





Case report

Umbilical cord wrapping around the neck and trunk as the cause of multi-site perinatal trauma – a case report



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Abstract

Nuchal cord is a relatively frequent phenomenon detected in the prenatal period and in newborns in the perinatal period. Most patients do not demonstrate any post-traumatic lesions related to umbilical cord wrapping. The patient referred to in this study suffered multiple haemorrhagic injuries after the delivery, which contributed to his extended stay at the Hospital Department. An additional objective of the article is to demonstrate ultrasound diagnostic options from the very first moment after childbirth. A sequence of ultrasound examinations allowed the monitoring of receding postnatal lesions in the patient without exposing him to X-rays.

Key words: scrotum, umbilical cord wrapping, perinatal trauma.

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Introduction

The umbilical cord is a structure connecting the fetus to the placenta, which allows the supply of oxygen and nutrients and the removal of metabolic products. During the pregnancy, the umbilical cord can get wrapped 360° around the fetal neck, defined as nuchal cord. Sometimes, a true knot of the umbilical cord can also be formed. Umbilical cord wrapping is diagnosed quite often (14.7-33.9%, 4.7%, and 4.2% of pregnancies for nuchal cord, trunk, and limb wrapping, respectively). However, most of it uncoils spontaneously during pregnancy [1].

In about 19-24% of cases, the umbilical cord entanglement is identified during delivery [2]. A condition that occurs during delivery can result in disturbances in oxygen supply. This study presents the complicated course of wrapping the umbilical cord in a newborn, leading to a disturbed adaptation period and numerous haemorrhagic lesions.

Case description

It was the second pregnancy of a 32-year-old woman, who had a 2-year-old boy. The first child was diagnosed with



Figure 1. Extravasation to the white of the eye. Photo by MWM. Published with the mother's consent



Figure 2. Ecchymosis in the epigastrium area over the umbilical cord attachment. Photo by MWM. Published with the mother's consent

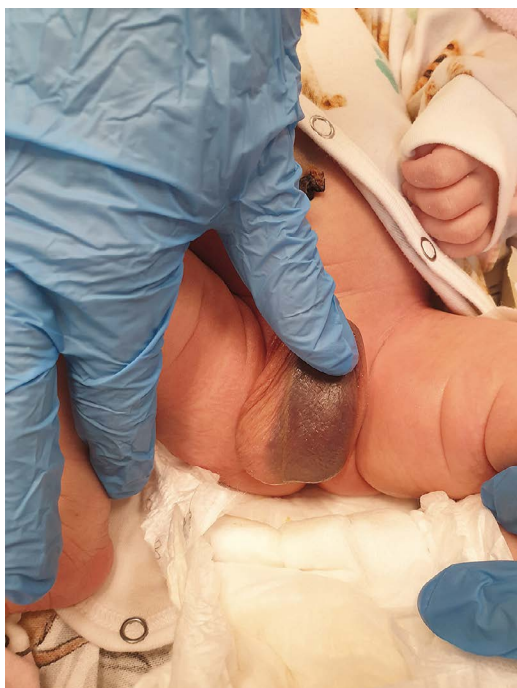


Figure 3. Ecchymosis and oedema of the scrotum on the left side on the 6th day of the patient's life. Photo by MWM. Published with the mother's consent

the administration of paracetamol. In the third trimester, the attending obstetrician assessed the fetus to be eutrophic in cephalic presentation, with one loose loop around the fetus's neck. Fetal echocardiography showed normal fetal heart anatomy and heart diameter. The fetus was in good condition and obtained 10 points in the Cardiovascular Profile Score (CVPS).

Postnatal outcome

A male baby was delivered vaginally at 40 weeks of gestation. The neonate was born in good condition and obtained an Apgar score of 9 (out of 10). His body weight (3710 g) and length (58 cm) were typical, but his head circumference (33 cm) was at 5 centiles according to the WHO growth charts [3]. During the delivery, it was noticed that the umbilical cord was wrapped around the baby's neck and trunk with a single loop. The results of blood gas analyses from the umbilical blood, taken from the vein and the artery, were normal (pH 7.3, BE -5.9, and Lac 6.2 in the arterial umbilical blood, and pH 7.31, BE -5.9, and Lac 6.1 in the venous umbilical blood). Clinical investigation showed petechiae around the face and extravasation to the white of the right eye (Figure 1), bruising on the epigastrium over the umbilical cord attachment (Figure 2), and bruising and oedema of the scrotal sac (Figure 3). The patient was given an intramuscular injection of 1 mg of vitamin K, according to current recommendations. During the initial hours of his life, the patient showed increasing respiratory failure with a tendency towards respiratory acidosis. Several hours of Du-oPAP respiratory support were sufficient to stabilise the patient's condition on the first day of his life. Based on the results of a lung ultrasound examination performed in the initial hours of the patient's life, with the use of an L14-6NE linear ultrasound transducer (Mindray apparatus), a small pneumothorax area

microdeletion syndrome with decreased muscle tone and psychomotor development retardation. The first trimester was unremarkable, with normal fetus size and cardiovascular system anatomy. The mother did not have any chronic diseases and was not taking any medications. No pathogenic bacteria cultures were obtained from the reproductive tract swab. In the second trimester, the patient was diagnosed with COVID-19, with symptoms such as fever, which required



Figure 4. Ultrasound image of the lungs with signs of pneumothorax in the anterior field of the right lung, Lines A, lung point. Mindray ultrasound machine, L14-6N linear transducer Examination performed by MWM

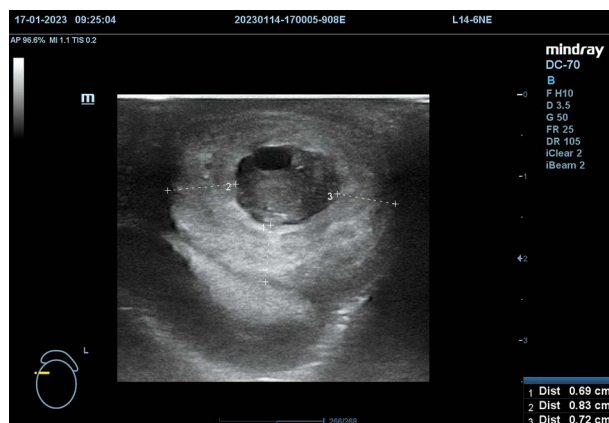


Figure 5. Ultrasound image of the scrotum on the left side with visible oedema of the scrotum wall, up to 8.3 mm. The testicle is visible in the transverse view. At 12 o'clock, a visible transverse view of the cyst in the epididymis area. Mindray ultrasound machine, L14-6NE transducer. Examination performed by MWM



Figure 6. Ultrasound image of the epididymis cyst with longitudinal axis dimensions of 6.2×3.1 mm. Mindray ultrasound machine, L14-6NE transducer. Examination performed by MWM.



Figure 7. Ultrasound image of ecchymosis in the epigastrium area. A visible hypoechoic space with longitudinal dimensions of 16.9×3.1 mm. Mindray ultrasound machine, L14-6NE transducer. Examination performed by MWM

(10 mm) was found in the anterior right lung field (Figure 4). The signs of the pneumothorax in the ultrasound image completely receded in the third day of the child's life.

Bruising and oedema of the scrotal sac on the right were consulted with a paediatric surgeon. The patient did not require surgical intervention, but antibiotics were recommended due to the possibility of infection. In the ultrasound examination of the scrotal sac, an extensive oedema and haematoma were initially observed in the scrotal sac, with layer thickness of up to 8 mm (Figure 5). Additionally, a cyst on the epididymis with a size of 6×3 mm was found (Figure 6). During the 2-week observation of the newborn, the evolution of the haematoma and the gradual reduction of the scrotum oedema were observed. The cyst on the epididymis was not changed. The echogenicity of the testicles and the blood flow in the testicular artery were normal.

In the ultrasound examination, the ecchymosis in the epigastrium area over the umbilical cord attachment corresponded to the extravasation to subcutaneous tissue with a size of approximately $17 \times 3 \times 3$ mm (Figure 7).

In relation to the extravasation to the white of the eye, the patient was also consulted by an ophthalmologist. The con-

sultation excluded severe bleeding to the oculus. In addition, an examination with the use of a linear ultrasound transducer was performed to estimate the width of optic nerve sheaths, which also showed symmetric dimensions (Figures 8A, B). The ultrasound image of the brain did not present any features of haemorrhage or hypoxic lesions. The blood flow spectrum in the anterior cerebral artery on the first day of the patient's life was characterised by a temporarily reduced resistive index (RI ACA 0.61), while in the subsequent days of his life, the resistive index was maintained at a normal level (RI ACA 0.7).

An echocardiography examination excluded the presence of structural intracardiac anomalies. During the neonate's 2-week stay at the Department, a residual leak at the arterial duct level was present. The leak at the level of the foramen ovale with a width of 4 mm did not affect the haemodynamics of heart function. Holosystolic tricuspid valve incompetence did not exceed the value of 2 m/s. In left heart ventricle projections, both in the long- and short-axis views, attention was paid to an additional hyperechogenic trabeculae carneae with a thickness of 2.6 mm, which continued as a tendinous cord attached to the interventricular septum along the left ventricular

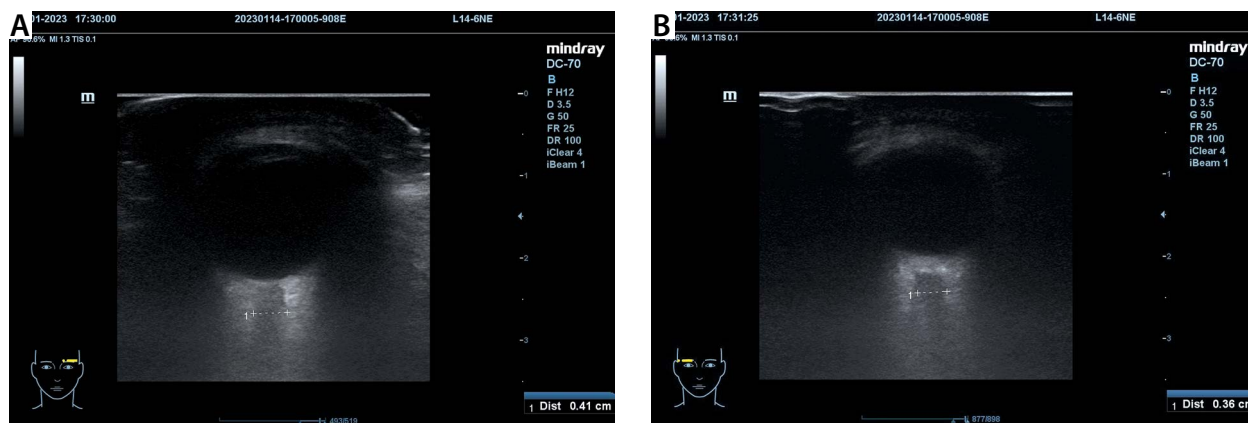


Figure 8. A – Ultrasound image of the left ocular and optic nerve sheath on the left side, Mindray ultrasound machine, L14-6NE transducer. Examination performed by MWM. B – Ultrasound image of the right ocular and optic nerve sheath on the right side. Mindray ultrasound machine, L14-6NE transducer. Examination performed by MWM

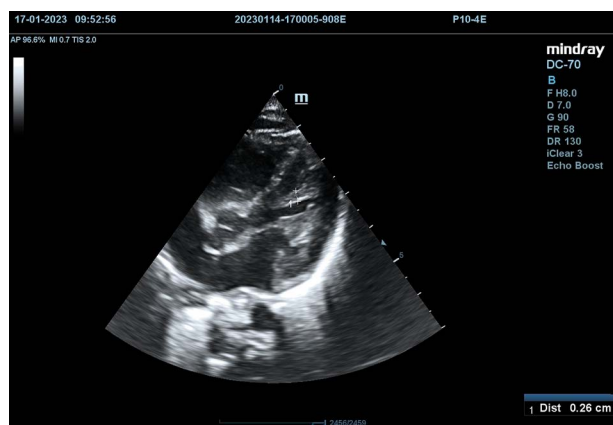


Figure 9. Echocardiography hyperechogenic a tendinous cord attached to the interventricular septum along the left ventricular outflow tract. Examination performed by MWM

outflow tract (Figure 9). Auscultation showed a persistent quiet systolic murmur along the left edge of the sternum, grade 2 (out of 6) on the Levine scale.

Laboratory examinations included the monitoring of inflammatory indicators and microbiological tests. Both blood culture and urine culture were negative. TORCH infections were ruled out. Coagulation parameters were monitored and did not show any anomalies concerning the neonatal period values. The patient was diagnosed with physiologic jaundice with a maximum total bilirubin level of 8.43 mg/dl. Blood count showed continued normal leukocyte, erythrocyte, and platelet levels.

Follow-up

The follow-up on the boy’s condition covered the initial 6 months of his life. Further follow-up revealed the recession of lesions in the skin, scrotum, and the white of the eye. Psychomotor development did not reveal any abnormalities.

Discussion

The case report describes a non-typical course of the nuchal cord, which resulted in numerous haemorrhagic lesions.

It can be assumed that the bleeding and oedema of the scrotum could have resulted from the pressure of the tightened umbilical cord or a sharp pull in the area of the umbilical ring during delivery. The ecchymosis in the epigastrium area over the umbilical ring provides some evidence for the traction mechanism. The extravasation to the white of the eye and small petechiae on the skin of the face are probably the results of haemostasis in the capillaries, which occurred while the child was passing through the birth canal or as a result of a tight umbilical cord wrapping around the neck.

During the diagnostic process, basic haematological disorders, infections, and congenital disorders were excluded in the patient. Due to the observed gradual recession of haemorrhagic lesions and the good condition of the patient in follow-up examinations, it can be stated that the umbilical mechanism is the most probable.

Physiologically, the umbilical cord is formed by 3 vessels: 2 arteries carrying deoxygenated blood and one vein carrying oxygenated blood. Because the vein is more susceptible, it can be compressed easily. This can result in oxygen supply disturbances. The risk factors considered to increase the frequency of umbilical cord wrapping are a long umbilical cord, male fetuses, hypertensive disorder, gestational diabetes, advanced maternal age, high maternal BMI, and multiparity [4-7]. According to some authors, it does not increase neonatal morbidity [8, 9]. Nevertheless, some of the conducted studies showed that cord entanglement may be associated with higher caesarean delivery rate [2, 7, 10], meconium-stained amniotic fluid [6, 7], umbilical cord blood acidosis [1], reduced Apgar score [2, 6, 11], lower birth weight [5-7], or even stillbirth [12].

Conclusions

Theoretically, any kind of wrapping can result in cord compression and, therefore, fetal distress. There is an ongoing discussion about whether cord entanglement is associated with adverse perinatal and neonatal outcomes. The prenatal diagnosis of cord wrapping around the neck may be a high perinatal risk factor. The presented clinical case was an example of respiratory failure and haemorrhagic disorders in the skin, eyes, and

scrotum. Ultrasound examination, including flow assessment, is a practical method for evaluating perinatal complications and organ blood supply.

Conflict of interest

The authors declare no conflict of interest.

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Division of work:

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