# Emergency protocols

# Introduction & Acknowledgement

We proudly present to you Emergency Protocols in various specialties, compiled and reviewed under the supervision of **Prof. Dr. Muhammad Mustafa Abdel Ghaffar**, Chairman of General Organisation for Teaching hospitals and institutes, and **Prof. Dr. Sherif Mohamed Safwat**, Vice President of the Organization for Technical Affairs.

We would like to express the deepest gratitude and all the appreciation to all who made this project a reality, to each one of the great advisory committee doctors in various specialties for the effort expended in these protocols, Whose collaborative efforts brought these protocols to fruition.

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**General Organization for Teaching Hospitals and Institutes**

# PROTOCOL FOR MANAGEMENT OF ANTEPARTUM HEMORRHAGE

**2024**

## Definition:

Antepartum hemorrhage (APH) is defined as bleeding from or into the genital tract, from 24 weeks of pregnancy and prior to birth. It complicates 3-5% of pregnancies and is a leading cause of maternal and perinatal mortality and morbidity.

## Causes of APH:

- Abruptio placenta (30-35%).
- Placenta previa (20%). However, incidence is expected to be higher in Egypt due to the cesarean section epidemic.
- Uterine rupture (rare).
- Vasa previa (rare).
- Local causes (cervicitis, vulvovaginal varicosities, and genital tumors).
- Unexplained (usually attributed to marginal separation of the placenta).

## Risk factors for APH:

### Risk factors for placental abruption include:

- Previous abruption is the strongest risk factor for abruption.
- Pre-eclampsia
- Abdominal trauma
- Intrauterine infection.
- Pregnancy following assisted reproductive techniques.
- IUGR
- Smoking
- Drug abuse (cocaine, amphetamines).
- Multiparity.
- PROM.

- Non-vertex presentations.
- Polyhydramnios.
- First trimester bleeding.
- Advanced maternal age.
- Maternal thrombophilia.

## Risk factors for placenta previa include:

- Previous placenta previa.
- Previous cesarean delivery.
- Multiple gestation.
- Multiparity.
- Advanced maternal age.
- Assisted conception.
- Previous abortion.
- Previous uterine surgical procedure.
- Smoking.
- Deficient endometrium (uterine scar, endometritis, manual removal of placenta, curettage, submucous fibroid).

## Risk factors for uterine rupture include:

- Previous uterine surgery.
- High parity.
- Trauma.
- Injudicious use of ecbolics.

## Risk factors for vasa previa include:

- Low lying placenta.
- Succenturiate lobe.

## Prediction and prevention of APH:

- APH can not reliably be predicted, 70% of cases of placental abruption occur in low-risk pregnancies.
- Women should be advised, encouraged and helped to change modifiable risk factors (such as smoking and drug misuse).
- Folic acid during pregnancy reduces the risk of placental abruption (no conclusive evidence).
- There are insufficient data to support a role for antithrombotic therapy (low dose aspirin and/or low molecular weight heparin) in the prevention of abruption in women with thrombophilia.
- It is considered good practice to avoid vaginal and rectal examinations in women with placenta previa (PP), and to advise these women to avoid penetrative sexual intercourse.
- Asymptomatic women with placenta previa should be advised to avoid moderate and strenuous exercise, heavy lifting, or standing for prolonged periods of time.
- Women receiving antenatal anticoagulant therapy should be advised that if they have any vaginal bleeding, they should not take any more doses. They should attend hospital to be assessed and further doses should only be administered after consultation with medical staff (expert hematological advice should be sought).

## Initial Assessment:

- Women with APH presenting to a primary health unit or to a hospital with limited resources should be assessed, stabilized if necessary and transferred to a hospital maternity unit with facilities for resuscitation and performing emergency operative delivery (such as anesthetic support and blood transfusion resources).

- The role of initial assessment in women with APH is to establish whether urgent intervention is required to manage maternal or fetal compromise. The process of triage includes history taking to assess coexisting symptoms such as pain, an assessment of the extent of vaginal bleeding, an assessment of the cardiovascular condition of the mother, and an assessment of fetal wellbeing.
- Women presenting with a major or massive APH that is persisting or if the woman is unable to provide a history due to a compromised clinical state, a rapid assessment of maternal wellbeing should be performed and resuscitation started immediately. **The mother is the priority** in these situations and should be stabilized prior to establishing the fetal condition. She should be resuscitated and stabilized before any decision is made regarding delivery of the baby.

## History :

If there is no maternal compromise, a full history should be taken:

- Amount of bleeding

  The amount of vaginal bleeding may not be a reliable indicator of the severity of hemorrhage since bleeding may be retained in the uterine cavity in case of concealed placental abruption.

- Pain
  - Mild to moderate abdominal pain is usually present with placental abruption. Back pain is prominent when the placenta is on the posterior uterine wall. Placental abruption should be considered when the pain is continuous.
  - Labor should be considered if the pain is intermittent.

- Placenta previa is characterized by painless bleeding.
- The sudden onset of constant sharp pain may be a presenting feature of uterine rupture.

- Associated or initiating factors
  - If the APH is associated with rupture of membranes, bleeding from a ruptured vasa previa should be considered
  - Symptomatic pregnant women with cervical cancer usually present with APH (mostly postcoital)
  - Abdominal trauma (placental abruption, uterine rupture). The possibility of abruption should always be considered in pregnant women who are being evaluated for trauma (e.g. motor vehicle crash, fall, domestic violence).
  - Rapid uterine decompression, such as after uncontrolled rupture of membranes in the setting of polyhydramnios or after delivery of a first twin (placental abruption).
- Fetal movements
- Previous episodes of vaginal bleeding during the present pregnancy
- Position of the placenta, if known from a previous scan
- Obstetric history (gestational age, previous abruption or PP)
- Previous uterine surgery. (The possibility of uterine rupture should always be considered in women with APH and a previous cesarean delivery or any other uterine surgery).
- Risk factors for placental abruption and placenta previa should be identified
- History of previous cervical smear to exclude neoplastic lesions of the cervix

## Examination :

Examination of the woman should be performed to assess the amount and cause of APH

**General examination**

- Blood pressure
- Pulse
- Other signs of hemodynamic compromise (pallor, cyanosis)
- Respiratory rate
- Temperature

**Abdominal examination**

- The woman should be assessed for tenderness or signs of an acute abdomen. The tense or woody feel to the uterus on abdominal palpation indicates a significant abruption. Abdominal palpation may also reveal uterine contractions.
- A soft, non-tender uterus may suggest a lower genital tract cause or bleeding from placenta or vasa previa.
- High presenting part or transverse lie raise the suspicion of placenta previa. Also, a high or unreachable presenting part may be a presenting feature of uterine rupture.
- In cases of placental abruption, fetal compromise may be noted during cardiotocography (CTG). Abnormal or pathologic CTG may be a presenting feature of uterine rupture. Acute fetal compromise with no maternal shock suggests vasa previa.

### Vaginal examination

- A speculum examination must be carried out on the first occasion a woman presents with even a small amount of vaginal bleeding or spotting in pregnancy, to ensure that the cervix is seen and cervical malignancy is excluded. Speculum examination on subsequent occasions can be useful to identify cervical dilatation or visualize a lower genital tract cause for the APH.
- Digital vaginal examination should not be performed until an ultrasound has excluded placenta previa (No PV until No PP). Digital vaginal examination can provide information on cervical dilatation if APH is associated with pain or uterine activity.

## Ultrasound examination

- In all women presenting with APH, an ultrasound scan should be performed to confirm or exclude placenta previa. Ultrasound has limited sensitivity in the identification of retroplacental hemorrhage (placental abruption is a clinical diagnosis). However, when the ultrasound suggests an abruption, the likelihood that there is an abruption is high.

## Maternal investigations:

### Minor hemorrhage

- Full blood count.
- Group and save.
- A coagulation profile is not indicated unless the platelet count is low.

### Major or massive hemorrhage

- Cross-matching of 4 units
- Full blood count

- Coagulation profile
- Urea and electrolytes
- Liver function tests

## Fetal assessment:

- Ultrasound should be carried out to establish fetal heart pulsation if fetal viability can not be detected using external auscultation.
- CTG should be performed in women presenting with APH once the mother is stable or resuscitation has commenced, to aid decision making on the time and mode of delivery.
- In case of suspected vasa previa, various tests to differentiate between fetal and maternal blood are available, but are often not applicable. Fetal compromise would be detected on CTG and delivery would be indicated irrespective of the test result and without delay.

Following initial assessment, women will fall into one of two categories:

I) Bleeding heavy and continuing or clinical shock (major or massive APH)
Mother or fetus is or soon will be compromised.

II) Bleeding mild or settling (minor APH)
Neither mother nor fetus is compromised

## I. Management of major/massive APH:

The major goals of management are to achieve and maintain maternal hemodynamic stability (resuscitation) and to treat the underlying cause in order to stop bleeding. A multidisciplinary team involving senior staff (including the anesthetic team and laboratory specialists) should be involved.

## A) Resuscitation

The cornerstones of resuscitation are restoration of both blood volume and oxygen-carrying capacity.

- A and B - assess airway and breathing

  High flow oxygen (10-15 l/min) via a facemask should be administered, regardless of maternal oxygen saturation. If the airway is compromised owing to impaired conscious level, anesthetic assistance should be sought urgently.

- Left lateral tilt to relieve venocaval compression
- Keep the woman warm
- Immediate venepuncture (20 ml) for:
  - Cross-match (4 units minimum)
  - FBC
  - Coagulation screen, including fibrinogen
  - Renal and liver function for baseline
- Continuous recording of pulse, BP and respiratory rate (using oximeter, electrocardiogram and automated BP recording). Monitor temperature every 15 minutes.
- Foley catheter to monitor urine output.
- Establish two 14-gauge IV lines.
- Fluid replacement: until blood is available, infuse up to 3.5 L of warmed fluids, initially 2 L of isotonic crystalloids. Further fluid resuscitation can continue with additional isotonic crystalloids or colloids (succinylated gelatin, gelofusine). Hydroxyethyl starch (voluven) should

not be used. The nature of the infused fluid is of less importance than rapid administration and warming of the infusion.

- Blood transfusion: compatible blood (supplied in the form of concentrate) should be transfused as soon as possible. Patients with acute hemorrhage can have normal Hb. Therefore, the clinical picture should be the main determinant of the need for blood transfusion and time should not be unnecessarily spent awaiting laboratory results. The goal is to maintain Hb greater than 8 gm%. Special filters should not be used as they slow infusions. If immediate transfusion is indicated, give group O, RhD-negative red cell units. Switch to group-specific red cells as soon as feasible.
- Fresh frozen plasma: transfuse 4 FFP units for every 4 units of red cell concentrate if:
  - hemorrhage is continuing and the results of hemostatic tests are not available
  - PT/APTT are prolonged
  - coagulopathy is suspected (placental abruption)
- Platelets: transfuse platelets at a trigger of 75000/microliter to maintain a level greater than 50000/microliter during ongoing APH.
- Cryoprecipitate should be used to maintain a fibrinogen level of greater than 2 g/l, even if PT/APTT are normal. Two cryoprecipitate pools (each pool is composed of 5 units) may be given in the face of relentless bleeding, while awaiting the results of the coagulation studies.
- Consider transfer to ICU once the bleeding is controlled or monitoring at high dependency unit on delivery suite, if appropriate.

### B) Arrest of bleeding

- Delivery through emergency CS in most of the cases, unless vaginal delivery is imminent.
- In case of placental abruption with IUFD, vaginal delivery is recommended unless vaginal delivery is not imminent and rapid control of bleeding is required because of maternal hemodynamic instability or significant coagulopathy.

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| Beware of DIC and renal failure, especially with placental abruption. |

## II. Management of minor APH:

- Immediate venipuncture (20 ml) for:
  - group and save
  - FBC
  - coagulation screen (if platelet count is low)
- IV access (one 14-gauge cannula)
- Pulse, BP and respiratory rate recording every 15 minutes
- Start warmed crystalloid infusion
- Ultrasound to confirm placental location and to establish fetal well-being (growth, amniotic fluid volume and doppler measurements).
- Delivery

  Deliver the patient if she is 37 weeks or more or if there is fetal distress or congenital anomalies that are incompatible with life or if the baby is dead.

- Expectant management

  If the bleeding stops and the maternofetal condition is stable, expectant management should be the option of choice to achieve fetal maturity.

  - Prevention and treatment of anemia is recommended
  - Steroids should be given if gestational age is <36 weeks (unless the cause is lower genital tract bleeding and imminent delivery is unlikely)
  - Anti-D Ig is recommended for Rh(D)-negative women after any presentation with APH, independent of whether routine antenatal prophylactic anti-D has been administered. In the event of recurrent vaginal bleeding after 20 weeks of gestation, anti-D Ig should be given at minimum of 6-weekly intervals.
  - Do not use prophylactic tocolytics in women with APH.
  - In cases of placenta previa, cervical cerclage to prevent or reduce bleeding and prolong pregnancy is not supported by sufficient evidence to recommend this practice outside a clinical trial.
  - Women with pregnancies complicated by APH (including unexplained APH) are at increased risk of adverse perinatal outcomes including small for gestational age fetus and fetal growth restriction. Serial ultrasound for fetal growth should be performed.
  - Home-based care

    All women with APH heavier than spotting and women with ongoing bleeding should remain in hospital at least until the bleeding has stopped.

    At present, there is no evidence to support recommendations regarding duration of inpatient management following APH. Each woman should be assessed on an individual basis and clinical judgment

applied. Where the bleeding has been spotting and has settled, and tests of fetal and maternal wellbeing are reassuring, the woman can go home. She should be encouraged to contact the maternity unit if she has any further bleeding, pain or a reduction in fetal movements.

Any home-based care requires:

1. Close proximity to the hospital
2. Ready access to the hospital
3. The constant presence of a companion
4. Full informed consent by the woman

Women managed at home should attend immediately if there is bleeding, contractions or any pain. They are advised to avoid excess physical activity, including sexual intercourse.

- Timing of delivery:
  - Delivery timing should be tailored according to antenatal symptoms and, for women presenting with uncomplicated placenta previa, delivery should be considered between $36^{+0}$ and $37^{+0}$ weeks of gestation.
  - Late preterm ($34^{+0}$ to $36^{+0}$ weeks of gestation) delivery should be considered for women presenting with placenta previa or a low-lying placenta and a history of vaginal bleeding or other associated risk factors for preterm delivery.
  - 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.
  - With placental abruption, delivery is recommended at 37-38 weeks of gestation.

## Postnatal Management:

- Postpartum hemorrhage should be anticipated in women who have experienced APH. Therefore, active management of the third stage of labor should be strongly advised. Consideration should be given to the use of oxytocin and ergometrine combined to manage the third stage in women with APH resulting from placental abruption or placenta previa in the absence of hypertension. A prophylactic oxytocin 40 IU in 500 ml infusion over 4 hours (125 ml/hour) should also be considered for the postnatal period.
- Anti-D Ig should be given to non-sensitized RhD-negative women.
- In women with pregnancies complicated by major or massive APH, thromboprophylaxis should be administered once the bleeding is controlled and any coagulopathy is corrected, as there is a high risk of thrombosis. If chemical thromboprophylaxis is contraindicated (e.g. in case of thrombocytopenia), anti-embolism stockings, foot impulse devices or intermittent pneumatic compression devices can be used.

## Anesthesia:

- In a case of APH where maternal and/or fetal condition is compromised and cesarean section is required, general anesthesia should be considered to facilitate control of maternal resuscitation and to expedite delivery.

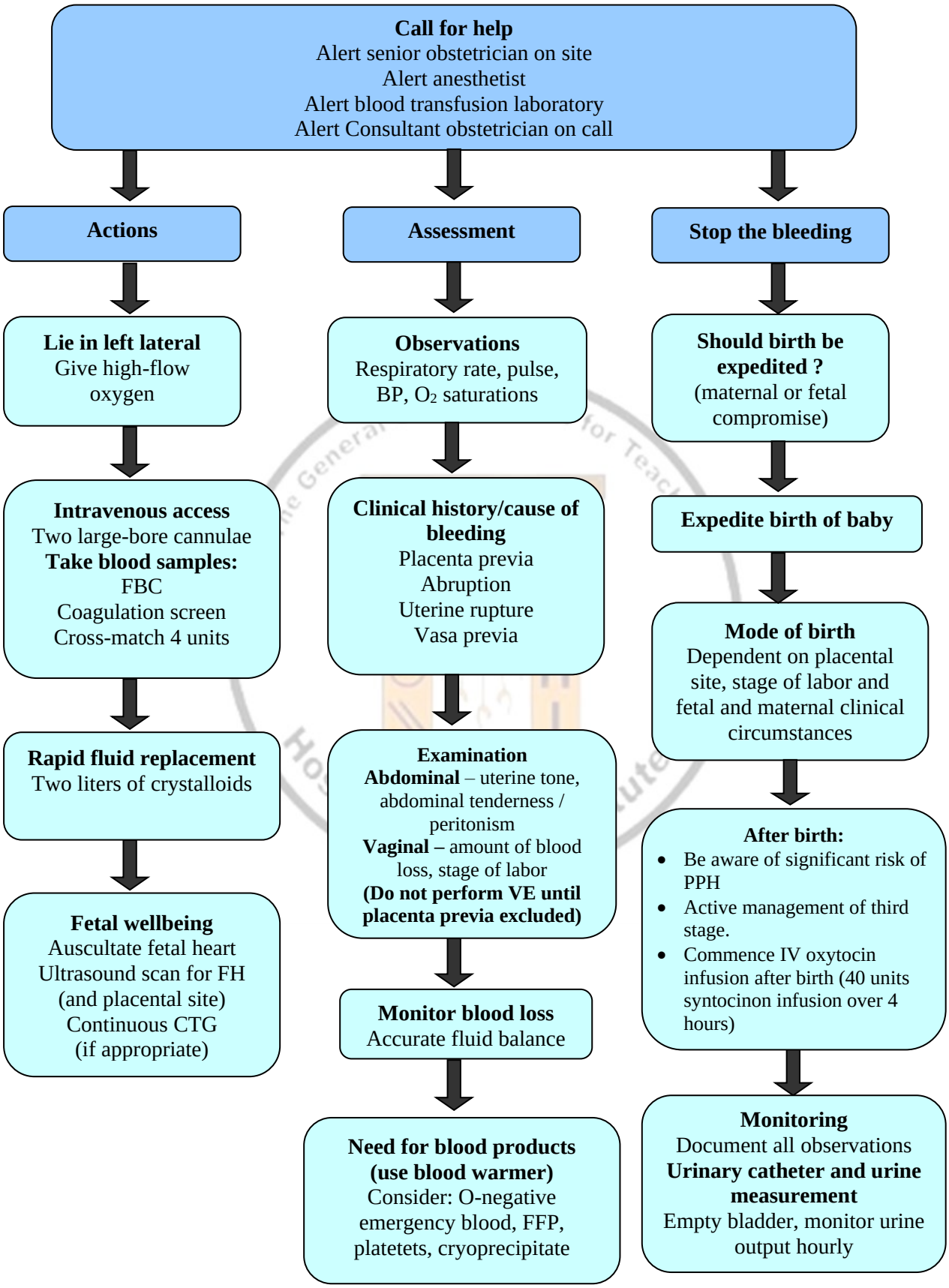
## Neonatal care:

- Major or massive APH may result in fetal anemia and fetal compromise. The neonate should be assessed by a senior neonatologist.
- In minor APH, clinical judgment should be used. With continuing hemorrhage, it would be appropriate to request neonatal support at the time of delivery.
- Anterior placenta previa that necessitates incising the placenta at the time of cesarean section is an indication for attendance by an experienced neonatologist.

## Appendix I: Maternal and Fetal Complications of APH:

| Maternal complications | Fetal complications |
|---|---|
| 1. Maternal shock<br>2. Postpartum hemorrhage.<br>3. Complications of blood transfusion.<br>4. Consumptive coagulopathy (especially with placental abruption).<br>5. Renal tubular necrosis (especially with placental abruption).<br>6. Infection.<br>7. Prolonged hospital stay.<br>8. Anemia.<br>9. Psychological sequelae | 1. Fetal hypoxia.<br>2. Small for gestational age and fetal growth restriction.<br>3. Prematurity (iatrogenic and spontaneous).<br>4. Fetal death. |

## Appendix II: Algorithm for the Management of antepartum haemorrhage



**General Organization for Teaching Hospitals and Institutes**

# PROTOCOL FOR MANAGEMENT OF POSTPARTUM HEMORRHAGE

**2024**

## Definition:

Primary postpartum hemorrhage (PPH) is defined as the blood loss from the genital tract of at least 500 ml after a vaginal birth (or at least 1000 ml after a cesarean section) within 24 hours of delivery. However, this is an arbitrary value as patients with a low BMI may have a low blood volume and anemic women may have fewer physiological reserves. Hence, they may not tolerate a blood loss of 500 ml and may decompensate much earlier.

It is one of the leading causes of maternal mortality in the developing world.

Secondary PPH is defined as abnormal or excessive bleeding from the birth canal between 24 hours and 12 weeks postnatally.

## Severity of PPH:

- Primary PPH can be minor (500-1000 ml) or major (more than 1000 ml).
- Major PPH can be further subdivided into moderate (1001-2000 ml) and severe (more than 2000 ml). It is important to be aware that minor PPH can easily progress to major PPH.
- Life-threatening hemorrhage (loss of more than 40% of total blood volume)
- Clinicians should be aware that the visual estimation of blood loss is inaccurate and that clinical signs and symptoms should be included in the assessment of PPH.
- Shock index=H.R./SBP (0.5 – 0.7 : no shock, > 0.9 : shock).
- Rule of 30: if SBP decrease by 30 mmhg, pulse increase by 30 beats/min, HB and hematocrite decrease by 30%, this means that she lost 30% of her blood volume.

# Prediction of PPH:

- Clinicians must be aware of risk factors for PPH. Women with risk factors for PPH should only be delivered in a hospital with a blood bank on site.
- Risk factors for PPH may present antenatally or intrapartum; care plans must be modified when risk factors arise.
- Most cases of PPH have no identifiable risk factors.
- PPH is caused by abnormalities of one or more of four basic processes; the four Ts: tone, trauma, tissue and thrombin. The most common cause of PPH is uterine atony.

## A. Uterine atony:

- Prolonged labor/precipitate labor
- Uterine overdistension (polyhydramnios, multiple pregnancy, fetal macrosomia)
- Previous PPH
- Placenta previa
- Fibroids
- Uterine inversion
- General anesthesia
- Anemia

## B. Trauma:

- Episiotomy
- Perineal lacerations
- Rupture uterus
- Instrumental delivery
- Cesarean section

## C. Retained tissue:

- Retained placenta
- Placenta accreta

## D. Coagulation failure:

- Placental abruption
- Pre-eclampsia
- Infection (chorioamnionitis, septicemia)

# Prevention of PPH:

* Antenatal anemia should be investigated and treated appropriately as this may reduce the morbidity associated with PPH.
* Uterine massage is of no benefits in the prophylaxis of PPH.
* Management of the third stage of labor:
  Prophylactic ecbolics should be offered routinely in the third stage of labor as they reduce the risk of PPH by about 60%.

  - **Oxytocin and ergometrine-oxytocin (syntometrine)**
    - Oxytocin (10 IU IM) is the agent of choice. With CS, 5IU by slow IV injection should be given. A bolus dose may be inappropriate in some women such as cardiac patients (a low-dose infusion is a safer alternative).
    - The advantage of a reduction in the risk of minor PPH needs to be weighed against the adverse effects associated with syntometrine. Syntometrine may be used in the absence of hypertension in women at increased risk of PPH.

  - **Misoprostol**
    - Oxytocin is superior to misoprostol in the prevention of PPH.

  - **Carbetocin (a longer-acting oxytocin derivative)**
    - No significant differences between carbetocin and oxytocin in terms of risk of PPH.

For women at increased risk of PPH, it is possible that a combination of preventive measures might be superior to syntocinon alone to prevent PPH

- **Tranexamic acid**
  - Clinicians should consider the use of IV tranexamic acid (0.5-1 gm), in addition to oxytocin at CS to reduce blood loss in women at increased risk of PPH.

# Management of PPH:

- Management of PPH involves four components, all of which must be undertaken SIMULTANEOUSLY:
  I. Communication
  II. Resuscitation
  III. Monitoring & investigation
  IV. Arresting the bleeding

## I. COMMUNICATION:

- Relevant staff with an appropriate level of expertise should be alerted.
- The first-line obstetric and anesthetic staff should be alerted when women present with minor PPH (blood loss 500-1000 ml) without clinical shock.
- A multidisciplinary team involving senior members of staff (including the anesthetic team, blood bank and the laboratory specialists) should be called to attend to women with major PPH (blood loss >1000 ml) and ongoing bleeding or clinical shock.

## II. RESUSCITATION

### a. Measures for <u>minor PPH</u> without clinical shock:

- Intravenous access (one 14-gauge cannula)
- Immediate venepuncture(20 ml) for:
  - group and save
  - FBC
  - coagulation screen, including fibrinogen
- Start warmed crystalloid infusion.

**b. Full protocol for <u>major PPH</u> and ongoing bleeding or clinical shock:**

- A and B –assess airway and breathing
    - High flow oxygen (10-15 l/min) via a facemask should be administered, regardless of maternal oxygen saturation. If the airway is compromised owing to impaired conscious level, anesthetic assistance should be sought urgently.
- C –evaluate circulation
- Place the patient in a flat position.
- Keep the woman warm
- Immediate venipuncture (20 ml) for:
    - cross-match (4 units minimum)
    - FBC
    - coagulation screen, including fibrinogen
    - renal and liver function for baseline
- Establish two 14-gauge IV lines
- Fluid replacement: until blood is available, infuse up to 3.5 L of warmed fluids, initially 2 L of isotonic crystalloids. Further fluid resuscitation can continue with additional crystalloids or colloids (succinylated gelatin, gelofusine). Hydroxyethyl starch (voluven) should NOT be used. The nature of the infused fluid is of less importance than rapid administration and warming of the infusion. The best equipment available should be used to achieve rapid warmed infusion of fluids.
- Blood transfusion: compatible blood (supplied in the form of red cell concentrate) should be transfused as soon as possible. Patients with acute hemorrhage can have normal Hb. Therefore, the clinical picture should be the main determinant of the need for blood transfusion and time should not be unnecessarily spent awaiting laboratory results. The goal is to maintain Hb greater than 8gm%. Special blood filters should NOT be used as they slow infusions. If immediate transfusion is indicated, give group O, RhD-negative red cell units. Switch to group-specific red cells as soon as feasible.

- Fresh frozen plasma: transfuse 4 FFP units for every 4 units of red cell concentrate if:
  - hemorrhage is continuing and the results of hemostatic tests are not available
  - PT/APTT are prolonged
  - coagulopathy is suspected (placental abruption)
- Platelets: transfuse platelets at a trigger of 75000/microliter to maintain a level greater than 50000/microliter during ongoing PPH.
- Cryoprecipitate should be used to maintain a fibrinogen level of greater than 2 g/l, even if PT/APTT are normal.
- Tranexamic acid (TXA)
  - Early use of IV TXA (within 3 hours of birth) in addition to standard care is recommended for women with PPH. (WHO recommendation)
  - first dose of 1 g IV is given over 10 minutes (to avoid hypotension)
  - second dose of 1 g IV may be given if bleeding continues after 30 minutes or if bleeding restarts within 24 hours of the first dose
  - do not exceed 2 g in 24 hours
  - TXA administration beyond 3 hours does NOT confer any clinical benefit
  - TXA should be avoided if there is a clear contraindication to antifibrinolytic therapy (e.g. thromboembolic event during pregnancy)
- The routine use of rFVIIa is not recommended in the management of major PPH unless as part of a clinical trial. It may be considered as a treatment for life-threatening PPH, but should not delay or be considered a substitute for a life-saving procedure.
  - suggested dose is 90 micrograms/kg, which may be repeated in the absence of clinical response within 15-30 minutes
  - rFVIIa will not work if there is no fibrinogen. Therefore, fibrinogen should be above 1g/l
  - effectiveness may be suboptimal with severe thrombocytopenia (less than 20000/microliter)

- Thromboprophylaxis should be administered once the bleeding is arrested and any coagulopathy is corrected as there is a high risk of thrombosis. Alternatively, anti-embolism stockings, foot impulse devices or intermittent pneumatic compression devices can be used if chemical thromboprophylaxis is contraindicated (e.g. in case of thrombocytopenia).

  The main therapeutic goals of the management of massive blood loss are:
  - Hb greater than 8 g%
  - Platelet count greater than 50000/microliter
  - PT less than 1.5 times normal
  - APTT less than 1.5 times normal
  - Fibrinogen greater than 2 g/l

  The ***GOLDEN HOUR*** refers to the time in which resuscitation must begin to ensure the best chance of survival. The probability of survival decreases sharply after the first hour, if the patient is not effectively resuscitated.

## III. MONITORING & INVESTIGATION

For **minor PPH** without clinical shock:

- Blood group and save
- FBC
- Coagulation screen, including fibrinogen
- Pulse, respiratory rate and BP recording every 15 minutes.

For **major PPH** and ongoing bleeding or clinical shock:

- Cross-match (4 units minimum)
- FBC
- Coagulation screen, including fibrinogen
- Liver and renal function for baseline
- Monitor temperature every 15 minutes
- Continuous pulse, respiratory rate and BP recording (using oximeter, electrocardiogram and automated blood pressure recording)
- Foley catheter to monitor urine output

- A central venous line not only provides a means of accurate central venous pressure (CVP) monitoring but also a route for rapid fluid replacement
- Consider transfer to ICU once the bleeding is controlled or monitoring at high dependency unit on delivery suite, if appropriate
- Recording of parameters on a flow chart
- Documentation of fluid balance, blood, blood products and procedures

## IV. ARRESTING THE BLEEDING

* The most common cause of primary PPH is uterine atony. Therefore, the initial management of PPH should involve a sequence of mechanical and pharmacological measures to stimulate myometrial contractions. These measures should be instituted in turn:
  - Rubbing up the uterine fundus
  - Ensure that the bladder is empty (Foley catheter, leave in place)
  - Oxytocin 5 IU by slow IV injection (dose may be repeated)
  - Ergometrine 0.5 mg by slow IV or IM injection (contraindicated in women with hypertension)
  - Oxytocin infusion (40 IU in 500 ml isotonic crystalloids at 125 ml/hour) unless fluid restriction is necessary
  - Carbetocin (a longer acting oxytocin derivatives)
  - Misoprostol 800 micrograms sublingually. Regardless of the route of administration (sublingual, rectal, vaginal), misoprostol takes 1 to 2.5 hours to increase uterine tone. Clinicians should be aware of this delay in the clinical effect of misoprostol.

    If significant hemorrhage continues after these measures, the team should consider transfer to the operating theatre for examination under anesthesia with an awareness of the impending need for surgical treatment
* If pharmacological measures fail to control the hemorrhage, surgical interventions should be performed sooner than later. Compression of the aorta may be a temporary but effective measure to allow time for resuscitation to catch up with the volume replacement and the appropriate surgical support to arrive.

- Tamponade using various types of hydrostatic balloon catheters has superseded uterine packing as a first-line surgical management of atonic PPH (Foley catheter, Bakri balloon, Sengstaken-Blakemore catheter, condom, Rusch balloon). The success rate is high (80-90%).
  - Tamponade test: a positive test (control of PPH following inflation of the balloon) indicates that laparotomy is not required.
  - In most cases, 4-6 hours of tamponade should be adequate to achieve hemostasis and ideally it should be removed during daytime hours in the presence of senior staff.
- Hemostatic brace sutures (B-Lynch suture, modified compression sutures) are effective in controlling severe PPH and in reducing the need for hysterectomy. The success rate is 70-80%. It is recommended that a laminated diagram of the brace technique be kept in theatre.
  - Compression sutures are associated with a low complication rate. A higher risk of uterine ischemia may occur if the procedure is combined with vessel ligation.
  - Combined use of hemostatic suturing and balloon tamponade has been reported.
- Stepwise uterine devascularization
- Internal iliac artery ligation (bilateral)
- Selective arterial embolization by interventional radiology (if available)
- Hysterectomy
  - SOONER RATHER THAN LATER (especially in case of placenta accreta or uterine rupture)
  - The decision should be made by an experienced consultant and preferably discussed with a second experienced clinician when feasible
  - Subtotal hysterectomy is the operation of choice unless there is trauma to the cervix or PPH following placenta previa.

# SECONDARY PPH:

## Causes of secondary PPH:

- Endometritis (secondary PPH is often associated with endometritis)
- Retained products of conception (RPOC)
- Uterine subinvolution (fibroid, uterine overdistension)
- Trophoblastic disease (rare)

## Investigations:

- High vaginal and endocervical swabs
- Blood cultures if there is fever
- FBC
- Pelvic ultrasound may help to exclude the presence of RPOC although the diagnosis of retained products is unreliable. Therefore, the clinical findings (including the severity of bleeding and whether the cervical os is open) should be taken into account before the decision to perform surgical evacuation is made
- B-hCG

## Management of secondary PPH:

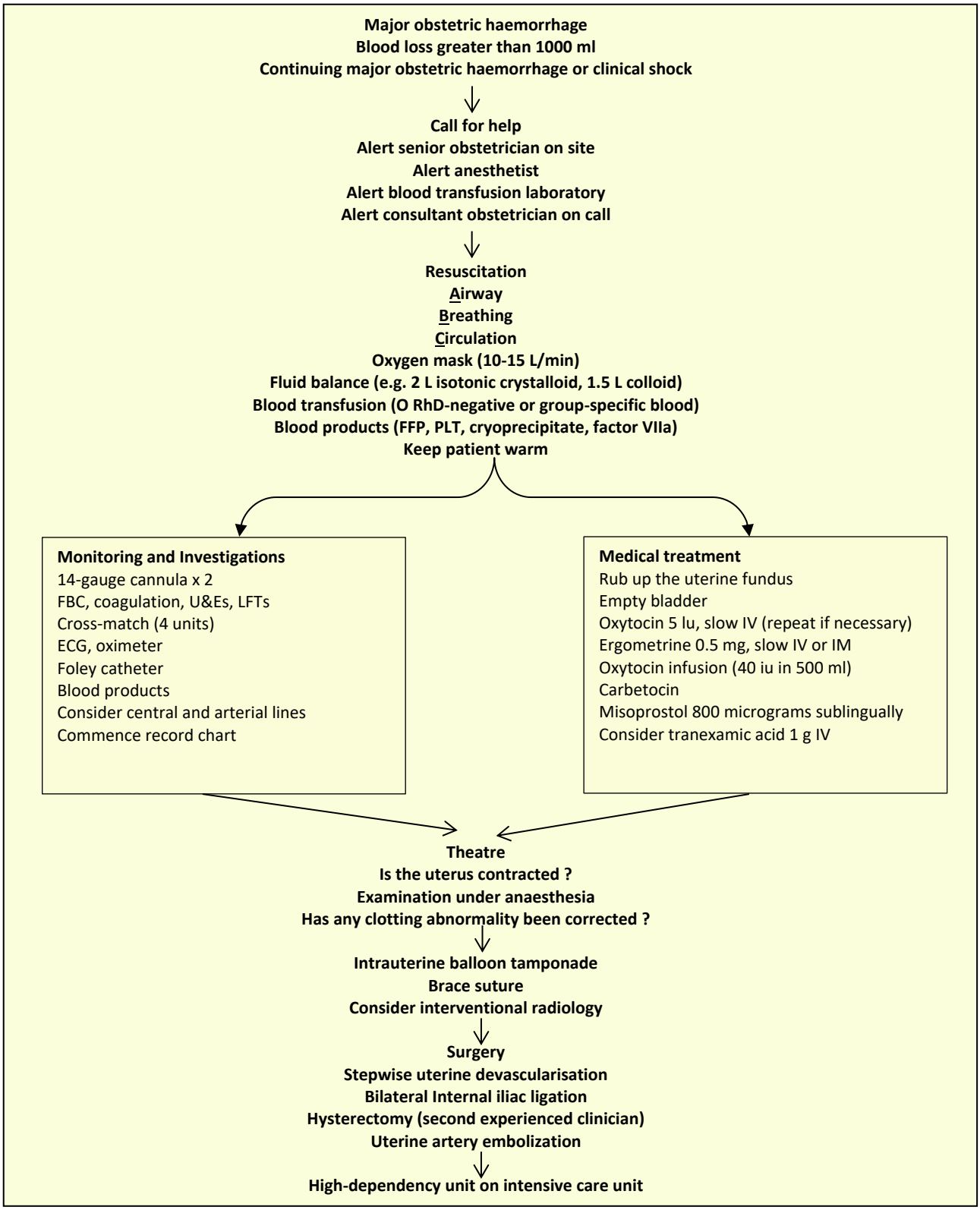
- Antimicrobial therapy: a combination of clindamycin and gentamycin is appropriate. Once endometritis has clinically improved with IV therapy, there is no additional benefit from further oral therapy.
- Surgical evacuation of RPOC: should be undertaken or supervised by an experienced clinician as the risk of perforation is high.
- Uterotonics such as misoprostol and ergometrine have been recommended in the management of secondary PPH, although evidence to support their use is limited.
- Uterine balloon tamponade use in cases of secondary PPH with ongoing bleeding has been reported.

## Appendix 1: The causes of PPH

| The four Ts | Risk factors/notes |
|---|---|
| **Tone: abnormalities of uterine contraction** | |
| Overdistension of uterus | Polyhydramnios, multiple gestation, macrosomia |
| Intra-amniotic infection | Fever, prolonged rupture of membranes |
| Functional/anatomic distortion of uterus | Rapid labour, prolonged labour, fibroids, placenta praevia, uterine anomalies |
| Uterine relaxants, e.g. magnesium and nifedipine | Terbutaline, halogenated anaesthetics, glyceryl trinitrate |
| Bladder distension | May prevent uterine contraction |
| **Tissue: retained products of conception** | |
| Retained cotyledon or succenturiate lobe | |
| Retained blood clots | |
| **Trauma: genital tract injury** | |
| Lacerations of the cervix, vagina or perineum | Precipitous delivery, operative delivery |
| Extensions, lacerations at caesarean section | Malposition, deep engagement |
| Uterine rupture | Previous uterine surgery |
| Uterine inversion | High parity with excessive cord traction |
| **Thrombin: abnormalities of coagulation** | |
| *Pre-existing states* | |
| Haemophilia A | History of hereditary coagulopathies or liver disease |
| Idiopathic thrombocytopenic purpura | Bruising |
| von Willebrand's disease | |
| History of previous PPH | |
| *Acquired in pregnancy* | |
| Gestational thrombocytopenic | Bruising |
| Pre-eclampsia with thrombocytopenia e.g. HELLP | Elevated blood pressure |
| *Disseminated intravascular coagulation* | |
| a) Gestational hypertensive disorder of pregnancy with adverse conditions | Coagulopathy |
| b) in utero fetal demise | Fetal demise |
| c) severe infection | Fever, neutrophilia/neutropenia |
| d) abruption | Antepartum haemorrhage |
| e) amniotic fluid embolus | Sudden collapse |
| Therapeutic anticoagulation | History of thromboembolic disease |

## Appendix II: A flow chart of the different steps for the management of major PPH

**Resuscitation, monitoring, investigation and treatment should occur simultaneously**



**General Organization for Teaching Hospitals and Institutes**

# PROTOCOL FOR MANAGEMENT

# OF

# PLACENTA PREVIA & PLACENTA ACCRETA

**2024**

## Introduction and background epidemiology

Placenta previa and placenta accreta are associated with high maternal and neonatal morbidity and mortality. The rates of placenta previa and accreta have increased and will continue to do so as a result of rising rates of cesarean deliveries, increased maternal age and use of assisted reproductive technology (ART). The highest rates of complications for both mother and newborn are observed when these conditions are only diagnosed at delivery.

### Placenta previa

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

The introduction of transvaginal scanning (TVS) in obstetrics in the 1980s has allowed for a more precise evaluation of the distance between the placental edge and the internal os. A recent multidisciplinary workshop of the American Institute of Ultrasound in Medicine (AIUM) has recommended discontinuing the use of the terms 'partial' and 'marginal', suggesting that the term 'placenta previa' is used when the placenta lies directly over the internal os. For pregnancies

greater than 16 weeks of gestation, the placenta should be reported as 'low lying' when the placental edge is less than 20 mm from the internal os, and as normal when the placental edge is 20 mm or more from the internal os on TAS or TVS. This new classification could better define the risks of perinatal complications, such as antepartum hemorrhage and major postpartum hemorrhage (PPH), and has the potential of improving the obstetric management of placenta previa.

The estimated incidence of placenta previa at term is I in 200 pregnancies. However, this is dependent on the definition used and is likely to change with the introduction of the AIUM classification described above and with the rising incidence of the main risk factors, i.e. prior cesarean delivery and pregnancies resulting from ART.

Risk factors for placenta previa include:

- Previous cesarean delivery (the risk rises as the number of prior cesarean sections increases).
- Previous placenta previa.
- Increased maternal age.
- Use of assisted reproductive technology.
- Smoking.

## Placenta accreta

Placenta accreta is a histopathological term used to describe abnormal trophoblastic invasion into the myometrium, and sometimes to or beyond the serosa. It includes three subtypes:

- Placenta accreta (or creta): anchoring placental villi attach to the myometrium (rather than the decidua).
- Placenta increta: anchoring placental villi penetrate into the myometrium.
- Placenta percreta: anchoring placental villi invade the myometrium to the serosa.

Cases of placenta accreta are also often subdivided into total, partial or focal according to the amount of placental tissue involved and different depths of accreta placentation have been found to co-exist in the same case. Thus, placenta accreta is a spectrum disorder ranging from abnormally adherent to deeply invasive placental tissue.

In the last decade, the condition has begun to be known by many different names, with 'morbidly adherent placenta' becoming particularly popular. This terminology is misleading as 'morbidly adherent' does not encompass the abnormally invasive end of the accreta spectrum (increta and percreta), which usually have the worst clinical outcomes. In order to overcome these difficulties, the terms 'placenta accreta spectrum' or 'abnormally adherent and invasive placenta' should be used to include both the abnormally adherent and invasive forms of accreta placentation. In this protocol, the term placenta accreta spectrum (PAS) will be used.

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

## Risk factors for placenta accreta include:

- History of placenta accreta in a previous pregnancy.
- Previous cesarean delivery. The risk rises as the number of prior cesarean sections increases. Women requesting elective cesarean delivery for non-medical indications should be informed of the risk of placenta accreta spectrum and its consequences for subsequent pregnancies.

- Other surgical trauma to the integrity of the uterine endometrium and/or superficial myometrium such as those following uterine curettage, manual removal of the placenta or myomectomy.
- Placenta previa is an important risk factor for placenta accreta spectrum.
- Advanced maternal age.
- Use of assisted reproductive technology.

# Diagnosis

## Screening and diagnosis of placenta previa

The midpregnancy routine fetal anomaly scan should include placental localisation thereby identifying women at risk of persisting placenta previa or a low-lying placenta. The term placenta previa should be used when the placenta lies directly over the internal os. For pregnancies at more than 16 weeks of gestation the term low-lying placenta should be used when the placental edge is less than 20 mm from the internal os on TAS or TVS. (TVS is better if posterior placenta and/or high BMI).

If the placenta is found to be low lying (less than 20 mm from the internal os) or previa (covering the os) at the routine fetal anomaly scan, a follow-up ultrasound examination including a TVS is recommended at 32 weeks of gestation to diagnose persistent low-lying placenta or placenta previa. Clinicians should be aware that TVS for the diagnosis of placenta previa or a low-lying placenta is superior to transabdominal and transperineal approaches, and is safe.

In women with a persistent low-lying placenta or placenta previa at 32 weeks of gestation who remain asymptomatic, an additional TVS is recommended at around 36 weeks of gestation to inform discussion about mode of delivery.

Cervical length measurement may help facilitate management decisions in asymptomatic women with placenta previa. A short cervical length on TVS before 34 weeks of gestation increases the risk of preterm emergency delivery and massive hemorrhage at cesarean section.

## Screening and diagnosis of placenta accreta spectrum

Antenatal diagnosis of placenta accreta spectrum is crucial in planning its management and has been shown to reduce maternal morbidity and mortality. Previous cesarean delivery and the presence of an anterior low-lying placenta or placenta previa should alert the antenatal care team of the higher risk of placenta accreta spectrum. Women with a history of previous cesarean section seen to have an anterior low-lying placenta or placenta previa at the routine fetal anomaly scan should be specifically screened for placenta accreta spectrum.

Ultrasound imaging is highly accurate when performed by a skilled operator with experience in diagnosing placenta accreta spectrum. Refer women with any ultrasound features suggestive of placenta accreta spectrum to a specialist unit with imaging expertise.

Clinicians should be aware that the diagnostic value of MRI and ultrasound imaging in detecting placenta accreta spectrum is similar when performed by experts. 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.

## Antenatal Care

Tailor antenatal care, including hospitalization, according to individual woman's needs, social circumstances, previous bleeding episodes, and hematology laboratory results. Prevention and treatment of anemia during the antenatal period is recommended.

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

### Counseling

Women with placenta previa or a low-lying placenta in the third trimester should be counselled about the risks of preterm delivery and obstetric hemorrhage, and their care should be tailored to their individual needs.

Women with suspected PAS based on clinical risk factors and suggestive ultrasound findings should be counseled about the diagnosis and potential sequelae (e.g, hemorrhage, blood transfusion, cesarean hysterectomy, maternal intensive care unit admission).

### Steroids

Steroids should be given if gestational age is <36 weeks (unless the cause is lower genital tract bleeding and imminent delivery is unlikely)

### Anti-D Ig

Anti-D Ig is recommended for Rh(D)-negative women after any presentation with APH, independent of whether routine antenatal prophylactic anti-D Ig has been administered. In the event of recurrent vaginal bleeding after 20 weeks of gestation, anti-D Ig should be given at minimum of 6-weekly intervals.

## Tocolytics

Do not use prophylactic tocolytics in women with APH.

## Cerclage

In cases of placenta previa, cervical cerclage to prevent or reduce bleeding and prolong pregnancy is not supported by sufficient evidence to recommend this practice outside a clinical trial.

## Home-based Care

All women with APH heavier than spotting and women with ongoing bleeding should remain in hospital at least until the bleeding has stopped.

At present, there is no evidence to support recommendations regarding duration of inpatient management following APH. Each woman should be assessed on an individual basis and clinical judgment applied. Where the bleeding has been spotting and has settled, and tests of fetal and maternal wellbeing are reassuring, the woman can go home. She should be encouraged to contact the maternity unit if she has any further bleeding, pain or a reduction in fetal movements.

Any home-based care requires:

1. Close proximity to the hospital
2. Ready access to the hospital
3. The constant presence of a companion
4. Full informed consent by the woman

Women managed at home should attend immediately if there is bleeding, contractions or any pain. They are advised to avoid excess physical activity, including sexual intercourse.

## Timing of delivery

- Delivery timing should be tailored according to antenatal symptoms and, for women presenting with uncomplicated placenta previa, delivery should be considered between $36^{+0}$ and $37^{+0}$ weeks of gestation.
- Late preterm ($34^{+0}$ to $36^{+0}$ weeks of gestation) delivery should be considered for women presenting with placenta previa or a low-lying placenta and a history of vaginal bleeding or other associated risk factors for preterm delivery.
- 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. If there is history of vaginal bleeding or other risk factors for preterm delivery, delivery may be carried out as early as $34^{0+}$ weeks of gestation.

## Delivery of women with placenta previa or a low-lying placenta

Delivery should be arranged in a maternity unit with on-site blood transfusion services and access to critical care.

Prior to delivery, all women with placenta previa and their partners should have a discussion regarding delivery. Indications for blood transfusion and hysterectomy should be reviewed. In women with a third trimester asymptomatic low-lying placenta the mode of delivery should be based on the clinical background, the woman's preferences, and supplemented by ultrasound findings, including the distance between the placental edge and the internal os, and the fetal head position relative to the leading edge of the placenta on TVS.

The optimal route for delivery of pregnancies where the distance between the placental edge and the internal os is 0 to 20 mm is debatable. In these cases, the fetal head may tamponde the adjacent placenta, thus preventing hemorrhage. The risks and benefits of a trial of labor should be discussed with the patient. The risk of bleeding increases as the distance between the placental edge and the internal os decreases. If this distance is more than 10 mm, trial of labor may be allowed.

If this distance is 10 mm or less, these pregnancies are at high risk of intrapartum hemorrhage necessitating cesarean delivery.

As a minimum requirement for a planned cesarean section for a woman with placenta previa, the surgical procedure should be carried out by an appropriately experienced operator. In cases of planned cesarean section for placenta previa or a low-lying placenta, a senior obstetrician (usually a consultant) and senior anesthetist (usually a consultant) should be present within the theatre suite. When an emergency arises, the senior obstetrician and senior anesthetist should be alerted immediately and attend urgently.

## Anesthesia

Regional anesthesia is considered safe and is associated with lower risks of hemorrhage than general anesthesia for cesarean delivery in women with placenta previa or a low-lying placenta. Women with placenta previa or a low-lying placenta should be advised that it may be necessary to convert to general anesthesia if required and asked to consent to this. For patients who are actively bleeding or require an emergency cesarean birth, general anesthesia is usually preferred.

## Surgical approach

- Consider using preoperative and/or intraoperative ultrasonography to precisely determine placental location and the optimal place for uterine incision.
- Consider vertical skin and/or uterine incisions when the fetus is in a transverse lie to avoid the placenta, particularly below 28 weeks of gestation.
- If the placenta is transected during the uterine incision, immediately clamp the umbilical cord after fetal delivery to avoid excessive fetal blood loss.
- If pharmacological measures fail to control hemorrhage, initiate intrauterine tamponade and/or surgical hemostatic techniques sooner rather than later. Interventional radiological techniques should also be urgently employed where possible.
- Early recourse to hysterectomy is recommended if conservative medical and surgical interventions prove ineffective.

## Delivery of women with placenta accreta spectrum

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. 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.

Once the diagnosis of placenta accreta spectrum is made, a plan for emergency delivery should be developed in partnership with the woman.

Any woman giving consent for cesarean section should understand the risks associated with cesarean 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.

## Anesthesia

The choice of anesthetic technique for cesarean section for women with placenta accreta spectrum should be made by the anesthetist conducting the procedure in consultation with the woman prior to surgery. 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.

## Surgical approach

- Cesarean section hysterectomy with the placenta left in situ is preferable to attempting to separate it from the uterine wall.
- 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.
- 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

- 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.
- 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.

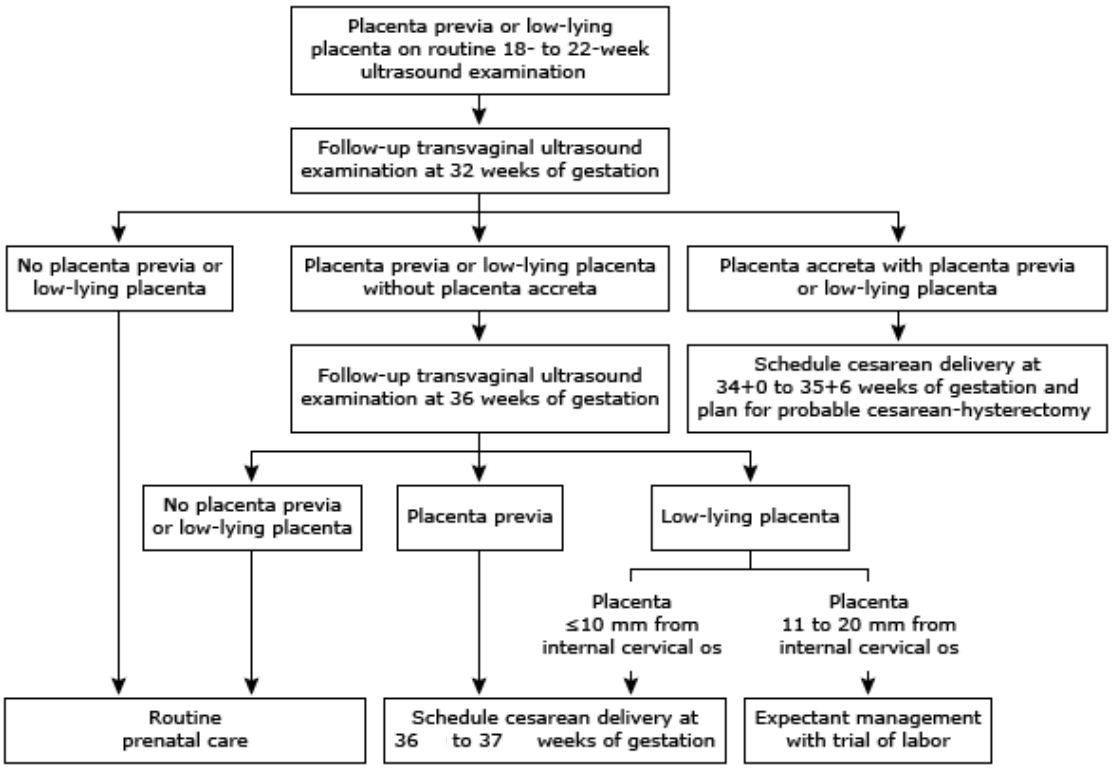
## Expectant management (leaving the placenta in situ)

- Elective peripartum hysterectomy may be unacceptable to women desiring uterine preservation or considered inappropriate by the surgical team. In such cases, leaving the placenta in situ should be considered.
- When the placenta is left in situ, local arrangements need to be made to ensure regular review, ultrasound examination and access to emergency care should the woman experience complications, such as bleeding or infection.
- Methotrexate adjuvant therapy should not be used for expectant management as it is of unproven benefit and has significant adverse effects.

## Management of undiagnosed or unsuspected PAS

- If at the time of an elective repeat cesarean section, where both mother and baby are stable, it is immediately apparent that placenta percreta is present on opening the abdomen, the cesarean 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.
- 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.

**Algorithm of management of placenta previa, low-lying placenta and placenta accreta:**




Charles JL, Karen RS. Placenta previa: Management. UpToDate 2022.