

1 **Green-top Guideline No. 27a**
2 **Final Draft – Winter 2017**

3
4 **Placenta Praevia and Placenta Accreta: Diagnosis and Management**
5

6 This is the fourth edition of this guideline. The first, published in 2001, was entitled *Placenta Praevia:*
7 *Diagnosis and Management*; the second, published in 2005, was entitled *Placenta Praevia and*
8 *Placenta Praevia Accreta: Diagnosis and Management*; and the third, published in 2011, was entitled
9 *Placenta Praevia, Placenta Praevia Accreta and Vasa Praevia: Diagnosis and Management*.

10
11 **Executive summary**

12
13 *Antenatal diagnosis and management of placenta praevia or a low-lying placenta*

14
15 What are the risk factors for placenta praevia or a low-lying placenta?

16
17 **Caesarean delivery is associated with an increased risk of placenta praevia in subsequent**
18 **pregnancies. This risk rises as the number of prior caesarean sections increases. [B]**

19
20 **Assisted reproductive technology and maternal smoking increase the risk of placenta praevia. [B]**

21
22 Should we screen for placenta praevia or a low-lying placenta, if so, at what gestation and with what
23 follow-up?

24
25 **The midpregnancy routine fetal anomaly scan should include placental localisation thereby**
26 **identifying women at risk of persisting placenta praevia or a low-lying placenta. [GPP]**

27
28 **The term placenta praevia should be used when the placenta lies directly over the internal os. For**
29 **pregnancies at more than 16 weeks of gestation the term low-lying placenta should be used when**
30 **the placental edge is 20 mm or less from the internal os on transabdominal or transvaginal**
31 **scanning (TVS). [D]**

32
33 **If the placenta is thought to be low lying (less than 20 mm from the internal os) or praevia**
34 **(covering the os) at the routine fetal anomaly scan, a follow-up ultrasound examination including**
35 **a TVS is recommended at 32 weeks of gestation to diagnose persistent low-lying placenta and/or**
36 **placenta praevia. [D]**

37
38 What is the role and what are the risks of TVS?

39
40 **Clinicians should be aware that TVS for the diagnosis of placenta praevia or a low-lying placenta is**
41 **superior to transabdominal and transperineal approaches and is safe. [GPP]**

42
43 **In women with a persistent low-lying placenta or placenta praevia at 32 weeks of gestation who**
44 **remain asymptomatic, an additional TVS is recommended at around 36 weeks of gestation to**
45 **inform discussion about mode of delivery. [D]**

46
47 **Cervical length measurement may help facilitate management decisions in asymptomatic women**
48 **with placenta praevia. A short cervical length on TVS before 34 weeks of gestation increases the**
49 **risk of preterm emergency delivery and massive haemorrhage at caesarean section. [D]**

50
51 Where should women with a low-lying placenta or placenta praevia be cared for in the third
52 trimester?

53

54 Women with a low-lying placenta or placenta praevia with recurrent bleeding
55
56 **Tailor antenatal care, including hospitalisation, to individual patient need and social**
57 **circumstances, e.g. distance between home and hospital and availability of transportation,**
58 **previous bleeding episodes, haematology laboratory results and acceptance of receiving donor**
59 **blood or blood products. [GPP]**
60
61 **It should be made clear to any woman being treated at home in the third trimester that she should**
62 **attend the hospital immediately if she experiences any bleeding, including spotting, contractions**
63 **or pain (including vague suprapubic period-like aches). [GPP]**
64
65 Women with asymptomatic placenta praevia or a low-lying placenta
66
67 **Women with asymptomatic placenta praevia or a low-lying placenta in the third trimester should**
68 **be counselled about the risks of preterm delivery and obstetric haemorrhage, and their care**
69 **should be tailored to their individual needs. [GPP]**
70
71 **Women with asymptomatic placenta praevia confirmed at the 32-week follow-up scan and**
72 **managed at home should be encouraged to ensure they have safety precautions in place, including**
73 **having someone available to help them as necessary and ready access to the hospital. [GPP]**
74
75 Is there a place for cervical cerclage in placenta praevia or a low-lying placenta?
76
77 **The use of cervical cerclage to reduce bleeding and prolong pregnancy is not supported by**
78 **sufficient evidence to recommend its use outside of a clinical trial. [GPP]**
79
80 In what circumstances, and at what gestation, should women be offered antenatal corticosteroids?
81
82 **A single course of antenatal corticosteroid therapy is recommended between 34⁺⁰ and 36⁺⁰ weeks**
83 **of gestation for pregnant women with a low-lying placenta or placenta praevia and is appropriate**
84 **prior to 34⁺⁰ weeks of gestation in women at higher risk of preterm birth. [GPP]**
85
86 Is there a place for the use of tocolytics in women presenting with a low-lying placenta or placenta
87 praevia and preterm labour?
88
89 **Tocolysis for women presenting with symptomatic placenta praevia or a low-lying placenta may**
90 **be considered for 48 hours to facilitate administration of antenatal corticosteroids. [C]**
91
92 **Should delivery be indicated based on maternal or fetal concerns, tocolysis should not be used in**
93 **attempt to prolong gestation. [C]**
94
95 At what gestation should planned delivery occur?
96
97 **Late preterm (35⁺¹ to 36⁺⁶ weeks of gestation) delivery should be considered for women**
98 **presenting with complicated placenta praevia or a low-lying placenta. [C]**
99
100 In what situations is vaginal delivery appropriate for women with a low-lying placenta?
101
102 **In women with a third trimester asymptomatic low-lying placenta, the mode of delivery should be**
103 **based on the clinical background, the woman's preferences supplemented by ultrasound findings,**
104 **including the distance between the placental edge and the fetal head position relative to the**
105 **leading edge of the placenta on TVS. [D]**
106

107 *Optimising the delivery of placenta praevia*

108

109 **Prior to delivery, all women with placenta praevia and their partners should have a discussion**
110 **regarding delivery. Indications for blood transfusion and hysterectomy should be reviewed and**
111 **concerns or plans to decline blood or blood products should be discussed openly and documented.**
112 **[GPP]**

113

114 **Placenta praevia and anterior low-lying placenta carry a higher risk of massive obstetric**
115 **haemorrhage and hysterectomy. Delivery should be arranged in a maternity unit with on-site**
116 **blood transfusion services and access to critical care. [D]**

117

118 **Women with atypical antibodies form a particularly high-risk group and the care of these women**
119 **should involve discussions with the local haematologist and blood bank. [D]**

120

121 **Prevention and treatment of anaemia during the antenatal period is recommended for women**
122 **with placenta praevia or a low-lying placenta as for any pregnant woman. [D]**

123

124 *Delivery for women with placenta praevia or a low-lying placenta*

125

126 **What grade of obstetrician and anaesthetist should attend the caesarean delivery for a placenta**
127 **praevia?**

128

129 **As a minimum requirement for a planned caesarean section for placenta praevia, the surgical**
130 **procedure should be carried out by an appropriately experienced operator. [GPP]**

131

132 **In cases of planned caesarean section for placenta praevia or a low-lying placenta, a senior**
133 **obstetrician (usually a consultant) and senior anaesthetist (usually a consultant) should be present**
134 **within the delivery or theatre suite where the surgery is occurring. [GPP]**

135

136 **When an emergency arises, the senior obstetrician and senior anaesthetist should be alerted**
137 **immediately and attend urgently. [GPP]**

138

139 **What anaesthetic procedure is most appropriate for caesarean section in placenta praevia or a low-**
140 **lying placenta?**

141

142 **Regional anaesthesia is considered safe and associated with lower risks of haemorrhage than**
143 **general anaesthesia for caesarean delivery in women with placenta praevia or a low-lying**
144 **placenta. Women with anterior placenta praevia or a low-lying placenta should be advised that it**
145 **may be necessary to convert to general anaesthesia if required and asked to consent. [D]**

146

147 **What blood products should be available?**

148

149 **Close liaison with the hospital transfusion laboratory is essential for women presenting with**
150 **placenta praevia or a low-lying placenta. [GPP]**

151

152 **Rapid infusion and fluid warming devices should be immediately available. [GPP]**

153

154 **Cell salvage is recommended for patients where the anticipated blood loss is great enough to**
155 **induce anaemia, in particular, in women who would decline blood products. [D]**

156

157 **What surgical approach should be used for placenta praevia or a low-lying placenta?**

158

159 **Consider vertical skin and/or uterine incisions when the fetus is in a transverse lie to avoid the**

160 placenta, particularly below 28 weeks of gestation. [GPP]
161
162 Consider using preoperative and/or intraoperative ultrasonography to precisely determine
163 placental location and the optimal place for uterine incision. [D]
164
165 If the placenta is transected during the uterine incision, immediately clamp the umbilical cord
166 after fetal delivery to avoid excessive fetal blood loss. [D]
167
168 If pharmacological measures fail to control haemorrhage, initiate intrauterine tamponade and/or
169 surgical haemostatic techniques sooner rather than later. Interventional radiological techniques
170 should also be urgently employed where possible. [C]
171
172 Early recourse to hysterectomy is recommended if conservative medical and surgical interventions
173 prove ineffective. [D]
174
175 *Antenatal diagnosis and outcome of placenta accreta spectrum*
176
177 What are the risk factors for placenta accreta spectrum?
178
179 The major risk factors for placenta accreta spectrum are history of accreta in a previous
180 pregnancy, previous caesarean delivery and other uterine surgery, including repeated endometrial
181 curettage. This risk rises as the number of prior caesarean sections increases. [B]
182
183 Women requesting elective caesarean delivery for non-medical indications should be informed of
184 the risk of placenta accreta spectrum and its consequences for subsequent pregnancies. [GPP]
185
186 How can a placenta accreta spectrum be suspected and diagnosed antenatally?
187
188 Antenatal diagnosis of placenta accreta spectrum is crucial in planning its management and has
189 been shown to reduce maternal morbidity and mortality. [D]
190
191 Previous caesarean delivery and the presence of an anterior low-lying placenta or placenta praevia
192 should alert the antenatal care team of the higher risk of placenta accreta spectrum. [D]
193
194 Ultrasound screening and diagnosis of placenta accreta spectrum
195
196 Ultrasound imaging is highly accurate when performed by a skilled operator with experience in
197 diagnosing placenta accreta spectrum. [C]
198
199 Refer women with any ultrasound features suggestive of placenta accreta spectrum to a specialist
200 unit with imaging expertise. [B]
201
202 Women with a history of previous caesarean section seen to have an anterior low-lying placenta
203 or placenta praevia at the routine fetal anomaly scan should be specifically screened for placenta
204 accreta spectrum. [D]
205
206 Is there a role for magnetic resonance imaging (MRI) in the diagnosis of placenta accreta spectrum?
207
208 Clinicians should be aware that the diagnostic value of MRI and ultrasound imaging in detecting
209 placenta accreta spectrum is similar when performed by experts. [C]
210
211 MRI may be used to complement ultrasound imaging to assess the depth of invasion and lateral
212 extension of myometrial invasion, especially with posterior placentation and/or in women with

213 **ultrasound signs suggesting parametrial invasion. [GPP]**
214
215 Where should women with placenta accreta spectrum be cared for?
216
217 **Women diagnosed with placenta accreta spectrum should be cared for by a multidisciplinary team**
218 **in a specialist centre with expertise in diagnosing and managing invasive placentation. [GPP]**
219
220 **Delivery for women diagnosed with placenta accreta spectrum should take place in a specialist**
221 **centre with logistic support for immediate access to blood products, adult intensive care unit and**
222 **neonatal intensive care unit (NICU) by a multidisciplinary team with expertise in complex pelvic**
223 **surgery. [D]**
224
225 When should delivery be planned for women with placenta accreta spectrum?
226
227 **In the absence of risk factors for preterm delivery and evidence of invasive placentation, planned**
228 **delivery at 35⁺⁰ to 36⁺⁶ weeks of gestation provides the best balance between fetal maturity and**
229 **the risk of unscheduled delivery. [GPP]**
230
231 *Planning delivery of a suspected placenta accreta spectrum*
232
233 **Once the diagnosis of placenta accreta spectrum is made, a contingency plan for emergency**
234 **delivery should be developed, including the use of an institutional protocol for the management of**
235 **maternal haemorrhage. [GPP]**
236
237 What should be included in the consent form for caesarean section in cases of suspected placenta
238 accreta spectrum?
239
240 **Any woman giving consent for caesarean section should understand the risks associated with**
241 **caesarean section in general, and the specific risks of placenta accreta spectrum in terms of**
242 **massive obstetric haemorrhage, increased risk of lower urinary tract damage, the need for blood**
243 **transfusion and the risk of hysterectomy. [GPP]**
244
245 **Additional possible interventions in the case of massive haemorrhage should also be discussed,**
246 **including cell salvage and interventional radiology where available. [D]**
247
248 What healthcare professionals should be involved?
249
250 **The elective delivery of women with placenta accreta spectrum should be managed by a**
251 **multidisciplinary team, which should include senior anaesthetists, obstetricians and**
252 **gynaecologists with appropriate experience in managing the condition and other surgical**
253 **specialties if indicated. In an emergency, the most senior clinicians available should be involved.**
254 **[GPP]**
255
256 What anaesthetic is most appropriate for delivery?
257
258 **The choice of anaesthetic technique for caesarean section for placenta accreta spectrum should be**
259 **made by the anaesthetist conducting the procedure in consultation with the patient in advance.**
260 **[GPP]**
261
262 **The woman should be informed that the surgical procedure can be performed safely with regional**
263 **anaesthesia but should be advised that it may be necessary to convert to general anaesthesia if**
264 **required and asked to consent. [D]**
265

266 Optimising the delivery of placenta accreta spectrum
267
268 What surgical approach should be used for placenta accreta spectrum?
269
270 **Caesarean section hysterectomy with the placenta left in situ is preferable to attempting to**
271 **separate it from the uterine wall. [C]**
272
273 **When the extent of the placenta accreta is limited in depth and surface area, and the entire**
274 **placental implantation area is accessible and visualised (i.e. completely anterior, fundal or**
275 **posterior without deep pelvic invasion), uterus-preserving surgery may be appropriate, including**
276 **partial myometrial resection. [GPP]**
277
278 **Uterus-preserving surgical techniques should only be attempted by surgeons working in teams**
279 **with appropriate expertise to manage such cases and after appropriate counselling regarding risks**
280 **and with informed consent. [D]**
281
282 **There are currently insufficient data to recommend the routine use of ureteric stents in placenta**
283 **creta and increta. [C]**
284
285 What surgical approach should be used for placenta percreta?
286
287 **There is limited evidence to support uterus-preserving surgery in placenta percreta and women**
288 **should be informed of the high risk of peripartum and secondary complications, including the**
289 **need for secondary hysterectomy. [D]**
290
291 Expectant management (leaving the placenta in situ)
292
293 **Elective peripartum hysterectomy may be unacceptable to women desiring uterine preservation**
294 **or considered inappropriate by the surgical team. In such cases, leaving the placenta in situ should**
295 **be considered. [D]**
296
297 **When the placenta is left in situ, local arrangements need to be made to ensure regular review,**
298 **ultrasound examination and access to emergency care should the woman experience**
299 **complications, such as bleeding or infection. [D]**
300
301 **Methotrexate (MTX) adjuvant therapy should not be used for expectant management as it is of**
302 **unproven benefit and has significant adverse effects, including a reported maternal death. [C]**
303
304 When is interventional radiology indicated?
305
306 **Larger studies are necessary to determine the safety and efficacy of interventional radiology**
307 **before this technique can be advised in the routine management of placenta accreta spectrum. [D]**
308
309 **Women diagnosed with placenta accreta spectrum who decline donor blood transfusion should be**
310 **managed in a unit with an interventional radiology service. [D]**
311
312 How is unsuspected placenta accreta spectrum at delivery best managed?
313
314 **If at the time of an elective repeat caesarean section, where both mother and baby are stable, it is**
315 **immediately apparent that placenta percreta is present on opening the abdomen, the caesarean**
316 **section should be delayed until the appropriate staff and resources have been assembled and**
317 **adequate blood products are available. This may involve closure of the maternal abdomen and**
318 **urgent transfer to a specialist unit for delivery. [GPP]**

319
320 **In case of unsuspected placenta accreta spectrum diagnosed after delivery of the baby, the**
321 **placenta should be left in situ and an emergency hysterectomy performed. [D]**
322

323 **1. Purpose and scope**

324
325 The purpose of this guideline is to describe the diagnostic modalities and review the evidence-based
326 approach to the clinical management of pregnancies complicated by placenta praevia and placenta
327 accreta.
328

329 **2. Introduction and background epidemiology**

330
331 Placenta praevia and placenta accreta are associated with high maternal and neonatal morbidity and
332 mortality.¹⁻⁵ The rates of placenta praevia and accreta have increased and will continue to do so as a
333 result of rising rates of caesarean deliveries, increased maternal age and use of assisted reproductive
334 technology (ART), placing greater demands on maternity-related resources. The highest rates of
335 complication for both mother and newborn are observed when these conditions are only diagnosed
336 at delivery.
337

338 *2.1 Placenta praevia*

339
340 Determining placental location is one of the first aims of routine midpregnancy (18⁺⁶–21⁺⁶ weeks of
341 gestation) transabdominal obstetric ultrasound examination.^{6,7} Placenta praevia was originally
342 defined using transabdominal scan as a placenta developing within the lower uterine segment and
343 graded according to the relationship and/or the distance between the lower placental edge and the
344 internal os of the uterine cervix. Grade I or *minor praevia* was defined as a lower edge inside the
345 internal uterine segment; grade II or *marginal praevia* as a lower edge reaching the internal os; grade
346 III or *partial praevia* when the placenta partially covers the cervix; and grade IV or *complete praevia*
347 when the placenta completely covers the cervix. Grades I and II are also often defined as 'minor'
348 placenta praevia whereas grades III and IV are referred to as 'major' placenta praevia.
349

350 The introduction of transvaginal scanning (TVS) in obstetrics in the 1980s has allowed for a more
351 precise evaluation of the distance between the placental edge and the internal os. A recent
352 multidisciplinary workshop of the American Institute of Ultrasound in Medicine (AIUM)⁸ has
353 recommended discontinuing the use of the terms 'partial' and 'marginal', suggesting that the term
354 'placenta praevia' is used when the placenta lies directly over the internal os. For pregnancies
355 greater than 16 weeks of gestation, the placenta should be reported as 'low lying' when the
356 placental edge is less than 20 mm from the internal os and as normal when the placental edge is 20
357 mm or more from the internal os on transabdominal or TVS. This new classification could better
358 define the risks of perinatal complications, such as antepartum haemorrhage and major postpartum
359 haemorrhage (PPH),^{9,10} and has the potential of improving the obstetric management of placenta
360 praevia. Recent articles reviewed in this guideline refer to the AIUM classification.
361

362 The estimated incidence of placenta praevia at term is 1 in 200 pregnancies.^{5,9} However, this is
363 dependent on the definition used and is likely to change with the introduction of the AIUM
364 classification described above and with the rising incidence of the main risk factors, i.e. prior
365 caesarean delivery and pregnancies resulting from ART. The relationship between a low-lying
366 placenta or placenta praevia and a velamentous insertion of the umbilical cord is presented and
367 discussed in sister Green-top Guideline no. 27b: *Vasa Praevia: Diagnosis and Management*.
368

369 *2.2 Placenta accreta*

370
371 Placenta accreta is a histopathological term first defined by Irving and Hertig in 1937, as the

372 “abnormal adherence of the afterbirth in whole or in parts to the underlying uterine wall in the
373 partial or complete absence of decidua”.¹¹ Irving and Hertig did not include abnormally invasive
374 placentation in their series and thus in their description was limited to abnormally adherent
375 placenta. Depending on the depth of villous tissue invasiveness, placenta accreta was subsequently
376 subdivided by modern pathologists into ‘creta’ or ‘adherenta’ where the villi adheres superficially to
377 the myometrium without interposing decidua; ‘increta’ where the villi penetrate deeply into the
378 uterine myometrium down to the serosa; and ‘percreta’ where the villous tissue perforates through
379 the entire uterine wall and may invade the surrounding pelvic organs, such as the bladder.¹²⁻¹⁴ Cases
380 of placenta accreta are also often subdivided into total, partial or focal according to the amount of
381 placental tissue involved and the different depths of accreta placentation have been found to co-
382 exist in the same case.^{12,15} Thus placenta accreta is a spectrum disorder ranging from abnormally
383 adherent to deeply invasive placental tissue.

384
385 Detailed data on clinical findings and, where possible, on histopathological examination are essential
386 when describing different diagnostic or management techniques.^{16,17} The diagnostic conundrum is
387 obvious at the abnormally adherent end of the spectrum where the differential diagnosis between a
388 difficult manual removal and an abnormally adherent or placenta accreta may be impossible in the
389 absence of histopathological confirmation. These diagnostic difficulties probably explain the current
390 wide variation in reported prevalence of placenta accreta ranging between 1 in 300 and 1 in 2000
391 pregnancies¹⁻⁵ and highlight the need for a standardised approach to imaging, clinical and
392 histopathological descriptions. In the last decade, even the condition itself has begun to be known
393 by many different names, with ‘morbidly adherent placenta’ becoming particularly popular. This
394 terminology was originally used in the 19th century to describe the clinical complications associated
395 with a retained placenta. This terminology is misleading as ‘morbidly adherent’ does not encompass
396 the abnormally invasive end of the accreta spectrum (increta and percreta), which usually have the
397 worst clinical outcomes.^{16,17} In order to overcome these difficulties, the terms ‘placenta accreta
398 spectrum’ or ‘abnormally adherent and invasive placenta’ should be used to include both the
399 abnormally adherent and invasive forms of accreta placentation.¹⁸ In this guideline, the term
400 placenta accreta spectrum will be used.

401
402 In the 1990s, the maternal mortality of placenta percreta was reported to be as high as 7% of
403 cases.¹⁹ More recent large series have reported lower rates of maternal death and this is likely to be
404 further improved by screening for placenta accreta spectrum in women at high risk and in planning
405 the delivery in specialist centres.²⁰⁻²²

406

407 **3. Identification and assessment of evidence**

408

409 This guideline was developed in accordance with standard methodology for producing Royal College
410 of Obstetricians and Gynaecologists (RCOG) Green-top Guidelines. The Cochrane Library (including
411 the Cochrane Database of Systematic Reviews and the Database of Abstracts of Reviews of Effects
412 [DARE]), EMBASE, Trip, MEDLINE and PubMed (electronic databases) were searched for relevant
413 randomised controlled trials (RCT), systematic reviews and meta-analyses. The search was restricted
414 to articles published between May 2009 and December 2017 (the search for the previous Guideline
415 was up to May 2009). The databases were searched using the relevant Medical Subject Headings
416 (MeSH) terms, including all subheadings, and this was combined with a keyword search. Search
417 words included ‘placenta praevia’, ‘low lying placenta’, ‘placenta accreta’, ‘placenta increta’
418 ‘placenta percreta’, ‘abnormally adherent placenta’ and ‘abnormally invasive placenta’. The search
419 was restricted to humans and the English language. The National Library for Health and the National
420 Guideline Clearinghouse were also searched for relevant guidelines and reviews.

421

422 Where possible, recommendations are based on available evidence. In the absence of published
423 evidence, these have been annotated as ‘good practice points’. Further information about the
424 assessment of evidence and the grading of recommendations may be found in Appendix I.

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4. Antenatal diagnosis and management of placenta praevia or a low-lying placenta

4.1 What are the risk factors for placenta praevia or a low-lying placenta?

Caesarean delivery is associated with an increased risk of placenta praevia in subsequent pregnancies. This risk rises as the number of prior caesarean sections increases. [B]

ART and maternal smoking increase the risk of placenta praevia. [B]

In 1997, a meta-analysis of the association of placenta praevia with history of caesarean delivery 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 deliveries compared with vaginal delivery.²³ [Evidence level 2++]

A systematic review and meta-analysis of 22 studies including over 2 million deliveries indicated that the incidence of placenta praevia increases from 10 in 1000 deliveries with one previous caesarean delivery to 28 in 1000 with three or more caesarean deliveries.²⁴ A 2014 meta-analysis confirmed these findings and reported an overall odds ratio (OR) of 1.47 (95% CI 1.44–1.51) for placenta praevia after caesarean section.²⁵ [Evidence level 1+]

Cohort studies have also reported that a second pregnancy within 1 year of a caesarean section is associated with an increased risk of placenta praevia (RR 1.7, 95% CI 0.9–3.1).²⁶ Compared with vaginal birth, a previous prelabour caesarean section is associated with an increased risk of placenta praevia in the second delivery (adjusted OR [aOR] 2.62, 95% CI 1.24–5.56).²⁷ [Evidence level 2++]

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.²⁸ A retrospective cohort of 67 895 singleton and twin pregnancies found that dichorionic (aOR 1.54, 95% CI 1.15–2.06) and monochorionic (RR 3.29, 95% CI 1.32–8.21) twin pregnancies had an increased risk of placenta praevia compared with singletons.²⁹ [Evidence level 2+]

ART is associated with a higher incidence of placenta praevia independently of the high rate of multiple pregnancies generated by the technique used.^{30,31} A 2016 meta-analysis of ART singleton pregnancies reported a RR of 3.71 (95% CI 2.67–5.16) for placenta praevia³² that was confirmed by a 2017 meta-analysis (OR 2.67, 95% CI 2.01–3.34).³³ Furthermore, a 2017 meta-analysis of the impact of maternal smoking on placental position³⁴ (OR 1.42, 95% CI 1.30–1.50) has found an increased risk of placenta praevia. [Evidence level 1+]

Advanced maternal age has been also associated with a slight increase in the risk of placenta praevia (OR 1.08, 95% CI 1.07–1.09) but this effect may be due to parity³⁵. [Evidence level 2–]

4.2 Should we screen for placenta praevia or a low-lying placenta, if so, at what gestation and with what follow-up?

The midpregnancy routine fetal anomaly scan should include placental localisation thereby identifying women at risk of persisting placenta praevia or a low-lying placenta. [GPP]

The term placenta praevia should be used when the placenta lies directly over the internal os. For pregnancies at more than 16 weeks of gestation the term low-lying placenta should be used when the placental edge is 20 mm or less from the internal os on transabdominal or TVS. [D]

478 **If the placenta is thought to be low lying (less than 20 mm from the internal os) or praevia**
479 **(covering the os) at the routine fetal anomaly scan, a follow-up ultrasound examination including**
480 **a TVS is recommended at 32 weeks of gestation to diagnose persistent low-lying placenta and/or**
481 **placenta praevia. [D]**
482

483 Placenta praevia is a well-established complication of pregnancy associated with high maternal and
484 perinatal complication rates.⁴⁻⁹ The UK National Screening Committee (UK NSC) does not
485 recommend a national screening program for placenta praevia, but it has supported current local
486 practices of identifying it at the routine midpregnancy (18⁺⁶–21⁺⁶ weeks of gestation) antenatal
487 screening ultrasound examination in women whose placenta extends onto the internal cervical os
488 (www.screening.nhs.uk/policies).³⁶ An update published in 2014 that included a literature search
489 covering the period between January 2008 and November 2012 concluded that this practice was not
490 supported by new evidence, but that the placental site is routinely reported at the time of the
491 routine fetal anomaly scan. In turn, this routine study has become the main screening test for
492 placenta praevia.³⁷ [Evidence level 4]

493
494 Apparent placental ‘migration’ following the development of the lower uterine segment during the
495 third trimester of pregnancy results in the resolution of the low-lying placenta in 90% of the cases
496 before term.³⁸⁻⁴⁶ This is less likely to occur in women with a previous caesarean delivery.³⁹ [Evidence
497 level 4]

498
499 In twin pregnancies, the likelihood of persistence of placenta praevia is also dependent on the
500 gestational age at sonographic detection. Among those with placenta praevia diagnosed in the
501 second trimester the majority of cases resolve by 32 weeks of gestation.^{29,47} After 32 weeks of
502 gestation around 50% of the remaining placenta praevia will resolve, with no further changes after
503 36 weeks of gestation.²⁹ [Evidence level 3]

504
505 The timing of a confirmatory ultrasound examination in the third trimester has varied between 32
506 and 36 weeks of gestation depending on the extent of the placenta praevia over the internal cervical
507 os. It is based on the perceived risk of antenatal haemorrhage, but there is no strong evidence that it
508 makes a difference in the care of asymptomatic women.³⁷ The timing of the follow-up ultrasound
509 examination should also be tailored according to a previous history of caesarean delivery to exclude
510 an associated placenta accreta spectrum. [Evidence level 4]

511
512 *4.3 What is the role and what are the risks of TVS?*
513

514 **Clinicians should be aware that TVS for the diagnosis of placenta praevia or a low-lying placenta is**
515 **superior to transabdominal and transperineal approaches and is safe. [GPP]**
516

517 **In women with a persistent low-lying placenta or placenta praevia at 32 weeks of gestation who**
518 **remain asymptomatic, an additional TVS is recommended at around 36 weeks of gestation to**
519 **inform discussion about mode of delivery. [D]**
520

521 **Cervical length measurement may help facilitate management decisions in asymptomatic women**
522 **with placenta praevia. A short cervical length on TVS before 34 weeks of gestation increases the**
523 **risk of preterm emergency delivery and massive haemorrhage at caesarean section. [D]**
524

525 TVS improves the accuracy of placental localisation particularly when the placenta is posterior or if
526 the transabdominal ultrasound is unclear, for example, due to maternal obesity or the presence of
527 large uterine fibroids.⁵ [Evidence level 4]

528
529 There is only one small (n = 38) RCT comparing transabdominal scan and TVS for placenta praevia,
530 which supports this safety profile and reports superior views, especially for posterior placentas.⁴⁸

531 [Evidence level 1+]

532

533 If the distance between the internal os and the placental edge is 20 mm or more on TVS, the
534 placental location should be recorded as normal and managed as per routine. Studies have not
535 demonstrated an increased risk for caesarean section due to haemorrhage in these cases.^{4,5} By
536 contrast, if the placenta extends beyond the internal os on TVS during the second trimester, it is
537 likely to be confirmed as placenta praevia at 32 weeks of gestation.⁴⁸⁻⁵⁰ However, 'migration' is still
538 possible after 32 weeks of gestation.^{50,51} [Evidence level 2+]

539

540 TVS will reclassify 26–60% of placentas diagnosed as low lying at the routine fetal anomaly scan.⁵²⁻⁵⁴
541 Overall, TVS has a high accuracy (positive predictive value of 93.3%, negative predictive value of
542 97.6% and false-negative rate of 2.33%) in predicting placenta praevia in women suspected of having
543 a low-lying placenta on transabdominal scan in the second and early third trimester, with a
544 sensitivity of 87.5% and a specificity of 98.8%.⁵⁵ [Evidence level 2+]

545

546 TVS has also been used to measure the cervical length to predict preterm birth⁵⁶ and cohort studies
547 with low risks of confounding bias have shown that cervical length is a predictor of antepartum
548 bleeding and emergency preterm caesarean section in placenta praevia.⁵⁷⁻⁶⁰ A prospective cohort
549 study of 59 women presenting with placenta praevia covering the internal os has shown that the
550 best cut-off point for the identification of women at risk of haemorrhage requiring a caesarean
551 delivery before 34 weeks of gestation is a cervical length of 31 mm or less (sensitivity of 83.3% and
552 specificity of 76.6%). Women with a cervical length of less than 31 mm have a 16 times (OR 16.4;
553 95% CI 3.4–75.9) higher risk of emergency caesarean section due to massive haemorrhage.⁵⁷
554 Similarly, a prospective cohort study of 54 women with placenta praevia covering the internal os has
555 shown that combining a cervical length of less than 30 mm and measurement of the lower placental
556 edge thickness of more than 10 mm has a sensitivity of 83.3% and a specificity of 78.4%.⁵⁸ More
557 prospective studies using a standardised ultrasound definition of placental edge thickness are
558 required before this sign can be used in clinical practice. [Evidence level 2+]

559

560 Compared with women with a long cervical length, women with a short cervical length (less than 25
561 mm) have a RR of 7.2 (95% CI 2.3–22.3) for massive haemorrhage during caesarean section for
562 placenta praevia.⁵⁹ [Evidence level 2+]

563

564 Serial TVS cervical length measurements from 26 weeks of gestation have indicated that when the
565 length of the cervix decreases rapidly to 35 mm or less there is an increased risk of preterm
566 caesarean section due to massive haemorrhage.⁶⁰ [Evidence level 2–]

567

568 *4.4 Where should women with a low-lying placenta or placenta praevia be cared for in the third*
569 *trimester?*

570

571 4.4.1 Women with a low-lying placenta or placenta praevia with recurrent bleeding

572

573 **Tailor antenatal care, including hospitalisation, to individual patient need and social**
574 **circumstances, e.g. distance between home and hospital and availability of transportation,**
575 **previous bleeding episodes, haematology laboratory results and acceptance of receiving donor**
576 **blood or blood products. [GPP]**

577

578 **Where hospital admission has been decided, a documented assessment of risk factors for VTE in**
579 **pregnancy should be performed as outlined in RCOG GTG No. 37a. [D]**

580

581 **It should be made clear to any woman being treated at home in the third trimester that she should**
582 **attend the hospital immediately if she experiences any bleeding, including spotting, contractions**
583 **or pain (including vague suprapubic period-like aches). [GPP]**

584

585 The Cochrane systematic review by Nielson on the impact of an intervention in women diagnosed as
586 having, or being likely to have a placenta praevia, which has not been updated since October 2002,
587 includes only one small RCT (n = 53) comparing hospital versus home care for symptomatic placenta
588 praevia.⁶¹ This trial found little evidence of any clear advantage or disadvantage to a policy of home
589 versus hospital care, and the only significant difference was a reduction in length of hospital stay.⁶²
590 *[Evidence level 1–]*

591

592 Two large retrospective studies of women presenting with placenta praevia at the routine fetal
593 anomaly scan have proposed scores to predict the risk of emergency caesarean section. The first
594 study (n = 250) found that the risk is increased if the first (sentinel) vaginal bleeding episode occurs
595 before 29 weeks of gestation (OR 2.64, 95% CI 1.17–5.98), and with the occurrence of three or more
596 episodes of antepartum haemorrhage (OR 2.53, 95% CI 1.1–5.86).⁶³ The second (n = 214) found that
597 independent predictors for emergency delivery are a history of caesarean section (OR 4.7, 95 CI 1.2–
598 12); antepartum haemorrhage on one (OR 7.5, 95% CI 2.5–23), two (OR 14, 95% CI 4.3–47), and
599 three or more occasions (OR 27, 95% CI 8.3–90); and need for antenatal blood transfusion (OR 6.4,
600 95% CI 1.7–23).¹⁰ A retrospective study of 214 women with singleton pregnancies found that the risk
601 of preterm emergency caesarean delivery increases with the number of antepartum bleeding
602 episodes with one (OR 7.5, 95% C, 2.5-23), two (OR 14, 95% CI 4.3-47), and three or more (OR 27,
603 95% CI 8.3-90), as well as need for blood transfusion (OR 6.4, 95% C, 1.7-23).⁶⁴ The results of these
604 studies suggest that predictors for emergency delivery in women with placenta praevia can be used
605 for individualised antenatal care regarding need for hospital admission, corticosteroids
606 administration and timing of delivery. *[Evidence level 2–]*

607

608 4.4.2 Women with asymptomatic placenta praevia or a low-lying placenta

609

610 **Women with asymptomatic placenta praevia or a low-lying placenta in the third trimester should**
611 **be counselled about the risks of preterm delivery and obstetric haemorrhage, and their care**
612 **should be tailored to their individual needs. [GPP]**

613

614 **Women with asymptomatic placenta praevia confirmed at the 32-week follow-up scan and**
615 **managed at home should be encouraged to ensure they have safety precautions in place, including**
616 **having someone available to help them as necessary and ready access to the hospital. [GPP]**

617

618 Most women with asymptomatic placenta praevia (no bleeding or contractions) can be cared for as
619 outpatients with similar outcomes compared with hospitalisation and at lower cost.⁵ Numerous
620 factors influence the chances of the placenta praevia persisting until delivery, such as prior
621 caesarean section,⁴³ the distance between the placental edge and the internal os, and the thickness
622 of the placental edge.⁴ These parameters can be useful in tailoring individual patient needs.
623 *[Evidence level 4]*

624

625 4.5 *Is there a place for cervical cerclage in placenta praevia or a low-lying placenta?*

626

627 **The use of cervical cerclage to reduce bleeding and prolong pregnancy is not supported by**
628 **sufficient evidence to recommend its use outside of a clinical trial. [GPP]**

629

630 The Cochrane systematic review by Nielson⁶¹ on the impact of cerclage in women diagnosed as
631 having, or being likely to have, placenta praevia included two small RCTs (n = 25 and 36) comparing
632 cervical cerclage versus no cerclage. There may be a reduction in preterm births before 34 weeks of
633 gestation (RR 0.45, 95% CI 0.23–0.87), but this evidence is not robust enough to recommend its use
634 outside of clinical trials. *[Evidence level 1–]*

635

636 There have been no new trials looking at this issue since the last update of this guideline.

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4.6 *In what circumstances, and at what gestation, should women be offered antenatal corticosteroids?*

A single course of antenatal corticosteroid therapy is recommended between 34⁺⁰ and 36⁺⁰ weeks of gestation for pregnant women with a low-lying placenta or placenta praevia and is appropriate prior to 34⁺⁰ weeks of gestation in women at higher risk of preterm birth. [GPP]

A large case-control study found that neonatal morbidities in women with placenta praevia include an increased risk of lower 5-minute Apgar scores, neonatal intensive care unit (NICU) admission, anaemia, respiratory distress syndrome, mechanical ventilation and intraventricular haemorrhage.⁶⁵ Neonates born to mothers with placenta praevia have lower birthweights (2806 versus 3285 g) and lower gestational ages (36⁺² versus 38⁺¹ weeks). These differences were not significant after adjusting for confounders such as prematurity.⁶⁶ [Evidence level 2++]

Compared with placebo or no treatment with antenatal corticosteroids (betamethasone, dexamethasone or hydrocortisone), antenatal corticosteroids are associated with a reduction in the most serious adverse outcomes related to prematurity, including perinatal death (RR 0.72, 95% CI 0.58–0.89), respiratory distress syndrome (average RR 0.66, 95% CI 0.56–0.77), intraventricular haemorrhage (average RR 0.55, 95% CI 0.40–0.76) and necrotising enterocolitis (RR 0.50, 95% CI 0.32–0.78).⁶⁷ [Evidence level 1+]

The 2016 RCT has found that the administration of betamethasone to women with a singleton pregnancy at risk for late preterm delivery (34⁺⁰ to 36⁺⁵ weeks of gestation) significantly reduces the rate of neonatal respiratory complications.⁶⁸ [Evidence level 1+]

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 indicated that corticosteroids administration at 35⁺⁵ weeks of gestation followed by planned delivery at 36 weeks of gestation optimises maternal and neonatal outcomes.⁶⁹ [Evidence level 4]

4.7 *Is there a place for the use of tocolytics in women presenting with a low-lying placenta or placenta praevia and preterm labour?*

Tocolysis for women presenting with symptomatic placenta praevia or a low-lying placenta may be considered for 48 hours to facilitate administration of antenatal corticosteroids. [C]

Should delivery be indicated based on maternal or fetal concerns, tocolysis should not be used in attempt to prolong gestation. [C]

A systematic review to determine if the prolonged (48 hours or more) use of tocolytics in women with symptomatic preterm placenta praevia improves perinatal outcome identified two retrospective studies (total, n = 217) and one RCT (n = 60).⁷⁰ The results of the RCT showed 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 (OR 1.19, 95% CI 0.63–2.28). The RCT was judged inadequately compliant with the Consolidated Standards of Reporting Trials statement. [Evidence level 1–]

A recent randomised, double-blind, placebo-controlled multicentre trial including 109 women at 24⁺⁰ to 33⁺⁶ weeks with at least one episode of placenta praevia bleeding and intact membranes has shown that there is no difference in the prolongation of pregnancy between the nifedipine (n = 54) and placebo (n = 55) groups.⁷¹ Adverse perinatal outcomes were comparable between groups. [Evidence level 1+]

690 4.8 At what gestation should planned delivery occur?

691

692 **Delivery timing should be tailored according to antenatal symptoms and for women presenting**
693 **with uncomplicated placenta praevia, delivery should be considered between 36 and 37 weeks of**
694 **gestation. [C]**

695

696 As the risk of major haemorrhage increases rapidly after 36 weeks of gestation, expert opinions have
697 highlighted that decisions regarding timing of delivery must be individualised and suggested that **on**
698 **the basis of limited data available**, women with uncomplicated placenta praevia should undergo
699 scheduled birth by caesarean section **between 36 and 37 weeks of gestation**.^{69,72,73} [Evidence level 4]

700

701 The risks of bleeding, labour, or bleeding and labour leading to the need for emergency delivery
702 increase with advancing gestational age, whereas the risks of morbidity associated with prematurity
703 decrease.^{4,5} The risk of an emergent bleed associated with placenta praevia has been reported to be
704 4.7% by 35 weeks of gestation, 15% by 36 weeks of gestation, 30% by 37 weeks of gestation and 59%
705 by 38 weeks of gestation.⁷⁴ [Evidence level 2-]

706

707 A US population-based cohort study using the Centre for Disease Control and Prevention's Linked
708 Birth-Infant Death data files has evaluated the effects of delivering placenta praevia at 35, 36 and 37
709 weeks of gestation on the risk of several neonatal outcomes.⁷⁵ Compared with neonates born at 38
710 weeks of gestation, those delivered at 35, 36 and 37 weeks of gestation have no greater odds of
711 meconium passage, fetal anaemia, neonatal seizures, increased ventilator needs or
712 infant death at 1 year. However, aOR odds of 5-minute Apgar scores of less than 7 are greater at 35
713 and 36 weeks of gestation (aOR 3.33, 95% CI 1.71–6.47; and aOR 2.17, 1.11–4.22, respectively) as
714 are odds of NICU admission rates (aOR 2.25, 95% CI 2.01–2.50; and aOR 1.57, 1.38–1.76,
715 respectively). [Evidence level 2+]

716

717 4.9 In what situations is vaginal delivery appropriate for women with a low-lying placenta?

718

719 **In women with a third trimester asymptomatic low-lying placenta, the mode of delivery should be**
720 **based on the clinical background, the woman's preferences supplemented by ultrasound findings,**
721 **including the distance between the placental edge and the fetal head position relative to the**
722 **leading edge of the placenta on TVS. [D]**

723

724 Women presenting with a placental edge less than 20 mm from the internal os in the third trimester
725 are more likely to need delivery by caesarean section when the placental edge is thicker (over 10
726 mm)^{76,77} and/or contains a sponge-like echo⁷⁸ or marginal 'sinus'.⁷⁹ These additional ultrasound
727 features are poorly defined, not routinely assessed in UK practice and the success rates of vaginal
728 delivery when the placental edge is between 10 and 20 mm from the internal os vary widely (56%
729 and 93%, respectively).^{80–83} The corresponding studies are small, observational and retrospective,
730 making a recommendation for a specific mode of delivery based on ultrasound findings difficult.
731 [Evidence level 2-]

732

733 **5. Optimising the delivery of a placenta praevia**

734

735 **Prior to delivery, all women with placenta praevia and their partners should have a discussion**
736 **regarding delivery. Indications for blood transfusion and hysterectomy should be reviewed and**
737 **concerns or plans to decline blood or blood products should be discussed openly and documented.**
738 **[GPP]**

739

740 **Placenta praevia and anterior low-lying placenta carry a higher risk of massive obstetric**
741 **haemorrhage and hysterectomy. Delivery should be arranged in a maternity unit with on-site**
742 **blood transfusion services and access to critical care. [D]**

Deleted: Late preterm (35⁺¹ to 36⁻⁶ weeks of gestation)

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Women with atypical antibodies form a particularly high-risk group and the care of these women should involve discussions with the local haematologist and blood bank. [D]

Prevention and treatment of anaemia during the antenatal period is recommended for women with placenta praevia or a low-lying placenta as for any pregnant woman. [D]

General procedures for discussing and obtaining consent for caesarean section are described in detail in RCOG Consent Advice No.7: *Caesarean section*.⁸⁴ [Evidence level 4]

Women having a caesarean section for placenta praevia are at increased risk of blood loss of more than 1000 ml compared with women having a caesarean section for other indications (RR 3.97, 95% CI 3.24–4.85).⁸⁵ Women with anterior placenta regardless of type of placenta praevia are at increased blood loss.⁸⁶ Placenta praevia covering the internal cervical os and anterior placentation are independent risk factors (OR 4.1 and OR 3.5, respectively) for massive haemorrhage during caesarean section.⁸⁶ A US case–control study from the National Institute of Child Health (NICHD) and Human Development Maternal-Fetal Medicine Units (MFMU) Network Caesarean Section Registry has shown that maternal haemorrhagic morbidity is more common in women with praevia (19% versus 7%, adjusted RR 2.6, 95% CI 1.9-3.5) and the main factors associated with maternal haemorrhage include pre-delivery anaemia, thrombocytopenia, diabetes and magnesium use.⁸⁷ [Evidence level 2++]

The risk of massive haemorrhage together with the possibility of needing a blood transfusion has been estimated to be approximately 12 times more likely in caesarean section for placenta praevia than in caesarean delivery for other indications.^{88,89} Similarly to uncomplicated pregnancies, women with placenta praevia should be screened for anaemia and investigated if their haemoglobin levels are outside the normal UK range (110 g/l at first visit and 105 g/l at 28 weeks).³⁶ Iron supplementation should be implemented if indicated. [Evidence level 4]

For women at high risk of emergency transfusion, such as those presenting with placenta praevia and with no clinically significant alloantibodies, 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 delivery. However, this should be at the discretion of the team responsible and managed according to local facilities.⁸⁹ [Evidence level 4]

6. Delivery for women with placenta praevia or a low-lying placenta

6.1 What grade of obstetrician and anaesthetist should attend the caesarean delivery for a placenta praevia?

As a minimum requirement for a planned caesarean section for placenta praevia, the surgical procedure should be carried out by an appropriately experienced operator. [GPP]

In cases of planned caesarean section for placenta praevia or a low-lying placenta, a senior obstetrician (usually a consultant) and senior anaesthetist (usually a consultant) should be present within the delivery or theatre suite where the surgery is occurring. [GPP]

When an emergency arises, the senior obstetrician and senior anaesthetist should be alerted immediately and attend urgently. [GPP]

Maternal complications at caesarean section increase when the primary surgeon is a trainee/resident rather than an experienced surgeon.⁹⁰ Placenta praevia is often associated with

800 additional including fetal malpresentation (transverse or breech presentation) requiring complex
801 intraoperative manoeuvres to deliver the baby.⁹¹ [Evidence level 4]

802

803 *6.2 What anaesthetic procedure is most appropriate for caesarean section in placenta praevia?*

804

805 **Regional anaesthesia is considered safe and associated with lower risks of haemorrhage than**
806 **general anaesthesia for caesarean delivery in women with placenta praevia or a low-lying**
807 **placenta. Women with anterior placenta praevia or a low-lying placenta should be advised that it**
808 **may be necessary to convert to general anaesthesia if required and asked to consent. [D]**

809

810 There is insufficient evidence to support one technique over another and there have been no new
811 trials since the previous version of this guideline.

812

813 An RCT of regional versus general anaesthesia for placenta praevia, including women with placenta
814 accreta, has indicated that blood transfusion requirements (although not estimated blood loss) are
815 greater in the general anaesthetic group.⁹² [Evidence level 1–]

816

817 A 4-year observational study at 19 US academic centres of women undergoing caesarean delivery
818 found that the risk factors for haemorrhage-related morbidity are increased in those undergoing
819 general anaesthesia.⁹³ [Evidence level 2–]

820

821 The recent case–control study from the NICHD/MFMU Network Cesarean Section Registry found
822 general anaesthesia to be one of the main factors associated with maternal haemorrhage in women
823 with placenta praevia.⁸⁷ [Evidence level 2++]

824

825 *6.3 What blood products should be available?*

826

827 **Close liaison with the hospital transfusion laboratory is essential for women presenting with**
828 **placenta praevia or a low-lying placenta. [GPP]**

829

830 **Rapid infusion and fluid warming devices should be immediately available. [GPP]**

831

832 **Cell salvage is recommended for patients where the anticipated blood loss is great enough to**
833 **induce anaemia, in particular, in women who would decline blood products. [D]**

834

835 Red cells, fresh frozen plasma, and cryoprecipitate or fibrinogen concentrate are all kept by blood
836 banks supplying obstetric units. If the haemoglobin is less than 70 g/l in the postoperative period,
837 where there is no ongoing or threat of bleeding, the decision to transfuse should be made on an
838 informed individual basis.⁸⁹ In an extreme situation and when the blood group is unknown, group O
839 rhesus D-negative red cells should be given.⁸⁹ Further recommendations are provided in Green-top
840 Guideline No.52: *Prevention and Management of Postpartum Haemorrhage*.⁸⁸ [Evidence level 4]

841

842 There is no evidence to support the use of autologous blood transfusion for placenta praevia.⁹⁰
843 [Evidence level 4]

844

845 Cell salvage was not often used previously in obstetrics because of the perceived risk of amniotic
846 fluid embolism or induction of maternal alloimmunisation. No definite cases of amniotic fluid
847 embolism have been reported so far and the risks of cell salvage in the obstetric population parallel
848 those in the non-pregnant population.^{94,95} [Evidence level 4]

849

850 *6.4 What surgical approach should be used for placenta praevia or a low-lying placenta?*

851

852 **Consider vertical skin and/or uterine incisions when the fetus is in a transverse lie to avoid the**

853 **placenta, particularly below 28 weeks of gestation. [GPP]**
854
855 **Consider using preoperative and/or intraoperative ultrasonography to precisely determine**
856 **placental location and the optimal place for uterine incision. [D]**
857
858 **If the placenta is transected during the uterine incision, immediately clamp the umbilical cord**
859 **after fetal delivery to avoid excessive fetal blood loss. [D]**
860
861 **If pharmacological measures fail to control haemorrhage, initiate intrauterine tamponade and/or**
862 **surgical haemostatic techniques sooner rather than later. Interventional radiological techniques**
863 **should also be urgently employed where possible. [C]**
864
865 **Early recourse to hysterectomy is recommended if conservative medical and surgical interventions**
866 **prove ineffective. [D]**
867
868 In cases of anterior placenta praevia, cutting through the placenta is often associated with increased
869 maternal bleeding. A retrospective cohort study found that avoiding incision of the anterior placenta
870 praevia after 24 weeks of gestation reduces the need for maternal blood transfusion during or after
871 caesarean delivery.⁹⁶ [Evidence level 2-]
872
873 A 'J'-shaped uterine incision has been evaluated in women presenting with placenta praevia in a
874 small retrospective study and shown to decrease intraoperative blood loss and facilitate the delivery
875 of the fetus.⁹⁷ [Evidence level 2-]
876
877 Intrauterine balloon tamponade, different types of compression sutures and uterine artery occlusion
878 techniques have been increasingly used since the previous version of the guideline in women with
879 placenta praevia to control, reduce or stop intraoperative bleeding and PPH. Case series on the use
880 of intrauterine hydrostatic balloon catheters, including the Bakri balloon,⁹⁸⁻¹⁰² the BT-Cath®
881 balloon¹⁰³ or the Sengstaken–Blakemore tube,¹⁰⁴ in women with placenta praevia have reported
882 success in controlling PPH ranging from 75% to 88%. [Evidence level 3]
883
884 Factors associated with the failure of Bakri balloon tamponade for placenta praevia include prior
885 caesarean section, anterior placentation, thrombocytopenia and/or coagulopathy at the time of
886 insertion, and a PPH volume of more than 500 ml within the first hour of placement.¹⁰⁰ [Evidence
887 level 2++]
888
889 Uterine compressive and endouterine sutures are well established techniques for the control of
890 haemorrhage following atonic PPH. The best known suture technique was described by B-Lynch in
891 1997.¹⁰⁵ A combined method of B-Lynch suture and the intrauterine balloon has also been
892 successfully used in preventing PPH in placenta praevia.¹⁰⁶ [Evidence level 3]
893
894 Intraoperative interventional radiological techniques, including transarterial embolisation¹⁰⁷ and
895 temporary balloon occlusion¹⁰⁸ of the internal iliac arteries, have also been successfully used to
896 prevent and control haemorrhage in placenta praevia and should be considered when available.
897 Follow-up studies of women who have undergone arterial embolisation for control of PPH suggest
898 that the intervention does not impair subsequent menstruation and fertility.¹⁰⁹⁻¹¹¹ [Evidence level 3]
899
900 **7. Antenatal diagnosis and outcome of placenta accreta spectrum**
901
902 *7.1 What are the risk factors for placenta accreta spectrum?*
903
904 **The major risk factors for placenta accreta spectrum are history of accreta in a previous**
905 **pregnancy, previous caesarean delivery and other uterine surgery, including repeated endometrial**

906 **curettage. This risk rises as the number of prior caesarean sections increases. [B]**

907

908 **Women requesting elective caesarean delivery for non-medical indications should be informed of**
909 **the risk of placenta accreta spectrum and its consequences for subsequent pregnancies. [GPP]**

910

911 All epidemiological studies of the last 2 decades have shown a direct association between the
912 increase in caesarean deliveries and the incidence of placenta accreta spectrum (abnormally
913 adherent and invasive placenta) in subsequent pregnancies worldwide.^{112–122} The 2016 Nordic
914 Obstetric Surveillance Study found that the risk of invasive placentation increases seven-fold after
915 one prior caesarean section.¹¹⁸ [Evidence level 2+]

916

917 A meta-analysis of five cohorts and 11 case-control studies reported a summary OR of 1.96 (95% CI
918 1.41–2.74) for placenta accreta spectrum after a caesarean section.²⁴ [Evidence level 2++]

919

920 The risk of placenta accreta spectrum increases with the number of previous caesarean sections. A
921 systematic review reported an increase in the incidence of accreta placentation from 3.3–4.0% in
922 women with placenta praevia and no previous caesarean delivery, to 50–67% in women with three
923 or more caesarean deliveries.²⁵ When stratified for the number of previous caesarean sections, the
924 OR for placenta accreta spectrum in a subsequent pregnancy ranges between 8.6 (95% CI 3.536–
925 21.078)¹¹² and 17.4 (95% CI 9.0–31.4) for two previous caesarean sections, and 55.9 (95% CI 25.0–
926 110.3) for three or more caesarean sections.¹²¹ [Evidence level 2++]

927

928 Placenta praevia is another important risk factor for placenta accreta spectrum (see Appendix II). A
929 large multicentre US cohort study noted that for women presenting with placenta praevia and prior
930 caesarean section the risk of accreta placentation was 3%, 11%, 40%, 61% and 67% for one, two,
931 three, four, and five or more caesarean deliveries, respectively.¹¹³ The national case-control study
932 using the UK Obstetric Surveillance System found that the incidence of placenta accreta spectrum
933 increases from 1.7 per 10 000 women overall to 577 per 10 000 in women with both a previous
934 caesarean section and placenta praevia.¹¹⁴ [Evidence level 2+]

935

936 Other additional risk factors include maternal age^{111,114,118,121} and ART, in particular in vitro
937 fertilisation.^{114,121,123–126} Advanced maternal age (35 years or more) in women without a previous
938 caesarean section increases the aOR by 1.30 (95%CI 1.13-1.50) for every 1-year increase in age.¹¹⁴
939 [Evidence level 2-]

940

941 Placenta accreta spectrum is not exclusively a consequence of caesarean delivery. Other surgical
942 trauma to the integrity of the uterine endometrium and/or superficial myometrium, such as those
943 following uterine curettage, manual removal of the placenta, postpartum endometritis or
944 myomectomy, has been associated with accreta placentation in subsequent pregnancies.^{1,12,13}
945 Overall, the aOR for placenta accreta spectrum after previous uterine surgery is 3.40 (95% CI 1.30–
946 8.91).¹¹⁴ [Evidence level 2+]

947

948 The development of placenta accreta spectrum has also been reported in women with no surgical
949 history but presenting with a uterine pathology, such as bicornuate uterus, adenomyosis,
950 submucous fibroids and myotonic dystrophy.^{1,12,13} [Evidence level 3]

951

952 More recently there has been an increase in reports describing implantation into deficient caesarean
953 section scars and mounting evidence that a caesarean scar pregnancy diagnosed in early pregnancy
954 can evolve into an abnormally adherent or invasive placenta in the second half of pregnancy.^{127–131} A
955 caesarean scar pregnancy can be diagnosed using TVS from the second month of pregnancy using
956 specific ultrasound criteria.^{130,131} In the last decade, the number of reported cases of caesarean scar
957 pregnancy has increased due to improved awareness of the condition, widespread use of ultrasound
958 scanning in early pregnancy and an increase in the number of prior caesarean sections. The outcome

959 of caesarean scar pregnancy depends on the amount of definitive placenta developing inside the
960 scar and depth of villous invasion. Further data are required to establish the relationship between a
961 first trimester scar pregnancy and the development of invasive placentation. [Evidence level 3]

962

963 7.2 How can a placenta accreta spectrum be suspected and diagnosed antenatally?

964

965 **Antenatal diagnosis of placenta accreta spectrum is crucial in planning its management and has**
966 **been shown to reduce maternal morbidity and mortality. [D]**

967

968 **Previous caesarean delivery and the presence of an anterior low-lying placenta or placenta praevia**
969 **should alert the antenatal care team of the higher risk of placenta accreta spectrum. [D]**

970

971 Maternal complications in placenta accreta spectrum are primarily the result of massive
972 haemorrhage.⁵ Median estimated blood loss in cohorts of placenta accreta spectrum ranges from
973 2000 to 7800 ml and the median number of units of blood transfused is 5 units.¹³² Antenatal
974 diagnosis of placenta accreta spectrum reduces maternal peripartum haemorrhage and
975 morbidity.^{20,133–136} [Evidence level 4]

976

977 Population studies have shown that placenta accreta spectrum remains undiagnosed before delivery
978 in one-half¹³⁷ to two-thirds of cases.¹²¹ In a series from specialist centres, approximately one-third of
979 cases of placenta accreta were not diagnosed during pregnancy.¹³⁸ [Evidence level 2+]

980

981 Multidisciplinary management in a maternity unit with access to maternal and neonatal intensive
982 care is often required for women with placenta accreta spectrum.^{21,22,136,139} For such care to be
983 organised, the diagnosis must be made antenatally. [Evidence level 4]

984

985 7.2.1 Ultrasound screening and diagnosis of placenta accreta spectrum

986

987 **Ultrasound imaging is highly accurate when performed by a skilled operator with experience in**
988 **diagnosing placenta accreta spectrum. [C]**

989

990 **Refer women with any ultrasound features suggestive of placenta accreta spectrum to a specialist**
991 **unit with imaging expertise. [B]**

992

993 **Women with a history of previous caesarean section seen to have an anterior low-lying placenta**
994 **or placenta praevia at the routine fetal anomaly scan should be specifically screened for placenta**
995 **accreta spectrum. [D]**

996

997 Numerous ultrasound imaging techniques have been reported over the years, including greyscale
998 imaging and colour Doppler imaging (CDI), and/or three-dimensional power Doppler
999 sonography.^{16,17,140–142} In 2016, the European Working Group on Abnormally Invasive Placenta
1000 proposed a standardised description of ultrasound signs (see Appendix III) used for the prenatal
1001 diagnosis of placenta accreta¹⁴¹ and the International Abnormally Invasive Placenta Expert Group
1002 produced a proforma protocol for the ultrasound assessment.¹⁴² [Evidence level 4]

1003

1004 A systematic review and meta-analysis of 23 ultrasound studies including 3707 pregnancies at risk of
1005 placenta accreta found that the overall performance of ultrasound when performed by skilled
1006 operators was very good with a sensitivity of 90.72% (95% CI 87.2–93.6), specificity of 96.94% (95%
1007 CI 96.3–97.5) and diagnostic OR of 98.59 (95%CI 48.8–199.0). Among the different ultrasound signs,
1008 abnormality of the uterus–bladder interface had the best specificity of 99.75% (95% CI 99.5–99.9)
1009 for the prediction of placenta accreta. Abnormal vasculature on CDI had the best predictive accuracy
1010 with a sensitivity of 90.74% (95% CI 85.2–94.7), specificity of 87.68% (95% CI 84.6–90.4) and
1011 diagnostic OR of 69.02 (95% CI 22.8–208.9).¹⁴³ [Evidence level 2++]

1012
1013 A 2017 systematic review and meta-analysis using the standardised ultrasound signs (see Appendix
1014 III) has shown that in women presenting with placenta praevia and history of prior caesarean
1015 section, the performance of ultrasound for the antenatal detection of placenta accreta spectrum is
1016 even higher with a sensitivity of 97.0% (95% CI 93.0–99.0), specificity of 97.0% (95% CI 97.0–98.0)
1017 and diagnostic OR of 228.5 (95% CI 67.2–776.9) in prospective studies.¹⁴⁴ Placental lacunae give the
1018 placenta a ‘moth-eaten’ appearance on greyscale imaging and the increased vascularity of the
1019 placental bed with large feeder vessels entering the lacunae are the most common ultrasound signs
1020 associated with placenta accreta spectrum.^{16,17,143,144} [Evidence level 2++]
1021
1022 Determining the depth and lateral extension of placental invasion is helpful for planning the
1023 individual care of women diagnosed with placenta accreta spectrum.^{16,17,145} No ultrasound sign or a
1024 combination of ultrasound signs have so far been found to be specific to the depth of placenta
1025 accreta spectrum and thus to provide with an accurate differential diagnosis between adherent and
1026 invasive accreta placentalisation.¹⁶ This may be due to the wide heterogeneity in terminology used to
1027 describe the grades of placenta accreta spectrum, differences in the study design with most studies
1028 not reporting detailed data on clinical diagnosis at birth and/or on histopathology examination, and
1029 many studies having included cases of placental retention in their cohort with no evidence of
1030 abnormal villous adherence or invasion. [Evidence level 2++]
1031
1032 As the vast majority of placenta accreta spectrum are now the consequence of low placentalisation into
1033 a previous caesarean section scar, TVS has an important role in the early diagnosis, follow-up,
1034 differential diagnosis between adherent and invasive accreta placentalisation and management of
1035 placenta accreta spectrum.¹⁴⁴ [Evidence level 4]
1036
1037 7.2.2 Is there a role for magnetic resonance imaging (MRI) in the diagnosis of placenta accreta
1038 spectrum?
1039
1040 **Clinicians should be aware that the diagnostic value of MRI and ultrasound imaging in detecting**
1041 **placenta accreta spectrum is similar when performed by experts. [C]**
1042
1043 **MRI may be used to complement ultrasound imaging to assess the depth of invasion and lateral**
1044 **extension of myometrial invasion, especially with posterior placentalisation and/or in women with**
1045 **ultrasound signs suggesting parametrial invasion. [GPP]**
1046
1047 MRI has been increasingly used for the prenatal diagnosis of placenta accreta.^{146–150} The main MRI
1048 features of placenta accreta include abnormal uterine bulging, dark intraplacental bands on T2-
1049 weighted imaging, heterogeneous signal intensity within the placenta, disorganised vasculature of
1050 placenta and disruption of the uteroplacental zone. A systematic review has found that most studies
1051 are of a small sample size and thus, sensitivity and specificity of MRI in diagnosing placenta accreta
1052 varies widely between 75% and 100%, and 65% and 100%, respectively.¹⁴⁹ [Evidence level 2++]
1053
1054 Two systematic reviews and meta-analyses have found that the diagnostic value of ultrasound
1055 imaging and MRI in detecting placenta accreta spectrum is similar. The first review¹⁴⁸ included 13
1056 studies and reported a sensitivity of 83% (95% CI 77–88), specificity of 95% (95% CI 93–96) and
1057 detection OR of 63.41 (95% CI 29.04–138.48) for ultrasound, compared with a sensitivity of 82%
1058 (95% CI 72–90), specificity of 88% (95% CI 81–94) and detection OR of 22.95 (95% CI 3.19–165.11)
1059 for MRI. The second review (2014)¹⁴⁹ included 18 studies and found that the overall diagnostic
1060 accuracy of MRI has a sensitivity of 94.4% (95% CI 86.0–97.9), specificity of 84.0% (95% CI 76.0–89.8)
1061 and diagnostic OR of 89.0 (95% CI 22.8–348.1). The latter review also found that MRI has high
1062 predictive accuracy in assessing both the depth and topography of placental invasion. [Evidence level
1063 2++]
1064

1065 The use of intravenous gadolinium injection may increase the sensitivity and specificity of MRI in the
1066 diagnosis of the invasive forms of placenta accreta spectrum but the evidence on long-term fetal
1067 safety is limited.¹⁵⁰ Furthermore, the experience of the radiologists remains an independent factor in
1068 the diagnostic accuracy of MRI and access to expert radiologists is highly variable. [Evidence level 4]
1069

1070 7.3 Where should women with placenta accreta spectrum be cared for?
1071

1072 **Women diagnosed with placenta accreta spectrum should be cared for by a multidisciplinary team**
1073 **in a specialist centre with expertise in diagnosing and managing invasive placentation. [GPP]**
1074

1075 **Delivery for women diagnosed with placenta accreta spectrum should take place in a specialist**
1076 **centre with logistic support for immediate access to blood products, adult intensive care unit and**
1077 **NICU by a multidisciplinary team with expertise in complex pelvic surgery. [D]**
1078

1079 More data have become available since the last version of this guideline on the specific management
1080 of placenta accreta spectrum. Overall, women with accreta placentation should be cared for
1081 according to the risks of severe maternal bleeding and premature delivery. Placenta percreta can be
1082 associated with major prenatal complications from early in pregnancy, such as uterine rupture^{151–153}
1083 and bladder involvement with associated life-threatening haemorrhage.^{154–156} [Evidence level 4]
1084

1085 A 2015 expert review has suggested that caesarean delivery of women at high risk and/or diagnosed
1086 prenatally with placenta accreta spectrum, in particular its invasive forms, should occur in a
1087 specialist centre with multidisciplinary expertise and experience in managing complex pelvic surgery,
1088 and with access to an adult intensive care unit and NICU.¹³⁶ [Evidence level 4]
1089

1090 A retrospective cohort study of 77 women with suspected placenta accreta found that women who
1091 delivered prior to a planned delivery date were significantly more likely to have had vaginal bleeding
1092 and uterine activity when compared with women who had a scheduled delivery.²⁰ Each episode of
1093 antenatal vaginal bleeding is associated with an increased risk of unscheduled delivery (aOR 3.8, 95%
1094 CI 1.8–7.8) and the risk increases when associated with preterm prelabour rupture of membranes.
1095 [Evidence level 2–]

1096
1097 Considering the higher frequency of placenta praevia in the accreta group,^{144,157} these results are
1098 likely to be influenced by the perinatal complications of placenta praevia. Surveys of healthcare
1099 providers in the US and Canada have highlighted widely varied approaches to virtually every aspect
1100 of care for placenta accreta spectrum.^{158–161} Similarly, a recent online survey completed by members
1101 of the expert panel for the perinatal management of placenta accreta spectrum disorders for the
1102 International Federation of Gynecology and Obstetrics (FIGO) has found wide variation in global
1103 practices.¹⁶² [Evidence level 4]
1104

1105 There is increasing evidence from retrospective cohort studies from the USA that women with
1106 placenta accreta spectrum diagnosed prenatally, cared for by a specialist multidisciplinary team, are
1107 less likely to require large volume blood transfusion and reoperation within 7 days of delivery for
1108 bleeding complications compared with women cared for by non-multidisciplinary standard obstetric
1109 care without a specific protocol.^{21,22,136,139,163,164} Women admitted at 34 weeks of gestation and
1110 delivered between 34 and 35 weeks of gestation by a specialist multidisciplinary team have a
1111 significantly lower emergency surgery rate than those not cared for by such a team (23% versus 64%;
1112 $P = 0.001$) despite a similar median gestational age at delivery (34 [16–39] weeks versus 34 [19–40]
1113 weeks; $P = 0.50$, respectively).²¹ In addition, maternal outcomes are improved over time with
1114 increasing experience within a well-established multidisciplinary team performing 2–3 cases per
1115 month.²² Very few of these studies provide with data on the differential clinical diagnosis between
1116 abnormally adherent and abnormally invasive accreta and detailed pathologic confirmation of the
1117 depth and lateral extension of villous myometrial invasion. [Evidence level 2–]

1118

1119 7.4 When should delivery be planned for women with placenta accreta spectrum?

1120

1121 **In the absence of risk factors for preterm delivery and evidence of invasive placentation, planned**
1122 **delivery at 35⁺⁰ to 36⁺⁶ weeks of gestation provides the best balance between fetal maturity and**
1123 **the risk of unscheduled delivery. [GPP]**

1124

1125 Similarly to placenta praevia, clinical factors should be considered when determining the timing of
1126 administration of antenatal corticosteroids and the optimal gestational age for delivery in women
1127 with placental accreta.^{165,166} There are currently no RCTs or well-controlled observational studies to
1128 guide best practice in delivery timing of placenta accreta spectrum. [Evidence level 4]

1129

1130 In cases of suspected placenta accreta spectrum, where significant blood loss and caesarean
1131 hysterectomy is anticipated, delivery at between 34 and 35 weeks of gestation has been proposed in
1132 order to avoid emergency delivery, which still occurs about 20% of the time even in scheduled
1133 cases.^{165,167} A 2010 decision analysis supports this approach based on the increasing likelihood of
1134 emergency delivery as pregnancy goes beyond 34 weeks of gestation.¹⁶⁸ [Evidence level 4]

1135

1136 The data of three recent single institution retrospective cohort studies of women with prior
1137 caesarean delivery diagnosed prenatally with placenta accreta have indicated that in the absence of
1138 risk factors for preterm delivery, it is safe to plan the delivery at 36 weeks of gestation. The first
1139 study included 103 women delivered between 1982 and 2002 and found that the mean gestational
1140 age at delivery is 33⁺⁵ weeks of gestation in cases of deep placental invasion (increta and percreta)
1141 compared with 35⁺² weeks of gestation in the superficial adherent group.¹⁶⁹ The second study of 216
1142 women found that urgent delivery for bleeding decreased significantly with advancing gestation.¹⁷⁰
1143 Most women were delivered at 36 weeks of gestation or greater, with nearly 90% in the absence of
1144 bleeding complications. The third study of 84 women who had reached 34⁺⁰ weeks of gestation with
1145 a suspected praevia accreta found that those with no risk factors for preterm birth are at low risk for
1146 an unscheduled delivery prior to 36 weeks of gestation.¹⁷¹ [Evidence level 2+]

1147

1148 **8. Planning delivery of a suspected placenta accreta spectrum**

1149

1150 **Once the diagnosis of placenta accreta spectrum is made, a contingency plan for emergency**
1151 **delivery should be developed, including the use of an institutional protocol for the management of**
1152 **maternal haemorrhage. [GPP]**

1153

1154 Due to a lack of RCTs or well-controlled observational studies, the optimal management of placenta
1155 accreta spectrum remains undefined and is determined by the expertise available, the depth and
1156 lateral extension of the accreta portion of the placenta, the presence of an associated placenta
1157 praevia, radiological findings, the medical and surgical comorbidities, and finally, the accessibility of
1158 a regional team focused on these patients.

1159

1160 The main risk associated with the delivery of placenta accreta spectrum is massive haemorrhage and
1161 its associated complications, such as coagulopathy, multisystem organ failure and death. Many
1162 women with placenta accreta spectrum require massive blood transfusion (8 units or more) and
1163 their median platelet count is lowest compared with other causes of massive PPH.^{172,173} [Evidence
1164 level 2+]

1165

1166 A review of 34 studies published between 1977 and 2012, including a total number of 508 617
1167 deliveries and 865 cases of confirmed placenta accreta, found that the most significant maternal
1168 risks associated with delivery are the need for postpartum transfusion due to haemorrhage and
1169 peripartum hysterectomy. Maternal mortality remains rare, but significantly higher than among
1170 matched postpartum controls.¹²³ [Evidence level 4]

1170

1171
1172 Transfusions in placenta accreta spectrum should be guided by a national and/or institutional
1173 protocol for management of PPH.^{88,89} [Evidence level 4]
1174
1175 *8.1 What should be included in the consent form for caesarean section in cases of suspected placenta*
1176 *accreta spectrum?*
1177
1178 **Any woman giving consent for caesarean section should understand the risks associated with**
1179 **caesarean section in general, and the specific risks of placenta accreta spectrum in terms of**
1180 **massive obstetric haemorrhage, increased risk of lower urinary tract damage, the need for blood**
1181 **transfusion and the risk of hysterectomy. [GPP]**
1182
1183 **Additional possible interventions in the case of massive haemorrhage should also be discussed,**
1184 **including cell salvage and interventional radiology where available. [D]**
1185
1186 Any woman with suspected placenta accreta spectrum should meet with a senior obstetrician in the
1187 antenatal period. The different risks and treatment options should have been discussed and a plan
1188 agreed, which should be reflected clearly in the consent form and medical record. This should
1189 include standard discussion for the caesarean section procedure⁸⁴ and whether conservative
1190 management of the placenta or proceeding straight to hysterectomy is preferred in the situation
1191 where increta or percreta is confirmed at surgery. [Evidence level 4]
1192
1193 Where available, cell salvage should be considered. If the woman refuses donor blood transfusion, it
1194 is recommended⁸⁹ that she be transferred to a unit with a cell saver. [Evidence level 4]
1195
1196 *8.2 What healthcare professionals should be involved?*
1197
1198 **The elective delivery of women with placenta accreta spectrum should be managed by a**
1199 **multidisciplinary team, which should include senior anaesthetists, obstetricians and**
1200 **gynaecologists with appropriate experience in managing the condition and other surgical**
1201 **specialties if indicated. In an emergency, the most senior clinicians available should be involved.**
1202 **[GPP]**
1203
1204 Following the previous version of the guideline, the National Patient Safety Agency in collaboration
1205 with the RCOG and the Royal College of Midwives set up an expert working group to develop a care
1206 bundle for placenta accreta.¹⁷⁴ Six elements of good care were agreed upon. The care bundle was
1207 then tested in six units over a 5-month pilot study period and it was found to be both achievable and
1208 practical. Clinical outcomes were monitored, confirming the high morbidity associated with this
1209 condition. [Evidence level 4]
1210
1211 The six elements considered to be reflective of good care are:
1212
1213 • Consultant obstetrician planning and directly supervising delivery.
1214 • Consultant anaesthetist planning and directly supervising anaesthesia at delivery.
1215 • Blood and blood products available.
1216 • Multidisciplinary involvement in preoperative planning.
1217 • Discussion and consent, including possible interventions (such as hysterectomy, leaving the
1218 placenta in situ, cell salvage and interventional radiology).
1219 • Local availability of a level 2 critical care bed.
1220
1221 The 2015 MBRRACE report from the Confidential Enquiry into Maternal Deaths in the UK has
1222 indicated that despite increasing numbers of women at risk from placenta accreta spectrum
1223 following previous caesarean section, only one death occurred in a woman who had a placenta

1224 praevia percreta and history of two previous caesarean sections.¹⁷⁵ There were no deaths from
1225 unexpected placenta accreta found at caesarean section, suggesting that previous recommendations
1226 regarding imaging and preparations for women with placenta praevia and a previous caesarean
1227 section have been followed.¹⁷⁶ [Evidence level 2++]

1228
1229 A 2015 single centre retrospective cohort study of the effectiveness of a standardised operative
1230 approach in 98 cases of histologically confirmed placenta accreta supports the early presence of a
1231 gynaecological surgeon and oncologist at delivery and demonstrates that a 'call if needed' approach
1232 is not acceptable for these complex cases.¹⁷⁷ [Evidence level 2+]

1233
1234 The American College of Obstetricians and Gynecologists (ACOG) guidelines highlight that to
1235 enhance patient safety, it is important that the delivery be performed by an experienced obstetric
1236 team that includes an obstetric surgeon, with other surgical specialists, such as urologists, general
1237 surgeons, and gynaecological surgeons and oncologists, available if necessary.¹⁶⁶ [Evidence level 4]

1238

1239 *8.3 What anaesthetic is most appropriate for delivery?*

1240

1241 **The choice of anaesthetic technique for caesarean section for placenta accreta spectrum should be**
1242 **made by the anaesthetist conducting the procedure in consultation with the patient in advance.**
1243 **[GPP]**

1244

1245 **The woman should be informed that the surgical procedure can be performed safely with regional**
1246 **anaesthesia but should be advised that it may be necessary to convert to general anaesthesia if**
1247 **required and asked to consent. [D]**

1248

1249 Both general and regional anaesthetic techniques have been shown to be safe for surgical
1250 procedures required for the delivery of placenta accreta spectrum; the judgment of which type of
1251 technique to be used should be made on an individual basis.¹⁶⁷ [Evidence level 4]

1252

1253 There is insufficient evidence to support one technique over another and there have been no new
1254 trials since the previous version of this guideline.

1255

1256 *8.4 Optimising the delivery of placenta accreta spectrum*

1257

1258 There are no RCTs comparing different surgical approaches for placenta accreta spectrum suspected
1259 antenatally. Both conservative and radical surgical approaches can be associated with a high
1260 maternal morbidity although the value of an experienced team in a specialist centre decreases the
1261 risk significantly.^{21,22,136,139,163,164} [Evidence level 4]

1262

1263 *8.4.1 What surgical approach should be used for placenta accreta spectrum?*

1264

1265 **Caesarean section hysterectomy with the placenta left in situ is preferable to attempting to**
1266 **separate it from the uterine wall. [C]**

1267

1268 **When the extent of the placenta accreta is limited in depth and surface area, and the entire**
1269 **placental implantation area is accessible and visualised (i.e. completely anterior, fundal or**
1270 **posterior without deep pelvic invasion), uterus-preserving surgery may be appropriate, including**
1271 **partial myometrial resection. [GPP]**

1272

1273 **Uterus-preserving surgical techniques should only be attempted by surgeons working in teams**
1274 **with appropriate expertise to manage such cases and after appropriate counselling regarding risks**
1275 **and with informed consent. [D]**

1276

1277 **There are currently insufficient data to recommend the routine use of ureteric stents in placenta**
1278 **creta and increta. [C]**

1279

1280 The choice of surgical technique will depend on the position of the placenta, the depth of invasion,
1281 and the parametrial extension of the placenta accreta spectrum as assessed by ultrasound and/or
1282 MRI before delivery, the visual assessment of the uterus at the time of surgery and the presenting
1283 clinical symptoms, i.e. bleeding or no bleeding.⁵ [Evidence level 4]

1284

1285 The ACOG recommends planned, preterm caesarean section hysterectomy with the placenta left in
1286 situ as removal of a placenta accreta spectrum is associated with significant haemorrhagic
1287 morbidity.¹⁶⁶ In cases of high suspicion for accreta during caesarean delivery, the majority of
1288 members of the US Society of Maternal-Fetal Medicine (SMFM) and FIGO expert panel proceed with
1289 hysterectomy.^{158–162} [Evidence level 4]

1290

1291 Similarly, in a 2017 systematic review and meta-analysis on the diagnosis and outcome of placenta
1292 accreta, an elective or emergency caesarean hysterectomy was performed in 208 out of 232 (89.7%)
1293 cases.¹⁴⁴ [Evidence level 2++]

1294

1295 A retrospective study of 57 cases of suspected accreta demonstrated significantly reduced short-
1296 term morbidity if the placenta is left in place and hysterectomy performed electively compared with
1297 attempting to remove the placenta first.¹⁷⁸ Attempting placental separation risks hysterectomy in up
1298 to 100% of cases as also confirmed by other authors.^{178,179} [Evidence level 2++]

1299

1300 A case-control study of 49 women requiring a peripartum hysterectomy for massive haemorrhage,
1301 including 20 women presenting with placenta accreta, reported that the use of a vessel sealing
1302 device during surgery decreases the estimated blood loss, the need for massive blood transfusions,
1303 and does not increase operative time or complication rates.¹⁸⁰ [Evidence level 2+]

1304

1305 A systematic review found that uterus-preserving surgery resulted in a secondary hysterectomy in
1306 24/77 women (31%), maternal mortality in 2/55 women (4%), subsequent menstruation in 28/34
1307 women (82%) and subsequent pregnancy in 19/26 women (73%).¹⁸¹ A more recent systematic
1308 review showed that uterus-preserving surgery is associated with a success rate of 48/76 women
1309 (63.2%), a secondary hysterectomy in 23/76 women (30.0%), maternal mortality in 2/54 women
1310 (3.7%), subsequent menstruation in 20/37 women (81.1%) and subsequent pregnancy in 21/27
1311 women (77.8%).¹⁸² [Evidence level 2++]

1312

1313 A small cohort study has shown that the introduction of the Triple-P procedure (perioperative
1314 placental localization, pelvic devascularization and placental non-separation) involving delivery of
1315 the fetus via transverse uterine incision above the upper border of the placenta, myometrial excision
1316 and reconstruction of the uterine wall reduces the rate of hysterectomy, PPH and duration of
1317 hospital stay in women with placenta accreta.¹⁸³ The incidence of post-operative complications of
1318 the Triple-P procedure depends on comorbidities and in particular, the placental position and the
1319 depth of villous invasion.¹⁸⁴ Small case series have also reported on the successful use of
1320 compression sutures and on using the cervix as a natural tamponade by inverting it into the uterine
1321 cavity, and suturing the anterior and/or the posterior cervical lips into the anterior and/or posterior
1322 walls of the lower uterine segment.^{185–188} [Evidence level 3]

1323

1324 A systematic review of peripartum surgical techniques used in placenta accreta spectrum has found
1325 that methotrexate (MTX) and uterus-preserving surgical techniques are associated with a 16%
1326 unintentional urinary tract injury rate as opposed to 57% for standard hysterectomy and that use of
1327 ureteric stents reduces the risk of urologic injury.¹⁸⁹ [Evidence level 2++]

1328

1329 There are no RCTs on the use of ureteric stents in placenta accreta spectrum. Ureteric stents or

Commented [EJ1]: Too

Commented [EJ2]:

1330 catheters are more commonly used pre-operatively in the USA where around 26% of the members
1331 of both the SMFM¹⁵⁹ and ACOG fellows¹⁶¹ are using them in the management of suspected of
1332 abnormally invasive placenta. [Evidence level 4]

1333

1334 8.4.2 What surgical approach should be used for placenta percreta?

1335

1336 **There is limited evidence to support uterus-preserving surgery in placenta percreta and women**
1337 **should be informed of the high risk of peripartum and secondary complications, including the**
1338 **need for secondary hysterectomy. [D]**

1339

1340 The following four approaches have been described.^{137,159–161,165,167,190}

1341

1342 1. Primary hysterectomy following delivery of the fetus, without attempting placental separation.

1343 2. Delivery of the fetus avoiding the placenta, with repair of the incision leaving the placenta in
1344 situ.

1345 3. Delivery of the fetus without disturbing the placenta, followed by partial excision of the uterine
1346 wall (placental implantation site) and repair of the uterus.

1347 4. Delivery of the fetus without disturbing the placenta, and leaving it in situ, followed by elective
1348 secondary hysterectomy 3–7 days following the primary procedure.

1349

1350 There are no well-controlled observational studies, and therefore, no firm recommendations can be
1351 made.

1352

1353 Women with placenta percreta are more likely to require additional blood products and intensive
1354 care admission than women with placenta creta or increta.¹⁹⁰ The incidence of urological
1355 complications is also increased, including cystotomy and ureteric injury.¹⁹¹ [Evidence level 4]

1356

1357 When the urinary bladder is invaded by placental tissue, preoperative cystoscopy and the placement
1358 of ureteric stents have been recommended.^{161,192} Planned cystotomy can prevent extensive
1359 muscularis damage and bleeding from attempts at dissection.¹⁹² [Evidence level 4]

1360

1361 Filling the bladder to identify the bladder separation site, opening the bladder to identify percreta
1362 villous tissue and removal of the involved bladder area have also been recommended by different
1363 authors.^{161,165,193} [Evidence level 4]

1364

1365 Uterus-preserving surgery is possible in placenta percreta as demonstrated in a cohort study of 71
1366 women. A multidisciplinary stepwise surgical approach, including bilateral ligations of the anterior
1367 division of the iliac arteries before removing the placenta, was shown to be successful in controlling
1368 the bleeding and preserving the patient's uterus in around 90% of the cases, with 14% of urinary
1369 tract complications, most of which can be identified and repaired during caesarean section.¹⁹⁴
1370 [Evidence level 3]

1371

1372 A review of 119 placenta percreta cases published in the international literature has shown that
1373 expectant management with the placenta left in situ is associated with severe long-term
1374 complications of haemorrhage and infections, including a 58% risk of secondary hysterectomy up to
1375 9 months after the delivery. Local resection appears to be associated with fewer complications
1376 within 24 hours postoperatively compared with hysterectomy or leaving the placenta in situ.
1377 However, a selection bias in the direction of less severe cases for the local resection technique may
1378 in part explain the lower complication rates with that approach.¹⁹⁵ [Evidence level 4]

1379

1380 *8.5 Expectant management (leaving the placenta in situ)*

1381

1382 **Elective peripartum hysterectomy may be unacceptable to women desiring uterine preservation**

1383 or considered inappropriate by the surgical team. In such cases, leaving the placenta in situ should
1384 be considered. [D]

1385

1386 **When the placenta is left in situ, local arrangements need to be made to ensure regular review,**
1387 **ultrasound examination and access to emergency care should the woman experience**
1388 **complications, such as bleeding or infection. [D]**

1389

1390 **MTX adjuvant therapy should not be used for expectant management as it is of unproven benefit**
1391 **and has significant adverse effects, including a reported maternal death. [C]**

1392

1393 Conservative management in placenta accreta spectrum, including in cases of placenta increta and
1394 percreta, is an option in women who desire to preserve their fertility. However, it is not
1395 recommended in women presenting with major bleeding as it is unlikely to be successful and risks
1396 delaying definitive treatment and increasing morbidity.⁵ [Evidence level 4]

1397

1398 A retrospective multicentre study examined 167 women treated conservatively for placenta accreta
1399 in tertiary university hospital centres in France between 1993 and 2007. Conservative expectant
1400 management with part of the placenta left in situ was successful in 131 out of 167 cases (78.4%; 95%
1401 CI 71.4–84.4).¹⁹⁶ One woman died of myelosuppression and nephrotoxicity related to MTX
1402 administration through the umbilical cord. Spontaneous placental resorption occurred in 87 out of
1403 116 cases (75.0%; 95% CI 66.1–82.6), with a median delay from delivery of 13.5 weeks (range 4–60
1404 weeks).¹⁹⁶ [Evidence level 2+]

1405

1406 The patient should be warned of the risks of chronic bleeding, sepsis, septic shock, peritonitis,
1407 uterine necrosis, fistula, injury to adjacent organs, acute pulmonary oedema, acute renal failure,
1408 deep venous thrombosis or pulmonary embolism.¹⁹⁶ Prophylactic antibiotics may be helpful in the
1409 immediate postpartum period to reduce the risk of infective complications.¹⁹⁷ [Evidence level 4]

1410

1411 An observational case series, including 24 women with placenta accreta left in situ after delivery and
1412 treated with MTX, reported placental delivery in 33.3% of the cases (spontaneously in 55%, and in
1413 45% following dilatation and surgical evacuation).¹⁹⁹ There was no control group of patients who did
1414 not receive MTX and so it is unknown whether or not the MTX was clinically helpful. One patient did
1415 suffer liver damage and the risks of this therapy must be balanced against the unproven benefit.
1416 [Evidence level 3]

1417

1418 The pattern of follow-up for the conservative management of placenta accreta spectrum is not
1419 supported by RCTs and not stratified for the according to the depth and lateral extension of villous
1420 myometrial invasion. Some authors have reported cases where retained villous tissues were
1421 removed after conservative management using hysteroscopic resection^{200,201} or high-intensity
1422 focused ultrasound.²⁰² In rare cases, a disseminated intravascular coagulation may develop requiring
1423 a secondary hysterectomy.²⁰³ [Evidence level 3]

1424

1425 *8.6 When is interventional radiology indicated?*

1426

1427 **Larger studies are necessary to determine the safety and efficacy of interventional radiology**
1428 **before this technique can be advised in the routine management of placenta accreta spectrum. [D]**

1429

1430 **Women diagnosed with placenta accreta spectrum who decline donor blood transfusion should be**
1431 **managed in a unit with an interventional radiology service. [D]**

1432

1433 Since the publication of the last version of this guideline there have been several cohort studies
1434 describing the use of interventional radiology in assisting surgical and conservative management of
1435 placenta accreta with variable success. The main aim of this procedure is to reduce the risks of

1436 intraoperative haemorrhage during the caesarean delivery of pregnancies diagnosed antenatally
1437 with praevia increta or percreta. Various combinations have been proposed, including intraoperative
1438 internal iliac artery and/or postoperative uterine artery embolisation^{204,205} and internal iliac artery^{206–}
1439 ²⁰⁹ or abdominal balloon occlusion^{210–215}. The latter technique has been increasingly used in China
1440 but the methodology of these studies is very heterogeneous with no data on the diagnosis of the
1441 different grades of villous invasion and variable confounding factors such as placental position and
1442 number of previous caesarean deliveries. Small cohort studies have also been published on the use
1443 of a tourniquet^{216,217} and of surgical artery ligation.²¹⁸ [Evidence level 3]
1444

1445 A single institution observational cohort study of 45 cases of placenta accreta describes the use of
1446 prophylactic lower abdominal aorta balloon occlusion and found a reduced need for blood
1447 transfusion.²¹² One of the cases was complicated by lower extremity arterial thrombosis and another
1448 by ischaemic injury to the femoral nerve. A comparative study of abdominal aortic occlusion versus
1449 internal iliac artery occlusion found that aortic balloon occlusion resulted in better clinical outcomes
1450 with less blood loss, blood transfusion, balloon insertion time, fluoroscopy time and fetal radiation
1451 dose.²¹⁵ [Evidence level 2–]
1452

1453 A systematic review reported success rates of 159/177 (89.8%) for arterial embolisation, with
1454 secondary hysterectomy being necessary in 20/177 (11.3%) and subsequent menstruation occurring
1455 in 74/85 (87.1%). In 3/10 women (30%) a subsequent pregnancy occurred. Arterial balloon occlusion
1456 catheters have been associated with a success rate of 33/42 (78.6%) and the need for a secondary
1457 hysterectomy in 8/42 (19%).¹⁸² [Evidence level 2++]
1458

1459 The value of prophylactic placement of balloon catheters in the iliac arteries in cases of placenta
1460 accreta has been more controversial. This is mainly because of the higher risks of complications than
1461 embolisation, including iliac artery thrombus or rupture, and ischaemic nerve injury.^{219–222} [Evidence
1462 level 3]
1463

1464 A small RCT of women presenting with a prenatal diagnosis of placenta accreta was published in
1465 2015.²²³ The women were randomised to either preoperative prophylactic balloon catheters (n = 13)
1466 or to a control group (n = 14). No difference was observed for the number of women with blood loss
1467 greater than 2500 ml, number of plasma products transfused, duration of surgery, peripartum
1468 complications and hospitalisation length. Reversible adverse effects related to prophylactic balloon
1469 catheter insertion were noted in 2/13 (15.4%) cases. [Evidence level 1+]
1470

1471 *8.7 How is unsuspected placenta accreta spectrum at delivery best managed?*
1472

1473 **If at the time of an elective repeat caesarean section, where both mother and baby are stable, it is**
1474 **immediately apparent that placenta percreta is present on opening the abdomen, the caesarean**
1475 **section should be delayed until the appropriate staff and resources have been assembled and**
1476 **adequate blood products are available. This may involve closure of the maternal abdomen and**
1477 **urgent transfer to a specialist unit for delivery. [GPP]**
1478

1479 **In case of unsuspected placenta accreta spectrum diagnosed after delivery of the baby, the**
1480 **placenta should be left in situ and an emergency hysterectomy performed. [D]**
1481

1482 If the placenta fails to separate with the usual measures, leaving it in place and closing, or leaving it
1483 in place, closing the uterus and proceeding to a hysterectomy are both associated with less blood
1484 loss than trying to separate it. Attempts at removing placenta accreta at caesarean section can lead
1485 to massive haemorrhage, high maternal morbidity and possible maternal death. These risks are
1486 particularly high when the caesarean section takes place in an environment with no emergency
1487 access to blood bank products and expertise in managing placenta accreta.^{20,21,123,136} [Evidence level
1488 4]

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9. Clinical governance

9.1 Debriefing

Postnatal follow-up should include debriefing with an explanation of what happened, why it happened and any implications for future pregnancy or fertility. In particular, women where conservative treatment of placenta accreta spectrum has been successful should be informed of the risk of recurrence.

9.2 Training

Raising the awareness about the clinical risk factors of placenta accreta spectrum should be pursued locally, including organising policies or guidelines for flagging up women at risk and arranging for them to see a specialist consultant when suspected.

There should be appropriate training for ultrasound staff in the antenatal diagnosis of placenta accreta spectrum.

9.3 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 identification of and planning further care of women suspected to have placenta accreta spectrum.

10. Recommendations for future research

- A large prospective study comparing the impact on the management 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 third trimester ultrasound in evaluating the risks of haemorrhage and emergency caesarean section in low-lying placenta and determining the mode of delivery.
- Large prospective population-based studies are needed in order to assess whether ultrasound is a cost-effective screening tool for placenta accreta spectrum in women with a history of caesarean section(s) presenting with a low-lying placenta or placenta praevia in the second trimester of pregnancy.
- Prospective comparative ultrasound imaging including transvaginal ultrasound and MRI studies are needed to evaluate the diagnostic accuracy for evaluation of the depth and topography of villous invasion in adjacent organs.
- RCTs of optimal timing of delivery for both conditions (placenta praevia and placenta accreta) are needed.
- RCTs of surgical and nonsurgical management strategies for placenta accreta spectrum (including interventional radiology) and comparing conventional versus conservative management, stratified according to the depth and lateral extension of villous myometrial invasion, are needed.
- Future studies on the diagnosis and management of placenta accreta spectrum should use standardised evidence-based approach including a systematic correlation between ultrasound signs and detailed clinical diagnosis at delivery and pathologic confirmation of grades of villous invasiveness when possible.

1542 **11. Auditable topics**

1543

1544 **Placenta praevia**

1545

1546 • Antenatal diagnosis of placenta praevia (100%).

1547 • Antenatal detection and treatment of anaemia (100%).

1548 • Antenatal imaging performed according to hospital policy (100%).

1549 • Appropriate antenatal delivery 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, queries or refusals of treatments have been addressed (100%).

1550 • Involvement of local blood bank and haematologist in the care of women with placenta praevia and atypical antibodies (100%).

1551 • Appropriate personnel present at delivery (100%).

1552 • Appropriate site for delivery (100%).

1553 • Appropriate surgical approaches performed (100%).

1554 • Early-term elective delivery between 37⁺⁰ and 37⁺⁶ weeks of gestation for asymptomatic women with placenta praevia and no other risk factors (100%).

1555 • Antenatal steroid administration between 34⁺⁰ and 36⁺⁰ weeks of gestation (100%).

1556 • Women requesting elective caesarean section for nonmedical reasons are informed of the risk of placenta praevia and accreta spectrum, and its consequences in future deliveries (100%).

1557

1564 **Placenta accreta spectrum**

1565

1566 • Antenatal imaging performed according to hospital policy with diagnosis confirmed at birth (100%).

1567 • Appropriate antenatal delivery 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, queries or refusals of treatments have been addressed (100%).

1568 • All elements of the care bundle satisfied before elective surgery in women with placenta accreta spectrum (100%):

1569 ○ consultant obstetrician planned and directly supervising delivery

1570 ○ consultant anaesthetist planned and directly supervising anaesthetic at delivery

1571 ○ blood and blood products available

1572 ○ multidisciplinary involvement in preoperative planning

1573 ○ discussion and consent includes 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.

1574

1582 **12. Useful links and support groups**

1583

1584 • Royal College of Obstetricians and Gynaecologists. *Low-lying placenta after 20 weeks (placenta praevia). Information for you.* London: RCOG; 20XX [insert web address].

1585 • National Childbirth Trust. *Placenta praevia – low-lying placenta* [https://www.nct.org.uk/pregnancy/low-lying-placenta].

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1594 **References**

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2174 **Appendix I: Explanation of guidelines and evidence levels**

2175

2176 Clinical guidelines are: ‘systematically developed statements which assist clinicians and patients in
 2177 making decisions about appropriate treatment for specific conditions’. Each guideline is
 2178 systematically developed using a standardised methodology. Exact details of this process can be
 2179 found in Clinical Governance Advice No.1 *Development of RCOG Green-top Guidelines* (available on
 2180 the RCOG website at <http://www.rcog.org.uk/green-top-development>). These recommendations are
 2181 not intended to dictate an exclusive course of management or treatment. They must be evaluated
 2182 with reference to individual patient needs, resources and limitations unique to the institution and
 2183 variations in local populations. It is hoped that this process of local ownership will help to
 2184 incorporate these guidelines into routine practice. Attention is drawn to areas of clinical uncertainty
 2185 where further research may be indicated.

2186

2187 The evidence used in this guideline was graded using the scheme below and the recommendations
 2188 formulated in a similar fashion with a standardised grading scheme.

2189

2190 **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, e.g. case reports, case series
4	Expert opinion

2191

2192 **Grades of Recommendation**

2193 **A** At least one meta-analysis, systematic reviews or RCT rated as 1++, and directly applicable to
 2194 the target population; or a systematic review of RCTs or a body of evidence consisting
 2195 principally of studies rated as 1+, directly applicable to the target population and
 2196 demonstrating overall consistency of results

2197

2198 **B** A body of evidence including studies rated as 2++ directly applicable to the target
 2199 population, and demonstrating overall consistency of results; or
 2200 Extrapolated evidence from studies rated as 1++ or 1+

2201

2202 **C** A body of evidence including studies rated as 2+ directly applicable to the target population,
 2203 and demonstrating overall consistency of results; or
 2204 Extrapolated evidence from studies rated as 2++

2205

2206 **D** Evidence level 3 or 4; or
 2207 Extrapolated evidence from studies rated as 2+

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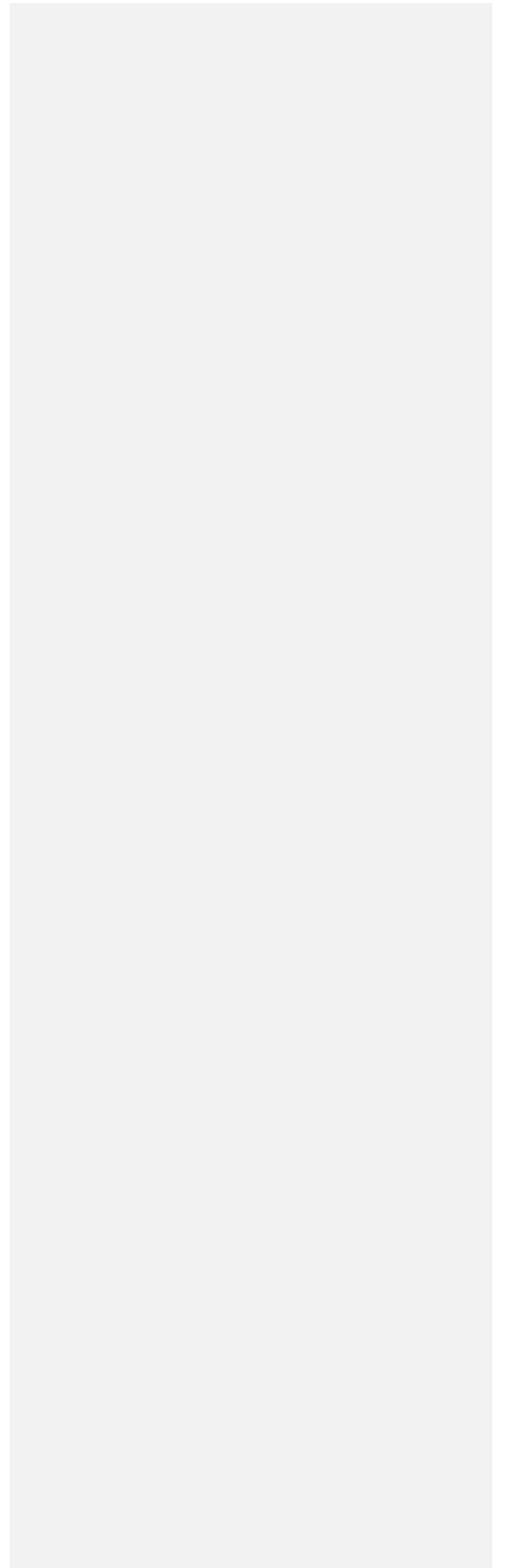
2209 **Good Practice Points**

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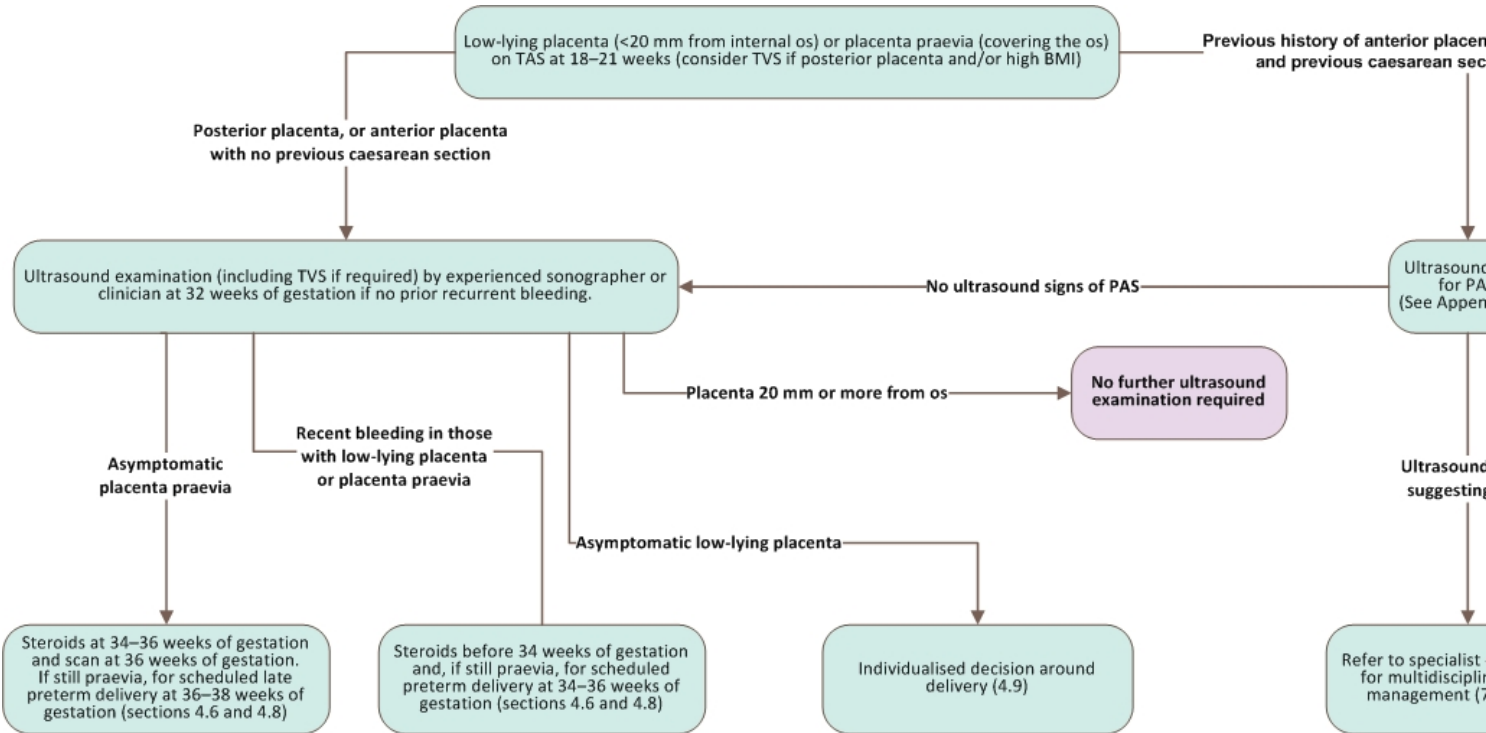
2211 Recommended best practice based on the clinical experience of the guideline development

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group



4 **Appendix II: Flow diagram for ultrasound diagnosis and follow-up of placenta praevia and placenta accreta spectrum**
 5



6 **Abbreviations:** BMI body mass index; PAS placenta accreta spectrum; TAS transabdominal scan; TVS transvaginal scan.
 7

8 **Appendix III: Ultrasound imaging signs commonly used to diagnose placenta accreta spectrum (modified from Collins SL)¹⁴¹**

9

Ultrasound imaging signs	Description
2D greyscale signs	
Loss of the 'clear zone'	Loss or irregularity of the hypoechoic plane in the myometrium underneath the placental bed (the 'clear zone').
Abnormal placental lacunae	Presence of numerous lacunae, including some that are large and irregular (Finberg grade 3), often containing turbulent flow visible in greyscale imaging.
Bladder wall interruption	Loss or interruption of the bright bladder wall (the hyperechoic band or 'line' between the uterine serosa and the bladder lumen).
Myometrial thinning	Thinning of the myometrium overlying the placenta to less than 1 mm or undetectable.
Placental bulge	Deviation of the uterine serosa away from the expected plane, caused by an abnormal bulge of placental tissue into a neighboring organ, typically the bladder. The uterine serosa appears intact but the outline shape is distorted.
Focal exophytic mass	Placental tissue seen breaking through the uterine serosa and extending beyond it. Most often seen inside a filled urinary bladder.
2D colour Doppler signs	
Uterovesical hypervascularity	Striking amount of colour Doppler signal seen between the myometrium and the posterior wall of the bladder. This sign probably indicates numerous, closely packed, tortuous vessels in that region (demonstrating multidirectional flow and aliasing artifact).
Subplacental hypervascularity	Striking amount of colour Doppler signal seen in the placental bed. This sign probably indicates numerous, closely packed, tortuous vessels in that region (demonstrating multidirectional flow and aliasing artifact).
Bridging vessels	Vessels appearing to extend from the placenta, across the myometrium and beyond the serosa into the bladder or other organs. Often running perpendicular to the myometrium.
Placental lacunae feeder vessels	Vessels with high velocity blood flow leading from the myometrium into the placental lacunae, causing turbulence upon entry.
3D colour Doppler signs	
Intraplacental hypervascularity (power Doppler)	Complex, irregular arrangement of numerous placental vessels, exhibiting tortuous courses and varying calibers.

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The Royal College of Obstetricians and Gynaecologists produces guidelines as an educational aid to good clinical practice. They present recognised methods and techniques of clinical practice, based on published evidence, for consideration by obstetricians and gynaecologists and other relevant health professionals. The ultimate judgement regarding a particular clinical procedure or treatment plan must be made by the doctor or other attendant in the light of clinical data presented by the patient and the diagnostic and treatment options available.

This means that RCOG Guidelines are unlike protocols or guidelines issued by employers, as they are not intended to be prescriptive directions defining a single course of management. Departure from the local prescriptive protocols or guidelines should be fully documented in the patient's case notes at the time the relevant decision is taken.