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## Type 3 vasa previa associated with resolution of a low-lying placenta: case report and literature review

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### Abstract:

Vasa previa occurs when fetal vessels lie above the cervical os. A novel type of vasa previa, known as Type III, is characterized by an abnormal branching of fetal vessels from the placenta in the absence of velamentous cord insertion (as seen in type I) or multilobed placenta (as seen in type II). Here we present a case of a Type III vasa previa after a resolution of a low-lying placenta. The presence of any known risk factors of vasa previa, including low lying placenta, should prompt screening for vasa previa in the third trimester. Accurate and timely diagnosis of vasa previa will confer significant survival benefit for the neonate.

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**TYPE 3 VASA PREVIA ASSOCIATED WITH RESOLUTION OF A LOW-LYING  
PLACENTA: CASE REPORT AND LITERATURE REVIEW**

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**ABSTRACT**

Vasa previa occurs when fetal vessels lie above the cervical os. A novel type of vasa previa, known as Type III, is characterized by an abnormal branching of fetal vessels from the placenta

in the absence of velamentous cord insertion (as seen in type I) or multilobed placenta (as seen in type II). Here we present a case of a Type III vasa previa after a resolution of a low-lying placenta. The presence of any known risk factors of vasa previa, including low lying placenta, should prompt screening for vasa previa in the third trimester. Accurate and timely diagnosis of vasa previa will confer significant survival benefit for the neonate.

## **Introduction**

Vasa previa occurs when fetal vessels lie within the membranes above or close to the cervical os<sup>1</sup>. These fragile vessels are then vulnerable to rupture or compression which can result in fetal death due to exsanguination or asphyxia. Vasa previa is fortunately a relatively rare event and occurring in about 4 cases per 10,000 pregnancies.<sup>2</sup>

Accurate and timely antenatal diagnosis is important as it confers a significant survival benefit for the neonate. There is a 97% survival rate when vasa previa is diagnosed prenatally versus a 44% survival rate in undiagnosed cases. When known antenatally, the diagnosis of vasa previa allows for appropriate antenatal care and delivery via a cesarean section<sup>2</sup>.

In 2001, vasa previa was classified into two types by Catanzarite et al<sup>1</sup>. Type I vasa previa is characterized by a single placental lobe with a velamentous cord insertion. Type II vasa previa is defined by a multilobed placenta with vessels traversing the membranes between the lobes, in which the vessels lie close to the cervix. More recently an additional class, type III vasa previa,

has been proposed<sup>3,4</sup>. It is characterized by an abnormal branching of fetal vessels out and back to the placental edge in the absence of a velamentous cord insertion or multilobed placenta.

We report a case of type 3 vasa previa with a normal cord insertion and highlight the importance of screening for vasa previa following a diagnosis of a low-lying placenta.

### **Clinical Presentation**

A healthy 29-year-old, G2P1, conceived spontaneously and presented to her obstetrician. She had a previously uncomplicated pregnancy with delivery via cesarean section at 41w1d for labour dystocia at 9.5cm. The surgery was complicated by hysterotomy extension to the vagina. However the post-op course was unremarkable and the baby was well.

This second pregnancy was initially complicated by first trimester bleeding at 10 weeks which self-resolved after 24 hours. A 19-week morphology scan noted placenta previa with approximately 21.5 mm overlap of the placental edge on transabdominal views. The cord insertion was normal (Figure 1). TVS views were not obtained.

The pregnancy was further complicated by threatened preterm labour at 27+0 weeks and concern for possible ruptured membranes. The patient was admitted to the hospital for 4 days during which time she received two doses of betamethasone and routine PPRM antibiotics. At that time, the placental edge was at the internal os (0 mm) on transvaginal (TVS) views. Serial ultrasounds were performed to follow up on placental location. By 30+0 weeks, the edge of the placenta was 8.5 mm away from the os and fetal vessels were seen adjacent to the internal os. (Figure 2).

The final ultrasound during the pregnancy was performed at 35w0d and demonstrated a distance of 26mm from the edge of the placenta to the internal cervical os (Figure 3a). There was persistence of a vessel with arterial Doppler interrogation that was characteristic of the fetal heart rate, lying approximately 17 mm from the internal os, diagnosing vasa previa (Figure 3b).

The plan was made for cesarean section the following week at 36 weeks with admission to the hospital the day before for pre-emptive monitoring. Neonatology consultation was done and a single repeat dose of betamethasone was recommended.

The scheduled Cesarean section was converted to an obstetrical code due to a prolonged bradycardia after the patient received spinal anesthesia. Nevertheless, the surgery itself was uncomplicated and ended with a delivery of a healthy baby boy with no evidence of fetal hemorrhage.

The neonatal course was complicated by admission to NICU for hypoglycemia and hypothermia for 1 day before being transferred to the ward. The baby was readmitted with jaundice at 1 week of age for 24 hours of phototherapy. After that admission, he was discharged without any complications. He is healthy and well.

The evaluation of the placenta clearly demonstrated the presence of a fetal vessel beyond the edge of the placenta coursing through the membranes and an otherwise normal appearing single placenta with no velamentous cord insertion (Figure 4).

## Discussion

The abnormal vessels in type III placenta previa have been described as leaving and returning to the placental edge following a path described by the shape of a boomerang<sup>4</sup>. The pathogenesis probably involves progressive atrophy of placental tissue close to the internal cervical os where the blood supply is more limited<sup>3</sup>. These features are demonstrated in the images of our case. There are only a few other case reports of type 3 vasa previa<sup>5</sup>.

The antenatal diagnosis of vasa previa has increased with advancements in transvaginal ultrasound with Doppler. A systematic review found the median detection rate of 93% with a specificity of 99-100%<sup>6</sup>. The incidence of vasa previa is on the rise for a variety of reasons including the increased use of artificial reproductive techniques<sup>7</sup>. Most cases, up to 89% of cases, of vasa previa have at least one of the known associated risk factors: placenta previa or low-lying placenta, velamentous cord insertion, bilobed or succenturiate lobed placenta, in vitro fertilization or multiple gestation<sup>7</sup>. These risk factors are also easily identified on routine ultrasound assessments and/or through patient history. The most common risk factor for vasa previa in general is low-lying placenta (61.5% of cases)<sup>2,7</sup>. It has been suggested that type 3 vasa previa, while currently infrequently reported, may in fact be the most common type of vasa previa<sup>3</sup>. A recent article comparing different screening strategies found that screening based on low lying placenta may be superior to screening based on presence of velamentous cord insertion<sup>8</sup>.

This case highlights the importance of follow up ultrasound following a finding of low-lying placenta, and careful assessment of the vessels adjacent to the internal cervical os with transvaginal color Doppler. In this case, there was an arterial signal at the fetal heart rate, but type 3 cases with venous vasa previa can occur, making the diagnosis via ultrasound more nuanced<sup>3</sup>. The information on type 3 vasa previa is limited and further study is warranted to examine outcomes<sup>5</sup>.

In clinical practice, once a low lying placenta resolves and is greater than 20mm from the internal os, most often the plan will be for a vaginal delivery. However, this case demonstrates that a previously low lying placenta that resolves can still be associated with fetal vessels within 2 cm of the cervical os at the time of delivery, in which case, Cesarean section should be recommended.

Around 0.66% of all pregnancies<sup>10</sup> will have a persistent low lying placenta. We have shown the importance of third trimester assessment for vasa previa including transvaginal imaging of the cervix with colour Doppler when there has been resolution of a low lying placenta. The forthcoming updated SOGC guideline on vasa previa<sup>9</sup> recommend targeted ultrasound for all women with a risk factor for vasa previa, and Cesarean section when fetal vessels are seen <2 cm from the internal os. These measures will be lifesaving for fetuses in pregnancies with vasa previa.

## References

1. Catanzarite V, Maida C, Thomas W, Mendoza A, Stanco L, Piacquadio KM. Prenatal

sonographic diagnosis of vasa previa: ultrasound findings and obstetric outcome in ten cases. *Ultrasound Obstet Gynecol* 2001;18(2):109-15

2. Oyelese Y, Catanzarite V, Prefumo F, Lashley S, Schachter M, Tovbin Y, et al. Vasa previa: the impact of prenatal diagnosis on outcomes. *Obstet Gynecol* 2004;103(5 Pt 1):937-42
3. Kamijo K, Miyamoto T, Ando H, Tanaka Y, Kikuchi N, Shinagawa M, et al. Clinical characteristics of a novel "Type 3" vasa previa: case series at a single center. *J Matern Fetal Neonatal Med* 2022;35(25):7730-7736
4. Suekane T, Tachibana D, Pooh RK, Misugi T, Koyama M. Type-3 vasa previa: normal umbilical cord insertion cannot exclude vasa previa in cases with abnormal placental location. *Ultrasound Obstet Gynecol* 2020;55(4):556-557
5. Takemoto Y, Matsuzaki S, Matsuzaki S, Kakuda M, Lee M, Hayashida H, et al. Current Evidence on Vasa Previa without Velamentous Cord Insertion or Placental Morphological Anomalies (Type III Vasa Previa): Systematic Review and Meta-Analysis. *Biomedicines* 2023;11(1):152
6. Ruiters L, Kok N, Limpens J, Derks JB, de Graaf IM, Mol BW, et al. Systematic review of accuracy of ultrasound in the diagnosis of vasa previa. *Ultrasound Obstet Gynecol* 2015;45(5):516-22
7. Pavalagantharajah S, Villani LA, D'Souza R. Vasa previa and associated risk factors: a systematic review and meta-analysis. *Am J Obstet Gynecol MFM* 2020;2(3):100117
8. Ruban-Fell B, Attilakos G, Haskins-Coulter T, Hyde C, Kusel J, Mackie A, et al. The impact of ultrasound-based antenatal screening strategies to detect vasa praevia in the United Kingdom: An exploratory study using decision analytic modelling methods. *PLoS*



9. Jain V, Gagnon R. Guideline No. 439: Diagnosis and Management of Vasa Previa. *J Obstet Gynaecol Can* 2023;45(7):506-518
10. Becker RH, Vonk R, Mende BC, Ragosch V, Entezami M. The relevance of placental location at 20-23 gestational weeks for prediction of placenta previa at delivery: evaluation of 8650 cases. *Ultrasound Obstet Gynecol* 2001;17(6):496-501

Figure 1 a) and b): Transabdominal ultrasound performed at 19w1d demonstrated: a) Sagittal cord insertion which shows that the insertion is high on the placenta and not close to the os; b) Transverse cord insertion which shows that the insertion is into the body of the placenta.

Figure 2 a) and b): Transvaginal ultrasound performed at 30w0d demonstrated: a) the edge of the placenta is 8.5 mm away from internal os; b) fetal vessels present close to the os.

Figure 3 a) and b): Transvaginal ultrasound performed at 35w0d demonstrated: a) the edge of the placenta 26mm away from internal os; b) fetal vessels extending from the placental edge approx.12mm from internal os.

Figure 4 a) Photo of placenta and cord insertion b): Closer view of fetal vessels on extreme edge of placenta with some atrophy of placental tissue.

1 arrow indicates vasa previa (fetal vessels), 2 arrows indicate normal cord insertion, 3 arrows indicate fetal membranes.





