

## True Knot of the Umbilical Cord and its Implications in the Fetal Well-Being

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### ABSTRACT

The true knot of the umbilical cord is a pathology with a relatively low incidence. However, it is associated with the risk of loss of fetal well-being and in severe cases with perinatal death.

There are both maternal and fetal risk factors, with different associated perinatal outcomes. Prenatal diagnosis is a challenge for the attending physician and almost all cases are findings at birth once the cord has been observed. However, over time, ultrasound methods have been developed to search for it in cases where suspicion is high. and most cases are findings at birth, however, today ultrasound methods are available for their intentional search, mainly in patients with unidentified risk factors.

Similarly, it should be suspected in the presence of an altered cardiotocographic record or one that shows a non-reassuring pattern, especially when there is no response to established intrauterine resuscitation maneuvers, such as left lateral decubitus position, supplemental oxygen and maternal hydration.

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### INTRODUCTION

The worldwide incidence of true umbilical cord knots ranges from 0.3 to 2.1%. The etiology of the knots is still unclear; however, many authors have described different mechanisms. Hyrtl et al postulated that the moment of knot formation could be determined by its location in the cord, therefore, it can be assumed that the closer the knot was to the nuchal of the fetus, the earlier its formation would have been. <sup>1</sup>

The presence of turns in the umbilical cord is a common finding (20% of deliveries) that in most cases does not have greater importance for the fetus, however, the presence of true knots is something more uncommon, and may have a fatal outcome. Within their rarity are usually more frequent in monoamniotic twin pregnancies. <sup>2</sup>

After that Chantreuil et al described that the formation of the knots was generated between the ninth and tenth week because the fetus is already more active and there is more space in the amniotic fluid, even bibliographies mention that there are aborted fetuses with the presence of a cord with knot, so its formation in early stages is confirmed. <sup>2</sup>

However, there are authors who refer that the formation occurs during childbirth, which has been proven false, Sincé

there are reports of prenatal detection by ultrasound. In 2004 in Spain, López Ramón et al described a new ultrasound sign which was called "hanged cord sign", this data was found in multiple patients with this finding. <sup>3</sup>

This sign is shown through the use of color Doppler and consists of an incomplete circle of the umbilical cord that surrounds itself, appreciated in an axial section. Just as in a sagittal section the pressure exerted on the umbilical vein is evaluated, so a cross section of the loop that forms the knot, above and below the cord, can be seen. <sup>4,5</sup>

This sign can even be found using gray scale, but it will be with color Doppler that it will be found with greater diagnostic precision. <sup>6,7</sup>

There are several factors that can predispose the formation of a true knot, such as long cords (greater than 55 cm according to various authors), polyhydramnios, small fetuses for gestational age, monoamniotic twins, post-term pregnancy, male fetus and others related such as gestational diabetes, multiparity, advanced maternal age, chronic hypertension and obesity. <sup>8</sup>

Although knots do not usually have a high clinical relevance, they have been associated with adverse perinatal outcomes,

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including fetal acidosis, low Apgar score at one minute, risk of emergency caesarean section, and intrauterine fetal death. Therefore, the search for various risk factors by ultrasonography is suggested, as well as monitoring by cardiotocography, since the presence of intrapartum decelerations may be the first indication of this pathology.<sup>9,10</sup> The case of a patient with a finding at birth with a true umbilical cord is described, which will be described below.

### CASE PRESENTATION

A 32-year-old patient, with multiple gestations, with three previous gestational losses, was admitted to our hospital unit with a pregnancy of 38.1 weeks of gestation, with a diagnosis of gestational diabetes made at week 26, managed with dietary and pharmacological treatment, in good metabolic control. Upon admission without labor, with a Bishop score

of 4 points, due to these characteristics and the maternal pathology and gestational age, it was decided to start cervical ripening with intracervical prostaglandin E2.

Being in the latent phase, she developed spontaneous rupture of the membranes with the presence of meconium amniotic fluid and later with variable decelerations of the fetal heart rate up to 90 beats per minute, without response to intrauterine resuscitation maneuvers, which required urgent termination of the pregnancy via the abdomen. A live newborn was obtained, female, weight 3,010 g, height 51 cm, Apgar 7-8, Silverman 2, Capurro 38.3 weeks, with the finding of a true umbilical cord knot (figure 1). She was placed in rooming-in and was discharged with her mother 48 hours later, without complications.



Figure 1. True umbilical knot.

### CONCLUSION

The true knot of the umbilical cord has a low incidence, but it can be associated with adverse outcomes, including intrauterine or perinatal death, for which prenatal diagnosis or suspicion is difficult, due to the limitation of diagnostic tools, and although there are ultrasound signs described by several authors, who can support the clinician in early detection, it should be considered that this detection continues to depend on the experience of the observer, the quality of the ultrasound equipment and gestational age. The relevance of a funicular pathology of this type lies in the fact that prenatal follow-up should be close, taking into account the possible perinatal results. Therefore, antepartum surveillance, route of birth, and emergency interruption should be appropriate.<sup>11,12</sup>

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