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Vasa previa Type 3: Advocating for universal screening and investigation of risk factors: A case report

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Abstract

Vasa previa is a critical obstetric condition marked by unprotected fetal vessels near the cervical os, traditionally divided into Types 1 and 2, based on its association with velamentous cord insertion and accessory placental lobes, respectively. The recent introduction of Type 3 vasa previa addresses atypical cases. We report a unique intrapartum diagnosis of Type 3 vasa previa in a 39-year-old at 38 weeks of gestation, identified during labor induction without prior risk indicators. Despite lacking traditional risk factors, advanced imaging and clinical vigilance led to a primary cesarean delivery, confirming the diagnosis through intraoperative findings of three aberrant vessels with marginal cord insertion. This case emphasizes the critical importance of considering vasa previa in prenatal and intrapartum care to prevent adverse outcomes, advocating for universal screening practices to identify this rare but significant condition.

Keywords

Type 3 vasa previa, aberrant fetal vessels, marginal cord insertion

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Introduction

Vasa previa is a critical condition in obstetrics, characterized by the presence of fetal blood vessels traversing the fetal membranes across or in close proximity (within 2 cm) to the internal opening of the cervix.[1] It is relatively rare, with a reported occurrence rate of approximately 0.05%.[2] Key risk factors for this condition include the insertion of the umbilical cord in a velamentous manner, the existence of an extra placental lobe or succenturiate lobe, anomalies in placental formation, the use of assisted reproductive technologies, and pregnancies involving multiple births.[2] Early detection of vasa previa through prenatal screening, along with a comprehensive understanding of its associated risk factors, plays a significant role in enhancing neonatal survival rates and minimizing the risk of mortality among fetuses.[3]

In the early 2000s, research led by Catanzarite V and colleagues delineated two primary forms of vasa previa: Type 1 involves the connection of fetal vessels from a velamentously inserted cord to the main placenta, while Type 2 concerns the vessels connecting separate lobes of a bilobed or multilobed placenta.[4] Further investigations identified cases that did not fit these classifications, leading to the introduction of Type 3 vasa previa in 2016 by the same group.[5] Type 3 is identified by aberrant vessels extending from the placenta across the amniotic membranes adjacent to the internal cervical os, and then back to the placenta.[6] Unlike the other types, Type 3 can occur even with a normally inserted umbilical cord and without placental abnormalities.[7]

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This case report presents an uncommon instance of Type 3 vasa previa identified during the labor induction of a woman with multiple past pregnancies. The diagnosis was notable for being the inaugural report within Lebanon, made particularly unique by its intrapartum recognition prior to membrane rupture, absent the usual risk factors, and lacking a prenatal diagnosis.[7]

Case presentation

A 39-year-old woman, gravida 4, para 1, aborta 2, with a history of chronic hypertension and Type II diabetes mellitus, was scheduled for induction of labor at Rafik Hariri University Hospital at 38 weeks of gestation. Throughout her pregnancy, she was under close observation due to her pre-existing medical conditions, which posed increased risks for obstetrical complications. Despite these concerns, her pregnancy course was notably uneventful, with regular fetal development and no signs of major complications observed on scans.

The patient underwent three critical obstetrical sonographic examinations. The initial scan at 12 weeks confirmed the pregnancy and assessed early fetal anatomy and placental position. A detailed morphological scan at 22 weeks provided a comprehensive evaluation of fetal development and again confirmed the anterior placement of the placenta. The third scan at 32 weeks focused on assessing fetal growth, amniotic fluid volume, and overall well-being, showing no signs of vasa previa or other placental anomalies.

Given her history of chronic conditions, the pregnancy was managed with particular caution. The management strategy aimed to mitigate potential complications associated with her diabetes and hypertension, closely monitoring her health and the fetus's development. The approach throughout was proactive and vigilant, with the anticipation of possible complications that could arise from her underlying health issues or the anterior placenta.

Despite the detailed prenatal surveillance, including targeted scans specifically looking for placental and fetal anomalies, Type 3 vasa previa was not diagnosed until the patient was in labor. Upon her admission for a scheduled induction, due to isolated oligohydramnios and decreased fetal movements, an examination raised suspicion for vasa previa, which was unexpected given the absence of any indicative findings throughout the pregnancy. This diagnosis was only confirmed through a transvaginal ultrasound performed upon noticing abnormal pulsating structures during a pelvic examination in labor (Figure 1), leading to an emergency cesarean section for the safe delivery of the baby.

The surgery resulted in the delivery of a live baby girl, who received Apgar scores[8] of 9 at 1 min and 10 at 5 min. Following the delivery, the uterus was exteriorized while the placenta remained attached, allowing for a thorough examination of the placentation and the fetal vessels. This examination revealed three aberrant fetal vessels running unprotected over the internal cervical os, depicted in Figure 2. After allowing the placenta to detach spontaneously, a marginal cord insertion was observed, as shown in Figure 3.

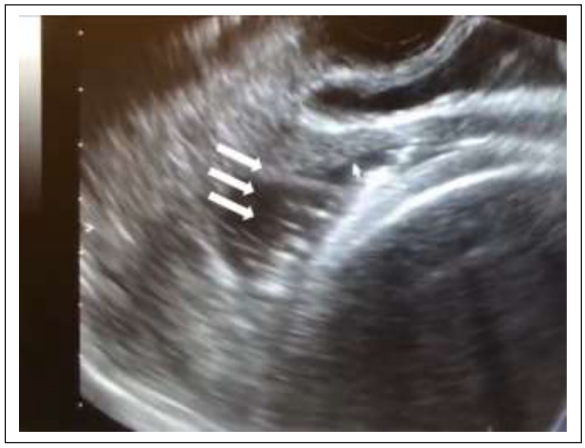

Figure 1. Intrapartum transvaginal ultrasonography. Three pulsating structures (arrows) were observed on the fetal membranes (machine cursor) near the dilated internal cervical os.

The discovery of Type 3 vasa previa at the time of labor underscores the unpredictability and complexity of obstetrical complications, highlighting the critical need for vigilant monitoring and readiness to adjust the clinical approach based on evolving findings during labor and delivery. Both the mother and her neonate had an uneventful recovery and were discharged on the second day post-delivery, marking a successful outcome despite the unexpected complication.

Discussion

This case presents a critical instance of Type 3 vasa previa identified unexpectedly during labor in a patient without the conventional prenatal risk factors typically associated with this condition. Despite the absence of a low-lying placenta or velamentous cord insertion, three aberrant vessels were detected traversing the fetal membranes over the cervical os. The late discovery underscores the challenges of diagnosing Type 3 vasa previa prenatally, especially in the absence of clear risk indicators, and emphasizes the vital role of prenatal diagnosis in preventing severe fetal outcomes.

The categorization of Type 3 vasa previa as a distinct and recently identified variant[3] introduces critical considerations for prenatal care, particularly due to the associated risks of undetected cases, including vessel rupture and severe fetal hemorrhage.[6] The literature suggests that early detection through prenatal diagnosis significantly enhances neonatal survival rates, reducing fetal mortality dramatically.[9] The mechanisms underlying Type 3 vasa previa, while not fully understood, are thought to involve factors such as placental location and umbilical cord placement.[6,7,10] This case adds to the discourse by illustrating that Type 3 vasa previa can occur without typical placental or umbilical anomalies, challenging the current understanding and detection strategies.

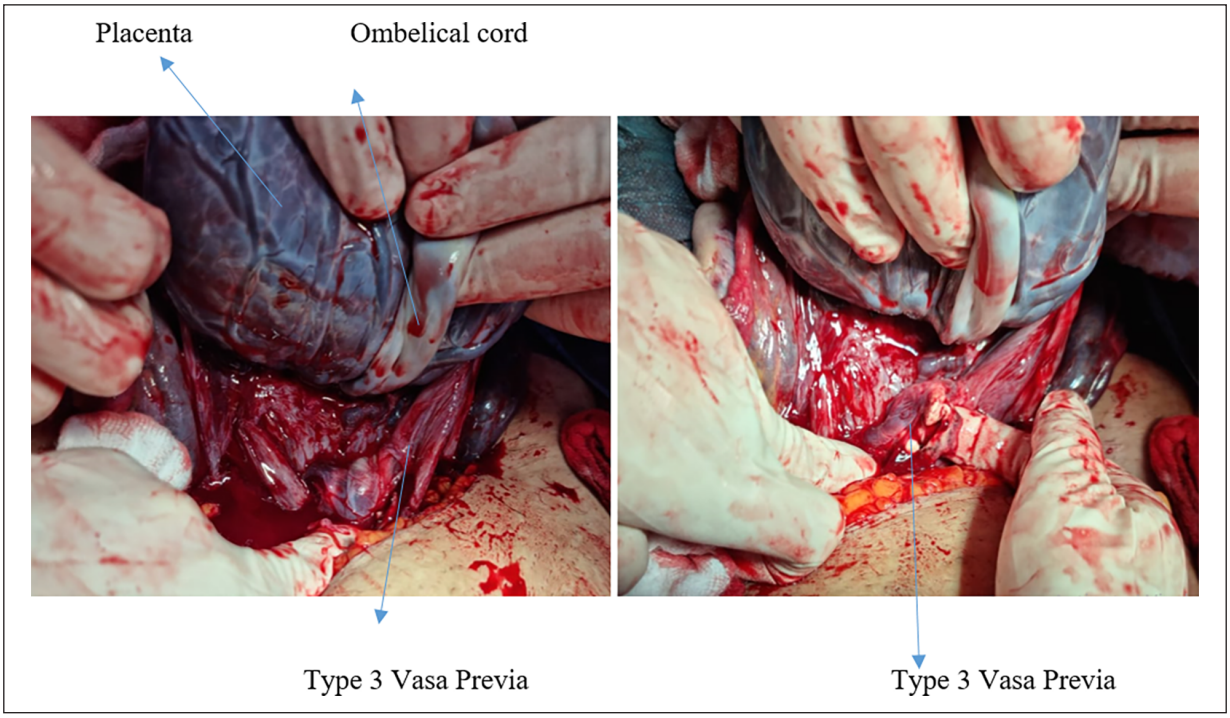

Figure 2. Intraoperative diagnosis. Exteriorized uterus through Pfannenstiel incision, with placenta and membranes undetached. Three aberrant vessels were observed in the fetal membranes over the cervix.

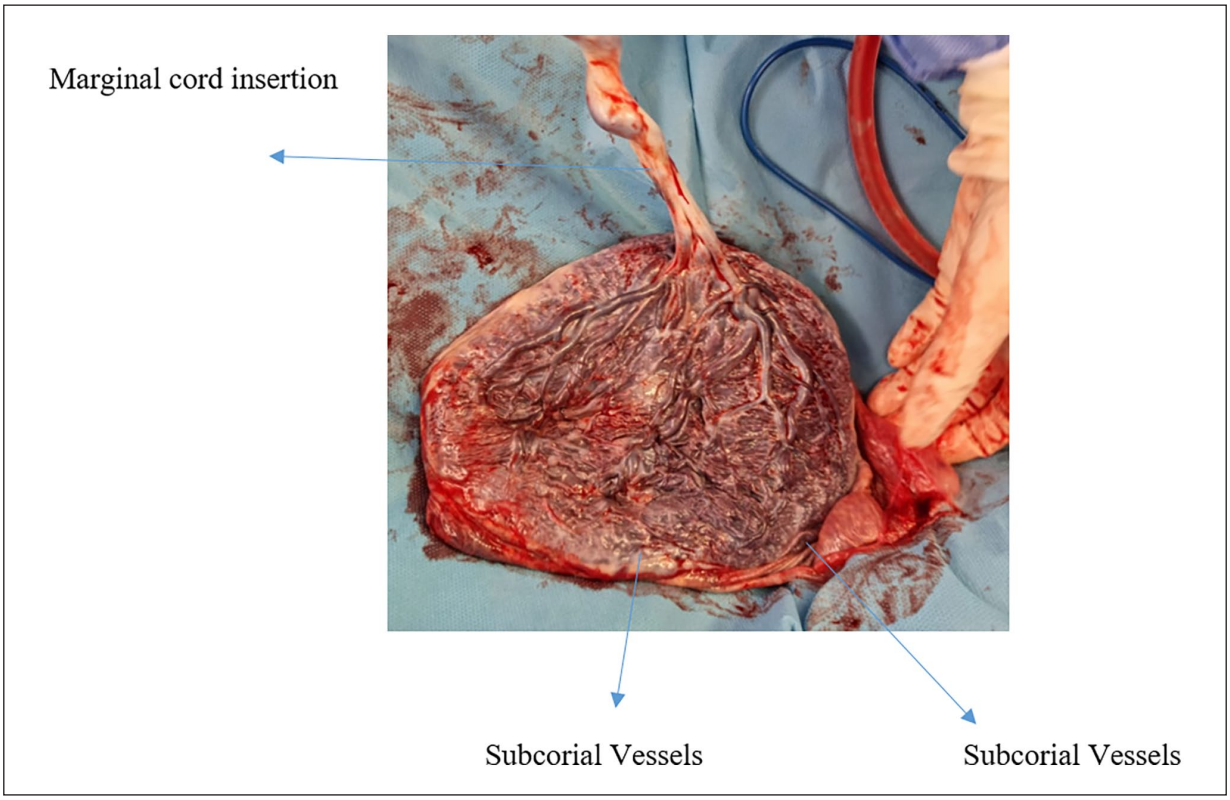

Figure 3. Marginal cord insertion in the placenta.

Proposed screening protocol for Type 3 Vasa previa

Given the implications of this case and the current literature, a more robust prenatal screening protocol is advocated:[11]

1. Early First-Trimester Ultrasound: Screening for placental position and umbilical cord insertion should be standard. While not directly indicative of Type 3 vasa previa, early identification of potential risk factors is crucial.[3]
2. Mid-Pregnancy Detailed Anatomy Scan: A comprehensive scan between 18 and 22 weeks should include assessments of the umbilical cord and placental position, utilizing color Doppler[12] when possible to identify aberrant vessels.[13]
3. Third-Trimester Follow-Up Scans: Recommended for cases where any risk factors are identified earlier in the pregnancy. These scans should pay particular attention to the placental position and the presence of aberrant vessels, with color Doppler[12] used to enhance detection.[10]
4. Transvaginal Ultrasound for Cervical Length Measurement: Particularly in the mid-pregnancy stage for women with any identified risk factors. This technique can improve the detection of vasa previa by providing detailed views of the cervix and lower uterine segment.[14]

Evidence for the protocol

This protocol draws on the findings of Tsakiridis et al.[9] regarding the impact of antenatal diagnosis, the exploratory work into the causes and characteristics of Type 3 vasa previa,[6,7,10] and the practical evidence supporting the use of color Doppler,[11] transabdominal and transvaginal ultrasound in enhancing prenatal screening.[13,14]

Meticulous intrapartum assessment is a comprehensive and careful examination process conducted by healthcare providers during labor to detect any signs of vasa previa before the membranes rupture. This process starts with a visual inspection of the cervix using a speculum, allowing for the observation of any visible blood vessels indicative of vasa previa. Following this, a gentle palpation of the area around the cervix is performed as part of a pelvic examination to feel for abnormal vessels or structures that might suggest the presence of vasa previa. To provide a more definitive assessment, a bedside ultrasound, ideally with color Doppler, can be employed to visualize the fetal vessels and their proximity to the cervix; this step is crucial, especially if vasa previa is suspected based on the patient's history or initial examination findings. In instances where vasa previa is suspected, consultation with obstetricians or maternal-fetal medicine specialists may be necessary to determine the best course of action for managing labor and delivery to ensure the safety of both the mother and the baby. Throughout this assessment, it is essential to maintain clear communication with the pregnant woman, explaining the procedures, their purposes, and any findings to ensure she is well-informed and reassured about her care. This meticulous approach is designed to be minimally invasive yet highly effective, aiming to detect a potentially life-threatening condition in time for a cesarean section to be arranged, significantly mitigating the risk of adverse neonatal outcomes associated with vasa previa

Clarifying screening for Type 3 Vasa Previa

Type 3 vasa previa is characterized by aberrant fetal vessels running across or in close proximity to the internal cervical os, without the presence of a low-lying placenta or velamentous cord insertion (rarity).[15] This condition poses a significant risk due to the potential for vessel rupture during delivery, making early detection crucial. The specific findings we aim to identify through our recommended screening protocol include:

1. Aberrant Vessel Location: Vessels located around the internal cervical os that are not associated with the placental body or the main cord insertion. These may be more challenging to detect compared to other types of vasa previa.
2. Placental Cord Insertion Site: A detailed examination of the placental cord insertion site is crucial, as Type 3 vasa previa can occur even in the absence of the more commonly associated placental anomalies.[16]
3. Use of Color Doppler Ultrasound: The application of color Doppler ultrasound is particularly vital for identifying Type 3 vasa previa. This technology enhances the visibility of blood flow within these aberrant vessels, which may not exhibit the typical risk factors or visual cues associated with other types of vasa previa. Pulsed Doppler imaging may also provide additional insights, helping to confirm the diagnosis by demonstrating blood flow within these vessels.

Our advocacy for universal screening, inclusive of such detailed examination for Type 3 vasa previa, stems from the understanding that early detection significantly enhances neonatal outcomes by allowing for appropriate planning and intervention. The unique challenges presented by Type 3 vasa previa, including its rarity and the diagnostic difficulties it poses, necessitate a comprehensive approach to prenatal screening. By integrating this targeted screening within the broader scope of universal screening protocols, we aim to ensure no cases are overlooked, thereby minimizing the risk of adverse outcomes.

The importance of specialized screening. Recognizing the rare nature of Type 3 vasa previa, it is imperative to incorporate specialized screening techniques, such as color Doppler

ultrasound, into routine prenatal care. This approach not only aids in the early detection of Type 3 vasa previa but also enhances our ability to safeguard maternal and neonatal health effectively.

Limitations and patient follow-up

This case report, while detailing a successful outcome, acknowledges the limitations inherent in the diagnostic process, notably the inability to use Color Doppler[11] imaging for early detection. The importance of long-term follow-up is noted, though not provided in this case, highlighting a gap in understanding the full spectrum of maternal and neonatal outcomes post Type 3 vasa previa diagnosis. Comprehensive postpartum care and monitoring are essential for similar cases, ensuring that potential long-term effects are addressed.

Conclusion

In conclusion, this report highlights a rare instance of Type 3 vasa previa, uniquely identified intrapartum before the rupture of membranes and notably in the absence of any conventional risk factors. This case underscores the imperative necessity for clinicians to maintain a good index of suspicion for vasa previa, regardless of the presence or absence of risk factors. It advocates for the adoption of universal screening protocols for vasa previa during the second trimester sonographic evaluations. Additionally, meticulous intrapartum assessment is crucial for excluding vasa previa prior to membrane rupture, aiming to mitigate adverse neonatal outcomes. The increasing reports of this new type of vasa previa necessitate further investigation to elucidate its associated risk factors, thereby enhancing prenatal diagnosis and management strategies.

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Author contributions

The study was designed, implemented, written, and presented for publication by K.G., and H.M. While J.A.H., G.Y. and C.E.H. made supervision for the manuscript. While also H.N. enhanced the quality of the paper making it professional.

Guarantor: I, K.G., willing to take full responsibility for this article, including the accuracy and appropriateness of the reference list.

Data availability statement

The data supporting the findings of this study are available upon request from the corresponding author.

Declaration of conflicting interests

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Ethics approval statement

Ethical approval to report this case was obtained from RAFIR HARIRI UNIVERSITY HOSPITAL BY DR. GEORGES YARED. Due to the unprecedented crisis in our country (Lebanon), formal ethical approval number was not obtainable; however, all procedures performed in the study adhere to the ethical standards of the 1964 Declaration of Helsinki and its later amendments, with informed consent obtained from the patient for publication of this case report, ensuring the protection of confidentiality and privacy.

Patient consent statement

Written informed consent was obtained from the patient(s) for their anonymized information to be published in this article

Trial registration

Not Applicable.

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