—Case Reports—

Is a Red Umbilical Cord a Sign of Umbilical Venous Congestion?: A Case Report

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Abstract

Postnatal examination of fetal appendages is important because this information may help predict perinatal outcome. We present a case of a red streak along the entire umbilical vein after a cesarean section due to non-reassuring fetal status. The pathological findings revealed an umbilical cord with dilated vascular changes and mild funisitis. Because the dilated change was intense in the umbilical vein, the red streak of the umbilical cord was caused by venous congestion. Moreover, we considered that the umbilical venous congestion was due to increased resistance in the fetal intra-abdominal umbilical vein, which was associated with the non-reassuring fetal status.
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Key words: umbilical cord, non-reassuring fetal status, congestion

Introduction

A universal examination of the placenta, umbilical cord, and membrane in the delivery room with documentation of findings and submission of tissue for pathologic evaluation based on abnormal appearance or certain clinical indications is standard medical practice[1]. When the umbilical cord is examined, most obstetrical staffs check the cord length, cord diameter, cord insertion, cord knots, cord vessels, thrombosis, and Wharton's jelly. In cases of funisitis, the exudate may occasionally be visible macroscopically as a yellow streak along the umbilical vein[2]. However, a reddish change in color of the cord has not been well recognized. In this case report, we present a case of reddening of the entire umbilical cord due to fetal umbilical venous congestion.

Case Report

A 26-year-old woman, gravida 2, para 0, was referred to our hospital at 5 weeks of gestation. She had conceived spontaneously. At 10 5/7 weeks of gestation, she underwent serological tests (e.g., for syphilis and toxoplasmosis), the results of which were normal. At that time, the gestational age was established by ultrasonographic examination of the fetal crown-rump length. She experienced a small vaginal hemorrhage and was diagnosed with a threatened miscarriage at 12 5/7 weeks of gestation.

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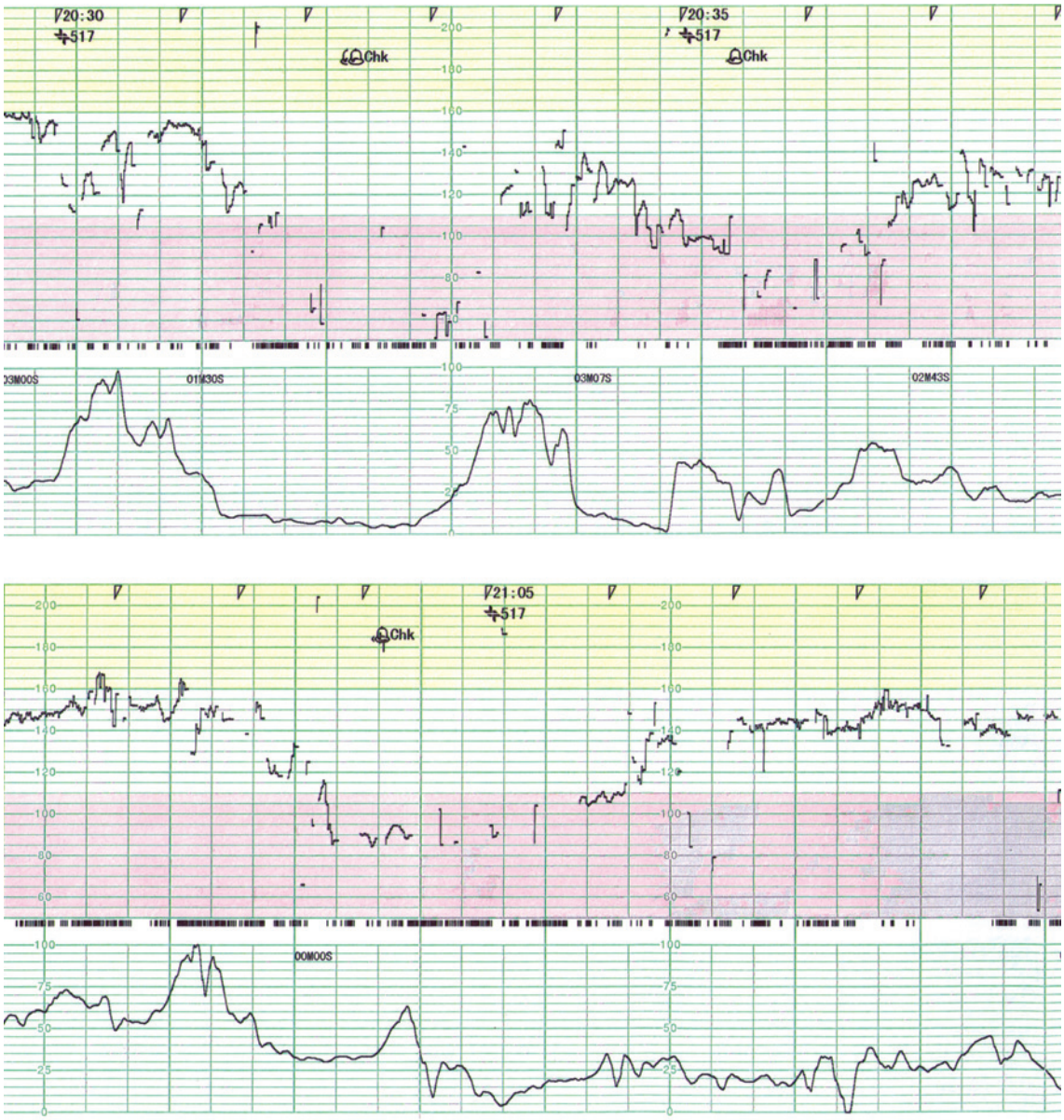

Fig. 1 Cardiotocogram findings on admission (40 4/7 weeks of gestation)
On admission for labor onset, multiple prolonged decelerations of a fetus (40 4/7 weeks) of a 26-year-old woman, gravida 2, para 0, were seen. She was delivered by cesarean section due to non-reassuring fetal status. Apgar scores were 8 and 9 at 1 and 5 min.

The genital hemorrhage resolved with the administration of piperidolate hydrochloride. At 30 5/7 weeks of gestation, she required medication for threatened preterm delivery with pseudo labor pain. There was no episode of bacterial vaginosis during her pregnancy course.

At 40 4/7 weeks of gestation, she was admitted to our hospital due to onset of labor pain with a 37.4℃ body temperature. On admission, the fetal heart rate pattern exhibited a late deceleration (episodic pattern) with a 155-bpm baseline and moderate variability. Because she had three episodes of prolonged deceleration within 90 min after the late deceleration **(Fig. 1)**, an emergent cesarean section was performed due to non-reassuring fetal status. During the operation, the estimated blood loss including amniotic fluid was 660 mL.

A 3,188-g male infant was delivered with Apgar scores of 8 and 9 at 1 and 5 min, respectively. The newborn had a slight respiratory disturbance with tachypnea and nasal flaring. The body temperature of the infant was 37.7℃. The pH value of umbilical

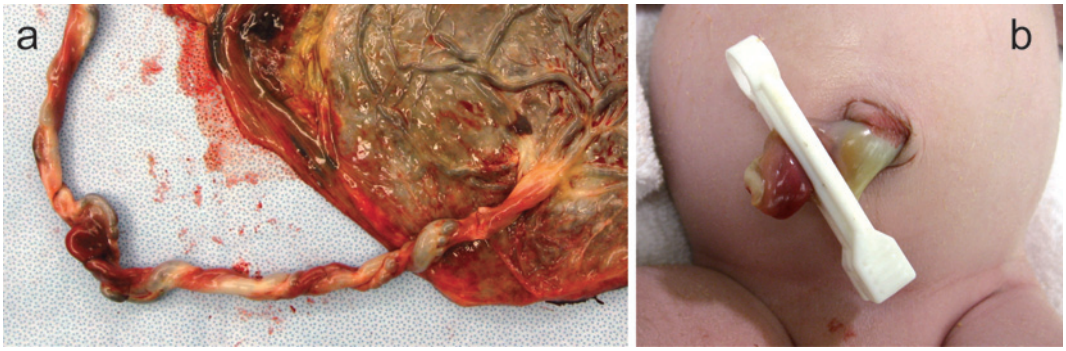

Fig. 2 Macroscopic findings of the placenta and umbilical cord
a: The fetal surface of the placenta was yellowish. A dark red streak appeared on the cord surface along the entire umbilical vein.
b: The dark red umbilical cord streak continued to the infant's navel.

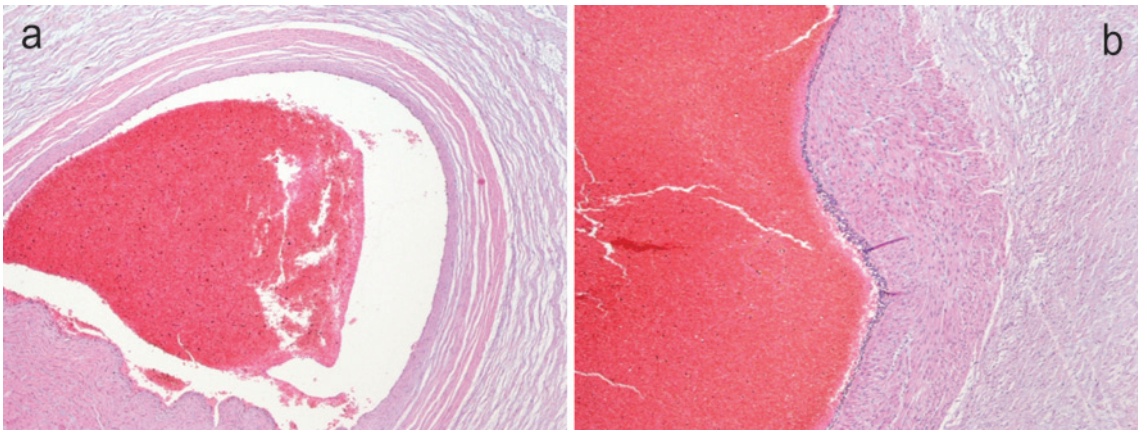

Fig. 3 Pathological findings of the umbilical cord
a: Low-power image. The umbilical cord exhibited dilated vascular changes and mild funisitis. The congestion in the umbilical vein was intense.
b: High-power image. Edema, hemorrhage, and mild neutrophilic infiltration were observed in the Wharton's jelly.

artery blood was 7.195 and umbilical venous blood C-reactive protein was negative.

The amniotic fluid was thick meconium-stained. The placenta weighed 520 g and measured 17 (W) × 20 (D) × 2 (H) cm **(Fig. 2)**, and the fetal surface of the placenta was yellowish. The umbilical cord measured 61 cm in length and 1.5 cm in diameter. A dark red streak appeared on the cord surface along the entire umbilical vein from the infant's navel to the placental cord insertion site.

Pathological findings revealed chorioamnionitis and mild funisitis. The arterial and venous dilated change of the umbilical cord was remarkable **(Fig. 3)**. In particular, the umbilical vein congestion was intense. Edema, hemorrhage, and mild neutrophilic infiltration were observed in the Wharton's jelly. The umbilical cord findings were not associated with calcification. The observed chorioamnionitis was an acute nonspecific inflammatory reaction characterized mainly by the infiltration of neutrophils. The placental parenchyma exhibited many placental infarctions without neutrophil infiltration, dysplasia, or malignancy.

Discussion

Postnatal examinations of the placenta, umbilical cord, and membrane are important as the information may help predict maternal or neonatal outcome. One of the remarkable findings on

macroscopic examination is the surface color[1]. For example, in case of chorioamnionitis, the placental surface becomes yellow when much leukocytic exudate has accumulated and when the process has long been of long duration[2]. Perivascular white arcs or bands that impart a "barber pole" or "cooked macaroni" appearance to the umbilical cord, and which can be calcified as demonstrated roentgenography, together with the cross-sectional arc patterns reminiscent of Ouchterlony precipitation bands are distinctive features of necrotizing funisitis[3]. Meanwhile, neonatal omphalitis is characterized by periumbilical edema, erythema, and tenderness with or without discharge[4]. In our case, this macroscopic change was associated with umbilical vessel dilatation due to venous congestion and mild inflammation. From these findings, we speculated that a reddish change in color of the cord mainly associated with increased umbilical venous resistance. Moreover, because these changes showed in entire site of the umbilical cord, we considered that umbilical venous resistance might be increased in the fetal intra-abdominal umbilical vein. We speculated that these changes in umbilical vein were associated with the abnormal fetal heart rate patterns in our case.

Several investigators have reported cases of intra-abdominal umbilical vein dilatation; however, the pregnancy outcomes were varied[5]. Tantbirojn et al.[6] reported that gross cord abnormalities (e.g., true knots, long cords, nuchal/body cords, abnormal cord insertion, hypercoiled cords, and narrow cord with diminished Wharton's jelly) were associated with perinatal complications such as stillbirth, non-reassuring fetal tracing, intrauterine growth restriction, meconium-stained amniotic fluid, and increased rate of emergency cesarean section. Moreover, the report revealed gross cord abnormalities related to fetal vascular ectasia[6]. In the present case, umbilical cord congestion was suspected to be associated with a non-reassuring fetal status. Further investigation is required to examine the association between the red streak along the umbilical vein and increased umbilical vein resistance.

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