Vasa praevia: Should we routinely screen high-risk women for this rare but serious condition?

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and Thomas Gray¹

Abstract

Vasa praevia is described as the unprotected fetal vessels traversing through the placental membranes over the cervical os, below the fetal presenting part and unprotected by placental tissue or the umbilical cord. It is often not detected antenatally and presents with painless bleeding and rapid fetal compromise after spontaneous or artificial rupture of the membranes, which causes trauma to these vessels. It is a rare condition affecting one in 2500 pregnancies and has a reported perinatal mortality rate of up to 60%. More than 80% of cases of vasa praevia have at least one risk factor for the condition and it has been shown that identification of vasa praevia antenatally results in fetal survival rates of up to 97%. Risk factors include placenta praevia, velamentous cord insertion, bi-lobed placenta, succenturiate lobe, assisted reproduction and multiple pregnancy. Screening for vasa praevia with transvaginal ultrasound has been shown to be sensitive and cost effective when used in a targeted population where risk factors are present. Here, we present the antenatal assessment and management of a case of vasa praevia detected during the routine 20-week anatomy scan of a healthy primigravida, which resulted in elective caesarean section delivery of a healthy baby at 36 weeks' gestation. The pathophysiology of vasa praevia is discussed and the methods and role of screening for this rare but serious condition are appraised.

Keywords

Vasa praevia, placenta praevia, ultrasound, obstetrics

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Case report

Ms X was a healthy 27-year-old primigravida with no known medical problems. She attended the ultrasound department at Rotherham Hospital NHSFT for a routine anomaly scan at 20+2 weeks. The scan showed a single, live fetus in breech position with a posterior low-lying placenta. As the placenta was low lying, a known risk factor for vasa praevia, a check for vessels across the internal cervical os was made in line with normal practice in our unit. A large anterior succenturiate lobe with three vessels running between this and the main lobe of the placenta was visualised. Ms X had previously been booked for low-risk midwifery-led care and was referred to consultant-led care in the same unit as a result of the findings. A consultant obstetrician

with a special interest in fetal medicine (SR) undertook a repeat scan the following week. This scan confirmed the presence of a posterior placenta, which was low lying, reaching the internal os, with an anterior succenturiate lobe with fetal vessels present crossing between the two lobes (Figure 1). Doppler ultrasound confirmed that the pulse rate was compatible with them being of

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Figure 1. Ultrasound image demonstrating fetal vessels crossing the cervical os at second trimester scan.

Figure 3. Ultrasound image demonstrating fetal vessels extending on to the anterior uterine wall, in close relationship with the site of incision at lower segment caesarean section.

Figure 2. Ultrasound image demonstrating that when Doppler applied the heart rate was 142 beats per minute, indicating fetal origin. Comparison was made with maternal heart rate to confirm this.

fetal origin (Figure 2). The diagnosis of vasa praevia was therefore made. The patient was counselled about the risks associated with vasa praevia, in particular the risk of painless massive antepartum haemorrhage with rapid fetal compromise. She was advised to call the emergency services if she experienced bleeding, for a rapid transfer to labour ward; and to have a low threshold for contacting the labour ward assessment unit for advice in the event of abdominal pain, abnormal vaginal discharge or changes in fetal movements. She was also counselled about mode of delivery, with vaginal birth being contraindicated due to the low-lying placenta and the risk of bleeding once the membranes are ruptured if this situation persisted at term. A shared decision was made with Ms X for elective caesarean section delivery at 36 week's gestation at Rotherham Hospital, as per the Royal College of Obstetricians and Gynaecologists (RCOG) guidelines.¹

Ms X was counselled by the neonatal team regarding the potential risks of pre-term delivery and a course of antenatal corticosteroids in the form of two doses of dexamethasone 12mg were given 24 hours apart 48 hours prior to planned delivery to enhance fetal lung maturity. A further scan to reassess placental location and fetal wellbeing via measurement of fetal growth, liquor volume and umbilical artery Doppler was undertaken at 35+2 weeks' gestation. Ideally this would have been performed at 32–34 weeks; however, in this case it was performed at 35+2 weeks. Umbilical artery Doppler was undertaken rather than middle cerebral artery (MCA) Doppler as this is the usual test available in the Rotherham Hospital ultrasound department. This scan confirmed the presence of vasa praevia and showed normal fetal growth, liquor volume and umbilical artery Doppler. Ms X was managed as an outpatient during her pregnancy because she had no vaginal bleeding or evidence of fetal compromise.

The elective caesarean section was undertaken at 36+4 week's gestation as this was the first available slot after Ms X had reached 36 weeks. The surgeon (TG) was aware from the scan reports that the vessels running between the placental lobes were likely to be closely related to the site of uterine incision in the lower segment (Figure 3). Care was therefore taken to avoid rupturing the membranes during delivery of the fetus, which was delivered in the membranes. The caesarean section was uneventful with an estimated blood loss of 400 ml and a healthy baby was delivered. The baby did not require respiratory support and was not admitted to the special care baby unit. The medical photography department took pictures of the placenta with consent (Figures 4 to 6) and the placenta was sent for histology with consent. Placental histology showed a bi-lobate placenta with a velamentous insertion, which was

Figure 4. Still image of the bi-lobed placenta demonstrating the velamentous cord insertion and fetal vessels running in membranes between the two lobes.

Figure 6. Close-up still image demonstrating velamentous cord insertion with both lobes clearly seen separately and three large fetal vessels running between them.

Figure 5. Close-up still image demonstrating three large fetal vessels running in the membranes between the two placental lobes.

1 cm from one lobe and 11.5 cm from the other lobe. The histology was otherwise normal.

Discussion

Pathophysiology, risk factors and incidence of vasa praevia

Vasa praevia is described as the unprotected fetal vessels traversing through the placental membranes over the cervical os, below the fetal presenting part and unprotected by placental tissue or the umbilical cord.² There are two types of vasa praevia. Type 1 is secondary to a velamentous cord insertion in a single- or bi-lobed placenta, type 2 is due to fetal vessels running between lobes of a placenta with one or more accessory lobes.³ Vasa praevia is rare and its incidence in pregnancy is reported to be 1 in 2500.⁴ The important clinical significance of vasa praevia is that either spontaneous or artificial rupture of membranes can result in

trauma to the low-lying fetal vessels with consequent antepartum haemorrhage and rapid exsanguination of the fetus.⁵ The low-lying vessels of vasa praevia can also be compressed during labour, resulting in fetal compromise. Typically vasa praevia presents with painless bleeding per vagina following spontaneous or artificial rupture of the membranes. It is often not diagnosed antenatally and there is currently no formal screening programme for the condition in the UK.

Risk factors for vasa praevia are placenta praevia, velamentous cord insertion, bi-lobed placenta, succenturiate lobes, assisted reproductive techniques including IVF and multiple pregnancy.¹ In a systematic review of 325 cases of vasa praevia, one or more of these risk factors were identified as being present in 83% of cases.⁶

The perinatal mortality rate associated with vasa praevia is 60%.⁷ Mortality from vasa praevia should be considered a potentially preventable cause of fetal morbidity and mortality as it has been shown that once a diagnosis of vasa praevia is confirmed survival rates of up to 97% have been reported.⁷ Screening for vasa praevia in high-risk women could contribute to the Royal College of Obstetricians and Gynaecologists' (RCOG) Each Baby Counts project, which is aiming to reduce stillbirths and neonatal deaths 50% by 2020.⁸

If vasa praevia is diagnosed antenatally, delivery by elective caesarean section between 35 and 37 weeks is recommended by the Royal College of Obstetricians and Gynaecologists.¹ A repeat scan in the third trimester, between 32 and 34 weeks is also advised, to confirm the diagnosis of vasa praevia as up to 15% of cases can resolve due to placental 'apparent' migration.¹ Women with vasa praevia should be counselled about the risk of bleeding and the urgency of reporting any bleeding to the labour ward assessment unit at the hospital where they are booked immediately should any occur.

Screening for vasa praevia

Screening for vasa praevia has been developed and tested by Gagnon et al.⁹ and consists of a standard evaluation of the umbilical cord insertion site using colour Doppler via a transvaginal probe at the second trimester scan. The accuracy of USS in prenatal diagnosis has a sensitivity of 100% and specificity of 99–98% when performed with a transvaginal probe with colour Doppler.⁶ A combination of transabdominal and transvaginal probes can be useful depending on the site of the umbilical cord insertion, and this is likely to improve diagnostic accuracy. MRI has an increasing role in diagnosing vasa praevia especially in assessing velamentous cord insertion located at the posterior uterine wall. MRI angiography can look at the vascular distribution within the placenta to aid in avoiding massive bleeding and to prevent fetal loss at caesarean section.¹⁰

In view of the low incidence of vasa praevia in the general population, screening in an unselected population is not currently advised by The UK National Screening Committee;¹¹ however, most women with vasa praevia have one or more risk factor and it has been suggested that targeted screening be offered to this population.¹² This is the current practice at Rotherham Hospital NHSFT where routine screening is undertaken in women identified with low-lying placenta, bilobed placenta and multiple pregnancy.

The cost effectiveness of such screening was assessed in a large well designed cost-utility analysis study in Canada.¹³ The authors demonstrated that it was cost effective to use targeted screening to identify vasa praevia in women with one or more risk factor. Universal screening of singleton pregnancies was not found to be cost effective compared to targeted screening. The population in which screening was found to be most cost effective was in multiple pregnancies.

In 2017, The UK National Screening Committee reviewed the role of screening for vasa praevia but does not currently recommend a national screening programme for vasa praevia. The reason for this is that it was felt there was not enough strong evidence to prove that screening every pregnancy would be more helpful than harmful. A lack of evidence about the number of babies affected by vasa praevia in the UK was cited, as well as the limited evidence for the accuracy of detecting vasa praevia by ultrasound. The UK National Screening Committee was also concerned that some women may have unnecessary caesarean sections, carrying a risk of potentially serious complications. The potential impact for women who may be falsely reassured by negative screening but experience complications relating to morbid placentation was also considered.¹¹ The psychological impacts to the patient of a

prenatal diagnosis of vasa praevia should be considered when offering patients screening and they should be counselled as appropriate, which is likely to then require further funding and training to those providing support.

The RCOG also currently recommends no routine screening for vasa praevia but supports current local practices in identifying placentas that encroach on the cervical os at the 20-week antenatal screening ultrasound scan.¹ However, the recent evidence regarding the presence of risk factors in 83% of vasa praevia cases,¹² with the addition of good evidence for both the sensitivity of the technique and the cost effectiveness of screening, considered in the context of the RCOG's Each Baby Counts project⁸ should perhaps prompt a more pragmatic approach to screening for vasa praevia.

Conclusions

Ultrasound departments in the UK working with maternity units to provide second trimester scanning could consider offering screening for vasa praevia if risk factors are present. This would require sonographers, specialist midwives or obstetricians undertaking second trimester scans to be skilled in transvaginal scan technique using Doppler to identify low-lying fetal vessels and may require additional training, including provision of counselling and support to affected patients and their partners. As a minimum, the presence of a low-lying placenta, velamentous cord insertion or bilobed placenta should prompt an assessment for vasa praevia as is the current practice at Rotherham Hospital, UK.

Despite the lack of a nationally agreed screening programme for vasa praevia,^{1,11} but given the high neonatal mortality associated with undiagnosed vasa praevia and the national policy drivers to reduce perinatal morbidity,⁸ in addition to the good sensitivity of the screening tests available^{3,4} as well as the potential for cost-effective screening if undertaken in a targeted population;¹³ all maternity units should perhaps consider reviewing their guidelines and recommendations surrounding vasa praevia.

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Guarantor

Thomas Gray

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