6.3 *What blood products should be available?*

Close liaison with the hospital transfusion laboratory is essential for women presenting with placenta praevia or a low-lying placenta. [*New 2018*] ✓

Rapid infusion and fluid warming devices should be immediately available. [*New 2018*] ✓

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

Red cells, fresh frozen plasma, and cryoprecipitate or fibrinogen concentrate are all kept by blood banks supplying obstetric units. If the haemoglobin is less than 70 g/l in the postoperative period, where there is no ongoing or threat of bleeding, the decision to transfuse should be made on an informed individual basis.[88] In an extreme situation and when the blood group is unknown, group O rhesus D-negative red cells should be given.[88] Further recommendations are provided in RCOG Green-top Guideline No. 52 *Prevention and Management of Postpartum Haemorrhage*.[87]

There is no evidence to support the use of autologous blood transfusion for placenta praevia.[89]

Cell salvage was not often used previously in obstetrics because of the perceived risk of amniotic fluid embolism or induction of maternal alloimmunisation. No definite cases of amniotic fluid embolism have been reported so far and the risks of cell salvage in the obstetric population parallel those in the nonpregnant population.[93,94]

Evidence level 4

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

Consider vertical skin and/or uterine incisions when the fetus is in a transverse lie to avoid the placenta, particularly below 28 weeks of gestation. [*New 2018*] ✓

Consider using preoperative and/or intraoperative ultrasonography to precisely determine placental location and the optimal place for uterine incision. [*New 2018*] D

If the placenta is transected during the uterine incision, immediately clamp the umbilical cord after fetal delivery to avoid excessive fetal blood loss. [*New 2018*] D

If pharmacological measures fail to control haemorrhage, initiate intrauterine tamponade and/or surgical haemostatic techniques sooner rather than later. Interventional radiological techniques should also be urgently employed where possible. [*New 2018*] C

Early recourse to hysterectomy is recommended if conservative medical and surgical interventions prove ineffective. [*New 2018*] D

In cases of anterior placenta praevia, cutting through the placenta is often associated with increased maternal bleeding. A retrospective cohort study found that avoiding incision of the anterior placenta praevia after 24 weeks of gestation reduces the need for maternal blood transfusion during or after caesarean delivery.[95]

A 'J'-shaped uterine incision has been evaluated in women presenting with placenta praevia in a small retrospective study and shown to decrease intraoperative blood loss and facilitate the delivery of the fetus.[96]

Evidence level 2–

Intrauterine balloon tamponade, different types of compression sutures and uterine artery occlusion techniques have been increasingly used since the previous version of the guideline in women with placenta praevia to control, reduce or stop intraoperative bleeding and PPH. Case series on the use of intrauterine hydrostatic balloon catheters, including the Bakri balloon,[97–101] the BT-Cath® balloon[102] or the Sengstaken–Blakemore tube,[103] in women with placenta praevia have reported success in controlling PPH ranging from 75% to 88%.

Evidence level 3

Factors associated with the failure of Bakri balloon tamponade for placenta praevia include prior caesarean section, anterior placentation, thrombocytopenia and/or coagulopathy at the time of insertion, and a PPH volume of more than 500 ml within the first 1 hour of placement.[99]

Evidence level 2++

Uterine compressive and endouterine sutures are well established techniques for the control of haemorrhage following atonic PPH. The best known suture technique was described by B-Lynch in 1997.[104] A combined method of B-Lynch suture and the intrauterine balloon has also been successfully used in preventing PPH in placenta praevia.[105]

Intraoperative interventional radiological techniques, including transarterial embolisation[106] and temporary balloon occlusion[107] of the internal iliac arteries, have also been successfully used to prevent and control haemorrhage in placenta praevia and should be considered when available. Follow-up studies of women who have undergone arterial embolisation for control of PPH suggest that the intervention does not impair subsequent menstruation and fertility.[108–110]

Evidence level 3

7. Antenatal diagnosis and outcome of women with placenta accreta spectrum

7.1 What are the risk factors for women with placenta accreta spectrum?

The major risk factors for placenta accreta spectrum are history of accreta in a previous pregnancy, previous caesarean delivery and other uterine surgery, including repeated endometrial curettage. This risk rises as the number of prior caesarean sections increases. [*New 2018*]

B

Women requesting elective caesarean delivery for non-medical indications should be informed of the risk of placenta accreta spectrum and its consequences for subsequent pregnancies. [*New 2018*] ✓

All epidemiological studies of the last 2 decades have shown a direct association between the increase in caesarean deliveries and the incidence of placenta accreta spectrum (abnormally adherent and invasive placenta) in subsequent pregnancies worldwide.[111–121] The 2016 Nordic Obstetric Surveillance Study found that the risk of invasive placentation increases seven-fold after one prior caesarean section.[117] Evidence level 2+

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

The risk of placenta accreta spectrum increases with the number of previous caesarean sections. A systematic review reported an increase in the incidence of accreta placentation from 3.3–4.0% in women with placenta praevia and no previous caesarean delivery, to 50–67% in women with three or more caesarean deliveries.[25] When stratified for the number of previous caesarean sections, the OR for placenta accreta spectrum in a subsequent pregnancy ranges between 8.6 (95% CI 3.536–21.078)[111] and 17.4 (95% CI 9.0–31.4) for two previous caesarean sections, and 55.9 (95% CI 25.0–110.3) for three or more caesarean sections.[120] Evidence level 2++

Placenta praevia is another important risk factor for placenta accreta spectrum (see Appendix II). A large multicentre US cohort study noted that for women presenting with placenta praevia and prior caesarean section the risk of accreta placentation is 3%, 11%, 40%, 61% and 67% for one, two, three, four, and five or more caesarean deliveries, respectively.[112] The national case–control study using the UK Obstetric Surveillance System found that the incidence of placenta accreta spectrum increases from 1.7 per 10 000 women overall to 577 per 10 000 in women with both a previous caesarean section and placenta praevia.[113] Evidence level 2+

Other additional risk factors include maternal age[110,113,117,120] and ART, in particular in vitro fertilisation.[113,120,122–125] Advanced maternal age (35 years or more) in women without a previous caesarean section increases the aOR by 1.30 (95% CI 1.13–1.50) for every 1-year increase in age.[113] Evidence level 2–

Placenta accreta spectrum is not exclusively a consequence of caesarean delivery. Other surgical trauma to the integrity of the uterine endometrium and/or superficial myometrium, such as those following uterine curettage, manual removal of the placenta, postpartum endometritis or myomectomy, has been associated with accreta placentation in subsequent pregnancies.[1,12,13] Overall, the aOR for placenta accreta spectrum after previous uterine surgery is 3.40 (95% CI 1.30–8.91).[113] Evidence level 2+

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

More recently, there has been an increase in reports describing implantation into deficient caesarean section scars and mounting evidence that a caesarean scar pregnancy diagnosed in early pregnancy can evolve into an abnormally adherent or invasive placenta in the second half of pregnancy.[126–130] A caesarean scar pregnancy can be diagnosed using TVS from the second month of pregnancy using specific ultrasound criteria.[129,130] In the last decade, the number of reported cases of caesarean scar pregnancy has increased due to improved awareness of the condition, widespread use of ultrasound scanning in early pregnancy and an increase in the number of prior caesarean sections. The outcome of caesarean scar pregnancy depends on the amount of definitive placenta developing inside the scar and depth of villous invasion. Further data are required to establish the relationship between a first trimester scar pregnancy and the development of invasive placentation.

Evidence level 3

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

Antenatal diagnosis of placenta accreta spectrum is crucial in planning its management and has been shown to reduce maternal morbidity and mortality. [*New 2018*]

D

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

D

Maternal complications in placenta accreta spectrum are primarily the result of massive haemorrhage.[5] Median estimated blood loss in cohorts of placenta accreta spectrum ranges from 2000 to 7800 ml and the median number of units of blood transfused is 5 units.[131] Antenatal diagnosis of placenta accreta spectrum reduces maternal peripartum haemorrhage and morbidity.[20,132–135]

Evidence level 4

Population studies have shown that placenta accreta spectrum remains undiagnosed before delivery in one-half[136] to two-thirds of cases.[120] In a series from specialist centres, approximately one-third of cases of placenta accreta were not diagnosed during pregnancy.[137]

Evidence level 2+

Multidisciplinary management in a maternity unit with access to maternal and neonatal intensive care is often required for women with placenta accreta spectrum.[21,22,135,138] For such care to be organised, the diagnosis must be made antenatally.

Evidence level 4

7.2.1 Ultrasound screening and diagnosis of placenta accreta spectrum

Ultrasound imaging is highly accurate when performed by a skilled operator with experience in diagnosing placenta accreta spectrum. [*New 2018*]

C

Refer women with any ultrasound features suggestive of placenta accreta spectrum to a specialist unit with imaging expertise. [*New 2018*]

B

Women with a history of previous caesarean section seen to have an anterior low-lying placenta or placenta praevia at the routine fetal anomaly scan should be specifically screened for placenta accreta spectrum. [*New 2018*] **D**

Numerous ultrasound imaging techniques have been reported over the years, including greyscale imaging and colour Doppler imaging (CDI), and/or three-dimensional power Doppler sonography.[16,17,139–141] In 2016, the European Working Group on Abnormally Invasive Placenta proposed a standardised description of ultrasound signs (see Appendix III) used for the prenatal diagnosis of placenta accreta[140] and the International Abnormally Invasive Placenta Expert Group produced a proforma protocol for the ultrasound assessment.[141]

Evidence level 4

A systematic review and meta-analysis of 23 ultrasound studies including 3707 pregnancies at risk of placenta accreta found that the overall performance of ultrasound when performed by skilled operators was very good with a sensitivity of 90.72% (95% CI 87.2–93.6), specificity of 96.94% (95% CI 96.3–97.5) and diagnostic OR of 98.59 (95%CI 48.8–199.0). Among the different ultrasound signs, abnormality of the uterus–bladder interface had the best specificity of 99.75% (95% CI 99.5–99.9) for the prediction of placenta accreta. Abnormal vasculature on CDI had the best predictive accuracy with a sensitivity of 90.74% (95% CI 85.2–94.7), specificity of 87.68% (95% CI 84.6–90.4) and diagnostic OR of 69.02 (95% CI 22.8–208.9).[142]

A 2017 systematic review and meta-analysis using the standardised ultrasound signs (see Appendix III) has shown that in women presenting with placenta praevia and history of prior caesarean section, the performance of ultrasound for the antenatal detection of placenta accreta spectrum is even higher with a sensitivity of 97.0% (95% CI 93.0–99.0), specificity of 97.0% (95% CI 97.0–98.0) and diagnostic OR of 228.5 (95% CI 67.2–776.9) in prospective studies.[143] Placental lacunae give the placenta a 'moth-eaten' appearance on greyscale imaging and the increased vascularity of the placental bed with large feeder vessels entering the lacunae are the most common ultrasound signs associated with placenta accreta spectrum.[16,17,142,143]

Evidence level 2++

Determining the depth and lateral extension of placental invasion is helpful for planning the individual care of women diagnosed with placenta accreta spectrum.[16,17,144] No ultrasound sign or a combination of ultrasound signs have so far been found to be specific to the depth of placenta accreta spectrum to provide an accurate differential diagnosis between adherent and invasive accreta placentation.[16] This may be due to the wide heterogeneity in terminology used to describe the grades of placenta accreta spectrum, differences in study design with most studies not reporting detailed data on clinical diagnosis at birth and/or on histopathology examination, and many studies having included cases of placental retention in their cohort with no evidence of abnormal villous adherence or invasion.

As the vast majority of placenta accreta spectrum are now the consequence of low placentation into a previous caesarean section scar, TVS has an important role in the early diagnosis, follow-up, differential diagnosis between adherent and invasive accreta placentation, and management of placenta accreta spectrum.[143]

Evidence level 4

