higher proportion of low Apgar scores and meconium staining at birth. Conclusions: Nuchal cord does not increase the chances of cesarean delivery. However tight cord around the neck may result in low Apgar scores and increased incidence of fetal distress leading to cesarean section.

Key words: nuchal cord, apgar score, cesarean delivery, meconium staining.

Introduction

Intrauterine life, sustained only by two small arteries and a tortuous vein coursing through a long flexible cord, hangs by a very delicate thread. Much like a hangman’s noose, the nuchal cord is often blamed for problems that are encountered during delivery and is often cited as a major cause of fetal distress and perinatal mortality. However, the actual significance that a nuchal cord has on the outcome of an infant is controversial ¹.

Nuchal cords are rare before 20 weeks of gestation mostly because the umbilical cord is shorter than the fetal body till then and so has no opportunity to wrap around the neck or head². The pattern of most nuchal cords (>80%) are wrapped right to left around the fetal neck. Most torsion (>70%) is counterclockwise (sinestral, left-handed) away from the fetus. This suggests that the fetus when stimulated maneuvers in the same direction most of the time. The fetus can develop entanglement and escape from it. It is possible for a 20 week fetus with a triple nuchal cord to free itself of the loops by 28 weeks³,⁴. About 28% of all pregnancies have a nuchal cord and of these 3.7% have two or more loops. The farther along in gestation a delivery occurs, the higher the probability of a nuchal cord being present - from around 10% at 24 weeks, to around 18% at 32 weeks and around 30% at term - following an almost perfectly linear distribution.
Therefore, it remains appropriate to use exceedingly conservative criteria like unequivocal histopathological evidence for obstruction of blood flow in ascribing causality to nuchal cords when they are found in stillborn babies. If the umbilical cord becomes overly stretched or compressed during labor, it usually causes the baby’s heart rate to slow down temporarily. This is the baby’s reflexive response to less blood flowing back to its heart. These brief variable heart rate decelerations are not harmful. If the baby’s heart rate slows to below 100 beats per minute and does not return to normal (120 to 160 for most babies) within a few minutes, measures should be taken to relieve the presumed cord compression. These include giving oxygen and fluid to the mother and changing her position. Medication may be given to slow down the contractions. If there is still concern about pressure on the umbilical cord, a cesarean delivery may be needed. One of the concerns that can increase the risk of cord problems is decreased amniotic fluid. This doesn’t allow for the free movement of the baby and the cord, on and off each other, raising the possibility of a cord accident.

During labor, the only indication of the umbilical cord being wrapped around the baby may be variable fetal heart decelerations on the fetal monitor. These are generally timed with contractions as at that time the cord is stretched more tightly.

**Methods**

During a one year period from July 2005 to June 2006, 690 infants were born. The maternal delivery record provided the data for gestational age, method of delivery, presence of meconium in the amniotic fluid, fetal heart rate monitoring which was done routinely, presence of nuchal cord, and any other complications that may have occurred at the time of delivery. The newborn’s record was used to collect data for Apgar scores.

Of the 690 deliveries, the study group consisted of 136 births involving nuchal cords. The remaining 554 deliveries, in which nuchal cords did not occur, served as the control group.

A nuchal cord was considered to be “loose” when it could be uncoiled before delivery of the newborn. When it needed to be clamped and cut before delivery, the nuchal cord was called tight. Fetal distress was defined as the presence of bradycardia or variable or late decelerations in heart rate detected by an electronic fetal heart monitor. Statistical analyses were performed using chi square.

**Table 1. Comparison between nuchal cord group and control group.**

<table>
<thead>
<tr>
<th></th>
<th>Nuchal cord group (%) (n=136)</th>
<th>Control Group (%) (n=554)</th>
<th>Chi square value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>124 (91.18)</td>
<td>410 (74.01)</td>
<td>18.396</td>
<td>0.001</td>
</tr>
<tr>
<td>Primary cesarean section</td>
<td>10 (7.35)</td>
<td>67 (12.09)</td>
<td>2.669</td>
<td>&lt; 0.2</td>
</tr>
<tr>
<td>Repeat cesarean section</td>
<td>2 (1.47)</td>
<td>77 (13.90)</td>
<td>17.047</td>
<td>0.001</td>
</tr>
<tr>
<td>Vacuum delivery</td>
<td>1 (0.74)</td>
<td>6 (1.08)</td>
<td>0.131</td>
<td>1</td>
</tr>
<tr>
<td>Breech delivery</td>
<td>1 (0.74)</td>
<td>20 (3.61)</td>
<td>3.058</td>
<td>0.1</td>
</tr>
<tr>
<td>Placental abruption</td>
<td>0</td>
<td>3 (0.54)</td>
<td>0.739</td>
<td>1</td>
</tr>
<tr>
<td>Meconium stained liquor</td>
<td>8 (5.88)</td>
<td>39 (7.04)</td>
<td>0.230</td>
<td>1</td>
</tr>
<tr>
<td>Fetal distress*</td>
<td>15 (11.11)</td>
<td>50 (9.02)</td>
<td>0.514</td>
<td>1</td>
</tr>
<tr>
<td>Apgar at 1 minute &lt;7</td>
<td>10 (7.35)</td>
<td>32 (5.78)</td>
<td>0.475</td>
<td>1</td>
</tr>
<tr>
<td>Apgar at 5 minutes &lt;7</td>
<td>4 (2.94)</td>
<td>8 (1.44)</td>
<td>1.432</td>
<td>1</td>
</tr>
</tbody>
</table>

*As manifested by bradycardia, variable, or late decelerations.
Results

During the study period, 19.71% of all deliveries had some form of nuchal cord. The incidence of one coil of the umbilical cord around the neck was 122 (17.68%), while two coils and three coils of the cord occurred in 10 (1.45%) and 4 (0.58%) of the deliveries, respectively. Of the 136 nuchal cords, 97 (71.32%) were loose, 39 (28.68%) were tight.

There were no significant differences in the maternal age, race or parity between the two groups. The mean age of the mothers in both the groups was slightly over 21 years. The majority were nulliparous (43%).

Table 1 is a summary of the timing, method, and complications of labor and delivery. The mean gestational age at birth was just over 38 weeks in both the groups. There was no statistical difference in frequency of primary cesarean sections or vacuum extractions between the two groups. The rate of primary cesarean section was 7.35% in the nuchal cord group compared with 12.09% in the control group.

The comparative study between two subgroups with tight nuchal cord and loose nuchal cord showed statistically significant higher primary cesarean rate, fetal distress and low apgar scores at 1 minute and 5 minutes in tight nuchal cord group.

Discussion

The frequency of nuchal cord in our study was 19.71%. The incidence varies from 12.6% to 33.3%, with an overall average of 20.4%.

This study was unable to demonstrate any association between the presence of a nuchal cord and the length of the pregnancy. The average umbilical cord length is 50 to 58 cm. Longer cords tends to become looped around the neck. Nuchal coiling can occur in shorter cords, in which cases the cord tends to be more tightly wrapped around the infant’s neck.

The presence of a nuchal cord in this study was not associated with an increased frequency of primary cesarean section, and vacuum, or forceps deliveries. Though the subgroup having tight nuchal cord had higher incidence of cesarean section in our study, this association is controversial in the literature.

Several studies in the past have implicated nuchal cord as a cause of fetal death. In contrast, several authors agree with the present study that nuchal cords do not increase fetal mortality.

The presence of a nuchal cord is often cited as a major cause of fetal distress, as evidenced by meconium stained amniotic fluid and/or fetal bradycardia or tachycardia. In the present study, over 5.88% and 7.04% of deliveries in nuchal cord and control group respectively were complicated by thick meconium staining. Fetal bradycardia and variable decelerations were found more often in the nuchal cord group than in the control group (11.11% vs 9.02%) in the present study. Similar increases in both moderate and severe variable decelerations in labors complicated by nuchal cords have been reported by Hankins et al.

Greater than 50% interruption of umbilical blood flow is significant for creating fetal hypoxia. Sustained or
repetitive compressions eventually lead to fetal compromise. Occlusion of the uterine artery has similar effects on the fetus with specific differences on the fetal heart and brain. Combined umbilical cord occlusion and uterine artery occlusion has effect on fetal organs and metabolism\(^{12}\). Cord compression; whether chronic intermittent or acute, ultimately stimulates the fetus to shunt its blood flow, vasoconstrict its extremities, and protect itself through a centralized circulation (heart, adrenal, brain). Baroreceptor and chemoreceptor responses occur with release of catecholamines, cortisol, vasopressin, angiotensin and other biochemical agents to initiate a fetal response to developing hypoxia. Fetal metabolism of glucose and gluconeogenesis are induced by cord compression. Arterial lactate elevations may be a measurable results of umbilical cord compression.

These protective steps over time can give way to bradycardia, vasodilatation, fetal hypotension, acidosis, depletion of glycogen stores, and blunting of the cortisol response. Eventually fetal compensation fails and peripheral vasodilatation occurs with heart failure, arrhythmias and fetal death. Short term rapid biochemical defenses such as catecholamines, are replaced by long term endocrine and paracrine biochemistry. These agents are metabolized at a slower rate eventually leading to devastating fetal effects. In an intermittent cord compression (one complete occlusion every 5 minutes), sheep model with term fetuses, fetal collapse occurs in 45 minutes to one hour. In a model of 5 minute complete cord compression repeated every 30 minutes the fetuses died after 3 or 4 occlusions. Clinical signs which may be present, given the biochemical status of the fetus at risk of umbilical cord compression, are hiccups, hyperactivity, decreased fetal movement and fetal heart rate changes. This acidosis is of a mixed (68%) or a pure respiratory (23%) type and is corrected quickly by prompt ventilation of the newborn. Thus though the nuchal cord group did tend to have a larger percentage of infants born with a score of less than 7, nuchal cords are not a major cause of fetal asphyxia \(^{4,9}\). In some studies, nuchal cord associated with meconium or an abnormal fetal heart rate pattern, and one that has multiple loops or is extremely tight may cause a subclinical deficit in neurodevelopmental performance or unexplained spastic quadriplegia \(^{13,14}\).

**Conclusion**

Nuchal cord does not increase the chances of cesarean delivery. However tight cord around the neck may result in low apgar scores and increased incidence of fetal distress and cesarean section.

**Reference**