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Case Report

True umbilical cord knots are not always knotty: a case report

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ABSTRACT

A true umbilical cord knot (TUCK) is a rare event, complicating 0.3-1.3% of all pregnancies. Prenatal diagnosis is not usual, as it is mostly discovered at delivery, when the knot is identified. True cord knots are mostly asymptomatic, but can be associated with adverse perinatal outcomes such as birth asphyxia and foetal demise, owing to compression of the umbilical vessels within the knot. This compression, however, is largely dependent on how tightly the knot is formed. We report a 30-year-old booked gravida 2, para 1, with a living child, who had spontaneous vaginal delivery of a healthy male baby at term, with incidental finding of a single loose TUCK at delivery. The umbilical cord was 81 cm long. The baby weighed 3600 g at birth, with 1- and 5-minutes Apgar scores of 9 and 10 respectively, and no adverse perinatal occurrence.

Keywords: True knot, Umbilical cord, Cord accident, Live birth

INTRODUCTION

At term, the average length of the umbilical cord is 55 cm, with a diameter of 12 mm.[1] A long cord predisposes to a true umbilical cord knot (TUCK), which is an interweave of a segment of the umbilical cord, developing when a foetus slips through a loop in the cord.[1] True knots of the umbilical cord account for about 4% of all umbilical cord complications, affecting 0.3-1.3% of pregnancies.[2,3] Though the exact aetiology of formation of TUCK is unclear, risk factors, aside from a long umbilical cord, include polyhydramnios, maternal diabetes mellitus (DM), male foetus, small size foetus, advanced maternal age, chronic hypertension, anaemia, obesity, previous spontaneous abortion, multiparity, monoamniotic twin gestation, prolonged gestation, and amniocentesis.[1-4] Foetuses with TUCK have a 4-10 fold increased risk of stillbirth, which is the result of obstructed foetal blood flow from constriction of the umbilical cord vessels by the knot.[2,4] Uteroplacental insufficiency from chronic impairment of foetal circulation may also be complicated by intrauterine growth restriction (IUGR), small for gestational age (SGA) foetuses, and low birth weight infants.[3,5] Affected foetuses are therefore at increased risk of preterm birth, Caesarean delivery, and neonatal intensive care unit (NICU) admission.[1,3,5] Most true knots, as in the reported case, are however, loose knots, discovered incidentally at delivery, with no adverse perinatal sequelae.[4]

CASE REPORT

Mrs. OO was a 30-year-old gravida 2, para 1, with a living child, who booked index pregnancy at our facility, at an estimated gestational age (EGA) of 21 weeks. Her booking parameters were normal. Her weight and height were respectively 55 kg and 1.6 m, giving a body mass index (BMI) of 21.48 kg/m^2, with a blood pressure of 120/80 mmHg, and a packed cell volume (PCV) of 33%. Obstetric ultrasound revealed a viable singleton gestation. There was no foetal, amniotic fluid, umbilical cord or

placental anomaly. Her antenatal period was uneventful, and serial measurements of her symphysiofundal height (SFH) revealed a normally growing foetus. Further routine scans at 32 and 39 weeks confirmed a normally growing foetus, with no foetal, amniotic fluid, umbilical cord, or placental anomaly. She fell into spontaneous labour at an EGA of 39 weeks + 4 days and subsequently progressed to having a spontaneous vaginal delivery of a live male baby, with a single loose nuchal cord. The baby weighed 3600 g at birth, with 1- and 5- minutes Apgar scores of 9 and 10 respectively. A single loose TUCK was discovered incidentally at delivery (Figures 1 and 2). The umbilical cord measured 81 cm in length, and 20 mm in diameter, with a central insertion into the placenta, which weighed 500 g. The baby had no complication, and is currently doing well.

Figure 1: A single loose true umbilical cord knot, found incidentally at delivery of the baby.

Figure 2: The long umbilical cord with a single loose true umbilical cord knot.

DISCUSSION

The longer than average umbilical cord length and male foetal gender were the risk factors for TUCK identified in Mrs OO. There is a well-established association between a long umbilical cord and TUCK.[6] Male foetuses have relatively longer umbilical cords compared with female foetuses, and are therefore at higher risk of formation of cord knots.[3] Other risk factors for TUCK include factors/conditions associated with an increased intra-uterine volume/space, which allows for free and exaggerated foetal movements, predisposing to the formation of TUCKs.[6] These risk factors include polyhydramnios and maternal DM, which predisposes to polyhydramnios.[3] Multiparity is associated with a lax abdominal and uterine wall, allowing ample room for foetal movements and formation of TUCKs.[6] Advanced maternal age and previous miscarriages, also risk factors for TUCK, are likely to be associated with multiparity.[2] Other risk factors like chronic hypertension and obesity, are associated with advanced maternal age and multiparity.[7] Saadia et al and Di Renzo et al found a significant association between hypertensive disorders of pregnancy and male foetal sex, a significant risk factor for the formation of TUCK.[8,9] Also, a preponderance of male foetal gender in pregnancies affected by gestational DM, a risk factor for TUCK, is documented.[3] Amniocentesis may cause increased uterine contractions and foetal movements, increasing the risk of formation of a true cord knot during the procedure.[6]

The adverse antenatal and perinatal outcomes, already highlighted, found in association with TUCK is the result of constriction of the umbilical vessels by the knot, thereby impairing foetal circulation and causing uteroplacental insufficiency.[2,5] Loose knots, as was seen in our patient, would however, usually not cause foetal compromise, as foetal blood supply is maintained.[5] That said, loose knots may tighten during pregnancy due to foetal movements, or during labour, as the foetus descends through the birth canal, thereby reducing umbilical cord blood flow, and leading to foetal distress, birth asphyxia, and foetal demise.[4,5] Wharton's jelly, which surrounds the umbilical cord vessels, protects the vessels from torsion and compression.[1] Thicker umbilical cords have larger amounts of Wharton jelly, as umbilical cord thickness depends on the amount of Wharton jelly that is formed and deposited within the cord.[10] Thick umbilical cords, as was seen in our patient, whose cord diameter of 20 mm was wider than the average of 12 mm, are therefore protective against tightening of cord knots and the consequent occlusion of foetal vessels. The nuchal cord, which complicated the TUCK in our patient, is usually benign, with no associated adverse perinatal outcome, even when tight.[11]

Prenatal diagnosis of TUCK is infrequent, as the exact gestational age at which knots form remains unclear.[4,5] True cord knots have been reported to form in all three trimesters of pregnancy, and even in labour.[5] In addition,

the entire length of the umbilical cord is not routinely visualised during ultrasound scanning (ultrasound examination of the entire cord length is time-consuming), and in later gestation, parts of the cord may be obscured by the foetus.[5] More so, the low incidence of TUCKs, coupled with the fact that knots do not have a characteristic ultrasonographic appearance, further makes the diagnosis difficult.[2,4] However, the 'four-leaf clover' appearance, and the 'hanging noose' sign, which is the visualisation of an umbilical cord segment surrounded by another loop of cord, have been reported as being highly specific features of a TUCK.[10] Loose umbilical cord knots and knots with wide-open loops however, do not demonstrate the 'hanging noose' appearance.[10] These may possibly explain why the TUCK in our patient was not diagnosed antenatally, despite her having done three ultrasound scans. Three- or four-dimensional ultrasound, colour Doppler imaging, and Doppler velocimetry are useful in the prenatal diagnosis of TUCKs, and differentiating these from false knots, which are kinks in the umbilical cord with no clinical significance.[4,10]

If diagnosed prenatally, the patient should be adequately counselled, given the increased risk of adverse foetal and neonatal outcomes.[4] Close monitoring with Umbilical Artery (UA) Doppler velocimetry until term, and continuous electronic foetal monitoring in labour are recommended.[4,5] Even though Caesarean delivery may be considered electively, owing to the risk of cord tightening during labour, a closely monitored vaginal delivery is a safe option.[2,4]

CONCLUSION

A true knot of the umbilical cord, though rare, may be an incidental finding at delivery. Prenatal detection is not common, and therefore, the diagnosis is often missed antenatally. Targeted sonographic and Doppler evaluation of patients at high risk of TUCK may increase prenatal detection rates, and reduce adverse outcomes. When diagnosed antenatally, close UA doppler follow-up, and continuous cardiotocography in labour are recommended. Vaginal delivery with close monitoring in labour is a safe delivery option, in the absence of any contraindication to vaginal birth.

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REFERENCES

1. Karakecili S, Barut MU, Cakmak G, Ozturk E, Bozkurt M, Demir M. True knot of the umbilical cord in advanced weeks of pregnancy: a case report. Proc Obstet Gynecol. 2017;7(3):1-5.
2. Airas U, Heinonen S. Clinical significance of true umbilical knots: a population-based analysis. Am J Perinatol. 2002;19(03):127-32.
3. Räisänen S, Georgiadis L, Harju M, Keski-Nisula L, Heinonen S. True umbilical cord knot and obstetric outcome. Int J Gynecol Obstet. 2013;122(1):18-21.
4. Scioscia M, Fornalè M, Bruni F, Peretti D, Trivella G. Four-dimensional and Doppler sonography in the diagnosis and surveillance of a true cord knot. J Clin Ultrasound. 2011;39(3):157-9.
5. Ikechebelu JI, Eleje GU, Ofojebe CJ. True umbilical cord knot leading to fetal demise. Ann Med Health Sci Res. 2014;4(8):155-8.
6. Hershkovitz R, Silberstein T, Sheiner E, Shoham-Vardi I, Holcberg G, Katz M, et al. Risk factors associated with true knots of the umbilical cord. Eur J Obstet Gynecol Reprod Biol. 2001;98(1):36-9.
7. Moessinger AC, Blanc WA, Marone PA, Polsen DC. Umbilical cord length as an index of fetal activity: experimental study and clinical implications. Pediatr Res. 1982;16(2):109-12.
8. Saadia Z, Farrukh R. Association between fetal sex ratio and maternal eclampsia- a descriptive study in Pakistani population. Internet J Gynecol Obstet. 2009;12:3.
9. Di Renzo GC, Rosati A, Sarti RD, Cruciani L, Cutuli AM. Does fetal sex affect pregnancy outcome?. Gend Med. 2007;4(1):19-30.
10. Moshiri M, Zaidi SF, Robinson TJ, Bhargava P, Siebert JR, Dubinsky TJ, et al. Comprehensive imaging review of abnormalities of the umbilical cord. Radiographics 2014;34(1):179-96.
11. Henry E, Andres RL, Christensen RD. Neonatal outcomes following a tight nuchal cord. J Perinatol. 2013; 33(3):231–234.

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