UK National Screening Committee

Screening for Vasa Praevia

An evidence map to outline the volume and type of evidence related to screening for vasa praevia for the UK National Screening Committee

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The UK National Screening Committee secretariat is hosted by The Office for Health Improvement & Disparities.

About the UK National Screening Committee (UK NSC)

The UK NSC advises ministers and the NHS in the 4 UK countries about all aspects of population screening and supports implementation of screening programmes. Conditions are reviewed against evidence review criteria according to the UK NSC's evidence review process.

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Summary

This document discusses the findings of the evidence map on screening for vasa praevia (VP).

Evidence maps are a way of scanning published literature to look at the volume and type of evidence in relation to a specific topic. They inform whether the evidence is sufficient to commission a more sustained analysis on the topic under consideration. In particular, this evidence map aims to assess the volume and type of evidence published since a rapid review conducted by the UK National Screening Committee (UK NSC) in 2017 that aimed to identify the epidemiology of VP and its outcomes, as well as the performance of transabdominal screening for VP. This 2023 evidence map found that at present, there is insufficient published literature to justify further work on screening for VP.

The UK NSC will reconsider the evidence for screening for VP when the recommendation is regularly reviewed again’

Introduction and approach

Background & Objectives

The UK National Screening Committee (UK NSC) external reviews (also known as evidence summaries or evidence reviews) are developed in keeping with the UK NSC evidence review process to ensure that each topic is addressed in the most appropriate and proportionate manner. See further information on the evidence review process on GOV.UK.

VP is a rare pregnancy complication occurring in just 0.46 per 1000 pregnancies,[1] in which the fetal blood vessels cross or run near the internal cervical os (the opening to the birth canal) beneath the fetus.[2, 3] Their location between the fetus and birth canal opening leaves them particularly at risk of rupture or compression, potentially leading to fetal exsanguination. This can happen at any time during the pregnancy usually presenting with painless vaginal bleeding, but is most likely during labour.[3] Due to this, preterm birth by elective Caesarean section (CS) is generally recommended for pregnancies complicated by VP. Without antenatal detection and intervention through planned Caesarean section, fatal exsanguination of the fetus may occur.[4]

A binary classification, based on pathological appearance, has been proposed for VP. Type 1 occurs as a consequence of a VCI into a placenta, whereas type 2 results from a multilobed placenta where vessels that connect the main placental plate with a succenturiate lobe are running over or near the internal cervical os.[3, 5] Type 1 VP is significantly more common than type 2, with a 2016 systematic review and meta-analysis suggesting that because of the strong association between VP and VCI, it should be considered a marker, rather than a risk factor, for VP.[6]

Whereas the exact cause of VP is unclear, several risk factors have been proposed to be associated with development of VP, which include multiple pregnancy, pregnancies arising from *in vitro* fertilisation (IVF), low-lying placenta in early pregnancy, succenturiate placental lobes, bilobed or multilobed placentas, and velamentous cord insertion (VCI).

Previous review on screening for vasa praevia

The UK NSC currently does not recommend screening for VP. The Committee based this recommendation on the evidence provided by a review carried out by the UK NSC in 2017.[7]

The 2017 UK NSC review found no evidence on the epidemiology of VP from a UK perspective. Only 1 low quality UK-based study reporting on the incidence of VP was identified; the study found no women diagnosed with VP among the study population.

The 2017 UK NSC review did identify evidence from countries with populations analogous to the UK, however, the incidence estimates varied considerably, leaving the UK VP incidence difficult to estimate.

Further to this, the proposed risk factors: VCI, bilobed or succenturiate placenta, low-lying placenta and *in vitro* fertilisation (IVF) were found to have a positive association with VP in the 2017 UK NSC review but there was insufficient evidence to support the role of these in screening of VP.

Additionally, amongst the small number of studies that were identified as reporting on the use of transabdominal screening for VP, none reported on the accuracy of transabdominal screening independently of transvaginal screening. Specificity and positive predictive values (PPVs) were relatively consistent, however, sensitivity results varied across studies. The review concluded that there was uncertainty about the accuracy of screening, and that evidence in this area was insufficient to recommend screening.

Although no studies were identified on the management of VP during the 2017 UK NSC review, this topic was not a focus of this evidence map since evidence on the screening test needs to be identified prior to evidence on management.

Aims of the evidence map

Evidence maps are rapid evidence products which aim to gauge the volume and type of evidence relating to a specific topic.

This evidence map was developed to assess the volume and type of evidence on key issues related to screening for VP since 2016. The search date was determined by the search period for the previous UK NSC review, which was conducted in July 2016.

The aim of this evidence map was to address the following questions:

1. Is there any UK-based epidemiological data on the prevalence of VP or its outcomes?
2. Are there any prospective studies reporting the accuracy of transabdominal ultrasound in the second trimester in the UK?

The objective, therefore, is to assess the volume and type of evidence relevant to screening for VP, with a focus on the prevalence of VP and its outcomes in the UK, as well as assessing whether there are any prospective studies reporting the accuracy of transabdominal ultrasound in the second trimester in the UK.

The findings of this evidence map will provide the basis for discussion to support decision making on whether there is sufficient evidence to justify commissioning a more sustained review of the evidence on VP in 2022. The aim of this document is to present the information necessary for the UK NSC to decide this.

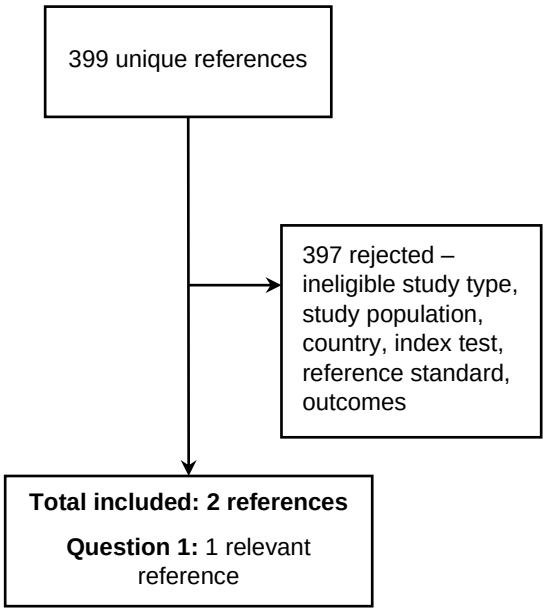
Search methods and results

The searches were conducted on 20 April 2022 in 3 databases: MEDLINE, Embase and the Cochrane Library. The search period was restricted to 1 January 2016 to 20 April 2022. The detailed search strategies, including exclusion and inclusion criteria, are available in below.

One reviewer screened all titles and abstracts with a second reviewer checking all included and 10% of excluded decisions. All references were reviewed at abstract level, though in some cases full texts were reviewed to clarify uncertain pieces of information. A formal quality appraisal of the evidence was not required, given the remit of the evidence map.

The search returned 420 results. After automatic and manual de-duplication, 399 unique references were reviewed for relevance to the review questions. One record was included in the evidence map based on abstract alone and presented relevant results for both review questions. Four abstracts were deemed potentially eligible for inclusion and the full texts were reviewed to ascertain their relevance; of these, 2 references were included in the final evidence map, with 1 study presenting results relevant to the first review question and 1 study presenting results relevant to the second review question. A flow diagram summarising the number of studies included and excluded is presented in Figure 1. Abstract reporting tables are available in 10.

Figure 1: Summary of included and excluded publications



Summary of findings

Question 1: Is there any UK-based epidemiological data on the prevalence of vasa praevia or its outcomes?

Of the 399 abstracts reviewed, 1 record was included for this review question.[8]

Zhang 2020 was a retrospective study using data from prospective screening of singleton pregnancies for VP, undertaken at the Fetal Medicine Unit at Medway Maritime Hospital, Gillingham, UK, between January 2012 and June 2018.[8] Screening for VP was based on a 2-stage strategy. In the first stage, a high-risk group was identified by the presence of VCI at the inferior part of the placenta at the 11 to 13-week scan and the presence of low-lying placenta at the 20 to 22-week scan. In the second stage, the high-risk group was examined by transvaginal sonography with colour Doppler to diagnose or exclude VP at the time of the 20 to 22-week scan by identifying vessels within 5 cm of the internal os. Of 26,830 singleton pregnancies, 22 had suspected VP, with one of these pregnancies later showing no VP, giving an overall incidence of 0.08% (21/26,830; 1 in 1278).[8]

In the 2017 UK NSC review, only 1 UK study was found, which did not identify any VP cases.[7] Zhang 2020 therefore provides the only estimate of VP incidence in a UK population. This is higher than the estimates from studies identified in the 2017 UK NSC review on populations considered to be analogous to the UK population, which ranged from 0.02% to 0.04%.[7] This could suggest that the incidence of VP is higher in the UK, although these results are from a single centre and therefore may not be representative of the UK as a whole.

According to the 2017 UK NSC review, the most commonly reported perinatal outcomes associated with VP were low birth weight, pre-term birth, and the need for emergency CS,[7] which were also identified in the Zhang 2020 study included in this evidence map.[8] Additionally, there were no stillbirths in pregnancies with a prenatal diagnosis of VP, although there was a higher prevalence of preterm birth <32 weeks, birth of a small-for-gestational age (SGA) neonate, emergency CS, postpartum haemorrhage, admission to the neonatal intensive care unit (NICU), neonatal blood transfusion, neonatal death and longer length of stay in the neonatal unit.[8]

In summary, 1 UK-based study was identified that reported on the epidemiology of VP or its outcomes.

At present, there is a very low volume of evidence on the epidemiology of VP or its outcomes in the UK to justify further work on this question.

Question 2: Are there any prospective studies reporting the accuracy of transabdominal ultrasound in the second trimester in the UK?

Of the 399 abstracts reviewed, 4 studies were identified as potentially relevant for this question. Full texts were consulted to determine their relevance. Ultimately, 1 record, reporting on 1 study, was included.[9]

Melcer 2018 was a retrospective study that included 2 cohorts of pregnancies complicated by placenta accreta spectrum (PAS) or VP.[9] The study compared the performance of screening for these conditions before and after the introduction of a targeted screening protocol at their centre (Department of Obstetrics and Gynecology, Assaf Harofe Medical Center, Tel Aviv University, Israel). Before the targeted screening protocol was introduced, 9 pregnancies were diagnosed with VP prenatally, with a detection rate of 50% (9/18).[9]

Zhang 2020 was identified as relevant for Question 1. While it did not meet the inclusion criteria for question 2, the study reported UK data on the performance of screening for VP using transabdominal ultrasound to identify specific risk factors (VCI, low-lying or bilobed placenta), followed by confirmatory transvaginal ultrasound.[8]

For the Melcer 2018 study, VP was detected with transabdominal ultrasound, but as this was followed by confirmatory transvaginal ultrasound, test accuracy was not reported separately for each step. Therefore, no evidence on the performance of transabdominal ultrasound alone was identified in the 2017 UK NSC review, there still remains a gap in the literature on this topic.[7]

In summary, 1 Israel-based study reported on the combined performance of transabdominal and transvaginal ultrasound for the screening of VP. No evidence was available for the specificity of the test.

At present, there is insufficient evidence on the performance of transabdominal ultrasound for the diagnosis of VP to justify further work on this question.

Conclusions

On the basis of this evidence map, the volume and type of evidence related to screening for VP is currently insufficient to justify an update review at this stage and so should be reconsidered in 3 years' time.

Appendix 1 — Search strategy for the evidence map

SOURCES SEARCHED: Ovid MEDLINE® In-Process & Other Non-Indexed Citations, Daily and Epub Ahead of Print, Ovid MEDLINE® and Versions 1946 to April 19, 2022, Embase® 1974 to 2022 April 19 (see Table 1 for the search terms), and the Cochrane Library (Cochrane Database of Systematic Reviews, Issue 4 of 12, April 2022; Cochrane Central Register of Controlled Trials, Issue 3 of 12, March 2022; see Table 2 for the search terms).

DATES OF SEARCH: 1st January 2016 to 20th April 2022 for all databases. Searches were run on 20th April 2022.

SEARCH STRATEGIES:

Table 1: Search Terms for MEDLINE and Embase

MEDLINE and Embase (searched simultaneously via the Ovid SP platform)		
Term group	#	Search terms
VP	1	exp Vasa Previa/
	2	(vasa previa or vasa praevia).ti,ab,kf.
	3	(vp and pregnan$).ti,ab,kf.
	4	or/1-3
Total	5	limit 4 to yr=2016-current
	6	remove duplicates from 5

Abbreviations: VP, vasa praevia.

Table 2: Search terms for the Cochrane Library

Cochrane Library (searched via the Wiley Online platform)		
Term group	#	Search terms
VP	#1	[mh "vasa previa"]
	#2	("vasa previa" or "vasa praevia"):ti,ab,kw
	#3	(vp and pregnan*):ti,ab,kw
	#4	{Or #1-#3}
Total	#5	#4 with Publication Year from 2016 to 2022, in Trials
	#6	#4 with Cochrane Library publication date Between Jan 2016 and Apr 2022, in Cochrane Reviews
	#7	#5 or #6

Abbreviations: VP, vasa praevia.

Results by database

MEDLINE and Embase	389

Cochrane Library	31
Total	420

Inclusions and exclusions

Studies were included based on the eligibility criteria listed in Table 3 for Question 1 and Table 4 for Question 2.

Table 3: Eligibility criteria for Question 1

PICOs domain	Inclusion criteria	Exclusion criteria
Patient population	Pregnant women with a diagnosis of VP	Studies that do not include women with a diagnosis of VP
Intervention	Any or none	N/A
Comparator	Any or none	N/A

Outcomes	• Prevalence
	• Incidence
	• Percentage of cases identified in the second trimester that resolve by late pregnancy
	• Risk of adverse perinatal outcomes, including, but not restricted to:
	  ○ Abnormal intrapartum fetal heart rate patterns
	  ○ Admission to neonatal intensive care unit
	  ○ Fetal growth restriction
	  ○ Low Apgar scores at 1 and 5 minutes
	  ○ Low birth weight
	  ○ Neonatal and fetal deaths
	  ○ Placental abruption
	  ○ Pre-term birth (including emergency CS)
		Studies that do not present any epidemiological outcomes

Study design	• Systematic reviews and meta-analyses • Observational studies • Cross-sectional studies	• Any other study design
Other considerations	• English language • Published in or after 2016 • Studies conducted in the UK or on UK data only	• Abstract or full-text not in the English language • Published prior to 2016 • Studies not conducted in the UK or on UK data

Abbreviations: Apgar, Appearance, Pulse, Grimace, Activity, and Respiration; CS, caesarean section; N/A, not applicable; VP, vasa praevia.

Table 4: Eligibility criteria for Question 2

PICOs domain	Inclusion criteria	Exclusion criteria
Patient population	Singleton unselected or low-risk pregnant women that would be covered by the NICE NG201 guidance[10]	Studies that do not include pregnant women
Intervention	**Index test:** • Transabdominal ultrasound with or without colour Doppler **Reference standard:** • Transvaginal ultrasound with or without colour Doppler • Other detection methods	Studies that do not include any detection method for VP
Comparator	N/A	N/A
Outcomes	• Sensitivity • Specificity • FPR • FNR • PPV • NPV	Studies that do not present any outcomes of interest
Study design	• Any original research study reporting relevant test accuracy parameters, where prospective cohort studies will be prioritised	• N/A
Other considerations	• English language • Published in or after 2016	• Abstract or full text not in the English language • Published prior to 2016

Abbreviations: FPR, false positive rate; FNR, false negative rate; N/A, not applicable; NPV, negative predictive value; PPV, positive predictive value; VP, vasa praevia.

Appendix 2 – Abstract reporting tables

Question 1

TITLE	
Citation	*Zhang W, Geris S, Beta J, et al. Prevention of stillbirth: impact of two-stage screening for vasa previa. Ultrasound in Obstetrics & Gynecology 2020;55:605-612.*
BACKGROUND	
Study type	*Retrospective cohort study*
Objectives	*To examine the feasibility and effectiveness of a two-stage ultrasound screening strategy for detection of VP and to*

	estimate the potential impact of screening on prevention of stillbirth [full text consulted]
Components of the study	***Population:*** *Women at high-risk for VP* ***Intervention (index test):*** *transabdominal ultrasound (risk factors for VP) + transvaginal ultrasound* ***Comparator (reference standard):*** *diagnosis at birth* ***Outcomes:*** *Incidence of VP, prevalence of preterm birth, delivery of an SGA neonate, emergency CS, postpartum haemorrhage, admission to NICU, neonatal blood transfusion, neonatal death and length of stay in the neonatal unit*
RESULTS	
Results	*Of 26,830 singleton pregnancies, 22 had suspected VP, with one of these pregnancies later showing no VP, giving an overall incidence of 0.08% (21/26,830; 1 in 1278).*
Conclusions	*A two-stage strategy of screening for vasa previa can be incorporated into routine clinical practice, and such a strategy could potentially reduce the rate of stillbirth.*

Abbreviations: CS, caesarean section; N/A; not applicable; NICU, neonatal intensive care unit; SGA, small-for-gestational age; VP, vasa praevia.

Question 2

TITLE	
Citation	*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;218:443.e1-443.e8.*
BACKGROUND	
Study type	*Retrospective cohort study*
Objectives	*To compare perinatal outcomes in women with PAS or VP before and after implementation of targeted screening protocols*
Components of the study	***Population:*** *2 cohorts of pregnancies complicated by PAS or VP, only the cohort examined prior to the introduction of the targeted screening protocol were relevant to the question* ***Intervention (index test):*** *non-targeted screening using transabdominal ultrasound followed by transvaginal ultrasound (relevant to the question)* ***Comparator (reference standard):*** *diagnosis at birth (inferred)* ***Outcomes:*** *DR*
RESULTS	

Results	*Before the targeted screening protocol was introduced, 18 pregnancies diagnosed with VP were identified, with a prenatal detection rate of 50% (9/18) [full text consulted]*
Conclusions	*The implementation of standardised prenatal targeted screening protocols for pregnant women with risk factors for PAS and VP was associated with improved maternal and neonatal outcomes.*

Abbreviations: DR, detection rate; PAS, placenta accrete spectrum; VP, vasa praevia.

References

1. Pavalagantharajah S, Villani LA, D'Souza R. Vasa previa and associated risk factors: a systematic review and meta-analysis. American Journal of Obstetrics & Gynecology MFM 2020;2:100117.
2. Ebbing C, Kiserud T, Johnsen SL, et al. Prevalence, risk factors and outcomes of velamentous and marginal cord insertions: a population-based study of 634,741 pregnancies. PLoS ONE [Electronic Resource] 2013;8:e70380.
3. Catanzarite V, Maida C, Thomas W, et al. Prenatal sonographic diagnosis of vasa previa: Ultrasound findings and obstetric outcome in ten cases. Ultrasound in Obstetrics and Gynecology 2001;18:109-115.
4. Bronsteen R, Whitten A, Balasubramanian M, et al. Vasa Previa: Clinical Presentations, Outcomes, and Implications for Management. Obstetrics & Gynecology 2013;122.
5. Rebarber A, Dolin C, Fox NS, et al. Natural history of vasa previa across gestation using a screening protocol. J Ultrasound Med 2014;33:141-7.
6. Ruiter L, Kok N, Limpens J, et al. Incidence of and risk indicators for vasa praevia: a systematic review. BJOG: An International Journal of Obstetrics & Gynaecology 2016;123:1278-87.
7. UK National Screening Comittee (UK NSC). Screening for vasa praevia in the second trimester of pregnancy. Version date: Final - June 2017.
8. Zhang W, Geris S, Beta J, et al. Prevention of stillbirth: impact of two-stage screening for vasa previa. Ultrasound in Obstetrics & Gynecology 2020;55:605-612.
9. 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;218:443.e1-443.e8.
10. National Institute for Health and Care Excellence (NICE). Antenatal care NICE guideline [NG201]. Available at: https://www.nice.org.uk/guidance/ng201/chapter/Recommendations. Last accessed April 2022.