East Midlands Fetal Medicine Network Regional Guideline: Diagnosis and management of abnormally invasive placentae

University Hospitals of Leicester NHS Trust

Trust Ref:C70/2024

1. Introduction and Who Guideline applies to

Definitions

Abnormally invasive placentation (AIP) or placenta accrete spectrum, is a generalised term when a placenta implants with some degree of invasion into the uterine wall. It occurs as a consequence of deficiency in the decidua basalis layer of the uterus. It is graded by the depth of invasion and includes:

- Placenta accrete, where the chorionic villi attach to the myometrium rather than being confined to the decidua basalis

- Placenta increta, where the chorionic villi invade into the myometrium

- Placenta percreta, where chorionic villi fully penetrate the myometrium and extend into the uterine serosa (parametrium). In some cases they can invade into surrounding structures.

Placenta praevia exists when the placenta is embedded wholly or partly into the lower segment of the uterus. It is classified as praevia if the placenta overlies the cervical os and low lying when the leading edge of the placenta is in the lower segment of the uterus but not covering the cervical os, and is less than 20 mm from the internal os. It occurs in 0.3-0.5% (up to 1 in 200) pregnancies.

Related documents;

Ultrasound UHL Obstetric Guideline.pdf Trust ref: B52/2011

https://www.rcog.org.ukplacenta-praevia-and-placenta-accreta-diagnos.pdf

Antepartum Haemorrhage UHL Obstetric Guideline.pdf Trust ref: C39/2011

Postpartum Haemorrhage UHL Obstetric Guideline.pdf Trust ref: C38/2011

Declining Blood and Blood Products UHL Obstetric Guideline.pdfTrust ref: C98/2006

Placenta Praevia UHL Obstetric Guideline.pdf Trust ref:C6/2014

Background

The incidence of placenta praevia and AIP along with its complications is increasing due to the increasing incidence of Caesarean section and increasing maternal age. Birthing women and birthing people are at risk of antepartum haemorrhage, preterm delivery, blood transfusion and hysterectomy. The commonest aetiological factor for AIP is previous endometrial injury particularly previous Caesarean section in combination with a placenta praevia. The risk of AIP in those with a placenta praevia and a history of one previous Caesarean section is approximately 10% in comparison to greater than 60% in pregnant women or pregnant people with three or more previous Caesarean sections.

The most important aspects of management of AIP are:

1. Early identification of pregnant women and people at risk of AIP
2. Multidisciplinary planning
3. Care and delivery in an appropriately experienced and equipped unit

Studies have shown that maternal morbidity and mortality are reduced (less bleeding and less likely to require further surgery) when pregnant women and pregnant people with AIP deliver in a centre with a multidisciplinary care team who have experience in managing the risks and challenges in these cases hence the reason for the development of a regional AIP service. There are three key areas that will be covered within the guideline: these include antenatal diagnosis; multi-disciplinary planning; and, management of delivery.

2. Antenatal Diagnosis

2.1 Screening in local hospital

The anomaly scan (usually undertaken between 18 and 20+6 weeks) should include documentation of placental location. Any pregnant woman or person booking later than this gestation, should additionally have the placental localisation documented at the time of their first scan.

The placenta should be reported as low lying if the leading edge is less than 20mm from the internal cervical os or praevia if covering the os (RCOG). If the placenta is considered to be low lying or a praevia a transvaginal scan should be performed to confirm the diagnosis. This is safe to perform and more accurate than a transabdominal scan to confirm the diagnosis.

It is not recommended for local units to arrange an MRI without discussion with the AIP centre or to bypass the AIP service. Locally specialist USS is better for prediction of AIP than MRI due to operator experience – diagnosis with both modalities remains subjective and accuracy varies with experience of the operator. Systematic review confirms that for pregnant women and pregnant people with a previous Caesarean section and placenta praevia USS is highly predictive of AIP with a sensitivity of 97% (95% confidence interval 93-99%) and specificity of 97% (95% CI 97%-98%).

AIP should be suspected when there is a placenta praevia and particularly in pregnant women and pregnant people with additional risk factors. Risk factors are classified as major, intermediate or minor.

Pregnant women and pregnant people with a placenta praevia (covering os) and one major risk factor should be referred after their detailed scan.

Advise and offer a rescan at their local hospital between 26-28 weeks gestation if:

- Placenta praevia (covering os) with 1 or more intermediate or 2 or more minor risk factors,

or

- Low lying placenta (<20mm at 20 weeks) with a 1 major/intermediate risk factor or 2 or more minor risk factors.

In these cases if the placenta is still covering or <20mm from os on TV scanning at 26-28 weeks referral to the AIP centre for further imaging is recommended.

90% of those with a low lying placenta at 20 weeks will migrate upwards with advancing gestation.

Table 1: Risk factors

Major Risk Factors	History of: • Previous AIP • Caesarean section • Previous trachelectomy (removal of cervix) • Suspected scar ectopic in this pregnancy
Intermediate Risk Factors	History of: • > 2 episodes of endometrial curettage (including ERPC and STOP) • Uterine surgery involving the endometrium (e.g. myomectomy which breached the cavity of resection of uterine septum) • Endometrial ablation • MROP with significant PPH requiring blood transfusion • Asherman's syndrome
Minor Risk Factors	History of: • 1 episode of endometrial curettage (including ERPC and STOP) • IVF • MROP not requiring blood transfusion • Previous postnatal endometritis or septic miscarriage

PLACENTA COVERING OS *PLUS* ONE MAJOR RISK FACTOR	PLACENTA COVERING OS *PLUS* ONE INTERMEDIATE OR TWO OR MORE MINOR RISK FACTORS PLACENTA <20MM FROM OS WITH A RISK FACTOR
↓ FOLLOWING COMPLETED DETAILED SCAN REFER TO REGIONAL AIP CENTRE FOR IMAGING	↓ RESCAN 26-28 WEEKS LOCALLY. IF PLACENTA <20MM FROM OS REFER TO REGIONAL AIP CENTRE

A checklist is included to facilitate the screening (Appendix 1: page 14)

2.2 Referral protocol for women at increased risk of AIP

Referrals should be made on the Fetal Medicine referral form (Appendix 2: page 15) and the relevant unit telephoned for an appointment prior to faxing the referral over.

Pregnant women and pregnant people will be seen within 10 working days of referral, depending on gestation and urgency.

Referrals should be made to one of the following:

- Nottingham: Dr Nia Jones, Fetal Care Unit, City Hospital. Telephone number 01159249924, extension 56480
- Leicester: Dr Farah Siddiqui, Leicester Royal Infirmary. Telephone 01162587770
- Derby: Dr Janet Ashworth, Fetal Medicine, Royal Derby Hospital. Telephone: 01332785409

2.3 Specialist AIP centre diagnostic service

Pregnant women and pregnant people attending for specialist scanning will have their scans performed by fetal medicine specialists who have experience in assessing for AIP.

At review an USS will be performed which will include greyscale and colour Doppler imaging.

A standardised reporting form will be used based on international consensus and necessitates confirming or refuting the ultrasound features for AIP.

Pregnant women and pregnant people will be classified as having high, intermediate or low risk of AIP following the USS. Classification of each case will be reviewed by the fetal medicine AIP specialists. This will be facilitated by using WebEx.

Those with low risk of AIP will be referred back to their local hospital for standard care.

MRI may be requested on a subset of patients. This decision will be made by either the fetal medicine AIP specialist of following an MDT meeting. The MRI will aim to look at the extent of invasion of the placenta and involvement of surrounding, particularly lateral, structures.

Those with intermediate or high risk of AIP will have further discussions and planning of care by a MDT.

A patient information Leaflet will be given following the clinic review.

2.4 Multidisciplinary planning for delivery

The multidisciplinary team will consist of:

- Fetal medicine specialists in AIP scanning
- Obstetrician
- Gynaecologists with experience in complex pelvic surgery
- Urologist
- Obstetric anaesthetist
- Interventional radiologist
- Vascular surgeon (Leicester)
- MRI radiologist

The team will meet (usually virtually by TEAMs) to discuss the cases of intermediate and high risk of having AIP to plan delivery (both in elective and emergency scenarios).

There are four potential surgical approaches that have been described:

1. Primary hysterectomy following delivery of 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.

Uterine preservation is appropriate in some birthing women and birthing people who wish to preserve fertility in the absence of excessive bleeding and when the extent of the AIP 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).

Elements of the planning will be discussed and documented and will include:

- Confirmation of diagnosis
- Assessment for evidence of extra-uterine invasion
- Timing of elective surgery including date and team
- Timing of admission
- Pre-operative investigations and management
    - FBC and ferritin
    - Blood group and presence of antibodies
    - Ensure patient would accept blood products if required
    - Further imaging-USS or MRI
- Surgical planning:
    - Planned anaesthesia
    - Cystoscopy and/or ureteric stenting
    - Interventional radiology
    - Patient positioning (supine, modified Lloyd Davies)
    - Planned abdominal incision (Pfannenstiel or midline)
    - Operative plan – removal of placenta, surgical resection, hysterectomy, conservative (placenta left in situ)
    - Uterotonics to be given or avoided
    - Anticipated parametrical or paravesical dissection
    - Anticipated transfusion requirements
    - Team members to be present for delivery (elective and emergency)
- Review date to discuss with patient
    - Surgery
    - Anaesthesia
    - Interventional radiology

A formal written plan will then be formulated and discussed with the patient by either the lead obstetrician or fetal medicine specialist. Antenatal review with an anaesthetist will also be planned.

2.5 Pre-operative patient counselling

This will be carried out by the consultant obstetrician or fetal medicine specialist on the AIP team. Include partner/family in meeting if possible to facilitate understanding.

Details of diagnosis and suspected extent of morbid adherence/abnormal invasion will be discussed.

Advise to avoid sexual intercourse, also advise to come to hospital if any vaginal bleeding.

Discuss planned antenatal admission.

Risks to be discussed include:

- Preterm delivery
- Antepartum haemorrhage
- Risk of severe haemorrhage
- Need for blood transfusion and cell salvage
- Potential for hysterectomy. May be the preferred option.
- Damage to surrounding structures, particularly bladder and ureters
- Potential risk of death (up to 7% for placenta percreta)

Discussion should also include a conversation around if family complete and option of sterilisation if uterus conserved and risk of AIP in subsequent pregnancy.

2.6 Elective delivery

Pre-operative management

Patients with suspected AIP should be delivered by caesarean section. This should be done by an experienced multidisciplinary team as this is associated with improved outcomes.

All pregnant women and pregnant people with suspected AIP (intermediate or high risk on antenatal USS assessment) should be encouraged to remain close to the planned hospital for delivery in the third trimester and admission to hospital considered beyond 34 weeks in the absence of a history of ante-partum haemorrhage. Those with a history of antepartum haemorrhage should be advised to stay in hospital after 32 weeks gestation as there is an increased in the risk of needing emergency delivery in the presence of previous APH.

In the presence of any APH the patient should be reviewed by a doctor at registrar level or above and the senior registrar on call and consultant on call should be informed of the event. Similarly the consultant on call should be informed of the event. Similarly the consultant on call should be informed if a patient with suspected AIP is admitted with tightening's or ruptured membranes.

Timing of delivery will depend upon the availability of an appropriate surgical team. At NUH in an elective case the operation will be performed at Nottingham City Hospital theatres. At Leicester the elective cases will be performed in the main theatres at LRI. At Derby the elective cases will be performed at Derby Royal Hospital in Gynae theatres. Caesarean sections will usually be performed at 36 weeks gestation in pregnant women and pregnant people with AIP to reduce the risk of needing to perform an emergency delivery and earlier in those at high risk of early delivery. The timing of the delivery should be individualised and take into account the clinical history (e.g. bleeding) of the patient and availability of staff and resources and is a balance between the risk of emergency delivery and neonatal morbidity. Antenatal corticosteroids for fetal lung maturity should be considered prior to planned caesarean section and considered prior to an emergency delivery. A critical care bed should be booked at time of decision for elective surgery.

Haemoglobin should be optimised. Start iron if ferritin <30 ug/L or anaemic. Pregnant women and pregnant people should have a group and save sample sent on admission and in the presence of bleeding cross matching of blood 6 units). Routine cross matching during hospital admission is not necessary but those who additionally have red cell antibodies should be discussed with Blood Bank and an individualised plan made. Six units of blood should be cross-matched on the day prior to the planned surgery.

A pre-operative checklist should be completed by 32 weeks gestation. Consent for interventional radiology procedure will be completed by an interventional radiologist (independent of the consent for the caesarean section. Ideally this will be done prior to the day of the surgery but this will be decided on a case by case basis.

2.7 Operative day

Pre-Operative

There will be multiple teams and staff in theatre. Each team should nominate a team leader and the Consultant Obstetrician will take the overall lead for the case. Clear communication is essential. Avoid overcrowding, theatre-attendance more suitable for senior trainees compared to junior trainees and students.

Cases should ideally be planned for the morning and be the only planned case for this day.

All pre-operative preparation should be performed in accordance with the local elective caesarean section pathway.

Ensure 6 units of blood are cross-matched and blood bank aware of case.

On the morning of the surgery the team should meet for a briefing and run through the plans for the day prior to commencing the operation. The briefing will be led by the obstetrician lead surgeon.

The WHO and AIP pre-operative checklists will be completed. Appendix 7 includes a list of equipment required for cases.

Team present will include:

- Obstetrician (team leader)
- Gynaecologist
- Anaesthetist (2 consultant anaesthetists at LRI)
- Interventional radiologist (+/- IR radiographer) (+ IR nurse)
- Theatre practitioner
- Midwife
- +/- neonatal team

If an epidural is planned for anaesthesia this will be sited first followed by a urinary catheter (placement of iliac artery compliant balloons through a groin approach means that the patient cannot be positioned for these two procedure after interventional radiology)

Interventional radiology (if required): at NUH transfer patient to interventional radiology suite for insertion of iliac artery compliant balloons. In an emergency the interventional radiology team can perform the procedure in theatre. Please contact the interventional radiology consultant to discuss. Consultant anaesthetist, consultant obstetrician and midwife will accompany the patient to IR. At LRI and Derby interventional radiology is undertaken in theatre (C arm in theatre). Fetal monitoring should be considered during this procedure. Vasospasm (which should be evident to the interventional radiologists) can potentially be treated with Glyceryl Trinitrate (GTN).

Transfer back to theatres if applicable. Once intra-arterial compliant balloons are in place then care is required with patient transfer to minimise flexion of legs at the hips.

Top up epidural will commence and invasive monitoring lines may also be sited. Alternatively general anaesthesia will be commenced at this point.

Pre-operative cystoscopy and ureteric stent insertion (if required)

Ultrasound on table to confirm lie and position and plan abdominal and uterine incision site prior to Caesarean section (if required)

Intra-operative

Maintain normothermia during surgery

Inspect uterine surface prior to incision to avoid the placenta. Incision through the placenta is associated with increased maternal and fetal bleeding.

Inflate intra-arterial compliant balloons (interventional radiologist) immediately after birth of baby. Embolisation may be required later if issues with haemostasis. Consider embolization when total blood loss reaches 2.0 litres.

Allow time for the placenta to deliver spontaneously or, if retained and not bleeding, consider leaving placenta in situ.

Confirm operative plane i.e. hysterectomy, resection, attempted placental removal or leave placenta in situ based on pre-operative planning and operative findings.

If planning resection then there needs to be a 2cm area of normal uterine tissue between the area of AIP and the cervix to allow for reconstruction following resection. If this is not present a hysterectomy would be a more suitable procedure, Resection is also less likely to be successful in lateral AIP.

If planning hysterectomy, do not attempt to remove placenta. **Do not electively administer uterotonics** as can cause partial placental separation and increase risk of bleeding. Consider closure of uterine incision to reduce operative bleeding. Proceed with hysterectomy and set lowest landmark for total or subtotal hysterectomy.

Keep check on blood loss intra-operatively (the anaesthetist will take the lead on this) and ensure appropriate blood product transfusion (including cell salvaged blood). Activate major obstetric haemorrhage protocol if indicated and consider early use of tranexamic acid to attempt to reduce blood loss. Correct any clotting abnormalities. Uterotonics may be used to try and reduced blood loss from an atonic lower uterine segment. Please refer to Postpartum Haemorrhage UHL Obstetric Guideline.pdf

Check the ureters: direct visualisation of the ureters during surgery may reduce the chance of injury.

Separate and mobilise bladder.

Once hysterectomy performed consider inflating bladder with normal saline +/- methylene blue to assess for any bladder injury.

Deflate intra-arterial compliant balloons and confirm haemostasis.

Insert drain intraperitoneally.

Removal of intra-arterial balloon +/- sheath will be completed by the interventional radiologists and the end of the operation. Leaving the sheaths in post-operatively is associated with risk of thrombosis and limb ischaemia and is not recommended.

Complete WHO checklist (sign out).

Post-operative

The majority of postpartum women or postpartum people will be managed on the Delivery Suite. Surgical HDU or critical care may be required depending upon blood loss, haemodynamic stability, acidosis, temperature etc. For the majority the stay in critical care is likely to be around 24 hours. Anaesthetist to inform critical care once it is clear that the patient does not require a critical care bed.

Follow post Caesarean section protocol for observations unless an amended plan requested by anaesthetic and surgical team.

Avoid excessive patient movement post-operatively as the risk of significant haemorrhage from the groin sites is high if this does occur.

Leave invasive monitoring in situ until haemodynamic stability is confirmed and discuss with duty anaesthetist prior to removal.

Correct any acidosis, hypothermia, hypocalcaemia or coagulopathy. Check FBC, Coagulation fibrinogen, U&E, Calcium post-operatively and the following day as a minimum.

Rhesus negative patients who have received cell salvaged blood transfusion need a maternal Kleihauer and cord blood for fetal blood group. It should be clearly documented on the request form

that cell salvage blood has been transfused. Repeat kleihauer 30-45 minutes after the cell salvaged blood transfusion in case more anti-D will be required. If the baby is Rhesus positive (or blood group unknown) the minimum dose of Anti-D given should be 1500 IU.

Patients are at increased risk of PN thromboembolism in view of prolonged operative time, heavy blood loss, extensive pelvic dissection, reduced mobility and possible blood product use. Postnatal mechanical thromboprophylaxis in the form of anti-embolic stockings during hospital admission along with low molecular weight heparin (e.g. clexane/enoxaparin) is therefore recommended for a minimum of 10 days, longer if the patient remains in hospital or has further complications. The surgical and anaesthetic team should confirm with the midwife the timing of the first dose. Senior registrar or consultant should review the patient prior to transfer to the ward. Offer PN follow up for debrief.

2.8 Emergency delivery

Some cases may require emergency delivery or may not be diagnosed prior to commencing surgery.

In pregnant women and pregnant people with suspected AIP surgical preparation may be in place – **FOLLOW PATIENT'S PRE-OPERATIVE PLAN/CHECKLIST.**

At the AIP centre inform the appropriate personnel:

1. On call consultant Obstetrician
2. On call consultant Anaesthetist responsible for Obstetrics
3. On call consultant Gynaecologist
4. On call consultant Vascular Interventional Radiologist
5. On call vascular team (LRI)
6. Theatre co-ordinator
7. Blood bank
8. Neonatal Unit
9. Alert on call urology consultant
10. Alert critical care

For pregnant women and pregnant people with suspected AIP, emergency Caesarean section is mostly performed in the presence of vaginal bleeding, PROM and/or uterine contractions.

In Nottingham in emergency situations the team will attend to the appropriate hospital where the patient is admitted rather than attempting to transfer the patient between hospitals at this point. The operative care pathway as described above will be followed.

For outlying hospitals in order to reduce the chances of pregnant women and pregnant people presenting as an emergency recommendations are for them to be admitted at Nottingham/Leicester/Derby prior to the delivery.

However if there are cases that attend at a local hospital, the team at this Unit should contact the appropriate team at Nottingham, Leicester or Derby. The point of contact will be:

1. Nottingham: Dr Nia Jones via switchboard 09:00-17:00 weekdays or on call obstetric consultant at City Hospital outside these hours or if Dr Jones unavailable.
2. Leicester: Dr Farah Siddiqui or Fetal medicine consultant via switchboard 09:00-17:00 weekdays or the consultant obstetrician on call for LRI outside these hours or if Dr Siddiqui unavailable.
3. Derby: Dr Janet Ashworth, via switchboard 09:00-17:00 weekdays or on call obstetric consultant at Derby Royal Hospital outside these hours or if Dr Ashworth unavailable.

The aim should be transfer of these pregnant women and pregnant people to the AIP centre prior to surgery if at all possible.

Some cases of AIP will not be diagnosed antenatally and it is important to recognise signs of AIP at the time of surgery.

2.9 Clinical operative features of AIP:

There may be features to suggest AIP at the time of Caesarean section. These include:

- Abnormal vascularity on the serosal surface of the uterus overlying the placenta
- Bluish tinge to the uterine wall
- Bulging of the uterine wall

If these features are recognised then it is important to ensure that the right team are involved with the delivery from here.

Consideration should be given to delaying the surgery and transfer the patient to the AIP centre.

If a trainee has commenced the operation they should not continue until there is a consultant present.

Decision by the consultant should be whether to transfer the patient to the AIP centre or continue with the surgery locally. To assist with the latter decision-making the consultant should contact the AIP team at one of the three regional sites (Nottingham, Leicester or Derby) to decide the appropriate course of action. Delivery at the AIP centre is likely to lead to reduced blood loss and morbidity but may increase the risk of fetal compromise.

Out of hours the consultant on call can be contacted through switchboard.

Consideration is needed on whether the patient is stable for transfer.

If the surgery is to be completed locally consider if a second consultant is needed for the surgery and ensure senior anaesthetist and adequate anaesthetic support is in theatre.

If the baby is to be delivered locally then the uterine incision should be done distal to the placental site (often either classical or high transverse incision).

Once the baby is delivered then a decision needs to be made as to whether to close the uterus and transfer the patient to the AIP centre or whether to continue with surgery locally. The decision should be made in conjunction with a discussion with the AIP centre and will depend on the stability of the patient and extent of bleeding.

If the incision has been made through the placenta then it is unlikely that bleeding will be controlled to allow for transfer.

If the decision is to complete the surgery locally the placenta should be left in situ and an emergency hysterectomy performed as attempting to separate the placenta is likely to increased blood loss.

Do not transfer the patient without contacting the AIP centre first.

Aortic compression can be performed in desperate cases to try and control the bleeding (to achieve this extend vertical incision above the umbilicus) this can be maintained for several hours if necessary (up to 4 hours) whilst further assistance is sought.

2.10 Care pathway for patients with placenta left in situ

For a proportion of patients the decision will be made to leave the placenta in situ at the time of the Caesarean section. The patient can then either be managed conservatively or further interval surgical intervention planned when there is potentially less morbidity from placental invasion of surrounding structures e.g. bladder.

In this group of patients, the risk of subsequent hysterectomy is high (28-30%) – half occurring within the first 24 hours after the primary surgery and half delayed[1, 2]

There is a significant risk of AIP in subsequent pregnancies (10-30%)[3.4] It may take many months (6-12 months) for the placenta to be entirely reabsorbed with conservative management. Patient selection is therefore important and only suitable for those willing to attend for regular review.

In these cases it is important to counsel the patient about the risk of bleeding, which can be severe, and infection. The complications can occur immediately or be delayed for a significant length of time (months). A patient information leaflet can be given to the patient (Appendix 8).

Other recognised complications include:

- Infectious morbidity (sepsis, septic shock, peritonitis, renal impairment, pulmonary oedema)
- Fever secondary to tissue necrosis
- Prolonged retention of products of conception
- Prolonged bleeding
- Placental polyps
- Expulsion of placental tissue vaginally
- Vesicouterine fistula in cases of placenta percreta rare)
- Venous thromboembolism

Symptoms and signs of infection should be discussed with the patient and inflammatory markers should be checked if there is clinical suspicion if infection.

Administer antibiotics (oral cephalexin or alternative if penicillin allergy) for 7 days post-delivery in all cases. In UHL please refer to the; Antimicrobial Summary UHL Womens Guideline.pdf.

Uterine artery embolization and methotrexate have not been proven to reduce the risk of infection and bleeding and therefore should not be routinely recommended.

Monitor for resorption with serum human chorionic gonadotrophin (B-HCG) and ultrasound. HCG should be performed weekly and USS monthly until the placenta is completely reabsorbed (B-HCG <5, normal USS).

If a patient presents with continued or heavy bleeding options for further management include:

- Radiological embolization
- Surgery: selective arterial ligation, uterine balloon tamponade, uterine compression sutures and hysterectomy.

3. Education and Training

None

4. Monitoring Compliance

What will be measured to monitor compliance	How will compliance be monitored	Monitoring Lead	Frequency	Reporting arrangements
Accuracy of antenatal diagnosis		Consultant lead		
Gestation at delivery		Consultant lead		
Operative details including incision, surgical procedure undertaken		Consultant lead		

Audit

Data on outcomes of cases reviewed by the service will continually and prospectively collected. This will include information on:

- Blood loss
- Blood product administration
- ICU stay and duration
- Maternal complications
- Fetal complications
- Balloon inflation duration

- Embolisation undertaken and details

5. Supporting References

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6. Key Words

Hysterectomy, Intra-arterial balloon, Placenta accrete, Placenta increta, Placenta percreta, Placenta Praevia

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The Trust recognises the diversity of the local community it serves. Our aim therefore is to provide a safe environment free from discrimination and treat all individuals fairly with dignity and appropriately according to their needs.
As part of its development, this policy and its impact on equality have been reviewed and no detriment was identified.

EDI Statement

We are fully committed to being an inclusive employer and oppose all forms of unlawful or unfair discrimination, bullying, harassment and victimisation.

It is our legal and moral duty to provide equity in employment and service delivery to all and to prevent and act upon any forms of discrimination to all people of protected characteristic: Age, Disability (physical, mental and long-term health conditions), Sex, Gender reassignment, Marriage and Civil Partnership, Sexual orientation, Pregnancy and Maternity, Race (including nationality, ethnicity and colour), Religion or Belief, and beyond.

We are also committed to the principles in respect of social deprivation and health inequalities.

Our aim is to create an environment where all staff are able to contribute, develop and progress based on their ability, competence and performance. We recognise that some staff may require specific initiatives and/or assistance to progress and develop within the organisation.

We are also committed to delivering services that ensure our patients are cared for, comfortable and as far as possible meet their individual needs.

CONTACT AND REVIEW DETAILS	
Guideline Lead (Name and Title) Farah Siddiqui - Consultant	**Executive Lead** **Chief medical oficer**
Details of Changes made during review: **New document**	

Appendix 1: CHECKLIST: Risk factors for abnormally invasive placenta (AIP)

To be completed on all pregnant women and people with low lying placenta at 20 weeks USS

		Risk factor present	
		YES	**NO**
Major Risk Factors	**Previous Abnormal Invasive Placentation**		
	Previous Caesarean Section		
	Previous trachelectomy (removal or cervix)		
	Suspected scar ectopic in this pregnancy		
Intermediate Risk Factors	Two or more episodes of endometrial curettage – including Evacuation of retained products of conception (EPRC) and surgical termination of pregnancy (STOP)		
	Uterine surgery involving the endometrium (e.g. myomectomy which breached the cavity or resection of uterine septum)		
	Endometrial ablation		
	Manual removal of placenta with significant postpartum haemorrhage requiring blood transfusion		
	Asherman's syndrome		
Minor Risk Factors	One episode of endometrial curettage (including ERPC/STOP)		
	IVF		
	MROP not requiring blood transfusion		
	Previous postnatal endometritis or septic miscarriage		

- **Pregnant women and people with placenta praevia (covering os) and one major risk factor (previous AIP, Caesarean section or trachelectomy, suspected scare ectopic) should be referred after their detailed scan.**
- **Pregnant women and people should have a rescan at their local hospital between 26-28 weeks gestation if:**
  - **Placenta praevia (covering os) with 1 or more intermediate or 2 or more minor risk factors, or**
  - **Low lying placenta (<20mm at 20 weeks) with a 1 major/intermediate risk factor or 2 or more minor risk factors**
- **If the placenta is still covering or <20mm from os on TV scanning at 26-28 weeks referral to the AIP centre for further imaging is recommended.**
- **For referrals use fetal medicine referral form (available online or Appendix 2) FAO Dr Jones (Nottingham), Dr Siddiqui (Leicester), Dr Ashworth (Derby). Fax referral form and copy of this checklist. See AIP pathway for further information.**
- **90% of those with a low lying placenta at 20 weeks will migrate upwards with advancing gestation**

Signature: ……..

NAME: …… DATE: --/ --/ --

Appendix 2: Fetal medicine clinic referral form

FETAL MEDICINE CLINIC REFERRAL FORM	Date of referral:

Fix addressograph sticker here	Name of person completing referral form: Name of Base Hospital and Responsible Consultant: Liaison Neonatologist:

Parity:	Date of detailed scan:	EDD:	Weight: (Kg)	BMI:

In order to provide appropriate information for the fetal scan please tick the box identifying the indication for the scan below and then add appropriate detail in the space at the bottom of the page. **This information is critical to the planning and performance of the scan.**

	Request for ultrasound assessment and ongoing management plan:
	1. Fetal malformation or anomaly identified or suspected: state:
	2. Known increased risk of genetic or chromosomal anomaly: state
	3. Previous fetal anomaly with increased recurrence risk:
	4. History of periconceptual exposure to teratogenic drugs (e.g. Lithium/mycophenolate):
	5. Request for invasive testing: Carrier of gene or chromosomal disorder: state: Increased Nuchal Translucency in the first trimester (>3.5mm) High risk on screening High risk on NIPT Increased Nuchal Fold measurement in the second trimester (>6mm) Rhesus D group
	6. Placenta praevia plus one major or two or more minor risk factors for abnormally invasive placentation (please also include copy of checklist with referral)::
	7. Other indication. **Use box below to specify reason for referral:**

Further Information:

Allergies:

Appt date/time:	Parents Informed: Yes / No	Fax sent date/time:
Interpreter required: Yes / No	Patient contact number:	GP name & address:

Appendix 3: AIP service ultrasound reporting form

AIP service ultrasound reporting form

SUSPECTED ABNORMALLY INVASIVE PLACENTA (AIP)

Ultrasound report

Demographics and Risk Factors

Name:
DOB:
Hospital or NHS number:

Date: _ _/_ _/_ _ _ _ EDD: _ _/_ _/_ _ _ _ Gestational age: _ _ weeks _ days

Parity ☐ BMI: _ _ . _ Mode of conception: Spontaneous ☐ IVF ☐

Number of previous CS ☐ Number of classical CS ☐ Allergies: _____

Number of previous surgical evacuations (including TOP) ☐

Was Cesarean scar pregnancy suspected/diagnosed in first trimester?	Yes ☐	No ☐	Not known ☐
Previous uterine surgery (e.g. myomectomy, endometrial ablation)	Yes ☐	No ☐	Not known ☐
History of AIP	Yes ☐	No ☐	Not known ☐
Placenta previa on ultrasound	Yes ☐	No ☐	Not known ☐

If yes: Anterior placenta previa < 2 cm from internal os ☐ Covering internal os ☐

Posterior placenta previa < 2 cm from internal os ☐ Covering internal os ☐

Desire for future fertility: _____ Episode of APH Yes ☐ No ☐ Gestation: _ _ + _ weeks

Ultrasound Signs

Cervical length (without funnel or placental tissue)			**mm**
Grayscale ultrasound parameters and definition	**Yes**	**No**	**Unsure**
Loss of 'clear zone' *- Loss, or irregularity, of hypoechoic plane in myometrium underneath placental bed ('clear zone')*			
Myometrial thinning *- Thinning of myometrium overlying placenta to <1mm or undetectable*			
Abnormal placental lacunae *- Presence of numerous lacunae including some that are large and irregular, often containing turbulent flow visible on grayscale imaging*			
Bladder wall interruption *- Loss or interruption of bright bladder wall (hyperechoic band or 'line' between uterine serosa and bladder lumen)*			
Placental bulge *- Deviation of uterine serosa away from expected plane, caused by abnormal bulge of placental tissue into neighboring organ, typically bladder; uterine serosa appears intact but outline shape is distorted*			
Focal exophytic mass *- Placental tissue seen breaking through uterine serosa and extending beyond it; most often seen inside filled urinary bladder*			
Color Doppler ultrasound parameters and definition	**Yes**	**No**	**Unsure**
Uterovesical hypervascularity *- Striking amount of color Doppler signal seen between myometrium and posterior wall of bladder; this sign probably indicates numerous, closely packed, tortuous vessels in that region (demonstrating multidirectional flow and aliasing artifact)*			
Subplacental hypervascularity *- Striking amount of color Doppler signal seen in 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 placenta, across myometrium and beyond serosa into bladder or other organs; often running perpendicular to myometrium*			
Placental lacunae feeder vessels *- Vessels with high-velocity blood flow leading from myometrium into placental lacunae, causing turbulence upon entry*			
Parametrial involvement	**Yes**	**No**	**Unsure**
- Suspicion of invasion into parametrium			

Clinical Significance of Ultrasound Findings

Probability of clinically significant AIP High ☐ Intermediate ☐ Low ☐

Extent of AIP Focal ☐ Diffuse ☐

Signature: _____ **PRINT:** _____ **POSITION:** _____

Appendix 4: RCOG patient information

For RCOG patient information leaflet please see;

https://www.rcog.org.uk/placenta-praevia-placenta-accreta-and-vasa-praevia.pdf

Appendix 5: AIP service MDT meeting pro forma

AIP service multidisciplinary meeting proforma

Date of meeting: __ / __ / __ Completed by: _____

Team members present and specialty: Planned site: Derby ☐ Nott. ☐ Leic. ☐

_____

_____

_____

Local/base hospital: _____

Allergies: _____

BMI: _____

Patient information

Confirmation of diagnosis

USS diagnosis: _____

Images reviewed by fetal medicine consultant with interest in AIP YES ☐ NO ☐

Index of suspicion: High ☐ Intermediate ☐ Low ☐

Extra-uterine involvement suspected YES ☐ NO ☐

Surgical planning recommendations

Comorbidities (e.g. blood borne infection, major cardiac disease): _____

Obstetric complications (e.g. APH, pre-eclampsia): _____

Recommendation for timing: Elective surgery: _____ weeks Admission: _____ weeks

Anaesthesia: _____

Pre-Caesarean Cystoscopy: YES ☐ NO ☐

Ureteric stenting YES ☐ NO ☐

Interventional radiology involvement planned YES ☐ NO ☐

Cell salvage YES ☐ NO ☐

Patient positioning for Caesarean section: Supine ☐ Lithotomy (transient) ☐

Elective use of uterotonics YES ☐ NO ☐

Abdominal incision: Vertical ☐ Pfannenstiel ☐

Surgical plan for placenta: removal of placenta, surgical resection, hysterectomy, conservative (placenta in situ)

_____

Anticipated parametrial or paravesical dissection: _____

Anticipated transfusion requirements:

Team members to be present for delivery (elective and emergency):

_____

_____

_____

Comments:

_____

Appendix 6: Pre-op checklist

AIP: The pre-operative checklist

Part 1 (completed ideally by 32 weeks)

Patient information:

Date of elective procedure: ___ / ___ / ____ Co-ordinating obstetric consultant: _____

Theatre booked: ☐

Planned consultants:

- Obstetrician: _____
- Gynaecologist: _____
- Urologist: _____
- Anaesthetist: _____
- Interventional radiologist: _____
- Other: _____

Consent form completed

- Surgery ☐
- Interventional radiology ☐

Delivery Suite manager informed: ☐

Obstetric theatre manager informed: ☐

Haematologist informed of case: ☐

Critical care bed booked: ☐

NNU informed: ☐

Interventional radiology procedure booked ☐

C arm booked ☐

Accepts blood transfusion: YES/ NO (if no refer to unit guideline on women who decline blood products)

Blood results: Hb ☐ WCC ☐ Plt ☐ Coagulation result: _____

Iron supplementation (if applicable): ☐

Antenatal corticosteroids- date planned: ____ / ____ / ____

Antenatal planned admission date: ____ / ____ / ____

Completed by:

Signature: _____ Print name: _____

The pre-operative checklist: Part 2 (completed day of surgery)

Blood results: Hb ☐ WCC ☐ Plt ☐ Coag ☐

Na ☐ K ☐ Urea ☐ Creatinine ☐

Blood crossmatched: 6 units: ☐

Blood Bank informed of case: ☐

Antenatal corticosteroids ☐

Patient fasting ☐

Ranitidine ☐

TED stockings ☐

Cell salvage: equipment ☐ team ☐

WHO checklist

Complete part 1 in theatre when patient arrives ☐

Separate WHO checklist will be completed in interventional radiology

WHO checklist will be reconfirmed on arrival back in theatres

Planned anaesthesia: GA ☐ Epidural ☐ Spinal ☐

Anaesthetic machine checked ☐

Routine uterotonics planned YES ☐ NO ☐

Completed by:

Signature: _____ Print name: _____

Appendix 7: AIP: Equipment list

- Arterial line pack
- CVC pack (don't open)
- Swan introducer (don't open)
- Ultrasound machine for siting CVC
- Double transducer
- Patient forced air warmer (Bair hugger)
- Rapid infusion device (if available)
- Urinary catheter (with integrated temperature probe if available)
- Patient wedge for interventional radiology suite (table does not tilt)
- Pneumatic compression stockings (Flowtron)
- Cell salvage
- Epidural pack
- Appropriate airway and intubation equipment for GA
- Infusion pumps
- Portable monitor for observations
- CTG
- Ultrasound machine
- Resuscitate
- Caesarean prep pack
- Image intensifier (C-arm) and lead aprons
- Uterotonic drugs: Syntocinon, ergometrine, carboprost, misoprostol, plus tranexamic acid
- Floseal
- Brace suture
- Bakri balloon
- Negative pressure wound dressing if BMI greater than 35
- Blood in theatre for commencement of Caesarean section
- (TEG if available)
- Urology cases:
- Image stack
- 25ch cystoscope sheath set
- 30' 4mm telescope
- Saline irrigation (compatible with irrigation set)
- Irrigation set (Fresenius of baxter)
- Cystoscopy procedure pack (alternative D&C plus irrigation set)
- Guidewire (Boston Scientific-sensor) x 2
- 4.8fr x 24cm stent x 2 (Boston Scientific percuflex)
- 4.8fr x 26cm stent x 2 (Boston Scientific percuflex)
- Ureteric access catheter (prn)
- Omnipaque just in case of difficulty and contrast is required to visualise the urinary system