Society for Maternal-Fetal Medicine (SMFM) Consult Series #37: Diagnosis and management of vasa previa

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This Maternal Fetal Medicine (MFM) consult provides information regarding the definition, epidemiology, natural history, accuracy of diagnosis, and management recommendations for vasa previa, and in particular those women with prenatal diagnosis. Because of the rarity of the condition, there are no clinical trials that compare different management options for those women with prenatal diagnosis; the supporting evidence is low quality, and the strength of these management recommendations is weak.

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Vasa previa occurs when fetal blood vessels that are unprotected by the umbilical cord or placenta run through the amniotic membranes and traverse the cervix. If membranes rupture, these vessels may rupture, with resultant fetal hemorrhage, exsanguination, or even death. Prenatal diagnosis of vasa previa by ultrasound scans is approximately 98%. Approximately 28% of prenatally diagnosed cases result in emergent preterm delivery. Management of prenatally diagnosed vasa previa includes antenatal corticosteroids between 28—32 weeks of gestation, considerations for preterm hospitalization at 30—34 weeks of gestation, and scheduled delivery at 34—37 weeks of gestation.

What is a vasa previa?

Vasa previa occurs when fetal blood vessels that are unprotected by the umbilical cord or placenta run through the amniotic membranes and traverse the cervix.[1] Two types of vasa previa have been described.[2] Type I occurs when there is a velamentous cord insertion between the umbilical cord and placenta, and fetal vessels that run freely within the amniotic membranes overlie the cervix or are in close proximity to it. Pregnancies with resolved placenta previa or low-lying placenta are at risk for type I vasa previa. Type II occurs when the placenta contains a succenturiate lobe or is multilobed (typically bilobed), and fetal vessels that connect the 2 placental lobes course over or near the cervix. Although there are no standardized criteria for how close the fetal vessels must be to the internal os to constitute vasa previa, a threshold of 2 cm has been proposed.[1,3] In 1 series, all emergent deliveries with vasa previa had a fetal vessel within 2 cm of the cervical os.[4]

What are the clinical implications of vasa previa?

Approximately 1 per 2500 deliveries are complicated by vasa previa.[4,5] If membranes rupture, these vessels may rupture, with resultant fetal hemorrhage, exsanguination, or even death.[6] In addition, fetal asphyxia could occur if sufficient pressure is applied to vessel(s) overlying the cervix and circulation is compromised. In most recent case series, the perinatal mortality rate for pregnancies that are complicated by vasa previa is <10%, largely owing to improved prenatal diagnosis with ultrasound scanning.[2-4,7,8] The largest study of pregnancy outcomes to date is a retrospective review of 155 cases from a patient-support website (n = 87) and data from 6 different medical centers (n = 68).[9] This study found the survival rate for prenatally diagnosed vasa previa to be 97.6%, compared with 43.6% with intrapartum or postnatal diagnosis. Selection bias most likely contributed in part to these survival differences because of patient self-reporting of postnatal diagnoses that were complicated by adverse outcomes. In cases with prenatal diagnosis, 3.4% of newborn infants required transfusion, compared with 58.8% in those infants without prenatal diagnosis.[9]

In a series of 56 cases with prenatal diagnosis, preterm bleeding occurred in 42% of cases with emergent delivery that occurred in 4.1% of singleton and 28.6% twin pregnancies.[4] In another large series 28% of cases with prenatal diagnosis were delivered emergently.[3]

What are risk factors for vasa previa?

The 2 major risk factors for vasa previa are velamentous cord insertion, which accounts for the majority of reported cases, and succenturiate placental lobe or bilobed placenta.[7,9] Approximately 60% of women with vasa previa at delivery had a placenta previa or low-lying placenta identified during the second-trimester ultrasound scan.[4,9] In addition, 20% with vasa previa have a low-lying placenta at delivery.[9]

Another risk factor that has been identified consistently is in vitro

From the Society for Maternal-Fetal Medicine, Washington, DC.

Received July 27, 2015; accepted Aug. 10, 2015.

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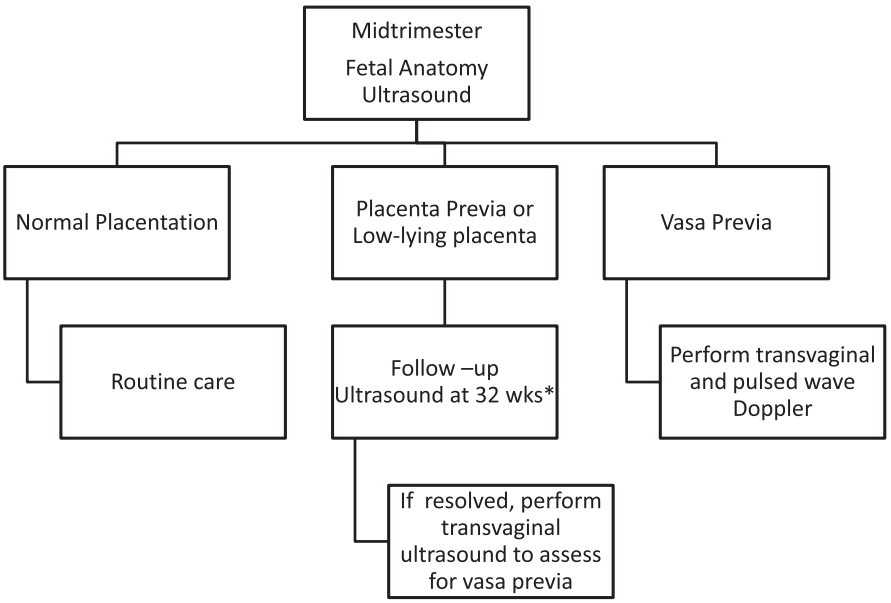
0002-9378/$36.00

http://dx.doi.org/10.1016/j.ajog.2015.08.031

FIGURE 1
Algorithm for diagnosis of vasa previa



* These recommendations are for asymptomatic women; an earlier ultrasound study may be indicated in women who are bleeding.

If placentation appears normal during a fetal anatomy ultrasound, the patient may resume routine care. If the placenta is a complete previa or is low-lying, a follow-up ultrasound is indicated to assess for vasa previa. If a vasa previa is suspected, a transvaginal ultrasound with pulsed wave Doppler may confirm the diagnosis.

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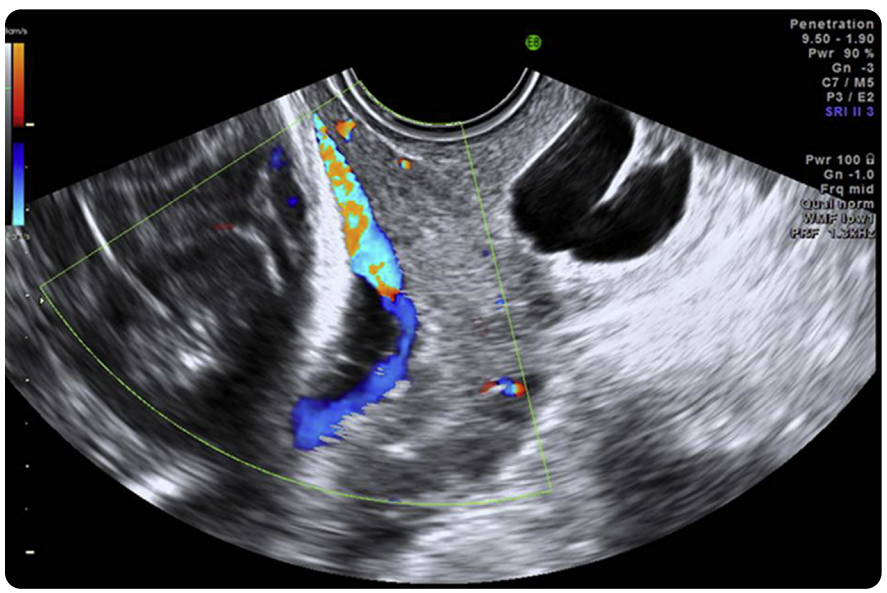
FIGURE 2
Transvaginal ultrasound with color Doppler image of vasa previa



In this image obtained by transvaginal ultrasonography, a fetal blood vessel is seen traversing across the cervical os suggestive of a vasa previa.

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fertilization, which may increase the risk for type 1 vasa previa to approximately 1 in 250, regardless of whether the gestation is a singleton or a multple.[7,10] An increased prevalence of vasa previa has also been described with multiple gestations.[4,8,10] However, in many cases, this occurred in the setting of in vitro fertilization. Thus, the risk appears to be more modest with spontaneous twins.

How is vasa previa diagnosed?

The diagnosis of vasa previa by ultrasound scanning was first reported in 1987.[11] Routine ultrasound evaluation of the placenta and lower uterine segment permits detection of the majority of cases. In a recent systematic review of 8 series that included >400,000 pregnancies and 138 cases of vasa previa, the median detection rate was 93%, with a specificity 99%.[5] Although it can be diagnosed antenatally by transvaginal ultrasound scanning, vasa previa can be missed even under optimal circumstances.

Prenatal diagnosis of vasa previa by ultrasound scanning is most often made at 18−26 weeks of gestation, and identification is less effective if the ultrasound examination was performed only in the third trimester.[5] If diagnosed in the second trimester, approximately 20% of cases resolved before delivery.[3,8]

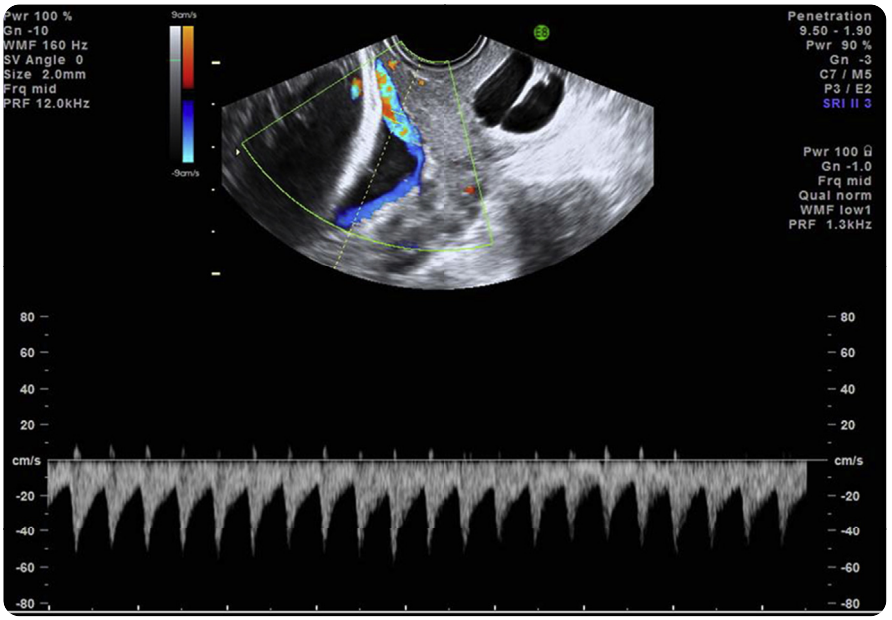
The following algorithm is recommended to facilitate the diagnosis of vasa previa and applies to all pregnancies (Figure 1).

- At the time of mid-trimester ultrasonography, the placental location and the relationship between the placenta and internal cervical os should be evaluated.[12]
- The American Institute of Ultrasound in Medicine and the American College of Obstetricians and Gynecologists also recommend that the placental cord insertion site be documented when technically possible.[12]
- A follow-up ultrasound should be performed at 32 weeks of gestation for women who were diagnosed with placenta previa or low-lying placenta

at the mid-trimester ultrasound examination. Since placenta previa detected in the middle of the second trimester that later resolves and low-lying placenta, even it it later resolves, are associated with vasa previa and consequently high perinatal mortality rates, transvaginal ultrasonography with color and pulsed Doppler is recommended to rule out vasa previa. These recommendations are for asymptomatic women, an earlier ultrasound may be indicated in owmen who are bleeding.[13]

- If vasa previa is suspected, transvaginal ultrasound scans with color and pulsed Doppler should be used to facilitate the diagnosis.
- The diagnosis of vasa previa is confirmed if an arterial vessel is visualized over the cervix, either directly overlying the internal os or in close proximity to it, and color Doppler demonstrates a rate consistent with the fetal heart rate (Figures 2 and 3).[14-16] The course of the vessel should be evaluated carefully to visualize it within the membranes and to exclude other possible causes of a vessel in close proximity to the cervix, such as funic presentation, marginal vein, or venous sinus.

FIGURE 3
Transvaginal ultrasound scan with color Doppler image and pulsed wave Doppler image shows fetal heart rate



Pulsed wave Doppler of the vessel over the cervical os depicts a fetal heart rate, confirming a diagnosis of vasa previa.

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How should the pregnancy with prenatal diagnosis of vasa previa be managed?

The goal of management of vasa previa is to prolong pregnancy safely while avoiding potential complications related to rupture of membranes or labor. Two other national societies have existing clinical guidelines, but these recommendations regarding management are also based on observational data, decision analyses, and expert opinion.[17,18] Given the risk-benefit profile of antenatal corticosteroids, if indications do not develop earlier, it is reasonable to consider treatment at 28-32 weeks of gestation in case of need for urgent preterm delivery.[17] Antenatal hospitalization has also been proposed, beginning at 30−34 weeks of gestation; in 1 series, more than one-half of the women who were observed as outpatients subsequently required hospitalization for a complication.[1,5,19,20] The purpose of hospitalization is to allow for closer surveillance for signs of labor and then a more timely performance of cesarean delivery to avoid membrane rupture. However, quality data to support this as standard practice (compared with outpatient treatment) are lacking; a decision for prophylactic hospitalization may be individualized and based on a combination of factors such as presence or absence of symptoms (eg, preterm contractions, vaginal bleeding), a history of spontaneous preterm birth, logistics (distance from hospital), and the balancing of the risks that are associated with bedrest and activity restriction.[21]

How and when should a pregnancy complicated by vasa previa be delivered?

The ultimate goal is to deliver before rupture of membranes while minimizing the impact of iatrogenic prematurity. Amniocentesis is not recommended to evaluate fetal lung maturity because delaying delivery is not helpful or recommended if fetal lung maturity is not confirmed. Optimal timing of cesarean delivery remains unknown. In the largest retrospective series, fetuses who were diagnosed prenatally had a 97% survival rate, and the mean gestational age at delivery was 34.9 ± 2.5 weeks of gestation.[9] Data from a decision analysis study suggested that delivery at 34−35 weeks balances the risk of premature rupture of the membranes and subsequent fetal hemorrhage and death vs the risks of prematurity; the authors found no benefit to expectant management beyond 37 weeks of gestation.[22] Based on available data, planned cesarean delivery for a prenatal diagnosis of vasa previa at 34−37 weeks of gestation is reasonable.

If a woman with pregnancy at viable gestational age has an antenatal diagnosis of vasa previa and then develops premature rupture of membranes or labor, cesarean delivery should be

Summary recommendations

Recommendation	GRADE
Ultrasound evaluation of placental location and the relationship between the placenta and internal cervical os should be included at the second-trimester ultrasound scan, and the placental cord insertion site should be documented when technically possible.	Best practice
Follow-up ultrasound should be performed at 32 weeks of gestation for women who were diagnosed with placenta previa or low-lying placenta at mid-trimester ultrasound examination. Since placenta previa detected in the middle of the second trimester that later resolves and low-lying placenta even if it later resolves are associated with vasa previa and consequently high perinatal mortality rates, transvaginal ultrasonography with color and pulsed Doppler is recommended to rule out vasa previa.	2C: weak recommendation, low-quality evidence
If a woman with pregnancy at viable gestational age has an antenatal diagnosis of vasa previa and then develops premature rupture of membranes or labor, cesarean delivery should be performed.	1B: strong recommendation, moderate-quality evidence
Antenatal hospitalization for a woman with prenatal diagnosis of vasa previa may be considered from 30–34 weeks of gestation.	2C: weak recommendation, low-quality evidence
Administration of antenatal corticosteroids may be considered from 28–32 weeks of gestation.	2C: weak recommendation, low-quality evidence
Scheduled cesarean delivery for pregnancies with vasa previa may be considered from 34–37 weeks of gestation.	2C: weak recommendation, low-quality evidence
Delivery of a pregnancy that is complicated by vasa previa should occur by cesarean birth at a center that is capable of providing immediate neonatal blood transfusion if needed	1C: strong recommendation, low-quality evidence

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preformed. (3,4,6,8) In addition, vasa previa should be suspected when there is vaginal bleeding combined with either sinusoidal FHR pattern or sudden FHR bradycardia.

Delivery of a pregnancy that is complicated by vasa previa should occur by cesarean birth at a center that is capable of providing immediate neonatal blood transfusion if needed.[1] The surgical team should make the hysterotomy mindful of the location of the placenta and aberrant blood vessels.[23] In the event that a fetal vessel has been lacerated inadvertently during delivery, immediate cord clamping is recommended to prevent fetal/neonatal blood loss. Delayed clamping of the umbilical cord is not recommended. In selected cases, preparations for delivery should include immediate availability of type O negative blood, in case of delivery of severely anemic neonate. ■

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