CASE REPORT

Early sonographic detection of a succenturiate placenta after IVF in a 42-year-old woman with multiple comorbidities

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SUMMARY

We present a case of a 42-year-old woman with a pregnancy resulting from in vitro fertilisation and a medical history including two spontaneous abortions, hypercoagulable state and other comorbidities. At 13 4/7 weeks' gestation, during research ultrasonography, the patient was noted to have an anterior succenturiate placental lobe. Following an episode of vaginal bleeding at 21 6/7 weeks, she was diagnosed with a low-lying posterior placental lobe. Velamentous cord insertion, placenta previa and vasa previa were excluded at that time. After elective induction for advanced maternal age at 39 0/7 weeks, arrest of labour and chorioamnionitis resulted in a primary low transverse caesarean section and delivery of a healthy girl at 39 3/7 weeks. Gross examination of the placenta showed an irregular, singleton placenta with an attached succenturiate lobe and a marginally inserting umbilical cord. Both lobes were connected by two vessels.

BACKGROUND

Succenturiate placenta is a pathological condition with an incidence of approximately 0.6%–1%.^{1,2} However, untimely and delayed diagnosis can have serious repercussions on both maternal and fetal well-being.

Maternal age >35 years and pregnancies resulting from in vitro fertilisation (IVF) increase the risk of a succenturiate placenta.² Both predisposing factors were present in this patient. Succenturiate placentas, if undiagnosed, can increase maternal mortality and morbidity due to retained placenta, postpartum haemorrhage and infection.² One of the most devastating complications is a ruptured vasa previa, which has a fetal mortality rate of 33%–100%.^{3–6} Vasa previa can be defined as a condition wherein velamentous fetal vessels within the membranes traverse the lower uterine segment and present beneath the leading fetal part.^{3,4} Hence, timely antenatal diagnosis is essential in ensuring an uneventful pregnancy for the mother and the fetus. Obstetricians should have a high level of suspicion during routine antenatal ultrasound assessments especially in the presence of concurrent risk factors.

CASE PRESENTATION

The patient had a medical history of protein S deficiency with three episodes of deep vein thrombosis and two episodes of pulmonary embolism, which

required lifelong anticoagulation. In addition, she had Graves' disease and ulcerative colitis. She became pregnant after IVF with frozen embryo transfer. Ultrasound confirmed a live intrauterine fetus at 8 5/7 gestation. Antenatally, she was treated with therapeutic anticoagulation with weight-based Lovenox. She presented with vaginal bleeding at 10 3/7 weeks of gestation. A subchorionic haematoma with a dimension of 3.4×1.5×2 cm was detected by ultrasound. Both the bleeding and the haematoma resolved.

In a follow-up examination at 15 6/7 weeks' gestation, a succenturiate placental lobe was noted on the anterior wall, with the main lobe of the placenta noted on the posterior wall.

At 21 6/7 weeks of gestation, a second episode of vaginal bleeding occurred. Ultrasonography (USG) revealed a low-lying posterior placental lobe 0.8 cm away from the internal cervical os.

The remainder of the pregnancy was uncomplicated. Because of the patient's high-risk status, labour was induced at 39 weeks with cervical ripening followed by Pitocin.

INVESTIGATIONS

The placental pathologies (subchorionic haematoma, low-lying and succenturiate placenta) were all detected and followed up by the patient's provider and maternal–fetal medicine (MFM) specialists using two-dimensional (2D) transabdominal and transvaginal ultrasound.

The accessory lobe was first described at 13 4/6 weeks of gestation, during a Yale Pregnancy Outcome Prediction Study (YPOPS) research visit using 2D, three-dimensional (3D) (figure 1) and four-dimensional (online supplementary video 1) transabdominal sonography, which was 2 weeks before detection and documentation by an MFM specialist. The research ultrasound was performed by a sonographer who was blinded to the patient's medical history and gestational age. During each of the four YPOPS research visits in the first, second and third trimesters, differentiation between a bilobate placenta versus succenturiate placenta was difficult to ascertain due to the nearly equal-sized sonographic appearance of both lobes. Additionally, an eccentric marginal insertion of the umbilical cord vessels was noted (figure 2) (online supplementary video 2). Each of the examiners ensured that velamentous cord

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Figure 1 (A) Sonography in the late first trimester (13 4/7 weeks of gestation) showing an accessory (succenturiate) anterior lobe and a main posterior lobe of the placenta and a cross-section through the fetus' upper abdomen (AC, abdominal circumference). (B) Threedimensional sonography in the late first trimester (13 4/7 weeks of gestation) showing a succenturiate anterior placental lobe.

insertion, placenta previa and vasa previa were excluded as these conditions can commonly occur concurrently with accessory placental lobes.

OUTCOME AND FOLLOW-UP

Due to a failed induction of labour and chorioamnionitis, a caesarean delivery was performed at 39 3/7 weeks of gestation.

A 2960 g baby was delivered with Apgar scores of 9 at 1 min and 9 at 5 min.

Gross examination of the placenta showed an irregular, singleton placenta of size 21.0×13.5×2.0 cm with an attached succenturiate lobe measuring 14.5×12.0×1.7 cm. A marginally inserting umbilical cord 1.3 cm from the closest placental margin was noted. Both lobes were connected by two vessels (figure 2). The length of the umbilical cord was 17.8 cm and the total placental weight was 720 g.

The patient's postoperative course was complicated by a skin incision infection. The patient also developed *Clostridium difficile* colitis, which was treated with vancomycin. The baby's course was uncomplicated.

DISCUSSION

With the breakthroughs and advents in the field of medical imaging, the placenta has been extensively studied using multiple modalities and means. The various modes of ultrasound have now been employed to elucidate the many questions about placental physiology and pathology. The placenta has been known to have significant variations in its morphology, some of which predispose the mother and fetus to myriad complications throughout pregnancy and labour. In addition to various other causes, genetics and uterine shape are believed to be the most important factors contributing to placental morphology.⁷

Succenturiate placenta is characterised by having one or more small accessory lobes of the placenta, which develop in the membranes apart from the main placental body to which they are usually connected by vessels of fetal origin.⁸ If these inter-connecting vessels are missing, the placenta is called 'placenta spuria'.

The pathogenesis is considered to be the local failure of normal villous atrophy, which results in a remnant of villous tissue at a distance from the main placenta.⁹ Another hypothesis

Figure 2 (A,B) Two-dimensional colour Doppler sonography in the third trimester (36 0/7 weeks of gestation) showing an eccentric (marginal) insertion (one asterisk) of the umbilical cord (UC) into the main posterior placental lobe; two vessels (two asterisks) are connecting with the anterior lobe and are also inserting marginally (three asterisks) (AC, amniotic cavity). (C) Gross examination of the placenta after caesarean section at 39 3/7 weeks of gestation.

Patient's perspective

"At the age of 42, I was finally so fortunate to become pregnant after 6 rounds of IVF (+ICSI) and pre-implantation genetic screening (PGS) after frozen transfer of our one and only chromosomally normal embryo. With my age, protein S deficiency, Graves disease and ulcerative colitis, we knew this pregnancy would be 'high risk' with frequent office visits. I felt it was important to participate in the YPOPS study on top of the regular follow-up to help evolve the understanding of pregnancy outcomes; I am glad I did as my 'case' turned out to be special and by documenting it well during pregnancy and writing this up, hopefully informative for the medical community."

"Early in the first trimester, it was thought that the placenta was anterior. I was a little confused when I came in for a check-up after my first bleed around 11 weeks, when a different US technician informed me that she saw a posterior placenta. Later it became clear that the placenta consisted of 2 parts; an anterior and a posterior part. The posterior placenta was low lying, and it was not clear until further in the pregnancy that the vessels connecting both parts were not covering the cervix; which was a relief, as it was luckily not the cause of a second bleed in the second trimester. The third trimester was uncomplicated and the posterior part of the placenta moved up, thankfully. Due to my age and clotting disorder, the physicians elected for an induction around 39 weeks carefully managing my coagulation status. Unfortunately, despite best efforts and all available techniques, I failed to progress and after 4 days developed an infection of the membranes, with an increasing heart rate of my baby. A C-section was performed and thankfully our little girl did well at birth. She was hospitalised in the NICU for monitoring and to receive antibiotics until cultures came back negative. I unfortunately developed a nasty infection underneath the skin along the incision line which was treated with daily wound care and cephalosporins. I developed *Clostridium difficile* colitis and must admit that the end of the 3rd and '4th trimester' have definitely been the hardest part of my pregnancy."

"I am grateful that the unusual shape of my placenta was detected during pregnancy, and that close follow up and knowledge of this condition around birth reduced the risk of complications. I am curious as to what the role of not just IVF with ICSI, but also PGS could have been. My understanding is that cells, which end up forming the placenta are taken from the day 5 embryo for chromosomal assessment. I wonder whether that could have had an impact on the formation of the placenta. Time (and more case reports?) will tell..."

is that implantation of the ovum occurs in the sulcus between the two walls of the uterus.¹⁰

The confirmation of diagnosis of this anomaly often occurs at birth, on visual inspection of the placenta, with only a few cases successfully diagnosed antenatally on ultrasound.¹¹ In our case, the diagnosis was already made as early as the late first trimester (figure 1) (online supplementary video 1). However, before making the diagnosis of a succenturiate placenta, it is imperative to rule out multiple pregnancies by assessing the chorionicity. In addition, there have been cases reported in the literature wherein the USG diagnosis of succenturiate placenta was mistaken as amniotic band syndrome owing to the interconnecting vessels between the two parts of the placenta.^{3 12} Using colour Doppler to visualise fetal blood flow is helpful in excluding the diagnosis of amniotic band syndrome.¹³ Efforts should be made not

to confuse succenturiate placenta with a placenta covering two aspects of the uterine cavity and also with the appearance of the placenta during myometrial contraction.¹⁴ Difficulty in diagnosis by USG has been reported in cases of posterior succenturiate placenta as the ultrasound does not penetrate the fetal body.¹¹

Use of colour Doppler (figure 2) (online supplementary video 2) also improves detection of the most dreaded complication of a succenturiate placenta—vasa previa.³ In a patient with prenatal diagnosis of succenturiate placenta, vaginal bleeding can be a baleful sign. The cause and source of bleeding should be determined with utmost priority and concern. A ruptured vasa previa almost always indicates a poor prognosis for the fetus.³

A study done by Suzuki and Igarashi² reported that maternal age >35 and history of IVF treatment increased risk of a succenturiate placenta. The proposed hypothesis for increased risk due to IVF can be attributed to the fact that the pregnancy and formation of the chorion are initiated in vitro, and hence the inherent difference in the nature of the placenta itself predisposes the patient to various risks like placenta previa, placental abruption, and abnormalities related to morphology such as succenturiate and bilobate placenta.¹⁵

Studies have also reported increased incidence of eccentric cord insertion (figure 2) (online supplementary video 2) in IVF patients.¹⁶ Both the anomalies, viz, succenturiate placenta and eccentric cord insertion, indicate irregularities in the early stages of placental development. When the embryo is engineered outside the natural environment of the body, it is obvious to expect some frailty in the process of blastocyst implantation and orientation.¹ Moreover the patient in the case was 42 years old. Increased maternal age is responsible for endothelial damage due to ageing, which predisposes the placental tissue to develop infarcts.¹⁷ Literature also mentions that one-third of cases of succenturiate placenta are associated with some type of infarction that may lead to atrophy between the accessory lobe and the main placenta.¹⁸ Interestingly, because the patient had an inherited thrombophilia and multiple episodes of thromboembolic disease, she was anticoagulated throughout the pregnancy, yet still had a succenturiate placenta. We attribute this to her age and use of assisted reproductive technology for conception. In patients with a history of thromboembolic disease, it is our practice to screen for inherited and acquired thrombophilias because anticoagulation prophylaxis decreases the risk of subsequent venous thromboembolism. However, we do not routinely screen patients with placental anomalies alone because of a lack

Learning points

- ▶ A detailed examination of the placenta and its morphology by ultrasonography during the antenatal period is necessary to reduce maternal and fetal morbidity and mortality.
- ▶ Placental anomalies can be detected on sonography as early as late first trimester.
- ▶ In the event of accessory placental lobes, a detailed examination of the cord insertion and the exclusion of vasa previa are warranted.
- ▶ With increase in employment of assisted reproductive technology, obstetricians should be vigilant in detecting associated placental pathologies.
- ▶ Given the current literature, screening for inherited and acquired thrombophilia should be limited to patients with a history of venous thromboembolism.

of sufficient data showing decreased recurrence of placental anomalies in anticoagulated patients.

The number of women getting pregnant beyond the age of 30 years is consistently rising.¹⁹ With this trend, inevitably the number of pregnancies resulting from assisted reproductive technology is also increasing. Thus, it is becoming paramount for obstetricians to have a high level of caution and diligence to diagnose the anomalies associated with these trends. Timely antenatal diagnosis can guide the clinical management and can help achieve favourable outcomes even in high-risk pregnancies. One advantageous approach for the high-risk collective of IVF patients and women with history of clotting disorders is advanced ultrasound imaging (ie, Doppler and 3D imaging). The strengths of this approach allow clinicians to evaluate possible placental complications because these individuals are predisposed to placental anomalies and subsequent bleeding episodes during pregnancy. Further clinical studies must be performed to outline management and prevention strategies for patients with placental anomalies.

The strengths of our study include a detailed follow-up of the patient throughout the course of pregnancy, a unique and interesting perspective of the patient herself and the high quality of images and video we provided. However, we faced some limitations such as not doing a transvaginal ultrasound to determine the precise extent of low-lying placenta during YPOPS research visits.

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