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Case Report

A rare case report of septuple nuchal cord entanglement with favourable perinatal outcome

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ABSTRACT

A nuchal cord refers to the umbilical cord being looped one or more times around the fetal neck. While often a common finding during pregnancy and labor without adverse effects, it can sometimes lead to complications, including variable decelerations in fetal heart rate, reduced fetal movement, signs of fetal distress, and, rarely, intrauterine fetal demise (IUD). This case describes a rare instance of seven loops of the umbilical cord encircling the fetal neck, identified during a cesarean section in a woman who presented with labor pains at 37 weeks and 1 day of gestation. The pregnancy was complicated by gestational diabetes and polyhydramnios. Intrapartum fetal surveillance revealed recurrent variable decelerations on cardiotocography and the presence of grade 2 meconium-stained liquor. Intraoperatively, seven tight loops of the umbilical cord were observed wrapped around the fetal neck, with a cord length of 115 cm. The fetal and maternal outcomes in cases of nuchal cord entanglement depend on various factors, including the number of loops, cord length, coiling tightness, and amniotic fluid index. Careful intrapartum monitoring and prompt interventions can improve perinatal outcomes, even when nuchal cord entanglement is not diagnosed prenatally. Managing nuchal cord entanglement remains challenging. Although multiple loops (more than five) are rare, we report an uncommon instance of seven loops of nuchal cord entanglement, which resulted in favorable maternal and fetal outcomes.

Keywords: Seven-loop umbilical cord, Nuchal cord entanglement, Obstetric complications, Cardiotocographic monitoring

INTRODUCTION

The umbilical cord is a vital structure that connects the fetus to the placenta, supporting the exchange of nutrients, gases, and waste throughout pregnancy. It begins forming during the fourth week of gestation and is typically fully developed by the seventh week. Functioning as the fetus's lifeline, the umbilical cord not only sustains life but also symbolizes the physiological bond between mother and child.

A nuchal cord is defined as the encirclement of the fetal neck by one or more loops of the umbilical cord, with at least a 360-degree wrapping.[1] It is a relatively common finding, observed in up to 24% of all deliveries, and is more prevalent in vaginal births (32.14%) compared to cesarean deliveries (16.78%), and is frequently associated with meconium-stained amniotic fluid (33.88%).[2] The entanglement is generally attributed to fetal movement through a cord loop and is often transient.

Although most cases of nuchal cord are clinically insignificant, some may lead to adverse outcomes, such as reduced fetal movements, variable decelerations in fetal heart rate, fetal hypoxia, and, in severe cases, intrauterine fetal demise.[3] Compression or stretching of the cord during descent through the birth canal may compromise blood flow, impacting neonatal outcomes.

The presence of multiple nuchal cords, particularly more than four loops, is a rare obstetric finding. In this report, we present an exceptional case of septuple (seven-loop) nuchal cord entanglement identified during cesarean delivery. Despite the rarity of such occurrences, the case

highlights the importance of vigilant fetal monitoring and timely obstetric intervention in ensuring favorable maternal and fetal outcomes.

CASE REPORT

A 24-year-old woman, G2A1, presented to the labour room, department of obstetrics and gynaecology, Vijaya Hospital, Chennai, at 37 weeks+1 day of gestation with complaints of abdominal pain for the past 3 hours. She reported no leaking or bleeding per vaginum, and fetal movements were perceived as normal. Her obstetric history included a spontaneous abortion at 18 weeks in her first pregnancy. The current pregnancy, conceived after ovulation induction three years post her first conception, was booked and immunized. A prophylactic cervical cerclage was performed at 13 weeks+6 days. She was diagnosed with gestational diabetes mellitus at 24 weeks and managed with medical nutrition therapy and self-monitoring of blood glucose levels. Antenatal care was regular. A growth scan at 28 weeks showed normal fetal growth and an amniotic fluid index (AFI) of 16.5 cm. Another scan at 35 weeks revealed normal growth with hydramnios (AFI: 24.7 cm). On admission, abdominopelvic examination revealed a mobile fetal head and an unfavorable Bishop score. Due to a prolonged latent phase of labor (>20 hrs), labor was induced with PGE2 gel. Six hours post-induction, cardiotocography (CTG) showed persistent variable decelerations. An artificial rupture of membranes was performed, revealing grade 2 meconium-stained liquor, prompting an emergency cesarean section after informed consent.

Intraoperatively, the fetus was in cephalic presentation, and seven loops of umbilical cord were found tightly wrapped around the fetal neck. The cord was doubly clamped and cut. A female infant weighing 2940 g was delivered with APGAR scores of 7 and 10 at 1 and 5 minutes, respectively. The newborn showed signs of respiratory distress and hypoxia, requiring immediate neonatal resuscitation. The cord measured 115 cm in length (Figure 1). The placenta was normal, with no retroplacental clots, and had a three-vessel umbilical cord. Both mother and baby recovered well and were discharged on post-operative day 3.

Figure 1: Umbilical cord with a total length of 115 cm showing seven loops around the fetal neck.

DISCUSSION

The term ‘nuchal cord’ was first introduced by Crawford in 1962, referring to the complete looping of the umbilical cord around the fetal neck.[4] Nuchal cords are typically categorized into loose and tight types. In cases of loose nuchal cords, the loop can be easily slipped over the fetal head during delivery, and they are generally not associated with significant complications for the mother or baby. However, when the cord is tightly wrapped, it may be difficult or impossible to unwind manually. In such instances, clamping and cutting the cord before delivery of the shoulders is often necessary to facilitate birth and prevent cord-related complications.

A notable ultrasound feature used to identify tight nuchal cords is the divot sign, a disruption or indentation along the smooth contour of the fetal neck due to cord compression. This sonographic finding can help distinguish tight from loose nuchal cords, offering critical insight during prenatal evaluations.[5,6]

A nuchal cord is a relatively common finding during childbirth. It may involve a single loop or multiple loops. While a solitary loop is generally considered benign and rarely associated with adverse outcomes, the presence of several loops, particularly four or more, is unusual and can be clinically significant. Exceptional reports have documented up to nine loops, emphasizing the potential complications associated with multiple cord entanglements.[7,8]

When the umbilical cord is tightly looped or wrapped multiple times, it can restrict blood flow within the cord, increasing vascular resistance and fetal blood pressure. This physiological stress often leads to bradycardia and reduced cardiac output. Such disturbances in circulation may compromise fetal oxygenation and well-being, especially during labor. These effects make tightly wrapped or multiple nuchal cords important risk factors for perinatal complications.[9-11]

Several maternal and fetal characteristics have been linked to a higher likelihood of nuchal cord development. Among these, an umbilical cord length of 70 cm or more, post-term pregnancy (beyond 42 weeks), marginal insertion of the cord into the placenta, and male fetal sex have been recognized as significant contributors. Other associated factors include polyhydramnios, large-for-gestational-age fetuses, multiple pregnancies, structural or nutritional issues affecting the cord, and non-cephalic fetal presentations such as breech or transverse lie.[12,13]

Cord length appears to play a particularly pivotal role in the occurrence of nuchal cords. Short cords (defined as≤35 cm) are typically associated with restricted fetal movement and an increased risk of placental abruption, while excessively long cords are more prone to tangling, looping, and knot formation. In our case, the umbilical cord measured 115 cm, falling into the long cord category.

Consistent with existing literature, long cords are more frequently observed in cases with nuchal entanglements, although cord length itself does not consistently correlate with fetal weight, length, or sex.[14,15]

The clinical impact of nuchal cord is highly variable. A single loop usually does not influence labor progression or neonatal outcomes significantly. However, with two or more loops, there is a greater chance of complications such as abnormal fetal heart rate patterns (e.g., variable decelerations), passage of meconium-stained fluid, a prolonged second stage of labor, and an increased likelihood of operative delivery.[13] In more serious cases, these conditions can result in fetal acidemia, neonatal anemia, perinatal asphyxia, and in rare instances, stillbirth.

Detecting a nuchal cord before labor can be difficult. Although its identification via ultrasound was first described decades ago, the sensitivity of standard ultrasound remains relatively low, estimated at around 37.5%.[16] The specificity, however, is higher at approximately 80%. Advances in ultrasonography, including color and power Doppler imaging, have improved diagnostic capabilities, but nuchal cords still frequently go undetected until delivery.[17]

Intrapartum monitoring using cardiotocography (CTG) is critical for recognizing signs of cord compression. Variable decelerations, especially those showing a "W" shape or with shouldering, are often indicative of a nuchal cord.[18] In the case presented, although prenatal imaging did not detect the cord loops, continuous cardiotocography (CTG) monitoring allowed for the timely identification of fetal distress. Prompt clinical action ensured a positive neonatal outcome.

It is important to note that the identification of a nuchal cord, in isolation, does not justify cesarean delivery. Management should be individualized, considering fetal well-being and labor progression. Careful monitoring and timely intervention remain the cornerstone of ensuring optimal maternal and neonatal outcomes in these scenarios.

CONCLUSION

Managing nuchal cord entanglement in clinical practice poses a significant obstetric challenge. The outcome for both the fetus and mother is influenced by various factors, such as the number of cord loops, the length of the umbilical cord, the type of coiling (tight or loose), gestational age, fetal growth, and the amniotic fluid index. In the present case, although seven loops of the nuchal cord were not detected during the antenatal ultrasound, the successful outcome, evidenced by favourable APGAR scores, was largely attributed to timely intervention facilitated by careful intrapartum monitoring using CTG. It is essential for obstetricians and sonographers to be vigilant in identifying potential cord-related complications during ultrasound examinations. With effective monitoring and prompt intervention during labor, it is possible to improve perinatal outcomes and prevent serious complications, even in cases where the nuchal cord is not diagnosed prenatally. If signs of fetal distress, such as persistent decelerations or a poor biophysical profile, emerge, prompt operative delivery is recommended.

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