

Third trimester intrauterine fetal death caused by complex cord entanglement

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Abstract: Umbilical cord entanglement occurs during early pregnancy. Typically, fetal asphyxia and demise because of umbilical cord entanglement is a unique characteristic of mono-amniotic twin pregnancies. We describe a case of a woman in late pregnancy that presented to medical consult at 36 weeks of amenorrhea because of the absence of fetal movements. The ultrasound found no fetal heartbeat and because the patient had two previous cesarean sections, another one was performed. We discovered a complex entanglement of the umbilical cord around the leg of the fetus that proved to be the cause of the fetal demise. Cord entanglement must be considered in cases of unexplained intrauterine fetal death. For all cases of intrauterine demise, it is important to look for marks of this condition around different parts of the body.

Key Words: umbilical cord entanglement, intrauterine demise.

A 28-year-old woman, gravida 3, para 3 presented to the medical consult in the third trimester of pregnancy accusing absence of fetal movements for one day. The ultrasound detected a fetus in the vertex presentation with normal biometry for gestational age. However, no fetal heart activity and blood flow was detected by Doppler ultrasonography. The patient had two previous cesarean sections resulting in two normal newborns. This pregnancy had been monitored, and no abnormal event occurred until 34 week of amenorrhoea. Because of the risk of uterine rupture a cesarean section was performed. After the fetus was extracted, we discovered that the umbilical cord was wrapped tightly around the right leg two times (Figure 1). The necropsy did not reveal other anomalies that could explain the fetal demise. The umbilical cord length was normal.

DISCUSSION

The umbilical cord represents the fetal lifeline during intrauterine development. Certain conditions, such as cord length abnormalities, malpresentations of the fetus, premature membrane ruptures, excessive fetal movements and external cephalic version predispose the cord to accidents [1]. Umbilical cord accidents are accepted as conditions associated with intrauterine fetal demise. In 1750, William Smellie, in his *Treatise of Midwifery*, published one of the first cases of an umbilical cord accident.

Cord entanglement, one important category of umbilical cord accidents, usually occurs during early pregnancy. Rarely, cord entanglement can compromise the cord blood flow and cause fetal demise. During late pregnancy, cord entanglement around different parts of

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Figure 1. Three-dimensional ultrasound of a cord entanglement around the lower limb in the first trimester of pregnancy.

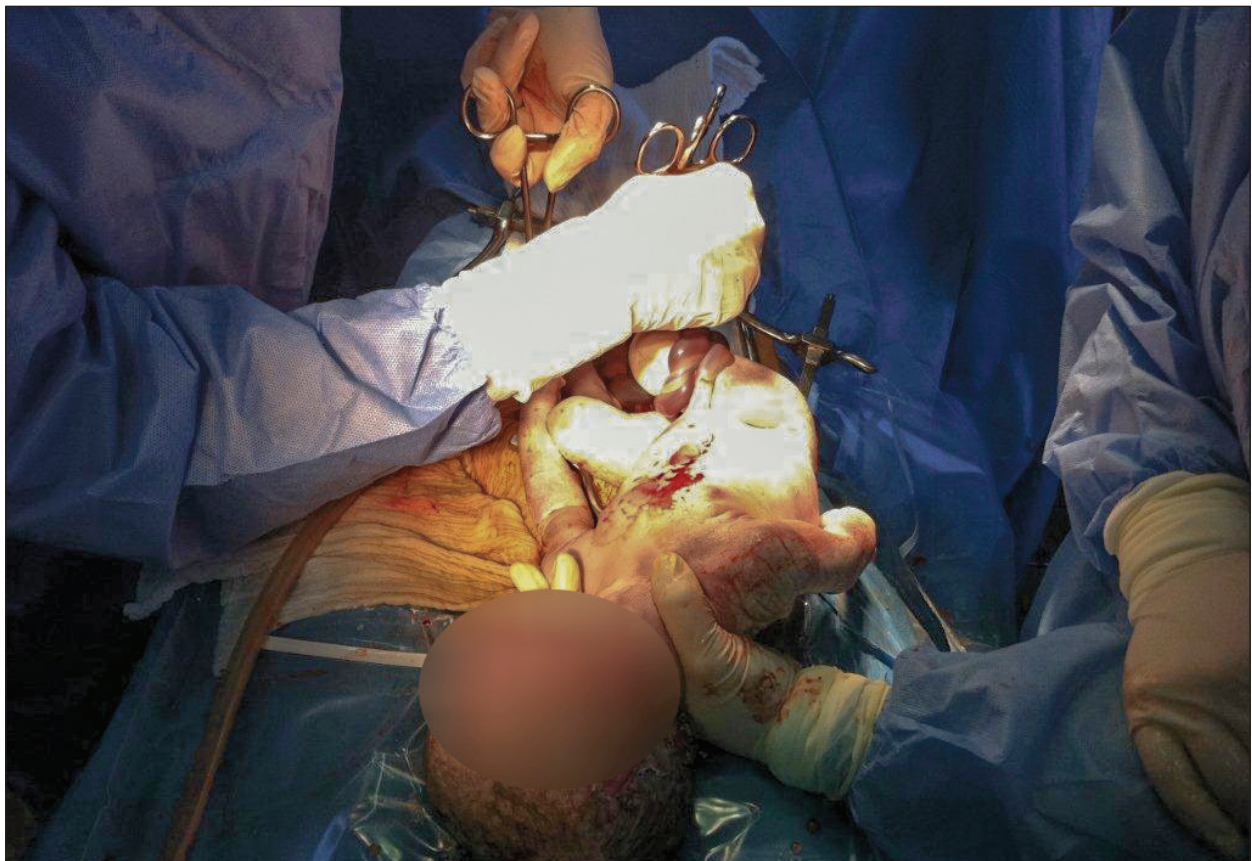


Figure 2. Complex entanglement of the umbilical cord around the right fetal thigh (intra-operative picture).

the fetal body is often an unrecognized cause of fetal intrauterine growth restriction (IUGR) or even fetal demise. While some events tend to be of less concern, others can have serious implications for both short and longer-term perinatal morbidity and mortality [2, 3].

Cord entanglement around the neck is well documented and occurs in about 20-30% of births [4,5]. However, most cord entanglements do not lead to adverse outcomes, probably because they are somewhat loose [6]. Although a tight nuchal cord is associated with some short-term fetal morbidity, it is an uncommon cause of antenatal fetal mortality or neurological morbidity [7]. With the exception of nuchal cord, entanglement involving other parts has not been well documented in the literature, most likely because diagnosing these entanglements is more difficult. Incidence for these types of entanglement is not well established; most often, it is discovered during labor, but not recorded for all cases.

Using three-dimensional ultrasound, the incidence of cord entanglement was estimated to be high between 13-16 weeks of amenorrhoea (Figure 2) [8]. Tepper *et al.* and reported the incidence of cord entanglement between 13-16 weeks of pregnancy as 62.9%, with distribution as follows: nuchal cord, 27%, legs, 9.7%, upper limbs, 8%, abdomen, 3%, around and other parts of the body, 15.2% [7]. During this period of pregnancy, this phenomenon may be considered part of normal early development. The majority of these entanglements resolve spontaneously, thus explaining the very low incidence of mortality during this period of pregnancy caused by cord entanglement [9]. However, in rare cases, fetal outcome could be adversely affected by cord entanglement. Cases of fetal demise caused by cord entanglement in the second trimester of pregnancy have been reported [10]. In these cases, IUGR or even fetal demise could occur.

During the third trimester of pregnancy, cord entanglement is rarer. A body loop could result in cord compression. In some cases tight loops have made impressions on the fetal skin and can restrict intrauterine fetal movement. Loops around the fetal extremities can affect circulation and cause damage to the extremities. Circulation disturbances can sometimes form blood clots in the arteries, veins, or placenta, affecting the oxygen supply to the fetus and possibly causing growth

disturbances or death. Umbilical cord encirclements are associated with IUGR, and the severity of the restriction is positively related to the number of encirclements [11].

Fetal asphyxia/demise because of umbilical cord entanglement and secondary cord occlusion is typically a unique characteristic of mono-amniotic twin pregnancies. These entanglements develop in early gestational age and become a crucial problem later [12]. In our case, the cord entanglement caused fetal death. The normal biometry of the fetus showed that it was an acute accident. Also, the length of the umbilical cord was normal, and no other predisposing factor was present.

Research is needed to understand the underlying mechanisms of umbilical cord accidents. Fetal death caused by umbilical cord accidents could be prevented by identifying risk factors such as malpresentations, polyhydramnios and multiple pregnancy, during antenatal visits. An accurate antenatal diagnosis of umbilical cord abnormalities represents a significant challenge. Detection of nuchal cord or cord entanglement can be diagnosed by careful color Doppler studies and four-dimensional sonography [13]. Although nuchal cord detection with Doppler ultrasonography is easy, diagnosing cord entanglement around other parts of the body could sometimes be quite difficult.

Entanglement of the umbilical cord around different parts of the body could affect fetal development, and, rarely could be fatal. Our case demonstrates that tight entanglement of the umbilical cord around the legs can cause fetal demise during the third trimester of pregnancy. Umbilical cord ultrasonography and Doppler flow velocimetry could be useful in the antenatal detection of umbilical cord morphologic abnormalities. In most cases, decreased fetal movement is the single alarming clinical sign before fatal consequences occur. In all cases, when women declare a sudden change in fetal activity, a careful assessment of the cord, particularly at the fetal end, should follow. In all intrauterine demise cases, it is important to look for marks of cord entanglement on all around parts of the body.

Conflict of interest

We declare that there is no conflict of interest.

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