

In vitro Fertilization: An Alert for the Association of Placenta Previa and Vasa Previa – Ultrasound and Magnetic Resonance Imaging Findings

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Abstract

A 33-year-old woman, gravida 2 para 0, with a history of two previous miscarriages, underwent an investigation for recurrent miscarriage. After genetic counseling, the couple were submitted to the karyotype, which resulted in 45, X/46, XX mosaicism (mosaic Turner syndrome) in the wife result, while the husband chromosomal resulted in 46, XY (normal). After evaluating the options, the couple opted for *in vitro* fertilization. During prenatal follow-up, placenta and vasa previa were identified, considerably increasing the maternal–fetal mortality rate in this case. However, despite being a delicate and challenging case, the early diagnose was possible due to transvaginal ultrasound using color Doppler. Due to good care in obstetric follow-up, involving a multidisciplinary team, a therapeutic program and a successful outcome were possible. The patient underwent a cesarean section at 35 weeks of pregnancy, without complications, with a newborn in good general condition, despite the prematurity.

Keywords: Assisted reproductive technologies, magnetic resonance imaging, placenta previa, transvaginal ultrasound, vasa previa

INTRODUCTION

Placenta previa occurs when the distance between the lower border of the placenta and the internal cervical os is <2.0 cm; while vasa previa refers to fetal vessels running through the membranes over the cervix and under the fetal presenting part, unprotected by the placenta or umbilical cord.^[1] Placenta previa is detected in 1:2500 of pregnancies, while vasa previa is found in 1:1275–2500. The record of the association between these two obstetric complications is not well known in the literature, which reinforces the rarity of this case.^[2] Risk factors and markers for these obstetric entities are the following a bilobed or succenturiate placenta, umbilical cord insertion in the lower third part of the uterus at the first-trimester scan and velamentous cord insertion, conception by assisted reproductive technologies (ART) (in this last one, the incidence is particularly high, at approximately 1:260).^[3]

The placenta and vasa previa are causes of bleeding in the second half of pregnancy and can cause fetal death in up to 60% of cases,^[4] if not diagnosed before birth. To avoid such an

outcome, this report shows how a multidisciplinary approach must be a priority, in which the obstetrician, radiologist, and neonatologist must work toward early diagnosis for a successful therapeutic plan.

This report describes a rare association between placenta previa and vasa previa, which requires collaboration between knowledge of guidelines and a multidisciplinary team aligned with the conduct.

CASE REPORT

A 33-year-old woman, no comorbidities, gravida 2 para 0, with a history of two previous miscarriages in consecutive years, underwent an investigation for recurrent miscarriage. After genetic counseling, the couple were submitted to the karyotype, which resulted in 45, X/46, XX mosaicism (mosaic Turner

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syndrome) in the wife result, while the husband's chromosomal resulted in 46, XY (normal). After genetic counseling, the couple opted for *in vitro* fertilization, with preimplantation biopsy of the embryo. Then, cycle induction was performed with gonadotropin-releasing hormone analog (gonal F, cetrotide), and 10 oocytes were collected in M2 (which is the second stage of meiosis, specifically, the one arrested at metaphase II oocyte). On the fifth day in the blastocyst stage, the biopsy of the preimplantation embryo was performed. After 10 days of the transfer of a frozen embryo, the pregnancy was confirmed with a beta-hCG test, with a value of 195.

In this third gestation, the follow-up in prenatal care was uneventful, until the discovery, at 22 weeks, of placenta previa. On subsequent examination, at 30 4/7 weeks, in addition to the previous finding, images suggestive of vasa previa were verified. The obstetric examination was unremarkable. In the prenatal follow-up, at 22 weeks, a placenta covering the internal cervical os was verified in the second-trimester scan, which was supplemented with transvaginal ultrasound. In a subsequent examination, at 30 4/7 weeks, a posterior placenta was noted with an inferior border reaching the internal cervical os and an accessory lobe in the anterior wall, associated with an anterior vasa previa that bordered the membranes in the internal cervical os [Figure 1]. Furthermore, a complementary study, with the use of magnetic resonance imaging [Figure 2], allowed the observation of an anterior placental cotyledon (placenta succenturiate), with the edge <10 mm from the internal cervical os, with vessels connecting the two parts of the placenta, running over the internal cervical os (vasa previa). This established the diagnosis of bilobed placenta previa associated with vasa previa, a rare and danger combination of two obstetric entities.

Following a discussion between the obstetrician, radiologist, and neonatologist, an elective cesarean section was scheduled;

since emergency cesarean delivery indicated due to the ruptured vasa previa diagnosed during labor can include unfavorable outcomes, such as maternal hemorrhage or neonatal resuscitation, with blood transfusion if required.

Considering the maternal and fetal risks associated, the obstetrician team decided to admit the pregnant women with 35 weeks for hospital surveillance and fetal lung maturation with corticoid administration. At 35 1/7 weeks of gestation by cesarean section, the male newborn, uneventful, with Apgar scores at 1st and 5th min were 9 and 10, respectively, weighing 2505 g. During the placental review, the presence of an accessory lobe placenta was confirmed, associated with fetal vessels running through the membranes, unprotected by the placenta or umbilical cord, no signs of ruptured vasa previa [Figure 3].

Both mother and newborn after 3 days were discharged without further complications. The anatomopathological study confirmed the diagnosis of a type 2 vasa previa. The mother and the newborn made a good recovery, without an anemia diagnosis or blood transfusion necessity.

DISCUSSION

Placental disorders, such as placenta previa and vasa previa, are important causes of vaginal bleeding in the second half of pregnancy. Moreover, they can be responsible for fetal and maternal morbidity and even mortality.^[5] Placenta previa occurs when the distance between the lower border of the placenta and the internal cervical os is <2.0 cm, and it can be classified into three types: (1) marginal – placenta just borders the internal cervical os, (2) partial – placenta partially covers the internal cervical os, and (3) complete – placenta completely covers the internal cervical os.^[1] The vasa previa refers to fetal vessels running through the membranes over the cervix and under the fetal presenting part, unprotected by the placenta or umbilical cord. The condition is classified as type 1 when there

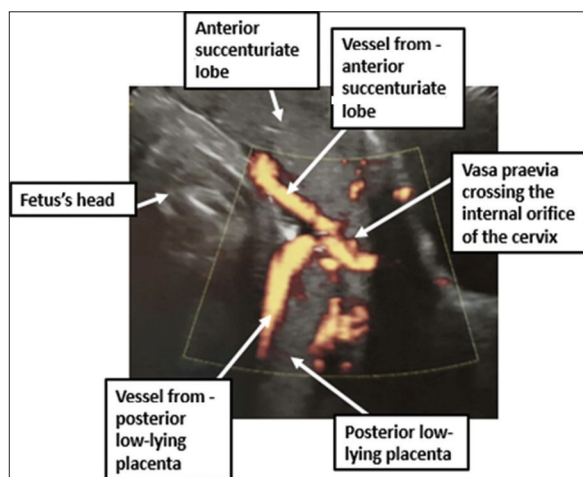


Figure 1: Use of color Doppler with obstetric ultrasound allowed the visualization of a vascular structure (vasa previa – in red/yellow) that crosses the internal orifice of the cervix, connecting the separate succenturiate lobe to the main portion of the placenta (posterior low-lying placenta)

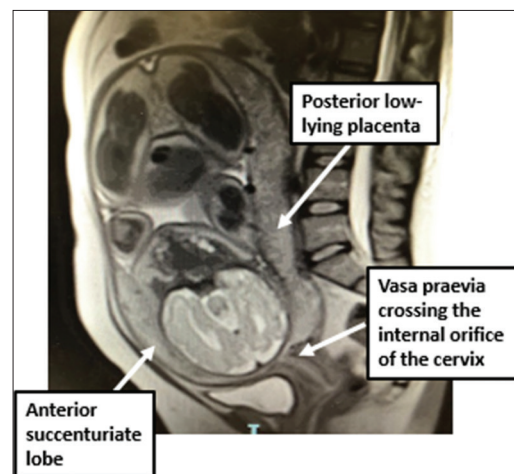


Figure 2: Complementary study with magnetic resonance imaging showing a sagittal section of the cervix revealing a posterior low-lying placenta and an anterior succenturiate lobe

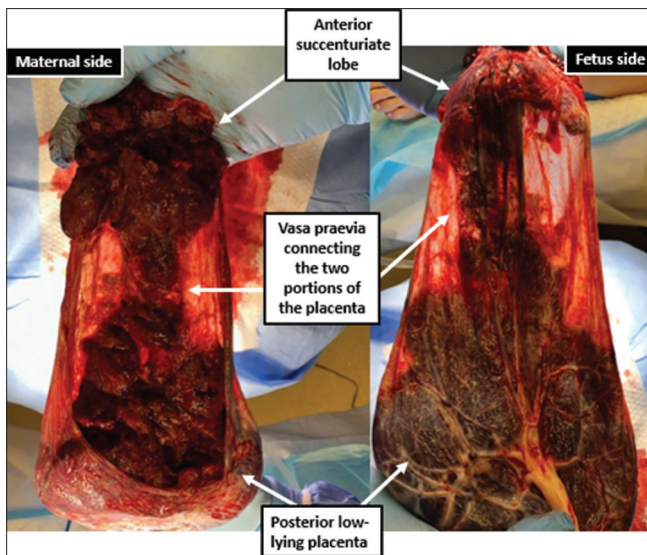


Figure 3: Placental review – the presence of an accessory lobe placenta was confirmed, associated with fetal vessels running through the membranes, unprotected by placenta or umbilical cord, no signs of ruptured vasa previa

is a velamentous cord insertion and vessels run between the umbilical cord insertion site, through the fetal membranes, and the placenta, mainly in cases where there is a velamentous or marginal cord insertion in the lower uterine segment; type 2 when the free vessels course through the membranes between two lobes of the placenta in the lower segment, which can occur in pregnancies with a bilobed or succenturiate placenta; and type 3 occurs when there are one or more large “boomerang” vessels which run along the margin of the placenta, through the membranes.^[2,6]

Vasa previa is uncommon in the general population with a prevalence ranging from 1/2500 deliveries.^[7] Its occurrence has been associated with perinatal mortality rates of 60% in recent series.^[8] However, improved survival rates of over 95% have been reported where the diagnosis has been made antenatally by ultrasound followed by planned cesarean section.^[2,9]

The rates of vasa and placenta previa are increasing, mainly, as a result of increasing rates of cesarean section, maternal age, and ART. Conditions considered risk factors to vasa previa are the following: low-lying placenta, multiple pregnancies, and of course multilobate placentas and velamentous cord insertion. It is less clear why, but *in vitro* fertilization increases the risk of vasa previa (about 1:260 pregnancies).^[3,8,10]

Placenta previa may present with bleeding in the third trimester, which occurs recurrently, progressively increasing in quantity, and painlessly. It can be diagnosed through its clinical presentation, but, fortunately, it can be easily recognized through routine ultrasounds throughout the prenatal period. On the other hand, vasa previa is often confirmed only when the placenta is inspected after delivery^[2] and it is most commonly diagnosed in the period of labor, when rupture of the membranes is accompanied by vaginal bleeding and fetal

distress or death, due to fetal exsanguination, occasionally, with the need of fetal blood transfusion. This kind of intervention is required in 58% of newborn without prenatal diagnosis, versus only 3% of those diagnosed prenatally.^[5]

The role of this report is to expose an unusual situation, but also education. And so, despite the rarity of this condition, it is still frequent enough to be known by all obstetrician–gynecologists. Today, more than 1.5% of all infants born in the United States, every year, are from women who achieved their pregnancies by using ART,^[11] which may enhance the frequency of cases like this one. A simple diagnosis during the prenatal can prevent an obstetric tragedy in our hands.

Good maternal–fetal outcomes depend on prenatal diagnosis.^[12] The majority of prenatally diagnosed cases of vasa previa are detected incidentally in women who have transvaginal ultrasound for evaluation of low-lying placentas or placenta previa.^[9] Studies have demonstrated that the majority of cases of vasa previa in asymptomatic women can be diagnosed prenatally through a policy of routinely evaluating associating the second-trimester scan (such as the transabdominal ultrasound) and the transvaginal ultrasound. It allows the assessment of the placental cord insertion, and a vaginal sonography with color Doppler can be considered, mainly, when the placental cord insertion cannot be identified or if there is a low-lying placenta/placenta previa or a suspected succenturiate placental lobe.^[8,9]

A combination of both transabdominal and transvaginal color Doppler ultrasonography provides the best diagnostic accuracy for vasa previa. However, the transvaginal color Doppler has improved the accuracy of gray scale imaging. A prospective study including a total of 33,795 women reported that transvaginal color Doppler performed during the second trimester detected all cases ($n = 11$) of vasa previa (sensitivity, 100%) with a specificity of 99.0%–99.8%, with no evidence of increase the risk of antepartum hemorrhage and increased the chance of emergency.^[13]

To further improve maternal and fetal outcomes, in the presence of confirmed vasa previa in the third trimester, regardless of the presence of associated placenta previa, the elective cesarean section should ideally be carried out before the onset of labor, before rupturing of membranes. Plus, as recommended by guidelines, the administration of corticosteroids for fetal lung maturity should be recommended from 34 weeks of gestation due to the increased risk of preterm delivery. Based on available data, planned cesarean section for a prenatal diagnosis of vasa previa at 34–36 weeks of gestation is reasonable in asymptomatic women, based on the benefits and harm.^[14]

This case report emphasizes an evidence-based approach, evolving a multidisciplinary team, to the clinical management of pregnancies with these conditions as well as highlights important knowledge gaps. The purpose of this manuscript is to help alert those who do prenatal examination that vasa previa are not difficult to recognize when sought and that

they are common enough to be worth seeking, mainly, when associated with ART.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that her name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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