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True Knot Of The Umbilical Cord: A Case Report

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ABSTRACT: The umbilical cord serves as the vital connection between the fetus and the mother, supplying essential nutrients, oxygen, hormones, and trophic factors necessary for fetal development. Although umbilical cord knotting is relatively uncommon, it can occur in two forms. A true knot of the umbilical cord is potentially dangerous and may lead to fetal distress or serious neonatal complications. We present a case involving a 23-year-old woman, pregnant with her second child, where a true knot was identified only after caesarean section. The knot had not been detected during routine antenatal ultrasounds. Fortunately, the newborn showed no adverse effects related to the knot. While diagnosing true knots before birth remains difficult, advances in imaging technologies show promise for earlier detection.

Introduction:

True knots of the umbilical cord are relatively uncommon but not rare, occurring in approximately 0.3% to 2.1% of all births. Despite their infrequency, they are associated with a high perinatal mortality rate—up to 11% in some cases [1]. Several factors increase the risk of true knot formation, including an unusually long umbilical cord, low birth weight, excessive amniotic fluid (polyhydramnios), and monoamniotic twin pregnancies. Most true knots remain loose and are often only discovered after delivery. However, if a knot tightens due to active fetal movement, it can restrict blood flow and lead to serious complications such as fetal distress or even stillbirth. Early detection during pregnancy could help prevent such outcomes, but identifying true knots before birth remains a significant diagnostic challenge.

Case Report

A 23 years old woman, gravida 2 para 1 live 1 previous lower segment caesarean section with 38weeks + 3 days of Gestational age, she is booked and immunized case belonging to lower socioeconomic status, admitted with complaints of decreased fetal movements. No history of bleeding and leaking per vagina.

Non stress test was done, and it was non-reactive, basic investigations done, all were within normal limits.

There was no significant past history. Her menstrual cycles were regular and her previous caesarean section was uneventful which had an indication of breech in labour. The first child is 3 years old and is healthy.

On examination, patient is moderately built and moderately nourished. Her general examination was normal and her vitals were stable. Normal cardiovascular, respiratory and nervous system examination.

On Abdominal examination uterus is term in size, relaxed, cephalic presentation, and fetal heart rate shows 80bpm and she was not in labour.

Planned for emergency repeat lower segment caesarean section in view of fetal distress.

Under aseptic condition patient was operated under spinal Anesthesia and a Pfannenstiel incision was made over the old scar. Healthy boy baby delivered with weight 3.5 kg, cried immediately after birth with APGAR SCORE 8/10 ,9/10 at 1 and 5 minutes.

A true umbilical Knot was identified. Placenta was examined, found to be normal and her postoperative period was uneventful and discharged at 6th postoperative day.



Fig: True Umbilical Cord Knot

Discussion

True knots of the umbilical cord fall under the broader category of umbilical cord accidents—a group of over 30 conditions that can impair blood flow to the fetus^[2]. A complete blockage can be fatal to the fetus. True knots account for about 4% of all umbilical cord-related complications ^[3].

Knots in the umbilical cord are generally classified as either true knots or loose knots ^[3]. True knots involve actual tightening of the cord and are associated with greater risk, while loose knots can potentially evolve into true knots, especially during fetal movement or labor. Another classification found in medical literature distinguishes between true knots and pseudo-knots.

True knots are actual entanglements of the cord, whereas pseudo-knots result from the umbilical vein looping around an artery, causing a localized bulge in Wharton's jelly ^[2].

The formation of true knots is believed to occur mainly between the 9th and 28th weeks of gestation, corresponding to early and mid-pregnancy ^[3]. This is supported by evidence showing a similar prevalence of knots in both aborted fetuses and full-term deliveries, along with the observation that cord length tends not to increase significantly after 28 weeks ^[3]. Biomechanically, a knot is more likely to form when the cord is longer, the fetus is smaller, and there is ample intrauterine space for movement. Various maternal and fetal conditions contribute to this risk, including polyhydramnios, small fetal size, elongated cords, monoamniotic twin gestation, post-term pregnancy, older maternal age, prior miscarriages, obesity, anaemia, chronic hypertension, and gestational diabetes. Male fetuses are more commonly affected. In the presented case, the newborn was male, yet no risk factors or complications were evident—possibly due to the knot not being tight enough to disrupt blood flow.

Prenatal detection of cord knots is notably challenging. Standard two-dimensional ultrasound struggles to visualize these three-dimensional structures, especially when fetal limbs obscure the view. As a result, most true knots are only identified postnatally. However, some distinctive ultrasound signs—such as the "hanging noose" and the "four-leaf clover" patterns—may suggest the presence of a true knot ^[3]. Advanced imaging, such as four-dimensional ultrasound and Doppler flow studies, can help detect loose knots and assess blood flow ^[4], while three-dimensional ultrasound provides the most accurate visualization due to its superior anatomical detail.

True knots are associated with increased risks including fetal growth restriction, premature birth, the need for neonatal intensive care, and even fetal demise [5]. A study by Airas and Heinonen in 2002 found that newborns with true knots had a higher incidence of low APGAR scores at 1 minute and were four times more likely to be stillborn compared to the general obstetric population. Surviving infants may experience temporary distress during labor but generally recover quickly post-delivery [6].

When a true or potentially tightening knot is identified during antenatal care, vigilant monitoring is essential. This includes using Doppler ultrasound to assess blood flow and continuous cardiotocography during labour, given the potentially life-threatening consequences.

Conclusion

In this case, a true umbilical cord knot could not be identified prenatally, even with the use of antenatal ultrasonography. Additionally, current knowledge and experience regarding true umbilical cord knots remain limited, as most cases are discovered incidentally. Hence, it is advisable to conduct regular antenatal check-ups, with increased frequency during the third trimester.

Ethical approval

Not required

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent. In these forms, the patient has provided consent for the publication of their images and clinical information in the journal. The patients acknowledge that while their names and initials will not be disclosed and all reasonable efforts will be made to maintain their anonymity, complete confidentiality cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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