Placenta Accreta Spectrum (PAS): Diagnosis and Management

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Abbreviations

- **AICU:** Adult Intensive Care Unit
- **CS:** Caesarean Section
- **GDG:** Guidelines Development Group
- **GPS:** Good Practice Statement.
- **GRADE:** Grading of Recommendations Assessment, Development and Evaluation
- **ICU:** Intensive Care Unit

- **MRI:** Magnetic Resonance Imaging
- **NICU:** Neonatal Intensive Care Unit
- **OB/GYN:** Obstetrics and Gynecology
- **PAS:** Placenta Accreta Spectrum
- **US:** Ultrasound

Glossary

- Antenatal Diagnosis: The identification of fetal or maternal conditions before birth, typically using imaging modalities such as ultrasound or MRI.

- Caesarean Section Hysterectomy: A surgical procedure involving the removal of the uterus immediately after delivering the baby via caesarean section, commonly performed in severe PAS cases to control life-threatening bleeding.

- Expectant Management: A conservative approach to PAS where the placenta is left in situ (inside the uterus) to allow for natural resorption or later surgical intervention, used in specific clinical scenarios.

- Interventional Radiology: A medical specialty utilizing minimally invasive procedures guided by imaging techniques (e.g., embolization) to manage complications like massive obstetric hemorrhage in PAS.

- Massive Obstetric Haemorrhage: Severe blood loss during pregnancy or childbirth, commonly associated with PAS due to abnormal placental attachment and separation.

- Multidisciplinary Team (MDT): A group of healthcare professionals from various specialties working collaboratively to provide comprehensive care, particularly crucial in managing complex conditions like PAS.

- **Placenta Accreta Spectrum (PAS):** A range of conditions characterized by abnormal adherence of the placenta to the uterine wall, which includes placenta accreta (superficial attachment), placenta increta (invasion into the uterine muscle), and placenta percreta (penetration through the uterine wall to adjacent organs).

- Placenta Accreta: A condition where the placenta attaches too deeply into the uterine wall without penetrating the muscle, leading to difficulties in placental separation after childbirth.

- Placenta Increta: A more severe form of PAS where the placenta invades the uterine muscle but does not extend beyond it.

- Placenta Percreta: The most severe form of PAS, where the placenta penetrates through the entire uterine wall and can invade nearby organs, such as the bladder.

- Placenta Praevia: A condition where the placenta partially or completely covers the internal opening of the cervix, increasing the risk of severe bleeding during pregnancy and delivery.

- Uterus-Preserving Surgery: A surgical approach aimed at managing PAS while maintaining the integrity of the uterus, often considered for women who desire future fertility.

Executive Summary

This guideline offers evidence-based recommendations on Placenta Accreta Spectrum. The recommendations are intended to provide healthcare professionals with practical guidance on diagnosis and management of Placenta Accreta Spectrum which can significantly reduce complications and improve the outcome for affected women and their infants.

List of Recommendations

Recommendation	Strength
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.	Strong Recommendation
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.	GPS
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.	Strong Recommendation
Ultrasound assessment of placental location should be part of routine obstetric care, particularly in women undergoing cesarean section delivery.	GPS
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.	Strong Recommendation
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.	Strong Recommendation
Refer women with any ultrasound features suggestive of placenta accreta spectrum to a specialist unit with imaging expertise.	Strong Recommendation
Standardised definitions should be used in reporting and consideration given to using a template.	GPS
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.	Strong Recommendation
Patients with previous one or more CS and diagnosed as CS scar pregnancy at 5-6 weeks of gestation are at high risk of developing placenta accreta. They should be counseled and referred to a tertiary hospital for termination of pregnancy.	Strong Recommendation
Is there a role for magnetic resonance imaging (MRI) in the diagnosis of placenta accreta spectrum?	

Clinicians should be aware that the diagnostic value of MRI and ultrasound imaging in detecting placenta accreta spectrum is similar when performed by experts.	Strong Recommendation
MRI may be used to complement ultrasound imaging to assess the depth of invasion and lateral extension of myometrial invasion, especially with posterior placentation and/or in women with ultrasound signs suggesting parametrial invasion.	GPS
Women with a history of previous cesarean delivery or uterine surgery who are found to have an anterior low-lying placenta or placenta previa should be considered at increased risk for placenta accreta spectrum, even if imaging does not confirm the diagnosis.	GPS
Where should women with placenta accreta spectrum be cared for?	
Women diagnosed with placenta accreta spectrum should be cared for by a multidisciplinary team in a specialist centre with expertise in diagnosing and managing invasive placentation.	GPS
Prevention and treatment of anemia during the antenatal period is recommended for women with placenta praevia, a low-lying placenta or accreta as for any pregnant woman.	GPS
Delivery for women diagnosed with placenta accreta spectrum should take place in a specialist centre with logistic support for immediate access to blood products, adult intensive care unit and neonatal intensive care unit by a multidisciplinary team with expertise in complex pelvic surgery.	Strong Recommendation
When should delivery be planned for women with placenta accreta spectrum?	
In the absence of risk factors for preterm delivery in women with placenta accreta spectrum, planned delivery at 35^{+0} to 36^{+6} weeks of gestation provides the best balance between fetal maturity and the risk of unscheduled delivery.	GPS
Planning delivery of women with suspected placenta accreta spectrum	
Once the diagnosis of placenta accreta spectrum is made, a contingency plan for emergency delivery should be developed in partnership with the woman, including the use of an institutional protocol for the management of maternal hemorrhage.	GPS
What should be included in the consent form for caesarean section in women with suspected placenta accreta spectrum?	
Any woman giving consent for caesarean section should understand the risks associated with caesarean section in general, and the specific risks of placenta accreta spectrum in terms of massive obstetric hemorrhage, increased risk of lower urinary tract damage, the need for blood transfusion and the risk of hysterectomy.	Strong recommendation
Additional possible interventions in the case of massive hemorrhage should also be discussed, including cell salvage and interventional radiology where available.	Conditional recommendation
What healthcare professionals should be involved?	
The elective delivery of women with placenta accreta spectrum should be managed by a multidisciplinary team, which should include senior anesthetists, obstetricians and gynecologists with appropriate experience in managing the condition and other surgical specialties if indicated. In an emergency, the most senior clinicians available should be involved.	Strong Recommendation

What anesthetic is most appropriate for delivery?	
The choice of anesthetic technique for caesarean section for women with placenta accreta spectrum should be made by the anesthetist conducting the procedure in consultation with the woman prior to surgery.	GPS
The woman should be informed that the surgical procedure can be performed safely with regional anesthesia but should be advised that it may be necessary to convert to general anesthesia if required and asked to consent to this.	GPS
What surgical approach should be used for women with placenta accreta spectrum?	
Intravenous tranexamic acid should be administered at the commencement of surgery because it reduces intraoperative blood loss.	Strong recommendation
Caesarean section hysterectomy with the placenta left in situ is preferable to attempting to separate it from the uterine wall.	Strong recommendation
When the extent of the placenta accreta is limited in depth and surface area, and the entire placental implantation area is accessible and visualised (i.e., completely anterior, fundal or posterior without deep pelvic invasion), uterus preserving surgery may be appropriate, including partial myometrial resection.	Conditional recommendation
Uterus preserving surgical techniques should only be attempted by surgeons working in teams with appropriate expertise to manage such cases and after appropriate counselling regarding risks and with informed consent.	Conditional recommendation
There are currently insufficient data to recommend the routine use of ureteric stents in placenta accreta spectrum. The use of stents may have a role when the urinary bladder is invaded by placental tissue.	GPS
What surgical approach should be used for women with placenta percreta?	
There is limited evidence to support uterus preserving surgery in placenta percreta and women should be informed of the high risk of peripartum and secondary complications, including the need for secondary hysterectomy.	GPS
When is interventional radiology indicated?	
Larger studies are necessary to determine the safety and efficacy of interventional radiology before this technique can be advised in the routine management of placenta accreta spectrum.	Strong recommendation
How are women with undiagnosed or unsuspected placenta accreta spectrum best managed at delivery?	
If at the time of an elective repeat caesarean section, where both mother and baby are stable, it is immediately apparent that placenta percreta is present on opening the abdomen, the caesarean section should be delayed until the appropriate staff and resources have been assembled and adequate blood products are available. This may involve closure of the maternal abdomen and urgent transfer to a specialist unit for delivery.	GPS
In case of unsuspected placenta accreta spectrum diagnosed after the birth of the baby, the placenta should be left in situ and an emergency hysterectomy performed.	GPS

Introduction

Placenta Accreta Spectrum (PAS) is a life-threatening obstetric condition characterized by abnormal placental adherence to the uterine wall, leading to significant maternal morbidity and mortality.

The global rise in Cesarean section rates has contributed to an increased incidence of PAS, making it a critical concern in obstetric practice.

In Egypt, the Cesarean delivery rate increased from 52 % in 2014 to 72% in 2021 (1), with a corresponding increase in PAS represents a growing challenge for obstetricians, anesthetists, and multidisciplinary teams involved in peripartum care and placing a substantial burden to the healthcare system.

While precise national statistics on PAS remain limited, hospital-based studies estimate an incidence ranging from 3 - 9 in 1000 births (2,3), significantly higher than the global average of 0.5 - 1 in 1000 births (4)

Classification:

- Placenta accreta: densely adherent placenta due to abnormally deep invasion of the placenta onto the uterine muscle (possibility placenta will separate at birth).
- Placenta increta: adherent placenta embedded into the uterine muscle wall (placenta unlikely to separate at birth).
- Placenta percreta: adherent placenta growing through the uterus and with possible involvement of other organs (placenta unlikely to separate at birth (5)

Scope and Purpose

This guideline focuses on the spectrum of placenta accreta disorders, collectively referred to as Placenta Accreta Spectrum (PAS), including placenta accreta, increta, and percreta. It does not cover the management of placenta previa not complicated by PAS; for guidance on placenta previa, readers are referred to the guideline titled *Placenta Praevia, Diagnosis and Management*. The scope encompasses diagnostic criteria, clinical presentation, and relevant management strategies throughout pregnancy, delivery, and the immediate postpartum period.

The purpose of this guideline is to enhance the quality and consistency of care provided to women with PAS through a comprehensive, evidence-based approach. It aims to support early and accurate diagnosis, promote timely and coordinated multidisciplinary management, and reduce the risks of severe maternal morbidity and mortality. By offering actionable clinical recommendations, the guideline strives to improve decision-making, optimize maternal and neonatal outcomes, and ensure the efficient allocation of resources. Ultimately, it seeks to standardize care pathways and facilitate best practices in the management of this high-risk obstetric condition.

Target Audience

The guideline is intended primarily for obstetricians at tertiary obstetric units who have the experience in dealing with women having PAS, but also, for general obstetricians, general practitioners, anesthetists, radiologists, and other healthcare professionals involved in the care of women with suspected or confirmed PAS. Very often, women with PAS present to primary and secondary care where early identification and referral optimize the outcome. This guideline should be applied to any setting in which PAS would be identified, monitored, or managed.

Methodology

A comprehensive search for guidelines was done to identify the most relevant ones to consider for adaptation. The inclusion/exclusion criteria that were followed in the search and retrieval of guidelines to be adapted are:

We select guidelines only if they are:

- Evidence-based guidelines
- National and/or international guidelines
- Guidelines published from 2015 to 2025
- Peer reviewed publications
- Guidelines written in English language

We Exclude guidelines that are:

- Written by a single author not on behalf of an organization as guideline to be valid and comprehensive ideally requires multidisciplinary input.
- Published without references as the panel needs to know whether a thorough literature review was conducted and whether the current evidence was used in the preparation of the recommendations.

The following characteristics of the retrieved guidelines were summarized in a table:

- Developing organization/authors
- Date of publication, posting, and release
- Country/language of publication
- Dates of the search used by the source guideline developers

All retrieved Guidelines were screened and appraised using AGREE II instrument (www.agreetrust.org) by at least three members. The panel decided on a cut-off point or ranked the guidelines (any guideline scoring above 50% on the rigor dimension was retained).

Guidelines used in the adaptation process:

1. FIGO Placenta Accreta Diagnosis and Management Expert Consensus Panel. FIGO consensus guidelines on placenta accreta spectrum disorders: series of articles. Int J Gynaecol Obstet. 2018 Mar;140(3):261-298. (5)
2. Jauniaux E, Alfirevic Z, Bhide AG, etal. Royal College of Obstetricians and Gynaecologists. Placenta Praevia and Placenta Accreta: Diagnosis and Management: Green-top Guideline No. 27a. BJOG. 2019 Jan;126(1): e1-e48. (6)
3. American College of Obstetricians and Gynecologists; Society for Maternal-Fetal Medicine. Obstetric Care Consensus No. 7: Placenta Accreta Spectrum. Obstet Gynecol. 2018 Dec;132(6):e259-e275. (7)
4. Hobson SR, Kingdom JC, Murji A, et al. SOGC Clinical Practice Guideline. No. 383-Screening, Diagnosis, and Management of Placenta Accreta Spectrum Disorders. J Obstet Gynaecol Can. 2019 Jul;41(7):1035-1049. (8)
5. Clinical Guideline Placenta Accreta Spectrum (PAS) (C-Obs 20), Women's Health Committee and associated working groups, RANZCOG Council and Board. (9)

Evidence assessment

According to WHO Handbook for Guidelines, we used the GRADE (Grading of Recommendations, Assessment, Development and Evaluation) approach to assess the quality of a body of evidence, develop and report recommendations. GRADE methods are used by WHO because these represent internationally agreed standards for making transparent recommendations. Detailed GRADE information is available on the following sites:

- GRADE working group: http://www.gradeworkingroup.org
- GRADE online training modules: http://cebgrade.mcmaster.ca/
- GRADE profile software: http://ims.cochrane.org/revman/gradepro

Table 1: Quality and Significance of the four levels of evidence in GRADE:

Quality	Definition	Implications
High	The guideline development group is very confident that the true effect lies close to that of the estimate of the effect	Further research is very unlikely to change confidence in the estimate of effect
Moderate	The guideline development group is moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different	Further research is likely to have an important impact on confidence in the estimate of effect and may change the estimate
Low	Confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the true effect	Further research is very likely to have an important impact on confidence in the estimate of effect and is unlikely to change the estimate
Very low	The group has very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of the effect	Any estimate of effect is very uncertain

Table 2; Factors that determine How to upgrade or downgrade the quality of evidence

Downgrade in presence of	Upgrade in presence of
Study limitations – 1 Serious limitations – 2 Very serious limitations	**Dose-response gradient** + 1 Evidence of a dose-response gradient
Consistency – 1 Important inconsistency	**Direction of plausible bias** + 1 All plausible confounders would have reduced the effect
Directness – 1 Some uncertainty – 2 Major uncertainty	**Magnitude of the effect** + 1 Strong, no plausible confounders, consistent and direct evidence + 2 Very strong, no major threats to validity and direct evidence
Precision – 1 Imprecise data	
Reporting bias – 1 High probability of reporting bias	

The strength of recommendations

The strength of a recommendation communicates the importance of adherence to the recommendation.

Strong recommendations: The GDG found that the desirable effects of adherence to the recommendation outweigh the undesirable effects. This means that in most situations the recommendation can be adopted.

Conditional recommendations: This means that the GDG found that there is:

- Greater uncertainty about the strength of evidence, or
- The recommendation may account for a greater variety in patient values and preferences, or
- The resource use makes the intervention suitable for some, but not for other locations.

Conditional recommendations **are still the best available evidence to date and** it can be adopted if it meets the conditions mentioned with it.

Good Practice Statement: Statements based on the opinion of respected authorities, e.g., the RCOG, ACOG, and the guidelines development group.

Recommendations

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

1.1 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. (10-23)
[Strong recommendation, Moderate quality evidence]

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. (24-26)

[GPS]

1.2 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. (27-30)
[Strong recommendation, Very Low-quality evidence]

Ultrasound assessment of placental location should be part of routine obstetric care, particularly in women undergoing cesarean section delivery.
[GPS]

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. (29 & 31-34)
[Strong recommendation, Very Low-quality evidence]

1.2.1 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.

Rational: In 2016, the European Working Group on Abnormally Invasive Placenta proposed a standardised description of ultrasound signs (see Appendix I) used for the prenatal diagnosis of placenta accreta and the International Abnormally Invasive Placenta Expert Group produced a proforma protocol for the ultrasound assessment. (35&36)
[Strong recommendation, Low quality evidence]

Refer women with any ultrasound features suggestive of placenta accreta spectrum to a specialist unit with imaging expertise.
[Strong recommendation, Moderate quality evidence]

Rational: The overall performance of ultrasound when performed by skilled operators is 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). (37)

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. (35-41)
[Strong recommendation, Very Low-quality evidence]

1.2.2 Is there a role for magnetic resonance imaging (MRI) in the diagnosis of placenta accreta spectrum?

Clinicians should be aware that the diagnostic value of MRI and ultrasound imaging in detecting placenta accreta spectrum is similar when performed by experts. (42-45)
[Strong recommendation, Low quality evidence]

MRI may be used to complement ultrasound imaging to assess the depth of invasion and lateral extension of myometrial invasion, especially with posterior placentation and/or in women with ultrasound signs suggesting parametrial invasion. (45)
[GPS]

Women with a history of previous cesarean delivery or uterine surgery who are found to have an anterior low-lying placenta or placenta previa should be considered at increased risk for placenta accreta spectrum, even if imaging does not confirm the diagnosis.
[GPS]

1.3 Where should women with placenta accreta spectrum be cared for?

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

Rational

Women with accreta placentation should be cared for according to the risks of severe maternal bleeding and premature delivery. Placenta percreta can be associated with major prenatal complications from early in pregnancy, such as uterine rupture150–152 and bladder involvement with associated life-threatening haemorrhage. (27 & 46-49)

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

Delivery for women diagnosed with placenta accreta spectrum should take place in a specialist centre with logistic support for immediate access to blood products, adult intensive care unit and NICU by a multidisciplinary team with expertise in complex pelvic surgery.
[Strong recommendation, Very Low-quality evidence]

Rational: There is increasing evidence from retrospective cohort studies from the USA that women with placenta accreta spectrum diagnosed prenatally, cared for by a specialist multidisciplinary team, are less likely to require large volume blood transfusion and reoperation within 7 days of delivery for bleeding complications compared with women cared for by non-multidisciplinary standard obstetric care without a specific protocol.
In addition, maternal outcomes are improved over time with increasing experience within a well-established multidisciplinary team performing two to three cases per month.22 (27,28,50-54)

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

In the absence of risk factors for preterm delivery in women with placenta accreta spectrum, planned delivery at 35^{+0} to 36^{+6} weeks of gestation provides the best balance between fetal maturity and the risk of unscheduled delivery.
[GPS]

Rational: Clinical factors should be considered when determining the timing of administration of antenatal corticosteroids and the optimal gestational age for delivery in women with placental accreta.

In cases of suspected placenta accreta spectrum, where significant blood loss and caesarean hysterectomy is anticipated, delivery at between 34 and 35 weeks of gestation has been proposed in order to avoid emergency delivery.

In the absence of risk factors for preterm delivery, it is safe to plan the delivery at 36 weeks of gestation. Urgent delivery for bleeding decreases significantly with advancing gestation. Those with no risk factors for preterm birth are at low risk for an unscheduled delivery prior to 36 weeks of gestation. (55-60)

2. Planning delivery of women with suspected placenta accreta spectrum:

Once the diagnosis of placenta accreta spectrum is made, a contingency plan for emergency delivery should be developed in partnership with the woman, including the use of an institutional protocol for the management of maternal haemorrhage.
[GPS]

Rational: Due to a lack of RCTs or well-controlled observational studies, the optimal management of placenta accreta spectrum remains undefined and is determined by the expertise available, the depth and lateral extension of the accreta portion of the placenta, the presence of an associated placenta praevia, radiological findings, the medical and surgical comorbidities, and finally, the accessibility of a regional team focused on these patients. (61-65)

2.1 What should be included in the consent form for caesarean section in women with suspected placenta accreta spectrum?

Any woman giving consent for caesarean section should understand the risks associated with caesarean section in general, and the specific risks of placenta accreta spectrum in terms of massive obstetric haemorrhage, increased risk of lower urinary tract damage, the need for blood transfusion and the risk of hysterectomy. (62)
[Strong recommendation, Very low quality evidence]

Additional possible interventions in the case of massive haemorrhage should also be discussed, including cell salvage and interventional radiology where available. (66)
[Conditional recommendation, low quality evidence]

2.2 What healthcare professionals should be involved?

The elective delivery of women with placenta accreta spectrum should be managed by a multidisciplinary team, which should include senior anaesthetists, obstetricians and gynaecologists with appropriate experience in managing the condition and other surgical specialties if indicated. In an emergency, the most senior clinicians available should be involved.
[Strong recommendation, Very low quality evidence]

Rational: The UK National Patient Safety Agency in collaboration with the RCOG and the Royal College of Midwives set up an expert working group to develop a care bundle for placenta accreta.173 Six elements of good care were agreed upon. The care bundle was then tested in six units over a 5-month pilot study period, and it was found to be both achievable and practical.

The six elements considered to be reflective of good care are(67):
- Consultant obstetrician planning and directly supervising delivery.
- Consultant anaesthetist planning and directly supervising anaesthesia at delivery.

- Blood and blood products available.
- Multidisciplinary involvement in preoperative planning.
- Discussion and consent, including possible interventions (such as hysterectomy, leaving the placenta in situ, cell salvage and interventional radiology).
- Local availability of a level 2 critical care bed.

2.3 What anaesthetic is most appropriate for delivery?

The choice of anaesthetic technique for caesarean section for women with placenta accreta spectrum should be made by the anaesthetist conducting the procedure in consultation with the woman prior to surgery. (68)
[GPS]

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

Rational: Both general and regional anaesthetic techniques have been shown to be safe for surgical procedures required for the delivery of placenta accreta spectrum; the judgment of which type of technique to be used should be made on an individual basis. (68)

2.4 Optimizing the delivery of women with placenta accreta spectrum:

2.4.1 What surgical approach should be used for women with placenta accreta spectrum?

Intravenous tranexamic acid should be administered at the commencement of surgery because it reduces intraoperative blood loss
[strong, high-quality evidence]

Rational: Tranexamic acid is a widely available hemostatic antifibrinolytic agent that inhibits the enzymatic breakdown of fibrinogen and fibrin by plasmin. Significant international efforts have culminated in several studies investigating tranexamic acid in obstetric trauma and postpartum hemorrhage. Most recently, a large double- blind placebo- controlled trial recruited over 20 000 patients with postpartum hemorrhage to the WOMAN trial. The study demonstrated that, compared with placebo, tranexamic administration significantly reduced death due to massive obstetric hemorrhage without increasing rates of adverse events, including thromboembolism. A recent meta- analysis of nine trials involving 2365 patients confirmed these findings, demonstrating that the administration of tranexamic acid before cesarean delivery significantly reduces intra- and postoperative blood loss and blood transfusion with no increase in thromboembolic events. After this analysis, three more placebo-controlled trials have shown that tranexamic acid administration immediately before cesarean delivery significantly reduces reported intraoperative blood loss and postoperative declines in hemoglobin without any increase in adverse maternal or neonatal effects, No trials have specifically examined the role of tranexamic acid in the surgical management of PAS disorders. However, the quality of the evidence on postpartum hemorrhage justifies its use in the management of women diagnosed prenatally or presenting with PAS disorders at the time of delivery. (69-72)

Caesarean section hysterectomy with the placenta left in situ is preferable to attempting to separate it from the uterine wall.
[strong, Very low-quality evidence]

Rational: The ACOG recommends planned, preterm caesarean section hysterectomy with the placenta left in situ as removal of a placenta accreta spectrum is associated with significant haemorrhagic morbidity. In cases of high suspicion for accreta during caesarean delivery, the majority of members of the US Society of Maternal-Fetal Medicine (SMFM) and FIGO expert panel proceed with hysterectomy.
A retrospective study of 57 cases of suspected accreta demonstrated significantly reduced short-term morbidity if the placenta is left in place and hysterectomy is performed electively compared with attempting to remove the placenta first. Attempting placental separation risks hysterectomy in up to 100% of cases as also confirmed by other authors. (74-78)

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

Rational: A small cohort study has shown that the introduction of the Triple-P procedure [perioperative placental localisation, pelvic devascularisation and placental non-separation] involving delivery of the fetus via transverse uterine incision above the upper border of the placenta, myometrial excision and reconstruction of the uterine wall reduces the rate of hysterectomy, PPH and duration of hospital stay in women with placenta accreta. The incidence of postoperative complications of the Triple-P procedure depends on comorbidities and in particular, the placental position and the depth of villous invasion. Small case series have also reported on the successful use of compression sutures and on using the cervix as a natural tamponade by inverting it into the uterine cavity and suturing the anterior and/or the posterior cervical lips into the anterior and/or posterior walls of the lower uterine segment.

A systematic review found that uterus preserving surgery resulted in a secondary hysterectomy in 24/77 women (31%), maternal mortality in 2/55 women (4%), subsequent menstruation in 28/34 women (82%) and subsequent pregnancy in 19/26 women (73%). A more recent systematic review showed that uterus preserving surgery is associated with a success rate of 48/76 women (63.2%), a secondary hysterectomy in 23/76 women (30.0%), maternal mortality in 2/54 women (3.7%), subsequent menstruation in 20/37 women (81.1%) and subsequent pregnancy in 21/27 women (77.8%). (79-82)

Uterus preserving surgical techniques should only be attempted by surgeons working in teams with appropriate expertise to manage such cases and after appropriate counselling regarding risks and with informed consent. (79-84)
[conditional, Very low-quality evidence]

There are currently insufficient data to recommend the routine use of ureteric stents in placenta accreta spectrum. The use of stents may have a role when the urinary bladder is invaded by placental tissue.
[GPS]

Rational: There are no RCTs on the use of ureteric stents in placenta accreta spectrum. Ureteric stents or catheters are more commonly used preoperatively in the USA where around 26% of the members of both the SMFM and ACOG fellows are using them in the management of suspected abnormally invasive placenta. (85&86)

2.4.2 What surgical approach should be used for women with placenta percreta?

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

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

The following four approaches have been described.
1. Primary hysterectomy following delivery of the fetus, without attempting placental separation.
2. Delivery of the fetus avoiding the placenta, with repair of the incision leaving the placenta in situ
3. Delivery of the fetus without disturbing the placenta, followed by partial excision of the uterine wall (placental implantation site) and repair of the uterus.
4. Delivery of the fetus without disturbing the placenta, and leaving it in situ, followed by elective secondary hysterectomy 3–7 days following the primary procedure.

There are no well-controlled observational studies, and therefore, no firm recommendations can be made. (85-90)

2.5 When is interventional radiology indicated?

Larger studies are necessary to determine the safety and efficacy of interventional radiology before this technique can be advised in the routine management of placenta accreta spectrum.
[strong, Very low-quality evidence]

Rational: Studies evaluating the safety and efficacy of interventional radiology in assisting surgical and conservative management of placenta accreta with variable success are very heterogeneous with no data on the diagnosis of the different grades of villous invasion and variable confounding factors, such as placental position and number of previous caesarean deliveries. (91-107)

Women diagnosed with placenta accreta spectrum who decline donor blood transfusion should be cared for in a unit with an interventional radiology service.

[Conditional, Very low quality evidence]

2.6 How are women with undiagnosed or unsuspected placenta accreta spectrum best managed at delivery?

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

In case of unsuspected placenta accreta spectrum diagnosed after the birth of the baby, the placenta should be left in situ and an emergency hysterectomy performed.
[GPS]

Rational: If the placenta fails to separate with the usual measures, leaving it in place and closing, or leaving it in place, closing the uterus and proceeding to a hysterectomy are both associated with less blood loss than trying to separate it. Attempts at removing placenta accreta at caesarean section can lead to massive haemorrhage, high maternal morbidity and possible maternal death. These risks are particularly high when the caesarean section takes place in an environment with no emergency access to blood bank products and expertise in managing placenta accreta. (18,27,29,34)

Implementation considerations (Do Not Write This Section)

Several barriers may hinder the effective implementation and scale-up of the recommendations in this guideline. These factors may be related to the behaviours of patients (or families), the behavior of healthcare professionals, the organization of care, health service delivery or financial arrangements.

Obstacles to effective implementation include:

- Patient engagement
- Collaboration; person centered, team-based collaboration between clinician, dietitian, pharmacist and others involved in care delivery
- Behavior changes: information, guidance and support delivered easily and consistently can help assess sustained behavioral changes.

Research needs

- Epidemiological studies investigating the prevalence of placenta accreta spectrum (PAS) in Egypt in relation to the rising rate of Caesarean sections.
- RCTs of optimal timing of delivery for 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 a standardised evidence-based approach, including systematic correlation between ultrasound signs and

detailed clinical diagnosis at delivery, and pathologic confirmation of grades of villous invasiveness where possible.

Clinical Quality Standards for Monitoring

➢	Standardized Ultrasound Definitions and Reporting for Placenta Accreta Spectrum
QS.1	Ultrasound assessments for suspected placenta accreta spectrum are performed using standardized diagnostic definitions and reported using a uniform, structured template to ensure consistent interpretation, communication, and clinical decision-making.
QM.1	**Numerator:** Number of ultrasound reports for suspected PAS that use standardized definitions and a uniform structured reporting template. **Denominator:** Total number of ultrasound assessments performed for suspected PAS. **Measure:** Evidence that a standardized reporting template and agreed diagnostic definitions for PAS are available and in active use within the imaging service. **Target:** 100%.

➢	**Documentation of Informed Delivery Planning Discussions**
QS.2	All women with suspected placenta accreta spectrum have a documented delivery plan that includes discussion with the woman and her partner about the risks and indications of blood transfusion and hysterectomy, and addresses any concerns.
QM.2	**Numerator:** Number of women with suspected PAS who have a documented delivery plan that includes discussion of blood transfusion, hysterectomy, and records any expressed concerns. **Denominator:** Total number of women with suspected PAS. **Target:** 100%.

➢	**Consultant-Led Obstetric Care**
QS.3	A consultant obstetrician plans and directly supervises the elective birth of women with placenta accreta spectrum.
QM.3	**Numerator:** Number of women with PAS whose elective birth was planned and directly supervised by a consultant obstetrician. **Denominator:** Total number of women with PAS undergoing elective birth. **Target:** 100%.

➢	**Consultant-Led Anaesthetic Care**
QS.4	A consultant anaesthetist plans and directly supervises the anaesthesia for elective delivery in women with placenta accreta spectrum.
QM.4	**Numerator:** Number of women with PAS whose anaesthesia was planned and directly supervised by a consultant anaesthetist during elective delivery. **Denominator:** Total number of women with PAS undergoing elective delivery. **Target:** 100%.

➢	**Availability of Blood and Blood Products**
QS.5	Blood and blood products are available on-site before elective surgery in women with placenta accreta spectrum.
QM.5	Evidence of availability of cross-matched blood and blood products for women with PAS prior to elective delivery.

	Target: 100%.

➢	**Comprehensive Informed Consent**
QS.6	Informed consent for elective surgery in women with PAS includes discussion of possible interventions
QM.6	**Numerator:** Number of women with PAS whose documented consent includes discussion of hysterectomy, leaving the placenta in situ, blood transfusion, bladder injury, interventional radiology. **Denominator:** Total number of women with PAS undergoing elective surgery. **Target:** 100%.

Updating of the guidelines

This guideline will be updated whenever there is new evidence.

Appendix I

Ultrasound imaging signs commonly used to diagnose placenta accreta spectrum (modified from Collins SL) (108)

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).

Ultrasound imaging signs	Description
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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