EDORIUM Journals

J Case Rep Images Obstet Gynecol 2021;7:100082Z08DH2021.
www.ijcriog.com

CASE REPORT PEER REVIEWED | OPEN ACCESS

A velamentous and furcate cord insertion in a vasa previa setting: A rare but potentially life-threatening condition. Case report and review of the literature

Delagrange Hannelore, Hindryckx An,
van Schoubroeck Dominique, Richter Jute

ABSTRACT

Introduction: Furcate cord insertion is a rare abnormality of the umbilical cord insertion, in which the umbilical vessels separate before inserting into the placenta. Only a few case reports have been published on this topic. Underreporting may be due to confusion with a velamentous insert and insufficient screening for placental cord abnormalities.

Case Report: A 34-year-old women presented for a routine first trimester scan. Ultrasound examination revealed a low-lying anterior placenta and a posterior cord insertion with long velamentous vessels running close to the internal cervical ostium. Serial follow-up scans confirmed the findings of a velamentous and furcate cord insertion in a vasa previa setting. Elective caesarean section was performed at 37 weeks of gestation. Macroscopic examination of the placenta confirmed the prenatal findings.

Conclusion: Furcate velamentous cord insertion and vasa previa can be detected during first and second trimester ultrasound. Prenatal detection and adjusted peripartum management prevent adverse perinatal outcome.

Keywords: Abnormal placental cord insertion, Furcate cord insertion, Prenatal diagnosis

Delagrange Hannelore[1], Hindryckx An[2], van Schoubroeck Dominique[3], Richter Jute[3]

Affiliations: [1]Resident of Gynecology, Department of Obstetrics and Gynecology, University Hospitals Leuven, Leuven, Belgium; [2]Medical Specialist, Department of Obstetrics and Gynecology, University Hospitals Leuven, Leuven, Belgium; [3]Medical Specialist, PhD, Department of Obstetrics and Gynecology, University Hospitals Leuven, Leuven, Belgium.

Corresponding Author: Delagrange Hannelore, Herestraat 49, 3000 Leuven, Belgium; Email: hannelore.delagrange@uzleuven.be

Received: 27 April 2021
Accepted: 20 May 2021
Published: 06 July 2021

How to cite this article

Delagrange H, Hindryckx A, van Schoubroeck D, Richter J. A velamentous and furcate cord insertion in a vasa previa setting: A rare but potentially life-threatening condition. Case report and review of the literature. J Case Rep Images Obstet Gynecol 2021;7: 100082Z08DH2021.

Article ID: 100082Z08DH2021

****

doi: 10.5348/100082Z08DH2021CR

INTRODUCTION

The umbilical cord normally inserts into the placenta and the three umbilical vessels are held together in a sheath of Wharton's jelly until they reach the placental surface [1, 2].

Furcate cord insertion is a rare abnormality of umbilical cord insertion, in which the umbilical vessels separate before insertion into the placenta. The furcate umbilical vessels run isolated without the protective covering of Wharton's jelly, resulting in higher risk of injury and thrombosis [1, 2]. Furcate cord insertion has first been described by Hyrtl in 1870 [3]. The incidence is low, estimated approximately around 0.1% of pregnancies [4, 5].

Another abnormality of the umbilical cord is the velamentous cord insertion, in which the umbilical cord inserts in the fetal membranes, and not directly in the

placenta. The reported incidence of a velamentous cord insertion in singleton pregnancies is 1%, but it is higher in multiple pregnancies [1, 2]. Velamentous insertion is associated with an increased risk of adverse outcome as intrauterine growth restriction (IUGR), preterm birth, placental abruption, and abnormal fetal heart patterns during delivery, which needs for emergency caesarean section and admission to neonatal care unit [1, 2, 6].

In both velamentous and furcate cord insertion the vessels are not protected by Wharton's jelly making them prone to rupture, hemorrhage, and death [1, 2, 6].

Vasa previa is a condition in which velamentous fetal blood vessels run near the internal cervical ostium [1, 2]. The reported incidence of vasa previa is 0.6% [7]. When membranes rupture or cervix dilates, these vessels may rupture leading to acute fetal exsanguination. If undetected prenatally, perinatal mortality is up to 60% [1, 2]. Furcate cord insertion has been described a long time ago, nevertheless only a few case reports have been published in the literature [3–5, 8–16].

Underreporting may be due to confusion with velamentous cord insertion, but both are two different entities, as described above.

As far as we know this is the first case report of a velamentous furcate cord insertion in a vasa previa setting, without a low-lying placenta. We reviewed the literature on the furcate cord insertion and the prenatal detection of placental cord insertions.

CASE REPORT

A 34-year-old patient with no relevant medical history presented for a routine first trimester ultrasound in her fourth pregnancy. She previously had three uncomplicated term vaginal deliveries. The ultrasound scan revealed a low-lying anterior placenta and a posterior cord insertion more than 7 cm away from the placental edge, with long velamentous vessels running close to the internal cervical ostium (Figure 1).

Serial ultrasounds confirmed a non-previa anterior placenta with posterior cord insertion (Figure 2A) with isolated fetal vessels running close to the cervical ostium (Figure 2B), i.e., velamentous and furcate cord insertion in a vasa previa setting. The branched pattern of the umbilical blood vessels can be demonstrated with both 2D (Figure 3A) and 3D (Figure 3B) techniques. The patient was counseled about the risks of IUGR, the risks associated with spontaneous rupture of the membranes, and the risk of fetal death in case of spontaneous rupture of the furcate vessels.

Since cervical shortening may be predictive of the onset of labor, serial cervical length measurements were performed. These measurements remained stable, so an elective caesarean section was planned at 37 weeks. Prior to incision, an ultrasound was performed to assess the position of the vasa previa positioned on the anterior side of the uterus. The caesarean section was uncomplicated, total blood loss during the procedure was estimated at 500 cc. A healthy girl with a birth weight of 2750 gram and good Apgar scores was born. She was admitted to neonatal care unit for four days because of transient tachypnoea. Both mother and child could be discharged in a good general condition after six days. Macroscopic evaluation of the placenta confirmed the velamentous and furcate cord insertion (Figure 4).

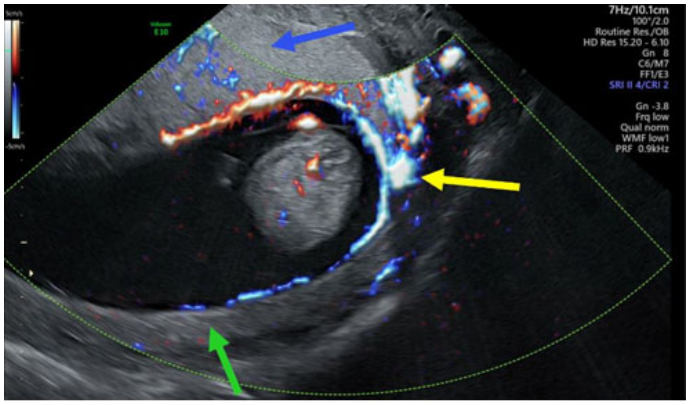

Figure 1: First trimester ultrasound scan at gestational age of 13 weeks. Low-lying anterior placenta (blue arrow), with a posterior cord insertion (green arrow) within a long velamentous vessel (yellow arrow) running close to internal cervical ostium.

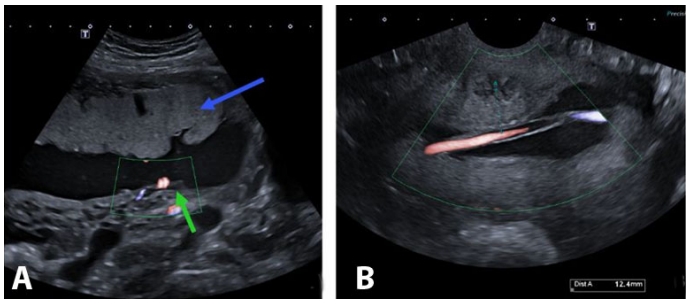

Figure 2: Ultrasound scan at gestational age of 25 weeks. (A) Placenta positioned anteriorly non-previa with the insertion at the posterior side. (B) Isolated fetal vessel running at close proximity of the internal ostium.

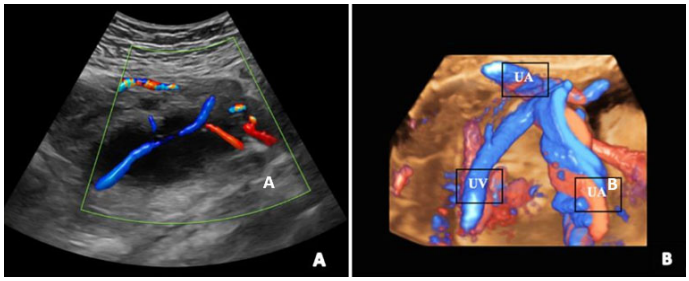

Figure 3: (A) Two-dimensional image of furcate cord insertion (artery in blue, vein in red); (B) 3D colour Doppler image showing the furcate pattern of the umbilical cord. UA: umbilical artery; UV: umbilical vein.

DISCUSSION

This case illustrates that prenatal detection of furcate velamentous cord insertion is feasible. Ultrasound

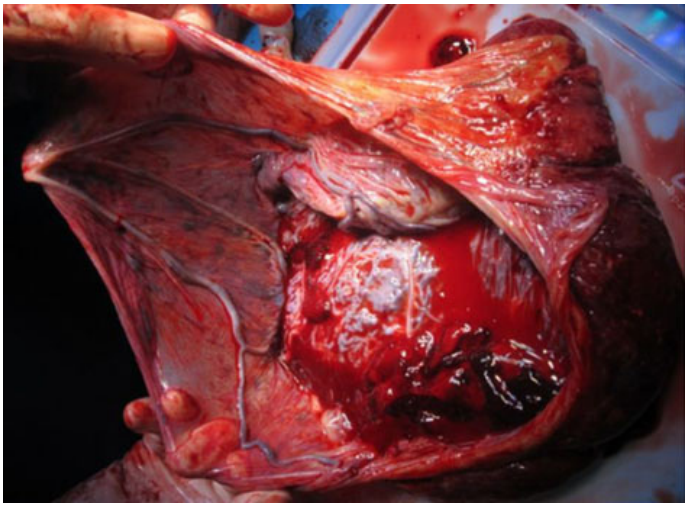

Figure 4: Macroscopic examination of the placenta. Umbilical vessels run isolated through the amniotic membranes and are highly branched before insertion into the placental surface.

characteristics are umbilical vessels that run isolated and branch out strongly before insertion into the placenta. An abnormal placental cord insertion was suspected early in pregnancy. Follow-up ultrasound scans confirmed the velamentous and furcate insertion in a vasa previa setting. Given the risk of adverse perinatal outcome, our patient was well monitored by 4 weekly ultrasounds and cervical length measurements. The mode and timing of the delivery was chosen based on these ultrasound findings.

We performed a literature search using Pubmed and Medline databases. Following search terms were used: "furcate cord insertion," "funiculi furcate fetal," "furcate" and "furcate." Articles were eligible if the prenatal diagnosis or outcome of the furcate cord insertion was described. Of the 28 remaining articles, 14 were excluded after full-text assessment, leaving 14 articles to be included.

To complete the literature review we also focused on abnormal placental cord insertion and prenatal diagnosis. The keyword "prenatal diagnosis" was further refined by the following terms: "abnormal placental cord insertion" and "vasa previa." Meta-analyses randomized controlled trials, literature reviews, observational, prospective, and retrospective studies were selected over the last 20 years. A total of 46 articles remained based on the title and abstract, of which 13 were effectively used as a source for this review.

In the literature only three case reports described the prenatal diagnosis of the furcate cord insertion. The first report of Lamale-Smith of 2015 described a case of duplex placenta and furcate cord insertion diagnosed during routine scan [8]. Fujita reported a case with furcate cord insertion detected at 34 weeks [9]. The third report by Cohen detected a furcate cord insertion at 35 weeks after noting decreased fetal movements [10].

There have been several reports of an abnormal outcome linked to a furcate insertion. Some authors have described intra-uterine death (IUFD) secondary to the rupture of one of the blood vessels of the furcate insertion [11–16]. Others reported furcate insertion to be associated with fetal growth restriction and preterm birth [1, 16].

The largest published case series on furcate cord insertion is a study of 132 cases where inclusion was based on the pathological findings of the placenta, so only cases with postnatal detection [5]. In seven cases (5.3%) an intrauterine fetal death (IUFD) was observed. In three of the seven cases the cause of fetal death was directly related to the furcate cord insertion: one case with ectasia of the umbilical vein and thrombosis, and two cases with rupture of the umbilical vessels of the furcate cord insertion. In the other four cases of IUFD furcate cord insertion was not identified as the direct cause of death but may have played a contributing role. In 98/132 cases perinatal outcome was assessed and compared with a control group. They demonstrated that furcate insertion did not increase the risk of perinatal complications. Therefore, they concluded that the outcome was good in most cases, although outcome was only described in 98 cases [5].

Placental cord insertion can be identified as early as in the first trimester, as our case illustrates. Up to now, according to the International Society of Ultrasound in Obstetrics and Gynecology (ISUOG) guideline, evaluation of the placental cord insertion is not mandatory in the first trimester scan [17]. However, recent research shows that visualization of the placental cord insertion during the first trimester is useful for the identification of high-risk pregnancies [18–20]. A prospective study, examining the positional relationship between uterus and cord insertion site at 9–11 weeks, found a significant association between low cord insertion and placental and umbilical cord abnormalities, such as velamentous and marginal cord insertion, vasa previa, and low-lying placenta at delivery [20]. So, the authors suggested that screening for the cord insertion at 9–11 weeks may be useful in predicting abnormalities of cord and placenta at delivery.

According to the ISUOG guideline for the second trimester ultrasound scan, the placental cord insertion should be checked in multiple pregnancies, but again this is not mandatory in singleton pregnancies [21]. The guidelines of the American Institute of Ultrasound in Medicine (AIUM), the American College of Radiology (ACR), the American College of Obstetricians and Gynecologists (ACOG), the Society for Maternal-Fetal Medicine (SMFM), and the Society of Radiologists in Ultrasound (SRU) include visualization of the number of vessels in the cord and the umbilical cord insertion during second and third trimesters. The placental cord insertion should be documented when technically possible [22].

The best concordance between pre- and postnatal findings of the cord insertion is found in the second trimester (sensitivity 73% and specificity 91%) [23]. Visualization of placental cord insertion is more difficult in the third trimester since the space of amniotic fluid between the uterine wall and the fetus is getting smaller [23, 24].

However, the review of Rodriguez reported excellent detection rates of placental cord insertion across all

trimesters. The overall detection rate was 90.3% and even 98% using color Doppler [24].

The benefit of the prenatal detection of abnormal cord insertion is well demonstrated in cases of vasa previa. Fetal mortality in case of undetected vasa previa is as high as 60% [1, 2, 6].

When vasa previa is detected prenatally, neonatal survival is significantly higher [25]. The accuracy of the diagnosis of vasa previa is high when transvaginal ultrasound is performed (sensitivity of 100% and specificity of 99–99.8%) [26]. When the cord insertion is not identified or if only transabdominal scan is performed, detection rates are lower [26, 27].

Given the low incidence of vasa previa, universal screening is not recommended [7, 26–29].

Risk-based screening is useful, as in 83% of cases one or more risk factors for vasa previa are present [26]. The most recent meta-analysis found associations between vasa previa and low-lying placenta (62%), velamentous cord insertion (52%), bilobed or succenturiate lobed placenta (33%), use of in vitro fertilization (26%), and multiple gestations (9%) [30].

CONCLUSION

Our case illustrates that detection of furcate velamentous cord insertion and vasa previa is feasible during first and second trimester ultrasound scan. Prenatal detection allows appropriate peripartum management and can significantly decrease the incidence of adverse perinatal outcome. Therefore, we believe that routine screening for placental cord insertions during first and second trimester scan is to be encouraged.

REFERENCES

1. Benirschke K, Kaufmann P, Baergen RN. Pathology of the Human Placenta. 5ed. New York: Springer; 2006.
2. Baergen RN. Manual of Pathology of the Human Placenta. 2ed. New York: Springer; 2011.
3. Hyrtl J. Die Blutgefäße der menschlichen nachgeburt in normalen und abnormen Verhältnissen. Vienna: Braumüller; 1870.
4. Foss JVM. Über Beziehungen Zwischen Implantations schäden der Plazenta und Plazentations störungen. Z Geburtsh Perinatol 1972;176:36–44.
5. Kosian P, Henrich W, Entezami M, Weichert A. Furcate insertion of the umbilical cord: Pathological and clinical characteristics in 132 cases. J Perinat Med 2020;48(8):819–24.
6. Ebbing C, Kiserud T, Johnsen SL, Albrechtsen S, Rasmussen S. Prevalence, risk factors and outcomes of velamentous and marginal cord insertions: A population-based study of 634,741 pregnancies. PLoS One 2013;8(7):e70380.
7. Ruiter L, Kok N, Limpens J, et al. Systematic review of accuracy of ultrasound in the diagnosis of vasa previa. Ultrasound Obstet Gynecol 2015;45(5):516–22.
8. Lamale-Smith LM, Snuttjer MJ, Harper TC. Furcate umbilical cord insertion: Disparate outcomes of a rare obstetrical finding. A case report. J Reprod Med 2015;60(7–8):365–8.
9. Fujita Y, Yumoto Y, Kato K. Prenatal diagnosis of abnormal umbilical cord insertion: A rare case of furcate insertion. J Med Ultrason (2001) 2017;44(2):203–5.
10. Cohen B, Wilson M, Cohen A, Yum M. Prenatal diagnosis of a furcate placenta. Obstet Gynecol 2020;135(4):960–3.
11. Canda MT, Demir N, Doganay L. Velamentous and furcate cord insertion with placenta accreta in an IVF Pregnancy with unicornuate uterus. Case Rep Obstet Gynecol 2013;2013:539379.
12. Tashkova D, Staribratova D, Ivancheva H, Pehlivanov B, Kostov I. Intrauterine fetal death in furcate insertion of umbilical cord. Akush Ginekol (Sofiia) 2014;53(1):49–51.
13. Laberke PJ, Deubler G. Sudden intrauterine death associated with furcate insertion of the umbilical cord. Int J Leg Med 2009;123(6):509–12.
14. Swanberg HWN. Rupture of the umbilical cord during pregnancy. Acta Obstet Gynecol Scand 1951;30:323–37.
15. Rüther H. Spontan rupture einer nabelschnurarterievor geburtsbeginnbei insertio funiculi furcate. Arch Gynak 1939;16844–50.
16. Addai FK, Quashie FJ, Ockleford CD. The mode of insertion of umbilical cord and vessels: Association with maternal hemoglobin genotype, neonatal factors, and placental component volumes. Anat Embryol (Berl) 1994;189(2):107–13.
17. Salomon LJ, Alfirevic Z, Bilardo CM, et al. ISUOG practice guidelines: Performance of first-trimester fetal ultrasound scan. Ultrasound Obstet Gynecol 2013;41(1):102–13.
18. Hasegawa J. Ultrasound screening of umbilical cord abnormalities and delivery management. Placenta 2018;62:66–78.
19. Hasegawa J, Farina A, Nakamura M, et al. Analysis of the ultrasonographic findings predictive of vasa previa. Prenat Diagn 2010;30(12–13):1121–5.
20. Hasegawa J, Matsuoka R, Ichizuka K, et al. Cord insertion into the lower third of the uterus in the first trimester is associated with placental and umbilical cord abnormalities. Ultrasound Obstet Gynecol 2006;28(2):183–6.
21. Salomon LJ, Alfirevic Z, Berghella V, et al. Practice guidelines for performance of the routine mid-trimester fetal ultrasound scan. Ultrasound Obstet Gynecol 2011;37(1):116–26.
22. AIUM-ACR-ACOG-SMFM-SRU Practice Parameter for the Performance of Standard Diagnostic Obstetric Ultrasound Examinations. J Ultrasound Med 2018;37(11):E13–24.
23. Ismail KI, Hannigan A, Kelehan P, O'Donoghue K, Cotter A. Antenatal detection of abnormal placental cord insertion across different trimesters: A prospective cohort study. Am J Perinatol 2020;37(1):104–11.
24. Rodriguez D, Eliner Y. Performance of ultrasound for the visualization of the placental cord insertion. Curr Opin Obstet Gynecol 2019;31(6):403–9.

25. Oyelese Y, Catanzarite V, Prefumo F, et al. Vasa previa: The impact of prenatal diagnosis on outcomes. Obstet Gynecol 2004;103(5 Pt 1):937–42.
26. Ruiter L, Kok N, Limpens J, et al. Incidence of and risk indicators for vasa praevia: A systematic review. BJOG 2016;123(8):1278–87.
27. Melcer Y, Jauniaux E, Maymon S, et al. Impact of targeted scanning protocols on perinatal outcomes in pregnancies at risk of placenta accreta spectrum or vasa previa. Am J Obstet Gynecol 2018;218(4):443.e1–8.
28. Smorgick N, Tovbin Y, Ushakov F, et al. Is neonatal risk from vasa previa preventable? The 20-year experience from a single medical center. J Clin Ultrasound 2010;38(3):118–22.
29. Sinkey RG, Odibo AO. Vasa previa screening strategies: Decision and cost-effectiveness analysis. Ultrasound Obstet Gynecol 2018;52(4):522–9.
30. 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.

****

Acknowledgments
With thanks to the patient for permitting to publish this case.

Author Contributions

Delagrange Hannelore – Conception of the work, Design of the work, Acquisition of data, Analysis of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Hindryckx An – Design of the work, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

van Schoubroeck Dominique – Conception of the work, Design of the work, Analysis of data, Interpretation of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Richter Jute – Conception of the work, Design of the work, Analysis of data, Interpretation of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Guarantor of Submission
The corresponding author is the guarantor of submission.

Source of Support
None.

Consent Statement
Written informed consent was obtained from the patient for publication of this article.

Conflict of Interest
Authors declare no conflict of interest.

Data Availability
All relevant data are within the paper and its Supporting Information files.