

Successful Vaginal Delivery Despite a Double True Umbilical Cord Knot: A Case Report and Literature Review

Ekram Guerbej^{1*}, Dhekra Toumi¹, Imen Ben Farhat¹, Houssem Bahloul¹, Olfa Zoukar¹, Hayet Ben Hamida¹¹Department of Gynecology and Obstetrics, Maternity and Neonatology Center of Monastir, Faculty of medicine of Monastir, University of Monastir, Tunisia**DOI:** <https://doi.org/10.36347/sasjm.2026.v12i01.016>**Received:** 05.11.2025 | **Accepted:** 11.01.2026 | **Published:** 31.01.2026***Corresponding author:** Ekram Guerbej

Department of Gynecology and Obstetrics, Maternity and Neonatology Center of Monastir, Faculty of medicine of Monastir, University of Monastir, Tunisia

Abstract**Case Report**

True umbilical cord knots are uncommon findings, occurring in approximately 0.3–2% of pregnancies, while double true knots are exceedingly rare, with an estimated incidence below 0.1%. These anomalies can lead to umbilical vessel compression, resulting in fetal hypoxia or stillbirth, though outcomes largely depend on the tightness of the knot and timely management. We report the case of a 31-year-old gravida 3 para 3 woman who delivered vaginally at 39 weeks of gestation. Her pregnancy was uneventful, and routine ultrasounds revealed no cord abnormalities. During labor, continuous fetal heart rate monitoring detected a sudden deceleration to 60 beats per minute at full dilation, prompting immediate delivery. A male newborn weighing 3200 g was delivered with Apgar scores of 6 and 9 at one and five minutes, respectively. Post-delivery examination revealed a double true umbilical cord knot approximately 30 cm and 40 cm from the placental insertion. Both mother and infant recovered well. This case emphasizes the potential risks of double true knots and highlights the crucial role of continuous intrapartum monitoring and prompt obstetric intervention in achieving favorable neonatal outcomes, even in unexpected high-risk cord anomalies.

Keywords: true umbilical cord knot, double knot, fetal distress, vaginal delivery, intrapartum monitoring, umbilical cord anomaly.

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INTRODUCTION

Double true knots of the umbilical cord are exceptionally rare; one of the earliest detailed reports dates back to 1988 [1]. Sonographic diagnosis is challenging and often based on suggestive but inconsistent signs such as the “slipknot” appearance described by Ramón y Cajal *et al.*, [2]. True knots occur in 0.3–2 percent of pregnancies, whereas double knots represent fewer than 0.1 percent [3]. They usually form between 9 and 12 weeks of gestation when fetal mobility and amniotic fluid are greatest, allowing loops of cord to interlace [4].

Risk factors include a long umbilical cord, advanced maternal age, multiparity, and male fetuses [3,5]. Although many knots remain loose and asymptomatic, tight knots can cause umbilical-vessel compression leading to fetal distress or stillbirth [6,7]. Prenatal identification remains difficult even with color Doppler, as overlapping loops can mimic other cord patterns [2,8]. Continuous intrapartum fetal monitoring

is therefore essential for early recognition of hypoxia and timely obstetric intervention. The following case reports a successful vaginal delivery despite a double true knot and contributes to the limited North-African literature on this rare finding.

CASE PRESENTATION

A 31-year-old woman (G3P3) with no significant medical or obstetric history was admitted at 39 weeks of gestation in spontaneous labor. Her previous vaginal deliveries were uneventful. Prenatal care was regular, and third-trimester ultrasound showed normal fetal growth and cord morphology.

On admission, uterine contractions were regular, and continuous fetal monitoring displayed a baseline heart rate of 140 bpm with moderate variability. Labor progressed normally. At full dilation, a sudden profound deceleration to 60 bpm was noted (Figure1), prompting immediate preparation for delivery. A male

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infant weighing 3200 g was delivered vaginally within minutes.

The neonate's Apgar scores were 6 at one minute and 9 at five minutes. The placenta weighed 470 g and had a three-vessel, centrally inserted umbilical cord measuring 67 cm in length. Two tight true knots

were found approximately 30 cm and 40 cm from the placental insertion (Figure 2). There was no meconium staining. Both mother and newborn had an uneventful postpartum course and were discharged in good condition 48 hours later.

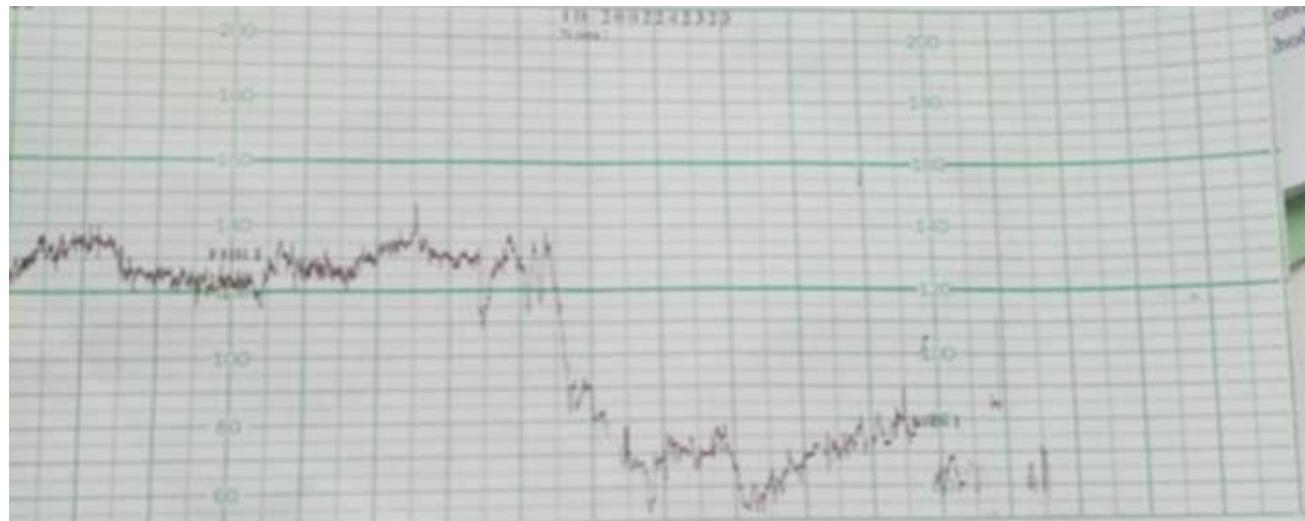


Figure 1: Fetal heart rate monitoring showing a deep deceleration with a nadir at 60 beats per minute.

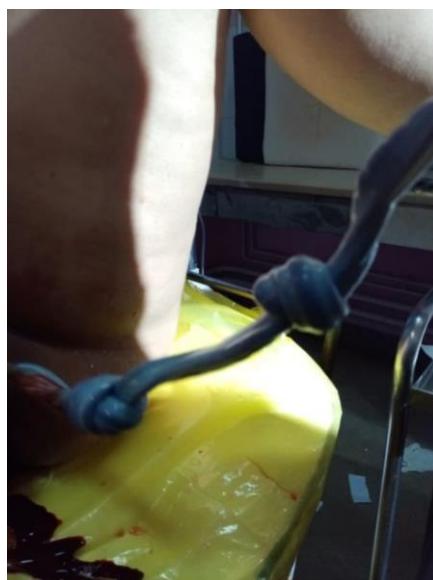


Figure 2: The double knot

DISCUSSION

Double true knots of the umbilical cord are among the rarest cord anomalies, first clearly documented by Höniogl *et al.*, in 1988 [1]. They generally develop early in pregnancy, when fetal movement and amniotic-fluid volume are maximal [2]. The incidence of true knots ranges from 0.3 to 2 percent [3], and double knots are extremely uncommon. Predisposing factors include multiparity, long cords, and male fetuses [5,8]. Suzuki [8] observed that very long cords may paradoxically protect against constriction by allowing

greater flexibility, yet excessive length also increases the chance of looping and knot formation.

Prenatal diagnosis remains challenging. Characteristic ultrasound appearances such as the “slipknot” sign are inconsistently observed [2], and standard two-dimensional or Doppler imaging fails to detect most knots. Even in large cohorts, the majority of knots are diagnosed only after delivery [9]. Recent advances like three-dimensional ultrasound and elastography may help evaluate cord stiffness and

vascular compromise [5], but these techniques are not yet part of routine screening.

Perinatal outcomes depend primarily on knot tightness and the timeliness of obstetric management. While some knots remain benign throughout gestation [6], others cause acute hypoxia or fetal demise [7]. Hayes *et al.*, confirmed a higher risk of stillbirth in pregnancies complicated by true knots [10], whereas Carter *et al.*, found no significant differences in fetal monitoring or neonatal outcomes at term [6]. Lichtman *et al.*, similarly reported no long-term neurological impairment associated with knots [11].

Several recent case reports describe favorable outcomes even with double knots. Bohiltea *et al.*, and Laranjo *et al.*, each reported uncomplicated vaginal deliveries when continuous intrapartum monitoring allowed prompt response to fetal distress [12,13]. Stabile *et al.*, also showed that close surveillance prevents adverse outcomes [14]. Agarwal and Singh noted that good results depend mainly on vigilance during labor [15], whereas Ikechebelu *et al.*, documented a fatal outcome in an unrecognized tight knot [4].

Our case aligns with published evidence: early detection of a sudden deceleration on cardiotocography prompted rapid delivery, preventing hypoxia. Sherer *et al.*, advocated that management decisions should be guided by real-time fetal status rather than prophylactic cesarean for every diagnosed knot [9]. Finally, Eleje *et al.*, recently demonstrated that even complex configurations such as double knots with nuchal cords can result in healthy neonates when timely intervention is undertaken [16]. Overall, vigilant intrapartum monitoring remains the cornerstone of safe management in pregnancies complicated by umbilical-cord knots.

CONCLUSION

Double true knots of the umbilical cord are rare but potentially serious anomalies that may lead to acute fetal distress if unrecognized. Prenatal diagnosis remains difficult despite modern imaging techniques. Continuous intrapartum fetal monitoring and rapid obstetric action are crucial to avoid adverse outcomes. This case demonstrates that even in the presence of a double true knot, vaginal delivery can be achieved safely when managed appropriately and promptly.

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