



Type 3 vasa previa with no low-lying placenta, with central umbilical cord insertion at the upper uterine segment, and with aberrant vessels on the broad membrane: A case report

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ABSTRACT

Type 3 vasa previa is a new concept. Herein, a case is reported of a 35-year-old woman, pregnant following in vitro fertilization, in whom vasa previa was detected on color Doppler ultrasound at 26 weeks, with no finding of a low-lying placenta. A cesarean section was performed at 34 weeks and 3 days. Gross examination of the placenta showed Type 3 vasa previa with findings somewhat different from previous reports: two aberrant fetal vessels with branching on the broad membrane, and central cord insertion which was farther from the longitudinal center of the placenta than were the running vessels on the membrane. Vasa previa cannot be excluded due to normal cord insertion at the upper uterine segment, absence of placenta previa, or a low-lying placenta in the second trimester. Careful ultrasound screening can promote neonatal survival in patients with Type 3 vasa previa.

1. Introduction

Vasa previa is a condition in which unprotected fetal vessels run on the amniotic membranes within 2 cm of the internal cervical os at the lower uterine segment [1]. A systematic review reported that the mean incidence of vasa previa was 0.60 per 1000 pregnancies [2]. A prenatal diagnosis of vasa previa is clinically important because delivery without a diagnosis leads to a poor neonatal prognosis. Zhang et al. reported that the risk of perinatal death and hypoxic morbidity in cases of undiagnosed vasa previa was 25-fold and 50-fold higher than in cases in which a prenatal diagnosis was made [3].

Catanzarite et al. classified vasa previa into two types [4]. Type 1 is a single placental lobe with velamentous cord insertion and Type 2 is the vessel over the cervix that connects the lobes of the placenta with multiple lobes. Recently, Suekane et al. advocated Type 3 vasa previa, in which fetal vessels follow a boomerang orbit on the amniotic membrane without velamentous cord insertion or bilobed/accessory placenta [5]. Before the category of Type 3 was advocated, several authors had stated that the reported cases “could not be classified into either category [6]” or “Type 1 and 2 of vasa previa was excluded” [7].

Since Type 3 vasa previa is a new concept, its clinical physiology has not yet been fully clarified. A few case reports and case series have

demonstrated that the clinical characteristics of Type 3 vasa previa include resolution of placenta previa in the second trimester of pregnancy, low-lying placenta, umbilical cord insertion at the lower uterine segment, and only one fetal aberrant vessel of vasa previa [5,6,8,9]. However, there have been no case reports describing any of these characteristics in detail.

Herein, a case is reported of Type 3 vasa previa with no finding of placenta previa or low-lying placenta at the time of pregnancy, central umbilical cord insertion at the upper uterine segment, and two fetal aberrant vessels with several branches on the broad area of the membrane.

2. Case Presentation

A 35-year-old pregnant woman (gravida 2, para 1; history of cesarean section) who had undergone in vitro fertilization was referred to authors' hospital during the first trimester of pregnancy. At that authors' hospital, transvaginal examination is performed on all pregnant women to evaluate cervical length, placenta previa, low-lying placenta, and vasa previa at 20 to 24 weeks of gestation. Color Doppler ultrasound is always used to evaluate vasa previa. In the present case, the cervical length was normal, and there were no findings of placenta previa, low-

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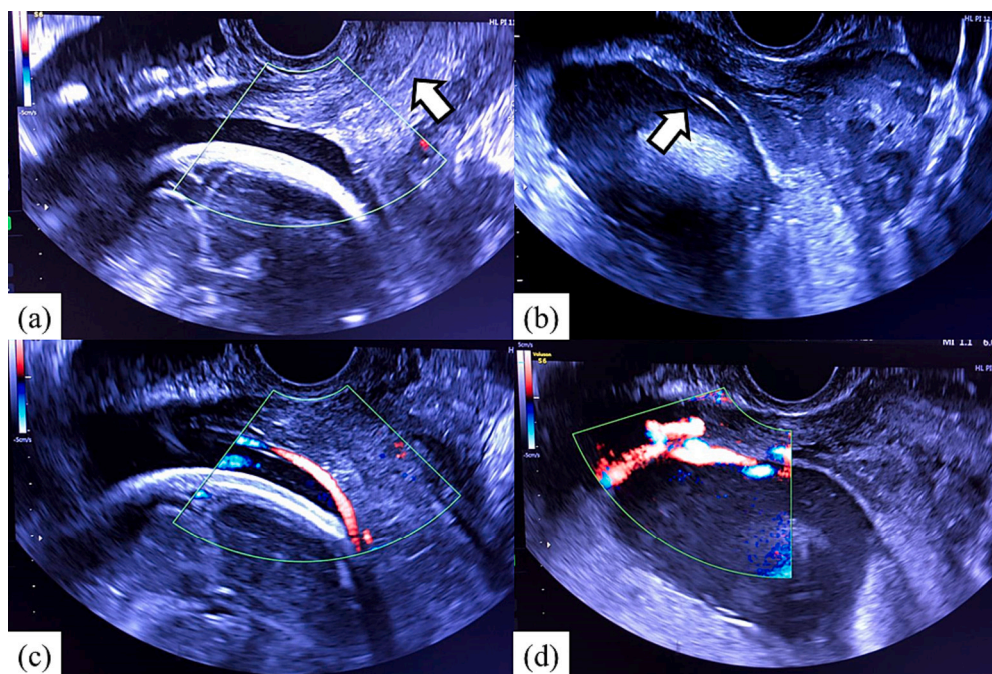


Fig. 1. Transvaginal ultrasound image at 26 weeks and 2 days. (a) The vessels of vasa previa are not visible in cross-sections where the cervical gland (white arrow) is visible. (b) The gray-scale image slightly deviated cross-section from image (a) shows the vessels of vasa previa (white arrow). (c) The color Doppler image of vasa previa. (d) The aberrant fetal vessels running on the anterior membrane at the lower uterine segment are detected by the color Doppler ultrasound.

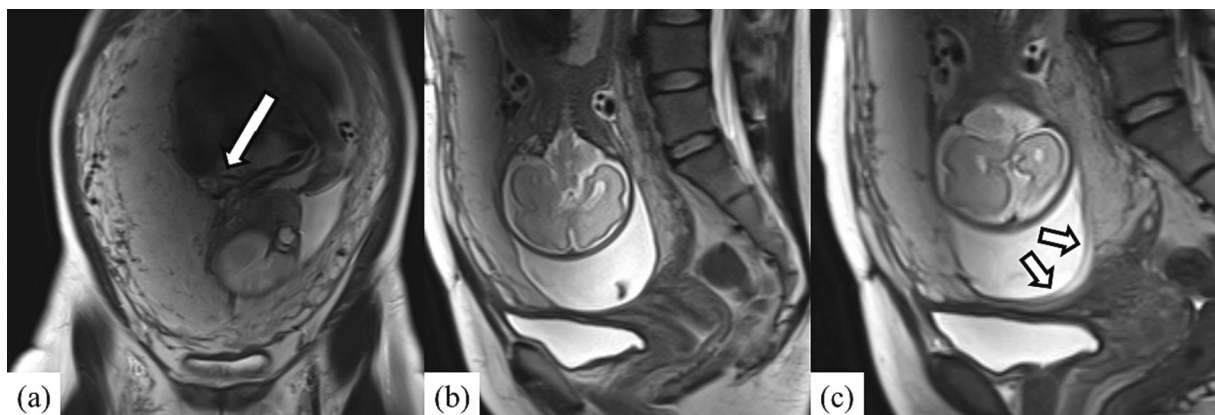


Fig. 2. Magnetic resonance imaging performed at 27 weeks and 3 days. (a) Normal cord insertion at the upper uterine segment is shown in the coronal section. (b) The vessels of vasa previa are not visible in cross-sections where the cervical gland is visible in the sagittal section. (c) The sagittal image slightly deviated cross-section from image (b) shows one vessel of vasa previa.

lying placenta, or vasa previa at 21 weeks of gestation. Placental screening using transabdominal ultrasound showed that the main position was anterior and central umbilical cord insertion was detected at the upper uterine segment.

The patient returned to the authors' hospital at 26 weeks of gestation because of brown genital bleeding. Transvaginal ultrasound with color Doppler, swinging the probe from side to side, revealed the vessels of vasa previa in which one vessel was found 17 mm away from the internal cervical os. Aberrant fetal vessels running along the anterior membrane of the lower uterine segment were also detected (Fig. 1). The vessels of vasa previa were not visible in cross-sections where the cervical gland was visible on ultrasonography. Magnetic resonance imaging (MRI) revealed aberrant fetal vessels at the lower uterine segment and normal cord insertion at the upper uterine segment (Fig. 2). Before delivery, the patient showed no signs of preterm birth or premature rupture of membranes.

Elective cesarean section was performed at 34 weeks and 3 days.

After incision of the lower uterine myometrium, several aberrant fetal vessels on the amniotic membrane were observed (Fig. 3). The operator ruptured the membrane where there were no running vessels. The patient delivered a male baby weighing 2442 g, with Apgar scores of 8 and 9 at one and five minutes, respectively. The postoperative condition of the mother was good, and the newborn infant had no complications.

Gross examination of the placenta showed two aberrant fetal vessels (one artery and one vein) on the membrane running on the extravillous side and central cord insertion (Fig. 3). The artery branched out from the placental surface and further branched once on the membrane; these two arteries returned to the placenta. The vein branched twice along the membrane. Several branches led to a relatively broad running of vessels on the membrane. The umbilical cord was farther from the longitudinal center of the placenta than were the running vessels on the membrane.

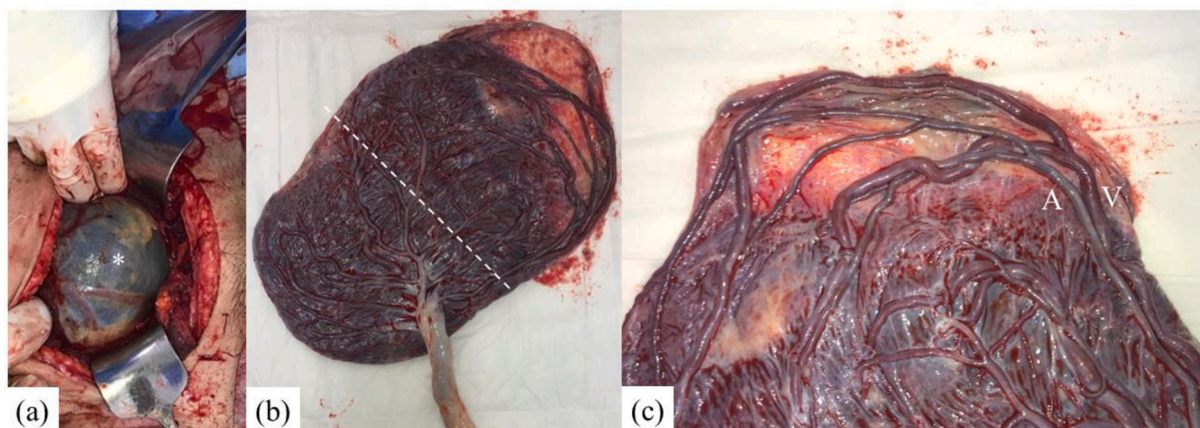


Fig. 3. The gross image of the amniotic membrane and placenta. (a) Several aberrant fetal vessels on the amniotic membrane are detected at cesarean section. The asterisk point is ruptured during the cesarean section. (b) The whole image of the placenta shows that the central umbilical cord is farther from the longitudinal center of the placenta (dashed white line) than are the running vessels on the membrane. (c) The enlarged view of the part of the aberrant vessels on the membrane shows one artery and vein branch on the membrane, running widely.

3. Discussion

In the present case, two novel clinical features were identified. First, Type 3 vasa previa had a rare pattern of no finding of placenta previa or low-lying placenta at the time of pregnancy, central umbilical cord insertion at the upper uterine segment, and extravillous fetal vessels following the boomerang orbit with several vessels with branches. Second, the perinatal outcome was good for rare broad vessels on the membrane in the pattern of Type 3 vasa previa, with a prenatal diagnosis.

In general, second-trimester placenta previa is a risk factor for vasa previa [2]. The migration of the placenta with fetal vessels running on the membranes from the position of the placenta previa to low-lying or normal could lead to vasa previa. Unlike Type 1 with velamentous cord insertion and mangrove-like vessels on the membranes, in Type 3 with slightly protruded extravillous fetal vessels, the migration of the placenta from previa may be an important factor leading to vasa previa. However, the patient had no history of placenta previa in the second trimester or a low-lying placenta. Because the placenta in this case showed a relatively broad area of fetal vessels running on the membranes (Fig. 3), a diagnosis of Type 3 vasa previa was made despite the normal position of the placenta.

Hasegawa et al. reported that cord insertion into the lower uterine segment was a risk factor for vasa previa [10]. Kanda et al. reported two cases of vasa previa with cord insertion into the lower uterine segment (which was similar to Type 3, but since “Type 3” was not reported at the time of the publication, the authors wrote “two cases could not be classified into either category” [6]). Several figures in the literature on Type 3 vasa previa have shown that the position of the cord insertion is near the fetal aberrant vessel on the membrane [5–9], which means the cord insertion is at the lower uterine segment. However, in this case, cord insertion was far from the center of the long axis of the placenta (Fig. 3). MRI also showed cord insertion at the upper uterine segment (Fig. 3), which means that even if the cord insertion is at the upper uterine segment, Type 3 vasa previa may still occur.

In this case, two fetal vessels branched out from the placenta and repeatedly divided into vessels on the membrane. As a result, the area of running vessels on the membrane was relatively broad. Kamiyo et al. reported that all Type 3 cases had only one aberrant vessel [8]. The figure in the case reported by Hara et al. showed three thin vessels on the membrane [7]. However, these vessels did not branch outside the placenta. Several figures in the literature on Type 3 vasa previa show a narrow area of running vessels on the membrane [5–9]. In cases of single- and no-branch vessels in the narrow area of the membrane, the

status of the low-lying placenta was perhaps necessary for the vessel to run near the internal os. In contrast, in this case of vessels running over a broad area of the membrane, a low-lying placenta was not necessary.

After a new category of vasa previa was proposed [5], two systematic reviews were published [9,11]. The incidence of Type 3 was reported to be 5.7% of vasa previa cases and the antenatal detection rate 84.6% [11]. Neonatal outcome was good in all cases with a prenatal diagnosis [9]. However, in cases of undiagnosed delivery, acidemia and low Apgar scores occur [9]. In this case, with a prenatal diagnosis and early gestational cesarean section, the neonatal outcome was good, with no complications.

Transvaginal ultrasound screening for vasa previa is important for improving neonatal outcomes [1]. Interestingly, in this case, the vessels of vasa previa were not visible in the cross-sections where the linear image of the cervical gland was visible on ultrasound (Fig. 1). The cross-section is always visualized to evaluate the length of the cervix. However, some cases of vasa previa are located in a position slightly displaced from the cross-section. It is important to swing the transvaginal ultrasound probe from side to side to evaluate vasa previa.

In conclusion, a rare case of Type 3 vasa previa with characteristics different from those reported previously is presented here. Vasa previa cannot be ruled out due to normal cord insertion and the absence of placenta previa or a low-lying placenta in the second trimester of pregnancy. Careful screening with transvaginal ultrasonography can promote neonatal survival in patients with type 3 vasa previa.

Contributors

Michihisa Shiro, Masumi Kiyose, Yukiko Suzuki, Yuka Sano, and Shota Ikagawa drafted, reviewed, edited the manuscript and provided patient care.

Shigeki Yoshida drafted, reviewed, and edited the manuscript.

All authors approved the final submitted manuscript.

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Conflict of interest statement

The authors declare that they have no conflict of interest regarding the publication of this case report.

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