



Royal College of  
Obstetricians and  
Gynaecologists

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*National Patient Safety Agency*

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## **Placenta praevia after caesarean section care bundle: background information for healthcare professionals**

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## **List of contributors**

Miss Sara Paterson Brown (CHAIR) FRCOG FRCS, Queen Charlotte's Hospital London

Dr Sue Catling, Obstetric Anaesthetist, Singleton Hospital, Swansea

Dr Tracey A Johnston MRCOG, Clinical Director, Birmingham Women's Hospital, Birmingham

Dr Josephine McHugo, Radiologist, Birmingham Women's Hospital, Birmingham

Dr Kanchan P Rege, Haematologist, Peterborough District Hospital, Peterborough MA, MRCP, FRCPath

Dr Helen J Scholefield, MRCOG, Liverpool Women's Hospital, Liverpool

Professor Anthony Watkinson FRCS FRCR, Interventional Radiologist, Royal Devon and Exeter Hospital and Peninsula Medical School, Exeter Devon

Miss Claire Singh, RCOG Research Midwife

Professor James Walker FRCOG, NPSA Clinical Advisor

Benedetta La Corte RCOG, administrative support

## **Group members**

Miss Sara Paterson Brown

Dr Helen J Scholefield

Professor Anthony Watkinson

Miss Claire Singh

Dr Sue Catling

Professor James Walker

Dr Tracey A Johnston

Dr Josephine McHugo

Dr Kanchan P Rege

Ms Emma Boakes

Ms Bridget James

Ms Sara Johnson

Ms Wendy Martin

Ms Dinah Matthew

Ms Valerie Ann Spalton

## ***Abbreviations***

<b>AAGBI</b>	Association of Anaesthetists of Great Britain and Ireland
<b>CMACE</b>	Centre for Maternal and Child Enquiries
<b>CEMACH</b>	Confidential Enquiry in Maternal and Child Health
<b>CS</b>	Caesarean section
<b>ERPC</b>	Evacuation of retained products of conception
<b>ESUR</b>	European Society of Urogenital Radiology
<b>GMC</b>	General Medical Council
<b>Hb</b>	Haemoglobin
<b>hCG</b>	Human chorionic gonadatrophin
<b>IHI</b>	Institute for Healthcare Improvement
<b>IR</b>	Interventional radiology
<b>LSCS</b>	Lower segment caesarean section
<b>MRI</b>	Magnetic resonance imaging
<b>MSBOS</b>	Maximum surgical blood ordering schedule
<b>NICE</b>	National Institute for Health and Clinical Excellence
<b>NPSA</b>	National Patient Safety Agency
<b>OAA</b>	Obstetric Anaesthetists' Association
<b>PPH</b>	Postpartum haemorrhage
<b>RCOG</b>	Royal College of Obstetricians and Gynaecologists

## 1. Introduction

A morbidly adherent placenta occurs when the placenta adheres to, or invades into or through the myometrium, and can occur when the placenta is located over a previous scar with a deficient decidua basalis. It is becoming more common with increasing numbers of previous caesarean section (CS)<sup>1,2</sup>, but can also occur following myomectomies, or after a previous manual removal of the placenta from the same placental site. Women with a morbidly adherent placenta (all types grouped together and termed placenta accreta for the purposes of this document) have an increased risk of morbidity and mortality due to massive obstetric haemorrhage at delivery<sup>1,3,4</sup>.

This care bundle has been designed by a multidisciplinary expert group to highlight an approach to clinical care, which would reasonably be expected to reduce these risks in a simple, practical and achievable way. They constitute the considered minimum standards of care for this clinical condition. The care bundle comprises six elements which all need to be applied in order for the care bundle to be complied with. Although it focuses on the care of women who have had a previous CS where the placenta is located over the old scar, it would be equally pertinent to apply it to other women in whom placenta accreta is suspected and CS is planned.

The elements of the care bundle are:

1. Consultant obstetrician planned and directly supervising delivery.
2. Consultant obstetric anaesthetist planned and directly supervising anaesthesia at delivery.
3. Blood and blood products available on-site.
4. Multidisciplinary involvement in pre-operative planning.
5. Discussion and consent includes possible interventions (such as hysterectomy, leaving placenta in situ, cell salvage and interventional radiology).
6. Local availability of level 2 critical care bed.

This background document summarises briefly how these decisions were made and provides a reference list for further reading to help inform clinicians.

### 1.1 Patient selection

All women undergoing CS at high risk of placenta accreta should be managed in accordance with this care bundle. This will include:

- women with one or more previous CS and placenta praevia;
- women with a previous scar where imaging of placental localisation has found the placenta to be lying over the previous scar, even if it is well clear of the internal cervical os.

Routine placental localisation at 20 weeks should have highlighted those women who need a follow-up scan at 32 weeks.

Other women at risk of placenta accreta such as women needing CS after previous myomectomies/manual removals could also have the care bundle applied to them.

## 2. Background to care bundles

Care bundles are a concept that was developed by the Institute for Healthcare Improvement (IHI) in North America to describe a collection of interventions needed to effectively and safely care for patients. Ideally, a care bundle should be small and straightforward with a set of three to five practices or precautionary steps<sup>5</sup>. This care bundle has six elements because the expert group chose to divide one element (consultant presence and supervision) into two elements (obstetric and anaesthetic).

Each element of a care bundle is an intervention or practice in its own right, with a sound evidence base. The IHI specify that there should be no controversy surrounding the elements of a care bundle, with the focus being on **how** to deliver the best care, not **what** the best care should be<sup>6</sup>.

A care bundle does not introduce any new ways of working, but combines these elements of good practice into one cohesive bundle, that when applied improves the quality of care patients receive and aims to improve patient outcomes.

It is crucial that a care bundle contains elements that can be applied to a patient in one clinical episode, so that each application of the bundle is self-contained. Each element of a care bundle should be easy to complete, with a tick box response, or a 'yes' or 'no' answer. For example, 'yes- consultant obstetrician planned and directly supervising delivery', or 'no - this component was not achieved'.

Compliance with a care bundle is easily monitored. Each care bundle is applied to every patient, every time<sup>7</sup>, therefore making the success of each care bundle application assessable with an 'all or nothing measure'. All elements of the bundle need to have been achieved to have successful completion of the care bundle in that application.

Within the UK, care bundles have previously been developed in the areas of critical care nursing, infection control, preventative antibiotics for surgery and medicines safety, and have formed a large part of the work of the Patient Safety First campaign ([www.patientsafetyfirst.nhs.uk](http://www.patientsafetyfirst.nhs.uk)) and the 1000 Lives campaign ([www.wales.nhs.uk](http://www.wales.nhs.uk)). Obstetric care bundles within the UK have not yet been implemented. The current work of the Royal College of Obstetricians and Gynaecologists (RCOG), Royal College of Midwives (RCM) and the National Patient Safety Agency (NPSA) in this area is therefore pioneering within the field of obstetrics and midwifery.

As with any change implemented within an organisation, staff can be apprehensive about new processes. However, with good planning, structured implementation and good communication, teams will be aware of the benefits of care bundles to patient safety and the benefits to their working time.

In summary, all elements of the care bundle have to be adhered to and compliance recorded unless otherwise indicated. A care bundle is a way to prompt people to act according to best practice.

## 3. The care bundle in application

All women undergoing caesarean section at high risk of placenta accreta should be managed in line with this care bundle.

Comprehensive guidance on the use of the care bundle can be found in the document entitled *How to use the placenta praevia after caesarean section care bundle*.

## 4. Antenatal work-up

The key to good antenatal care in placenta accreta is to recognise the risk of it and make plans accordingly. This requires an index of suspicion and an antenatal screening process focused on identifying those women with a previous CS whose placenta lies over the old scar.

### 4.1 Routine imaging

The CEMACH report *Saving mothers' lives* recommends that 'women who have had a previous caesarean section must have placental localisation in their current pregnancy to exclude placenta praevia, and if present, to enable further investigation to try to identify praevia accreta and the development of safe management strategies'<sup>3</sup>.

Women identified at the 20-week scan as having a low or anterior placenta with a history of a previous CS should have a further trans-abdominal ultrasound scan using the full bladder technique at 32 weeks. This scan aims to identify whether the placenta overlies the old scar and not just to identify the lower edge of the placenta in relation to the internal os. A trans-vaginal scan can help with assessing the lower edge of the placenta.

Suggested wording for the scan request could be: 'patient at risk of placenta accreta, please rescan at 32 weeks paying particular attention to place of placenta in lower segment around scar site and not just distance from os'.

A low placenta in the mid-trimester is likely to persist into the third trimester in 50 per cent of cases, and of those still present at around 32 weeks<sup>8</sup>, the vast majority will still be a placental praevia at term<sup>9</sup>.

### 4.2 Consultant review and ongoing consultant input

Women who are found to have the placenta lying over the old scar or who have placenta praevia should see the consultant obstetrician after this second scan (i.e. approx 32 weeks) to discuss the implications for delivery and make plans for antenatal care, further imaging, multidisciplinary preparation for delivery, and the delivery itself. The risk of hysterectomy should also be mentioned and the various different surgical options should be discussed. Since up to 40 per cent of cases are likely to be delivered as an emergency, a clear care plan needs to be placed in the case records, including which staff should be called in for an elective or an emergency delivery.

### 4.3 Avoid/treat anaemia

All women should have their haematinics checked, but it is particularly important for those at increased risk of obstetric haemorrhage. NB it must be borne in mind that serum Vitamin B<sub>12</sub> is commonly low despite normal tissue levels in pregnancy.

If iron studies indicate iron deficiency, oral iron supplementation should be started (the usual rate of Hb rise in iron deficiency is 0.2g/dl/day). Failure to respond to oral iron therapy (in genuine uncomplicated iron deficiency) is commonly due to poor compliance related to side effects. In such cases, the oral iron preparation should be substituted by another oral iron preparation or by parenteral therapy. Iron sucrose may be given intravenously in repeated small doses and iron dextran as a single 'total dose' intravenously. Preparations for intramuscular use are also available. Restoration of normal haemoglobin is speedier using parenteral methods<sup>10</sup>. There is no proven role for erythropoietin therapy in this setting for women not in chronic renal failure.

## 4.4 Timing of follow-up scan and further imaging

Complete placenta praevia at 32 weeks gestation is likely to persist in 90 per cent of cases<sup>11,12</sup> therefore, as part of good practice, a scan should be performed prior to delivery to exclude the 10 per cent of cases where the placenta has migrated. Features of placenta accreta may be looked for at the 32-week scan or at a subsequent specialist follow-up scan depending on local expertise.

Ultrasound features consistent with placenta accreta include:

1. Obliteration of the bladder-uterine interface with loss of the normal hypoechoogenic retroplacental myometrial zone.
2. Adjacent sonolucent spaces.
3. Increased vascularity of the bladder wall seen on colour Doppler.

Any one of these findings are consistent with abnormal placental invasion (sensitivity 0.77, specificity 0.96, positive predictive value 0.65, negative predictive value 0.98<sup>13</sup>), although some authors suggest the loss of the hypoechoogenicity zone between the retroplacental area and the myometrium can be seen in a normal placenta<sup>14</sup>. Patients with inconclusive ultrasound appearances should be considered for a magnetic resonance imaging (MRI) scan.

Features of abnormal placentation on precontrast MRI include:

1. Thickened dark nodular contour of the placenta – uterine interface with extension of the dark bands within the placenta.
2. Mass effect of the placenta causing bulging of the outer margin of the uterus.
3. Heterogeneous placenta signal on T2 – weighted Haste with large vessels or placenta lakes.

The use of Gadolinium is not licensed for use in pregnancy in the UK but it is widely used in North America and Europe in this clinical setting. Therefore in cases where unenhanced MRI scan remain inconclusive its use should be considered on an individual patient following a risk–benefits analysis<sup>15</sup>.

The value of MRI is variably reported and local expertise will influence the use and interpretation of it. The definitive diagnosis, however, is never made until surgery, so although it can help inform and raise the index of suspicion, it can never exclude the possibility, and preparations for accreta still need to go ahead as a precaution.

## 5. Gestation of elective delivery

It is accepted practice that in cases of placenta praevia where the placenta covers, or the placental edge is less than two centimetres from, the internal cervical os, delivery by CS should be offered. Elective CS should normally be performed at 39 weeks<sup>16</sup> due to the increased risk of neonatal respiratory morbidity compared to delivery after the onset of labour, and the fact that the risk of morbidity is gestational age dependant (approximately seven per cent at 37 weeks, four per cent at 38 weeks and less than two per cent at 39 weeks)<sup>17</sup>. However, with the increased risks of morbidity due to heavy bleeding with placenta praevia it is accepted that earlier delivery at around 38 weeks is a reasonable compromise<sup>11</sup>.

Maternal morbidity and mortality are higher following emergency CS compared to elective caesarean section, and this may be more so in cases of placenta accreta due to difficulties in arranging optimal operating circumstances out of hours. The later the elective CS is planned, the more likely the chance of the woman going into labour or having a significant bleed prior to the date of elective surgery, necessitating emergency intervention. Risks of neonatal morbidity therefore need to be balanced against the risks of non-elective surgery in the case of suspected or confirmed placenta accreta.

There is little in the literature addressing this problem. Members of the expert panel therefore reviewed the timings of elective and emergency CS for placenta praevia (not suspected placenta accreta) in over 1,000 cases from four major teaching hospitals over a 10-year period. The findings showed that delivery of women with placenta praevia is rarely required prior to 32 weeks but approximately 40 per cent will be delivered as an emergency prior to 38 weeks. This is consistent with previous published data on placenta praevia in general<sup>18</sup>. Studies have also shown that those requiring emergency delivery are unpredictable.

Elective delivery before 37 weeks cannot therefore be advocated. To achieve a significant reduction in emergency delivery, it would have to be performed at around 32 weeks gestation, which would have a significant impact on neonatal morbidity. Cases should therefore be assessed on an individual basis, taking into account local circumstances and facilities for elective surgery. The maternal and neonatal risks should be weighed up to determine the optimal timing of delivery, but this should not be done electively before 37 weeks.

## **6. Multidisciplinary pre-operative planning**

This should be planned by the consultant obstetrician and coordinated by them or a delegated senior member of the team. Multidisciplinary planning should include all relevant specialities, such as anaesthesia and haematology

### **6.1 Blood availability**

There should be good communication with the blood bank to allow cross-matched red cells to be available for delivery as per the hospital's maximum surgical blood ordering schedule (MSBOS). The blood will need to have been cross-matched within seven days prior to delivery due to the risk of red-cell allo-immunisation in late pregnancy. All blood banks supplying obstetric units keep stores of red cells, fresh frozen plasma and cryoprecipitate<sup>19</sup>.

Platelets, however, are commonly kept off-site and, although rarely needed in obstetric haemorrhage, will need to be ordered in from the local National Blood Transfusion Centre (again necessitating clear communication between the clinicians and the blood bank). Recombinant Factor VIIa is being used increasingly in massive obstetric haemorrhage, and local arrangements to procure it rapidly if needed should be considered<sup>19</sup>.

### **6.2 Cell salvage**

Cell salvage can reduce or eliminate the need for exposure to allogeneic blood, thus reducing patients' exposure to the well-documented risks of allogeneic blood transfusion<sup>20</sup>.

Secondly, in the rare case of severe, uncontrollable haemorrhage, the cell saver can re-circulate the ongoing blood loss and continue to provide red cells for tissue oxygenation even when the loss outstrips the planned provision of the blood bank<sup>21</sup>. The use of cell salvage in obstetric haemorrhage is now recommended by CEMACE, NICE, and both AAGBI/OAA and RCOG guidelines<sup>3,22,23</sup> and the evidence for its safety and effectiveness is extensively examined in two recent major review articles<sup>24,25</sup>.

In 2005-2006, 38 per cent of maternity units in the UK were using cell salvage<sup>26</sup> and there have been no proven complications of the technique reported through the UK Haemovigilance System<sup>20</sup>. It is likely that the total number of obstetric cell salvage cases is approaching 1,000<sup>24,26,27,28</sup>. Experience with the use of and the availability of cell savers in obstetrics is increasing, but it is by no means universally available yet. It is strongly recommended for women who refuse blood products, as it provides the only means of replacing red cells in major haemorrhage<sup>21</sup>. For such patients, transfer to a centre providing cell salvage expertise should be considered if this is not available locally.

### 6.3 Interventional radiology

Interventional radiology (IR) should be considered in both the elective and emergency management of placenta praevia and placenta accreta. Electively, it can be used as a prophylactic measure in known or suspected placenta praevia or accreta. Balloons can be placed via femoral artery punctures in the uterine or internal iliac arteries before delivery. These can be inflated in the event of postpartum haemorrhage (PPH). Subsequent embolisation can be performed via the balloon catheters if bleeding continues despite inflation. Even if hysterectomy is required, blood loss, blood transfusion and numbers of admissions to intensive care units can be reduced<sup>29,30,31,32</sup>. If this facility is not available locally it may be appropriate to transfer the patient at high risk of placenta accreta to a hospital where it is available. It is recommended to consider transfer for Jehovah's witnesses for either cell saver or interventional radiology access.

In an emergency situation, access to a suitably trained radiologist, radiographer and radiology nurse, as well as access to high-quality imaging are highly desirable. This is preferably in the obstetric unit or, if not available, in the special procedures unit in the radiology department. In this situation, access to the anterior division of the internal iliac arteries via a femoral artery approach (and embolisation with a suitable embolic agent) under image guidance should be considered<sup>29,30,31,32</sup>.

There are no randomised controlled trials (RCTs) but numerous observational studies illustrating the value of this technique and an analysis of 46 relevant studies<sup>32</sup> demonstrated success rates for control of major PPH of 90.7 per cent for arterial embolisation, 84 per cent for balloon tamponade, 91.7 per cent for uterine compression sutures and 84.6 per cent for uterine artery ligation. This study concluded that RCTs are unlikely to be feasible. In an emergency setting, compression sutures and balloon tamponade are simple, effective and can be done in all settings. If these fail and IR is available locally, its timely use can provide definitive care. If IR is not an option in the emergency setting, uterine artery ligation is a reasonable surgical option to try before hysterectomy.

NHS organisations should have in place protocols that include the use of IR in the management of obstetric cases where PPH is likely. In addition, NHS organisations should have clear strategies for the management of unpredictable PPH. In hospitals with an IR service treatment, algorithms should be drawn up which clearly identify the timing and place of IR in the management of PPH. Where IR services are not available locally or there is no continuous IR on call, NHS organisations should ensure that there is an agreed formal arrangement for the provision of these services either with a larger service nearby or through formation of a network with surrounding organisations.

### 6.4 Level 2 critical bed availability on site

Although many women will undergo this surgery and do well some will not, and it is imperative that there is the facility to provide level 2 critical care (i.e. a unit or high dependency room that is equipped and has staff competent to provide the support of one organ system) on site if it is needed<sup>33</sup>. The availability of a bed in this facility should be confirmed before an elective procedure for this high-risk condition<sup>3,34</sup>.

## 7. Consent

The variety of possible surgical approaches should be discussed with women by the consultant obstetrician pre-operatively, so that her preferences regarding blood transfusion, hysterectomy or leaving the placenta in place can be explored. In addition, the different procedures, which may be necessary to replace blood and/or control haemorrhage, need to be explained and included in the informed consent.

## 8. Anaesthesia

The high-risk nature of these obstetric cases means that a consultant obstetric anaesthetist should be directly involved in the care of these women during surgery. The decision regarding the type of anaesthesia to be used should be made by the consultant anaesthetist, but regional anaesthesia has been shown to be associated with less blood loss, a reduced need for blood transfusion and a higher post-op Hb than general anaesthesia, and will therefore usually be the safer alternative<sup>35,36,37</sup>.

## 9. Surgical procedures

Although good pre-operative planning will be a guide as to the risk, the definitive diagnosis of placenta accreta can only be made at surgery when the placenta either separates or fails to do so. The surgical approach should take this uncertainty into account. The options for surgical approach are as follows:

### a) Routine access to the uterus

This can risk entry through the placenta which, if morbidly adherent, will then fail to separate cleanly and will bleed. Treatment options in this scenario focus on controlling bleeding and replacing lost volume and as such are damage limiting:

- Blood needs to be replaced in the form of fluids and blood transfusion (cell salvage in this situation is useful in limiting donor blood use).
- Control of bleeding is meanwhile imperative and surgical techniques, such as systemic infusion and local infiltration with uterotonics to maximise uterine tone, under-running the bleeding sinuses in the placenta bed, compression sutures, or even local excision of bleeding myometrial sections can all be useful, as can local pressure applied by a balloon catheter<sup>11,38</sup>. IR can supplement these manoeuvres in achieving haemostasis if available in theatre, or if the patient is stable enough for transfer to the interventional radiology unit<sup>29,30,31,32</sup> and this can provide definitive treatment while conserving the uterus. In the absence of this facility, hysterectomy remains the definitive treatment if performed in a timely fashion.

### b) Accessing the uterine cavity deliberately avoiding the placenta

This requires a knowledge of the limits of placental localisation to enable the appropriate skin and uterine incisions to be made, but has the advantage of allowing an assessment of placental adherence without heavy bleeding before a definitive decision is made. Either the placenta separates and the operation continues as normal, or it remains adherent, fails to separate and then the surgical options (previously discussed and agreed with the patient) include:

- proceed straight to hysterectomy (family complete/woman prefers this to the risk of massive haemorrhage or leaving placenta *in situ*);
- leave the placenta *in situ* and manage it conservatively in the postnatal period (woman keen to conserve her uterus and understands the follow-up required from this technique and the morbidity and risks associated with it).

## 10. Care for those where the placenta is left in situ

Although practice varies, this approach to limiting morbidity and preserving the uterus is now recognised through a series of case reports describing good outcomes. Some women do bleed subsequently requiring hysterectomy as an emergency<sup>39</sup>.

### 10.1 At surgery

At surgery, when the baby is delivered, the routine five units of slow intravenous syntocinon should be given to make sure the placenta does not separate and is truly adherent. Once it is clear that this is the case, the cord should be unclamped and the placenta drained of blood before tying off and dividing it as close to its insertion into the placenta as surgically practicable. The uterus is then closed in the routine way.

### 10.2 Management in the immediate postpartum period

This relates to careful postoperative observations, especially looking for signs of haemorrhage. When the placenta totally covers the cervical os, concealed bleeding within the uterine cavity can occur and vigilance should be high to detect and respond quickly to this, with regular assessments of the uterine fundus and vital signs.

### 10.3 Ongoing care and follow-up

Ongoing care and follow-up recognises the risk of infection and delayed haemorrhage, and involves commitment and compliance in terms of hospital visits for clinical checks, blood tests and in some cases, series imaging. Pregnancies have been reported after this approach, but so have cases of delayed haemorrhage and hysterectomy<sup>11</sup>.

**a) Infection:** Prophylactic antibiotics are given at delivery, but most important is the postnatal follow-up with prompt recognition and treatment of infection. This can be done with regular hospital visits (as frequent as twice weekly) with clinical review and blood tests for full blood count and C-reactive protein measurements.

**b) Placental reabsorption:** A baseline measurement of serum beta-HCG should be performed after delivery and then this can be monitored with regular blood tests (twice weekly initially) to check that levels are falling. Methotrexate has been used routinely in some case series, but others reserve it for women in whom the serum beta-HCG stops falling (or rises) which occurs rarely. Some embolise the placental bed electively and others perform an elective evacuation of retained products of conception (ERPC) at six weeks, while in many case series it is just reabsorbed spontaneously over time.

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