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RCOG GUIDELINES

Placenta Praevia and Placenta Accreta Spectrum: Diagnosis and Management

Green-Top Guideline No. 27a

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KEY RECOMMENDATIONS

Placenta Praevia

- The fetal anomaly screening (FAS) ultrasound examination at 18^{+0}–20^{+6} weeks of gestation should include placental location. [Grade A]
- For pregnancies more than 16 weeks of gestation, the placental location should be recorded on ultrasound imaging as praevia if covering (partially or completely) the internal os of the uterine cervix, and low-lying if its leading edge is less than 20 mm from the internal os. [Grade B]
- Women with a symptomatic (pain and/or bleeding) low-lying placenta or placenta praevia should be provided with antenatal care, including hospitalisation, tailored to their individual clinical needs and social circumstances. [Grade GPP]
- Asymptomatic pregnant women with a low-lying placenta or placenta praevia can be cared for as outpatients, and should be offered follow-up ultrasound examination, including, where necessary, a transvaginal scan at 32 weeks of gestation, by an experienced operator for delivery management planning. [Good Practice Point (GPP)]
- Tocolysis for women presenting with a symptomatic placenta praevia may be considered for 48 h, to facilitate administration of antenatal corticosteroids, but cervical cerclage is not recommended. [Grade C]
- Corticosteroids between 24^{+0} and 34^{+6} weeks of gestation (and magnesium sulphate up to 30^{+0} weeks of gestation) should be offered to pregnant women with a placenta praevia in whom imminent preterm birth is anticipated (either due to established preterm labour or planned preterm birth for medical indications). [Grade A]
- For women presenting with an uncomplicated low-lying placenta or placenta praevia, the timing of birth should be tailored according to antenatal symptoms, and planned birth should be considered no later than 37^{+6} weeks of gestation. [Grade A]
- Women presenting with a placenta praevia carry a high risk of emergency caesarean birth, intraoperative haemorrhage, postpartum haemorrhage and hysterectomy, and birth should be arranged in a maternity unit with on-site blood transfusion services and access to critical care. [Grade C]
- Intraoperative cell salvage is beneficial and safe for women with a placenta praevia, in particular for women who decline transfusion of blood products for personal or religious reasons. [Grade B]

This is the fifth edition of this guideline. The first, published in 2001, was entitled *Placenta Praevia: Diagnosis and Management*; the second, published in 2005, was entitled *Placenta Praevia and Placenta Accreta: Diagnosis and Management*; the third, published in 2011, was entitled *Placenta Praevia, Placenta Accreta and Vasa Praevia: Diagnosis and Management*, and the fourth was divided into Green-top Guideline no. 27a *Placenta Praevia, Placenta Accreta Diagnosis and Management* and Green-top Guideline no. 27b *Vasa Praevia: Diagnosis and Management*.

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- If pharmacological measures (uterotonics and tranexamic acid) fail to control haemorrhage during and after birth in women with low-lying placenta or placenta praevia, intrauterine balloon tamponade should be initiated, and uterine compression sutures should be considered. [Grade B]

Caesarean Scar Pregnancy

- Women diagnosed with a live caesarean scar ectopic pregnancy at the end of the first trimester of pregnancy must be informed by an expert consultant of the high risk of developing major complications such as placenta praevia and placenta praevia accreta in the second and third trimester. [Grade B]

Placenta Accreta Spectrum

- Women at high risk of placenta accreta spectrum (PAS) at birth (previous history of caesarean birth presenting with an anterior low-lying placenta or placenta praevia) should be identified at the first antenatal appointment and provided with a care plan including screening for ultrasound signs associated with PAS at the 18^{+0}–20^{+6} weeks FAS ultrasound examination. [Grade C]
- Where ultrasound imaging expertise, including transvaginal scan, is available, routine MRI is not recommended in the evaluation of women with a high probability of PAS at birth. [Grade C]
- Women with a high risk of PAS identified on FAS scan at 18^{+0}–20^{+6} weeks of gestation should be assessed by a multidisciplinary team in a specialist centre with expertise in regularly performing and managing complex caesarean sections. [Grade B]
- The timing of birth of women with a high probability of PAS should be tailored according to antenatal symptoms and placental location. In the absence of risk factors for PTB and/or antenatal bleeding, planned birth at 36^{+1} to 37^{+0} weeks of gestation provides the best balance between prematurity and the risk of operative complications associated with unscheduled delivery. [GPP]
- Delivery of women with a high probability of PAS at birth should take place in a specialist centre with an MDT with expertise in complex obstetric surgery and logistic support for immediate access to blood products, adult intensive care unit and neonatology support. [Grade B]
- Attempting to separate the placenta from the uterine wall or intentionally incising through the placenta for fetal extraction should be avoided in all women with a high probability of PAS at birth. [Grade B]
- There is no evidence to support the routine use of prophylactic ureteric stents in the surgical management of PAS; however, collaboration with a urologic surgeon is advisable in cases presenting with major uterine remodelling and hypervascularity of the bladder–uterine interface on preoperative imaging. [Grade C]
- There is insufficient evidence to support the use of any interventional radiology procedures in the routine care of PAS. [Grade C]
- When the placenta is left in situ after delivery of the fetus, local arrangements need to be made to ensure regular review, ultrasound examinations and access to emergency care should the woman experience complications such as bleeding or infection. Methotrexate adjuvant therapy should not be used in this context. [Grade D]
- The woman with a high probability of PAS at birth and her partner should be involved in the preoperative decision concerning the mode of anaesthesia and postoperative discussion about pain control and informed of the availability of psychological support before and after birth. [Grade C]
- Women with PAS who were managed conservatively (uterine preservation surgery or placenta left in situ) should be informed of the high risk of recurrence in subsequent pregnancies. Contraceptive choices should be discussed. [Grade C]

1 | Purpose and Scope

The purpose of this guideline is to describe the diagnostic modalities and review the evidence-based approach to the clinical care of pregnancies complicated by placenta praevia and placenta accreta spectrum (PAS). Many observational studies lack a rigorous design for diagnosing these conditions, and there are very few randomised controlled trials (RCTs) to support specific approaches to care, which limits the ability to provide detailed, evidence-based recommendations for certain aspects of care. The phrase Placenta Accreta Spectrum (PAS) has replaced the previous descriptive term ‘abnormally invasive placenta’ (AIP).

This guideline is for healthcare professionals who care for women, non-binary, and trans people with placenta praevia or PAS. Within this document, we use the terms woman and women's health. However, it is important to acknowledge that it is not only women for whom it is necessary to access reproductive health services and reproductive wellbeing.

2 | Introduction and Background Epidemiology

Placenta praevia and PAS are associated with high maternal and neonatal morbidity and mortality, due to antepartum haemorrhage (APH) and/or major obstetric haemorrhage (MOH) during birth and preterm birth (PTB) [1, 2]. Rates of both placenta praevia and PAS have increased. They are likely to continue doing so as a result of rising rates of caesarean births and the use of assisted reproductive technology (ART), particularly in vitro

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fertilisation (IVF) [2, 3]. The highest rates of complication for both the woman and their newborn are observed when these conditions coexist and are only diagnosed during birth [4–8]. Unlike other placental-related complications of pregnancy, such as pre-eclampsia, there is no evidence of ethnic variations in the prevalence or incidence of placenta praevia and PAS.

2.1 | Placenta Praevia

The first clinical description of a placenta praevia is attributed to Paul Portal, a 17th-century French surgeon [9], and identifying placental location became one of the first aims of the use of ultrasound in obstetric care [10, 11]. Determining the placental location is now part of the fetal anomaly screening (FAS) scan, also known as the mid-pregnancy fetal anomaly scan worldwide [12]. It is performed routinely at 18^{+0}–20^{+6} weeks of gestation in the UK.

For pregnancies more than 16 weeks of gestation, the placenta should be reported as 'low-lying' when the presenting placental edge is less than 20 mm from the internal os (IO) of the uterine cervix, but not covering it, and as normal when the placental edge is 20 mm or more from the IO on ultrasound imaging [13]. If the placental edge reaches or covers the IO on ultrasound examination, the placenta should be reported as praevia. Both this and the previous edition of this guideline endorse this ultrasound classification, as this standardised protocol is less confusing than the old clinical classification (low-lying, marginal, partial covering) and better defines the risks of perinatal complications, such as APH and postpartum haemorrhage (PPH), and has been shown to improve the obstetric care of both placenta praevia and placenta praevia accreta [14, 15].

The reported prevalence of placenta praevia in the second half of pregnancy ranges between 1 in 50 and 1 in 500 pregnancies [12, 16]. These numbers depend on gestational age at diagnosis confirmation, the use of transvaginal ultrasound (TVS) together with the standardised classification described above, and on the incidence of the main risk factors across different populations, that is, the number of prior caesarean births and IVF conceptions. The relationship between a low-lying placenta or placenta praevia and a velamentous insertion of the umbilical cord is presented and discussed in the related Green-top Guideline no. 27b *Vasa Praevia: Diagnosis and Management*.

2.2 | Placenta Accreta Spectrum

Clinical diagnosis of placenta accreta can only be made at birth when the placenta cannot be detached manually from the uterine wall. The histopathologic criteria used to describe placenta accreta were published between the 1920s and 1970s and include a total or partial absence of decidua basalis with villous tissue directly attached or sometimes growing in between the individual fibres of the myometrium (increta) [17–19]. Some authors have also hypothesised that, in some cases, the villous tissue could invade the entire uterine wall and beyond, into the surrounding pelvic tissues and organs (percreta) [19, 20]. These descriptions have been used ever since by pathologists to confirm the diagnosis of PAS at birth and included in 2019 the International Federation of Gynaecology and Obstetrics (FIGO) placenta accreta spectrum (PAS) classification [21] and endorsed in 2020 by the Society for Paediatric Pathology [22].

There are no reported cases with histologic evidence of normal placental villous tissue found to spontaneously 'invade' the entire thickness of the uterine wall and beyond [23–26]. Studies have shown that the clinical and histopathologic descriptions of placenta percreta are a consequence of uterine scarring with secondary dehiscence and intraoperative dissection of the lower uterine segment (LUS). Abnormal villous attachment into the myometrial scar area, that is, superficial (creta/adherenta) and deep (increta), can be found in the same specimen. Therefore, accreta placentation can be described as a spectrum depending on the location, depth of abnormal attachment and lateral extension of the accreta area [2, 23–26]. Overall, the lack of a limited clinical description and/or detailed histopathologic data at birth is a major limitation for interpreting the results of many observational studies on PAS [27, 28]. These diagnostic difficulties can explain the current wide variation in the reported prevalence of PAS, ranging from 1 in 100 to 1 in 10 000 pregnancies [27], and highlight the need for standardised imaging, clinical and histopathologic protocols. The above findings have also highlighted the need for a new PAS classification [2].

When the placenta spontaneously detaches soon after birth, or can be manually totally removed, or when retained placental tissue can be removed by simple curettage/aspiration without the need to surgically remove the part of the uterine wall under the area of abnormal villous attachment [29], the case should not be reported as PAS in the patient record or maternity database [30].

The continuous rise in caesarean birth rates has changed the epidemiology and pathophysiology of PAS [2, 31]. Over the last decade, there has been mounting evidence that most cases of PAS result from placentation into a caesarean scar defect (CSD) [32]. Some clinical aspects of caesarean scar ectopic pregnancy (CSEP) are therefore included in the present guideline.

3 | Identification and Assessment of Evidence

The Cochrane Library and electronic databases (MEDLINE, EMBASE, Trip and PubMed) were searched using the relevant Medical Subject Headings (MeSH) terms, including all subheadings, and this was combined with a keyword search. The databases were searched for relevant randomised controlled trials (RCTs), systematic reviews, and meta-analyses. Search words included 'low-lying placenta'; 'placenta praevia', 'low lying placenta', 'placenta accreta', 'placenta increta', 'placenta percreta', 'abnormally adherent placenta', and 'abnormally invasive placenta'. The search was restricted to human studies and the English language. The search was restricted to articles published between December 2017 and June 2025 (the search for

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the previous Guideline was up to November 2017). The National Library for Health and the National Guideline Clearinghouse were also searched for relevant guidelines and reviews. Papers identified by peer reviewers and the developers which fall outside the literature searches which may be more recent have also been included. The full search strategy is available in Appendices S1 and S2.

This guideline was developed using the methodology described in the Royal College of Obstetricians and Gynaecologists (RCOG) handbook Developing a Green-top Guideline: Guidance for developers. Where possible, recommendations are based on available evidence. In the absence of published evidence, these have been annotated as 'good practice points'. Further information about the assessment of evidence and the grading of recommendations may be found in Appendix 1.

4 | What Are the Risk Factors Associated With Low-Lying Placenta or Placenta Praevia?

A 2018 systematic review and meta-analysis found that, compared to vaginal birth, a caesarean birth was associated with an odds ratio (OR) of 1.74 (95% CI 1.62–1.87; $n = 7\,101\,692$; 10 studies) of placenta praevia in the subsequent pregnancy [31] (Table 1). *[Evidence level 2++]*

In 1997, a meta-analysis of the association of placenta praevia with history of caesarean birth found a dose–response pattern for the relative risk (RR) of placenta praevia of 4.5 (95% CI 3.6–5.5) for one, 7.4 (95% CI 7.1–7.7) for two, 6.5 (95% CI 3.6–11.6) for three, and 44.9 (95% CI 13.5–149.5) for four or more prior caesarean births compared with vaginal birth [33]. A systematic review and meta-analysis of 22 studies including over two million births indicated that the incidence of placenta praevia increases from 10 in 1000 births with one previous caesarean birth to 28 in 1000 after more than three caesarean births [34]. A 2014 meta-analysis confirmed these findings and reported an overall OR of 1.47 (95% CI 1.44–1.51) for placenta praevia after caesarean birth [35]. *[Evidence level 2++]*

A second pregnancy within 1 year of a caesarean birth is associated with an increased risk of placenta praevia as compared to intervals longer than 1 year [36]. Compared with vaginal birth, a previous prelabour caesarean birth is associated with an increased risk of placenta praevia in the second birth [37]. *[Evidence level 2+]*

TABLE 1 | Epidemiologic factors associated with placentation in the LUS.

Risks factors	Evidence level
Previous caesarean birth	2++
Multiple pregnancies	2+
Pregnancy resulting from IVF	2++
History of endometriosis	2+
Maternal smoking	1+
Uterine fibroid	1+
Short pregnancy interval (< 1 year)	1+
Advanced maternal age	2–

Abbreviation: IVF, in vitro fertilisation.

There have been contradictory reports regarding the incidence of placenta praevia in multiple pregnancies. A retrospective cohort study of 1 172 405 twin live births and stillbirths in the USA between 1989 and 1998 found no increased risk in twins [38]. A retrospective cohort of 67 895 singleton and twin pregnancies found that both dichorionic and monochorionic twin pregnancies had an increased risk of placenta praevia compared with singletons [39]. *[Evidence level 2+]*

An association between IVF and a higher incidence of pregnancies with a placenta praevia was first reported by Steptoe et al. in 1980, 2 years after the birth of the first IVF baby [39]. The relationship between IVF and placentation in the LUS is now well established and is independent of the high rate of multiple pregnancies associated with IVF [40–46]. In 2019, a systematic review and meta-analysis of 33 low/moderate quality studies evaluating 124 215 ART and 6 054 729 non-ART singleton pregnancies reported an increased risk (OR 3.76, 95% CI 3.09–4.59) in ART pregnancies compared to spontaneous conceptions [42], confirming the findings of previous systematic reviews [40, 41]. A Scandinavian population-based cohort study including data on 146 998 pregnancies resulting from ART over 20–25 years found that over time, the risk of placenta praevia increased in pregnancies after ART among both singletons and twins, but remained stable in spontaneously conceived pregnancies [43]. A retrospective multicentre cohort study in Massachusetts of 1939 pregnancies conceived with ART found an incidence of 2.9% of placenta praevia at birth [44]. *[Evidence level 2++]*

In 2018, a systematic review of the perinatal outcomes of endometriosis of 33 observational studies including 3 280 488 pregnancies found that women with endometriosis are at higher risk of placenta praevia (OR 3.31, 95% CI 2.37–4.63) in pregnancies resulting from both spontaneous conception and ART [47]. This finding was confirmed by a 2021 systematic review of 7 184 313 pregnancies without endometriosis compared with 98 463 pregnancies with endometriosis (aOR 3.17, 95% CI 2.58–3.89) [48]. When stratified according to histologic confirmation, the risk increased in women with confirmed endometriosis (aOR 4.23, 95% CI 1.74–10.30) [48]. New data support an association between endometriosis and the risk of placenta praevia. A French nationwide cohort of 4 121 767 singleton births, including 38 035 diagnosed with endometriosis, has reported an overall increased risk of placenta praevia in women with endometriosis, including in those with pregnancies resulting from ART [49]. *[Evidence level 2+]*

A 2017 meta-analysis of the impact of maternal smoking on placental position [50] (OR 1.42, 95% CI 1.30–1.50) has found an increased risk of placenta praevia, and a 2019 meta-analysis found an increased risk (2.21, 95% CI 1.48–2.94) in women with fibroids [51]. *[Evidence level 1+]*

Advanced maternal age (35 years and older) has also been associated with a small increase in the risk of placenta praevia

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in spontaneous conceptions in a large population-based study [52]; however, this effect is likely to be confounded by the association between increased parity and advancing maternal age. *[Evidence level 2–]*

5 | Antenatal Diagnosis and Care of Women With Low-Lying Placenta or Placenta Praevia

5.1 | Antenatal Screening and Diagnosis

5.1.1 | Screening for a Low-Lying Placenta or Placenta Praevia and Follow-Up

Recommendation	Evidence quality	Strength	Rationale for the recommendation
The fetal anomaly screening scan at 18^{+0}–20^{+6} weeks of gestation should include placental location	4	A	Undiagnosed placenta praevia is associated with a high maternal and neonatal morbidity
The placental location should be recorded as praevia if the presenting edge reaches or covers (partially or completely) the internal os (IO) and low-lying if its edge is less than 20 mm from the IO after 16 weeks of gestation	4	B	The use of standardised protocol for the diagnosis and follow-ups of women presenting with low placentation is essential to optimise maternal and perinatal outcomes
A follow-up ultrasound examination including, where necessary, a TVS is recommended at 32 weeks of gestation to diagnose a persistent low-lying placenta or to confirm a placenta praevia. The corresponding management should be discussed with the obstetric team in charge of the patient care	4	D	Between mid-gestation and 37 weeks of gestation, over 90% of placentas recorded as low-lying are no longer low-lying

The use of ultrasound imaging in antenatal care has been pivotal in the diagnosis of placenta praevia before birth, an obstetric condition which, up to 50 years ago, was a leading cause of perinatal morbidity and mortality worldwide [53, 54]. Ultrasound imaging has rapidly become essential in the care of women presenting with an APH [55], however, the UK National Screening Committee (UK NSC) has never recommended a national screening programme for placenta praevia. The national guidance, information and processes for the NHS England Fetal Anomaly Screening Program (FASP) state that the examination of placental position and amniotic fluid at the 18^{+0}–20^{+6} week FAS scan is not part of the NHS FASP but is good clinical practice (https://www.gov.uk/guidance/fetal-anomaly-screening-programme-overview). The National Institute for Health and Care Excellence (NICE) Guideline [NG201] *Antenatal Care* recommends offering all pregnant women a screen for fetal anomalies and to determine the placental location at the routine mid-pregnancy scan (https://www.nice.org.uk/guidance/ng201). *[Evidence level 4]*

A prospective study of 381 singleton pregnancies with a live fetus at 11–14 weeks of gestation attending for routine antenatal care found that, when the placental edge overlaps the IO by 23 mm or more at 11–14 weeks, the probability of placenta praevia at term is 8% with a sensitivity of 83.3% and specificity of 86.1% [56]. This strategy is not sustainable in routine obstetrics antenatal care as it would require all women to have a TVS at the 11–14 week ultrasound examination by an expert operator. The Society of Obstetricians and Gynaecologists of Canada (SOGC) guideline on the diagnosis and care of placenta praevia recommends that a diagnosis of placenta praevia or low-lying placenta should not be made before 18 weeks of gestation [57]. *[Evidence level 4]*

The development of the LUS during the second half of pregnancy results in the resolution (also called 'placental migration') of over 90% of placentas identified as low-lying on transabdominal ultrasound (TAS) at the mid-trimester scan before 37 weeks [58–60]. A 2019 systematic review and meta-analysis of 11 eligible studies, including 3586 women with a low-lying placenta (placental edge 20 mm or less from the IO) in the second trimester, found that in over two-thirds of women the placenta will be entirely located within the upper segment in the third trimester [61]. *[Evidence level 2++]*

In twin pregnancies, the likelihood of persistent placenta praevia is also dependent on the gestational age at which it is sonographically detected. Retrospective cohort studies of twin pregnancies with placenta praevia diagnosed in the second trimester reported that the majority will have resolved by 32 weeks of gestation [38, 62]. After 32 weeks of gestation, around 50% of the remaining placenta praevia will resolve, with no further changes after 36 weeks of gestation [38]. *[Evidence level 2–]*

The high resolution of TVS imaging and the proximity of the probe to the regions of interest allow for the detailed examination of the cervix, LUS and urinary bladder that would otherwise be difficult on TAS, particularly in women with a high body mass index (BMI). TVS has a higher accuracy at 32–36 weeks of gestation than TAS in the differential diagnosis between a low-lying placenta and a placenta previa [12]. Traditionally, recommendations on the timing of a confirmatory ultrasound examination in the third trimester for a low-lying placenta or asymptomatic placenta praevia on TAS at the mid-trimester fetal anatomy scan have been at 32 weeks of gestation [12, 63], or after 32 weeks [57] of gestation. If the placental edge remains low-lying or praevia, a follow-up TVS should be performed at 36 weeks for delivery management (Appendix 2). *[Evidence level 4]*

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5.1.2 | What Is the Role and What Are the Risks of TVS?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
A TVS examination should be included in the third-trimester ultrasound follow-up(s) of asymptomatic women presenting with a low-lying placenta or placenta praevia at the 18^{+0}–20^{+6} week FAS scan, and for all women presenting with bleeding in the second or third trimester	2+	C	TVS is more accurate than TAS to differentiate between low-lying placenta and placenta praevia and is safe even in symptomatic women
The timing of the follow-up ultrasound examinations and informed discussion about mode of birth in persistent low-lying placenta should be tailored according to the woman's symptoms and TVS findings	2+	C	Individualising women's follow-up and birth planning allows proactive management of risks

Ultrasound examination to determine the placental location can be done transabdominally, transvaginally, transperineally or transrectally [64]. TVS was first used in the diagnosis of placenta praevia 35 years ago and is shown to be safe in women presenting with bleeding [65]. The majority of pregnant women who have TVS reported finding the experience acceptable [66], and TVS is safe in women suspected of having a placenta praevia on TAS [67, 68]. The data from one small RCT ($n = 38$) [69] and one small quasi-RCT ($n = 13$) [70] comparing TAS and TVS for placenta praevia support the safety of the TVS profile and report superior views, especially for posterior placentas. *[Evidence level 2+]*

TVS will re-classify up to 60% of placentas diagnosed as low-lying at the routine fetal anomaly transabdominal scan [71–78]. Overall, TVS has a high accuracy (positive predictive value of 93.3%, negative predictive value of 97.6% and false-negative rate of 2.33%) in predicting placenta praevia in women diagnosed with a low-lying placenta on TAS in the second and early third trimester, with a sensitivity of 87.5% and a specificity of 98.8% [67]. A Dutch prospective cohort study of 958 women with a low-positioned placenta confirmed on TVS found that only 5% of those diagnosed with a low-lying placenta at 18–24 weeks of gestation still have a low-lying placenta at 32–36 weeks [76]. A secondary analysis of the data of 313 women from the same cohort with a placenta praevia in the second trimester found that 14% still had a placenta praevia in the third trimester [77]. *[Evidence level 2+]*

TVS also allows accurate measurement of the distance between the placental edge and the IO [12, 14, 76–81]. A retrospective study of 658 women with a low-lying placenta or placenta praevia at mid-trimester anatomy scan, with known distance from the IO, found that the probability of resolution was inversely proportional to the distance from the IO. Resolution is nearly universal in women with an initial distance from the IO greater than 10 mm [81]. The findings of this study also indicated that the distance between the placental edge and the IO on TVS, as the threshold to recommend follow-up sonograms, could be reduced from 20 mm to 5 mm without missing any high-risk women [76]. *[Evidence level 2+]*

TVS has been increasingly used to measure cervical length (CL), and cohort studies with low risk of confounding bias have shown that CL is a predictor of antepartum bleeding and emergency preterm caesarean birth in placenta praevia [82–85]. A systematic review and meta-analysis of 13 observational studies reported that a CL of 30 mm or less at 28–34 weeks of gestation is associated with antenatal bleeding (OR 3.62, 95% CI 2.09–6.26), preterm birth (OR 8.46, 95% CI 3.05–23.44) and PPH (OR 6.89, 95% CI 4.51–10.53), suggesting that measurements of CL can assist in predicting the risk of perinatal complications in women with persistent placenta praevia at follow-up scans [86]. *[Evidence level 2+]*

5.2 | Antenatal Care

The goals for the care of women with a low-lying or placenta praevia should be tailored according to clinical symptoms, mainly antenatal bleeding and preterm labour, local protocols and the personal goals and social circumstances of pregnant women. Women with a low-lying placenta or placenta praevia, and their family members, should be informed and have a clear understanding of the signs and symptoms that warrant an immediate visit to the hospital for possible antenatal admission.

5.2.1 | Where Should Women With a Low-Lying Placenta or Placenta Praevia Be Cared for in the Third Trimester?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
Women with a symptomatic low-lying placenta or placenta praevia (including spotting, contractions or pelvic pain) should be provided with antenatal care, including hospitalisation, tailored to their individual clinical need and social circumstances, such as distance between home and maternity hospital and availability of transportation	4	GPP	Women should be informed of the risks associated with a low-lying placenta and placenta praevia and be provided with an emergency plan, including emergency contact numbers

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Recommendation	Evidence quality	Strength	Rationale for the recommendation
Women with an asymptomatic placenta praevia confirmed at the 32-week follow-up scan can be cared for as outpatients but should be encouraged to ensure they have safety measures in place, including access to help at home and ready access to the hospital	4	GPP	Women presenting with a low-lying placenta or placenta praevia should be informed about the risks of antenatal bleeding and preterm labour as major haemorrhage is more likely as pregnancy advances

A systematic review and meta-analysis of 29 studies, including 4687 pregnant women with placenta praevia, reported a pooled overall prevalence of APH of 51.6% (95% CI 42.7–60.6) [87]. There was a high heterogeneity between studies due to differences in the distribution of obstetric, social and lifestyle confounding factors associated with antenatal bleeding as identified by the authors, but also probably due to differences in gestational age at diagnosis, in the definition of the different grades of low placentation, description of the placental position on ultrasound imaging and the use of TVS. *[Evidence level 1–]*

Two large retrospective studies have reported on the obstetric outcomes of women presenting with a placenta praevia. The first study included 513 women diagnosed antenatally with a low-lying placenta or placenta praevia after 28 weeks of gestation, of whom 67.3% gave birth at term. The authors found that APH was associated with an increased risk of blood transfusion, emergency caesarean birth and PTB after 32 weeks of gestation [88]. The second study included women diagnosed at the time of birth and compared major (complete and partial praevia) with minor (marginal and low-lying) cases. The authors found that major cases had an increased risk of APH, birth at an earlier gestational age (36.1 weeks versus 37.4 weeks), and a greater incidence of unscheduled caesarean births (51% vs. 40%) [89]. *[Evidence level 2–]*

5.2.1.1 | Women With Recurrent Bleeding. The retrospective analysis of the antenatal data of 250 women presenting with placenta praevia at the routine fetal anomaly scan found that the risk of emergency caesarean birth is increased if the first (sentinel) vaginal bleeding episode occurs before 29 weeks of gestation, and with the occurrence of three or more episodes of APH [90]. Similarly, a retrospective study of 214 women with singleton pregnancies found that the risk of preterm emergency caesarean birth increases with the number of antepartum bleeding episodes [91]. A retrospective case–control study including 125 singleton women with placenta praevia found an association between APH, premature contractions and CL < 2.5 cm [92]. Overall, the risk of unscheduled birth increases with earlier gestational age of the first episode of antepartum bleeding, increasing number of bleeding episodes and shorter length of the cervix. *[Evidence level 2+]*

The Cochrane systematic review on the impact of an intervention in women diagnosed with, or likely to have, placenta praevia, which has not been updated since October 2003, includes only one small RCT ($n = 53$) comparing hospital versus home care for symptomatic placenta praevia [93]. This trial found little evidence of any clear advantage or disadvantage to a policy of home versus hospital care, and the only significant difference was a reduction in length of hospital stay [94]. *[Evidence level 1–]*

5.2.1.2 | Asymptomatic Women. Women with asymptomatic placenta praevia (no bleeding or contractions) can be cared for as outpatients with similar outcomes compared with hospitalisation and at lower cost [95]. There is a need for further prospective clinical studies, including ultrasound parameters such as the distance between the placental edge and the IO, the lower placental edge thickness, and CL, to evaluate the risks of third-trimester bleeding and premature labour (Appendix 2). The woman's obstetric history and in particular, a history of previous caesarean births and/or preterm birth are also essential in tailoring the antenatal care of individual women. *[Evidence level 4]*

5.2.2 | Is There a Place for Preventive Interventions of Preterm Birth in Women Diagnosed With a Low-Lying Placenta or a Placenta Praevia?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
Tocolysis for women presenting with a symptomatic placenta praevia may be considered for 48 h to facilitate administration of antenatal corticosteroids	1–	C	Pregnancy can be prolonged for more than 7 days with continued tocolytics
Routine use of cervical cerclage is not recommended in women presenting with low-lying placenta or placenta praevia alone	1+	C	There is insufficient evidence on the efficacy of cervical cerclage and safety in women with a placenta praevia

The most critical impact on neonatal morbidity associated with low-lying or placenta praevia is PTB [96]. A systematic review and meta-analysis found that the PTB rates for low-lying/marginal placenta and placenta praevia are 26.9% and 43.5%, respectively. Based on comparative studies using controls with normal placental location, placenta praevia is associated with an increased risk for PTB (RR 5.32, 95% CI 4.39–6.45) and related complications, that is, neonatal intensive care unit (NICU) admissions (RR 4.09, 95% CI 2.80–5.97), neonatal death (RR 5.44, 95% CI 3.03–9.78) and perinatal death (RR 3.01, 95% CI 1.41–6.43) [97]. *[Evidence level 2++]*

A systematic review on the use of tocolytics in women with symptomatic preterm placenta praevia, including two retrospective studies ($n = 217$) and one RCT ($n = 60$), reported inadequate outcomes [98]. The RCT reported that pregnancy can be prolonged for more than 7 days with continued tocolytics (OR 3.10, 95% CI 1.38–6.96). When combined with the data of retrospective studies, the results did not reach significance. The RCT was judged inadequately compliant with the Consolidated Standards of Reporting Trials statement [98]. *[Evidence level 1–]*

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A double-blind, placebo-controlled, multicentre RCT involving 109 women at 24^{+0}–33^{+6} weeks of gestation with at least one episode of bleeding due to placenta praevia and intact membranes has demonstrated that there is no difference in the prolongation of pregnancy between the nifedipine ($n = 54$) and placebo ($n = 55$) groups [99]. Adverse perinatal outcomes were comparable between groups. *[Evidence level 1+]*

The 2003 Cochrane systematic review [93] on the impact of cerclage in women diagnosed as having, or likely to have, placenta praevia included two small RCTs ($n = 25$ and $n = 36$, respectively) comparing cervical cerclage with no cerclage. There may be a reduction in preterm births before 34 weeks of gestation; however, the evidence is not robust enough to recommend its use outside of clinical trials. There are also major concerns about the safety of this procedure, with the placenta partially or completely covering the IO of the cervix. *[Evidence level 1–]*

A systematic review and meta-analysis of 34 observational studies reporting on PTB and preventive intervention in women with low placentation found that those with a placenta praevia were more likely to have a PTB before 37 weeks of gestation compared to those with a low-lying placenta (OR 1.69, 95% CI 1.35–2.11) [100]. The pooled effect of the three RCTs reporting on gestational age at birth after cerclage in women with a low-lying placenta showed no significant difference. By contrast, intramuscular progesterone showed a significant prolongation of gestation in favour of women with a placenta praevia treated with progesterone in two out of three RCTs. *[Evidence level 1+]*

Overall, existing data do not support the use of cerclage in women with a low-lying or placenta praevia and highlight the need for larger RCTs on the use of progesterone in this context. *[Evidence level 4]*

5.2.3 | At What Gestation Should Women Diagnosed With a Placenta Praevia or a Low-Lying Placenta Be Offered Antenatal Corticosteroids and Magnesium Sulphate?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
Corticosteroids should be offered between 24^{+0} and 34^{+6} weeks of gestation and magnesium sulphate up to 30^{+0} weeks of gestation to women in whom imminent PTB is anticipated (either due to established PTB or planned PTB for vaginal bleeding). The benefit of corticosteroids after 35^{+0} weeks of gestation should be discussed with the woman	2++	A	Recommended in RCOG Green-top Guideline No 74 [101].

Data on the use of corticosteroids in women presenting with a low-lying placenta are limited. A retrospective cohort study of 202 women admitted to a tertiary referral centre at 24–34 weeks of gestation with vaginal bleeding due to placenta praevia or low-lying placenta reported that 15% and 22% gave birth within 7 and 14 days from admission, respectively [102]. A complete placenta praevia, severe bleeding at presentation, uterine contractions at presentation and CL less than 25 mm at presentation were independently associated with birth within 14 days from admission, suggesting that these risk factors could allow selective (rather than routine) administration of antenatal corticosteroids. *[Evidence level 2+]*

There are currently no data on the use of repeat doses of antenatal corticosteroids in women presenting with low placentation and recurrent bleeding episodes. Within this context, we will refer to Green-top Guideline No. 74 *Antenatal corticosteroids to reduce neonatal morbidity and mortality* [101] and NICE guideline [NG25] *Preterm labour and birth* (www.nice.org.uk/guidance/ng25). *[Evidence level 4]*

RCOG Green-top Guideline No. 74 recommends intravenous magnesium sulphate for a maximum of 24 h for neuroprotection of the premature newborn up to 30^{+0} weeks of gestation in women in established labour or having a planned birth within 24 h [101]. NICE guideline [NG25] allows consideration of magnesium sulphate use up to 33^{+6} weeks of gestation (www.nice.org.uk/guidance/ng25). *[Evidence level 4]*

6 | Optimising Birth for Women With Low-Lying Placenta or Placenta Praevia

6.1 | At What Gestation Should a Planned Birth Occur?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
Timing of birth should be tailored according to antenatal symptoms. Planned birth should be considered no later than 37^{+6} weeks of gestation for women presenting with asymptomatic low-lying placenta or placenta praevia	2+	C	The risk of haemorrhage associated with low-lying placenta or placenta praevia increases with advancing gestation

The risks of APH leading to the need for emergency birth increase with advancing gestational age, whereas the risks of morbidity associated with prematurity decrease [57, 63, 103–106]. A decision analytic model designed to compare total maternal and neonatal quality-adjusted life years for delivery of women with placenta praevia at 34^{+0} to 36^{+6} weeks of gestation has indicated that corticosteroid administration at 35^{+5} weeks of gestation followed by planned birth at 36 weeks of gestation optimises maternal and neonatal outcomes [103].

A US population-based cohort study of 4 118 956 births, including 5675 women with placenta praevia (0.13%), has evaluated the effects of birth with placenta praevia at 35, 36 and 37 weeks of gestation on the risk of several neonatal outcomes [107].

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Compared with neonates born at 38 weeks of gestation, those born at 35, 36 and 37 weeks of gestation have no greater odds of meconium passage, fetal distress, fetal anaemia, neonatal seizures, increased ventilator needs or infant death at 1 year. However, the incidence of 5-min Apgar scores below 7 and NICU admission rates are higher at 35 and 36 weeks of gestation. *[Evidence level 2+]*

As the risk of major APH increases rapidly after 35 weeks of gestation, expert opinions have previously highlighted that decisions regarding the timing of birth must be individualised and suggested that, based on the limited data available, women with uncomplicated low-lying placenta or placenta praevia should give birth by caesarean section no later than 37^{+6} weeks of gestation [57, 63]. *[Evidence level 4]*

6.2 | What Are the Risks of Trial of Labour in Women With a Low-Lying Placenta?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
The option of a trial of labour should be discussed with women who have a third trimester asymptomatic low-lying placenta with placental edge-IO distance between 11 and 20 mm after 36 weeks of gestation	2++	B	Women in this situation have more than 80% successful vaginal birth with no increased in morbidity and should be informed of their options

A systematic review and meta-analysis of 10 articles on birth outcomes in 592 women with a low-lying placenta in the third trimester found that successful vaginal birth depends on the distance between the placental edge and IO, with 43% vaginal birth at 1–10 mm, 85% at 11–20 mm and 82% at above 20 mm. A shorter IO distance was associated with a higher risk of APH, whereas a longer distance was associated with a higher need for postpartum blood transfusion [108]. A retrospective multicentre study of 128 233 births, including 171 (0.13%) who had low-lying placenta, found similar rates of PPH and maternal and neonatal morbidity in the trial-of-labour ($n = 70$) and planned caesarean birth ($n = 101$) subgroups [14]. An IO distance of 1–10 mm after 36 weeks of gestation reduces the likelihood of vaginal birth considerably compared with 11–20 mm, but without increasing the incidence of intra-partum haemorrhage or severe maternal morbidity. *[Evidence level 2++]*

Data from small cohort studies have shown that patients with a low-lying placental in the third trimester are more likely to require a caesarean delivery when the placental edge is thicker (> 10 mm or > 45° angle) [109, 110] and/or contains a sponge-like [111] or marginal 'sinus' [112]. These additional ultrasound features are poorly defined, not routinely assessed in UK practice, and the success rates of vaginal birth when the placental edge is between 10 and 20 mm from the internal os vary widely (56% and 93%, respectively) [113–115]. The corresponding studies are small, observational and retrospective, making a recommendation for a specific mode of birth based on these ultrasound findings difficult. *[Evidence level 2–]*

7 | Planning of Caesarean Birth in Women With a Placenta Praevia

Recommendation	Evidence quality	Strength	Rationale for the recommendation
Women presenting with a placenta praevia carry a higher risk of intraoperative haemorrhage, PPH and hysterectomy and birth should be arranged in a maternity unit with on-site blood transfusion services and access to critical care. There should be careful preoperative planning with optimisation of haemoglobin	2+	C	Haemoglobin should be optimised to mitigate the maternal effects of any additional operative blood loss
All women with placenta praevia and their partners should have a discussion with a senior obstetrician (ST 6–7, experienced nontraining grade obstetrician or consultant) regarding birth and should be provided with information on risks and indications for blood transfusion, hysterectomy and maternal mortality. Concerns or plans to decline blood products should be discussed, including the risk of maternal mortality	4	GPP	Caesarean section in case of low-lying placenta or placenta praevia are the risk of intra-operative haemorrhage, in particular when the placenta is anterior and may require additional surgical procedures including emergency hysterectomy for haemostasis
Women with atypical red blood cell antibodies form a particularly high-risk group and the care of these women should involve local haematology and blood transfusion services	4	GPP	Recommended in Green-top Guideline No. 47 *Blood Transfusions in Obstetrics* [116].

Physiologically, the LUS is much thinner, contains fewer myofibers and more elastic connective tissue than the upper segment [117] and thus is more prone to uterine atony after placental delivery. Placentation in the LUS will also be associated with extensive dilatation of the corresponding uteroplacental circulation, and women having a caesarean birth for placenta praevia are at increased risk of blood loss of more than 1000 mL compared with women having a caesarean birth for other indications [118]. Overall, the risk of MOH together with the possibility of needing a blood transfusion has been estimated to be approximately 12 times higher in caesarean birth for placenta praevia than in caesarean birth for other indications [116, 119–121]. *[Evidence level 4]*

Women with a placenta praevia covering the internal cervical os [88, 89] and women with an anterior placenta, regardless of the type of placenta praevia, are at increased risk of intraoperative blood loss and need for blood transfusion [116]. Placenta praevia covering the IO and anterior placentation are independent risk factors for MOH during caesarean birth. Placenta praevia is also associated with a higher risk of atony requiring uterotonics, red blood cell transfusion and hysterectomy. *[Evidence level 2+]*

Women with placenta praevia should be screened for anaemia, and iron supplementation should be implemented if indicated. For women at high risk of emergency transfusion, such as those presenting with placenta praevia and no clinically significant

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allo-antibodies, it has been recommended that group and screen samples should be sent once a week to exclude or identify any new antibody formation and to keep blood available if necessary for birth. However, this should be at the discretion of the responsible team and care provided according to local facilities [119]. *[Evidence level 4]*

The LUS is more vulnerable to the development of scar defect and myometrial disruption at the surgical site than the upper segment [32]. In women with a history of multiple caesarean births, the LUS often becomes dehiscent with the inability to effectively re-approximate the hysterotomy edge and repair at birth [122]. Independently of accreta placentation, a placenta praevia under a scarred, thinned, partially disrupted LUS, covered by thick adhesions with the posterior wall of the bladder, poses a surgical risk and requires fine dissection and surgical expertise, adding to the complexity of the procedure and the risk of peripartum haemorrhage and need for hysterectomy [122]. *[Evidence level 4]*

General procedures for discussing and obtaining consent for caesarean birth are described in detail in RCOG Consent Advice No. 7 *Caesarean section* [123] and RCOG Consent Advice No. 12 *Caesarean section for placenta praevia* [124]. *[Evidence level 4]*

7.1 | What Grade of Obstetrician and Anaesthetist Should Attend the Caesarean Birth for a Placenta Praevia or Low-Lying Placenta?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
In cases of planned caesarean birth for placenta praevia, a senior obstetrician (consultant) and senior anaesthetist (consultant) should be present within the operating theatre suite	4	GPP	Placenta praevia is often associated with fetal malpresentation requiring expertise in performing complex intraoperative delivery manoeuvres
When an emergency arises, a senior obstetrician, senior anaesthetist and senior midwife (labour ward coordinator) should be alerted immediately and attend urgently, but the birth should not be delayed if maternal or fetal health is compromised	4	GPP	Women with a low-lying placenta or placenta praevia presenting with an APH and/or labour symptoms may require emergency delivery and are at high risk of intra- and postoperative haemorrhage

Maternal complications at caesarean birth increase when the primary surgeon is a trainee/resident rather than an experienced surgeon [90, 125]. Placenta praevia is often associated with additional issues, including fetal malpresentation (transverse or breech presentation), requiring complex intraoperative manoeuvres to give birth to the baby. *[Evidence level 4]*

7.2 | What Anaesthetic Method Is Most Appropriate for Caesarean Birth in Placenta Praevia or Low-Lying Placenta?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
Choices around the mode of anaesthesia should follow routine obstetric anaesthetic practice and women should be informed that the surgical procedure can be performed safely with regional anaesthesia, but should be advised that it may be necessary to convert to general anaesthesia if required and asked to consent	4	GPP	Regional anaesthesia is considered safe and associated with lower risks of haemorrhage than general anaesthesia for caesarean birth in women with placenta praevia or a low-lying placenta

The anaesthetic method used should be discussed with the woman, including the possibility of converting to a general anaesthetic partway through the procedure if complications arise and the procedure is likely to be prolonged.

An RCT of regional (neuraxial) versus general anaesthesia for placenta praevia, including women with PAS, has indicated that blood transfusion requirements (although not estimated blood loss) are greater in the general anaesthetic group [126]. A 4-year observational study at 19 US academic centres of women undergoing caesarean birth found that the risk factors for haemorrhage-related morbidity are increased in those undergoing general anaesthesia [127]. A retrospective cohort study of 1234 women with placenta praevia has shown that estimated blood loss, neonatal asphyxia and admission to NICU were lower with regional than general anaesthesia [128]. *[Evidence level 1–]*

7.3 | What Blood Products Should Be Available?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
Close liaison between the maternity ward and the hospital transfusion service is essential for women presenting with an anterior placenta praevia or a low-lying placenta	4	GPP	Recommended in Green-top Guideline No. 47 *Blood Transfusions in Obstetrics* [116].
Rapid infusion and fluid warming devices should be immediately available	4	GPP	Recommended in Green-top Guideline No. 47 *Blood Transfusions in Obstetrics* [116].
Intraoperative cell salvage is beneficial for women with a placenta praevia, particularly for women who decline transfusion of blood products for personal or religious reasons.	2++	B	Cell salvage increases postoperative haemoglobin levels and decreases the length of hospital stay and the incidence of donor blood transfusion-related adverse events [125].

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Predelivery optimisation of Hb levels is essential in the management of women diagnosed with a placenta praevia. Red cells, fresh frozen plasma and cryoprecipitate or fibrinogen concentrate are all kept by blood banks supplying obstetric units. If the haemoglobin is less than 70 g/L in the postoperative period and there is no ongoing or threatening bleeding, the decision to transfuse should be made on an informed individual basis [119]. In an extreme situation and when the blood group is unknown, group O rhesus D-negative red cells should be given [119]. Further recommendations are provided in Green-top Guideline No. 52 *Prevention and Management of Postpartum Haemorrhage* [116]. *[Evidence level 4]*

Intraoperative cell salvage (ICS) involves the collection, processing, and reinfusion of the patient's own blood lost during surgery. The 2023 Cochrane systematic review of 106 RCTs on the use of cell salvage, incorporating data from 14 528 adults undergoing surgery, found that in some types of elective surgery, ICS may reduce the need for and volume of allogeneic transfusion, alongside evidence of no difference in adverse events, when compared to no cell salvage [129, 130]. A systematic review and meta-analysis of 11 RCTS and 13 observational studies, including 5872 women at high risk of PPH undergoing a caesarean birth, of whom 2989 had intra-operative cell salvage with autologous blood transfusion, and 2883 controls received an allogenic blood transfusion [130]. They found that postoperative haemoglobin levels were higher, hospital stay shorter and the incidence of transfusion-related adverse events lower among women who had intra-operative cell salvage. A integrative review of four Cochrane systematic reviews published in 2024 and 2025 on ICS during caesarean birth found that changes in postpartum haemoglobin levels are relatively modest in magnitude; they may be clinically meaningful in women at high risk for PPH, such as those with placenta praevia, where small differences can influence the need for transfusion or escalation of care [131] and for women declining blood products for personal or religious reasons [129]. No maternal deaths or cases of amniotic fluid embolism were reported [131]. *[Evidence level 2++]*

7.4 | What Surgical Approach Should Be Used for Placenta Praevia or a Low-Lying Placenta?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
If the placenta is transected during the uterine incision, immediately clamp the umbilical cord after fetal birth. Delayed cord clamping should be avoided to prevent excessive fetal blood loss	4	GPP	Intra-operative fetal blood loss due to damage to umbilical cord vessels increases the risk of neonatal complications
If pharmacological measures (uterotonics and tranexamic acid) fail to control haemorrhage, intrauterine balloon tamponade should be initiated and compression sutures considered	2++	B	The success rate of intrauterine hydrostatic balloon in controlling PPH during the birth of women with placenta praevia is high (over 80%)
Early recourse to hysterectomy is recommended if conservative medical and surgical interventions prove ineffective	4	GPP	Massive maternal haemorrhage is associated with high morbidity and mortality

Overall, the main complications associated with caesarean birth are intraoperative obstetric haemorrhage and PPH due to bleeding from the placental bed and/or uterine atony. In addition, in cases of anterior placenta praevia, cutting through the placenta may be necessary for the baby to be born through the LUS and can be associated with increased maternal and fetal bleeding. These parameters can be evaluated preoperatively using ultrasound imaging [122], which facilitates planning the surgical procedure and the corresponding logistical support. Recommendations for the use of uterotonics and the antifibrinolytic agent tranexamic acid (TXA) to prevent PPH in high-risk women, and for an intraoperative blood transfusion protocol during caesarean birth, are provided in RCOG Green-top Guideline No. 47 [119] and 52 [116]. *[Evidence level 4]*

Intrauterine balloon tamponade, various types of compression sutures and uterine artery occlusion techniques have been increasingly used since the previous version of this guideline to control, reduce, or stop intraoperative bleeding from the LUS and PPH. Cohort studies on the use of intrauterine hydrostatic balloon catheters to control PPH associated with placenta praevia have reported success in over 80% of cases [132–134]. Factors related to the failure of Bakri balloon tamponade for placenta praevia include prior caesarean birth, anterior placentation, placenta praevia accreta, thrombocytopenia and/or coagulopathy at the time of insertion, and a PPH volume of more than 500 mL within the first hour of placement. A systematic review and meta-analysis of 91 studies, including six RCTs and involving 4729 women cared for with uterine balloon tamponade for PPH reported a success rate of 85.9% (95% CI 83.9%–87.9%) [135].

Intrauterine hydrostatic balloon alone may not control bleeding from the LUS in placenta praevia as the balloon is inserted in the upper segment. Uterine compressive and endouterine sutures are well-established techniques for the control of haemorrhage following atonic PPH. The best-known suture technique was described by B-Lynch in 1997 [136]. A combined method of B-Lynch suture and the intrauterine balloon [137] or the use of a uterine tourniquet [138] has also been successfully used in preventing PPH in placenta praevia. Surgical bilateral uterine artery ligation has been proposed in preventing excessive intraoperative bleeding with placenta praevia [139]. *[Evidence level 3]*

Interventional radiological (IR) techniques, including prophylactic uterine artery embolisation [140, 141] and temporary balloon occlusion of the internal iliac arteries or the aorta [142], have also been proposed to prevent and control excessive bleeding in placenta praevia. Small follow-up cohort studies [143, 144] and a

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systematic review [145] of women who have undergone arterial embolisation for control of PPH suggest that IR does not impair subsequent menstruation and fertility. Overall, the number of studies and the quality of the available evidence on both the efficacy, postoperative vascular complications and long-term outcomes are still too limited to justify the routine use of IR in women with placenta praevia. *[Evidence level 3]*

8 | Care of Ongoing Live Caesarean Scar Ectopic Pregnancies

Recommendation	Evidence quality	Strength	Rationale for the recommendation
Symptomatic women with a history of caesarean birth are at risk of caesarean scar ectopic pregnancy (CSEP) and should be offered an early pregnancy scan by an operator with experience in diagnosing and managing this condition	4	GPP	Caesarean birth is associated with a risk of caesarean scar defect and development of the gestational sac inside the niche in subsequent pregnancies
Women diagnosed with a live CSEP at the end of the first trimester of pregnancy must be informed by an expert consultant of the high risk of developing major complications, such as placenta praevia and placenta praevia accreta, in the second and third trimester	2++	B	Placentation inside a caesarean scar defect is associated with a high risk of placenta praevia and placenta praevia accreta

In the last two decades, there has been mounting evidence indicating that a gestational sac developing in the scar area of a prior LUS caesarean section can evolve into an accreta placentation [146–148]. Two types of caesarean scar pregnancies (CSP) have been described: Type 1 or A, where the gestational sac develops on top of a well-healed scar, and Type 2 or B, where the gestational sac develops inside or protrudes towards the caesarean scar defect (CSD), also called an isthmocele or niche [149]. There is growing evidence that Type 1 carries a low risk of maternal morbidity, and it may not be clinically significant [149]. In Type 2, as pregnancy advances, the gestational sac grows into the niche, protruding progressively (bulging) outside the normal uterine anatomical boundaries [150]. A new classification was recently proposed [150]: Type 1 CSP in which the largest part of the gestational sac protrudes towards the uterine cavity; Type 2 CSP in which the largest part of the gestational sac is embedded in the myometrium but does not cross the serosal contour; and Type 3 CSP in which the gestational sac is partially located beyond the outer contour of the cervix or uterus also referred to as caesarean scar ectopic pregnancy (CSEP). This classification is of limited value, has no large external validation studies, and the degree of protrusion inevitably changes with advancing gestation. In the last decade, the number of reported cases of CSEP has increased due to improved awareness of the condition, widespread use of ultrasound scanning in early pregnancy, and an increase in the number of prior caesarean births. *[Evidence level 4]*

The first trimester diagnosis and care of CSEP are presented and discussed in the 2016 joint RCOG/AEPU Green-top Guideline No. 21 *Diagnosis and Management of Ectopic Pregnancy* [151].

8.1 | What Are the Risk Factors for Caesarean Scar Ectopic Pregnancies

A national cohort study using the UK Early Pregnancy Surveillance Service (UKEPSS) reported an incidence of 1.5 CSEP per 10 000 (95% CI 1.1–1.9) maternities between November 2013 and January 2015 [152]. This incidence is likely to have increased with the increasing rate of caesarean births after 2015. *[Evidence level 2++]*

Retrospective cohort studies have shown that the incidence of CSDs increases with the number of previous caesarean births and is more common with retroverted uteruses, suggesting that these women are at higher risk of CSEP in their subsequent pregnancy [153, 154]. A systematic review identified nine studies reporting on risk factors and found probable risk factors: single-layer myometrial closure, multiple caesarean births and uterine retroflexion [155]. The development of a CSD may also vary according to the suture material used and the type of caesarean birth (i.e., planned versus emergency). Overall, systematic reviews and meta-analyses of RCTs comparing single-layer to double-layer myometrial closure have found a similar incidence of CSD, suggesting that the type of uterine closure has little influence on uterine scarification after caesarean birth [156–158]. There are no prospective data on the risks of CSEP according to the development and morphology of CSD. *[Evidence level 2+]*

8.2 | Natural History of Caesarean Scar Ectopic Pregnancies and Prediction of Late Pregnancy Complications

Approximately two-thirds of CSEPs fail before the end of the first trimester [159], and data on the outcomes of ongoing CSEPs after the first trimester are limited to small cohorts, case reports, and case series. Thus, the accurate evaluation of morbidity and mortality in women with live CSEP at 11–14 weeks scan remains difficult. For those CSEPs that continue into the second and third trimester, the outcome can be a low-lying/placenta praevia, a placenta praevia accreta or very rarely a complete uterine rupture [160, 161]. A systematic review of 17 case reports and case series including 69 cases of CSEP managed expectantly, 52 with and 17 without embryonic/fetal heartbeat, found that those with fetal heart activity had a uterine rupture during the first or second trimester in 9.9% (95% CI, 2.9%–20.4%) of cases, 39.2% (95% CI, 15.4%–66.2%) experienced severe bleeding in the second or third trimester and 74.8% (95% CI, 52.0%–92.1%) were diagnosed with PAS at birth [161]. Two case–control studies have suggested that the development of PAS in ongoing CSEP is associated with a remaining myometrial thickness of less than 2 mm in the first-trimester ultrasound examination [149, 160]. *[Evidence level 2++]*

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9 | Antenatal Evaluation of Women at Risk of Placenta Accreta Spectrum

A systematic review of 29 cohort studies with obstetric population data from 15 different countries collected between 1988 and 2015 found a pooled prevalence for PAS of 0.17% (95% CI 0.14–0.19) or 1 in 817 births [27]. At least 90% of women presenting with a PAS at birth have a history of one or more caesarean births, and are diagnosed during pregnancy with a low-lying placenta or placenta praevia [162]. However, the interpretation of epidemiology and management outcome data is limited by the lack of evidence-based data describing the intraoperative and clinical findings at birth and the use of clinical descriptions previously used to report uterine atony and/or placental retention [2]. In addition, in around half of the cohorts on diagnosis and management of placenta praevia accreta, the authors do not describe or use variable definitions for the ultrasound signs used for the antenatal ultrasound diagnosis of placenta praevia [28]. Overall, except for the small risk of antenatal uterine rupture, which cannot be accurately evaluated due to the lack of prospective data, women with placenta praevia accreta at birth are at similar risk of antenatal complications (bleeding, premature labour) as a nonaccreta placenta praevia. *[Evidence level 4]*

9.1 | What Are the Risk Factors for Placenta Accreta Spectrum?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
Women requesting planned caesarean birth for nonmedical indications should be informed of the risk of PAS and its obstetric consequences for subsequent pregnancies	2++	B	Both planned and emergency caesarean births increase the risk of PAS is subsequent pregnancies

Many population studies on PAS have used and continue to use the Tenth Revision of the World Health Organisation (WHO) International Classification of Diseases (ICD-10) (https://www.who.int/standards/classifications/classification-of-diseases), to report their data (Table 2). Within this classification, accreta placentation is listed under placental disorder (O43) as morbidly adherent placenta (O43.2) accreta, increta, percreta. ICD provides no clinical/histopathologic description of PAS and no category to report on placenta praevia accreta. In addition, PAS has been increasingly reported over the last two decades in women with no prior uterine surgery or pathology using clinical criteria similar to those used for uterine atony and simple placental retention [2]. Descriptions of 'placenta accreta', such as 'without easy separation of the placenta at delivery', are inherently subjective as the difficulty level in detaching the placenta from the uterine wall varies with the obstetrician's experience and personal interpretation of what is an abnormal attachment [30]. In many epidemiologic studies, these cases account for 70%–90% of all the cases of PAS [2, 27, 30]. *[Evidence level 4]*

TABLE 2 | Epidemiologic factors associated with PAS at birth.

Risks factors	Evidence level
Previous LUS caesarean birth	2++
Anterior low-lying or placenta praevia	2++
Uterine surgery or trauma	2+
Advanced maternal age	2−
Pregnancy resulting from IVF	2−

A previous caesarean birth is the only risk factor to have shown a significant concomitant rise in the prevalence of PAS in all obstetric populations [2, 27, 163–167]. A 2018 systematic review and meta-analysis of 29 928 274 participants from 79 cohort studies and one RCT found that compared to vaginal birth, a caesarean birth was associated with an OR of 2.95 (CI 1.32–6.60) of PAS in the subsequent pregnancy [31]. The risk of PAS increases with the number of previous caesarean births. A prospective observational cohort of 30 132 women who had caesarean birth without labour in 19 academic centres in the US over 4 years (1999–2002) reported that PAS was diagnosed in 15 (0.24%), 49 (0.31%), 36 (0.57%), 31 (2.13%), 6 (2.33%) and 6 (6.74%) after one, two, three, four, five and six or more caesarean births, respectively [163]. A 3-year (2009–2012) Nordic Obstetric Surveillance Study of clinical reports from 205 women with PAS found that the risk increases sevenfold after one prior caesarean birth [166]. *[Evidence level 2++]*

Placentation in the LUS is the second most important risk factor for the development of PAS [2, 163–168]. A large multicentre US cohort study noted that for women presenting with placenta praevia and prior caesarean births, the risk of accreta placentation was 3%, 11%, 40%, 61% and 67% for one, two, three, four, and five or more caesarean births, respectively [163]. A population-based descriptive study using the UK Obstetric Surveillance System, including 134 women identified with PAS, found that the incidence of PAS increases from 1.7 per 10 000 to 577 per 10 000 in women with both a previous caesarean birth and placenta praevia [165]. Similarly, the Nordic Obstetric Surveillance Study reported a 640-fold increased risk (OR 614 [95% CI 372–844]) compared to pregnancies with a previous caesarean birth but no placenta praevia [166]. *[Evidence level 2++]*

PAS is not exclusively a consequence of caesarean birth. Other surgical trauma to the integrity of the uterine endometrium and/or superficial myometrium, such as that following uterine curettage, postpartum endometritis, hysteroscopic surgery, endometrial ablation and uterine artery embolisation and myomectomy, has been associated with accreta placentation in subsequent pregnancies [2, 162, 168–169]. A multicentre case–control study of 176 women with prior myomectomy found no case of PAS in subsequent pregnancies [170], suggesting that the proportion of PAS at birth following major uterine surgical procedures requiring hysterotomy, other than caesarean birth, is small (below 10%). The UK Obstetric Surveillance System reported an aOR for PAS after previous uterine surgery of 3.40 (95% CI 1.30–8.91) [165]. In contrast, the Nordic Obstetric Surveillance Study found that around a third of nulliparous women with PAS reported a previous surgical procedure, that is, surgical abortions, myomectomy,

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hysteroscopy and trachelectomy [166]. A population-based data linkage study including all nulliparous women who delivered in New South Wales, Australia, between 2003 and 2012 found that the RR of PAS is 1.5 (99% CI 1.1–1.9) after one minor gynaecologic procedure, 2.7 (99% CI 1.7–4.4) and 5.1 (99% CI 2.7–9.6) after two and three procedures, respectively [169]. Overall, these data can explain the rare development of PAS in the upper uterine segment, particularly in nulliparous women [171]. However, some procedures, particularly uterine curettage for pregnancy termination, may not always be accurately reported [172], limiting the interpretation of these data. *[Evidence level 2+]*

Maternal age (35 years and above) is another commonly reported additional risk factor in epidemiologic studies [162–166]. Compared to women below 35 years, those over 35 years without a previous caesarean birth have a 4.6-fold higher risk [166] of PAS, and the risk increases the aOR by 1.30 (95% CI 1.13–1.50) for every 1-year increase in age [165]. Like for placenta praevia, this effect is probably due to the association between increasing maternal age and parity, but also due to a higher likelihood of uterine atony and placental retention. *[Evidence level 2–]*

The development of accreta placentation has also been reported in case reports or case series of women with no surgical history (unscarred uterus) but presenting with a uterine pathology, such as a bicornuate uterus, adenomyosis, submucous fibroids and myotonic dystrophy [30, 162, 173]. More recently, pregnancies resulting from ART, and in particular IVF, have been reported to have a higher risk of PAS at birth. A population study of 48 240 pregnancies after ART reported an increased risk of PAS and placenta praevia accreta [174]. A systematic review and meta-analysis of 33 low/moderate quality studies evaluating 124 215 ART and 6 054 729 non-ART singleton pregnancies reported an increased risk (OR 2.27 [95% CI 1.79–2.87]) of PAS in ART compared to spontaneous pregnancies. Similarly, the risk of placenta praevia non-accreta was increased (OR 3.76 [95% CI 3.09–4.59]) in ART pregnancies [42]. The data of the corresponding studies were not adjusted for maternal age, parity and previous uterine surgery, including previous caesarean births, placental position and do not provide detailed description on type of infertility nor on the confirmation of the diagnosis of PAS at birth, suggesting that the increased risk of PAS in ART pregnancies is likely due to the strong association between IVF and low placentation [39–44]. *[Evidence level 2–]*

9.2 | Screening for Women at High Risk of Placenta Accreta Spectrum

Recommendation	Evidence quality	Strength	Rationale for the recommendation
Women with a high probability of PAS at birth should be identified at the first antenatal appointment and provided with a care plan, including screening for ultrasound signs associated with PAS at the 18^{+0}–20^{+6} weeks FAS scan	2+	C	Antenatal screening of women at high-risk of PAS, allowing referral to specialised centres for ultrasound follow-ups and surgical management by an MDT, reduces the burden of antenatal and intraoperative complications
Previous caesarean birth and the presence of an anterior low-lying placenta or placenta praevia should alert the antenatal care team and ultrasound operator of the high risk of PAS at birth	2++	A	Caesarean scars are the main clinical factors leading to low placentation and the development of accreta placentation in subsequent pregnancies
Women with ultrasound features suggestive of PAS at the 18^{+0}–20^{+6} week FAS scan should be referred to a specialist fetal medicine unit with the corresponding imaging expertise by 28 weeks of gestation	4	GPP	Ultrasound imaging by an expert reduces the risk of false positive and false negative diagnosis of PAS

Multidisciplinary (MDT) care in a maternity unit with access to maternal and neonatal intensive care is essential for women with PAS. For such care to be organised, women with a high probability of PAS must be identified before birth [4–8]. Overall, women who are identified antenatally at high risk for PAS have less blood loss during surgery and require fewer units of RBC and FFP, compared with those with an intrapartum diagnosis [4]. The high incidence (43.9%) of women classified on ultrasound and/or MRI as having a so-called 'placenta percreta' and the lack of intra-operative and/or histopathologic confirmation in six studies limit the interpretation of the results. A systematic review and meta-analysis of 31 studies with similar limitations found similar results [7]. A report by the Society for Maternal-Fetal Medicine (SMFM) expert group [175], indicates that most studies on the prenatal ultrasound evaluation of PAS are retrospective in design, lack control 'low-risk' comparison groups, and do not provide clear definitions of the PAS ultrasound signs studied. There has also been considerable variability in these studies regarding the ultrasound criteria used to diagnose low-lying/placenta praevia and the gestational age at which the diagnosis is confirmed, as well as the clinical criteria used to confirm the diagnosis of PAS at birth [28]. *[Evidence level 4]*

Numerous ultrasound imaging techniques have been reported over the last two decades, including greyscale imaging (GSI) and colour Doppler imaging (CDI), three-dimensional (3D) power Doppler sonography, 3D and 4D colour volumes/volume rendering ultrasound (Crystal Vue/Realistic Vue) and High Acoustic Radiation Force Impulse (ARFI) Elastography [176]. An expert consensus study, through a modified Delphi process [177] of conventional [178, 179] and new ultrasound signs associated with PAS at birth, has confirmed the role of standardised signs (loss of the 'clear zone', myometrial thinning, bladder wall interruption and the presence of a placental bulge, exophytic mass, uterovesical hypervascularity (2D and 3D), placental lacunae and bridging vessel) [179]. For other ultrasound features associated with an increased probability of PAS at birth, there is a consensus for the finding of an anterior placenta praevia or a placenta praevia

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with cervical involvement. Only the quantification of placental lacunae using the score proposed by Finberg and Williams [180] obtained a strong consensus [177]. *[Evidence level 2+]*

No consensus was reached among the panellists in the Delphi study on the optimal gestational age to identify the different ultrasound signs associated with PAS at birth [177]. When performed by skilled operators, the pooled performance of ultrasound in the second trimester for the prenatal identification of women with a PAS at birth is over 90% [175–178, 181–182]. The highest level of interobserver agreement for the signs previously reported in the literature [176] is for the loss of clear zone, myometrial thinning on GSI, and on CDI for the presence of lacunar feeder vessels, bridging vessels, and lacunae [183]. A multivariate analysis found that true positive cases of PAS at birth are likely to be identified after 16 weeks of gestation with loss of clear zone, myometrial thinning, irregular bladder wall, placental lacunae and utero-placenta vascular abnormalities [184]. A 2024 systematic review of 37 studies, including 1348 confirmed cases of PAS, has shown that at less than 14 weeks of gestation, the sensitivity of ultrasound imaging is 86% (95% CI 78%–92%) with specificity of 63% (95% CI 55%–70%), compared to 88% (95% CI 84–91%) and 92% (95% CI 85–96%) during the second/third trimester [185]. These data suggest that pregnant women at high risk of PAS at birth could be first screened for at the routine 11–13^{+6} ultrasound examination. *[Evidence level 2++]*

Placental lacunae are formed by the distortion of one or more placental lobules developing inside a uterine scar. High-volume, high-velocity flows from the radial/arcuate arteries, and this sign is the most strongly associated with PAS at birth [177, 181]. Anomalies of the uterine contour and uteroplacental interface [175] are secondary to uterine remodelling following scarification and lead to progressive myometrial thinning and placental bulge as pregnancy advances. These changes are often found in women with a history of previous multiple caesarean births and are indicative of LUS dehiscence, independently of the presence of accreta lesions at birth [15, 186–188]. These data suggest that the main ultrasound features used for the screening of women at risk of PAS are better separated for reporting into anomalies of uterine contour or uteroplacental interface, that is, loss of clear zone, myometrial thinning and placental bulge; and abnormalities of the utero-placental circulation, including subplacental hypervascularity and placental lacunae (see Appendix 3) [15]. *[Evidence level 4]*

Population studies have shown that the presence of PAS at birth remains undiagnosed before birth in half [165, 167] to two-thirds of cases [166]. The diagnosis of placenta creta/adherenta at birth is often confused with that of uterine atony and partial placental retention, which cannot be predicted antenatally with imaging [2, 30]. In contrast, cases previously referred to as 'percreta' have been misdiagnosed as PAS [24–26] based on placental bulging (herniated placental tissue through a large uterine dehiscence) at laparotomy [187]. Large national and international epidemiologic studies [165, 166, 168] have used variable clinical definitions of PAS at birth and do not provide details on how the diagnosis of PAS was confirmed, beyond a basic description such as 'confirmed by histopathology' [30]. Overall, these data suggest that between one third and half of the cases reported in these studies and many similar studies are not PAS and can explain why these cases were not identified antenatally. *[Evidence level 2–]*

As the upper uterine segment is thicker and therefore less prone to scarring and remodelling even after major surgical procedure such as myomectomy, the ultrasound signs associated with non-praevia PAS at birth are less pronounced and so less likely to be identified antenatally [2], particularly if the accreta lesion is small. Women with evidence of post-surgical remodelling of the uterine corpus on ultrasound imaging with a placenta located under the scar should be examine for PAS by a trained operator. Cases of simple partial placental retention are often recorded as PAS [189], adding to the number of false-positive cases of PAS and consequently to its prevalence at birth [27, 30]. Placental retention and difficult placental delivery are intrapartum complications which are not associated with prenatal ultrasound signs. Describing those cases as PAS undermines the overall accuracy of PAS ultrasound screening strategies [30]. *[Evidence level 4]*

Studies have suggested that preoperative ultrasound examination in women with a high probability of PAS at birth can identify women with higher odds of intraoperative bleeding and need for hysterectomy [186, 187, 190]. A prospective cohort study of 90 women at high risk of PAS at birth cared for by a specialist MDT, including 58 cases with confirmed PAS at birth, found higher odds of hysterectomy associated with subplacental hypervascularity, high lacunar scores (2+ and 3+), lacunar feeder vessels, or bridging vessels on preoperative ultrasound at 32–36 weeks of gestation [186]. As the vast majority of cases of PAS are now the consequence of low placentation into a previous caesarean section scar, TVS has an essential role in the early diagnosis, follow-up and preoperative assessment of women at high risk of placenta praevia accreta [187, 190]. *[Evidence level 4]*

9.3 | Is There a Role for Magnetic Resonance Imaging in the Prenatal Evaluation of Women at High Risk of Placenta Accreta Spectrum?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
Where expert ultrasound imaging, including TVS is available, magentic resonance imaging (MRI) is not recommended in routine antenatal evaluation of women with a high probability of PAS at birth	2+	C	MRI (without contrast agent) does not allow mapping of the circulation and expertise in MRI of the placenta is limited

Magnetic resonance imaging (MRI) has been increasingly used for the prenatal diagnosis of placenta accreta. A systematic review has found that most studies have a small sample size. Therefore, the sensitivity and specificity of MRI in diagnosing placenta accreta vary widely, ranging from 75% to 100% and 65% to 100%, respectively [191]. A systematic review and meta-analysis of 17 studies, including 457 women with PAS, that compared MRI and ultrasound data found no statistically significant difference in diagnostic accuracy between the two imaging techniques [192]. The main features associated with PAS at birth, provided by regular MRI, include placental bulging, dark intraplacental bands on T2-weighted

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imaging, heterogeneous signal intensity within the placenta and disruption of the uteroplacental zone [193], which are all signs of uterine remodelling postcaesarean birth [15, 186–188], and therefore are not specific to PAS. The interobserver agreement is almost perfect for the diagnosis of placenta praevia; substantial for myometrial interruptions and placental bulging; and moderate to slight for other signs of PAS, but the accuracy and predictive value are modest and lower than previously reported [194]. Furthermore, MRI results in a change in diagnosis that could alter clinical care of PAS in more than one-third of cases, but when changed, the diagnosis is often incorrect [195]. *[Evidence level 2+]*

The use of intravenous gadolinium-based contrast agents which improves visualisation of the utero-placental vasculature, may increase the sensitivity and specificity of MRI [196]; however, the agents cross the placental-fetal barrier, and so their use is not recommended during pregnancy in many settings, as evidence on long-term fetal safety is limited [197]. The experience of the radiologists in interpreting PAS-related MRI [198] remains an essential factor in the diagnostic accuracy of MRI, and access to expert radiologists is highly variable in both low- and high-resources countries. MRI and, in particular, super-resolution reconstruction MRI [199], may contribute to surgical planning in women with a high probability of PAS at birth, but there is no evidence supporting its routine use in PAS management. *[Evidence level 4]*

10 | Antenatal Care

Women with a high probability of placenta praevia accreta at birth have a similar frequency of antenatal complications to those associated with placenta praevia nonaccreta, but a much higher risk of severe intrapartum/intraoperative complications, particularly when the condition is undiagnosed and the birth unplanned, or if the issue of termination of pregnancy arises during the second trimester. There are no data on the antenatal care of women with a PAS of the upper uterine segment, as antenatal imaging findings are limited to a few case reports.

10.1 | Where Should Women Identified as High-Risk of Placenta Accreta Spectrum Be Cared for During Pregnancy?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
Women identified locally as having a high probability of PAS at birth should be assessed by the nearest specialised centre with an MDT with expertise in regularly diagnosing and managing for placenta praevia accreta, and an individualised referral pathway should be agreed	2++	B	MDT management improved maternal outcomes and reduced risk of intra- and postsurgical complications

PAS has become the obstetric condition with the highest risk of maternal comorbidity worldwide [200–202]. A retrospective, observational study of severe maternal morbidity, defined using the Centers for Disease Control (CDC) and Prevention index, and nontransfusion severe maternal morbidity from discharge data from 919 546 birth hospitalisations in California during 2016–2017, found that the highest risk comorbidity was PAS (aRR of 30.5 for severe maternal morbidity and 54.7 for nontransfusion severe maternal morbidity) [200]. A US population-based retrospective, observational study of 2 727 477 women who had caesarean births between October 2015 and December 2017, reported that compared to caesarean birth without PAS, caesarean birth complicated by PAS ($n = 8030$) was associated with an increased risk of any surgical morbidities (78.3% vs. 10.6%), including haemorrhage (54.1% vs. 3.9%), coagulopathy (5.3% vs. 0.3%), shock (5.0% vs. 0.1%), urinary tract injury (8.3% vs. 0.2%) and death (0.25% vs. 0.01%) [201]. *[Evidence level 4]*

Standardised criteria for measuring severe maternal morbidity and mortality for PAS have been proposed through collaborative expert consensus [202]. These include maternal death, transfusion of 8 or more units of packed red blood cells, unplanned return to the operating room, specific organ injuries, prolonged mechanical ventilation, pulmonary complications, acute renal failure, prolonged vasopressor use, circulatory support requirements, acute coronary syndrome requiring intervention, cardiac arrest, thromboembolism and neurologic events. This composite outcome distinguishes true complications from expected care interventions, avoiding bias towards specific management approaches. It relies on objective criteria to limit interpretation variations and excludes procedures that reflect institutional protocols rather than complications. *[Evidence level 4]*

Women with a high probability of PAS at birth should be cared for according to the risks of severe maternal bleeding and PTB associated with low placental insertion [203–205]. There has been mounting evidence after the publication of the 2018 edition of this guideline that women with PAS identified antenatally as high risk of PAS at birth, and cared for by a MDT in a specialist centre, are less likely to require emergency surgery, large-volume blood transfusion and reoperation within 7 days of birth for bleeding complications compared with women cared for by standard obstetric care without a specific protocol [206–209], even in the case of unexpected PAS [210]. Women admitted at 34 weeks of gestation and who give birth between 34 and 35 weeks of gestation under the care of a specialist MDT have a significantly lower emergency surgery rate than those not cared for by such a team (23% vs. 64%), despite a similar median gestational age at birth [207]. Although there is no evidence for an ideal minimal number of cases of PAS managed per month or year, maternal outcomes are improved over time with increasing experience within a well-established MDT performing 2–3 cases per month [208]. A systematic review and meta-analysis of six studies, including 461 women with PAS, showed that compared with standard care, MDT care significantly reduces perioperative estimated blood loss and transfusion requirements [211]. *[Evidence level 2++]*

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10.2 | When Should Birth Be Planned for Women With Suspected Placenta Accreta Spectrum?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
Timing of birth and use of corticosteroids should be tailored according to antenatal symptoms and placental location and the benefit of corticosteroids after 35^{+0} weeks discussed with the individual pregnant women.	2++	A	Recommended in RCOG Green-top guideline No 74 [101].
In the absence of risk factors for PTB and/or antenatal bleeding, planned birth at 35^{+0} to 36^{+6} weeks of gestation provides the best balance between fetal maturity and the risk of unscheduled birth	2−	GPP	Early iatrogenic near-term birth in women with a high probability of PAS at birth allowing for planned surgery by an MDT is associated with a lower risk of perinatal complications compared to emergency delivery

For women diagnosed with placenta praevia and no ultrasound signs of accreta placentation, clinical factors should be considered when determining the timing of antenatal corticosteroid administration and the optimal gestational age for birth [101].

In cases of antenatally suspected PAS, where significant blood loss and caesarean hysterectomy is anticipated, a planned preterm birth at 34^{+0} to 35^{+6} weeks of gestation is recommended by ACOG to avoid emergency birth, which still occurs about 20% of the time, even in scheduled cases [212]. This recommendation was based on a decision analysis study showing an increasing likelihood of emergency birth as pregnancy goes beyond 34 weeks of gestation [213]. A retrospective study from a single tertiary care centre of 202 women suspected of PAS has found that women with no other indications for birth, such as bleeding, labour, or rupture of membranes, can have a planned birth in the late preterm or early-term period (36^{+1}–37^{+1} weeks) without affecting maternal outcomes but improving neonatal outcomes [214]. *[Evidence level 2+]*

Retrospective cohort studies of women identified antenatally with a high probability of placenta praevia accreta have indicated that in the absence of risk factors for PTB, the risk for an unscheduled birth before 36^{+0} weeks of gestation is low [215, 216]. A retrospective multicentre review of data from 356 women, including 26 (7%) women with no evidence of PAS at birth and 56 (16%) women with placenta creta/accreta, confirmed that the single greatest risk factor for emergency birth is antenatal bleeding [217]. A retrospective study of 125 women with more than one prior caesarean birth, presenting with a low-lying placenta or placenta praevia, found that those with PAS at birth had a shorter CL than those with a placenta praevia nonaccreta [218]. These findings did not correlate with higher rates of vaginal bleeding and PTB before 36 weeks. There are currently no RCTs or well-controlled prospective studies stratified for the placental position (low-lying versus praevia; anterior versus posterior) or the CL on TVS to guide best practice in timing of birth of women with PAS in general, and those with placenta praevia accreta in particular, but all women with a high probability of PAS should be informed of the risk of emergency birth. *[Evidence level 4]*

11 | Optimising the Birth of Women With Suspected Placenta Accreta Spectrum

Recommendation	Evidence quality	Strength	Rationale for the recommendation
For women with a high probability of PAS at birth, birth should take place in a maternity ward with an MDT with expertise in complex caesarean birth and logistic support for immediate access to blood products, adult intensive care unit and NICU	2++	B	Due to the high risk of intra-operative bleeding and damage to the urinary tract, women with a placenta praevia accreta may need additional support for these complications
A contingency plan for emergency birth should be in place, including the use of an institutional protocol for the management of maternal haemorrhage for all women at risk of PAS	4	GPP	Women with a high probability of PAS at birth are at increasing risk of antenatal bleeding as pregnancy advances and higher risk of intra- and post-operative complications in case of emergency birth

There are some generally agreed-upon strategies, but a comparison of the different guidelines shows that even those recommendations graded as strong, particularly regarding different care strategies for birth, are not supported by RCTs or high-quality prospective case–control studies [197].

The main perinatal maternal complications of PAS are primarily the consequence of intra- or post-operative bleeding [212, 219]. When unsuspected at birth, attempts to remove accreta placental tissue or incise through the accreta area typically provoke rapid MOH [220]. MOH and its associated complications, such as coagulopathy, can lead to multisystem organ failure and account for 7% of the causes of maternal death in the UK between 2019 and 2021 [221]. PAS-associated MOH was directly associated with four maternal deaths in the UK during that period. Many women with PAS at birth require massive blood transfusion (8 units or more). Their median platelet count is lowest compared with other causes of massive PPH [222, 223]. Women with a placenta praevia accreta are at the highest risk of intraoperative bleeding due to the hypervascularity of the utero-bladder interface and surrounding pelvic tissues and damage to the urinary tract [224]. *[Evidence level 2++]*

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Similarly to placenta praevia, transfusions in case of PAS should be guided by a national and/or institutional protocol for management of PPH [88, 89]. *[Evidence level 4]*

11.1 | What Should Be Included in the Consent Form for Caesarean Birth in Women With Suspected Placenta Accreta Spectrum?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
Any woman with a high probability of PAS at birth giving consent for caesarean birth should understand the risks associated with caesarean birth in general, and the specific risks associated with PAS including MOH with the need for blood transfusion, lower urinary tract damage and hysterectomy	4	GPP	Pregnant women with a high probability of PAS at birth should be provided with a detailed plan for the surgical procedure and informed on the different care options
For women who do not accept blood products for personal or religious reasons, additional possible interventions should also be discussed, including cell salvage and IR	4	GPP	Cell salvage increases postoperative haemoglobin levels and decreases the length of hospital stay and the incidence of donor blood transfusion-related adverse events

Any woman with a high probability of PAS at birth should meet with the lead obstetrician of the MDT when identified in the antenatal period. The different risks and care options should have been discussed with the pregnant woman before 34 weeks, and a plan agreed upon, which should be clearly reflected in the consent form and medical record. This should include standard discussion for the caesarean section procedure [123], and about the specific risks associated with PAS, that is, heavy blood loss requiring replacement of blood products, lower urinary tract damage, emergency hysterectomy, and need for admission to the intensive care unit. Similarly to women presenting with a non-PAS placenta praevia, cell salvage and IR should be discussed with women who do not accept blood products for personal or religious reasons, where available. *[Evidence level 4]*

Launched by the World Health Organization (WHO) in June 2008, the checklist (https://www.who.int/teams/integrated-health-services/patient-safety/research/safe-surgery/tool-and-resources) was mandated for use in the NHS in January 2009 (https://www.england.nhs.uk/2019/01/surgical-safety-checklist/). It is now in standard use across the UK and worldwide, and team time-outs for PAS surgery are recommended both preoperatively and intraoperatively. *[Evidence level 4]*

A clear written contingency plan should be discussed with the pregnant woman and be available in the woman's antenatal notes in the event of an unscheduled emergency birth at the local maternity unit, other than the specialist centre, so that the local team can follow this agreed plan. *[Evidence level 4]*

11.2 | What Anaesthetic Method Is Most Appropriate for Birth?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
The choice of anaesthetic procedure should be discussed with the woman, who should be informed that the surgical procedure can be performed safely with regional anaesthesia but should be advised that it may be necessary to convert to general anaesthesia if required and asked to consent	4	GPP	General anaesthesia can be required in cases of major blood losses and/or longer than expected surgical procedure

As for women presenting with a placenta praevia non-accreta, both general and regional (neuraxial) anaesthetic techniques are safe for surgical procedures required for birth in women with a high risk of PAS at birth. The choice of which type of technique to use should be made on an individual basis following discussion with the woman, who should be informed that it may be necessary to convert to general anaesthesia if required and asked to consent. The likelihood of conversion from regional to general anaesthesia increases (above 50%) as blood loss increases; therefore, a combination of neuraxial and planned secondary general anaesthesia can maximise both the comfort and safety of the woman [225]. *[Evidence level 4]*

An international survey of 171 anaesthetists showed that 69 (42%) recommend neuraxial-only, whereas 58 (35%) used a combined approach of neuraxial and general anaesthesia. When a midline laparotomy is planned, there is a preference for general anaesthesia for the duration of the surgery [226]. *[Evidence level 3]*

11.3 | What Surgical Approach Should Be Used?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
Attempting to separate the placenta from the uterine wall or incising through the placenta to give birth to the baby should be avoided in women with a high probability of PAS at birth, and the baby should be delivered via an incision above the upper placental edge	2++	B	Damage to the abnormally attached area in PAS can lead to uncontrollable pelvic bleeding with rapid deterioration of maternal hemodynamic parameters and hypovolemic shock

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Recommendation	Evidence quality	Strength	Rationale for the recommendation
The choice of surgical technique is left to the operator judgement and experience. Where possible, uterus-preserving surgical techniques are preferable but only attempted by expert surgeons, and after appropriate counselling regarding risks and with informed consent of the woman	4	GPP	There are no well-controlled prospective studies stratified for the different pre-and intra-operative features
There is no evidence to support the routine use of prophylactic ureteric stents in the surgical management of PAS, however collaboration with a urologic surgeon is advisable in cases presenting with major uterine remodelling and hypervascularity of the bladder-uterine interface on preoperative imaging	2+	C	Major uterine remodelling and thick adhesions between the uterine and bladder serosa are associated with a high risk of urinary tract damage

Overall, care strategies will be determined by the local expertise available, the preoperative position of the placenta and other imaging findings (remodelling of LUS, vascularity of the LUS and surrounding pelvic tissue, involvement of the cervix) [177, 187, 189–190], the depth and lateral extension of the accreta portion of the placenta and its association with major dehiscence of the LUS at laparotomy [186, 227]. International surveys of experts on the care of PAS have found that between 55% and 90% opt for a primary caesarean hysterectomy in case of placenta praevia accreta [228, 229]. The ACOG guideline indicates that the most generally accepted approach to PAS is caesarean hysterectomy [212] and not surprisingly, the highest rates of caesarean hysterectomy in women with PAS have been reported in North America [229]. The choice of surgical care should be left to the judgement of the local MDT, but uterus-preserving surgical techniques should be considered if possible, as they are less traumatising for the woman and their partner [230]. However, there are no well-controlled prospective studies comparing the outcomes of caesarean hysterectomy versus uterine preservation techniques stratified for different pre- and intraoperative features, and so uterine preservation should only be attempted by expert surgeons. *[Evidence level 4]*

When the accreta lesion is outside the LUS and is small, a partial myometrial resection should be possible in most cases [231]. By contrast, women with a history of prior multiple caesarean births presenting with a low-lying placenta or placenta praevia identified antenatally with a high probability of PAS at birth are also at high risk of major LUS dehiscence and thick pelvic adhesions [122]. In this case, the surgical team must be prepared for complex dissection of the vesico-uterine interface and additional intraoperative bleeding [186, 187]. The main intraoperative risks in these cases are damage to the bladder and the thin but highly vascularised shell of scarred myometrium separating the placental basal plate from the bladder wall. A large placental bulge or herniation may further complicate the procedure through the LUS, particularly when lateral, limiting access to the lower part of the pelvis [231]. *[Evidence level 4]*

Numerous surgical techniques, starting with the type of skin incision, have been described [212, 224, 232–233] with no consensus, including:

1. Primary hysterectomy following birth of the fetus through a hysterotomy above the placental implantation site, without attempting placental separation
2. Birth of the fetus through a hysterotomy above the abnormal implantation area, followed by partial excision of the accreta area (partial myometrial resection) and repair of the uterus.
3. Birth of the fetus without disturbing the placenta, and leaving it in situ, followed by planned secondary hysterectomy 3–7 days following the primary procedure.
4. Birth of the fetus through an incision above the placental implantation site, leaving the placenta in situ, followed by expectant management

As there are no well-controlled prospective studies stratified by different pre- and intraoperative features, the choice of surgical technique is left to the operator's judgement. These management strategies do not apply to PAS of the uterine corpus as in those cases the hysterotomy can be performed in the LUS below the lower placental edge. *[Evidence level 4]*

One of the most critical steps is the birth of the fetus, and the hysterotomy incision should be performed above the placental upper edge to avoid the placental tissue. Attempts at manual placental removal are strongly discouraged, and if the diagnosis of PAS is uncertain, a period of intraoperative observation of a maximum of 5 min to allow for spontaneous uterine placental separation, without the administration of oxytocic drugs, is appropriate [6, 202, 204, 209, 212, 220, 224, 232]. *[Evidence level 2++]*

A systematic review and meta-analysis including 11 618 women undergoing surgery for PAS found that genitourinary tract injury occurred during the surgical delivery in 15.2% (95% CI 12.9%–17.7%) of women with PAS [234]. The majority (13.5%) is due to damage to the bladder (cystotomy), of which 7.7% were intentional to facilitate access to the accreta area in the LUS and avoid the bladder trigone, and 7.2% unintentional. International surveys of experts on the care of PAS have reported that between 6% and 75% of operators use prophylactic ureteric stents [228, 229]. A systematic review and meta-analysis of nine studies, including 848 women with PAS, of which 523 (61.7%) had prophylactic ureteric stents placed, and 325 (38.3%) did not, found no difference in the rates of genitourinary tract injury [235]. *[Evidence level 2+]*

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Internal iliac artery ligation using sutures or removable clips has been used in obstetrics and gynaecology for over 70 years to reduce the risks of intraoperative bleeding [236]. A systematic review and meta-analysis of 795 women undergoing surgery for PAS found that prophylactic internal iliac artery ligation has no significant effect on intraoperative bleeding control [237]. Similarly, a small RCT of bilateral internal iliac artery ligation ($n = 29$ cases) versus controls ($n = 28$ cases) reported no significant difference between the two groups in estimated intraoperative blood loss [238]. *[Evidence level 2+]*

11.4 | Is There a Role for Interventional Radiology?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
There is insufficient evidence to support the use of any IR procedures in the routine care of PAS by an expert surgical team	2+	C	Data on embolisation are based on a small retrospective cohort whereas data on preoperative prophylactic internal iliac artery balloon occlusion are based on small RCTs
Resuscitative endovascular balloon occlusion of the aorta may be useful in women diagnosed with PAS who decline donor blood transfusion; these women should give birth in a unit with an IR service	4	GPP	There are no studies on the use of IR in women who decline donor blood transfusion

Since the publication of the 2018 edition of this guideline, many more retrospective cohort studies have described the use of IR, with variable success in reducing the risk of intraoperative bleeding in the care of PAS. Various combinations have been proposed, including intraoperative internal iliac artery and/or postoperative uterine artery embolisation, and immediate preoperative insertion of an internal iliac artery or abdominal balloon for intraoperative occlusion, also called resuscitative endovascular occlusion of the aorta (REBOA).

A systematic review and meta-analysis of all papers published in the international literature up to December 2017 on the use of the different IR techniques in the care of PAS at birth found lower mean estimated blood loss and the risk of blood loss ≥ 2.5 L in women who underwent IR before surgery compared to those who did not [239]. However, the overall quality of evidence, as assessed by the GRADE methodology, was very low, with many studies including a small number of cases, dissimilarity of the populations and lack of stratification according to the severity of PAS, type of surgical approach adopted and gestational age at surgery [239]. *[Evidence level 1–]*

A retrospective study, including 15 women diagnosed with PAS who underwent intraoperative multivessel embolisation, was compared with 30 matched historical cases. The study reported a decrease in blood transfusion requirements and estimated blood loss, with no increase in operative complications [240]. Around a quarter of the women included in each study group were described as having a placenta 'percreta without invasion', suggesting that many cases did not have PAS at birth. A retrospective study of women with PAS cared for by a specialist MDT over 10 years has compared the outcome of 30 women cared for with uterine artery embolisation and tranexamic acid and 34 women who were not [241]. The authors reported reductions in blood loss and blood transfusion rates, as well as in massive blood transfusion (more than 10 units transfused), with similar postoperative complications and neonatal outcomes. All cases included in both groups of this study were diagnosed as PAS if over 50% disruption of the underlying myometrium at the site of placental attachment was noted intraoperatively, with no description of areas of abnormal placental attachment and no description of the histopathologic criteria used to confirm the diagnosis of PAS. *[Evidence level 2–]*

Three RCTs of women presenting with imaging features suggesting PAS at birth were randomised to either preoperative prophylactic internal iliac artery balloon occlusion or no occlusion have been published. The first included 13 cases and 14 controls [242], the second 50 cases in each group [243], and the third 20 in each group [244]. None of the three studies found any significant differences between the intervention and control groups for the mean number of packed RBC units transfused or in the calculated blood loss. The largest of the three studies also reported higher hospitalisation costs and incidence of postoperative fever in the balloon group. A 2021 systematic review and meta-analysis confirmed these findings [245]. *[Evidence level 2+]*

Balloon occlusion of the descending aorta has been increasingly used in some countries (China in particular). The methodology used in these studies is very heterogeneous, with little data confirming the diagnosis of PAS at birth and confounding factors such as placental position, number of previous caesarean births and surgical experience of the team in performing complex caesarean births. There is also wide variation across studies in clinical selection criteria and intraoperative IR methodology, including the duration of balloon inflation/deflation, the size of the balloon used and the need for transfer between the IR room and the operating theatre [246]. *[Evidence level 4]*

The most commonly reported postoperative complication associated with IR is arterial thrombosis of the external iliac or the femoral artery. There are no data on the long-term follow-up of children born after IR; therefore, a primary concern is the risk–benefit ratio of IR use for both women and their fetuses. IR may be useful for women presenting with an anterior placenta praevia with ultrasound signs suggestive of PAS who decline blood products for personal or religious reasons. *[Evidence level 4]*

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11.5 | How Are Women With Unexpected Placenta Accreta Spectrum at Birth Best Cared for?

Recommendation	Evidence quality	Strength	Rationale for the recommendation
If at planned repeat caesarean birth, it is apparent at laparotomy that there are anomalies of the uterine contour and vascularisation associated with PAS, the caesarean birth should be delayed until the appropriate staff and adequate resources have been assembled and blood products are available, provided the woman and her fetus are stable. This may involve closure of the maternal abdomen and urgent transfer to a specialist unit for birth and surgical management	4	GPP	Based on one small retrospective study from the US

If PAS is only discovered at planned caesarean birth based on the appearance of the LUS at laparotomy and/or the placenta is bulging laterally within the parametrium and/or there are thick adhesions between a dehiscent LUS covering a placenta praevia, the posterior wall of the bladder and/or the vasculature of the lower pelvis requiring complex dissection, the surgical procedure should be temporarily paused until surgical expertise is available. Delayed hysterectomy may represent a strategy for minimising the degree of haemorrhage and need for massive blood transfusion in women [247]. For women presenting with an undiagnosed non-previa PAS at caesarean birth it should be possible to perform a focal partial myometrial resection of the accreta area and a hysterectomy would only be required in case of secondary haemorrhage. *[Evidence level 4]*

11.6 | Nonsurgical or Expectant Management of Placenta Accreta Spectrum

Recommendation	Evidence quality	Strength	Rationale for the recommendation
Leaving the entire placenta in situ after delivery of the fetus can be considered when peripartum hysterectomy is unacceptable to the woman for personal reasons or judged inappropriate by the surgical team	2–	D	Based on a large retrospective observational study from France
When the placenta is left in situ, local arrangements need to be made to ensure regular review, ultrasound examination and access to emergency care, should the woman experience complications such as bleeding or infection	2–	D	Based on good clinical practice for women at risk of PPH and endometritis similar to those observed following accidental partial placental retention
Methotrexate (MTX) adjuvant therapy should not be used for expectant management as it is of unproven benefit and is associated with maternal morbidity and mortality	3	D	Based on evidence from retrospective observational studies and know side effects associated with the use of MTX in oncology

Leaving the placenta in situ after the birth of the baby, avoiding the placenta with repair of the hysterotomy incision, was discussed in the 2018 edition of this guideline. However, the evidence supporting this care strategy is still limited, and it is not recommended in women presenting with major bleeding as it is unlikely to be successful and risks delaying definitive treatment, therefore increasing their morbidity [212]. The success of uterine balloon tamponade for PPH associated with retained placental tissue (accreta or not) is low (< 20%) at both caesarean and vaginal births [135], and, following this, is not recommended *[Evidence level 4]*

The largest study published so far is a retrospective multicentre study that examined 167 women with possible PAS treated by leaving the placenta in situ in tertiary university hospital centres in France between 1993 and 2007 [248]. Conservative expectant management with the whole or part of the placenta left in situ was successful in 131 out of 167 cases (78.4%). One woman died of myelosuppression and nephrotoxicity related to methotrexate (MTX) administration through the umbilical cord. Spontaneous placental resorption occurred in 87 out of 116 cases (75.0%), with a median delay from birth of 13.5 weeks (range 4–60 weeks) [248]. The same authors reported recently on the outcome of 86 women who were treated conservatively compared with that of women who had a caesarean hysterectomy. The women in the conservative group had less total estimated blood loss, blood product transfusions, and adjacent organ injury at birth but higher rates of arterial embolisation, endometritis, and re-admission within 6 months [249]. As attempts at delivering the placenta in PAS are inevitably associated with haemorrhage, often requiring emergency hysterectomy and histologic examination is only possible when a partial myometrial resection or hysterectomy is performed, it is impossible to ascertain the number of cases that truly had PAS in the conservative group, limiting the interpretation of the data in both studies. *[Evidence level 2–]*

The woman who opts for conservative management with the placenta left in situ should be informed of the risks of chronic bleeding, sepsis, septic shock, peritonitis, uterine necrosis, fistula, acute pulmonary oedema, acute renal failure, deep venous thrombosis or pulmonary embolism [248]. Prophylactic

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antibiotics may be helpful in the immediate postpartum period to reduce the risk of infectious complications [250]. A study, including a case series and a systematic review, has found that leaving the placenta in situ poses a risk of coagulopathy similar to that associated with concealed placental abruptio, and keeping the placenta in situ after birth prolongs the risk factors integral to PAS [251]. *[Evidence level 4]*

An observational case series, including 24 women with PAS where the placenta was left in situ after birth and treated with MTX, reported placental delivery in 33.3% of the cases (spontaneously in 55% and in 45% following surgical evacuation) [252]. The authors had no control group of women with PAS who did not receive MTX, and so it is unknown whether or not the MTX was clinically helpful. There was also no evidence that these cases were truly PAS, particularly those where the placenta was subsequently fully delivered after MTX. Furthermore, one woman did suffer liver damage, and the risks of this therapy must be balanced against the unproven benefit. All international guidelines recommend against the use of MTX in women with PAS [197]. *[Evidence level 3]*

12 | Post-Birth Support and Long-Term Outcome of Women With Pregnancies Complicated by PAS

Recommendation	Evidence quality	Strength	Rationale for the recommendation
The woman and her partner should be involved in the pre-operative decision concerning the mode of anaesthesia and post-operative discussion about pain control and informed of the availability of psychological support before and after birth	2+	C	Cohort studies have shown that involvement of the women and her partner in discussion regarding anaesthesia and post-operative pain control improve the overall experience of women with PAS at birth
Identifying the psychological impact of traumatic birth and its long-term consequences should be part of the integrated care pathways of specialist PAS MDT	4	GPP	Adequate support to women and their partners in complex obstetric cases are associated with a lower risk of post-traumatic stress disorder
Women with PAS who were managed conservatively (uterine preservation surgery or placenta left in situ) should be informed of the high risk of recurrence in subsequent pregnancies	2+	C	Based on the evidence from small observational studies and a meta-analysis

There is limited literature on the woman's and her partner's experience during the perioperative period and postpartum pain management for PAS, and on the long-term obstetric risks in subsequent pregnancies after conservative management.

A 2024 study explored the impact of anaesthesia for PAS using a survey questionnaire agreed by consensus by international experts on the care of PAS, confirming that the decision concerning the mode of anaesthesia for the birth was central to the woman's experience [253]. The majority of women (82%) want to be awake for the birth of their baby; however, only 60% reported that this actually happened, and only 56% felt they were given enough information to make an informed decision. Very poor or poorly managed pain control during the postpartum period was reported by 40%, with 17% reporting severe pain. Inadequate pain control was more common in women who did not have an anaesthesiology consult and who had a caesarean hysterectomy. *[Evidence level 2+]*

There is mounting clinical evidence that women and their partners may suffer psychological consequences following the diagnosis of PAS and the experience of a traumatic birth [230, 254–262]. Surviving PAS can be considered a traumatic event, which can lead to serious postpartum mental health problems such as depression and post-traumatic stress disorder [258]. A US qualitative study of semi-structured interviews of 25 women with PAS contacted at random, of whom 17 agreed to participate in interviews, found that many experienced birth-related trauma, mourned the loss of future fertility, and were dissatisfied with the lack of options for treatment [254]. A follow-up study from Ireland, including 17 women with pregnancies complicated by PAS, of whom 16 were managed by caesarean hysterectomy, reported a profound, long-lasting impact on their physical and emotional health and their relationship with their partner [255]. Participants shared the frustration and difficulty of being cared for as if they had had a routine caesarean birth in the postnatal period, and how this was unsatisfactory in meeting their needs, both immediately after birth and in the long term. A content analysis of 22 blogs posted on the internet identified seven themes that provide an insider's view of placenta accreta: the shock of it all, living in constant fear, advocate for yourself to get some sense of control, my mental health is deteriorating, you saved our lives!, recommendations and posttraumatic growth [262]. *[Evidence level 2+].*

There are currently no formal recommendations for mental health intervention for women with pregnancy complicated by PAS, and the availability of mental health support varies widely. The above findings support the need for interventions such as decision tools and educational materials, together with an integrated care pathway, delivered as part of the specialist PAS MDT care, which should include mental health professionals, specialist midwives and referral to a local support group for peer support when available [257]. *[Evidence level 4]*

Conservative management of PAS, including uterus-sparing surgery and leaving the placenta in situ, carries a recurrence risk of PAS ranging between 10% and 30% and a risk of spontaneous uterine rupture of 3.3% in subsequent pregnancies [263–265]. A national, multicentre, retrospective French study of 96 women managed with the placenta left in situ reported that PAS recurred in six of the 21 women (28.6%) who became pregnant, four of whom were diagnosed with placenta praevia accreta [263]. The study group included eight women (8.3%) who were subsequently diagnosed with severe intrauterine synechiae and secondary amenorrhea. A

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retrospective population study from New South Wales, Australia, using a modified version of the WHO ICD-10, identified PAS in 27/570 (4.7%, 95% CI 3.0%–6.5%) of second and 9/119 (7.6%, 95% CI 2.8%–12.3%) of third pregnancies after PAS in the preceding birth [265]. Only 17 (3%) and 6 (5%) of the corresponding women were recorded as having placenta praevia accreta, and only 138 (24.2%) and 28 (23.5%) had a previous caesarean birth, suggesting that the majority of women included in this study did not have a true PAS in their last pregnancy. This study highlights the limitations of using the WHO ICD-10 in epidemiologic studies [2, 30, 266]. A 2024 systematic study and meta-analysis, including the above studies, confirmed a PAS recurrence rate in the subsequent pregnancy of 11.8% (95% CI 1.1–60.3) with high heterogeneity between studies [267]. *[Evidence level 2–]*

13 | Clinical Governance

13.1 | Debriefing

Postnatal follow-up should include a debriefing that explains what happened and why. Women presenting with symptoms of depression and post-traumatic stress disorder should be provided with adequate support. Where conservative management of PAS has been successful, women should be informed of the risk of recurrence. Debrief is also useful for the PAS team for improving future care.

13.2 | Training

Raising awareness about the clinical risk factors associated with placenta praevia and placenta praevia accreta at birth should be pursued nationally and locally, including organising integrated care pathways for women with a high probability of PAS at birth and arranging for them to be referred to a specialist MDT for further investigations.

There should be appropriate training for all ultrasound staff (sonographers and obstetrician-gynaecologists) in diagnosing placenta praevia and identifying the antenatal ultrasound signs associated with PAS at birth, and obstetric trainees and junior consultants in performing complex caesarean birth.

13.3 | Clinical Incident Reporting

Any lack of compliance with the care bundle by the clinical team for a woman with either placenta praevia or accreta should be investigated.

There should be written protocols for the identification and planning of further care of women presenting with a placenta praevia and for those with a high probability of PAS.

14 | Recommendations for Future Research

- Adequately powered prospective study comparing the impact on the care and outcome of the use of the 'low-lying placenta or placenta praevia' classification with the traditional grades 1–4 classification at different gestations is needed.
- Prospective studies are needed to assess the role of first-trimester (11–14 weeks) ultrasound in women with a history of more than two previous caesarean births.
- Prospective studies are needed to assess the role of third-trimester ultrasound, and in particular changes in cervical length with advancing gestation, in evaluating the risks of haemorrhage and emergency caesarean birth.
- Prospective comparative imaging studies, including transvaginal ultrasound, 3D imaging and MRI studies, are needed to evaluate the role of different techniques for the evaluation of surgical planning and outcomes in women presenting with a placenta praevia with signs associated with a high probability of accreta placentation and anomalies of the uterine contour indicating a dehiscence of the LUS.
- Prospective case–control or RCTs of the impact of progesterone on the risk of preterm birth for both conditions (placenta praevia and placenta accreta) stratified for the risks of preterm birth, including cervical length and placental position at different gestational ages, are needed.
- Prospective case–control or RCTs on the optimal timing of birth for both conditions (placenta previa and placenta accreta) stratified according to the risks of preterm birth, including cervical length, are needed.
- Prospective studies of the psychological consequences following the diagnosis of both conditions (placenta praevia and placenta accreta) and the experience of a traumatic birth.
- Prospective studies on the use of different surgical techniques that reduce the risk of intraoperative bleeding in the management of both placenta previa and PAS.
- A prospective study is required to evaluate access to specialist care for women at higher risk of these placental conditions across different ethnic groups and to assess the impact of a raising awareness campaign on providing these women with access to care from the first trimester of pregnancy.

15 | Auditable Topics

15.1 | Placenta Praevia

- Antenatal diagnosis of low-lying placenta and placenta praevia using a standardised protocol (100%).
- Antenatal detection and treatment of anaemia (100%).
- Antenatal imaging performed according to hospital policy (100%).
- Appropriate antenatal birth plan made and documented, to include discussion with woman and her partner, documentation that the risks and indications for blood transfusion and hysterectomy have been discussed, and that concerns,

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queries or refusals of treatments have been addressed (100%).

- Involvement of local blood bank and haematologist in the care of women with placenta praevia and atypical antibodies (100%).
- Appropriate personnel present at birth (100%).
- Appropriate site for birth (100%).
- Appropriate surgical approaches performed (100%).
- Planned early-term birth between 37^{+0} and 37^{+6} weeks of gestation for asymptomatic women with placenta praevia and no other risk factors (100%).
- Women requesting planned caesarean birth for nonmedical reasons are informed of the risk of placenta praevia and accreta spectrum, and its consequences in future births (100%).

15.2 | Placenta Accreta Spectrum

- Performance of antenatal imaging according to hospital policy, with documentation of intraoperative findings and confirmation of diagnosis at birth (100%).
- Appropriate antenatal birth plan made and documented, to include discussion with the woman and their partner, documentation that the risks and indications for blood transfusion and hysterectomy have been discussed, and that concerns, queries or refusals of treatments have been addressed (100%).
- All elements of the care bundle were satisfied before planned surgery in women with placenta accreta spectrum (100%):
  - Consultant obstetrician planned and directly supervising the birth.
  - Consultant anaesthetist planned and directly supervising anaesthesia at birth.
  - Blood and blood products are available.
  - Multidisciplinary involvement in preoperative planning.
  - Discussion and consent should include possible interventions (such as hysterectomy, leaving the placenta in place, cell salvage and interventional radiology) and local availability of a level 2 critical care bed.

16 | Useful Links and Support Groups

- Royal College of Obstetricians and Gynaecologists. *Placenta praevia, placenta accreta and vasa praevia. Patient information Information for you*. [https://www.rcog.org.uk/for-the-public/browse-our-patient-information/placenta-praevia-placenta-accreta-and-vasa-praevia].
- National Childbirth Trust. *Placenta praevia—low-lying placenta* [https://www.nct.org.uk/pregnancy/low-lying-placenta].
- The Birth Trauma Association—[https://www.birthtraumaassociation.org/]
- Tommy's—[https://www.tommys.org/]
- Walker SP, Weale N, Elhodaiby *M. placenta* accreta spectrum: management update. The Obstetrican & Gynaecologist. Sept 2025 https://doi.org/10.1111/tog.70008
- General professional information videos (introduction; diagnosis & management): Medical aid films Website/YouTube

CSEP: https://youtu.be/ZFbzicy6WBQ?si=PC1PfTzBDnk3tz9d; https://youtu.be/F6gWC_ECwQs; https://youtu.be/ad3FtTYzlp4.

PAS: https://youtu.be/xaB7pGA7m2Q?si=RR4rW32xq; https://youtu.be/eCS68FXQUq0; https://youtu.be/iXUgxcjAf1w; https://youtu.be/ChJhXoTFiCg.

Patient information videos: https://www.youtube.com/watch?v=b7KiAsvfL18.

Author Contributions

E.J. wrote the initial draft. All authors revised this article critically and agreed upon the final version.

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Conflicts of Interest

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Supporting Information

Additional supporting information can be found online in the Supporting Information section. **Appendix S1:** bjo70239-sup-0001-AppendixS1.doc. **Appendix S2:** bjo70239-sup-0002-AppendixS2.docx.

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Appendix 1

Explanation of Grades and Evidence Levels

Classification of Evidence Levels	
1++	High-quality meta-analyses, systematic reviews of randomised controlled trials or randomised controlled trials with a very low risk of bias
1+	Well-conducted meta-analyses, systematic reviews of randomised controlled trials or randomised controlled trials with a low risk of bias
1—	Meta-analyses, systematic reviews of randomised controlled trials or randomised controlled trials with a high risk of bias
2++	High-quality systematic reviews of case–control or cohort studies or high-quality case–control or cohort studies with a very low risk of confounding, bias or chance and a high probability that the relationship is causal
2+	Well-conducted case–control or cohort studies with a low risk of confounding, bias or chance and a moderate probability that the relationship is causal
2—	Case–control or cohort studies with a high risk of confounding, bias or chance and a significant risk that the relationship is not causal
3	Non-analytical studies, for example, case reports, case series
4	Expert opinion

Grades of Recommendation	
A	At least one meta-analysis, systematic review or RCT rated as 1++, and directly applicable to the target population; or a systematic review of RCTs or a body of evidence consisting principally of studies rated as 1+, directly applicable to the target population and demonstrating overall consistency of results
B	A body of evidence including studies rated as 2++ directly applicable to the target population, and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 1++ or 1+
C	A body of evidence including studies rated as 2+ directly applicable to the target population, and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 2++
D	Evidence level 3 or 4; or Extrapolated evidence from studies rated as 2+

Good Practice Points (GPP)

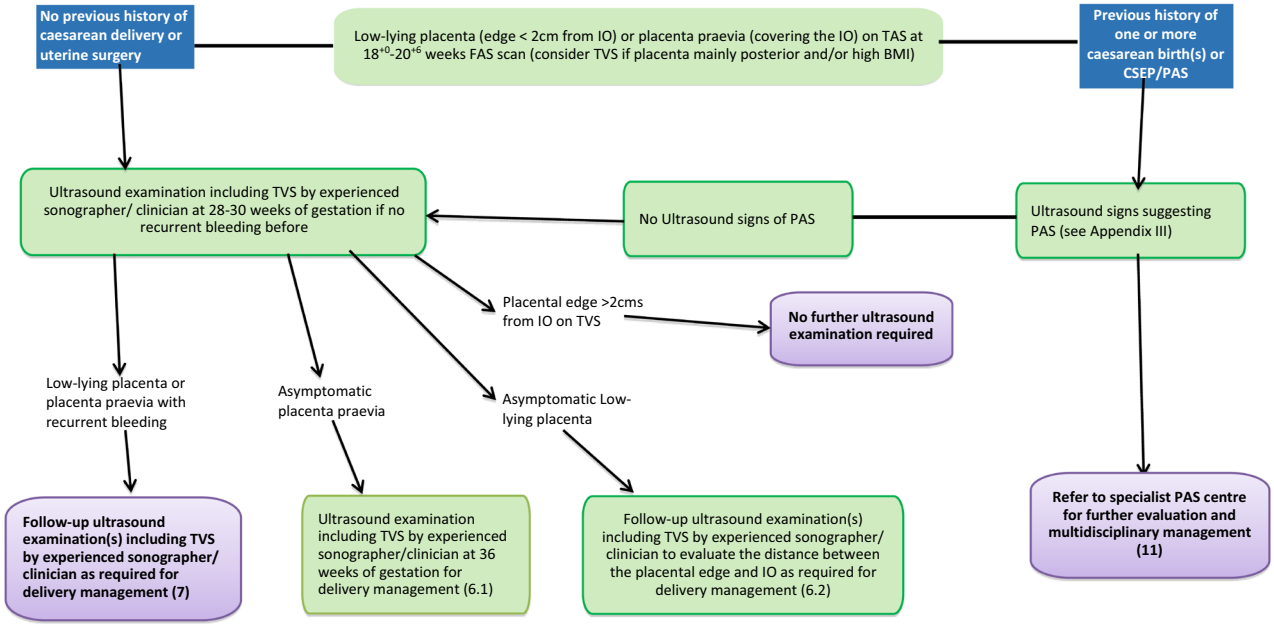
GPP	Recommended best practice based on the clinical experience of the guideline development group.*

*on the occasion when the guideline development group find there is an important practical point that they wish to emphasise but for which there is not, nor is there likely to be any research evidence. This will typically be where some aspect of treatment is regarded as such sound clinical practice that nobody is likely to question it. These are marked in the guideline, and are indicated by GPP. It must be emphasised that these are NOT an alternative to evidence-based recommendations, and should only be used where there is no alternative means of highlighting the issue.

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Appendix 2

Flow Diagram for Ultrasound Diagnosis and Follow-Up of Placenta Praevia and PAS



Abbreviations: TAS= transabdominal scan; **BMI=** body mass index; **TVS=** transvaginal scan; **IO**= Internal os; PAS**= Placenta accreta spectrum; CSEP**= Caesarean ectopic pregnancy; **FAS**= fetal anomaly screening.

Appendix 3

Ultrasound Imaging Signs Commonly Used to Identify PAS Stratify According to Their Main Features (Modified From Jauniaux et al.) [15]

Ultrasound imaging signs	Ultrasound descriptions anatomical descriptions	
Anomalies of uterine contour		
Loss of the 'clear zone'	**GSI**: Loss or irregularity of the normal hypoechoic plane in the uterine wall underneath the placental bed.	The thickness of this layer, which probably corresponds to the decidua decreases with advancing gestation and is altered by remodelling of the uterine wall during the scarification process.
Myometrial thinning	**GSI**: Myometrial thickness < 1 mm or undetectable.	Area of the myometrium lost during the scarification process of the LUS. The myometrial thickness also decreases with advancing gestation and number of prior caesarean births.
Bladder wall interruption	**GSI**: Partial or complete interruption, loss or irregularity of the bladder wall or of the hyperechoic line between uterine serosa and bladder lumen.	Anatomical artefact associated with the remodelling of the uterine wall during the scarification process and the increase in subplacental vascularity.
Placental bulge	**GSI**: 'Ballooning' of the uterus containing the placenta into the surrounding pelvic structure.	Hernia of one or more placental lobules (cotyledons) through a dehiscent uterine wall scar (often only made of fibrotic tissue covered by the uterine serosa) following myometrial thinning and stretching of the LUS with advancing gestation.
Exophytic mass	**GSI**: Focal area of the myometrium where the placenta appears to protrude outside the uterine wall.	Focal placental tissue hernia through a small defect of the uterine wall following scarification.

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Ultrasound imaging signs	Ultrasound descriptions anatomical descriptions	
Anomalies of the utero-placental and intraplacental circulation		
Subplacental hypervascularity	**CDI**: Striking amount of colour Doppler signal seen under part of the placental bed demonstrating multidirectional flow and aliasing artefact.	Excessive dilatation of the deep uterine circulation (radial and arcuate) resulting from development of part of the definitive placenta inside and around a scar defect.
Placental lacunae	**GSI & CDI**: Large, irregular hypoechoic intraplacental spaces located above large feeder vessels, giving the placenta a 'moth-eaten' appearance.	Distortion of a placental lobule due to chronically high velocity maternal blood flow entering the intervillous space directly from a radial or arcuate artery.
Bridging vessels	**CDI**: Vessels appearing to extend from the placenta bed, across uterine wall into bladder or other pelvic organs.	Dilated radial or arcuate arteries between the accreta area and the uterine serosa often associated with anastomosis between the uterine and bladder circulation.

Abbreviations: CDI, Colour Doppler imaging; GSI, Grey-scale imaging; LUS, lower uterine segment.

Appendix 4

Abbreviations

ACOG = American College of Obstetricians and Gynaecologists

APH = Antepartum haemorrhage

ART = Artificial reproduction technology

BMI = body mass index

CDI = Colour Doppler imaging

CL = Cervical length

CSD = Caesarean scar defect

CSEP = Caesarean scar ectopic pregnancy

DH = Delayed hysterectomy

FAS = fetal anomaly screening

GSI = Grey-scale imaging

ICU = Intensive care unit

IO = Internal os

ICS = Intraoperative cell salvage

IR = Interventional radiology

IVF = In vitro fertilisation.

LUS = Lower uterine segment

MDT = Multidisciplinary team

MRI = Magnetic resonance imaging

MOH = Major obstetric haemorrhage

NICU = neonatal intensive care unit

OR & CI = Odds ratio and confidence intervals

PAS = Placenta accreta spectrum

PH = Primary hysterectomy

PMR = Partial myometrial resection

PPH = Postpartum haemorrhage

PTB = Preterm birth

RCT = Randomised controlled trial

RR = relative risk

TAS = Transabdominal scan

TVS = Transvaginal scan

Appendix 5

Glossary

Caesarean scar defect: Defect of the myometrium that develops following incomplete closure of the incision of caesarean section.

Caesarean scar ectopic pregnancy: Development of a pregnancy following the implantation of the blastocyst inside a caesarean scar defect.

Decidua: Transformed endometrial layer during pregnancy which provides nutritional support to the early placenta and foetus, and regulates trophoblast migration.

Internal os: Opening between the uterine cervix and the corpus or upper uterine segment.

Interventional radiology: Subspecialty of radiology that uses image-guidance to perform procedures in obstetrics such as vascular embolisation or insertion of a balloon into the aorta, iliac artery or uterine artery.

Low-lying placenta: When the lower placental edge is <20 mm from the IO of the uterine cervix at any gestation >16 weeks on ultrasound examination.

Major (massive) obstetric haemorrhage: leading cause of direct maternal morbidity and mortality worldwide, variably defined as a blood loss >1500 mL, or a fall in haemoglobin of more than 4 g/dL after acute blood loss during delivery or need transfusion of four or more units of blood.

Massive PPH refers to a blood loss of >2000 mL (or >30% of blood volume).

Lower uterine segment: part of the uterus between the cervix and the upper thicker uterine segment which undergoes circumferential dilatation during labour.

Placenta increta: Placenta with one or more lobule(s) where the villous tissue is abnormally attached inside a scar area of the uterine wall

Placental cotyledon (lobule): The globular arrangement of placental villi centred over the opening of a spiral artery.

Placenta praevia: When the placental edge reaches or covers the IO of the uterine cervix at any gestation >16 weeks on ultrasound examination.

PPH (Primary) is defined as blood loses ≥500 mL within the first 24 h after the birth.

Residual myometrial thickness: Thickness of the uterine wall of a caesarean scar defect between the placenta and the serosa of the bladder.

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