

Case Report

A Case Report of Umbilical Artery Thrombosis

Danmin Lin¹, Xiaoling Guo^{2,*}, Xinfang Zeng¹, Limin Zhong³

¹Obstetrics and Gynecology Department, First Affiliated Hospital of Jinan University, Guangzhou, China

²Foshan Maternal and Child Health Hospital, Foshan, China

³Department of Rehabilitation, First Affiliated Hospital of Jinan University, Guangzhou, China

Email address:

danmin2023@163.com (Danmin Lin), xiaoling199709@163.com (Xiaoling Guo), kwddzxf@163.com (Xinfang Zeng), 1780801240@qq.com (Limin Zhong)

*Corresponding author

To cite this article:

Danmin Lin, Xiaoling Guo, Xinfang Zeng, Limin Zhong. (2023). A Case Report of Umbilical Artery Thrombosis. *Journal of Gynecology and Obstetrics*, 11(6), 164-167. <https://doi.org/10.11648/j.jgo.20231106.17>

Received: November 8, 2023; **Accepted:** November 27, 2023; **Published:** December 11, 2023

Abstract: Umbilical artery thrombosis is a perinatal disease with low incidence rate and high mortality. Umbilical artery thrombosis is very rare. Research data show that the pregnancy outcome of fetuses with umbilical artery thrombosis is usually poor, and umbilical artery thrombosis is rare. Prenatal screening and diagnosis of umbilical artery thrombosis are usually performed through ultrasound examination. So far, no consensus has been reached on treatment. We reported a rare case of umbilical artery thrombosis combined with abnormal umbilical vein catheter blood flow in late pregnancy. Emergency cesarean section was performed after emergency admission. Thrombosis was observed in one umbilical artery during and after surgery pathology. Follow up the postpartum and newborn babies, and both are in good condition. During pregnancy, the number and morphology of umbilical arteries should be carefully observed. The treatment of umbilical artery thrombosis should be based on clinical conditions, and timely termination of pregnancy if necessary may be suitable for improving adverse pregnancy outcomes.

Keywords: Umbilical Artery Thrombosis, Pregnancy, Fetal Heart Monitoring

1. Introduction

Umbilical artery thrombosis is a perinatal disease with low incidence rate and high mortality. Umbilical artery thrombosis is very rare. Research data show that the pregnancy outcome of fetuses with umbilical artery thrombosis is usually poor, and umbilical artery thrombosis is rare. Prenatal screening and diagnosis of umbilical artery thrombosis are usually performed through ultrasound examination. So far, no consensus has been reached on treatment. We reported a rare case of umbilical artery thrombosis combined with abnormal umbilical vein catheter blood flow in late pregnancy. Emergency cesarean section was performed after admission to the emergency department. Thrombosis was observed in one umbilical artery during and after surgery pathology. Follow up with the mother and newborn, both in good condition. During pregnancy, the number and morphology of umbilical arteries

should be carefully observed. So far, there is no consensus on the treatment of umbilical artery thrombosis both domestically and internationally. The treatment of umbilical artery thrombosis should be based on clinical conditions, and timely termination of pregnancy if necessary may be suitable for improving adverse pregnancy outcomes. The consensus is that scheduled prenatal checkups, self counting fetal movements, fetal heart rate monitoring, ultrasound examinations, etc. can all benefit from it. For underage fetuses, the balance between seeking treatment to extend gestational age and immediately rescuing the fetus through cesarean section is a major clinical challenge.

2. Case Presentation

The patient is 40 years old, giving birth to 1 child in 3 pregnancies, and at 295 weeks of pregnancy. During routine prenatal examination, the chief complaint was that on the

same day, a B-ultrasound showed the absence of the left umbilical artery (previously two umbilical arteries were detected by the B-ultrasound), and the A wave of the umbilical vein catheter was positive, which did not exclude the possibility of fetal umbilical artery thrombosis. Therefore, the patient was immediately admitted to the hospital. The patient was healthy in the past and had regular prenatal examination since the 16th week of pregnancy. No abnormality was found in the previous ultrasonic examination and non-invasive DNA screening during pregnancy. The glucose tolerance test at the 24th week of pregnancy was 5.02-10.08-8.58mmol/L, which was diagnosed as diabetes during pregnancy. After diet and exercise intervention, the blood sugar during pregnancy was controlled steadily. This couple has no family history of drugs, genetic diseases, drug abuse, or congenital malformations.

The patient undergoes regular prenatal examinations, and the ultrasound examination at 22 weeks still indicates two umbilical arteries. The patient gained a weight of 12kg during pregnancy and had no history of thrombotic disease or related family history, as well as no history of smoking.

After admission examination: body temperature 36.8°C, heart rate 80 times/min, breathing 14 times/min, blood pressure 128/70mmHg (1mmHg=0.133kPa), considering acute fetal distress, explain the condition to the patient and family, and suggest immediate cesarean section to terminate the pregnancy. During the operation, amniotic fluid was clear, umbilical cord torsion was observed, and the fetus was delivered smoothly. The newborn was immediately handed over to a neonatal pediatrician with a weight of 1150g and an Apgar score of 7 points at 1 minute, 9 points at 5 minutes, and 10 points at 10 minutes. The length of the umbilical cord is 50cm, the weight of the placenta is 770g, and there is no abnormality in the appearance of the placenta. Dark brown blood stains were observed in the umbilical artery at the point of umbilical cord rupture, and red hemolytic changes were observed at the left side of the umbilical artery (see Figure 1). The possibility of umbilical vascular thrombosis was considered during the operation. Due to umbilical cord thrombosis, the extraction of umbilical vein blood gas was not possible. When extracting umbilical vein blood, a small amount of black brown sol like thrombus was observed. The umbilical cord blood gas examination showed a pH value of 7.267, residual alkali of -6mmol/L, and partial pressure of carbon dioxide of 48.1mmHg, all within the normal range. The postoperative patient showed no abnormalities, and the newborn was transferred to the neonatal department due to premature delivery. She was discharged 4 days postpartum. The pathological examination results of the placenta and umbilical cord after surgery indicate that the umbilical cord is spiral shaped, with some umbilical cords and blood vessels being blocked. Three blood vessels (arteriovenous ratio 2:1) can be seen in the umbilical cord, with one of the umbilical artery lumens narrowing and collapsing. Considering abnormal maternal vascular perfusion, umbilical artery occlusion, and visible thrombosis. (See Figure 2)



Figure 1. Images of Dark brown blood stains in the umbilical artery at the point of umbilical cord rupture.



Figure 2. Images of The umbilical cord is spiral shaped.

3. Discussion

The umbilical cord is an important bridge between the mother and fetus, and an important channel for gas exchange, nutrient transport, and metabolic product excretion. Umbilical vein thrombosis is very rare, and research data shows that fetuses with umbilical vein thrombosis often have poor pregnancy outcomes, leading to fetal death, cerebral palsy, or severe intrauterine distress [1]. Umbilical vein thrombosis is more common than umbilical artery thrombosis, and even in cases with good prognosis, growth restriction in infancy may occur after umbilical vein thrombosis [2].

In the analysis of 8 cases of umbilical vein thrombosis, Ying Zhu et al [3]. found that abnormalities in the shape or structural development of the umbilical cord, such as cord length, dense spiral, true or false knot formation, and umbilical cord attachment sites, can cause a slowing down of blood flow velocity in the blood vessels. The length of the umbilical cord in this case is 50cm, in a spiral shape. Excessive spiral leads to an increase in exogenous pressure, leading to stagnation of blood flow in the umbilical blood vessels. The disorder or eddy current of blood flow in the lumen can promote local accumulation of platelets and fibrinogen, thereby promoting thrombosis.

The patient with umbilical artery thrombosis reported by Xiaomin Ma et al [4], had abnormal fetal heart rate monitoring as the surgical indication, while in this case, the patient was admitted to the hospital with abnormal umbilical blood flow detected by ultrasound, and there were no other complaints. Based on the patient's past medical history and clinical manifestations, it is analyzed that the occurrence of umbilical

artery thrombosis may be related to excessive twisting, twisting, and compression of the fetal umbilical cord for 2 weeks. After excessive twisting, pulling, and compression of the umbilical cord, the blood flow of the umbilical artery slows down and is obstructed, resulting in thrombosis. In addition, this patient has high risk factors such as advanced age, pregnancy diabetes, IVF status, which may also have an impact on thrombosis and vascular fragility. Multiple factors will eventually lead to umbilical artery thrombosis.

The incidence rate of umbilical vein thrombosis is low, but it does great harm to the fetus. The means of prenatal diagnosis of umbilical vein thrombosis are extremely limited. Pregnant women are in hypercoagulable state and have the risk of forming thrombus. If obesity, old age, diabetes, hypertension, cesarean section history, etc. are combined, they may be susceptible factors such as vascular embolism [5]. It is necessary to actively screen for thrombus related molecular markers in high-risk populations to guide whether further use of anticoagulants is necessary to prevent thrombosis [6, 7]. Counting fetal movements in late pregnancy is the simplest and fastest way to evaluate the intrauterine condition of the fetus. If there is a sudden decrease or increase in fetal movements followed by a decrease, it indicates the possibility of fetal distress in the uterus. Electronic fetal heart rate monitoring is an important tool for evaluating fetal intrauterine safety through continuous observation of the relationship between fetal heart rate and uterine contractions. At present, ultrasound is considered the preferred diagnostic method in clinical practice. A two-dimensional ultrasound scan of a normal umbilical cord shows three loops - one large loop, umbilical vein, and two small loops, umbilical artery [8]. During pregnancy, sudden absence of blood flow signals can be used to detect intrauterine thrombosis. The disappearance of umbilical artery blood flow signal in our case is clearly occurring [9]. However, ultrasound examination is still difficult to detect umbilical artery embolism in a timely manner before delivery and can be easily confused with a single umbilical artery. Single umbilical artery is a rare congenital abnormality in the number of umbilical vessels, which can be detected in a timely manner through continuous ultrasound examination during pregnancy. When the umbilical artery is occluded, ultrasound examination will also show a single umbilical artery like change. If the number of umbilical arteries is not detected in a timely manner during pregnancy, it may lead to serious consequences [10].

Similar to this patient, Wang Qilin *et al* [11]. reported a single chorionic double amniotic sac twin patient at 295 weeks of pregnancy who underwent routine prenatal ultrasound examination and found a lack of blood flow in one of the umbilical arteries. After ruling out the possibility of infection and other factors, the fetal heart and fetal movements were closely monitored to strive for a time to promote fetal lung maturation. A lower segment cesarean section was performed at 32 weeks of pregnancy, and both fetuses were confirmed to have umbilical artery thrombosis through pathological examination. Huanxi Li *et al* [12]. reported that 5 cases of prenatal ultrasound examination revealed the absence of one

of the umbilical arteries, and no other abnormal monitoring indicators were not intervened. Among them, 2 cases were found to have fetal death in the uterus when seeking medical attention again. Based on the clinical manifestations of this patient, the patient's previous ultrasound did not indicate any abnormalities in umbilical blood vessels or umbilical blood flow. Routine prenatal examination found that there were 3 umbilical blood vessels instead of 2. At the same time, B-ultrasound also found a positive A wave in the umbilical vein catheter, so emergency cesarean section was performed. Therefore, in clinical work, when there is a sudden change in the number of umbilical blood vessels or abnormal changes in umbilical blood flow, it is necessary to strengthen the detection of fetal heart and fetal movement. If combined with abnormal venous catheter blood flow, S/D ratio, fetal movement, fetal heart monitoring, etc., it is necessary to consider the possibility of fetal intrauterine hypoxia [13, 14]. Regardless of whether the pregnancy is full term or whether the promotion of fetal lung maturity is completed, termination of pregnancy should be considered. Conversely, It is necessary to try to prolong the gestational age through expectant treatment and close fetal monitoring, in order to improve neonatal survival rate [15].

4. Conclusion

In summary, umbilical artery thrombosis is a rare disease that can lead to poor fetal prognosis and even fetal death in the uterus. During prenatal examination, the number and morphology of umbilical arteries should be carefully observed. In our case, the patient diagnosed with umbilical artery thrombosis underwent an emergency cesarean section immediately, and the prognosis of the newborn was good. With the implementation of the "two child policy" and "three child policy", the number of high-risk pregnancies has increased, and it is even more necessary to strengthen fetal monitoring and education for pregnant women. For high-risk pregnant women, it is important to pay attention to the patient's main complaint, promote fetal movement, appropriately advance fetal heart rate monitoring time, and conduct moderate ultrasound examination. Once B-ultrasound doctors discover changes in the number of umbilical blood vessels or blood flow, they should pay attention to comparing with early pregnancy, mid pregnancy, and other B-ultrasound methods, terminate pregnancy in a timely manner, and improve adverse pregnancy outcomes [16].

Data Sharing Statement

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare no conflict of interest.

References

- [1] Hongmei Dong, Xiaohang Zhang, Suzhen Ran. Analysis of prenatal ultrasound features of a umbilical artery embolism [J]. *Chinese Journal of Ultrasound Imaging*, 2020, 29 (10): 892-896.
- [2] Aihua Ruan, Xiaoqin He, Xiaohong Zhong. Prenatal ultrasound diagnosis of umbilical artery embolism [J]. *Chinese Journal of Ultrasound Medicine*, 2020, 36 (12): 1140-1142.
- [3] Ying Zhu, Yanyan Liu. Analysis of high-risk factors and perinatal outcomes of umbilical vein thrombosis [J] *Journal of China University of Science and Technology*, 2020, 50 (07): 936-9.
- [4] Xiaomin Ma, Qingyun Shi, Ling Chang, et al. A case of umbilical artery thrombosis [J] *Chinese Electronic Journal of Obstetrics and Emergency Care*, 2019, 8 (04): 254-6.
- [5] Qiuyu Huang, Yingying Huang, Qitao Huang, et al. Interpretation and comparison of domestic and international guidelines and expert consensus on the prevention of pregnancy related venous thrombosis [M]. 2022.
- [6] TING W, YINGSHA Y, TING X, et al. Application of low molecular weight heparins in umbilical artery thrombosis: A case series and review of the literature [J]. *Medicine*, 2023, 102 (15).
- [7] REBECCA D, BETHANY M, CHRISTOPHER S. Case Report of Umbilical Artery Thrombosis in a Patient With a History of Heparin-Induced Thrombocytopenia [J]. *Journal of obstetric, gynecologic, and neonatal nursing: JOGNN*, 2023.
- [8] Youping Wu, Nayan Chen, Xiaohong Zhong. Ultrasound manifestations of umbilical artery thromboembolism [J] *Chinese Medical Imaging Technology*, 2023, 39 (06): 932-3.
- [9] SHILLING C, WALSH C, DOWNEY P, et al. Umbilical Artery Thrombosis is a Rare but Clinically Important Finding: A Series of 7 Cases with Clinical Outcomes [J]. *Pediatric and Developmental Pathology*, 2014, 17 (2).
- [10] A J R, T X, W L, et al. [Clinical analysis of 31 cases of fetal umbilical artery thrombosis] [J]. *Zhonghua fu chan ke za zhi*, 2023, 58 (7).
- [11] QILIN W, YANPING Z, RONG Z. Expectant management for umbilical artery thrombosis in monochorionic diamniotic twin pregnancies: a case report [J]. *BMC pregnancy and childbirth*, 2023, 23 (1).
- [12] Huanxi Li, Quanfeng Wu, Wei Wei, et al. Clinical analysis of 352 cases of single umbilical artery diagnosed by prenatal ultrasound in single fetuses [J] *Journal of Practical Obstetrics and Gynecology*, 2019, 35 (06): 463-6.
- [13] TAITO K, AYAKO O, KUMIKO T, et al. A case of severe neonatal asphyxia due to umbilical artery thrombosis [J]. *Journal of obstetrics and gynaecology: the journal of the Institute of Obstetrics and Gynaecology*, 2018, 38 (8).
- [14] Lina Ye, Cuimei Li, Cuicui Xie The influencing factors of abnormal S/D ratio of umbilical artery blood flow and its impact on perinatal outcomes [M]. 2019.
- [15] CAIXIA H, KUN D, ZONGYANG J, et al. Expectant management for umbilical artery thrombosis: a report of two cases and literature review [J]. *The journal of maternal-fetal & neonatal medicine: the official journal of the European Association of Perinatal Medicine, the Federation of Asia and Oceania Perinatal Societies, the International Society of Perinatal Obstetricians*, 2022, 35 (25).
- [16] Qian Sun, Zhen Jin. The current status of diagnosis and treatment of umbilical artery embolism [J] *The progress of modern obstetrics and gynecology*, 2019, 28 (05): 393-5.