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Case Report

Antenatal diagnosis and management of type III vasa previa

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ABSTRACT

Vasa previa is rare but potentially life-threatening condition for fetus, in which unprotected fetal vessels traverse the membranes over or near the internal cervical os, placing the fetus at risk of rapid exsanguination if undiagnosed. The risk is increased in pregnancies conceived by *in vitro* fertilization (IVF). With prior written consent of the patient, we report a rare case of type III vasa previa in an IVF pregnancy, diagnosed antenatally and managed successfully. A 26-year-old primigravida with IVF conception was found to have placenta previa on mid-trimester scan. Serial ultrasonography with color Doppler from 28 weeks demonstrated persistent unprotected fetal vessels near the internal os. The pregnancy was managed with close antenatal surveillance, corticosteroid administration, and planned hospitalization. An elective cesarean section at 35 weeks resulted in the delivery of a healthy neonate. Placental examination confirmed Type III vasa previa. This case underscores the importance of targeted ultrasound screening and planned delivery in improving perinatal outcomes.

Keywords: Vasa previa, *In vitro* fertilization, Trans vaginal sonography, Colour doppler, Fetal exsanguination, Still birth

INTRODUCTION

Vasa previa is a foetal vessel either arterial or venous which is unprotected by placental tissue or umblical cord and runs through the membranes over or in close proximity to the internal os.[1] It occurs in about 1 in 2500 births.[2] If undiagnosed this condition can lead to foetal exsanguination, asphyxia and even mortality secondary to rupture of these vessels. With the advancement in ultrasonography, it is possible to diagnose vasa previa in antenatal period. This can avoid foetal morbidity and mortality.[3,4]

The risk factors of vasa previa includes velamentous cord insertion, second trimester placenta previa, invitro fertilization.[5,6] There are 3 types of vasa previa: Type I: Where unprotected foetal vessels run from velamentous cord insertion into the placental edge. Type II: Where unprotected foetal vessel run between two placental lobes over the cervix. Type III: Where foetal vessel run from one edge of placenta to another edge over the cervix.[7,8]

Here we present a case of type 3 vasa previa diagnosed in the antenatal period and managed successfully with stringent antenatal monitoring followed by an elective caesarean section, which averted perinatal morbidities.

CASE REPORT

A 26-year-old female with four years of subfertility underwent IVF in view of azoospermia and previous two failed intra-uterine insemination. Day 5 blastocyst transfer was done using patient's egg and donor sperm. Target scan at 20 weeks revealed anterior placenta which was covering the internal os. Foetal growth monitoring was started from 28 weeks, when vasa previa was diagnosed first time on ultrasound (Figure 1 A-D). Thereafter, 2 weekly ultrasound was done for cervical length monitoring and foetal growth till 34 weeks. Cervical length was maintained more than 3 cm but the foetus showed early onset growth restriction with normal doppler parameters. In all these scans, vasa previa was persistent and the placenta was anterior and low lying

i.e. 2 cm away from internal os. She was admitted at 34 weeks and was monitored with daily NST. After steroid administration for lung maturity, an elective caesarean was performed at 35 completed weeks, as per the existing guidelines.[9,10] O negative blood was kept arranged for neonatal transfusion, in case of intraoperative inadvertent transection of foetal vessel during caesarean section. However, a careful preoperative ultrasound mapping and avoidance of incision of membranes helped to deliver the baby safely. A live male child weighing 1.95 kg, was born with Apgar scores were 8 and 9 at 1 and 5 minutes. The placenta was anterior and low lying and on gross examination (Figure 1 E), an unsupported foetal umbilical artery was seen traversing one edge of the placenta to another through membranes. This confirmed the diagnosis of type III vasa previa. The neonatal haemoglobin at birth was 14.6 g/dl and was discharged on day 7 after assuring adequate weight gain.

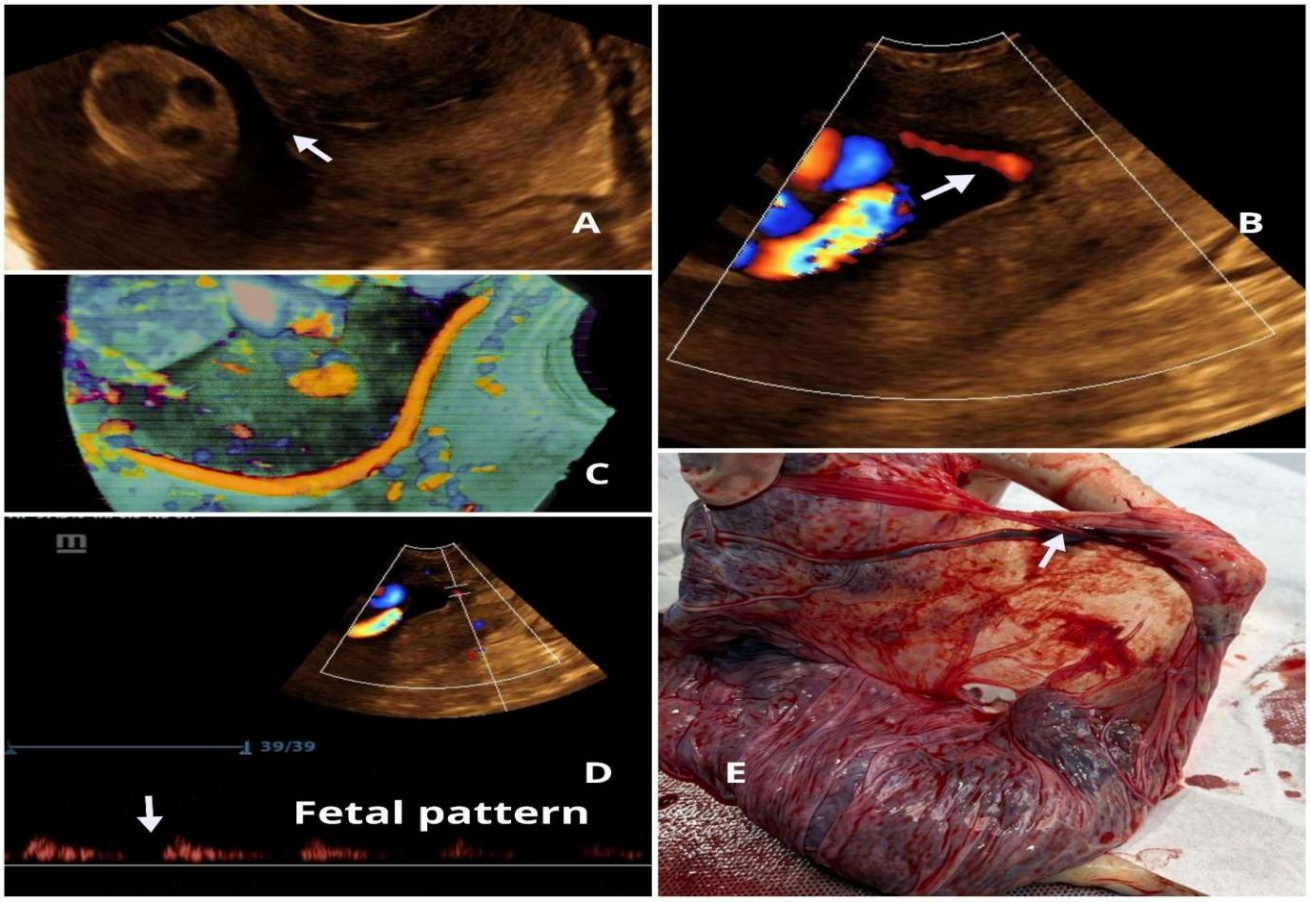

Figure 1 (A-E)-B mode ultrasound showing hypoechoic vessel at internal os. (B)-colour doppler shows arterial flow in the unsupported vessel. (C)-3 D imaging confirmed the presence of unsupported vessel. (D)-Power Doppler showing fetal blood flow pattern in the unprotected blood vessel confirming vasa previa. (E)-Placenta with unsupported fetal vessel running within the membrane from one edge of the placenta to the other.

DISCUSSION

Suekane et al first described a distinct form of vasa previa that could not be classified as type I or II. They reported two cases in which an aberrant fetal vessel coursed near the internal cervical os in a characteristic *"boomerang-shaped"* configuration, proposing the entity now recognised as type III vasa previa.[8]Subsequently, Kamijo et al. suggested that Type III vasa previa may represent a substantial proportion of vasa previa cases. Importantly, most reported cases were characterised by the presence of an isolated aberrant fetal vessel without associated placental or cord insertion abnormalities, rendering antenatal diagnosis particularly challenging.[11] A systematic review and meta-analysis by Takemoto et al estimated that type III vasa previa accounts for approximately 5-6% of all reported vasa previa cases.[12] Diagnosis was most frequently made between 28 and 32 weeks' gestation, and nearly half of the pregnancies resulted from assisted reproductive techniques, supporting a potential association similar to that observed with other vasa previa subtypes. A proposed mechanism underlying type III vasa previa is secondary atrophy of placental tissue over the lower uterine segment, resulting from preferential placental growth towards the uterine fundus, where vascular supply is relatively greater.[13] This process may leave unsupported fetal vessels traversing the membranes near the internal cervical os. If undiagnosed it can lead to still births, fetal exsanguination leading to severe neonatal anemia and asphyxia.

The diagnostic challenges of type III vasa previa have been further illustrated by individual case reports. Kim et al highlighted the importance of repeat ultrasonographic evaluation following identification of low-lying placenta, with particular attention to vessels in close proximity to internal cervical os using transvaginal colour Doppler imaging.[14] In systematic review, Pozzoni et al emphasised that prenatal diagnosis of type III vasa previa remains difficult, with relatively few cases documented in literature.[15] Nevertheless, antenatal detection is critical for optimising perinatal outcomes, as it enables planned early-term caesarean delivery prior to membrane rupture. Given absence of specific clinical risk factors and the possibility of normal cord insertion and single placental mass, authors advocated systematic transvaginal ultrasound screening, particularly in women with low-lying or morphologically abnormal placentas and in pregnancies conceived using assisted reproductive technology. In present case, recognised risk factors included IVF and 2nd trimester placenta previa. Consistent with previously reported type III cases, placental morphology demonstrated single placental mass with normal cord insertion, underscoring diagnostic complexity of this subtype.

Ultrasonographic diagnosis of vasa previa relies on identification of a linear hypoechoic structure overlying or adjacent to the internal cervical os that demonstrates flow on colour Doppler imaging. Pulsed-wave Doppler confirms a fetal arterial or venous waveform synchronous with the fetal heart rate, distinguishing fetal vessels from maternal vasculature.[16-18] Although earlier definitions applied a 2-cm distance criterion, recent Delphi consensus guidance discourages strict reliance on vessel-os distance.[18] These sonographic findings remain stable across serial examinations and are unaffected by maternal position, aiding differentiation from funic presentation.[10] In this case, prenatal diagnosis was established based on classical ultrasonographic features of vasa previa (Figure 1 A-D). A high index of suspicion, combined with targeted imaging in an IVF pregnancy complicated by second-trimester placenta previa, facilitated timely diagnosis. Management was subsequently undertaken in accordance with SMFM guidance, RCOG Green-top recommendations, and the Delphi consensus, summarised in Table 1.[1,9,18,19] A strict compliance with these practices allowed us to prevent still birth, fetal anemia and hypoxia thus improving perinatal survival.

Table 1: Screening and management recommendations.

Period of gestation	Screening and management	Recommendation grade
20 weeks	All pregnancies should be screened placental mass evaluation-ensuring single placental mass Assessing relation of lower placental edge with internal os Identification of umbilical cord insertion into placenta Check for cluster of vessels oriented in different directions to check -velamentous cord insertion In high-risk cases e.g. IVF pregnancies and suspicious cases Trans vaginal scans should be performed including colour doppler and pulse wave doppler	Best practice
28 weeks	Transvaginal ultrasound every 2-4 weeks for cervical length assessment	Weak recommendation, low quality evidence
30-32 weeks	Lower uterine segment re-evaluation with a trans vaginal scan with doppler in cases of placenta previa or marginal previa detected in second trimester Prophylactic hospitalization Antenatal Corticosteroid coverage Rule out funic presentation	Weak recommendation, low quality evidence
34-37 weeks	Elective cesarean Immediate cord clamping to prevent fetal blood loss Emergency preparedness with O Negative blood for neonatal transfusion	Weak recommendation, low quality evidence

CONCLUSION

Undetected antenatal vasa previa poses a significant risk to fetal survival; however, timely and accurate sonographic identification combined with expert obstetric management can effectively reduce perinatal morbidity and mortality.

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