

# CASE REPORT

## > THE PATIENTS

4 pregnant women  
ages  $\geq 23$  years

## > SIGNS & SYMPTOMS

– A shared incidental finding  
at delivery

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## > THE CASES

**CASE 1** ▶ A 32-year-old G2P1 with an uncomplicated prenatal course presented for induction at 41 weeks and 2 days of gestation. Fetal heart tracing showed no abnormalities. A compound presentation and a prolonged second stage of labor made vacuum assistance necessary. The infant had both a true umbilical cord knot (TUCK) (FIGURE 1A) and double nuchal cord.

**CASE 2** ▶ A 46-year-old G3P0 at 38 weeks of gestation by in vitro fertilization underwent an uncomplicated primary low transverse cesarean (C-section) delivery of dichorionic/diamniotic twins. The C-section had been necessary because baby A had been in the breech position. Fetal heart tracing showed no abnormalities. Baby A had a velamentous cord insertion, and baby B had a succenturiate lobe and a TUCK.

**CASE 3** ▶ A 23-year-old G2P1 with an uncomplicated prenatal course chose to have a repeat C-section and delivered at 41 weeks in active labor. Fetal heart monitoring showed no abnormalities. Umbilical artery pH and venous pH were normal. A TUCK was noted at time of delivery.

**CASE 4** ▶ A 30-year-old G1P0 with an uncomplicated prenatal course presented in active labor at 40 weeks and 4 days of gestation. At 7 cm cervical dilation, monitoring showed repeated deep variable fetal heart rate decelerations. The patient underwent an uncomplicated primary C-section. Umbilical artery pH and venous pH were normal. A TUCK (FIGURE 1B) and double nuchal cord were found at time of delivery.

FIGURE 1

Incidental finding of true umbilical cord knot in Case 1 (A) and Case 4 (B)



IMAGE A COURTESY OF: MORTEZA KHODAE, MD, MPH; IMAGE B  
COURTESY OF: ANNAMARIE MEEUWSEN, MD

## DISCUSSION

TUCKs are thought to occur when a fetus passes through a loop in the umbilical cord. They occur in <2% of term deliveries.<sup>1,2</sup> TUCKs differ from false knots. False knots are exaggerated loops of cord vasculature.

■ **Risk factors** that have been independently associated with TUCK include advanced maternal age (AMA; >35 years), multiparity, diabetes mellitus, gestational diabetes, polyhydramnios, and previous spontaneous abortion.<sup>1-3</sup> In one study, 72% of women with a TUCK were multiparous.<sup>3</sup> Hershkovitz et al<sup>2</sup> suggested that laxity of uterine and abdominal musculature in multiparous patients may contribute to increased room for TUCK formation.

The adjusted odds ratio of having a TUCK is 2.53 in women with diabetes mellitus.<sup>3</sup> Hyperglycemia can contribute to increased fetal movements, thereby increasing the risk of TUCK development.<sup>2</sup> Polyhydramnios is often found in patients with diabetes mellitus and gestational diabetes.<sup>3</sup> The incidence is higher in monoamniotic twins.<sup>4</sup>

Being a male and having a longer umbilical cord may also increase the risk of TUCK. On average, male infants have longer cords

than females, which may predispose them to TUCKs.<sup>3</sup> Räisänen et al<sup>3</sup> found that the mean cord length in TUCK infants was 16.9 cm longer than in infants without a TUCK.

Of our 4 patients, one was of AMA, 2 were multiparous, and 3 of the 4 infants who developed TUCK were male.

### TUCK is usually diagnosed at delivery

Most cases of TUCK are found incidentally at the time of delivery. Antenatal diagnosis is difficult, because loops of cord lying together are easily mistaken for knots on ultrasound.<sup>5</sup> Sepulveda et al<sup>6</sup> evaluated the use of 3D power Doppler in 8 cases of suspected TUCK; only 63% were confirmed at delivery. Some researchers have found improved detection of TUCK with color Doppler and 4D ultrasound, which have demonstrated a “hanging noose sign” (a transverse section of umbilical cord surrounded by a loop of cord) as well as views of the cord under pressure.<sup>7-10</sup>

■ **Outcomes associated with TUCK vary greatly.** Neonates affected by TUCK have a 4% to 10% increased risk of stillbirth, usually attributed to knot tightening.<sup>2,4,11,12</sup>

In addition, there is an increased in-

TABLE

### A look at 4 patients with a true umbilical cord knot

Maternal age, years (G/P)	Maternal history	Gestational age, weeks	Delivery method	Sex	Weight (g)	1/5-minute Apgar	Complications
Case 1: 32 (2/1)	Uncomplicated	41 <sup>2/7</sup>	Vacuum assistance	Male	3628	8/9	Double nuchal cord, hand presentation, postpartum hemorrhage
Case 2: 46 (3/0)	AMA, IVF	38 <sup>0/7</sup>	Primary C-section	Male Male	2568 2473	9/9 8/9	Twin pregnancy, breech, succenturiate lobe
Case 3: 23 (2/1)	History of prior C-section	41 <sup>0/7</sup>	Repeat C-section	Male	2806	8/9	None
Case 4: 30 (1/0)	Uncomplicated	40 <sup>4/7</sup>	Primary C-section	Female	3338	9/9	Fetal distress, double nuchal cord

AMA, advanced maternal age; C-section, cesarean section; G, gravida; IVF, in vitro fertilization; P, para.

➤ **Infants with true umbilical cord knots have an increased incidence of heart rate abnormalities during labor.**

incidence of fetal heart rate abnormalities during labor.<sup>1,3,12,13</sup>

There is no increase in the incidence of assisted vaginal or C-section delivery.<sup>12</sup> And as for whether TUCK affects an infant's size or weight, one study found TUCK infants had a 3.2-fold higher risk of measuring small for gestational age, potentially due to chronic umbilical cord compromise; however, mean birth weight between study and control groups did not differ significantly.<sup>3</sup>

■ **Outcomes for our patients and their infants.** All 4 cases had good outcomes (TABLE). The umbilical cord knot produced no detectable fetal compromise in cases 1 through 3. In Case 4, electronic fetal monitoring showed repeated variable fetal heart rate decelerations, presumably associated with cord compression.

## THE TAKEAWAY

Pregnant women who may be at risk for experiencing a TUCK include those who are older than age 35, multiparous, carrying a boy, or have diabetes mellitus, gestational diabetes, or polyhydramnios. While it is good to be aware of these risk factors, there are no recommended changes in management based on risk or ultrasound findings unless there is additional concern for fetal compromise.

Antenatal diagnosis of TUCK is challenging, but Doppler ultrasound may be able to identify the condition. Most cases of TUCK are noted on delivery, and outcomes are generally positive, although infants in whom the TUCK tightens may have an increased risk of heart rate abnormalities or stillbirth.

JFP

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