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Section 4: Clinical Problems

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4.3 Vaginal bleeding after childbirth

Acronyms and abbreviations

ABCDE	airway, breathing, circulation, disability, exposure
bpm	beats per minute
IM	intramuscular
IV	intravenous
NASG	non-pneumatic anti-shock garment
NS	normal saline
PPH	postpartum haemorrhage
RL	Ringer's lactate
SBP	systolic blood pressure
TXA	tranexamic acid

4.3.1 Clinical situation

- Excessive bleeding that occurs within the first 24 hours of birth (primary [immediate] postpartum haemorrhage [PPH]).
- Excessive bleeding occurring between 24 hours after birth and 6 weeks postpartum (secondary [late] PPH).

PPH is an obstetrical emergency that can lead to death of the woman very quickly if appropriate care is not provided on time.

4.3.2 What is postpartum haemorrhage?

- Excessive vaginal bleeding after childbirth, or PPH, is commonly defined as blood loss > 500 ml within 24 hours after birth.
- Severe PPH is defined as blood loss of ≥ 1000 ml within the same timeframe.

There are, however, some known problems in identifying blood loss.

- Estimates of blood loss are notoriously low, often half the actual loss. Blood is mixed with amniotic fluid and sometimes with urine. It is dispersed on sponges, towels and linens, in buckets and on the floor.
- The importance of a given volume of blood loss varies with the woman's haemoglobin level before she gives birth. A woman with a normal haemoglobin level will tolerate blood loss that would be fatal for an anaemic woman.
- Bleeding can occur at a slow rate over several hours; the condition might not be recognized until the woman suddenly enters shock.
- Thus, for practical purposes, any blood loss that has the potential to result in cardiovascular instability can be defined as PPH.
- For all women giving birth, routine objective measurement of postpartum blood loss is recommended to improve the detection and prompt treatment of PPH.
- Methods to objectively quantify blood loss, such as calibrated drapes for women having vaginal birth, can achieve this.
- Blood loss measurement is particularly critical in the first one hour after birth. Women should also be regularly monitored for early warning signs of excessive blood loss (e.g. tachycardia or hypotension).
- The process for postpartum blood loss measurement should ensure that a woman's customary or cultural requirements, including choice of birth position, are respected and maintained.

For all women giving birth, routine objective measurement of postpartum blood loss is recommended to improve the detection and prompt treatment of PPH

4.3.3 Prevention of postpartum haemorrhage

Several interventions in the antenatal period are important in the prevention of PPH, including:

- addressing anaemia;
- the promotion of good clinical practices throughout pregnancy, including the early identification of risk factors (e.g. placental abnormalities and inherited or acquired bleeding disorders);
- counselling on the prevention of obstetric complications;
- encouraging birth preparedness and complication readiness; and
- supporting decisions to give birth in well-equipped health facilities with skilled health personnel.

For more information, see Section 2.1 Antenatal care and 2.2 Labour and childbirth.

Diagnosis and management of anaemia in the antenatal period is an important intervention for prevention of PPH and its complications. In addition, risk assessment in the antenatal period is important for being prepared for complications. However, these do not effectively predict which women will have PPH. A woman can develop PPH even in the absence of risk factors.

The third stage of labour and immediate postpartum period is perhaps the most critical window for preventing PPH through the use of uterotonics during the third stage of labour (see Section 2.2.8 Management of the third stage of labour and use of immediate postpartum uterotonic).

The use of uterotonics for the prevention of PPH during the third stage of labour is recommended for all births.

To effectively prevent PPH after birth, use only one of the following uterotonics within 1 minute of birth (vaginal or via caesarean section):

- oxytocin 10 IU, intramuscularly (IM)/intravenously (IV); or
- carbetocin 100 µg, IM/IV (the heat-stable carbetocin formulation is recommended in settings where cold chain cannot be guaranteed); or
- misoprostol, either 400 µg or 600 µg, orally.

In settings where multiple uterotonic options are available, oxytocin (10 IU, IM/IV) is the recommended uterotonic agent of choice for the prevention of PPH for all births.

In situations where women giving birth vaginally already have IV access, the IV administration of 10 IU oxytocin – diluted and administered slowly over 1–2 minutes – is recommended in preference to IM administration.

Heat-stable carbetocin (100 µg, IM/IV) is the recommended choice for the prevention of PPH in settings where cold-chain oxytocin cannot be consistently maintained. If heat- stable carbetocin is not available, misoprostol (400 µg or 600 µg, orally) can be used as an alternative.

Ergometrine/methylergometrine, fixed-dose combination of oxytocin and ergometrine, and injectable prostaglandins are NOT recommended for the prevention of PPH.

Tranexamic acid (TXA) is NOT recommended for the prevention of PPH at vaginal birth.

Close monitoring of postpartum uterine tone, vaginal bleeding, pulse and blood pressure is recommended for all postpartum women to ensure prompt identification of and rapid response to uterine atony, excessive bleeding and haemodynamic changes.

Continuous slow bleeding or sudden heavy bleeding is an emergency; intervene early and aggressively. Even healthy, non-anaemic women can have catastrophic blood loss.

4.3.4 Immediate management of postpartum haemorrhage

When managing a woman with PPH, apply principles of respectful care and principles of clinical care, including providing information to the woman and her family, ensuring that the woman has a companion of her choice, adhering to infection prevention and control measures and providing adequate pain relief as required. As you begin treating her, explain to the woman what is being done in clear and simple language.

4.3.4.1 Triggers to start PPH bundle

Objectively measure blood loss and regularly monitor the woman as recommended in the immediate postpartum period to facilitate early detection of excessive bleeding (see Section 2.2.9 Care of the woman and newborn during the first hour after childbirth).

Start the PPH bundle immediately if any of the following triggers are present.

- 500 ml or more of blood has been lost.
- 300 ml of blood loss and one or more of the following warning signs:
  - atonic uterus;
  - heavy blood flow, or large blood clots, or constant trickle of blood;
  - history of severe anaemia;
  - increasing pulse rate: > 100 beats per minute (bpm) or an increase of > 20 bpm;
  - decreasing systolic blood pressure (SBP): < 100 mmHg or a decrease of > 20 mmHg;
  - shock index > 1 (calculated as pulse rate divided by SBP, which is > 1 when pulse rate is higher than the SBP).
- Your clinical judgment – start the PPH bundle regardless of blood loss if you have concerns such as:
  - atonic uterus
  - heavy blood flow, large blood clots, or constant trickle of blood
  - concern for high risk of PPH, for example:
    - → previous PPH
    - → anaemia
    - → twins
    - → prolonged labour
    - → pre-eclampsia.
- Triggers before placenta is out:
  - if you identify a trigger before delivering the placenta, start the PPH bundle immediately and call for help to manually remove the placenta.

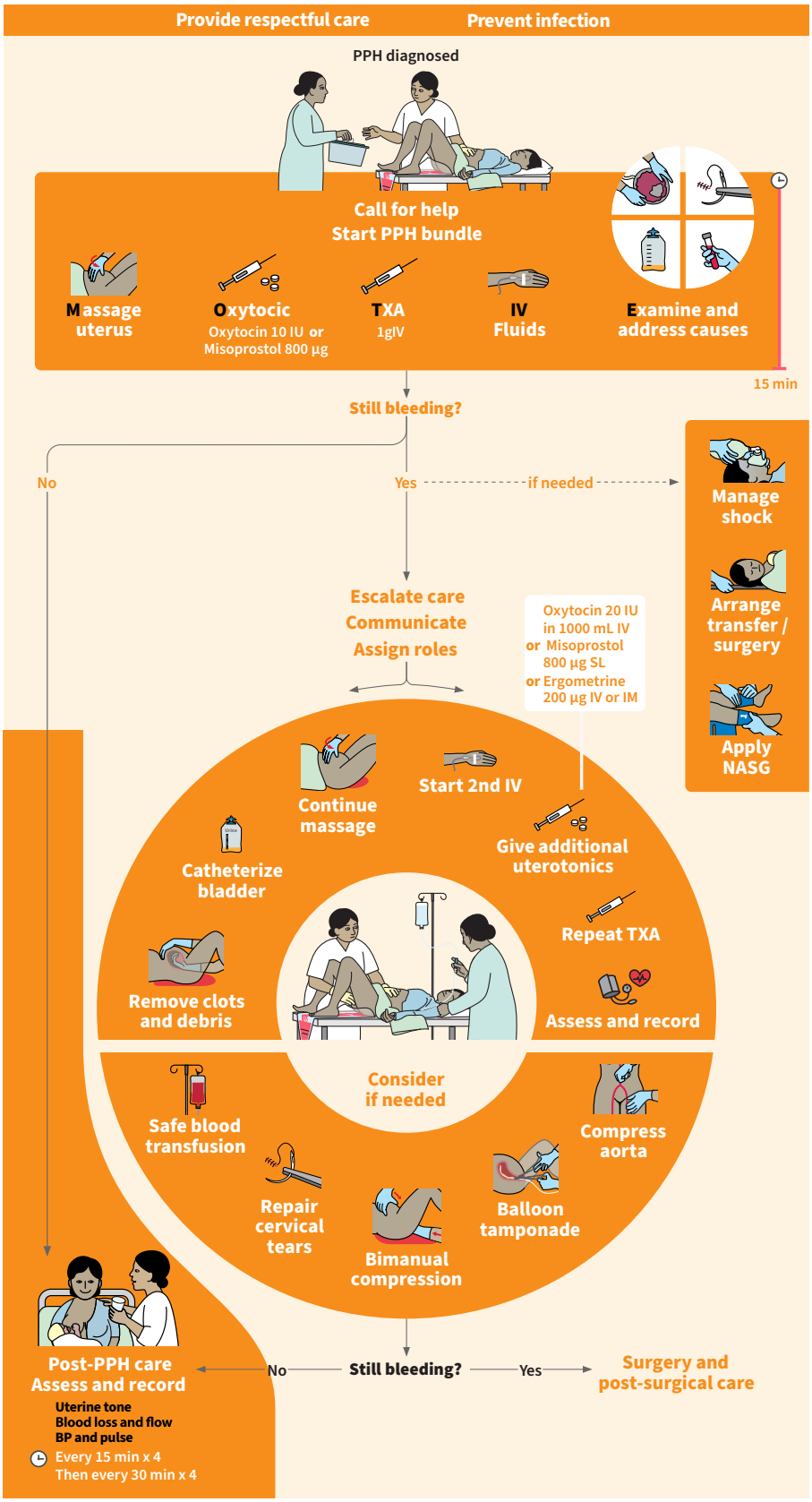
4.3.4.2 Start the PPH bundle

SHOUT FOR HELP. Urgently mobilize all available personnel. This should include senior experienced staff including midwives, nurses, doctors, obstetricians, anaesthetists and blood bank personnel.

Use the “MOTIVE” mnemonic to remember the elements of the PPH bundle.

- **M**assage the uterus to stimulate contractions.
- **O**xytocic or uterotonic drugs to stimulate contractions.
- **T**ranexamic acid (TXA) that prevents clots from breaking down.
- Start **IV** quickly, draw blood for testing and quickly give medicines and IV fluids.
- **E**xamine to identify the cause and stop the bleeding and Escalate to the next steps if needed (see Fig. 4.3.1).

Fig. 4.3.1 Bleeding after birth: postpartum haemorrhage treatment



Source: WHO 2025a.

Complete the PPH bundle within 15 minutes

The order in which you complete the steps does not matter.

Give all elements in the bundle, even if there is improvement.

- Without delaying the PPH bundle, perform a rapid evaluation of the woman's general condition, vital signs (pulse, blood pressure, respiration), level of consciousness, presence of anxiety and/or confusion, blood loss, skin colour and temperature (see Section 3.1.4 Rapid assessment).
  - Remember ABCDE (Airway, Breathing, Circulation, Disability, Exposure).
  - See Section 3.2 Management of obstetric emergencies.
- If the woman has given birth outside of the current facility (either at home or in another health facility), ask the woman, or if she is not in a condition to respond, the person accompanying her, for details to assess the amount of bleeding (e.g. number of pads soaked, clothes soaked), time since bleeding began and whether the placenta has been delivered. When time allows, take a more detailed clinical history.
- If shock is suspected, begin treatment immediately. Even if signs of shock are not present, keep in mind that shock could develop as you evaluate the woman further because her status might worsen rapidly.
- Start an IV, draw blood samples (see next bullet point) and infuse isotonic crystalloids (e.g. normal saline [NS] or Ringer's lactate [RL]) rapidly; 1 L can be infused over 15–20 minutes if shock is suspected. Give at least 2 L in the first hour (unless there are concerns regarding fluid overload as with pre- eclampsia/ eclampsia) and then reduce to 1 L in the next 6–8 hours.
- Note: send a blood sample for haemoglobin or haematocrit and type and screen, and order blood for possible transfusion, before infusing IV fluids. If facilities are available, do prothrombin time (PT), activated partial thromboplastin time (APTT), platelet count and fibrinogen. Perform a bedside clotting test if these are not available.

Isotonic crystalloids are recommended in preference to colloids for IV fluid resuscitation of women with PPH.

- Massage the uterus to expel blood and blood clots. Blood clots trapped in the uterus will inhibit effective uterine contractions.
- IV oxytocin is the recommended uterotonic drug for the treatment of PPH. Give oxytocin 10 IU IV diluted and administered slowly over 1–2 minutes as a bolus or diluted in a small volume of crystalloids and infused over 5–10 minutes as an infusion (or IM if IV infusion line is not present).
- If IV oxytocin is unavailable, or if the bleeding does not respond to oxytocin, use IV ergometrine, oxytocin-ergometrine fixed dose, or a prostaglandin (including misoprostol) (see Table 4.3.3).
- Administer TXA 1 g IV slowly. Early use of IV TXA (within 3 hours of birth) in addition to standard care is recommended for women with clinically diagnosed PPH following vaginal birth or caesarean section.
- Catheterize the bladder.
- Anticipate the need for blood early, and transfuse as necessary (for more information, see Section 1.3.6 Clinical use of blood, blood products and replacement fluids in obstetric care).
- Determine the cause of PPH and manage accordingly.
  - Place a hand on the fundus of the uterus and check the tone of the uterus (see Section 4.3.9 Management of atonic uterus).
  - Check to see if the placenta has been expelled, and examine the placenta to be certain it is complete . If there are signs of retained placental fragments, remove remaining placental tissue. Do NOT give ergometrine.
  - Examine the cervix, vagina and perineum for tears (see Section 4.3.10 Management of tears).

Continue close observation and monitoring of blood loss and clinical parameters, including vital signs, during and following specific management of the underlying cause of PPH.

If you are in a Level 1 facility, referral and transfer may be required if the woman fails to adequately respond to treatment administered (i.e. uterotonics) or if further treatment is required (repair of a tear) that cannot be undertaken at the current facility or level of care. Every effort should be made to stabilize the woman for transport and ensure ongoing care during transport when referring her to a higher level of care. If needed, consider application of a non-pneumatic anti-shock garment (NASG) or uterine balloon tamponade (if conditions for safe use are met.

4.3.5 Clinical history

If the woman has given birth outside of the current facility (either at home or in another health facility) and is brought to you with excessive bleeding after birth, start initial management according to the PPH bundle.

Once she is haemodynamically stable or the PPH bundle has been carried out, ask her or her family or those accompanying her the following questions. These will help determine the cause and anticipated response to interventions. Adapt the questions in clear and simple language. Be respectful when asking these questions and sensitive and empathetic to the woman. Ensure adequate privacy while asking these questions.

- How much blood have you lost? This can be assessed by asking about number of pads/clothes soaked, duration of bleeding.
- Where did you give birth? What was the mode of birth: was it a normal vaginal birth, an assisted vaginal birth or a caesarean section?
- Has the placenta been delivered?
- Was the labour prolonged?
- Did you have any history of bleeding prior to labour or during labour?
- What is your parity?
- Did you have any complications during the pregnancy? Were you told you had anaemia or pre-eclampsia? Do you have any bleeding disorders? Did you have PPH in any of your previous births?

4.3.6 Communicating about postpartum haemorrhage

- Always communicate with the woman and her family regarding her concerns, possible causes of the bleeding, treatment options available, and treatment being provided. Answer any questions that she or her family may have in clear and simple language. If she needs to be transferred to a higher level of care for further treatment, explain the reasons for transferring and what arrangements are being made (e.g. transport, continuing care) for the transfer. Please note that the woman experiencing vaginal bleeding after birth may be very anxious and distressed. Communicate with the woman and her companion of choice, informing them of clinical developments and proposed management.
- Always inform the woman of any procedures being undertaken and obtain her consent after explaining to her details of the procedure.
- Ensure that someone from the health-care team is assigned to attend to the baby while the woman is being treated for bleeding. Enlist the support of the family for attending to the baby, especially if there is a shortage of human resources. If the woman is transferred to a different facility for further management, make a plan for care of the baby. It would be best to transfer the baby along with the mother. However, if that is not possible, make a plan for care for the baby, including feeding and thermal care.

For more information, see *Counselling for maternal and newborn health care: a handbook for building skills*.

4.3.6.1 Communication between health workers

Clear communication and teamwork are imperative when responding to an emergency. See Section 3.2.3 Preparing for emergencies for details on effective communication between health workers.

4.3.7 Differential diagnosis of vaginal bleeding after childbirth

The common causes of PPH can be recognized with a 4T mnemonic:

- Tone – uterine atony
- Trauma – uterine, cervical or vaginal tears or injury
- Tissue – retained placenta or clots
- Thrombin – pre-existing or acquired coagulopathy.

See Table 4.3.1 for differential diagnoses of PPH.

Table 4.3.1 Differential diagnosis of vaginal bleeding after childbirth

Presenting symptoms and other symptoms and signs typically present	Symptoms and signs sometimes present	Risk factors that may be present PPH can occur even in the absence of any of these risk factors	Probable cause
Primary PPH[a,b] Uterus soft and not contracted	Shock	High parity Prolonged labour Overdistended uterus (multiple pregnancy, polyhydramnios) Chorioamnionitis Placenta praevia	Atonic uterus
Primary PPH[a,b]	Complete placenta Uterus contracted	Precipitous birth Assisted vaginal birth (forceps or vacuum assisted)	Tears of cervix, vagina or perineum
Placenta not delivered within 30 minutes after childbirth	Primary PPH[a,b] Uterus contracted	Adherent placenta	Retained placenta
Portion of maternal surface of placenta missing, or torn membranes with vessels	Primary PPH[a,b] Uterus contracted	Succenturiate lobe of placenta	Retained placental fragments
Uterine fundus not felt on abdominal palpation Slight or intense pain	Inverted uterus apparent at vulva Primary PPH[a,c]	Excessive cord traction	Inverted uterus
Primary PPH[a] (bleeding is intra-abdominal and/or vaginal)	Shock Tender abdomen	Previous caesarean or previous uterine surgery	Ruptured uterus
Severe abdominal pain (may decrease after rupture)	Rapid maternal pulse	Obstructed labour	
Bleeding occurs > 24 hours after childbirth Uterus softer and larger than expected for elapsed time since childbirth	Bleeding is variable (light or heavy, continuous or irregular) and foul-smelling Anaemia	Retained placental fragments Endometritis	Secondary PPH

PPH: postpartum haemorrhage.

a Bleeding in the first 24 hours after childbirth.
b Bleeding may be light if a blood clot blocks the cervix or if the woman is lying on her back.
c There might be no bleeding with complete inversion.

4.3.8 Overview: management of different causes of postpartum haemorrhage

Once the steps detailed in the immediate management of PPH have been completed, it is important to identify the cause of PPH and provide specific management according to the cause. The following sections detail the necessary steps.

Before any procedure, explain the procedures to the woman in clear and simple language, including that fact that it might be uncomfortable, and obtain consent.

4.3.9 Specific management of atonic uterus

Table 4.3.2 Specific management of atonic uterus by facility level

Level 1	Level 2
Immediately perform the steps of the PPH care bundle. All bundle treatment interventions should ideally be initiated within the first 15 minutes after a diagnosis of PPH. • Perform uterine massage. • Use uterotonic drugs, TXA. • Start IV fluids and manage shock. Check for tears of the perineum, vagina, cervix. Check placenta for completeness. If there are signs of retained placental tissue, remove them. If bleeding continues/or the uterus remains atonic, administer alternative uterotonic drugs as available and a second dose of TXA (see Section 4.3.9.1 and Table 4.3.3). If bleeding still continues, proceed to temporizing measures without delay – bimanual uterine compression/external aortic compression/use of a NASG – based on availability and skills. Refer for further management without delay if bleeding is still uncontrolled, the woman is haemodynamically unstable or if blood transfusion is needed. Continue temporizing measures and administration of IV fluids and oxytocin drip during transfer.	In addition to actions listed under Level 1, do the following. Uterine balloon tamponade can be used as a temporizing measure provided the following conditions are met. • Immediate recourse to surgical management and access to blood products is possible if needed. • A primary PPH first-line treatment protocol (use of uterotonic drugs, IV fluids and TXA) has been implemented. • Other causes of PPH (retained tissue, trauma) have been reasonably excluded. • The procedure is performed by trained personnel skilled in the management of PPH, including use of uterine balloon tamponade. • Maternal condition can be monitored for prompt identification of any deterioration. If bleeding continues in spite of uterotonics, uterine massage and temporizing measures, proceed to surgical management without delay.

IV: intravenous; NASG: non-pneumatic anti-shock garment; PPH: postpartum haemorrhage; TXA: tranexamic acid.

4.3.9.1 Uterine massage and medicines

An atonic uterus fails to contract after childbirth.

- Continue to massage the uterus.
- Use uterotonic drugs (see Table 4.3.3).
  - IV oxytocin is the uterotonic drug of choice for the treatment of PPH.
  - If IV oxytocin is unavailable, or if the bleeding does not respond to oxytocin, use IV (or IM) ergometrine, oxytocin-ergometrine fixed dose, or a prostaglandin (including misoprostol).
  - Administer TXA in all cases of PPH as soon as possible, and within 3 hours of childbirth. Administration beyond 3 hours does not seem to offer clinical benefit. Repeat the dose if bleeding persists 30 minutes after administration of the first dose or if bleeding restarts after 24 hours.
- If bleeding continues:
  - check placenta again for completeness;
  - if there are signs of retained placental fragments (absence of a portion of maternal surface or torn membranes with vessels), remove remaining placental tissue;
  - assess clotting status using a bedside clotting test; failure of a clot to form after 7 minutes suggests coagulopathy.

Table 4.3.3 Use of medicines in the management of postpartum haemorrhage

Medicine	Dose and route[a]	Continuing dose[a]	Maximum dose	Precautions and contraindications
Oxytocin (To be refrigerated)	IV: infuse 10 IU in 500 ml crystalloid fluids, at fastest flow rate possible Caution: be vigilant in the amount of fluid infused in a woman with pre-eclampsia IM: 10 IU	IV: infuse 20 IU in 1 L IV fluids at 40 drops per minute over 4 hours	60 IU in 24 hours, not more than 3 L of IV fluids containing oxytocin	IV bolus oxytocin can cause hypotension and should be given with caution and slowly. Do not give > 10 IU diluted and given slowly as an IV bolus.
Ergometrine/ methylergometrine (To be refrigerated and protected from light)	IM or IV (slowly): 0.2 mg	If required, give 0.2 mg IM or IV (slowly) every 4 hours	5 doses in 24 hours (total 1.0 mg)	High blood pressure, pre-eclampsia, heart disease, retained placenta
15-methyl prostaglandin F2 alpha (To be refrigerated)	IM: 0.25 mg	0.25 mg every 15 minutes	8 doses (total 2 mg)	Asthma Do not give IV
Misoprostol PGE1	Sublingual or rectal: 800 µg	Repeat 200 – 800 µg sublingual or rectal	Not more than 1600 µg	
TXA	IV (slowly over 10 minutes): 1 g in 10 ml (within 3 hours)	Repeat after 30 minutes if bleeding continues, or if bleeding restarts within 24 hours of completing first dose	2 doses, 2 g in total	History of coagulopathy or active intravascular clotting, convulsions

IM: intramuscular; IV: intravenous; TXA: tranexamic acid.

a Drip rate calculated using a giving set of 20 drops/ml.

Prostaglandins should not be given intravenously. They can be fatal.

4.3.9.2 Temporizing measures

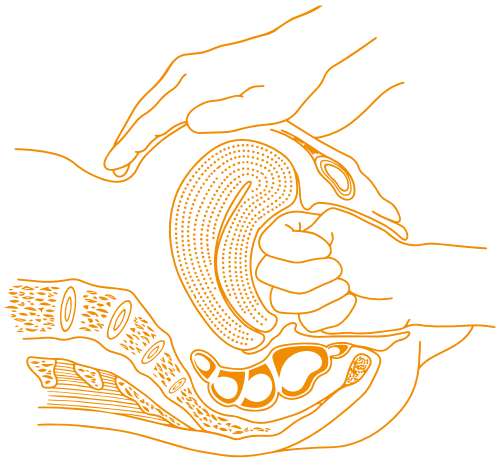
Temporizing measures are used to stabilize the woman haemodynamically while waiting for response to uterotonics, definitive surgical treatment, blood transfusion or transfer to higher levels of care.

4.3.9.2.a Procedure: bimanual uterine compression

If bleeding continues in spite of management as above, perform bimanual compression of the uterus until appropriate care is available (see Fig. 4.3.2).

- Wearing sterile gloves, insert a hand into the vagina and remove any blood clots from the lower part of the uterus or cervix.
- Form a fist and place the fist into the anterior fornix and apply pressure against the anterior wall of the uterus.
- With the other hand, press deeply into the abdomen behind the uterus, applying pressure against the posterior wall of the uterus such that the uterus is compressed between the two hands.
- Maintain compression until bleeding is controlled and the uterus contracts.

Fig. 4.3.2 Bimanual compression of the uterus

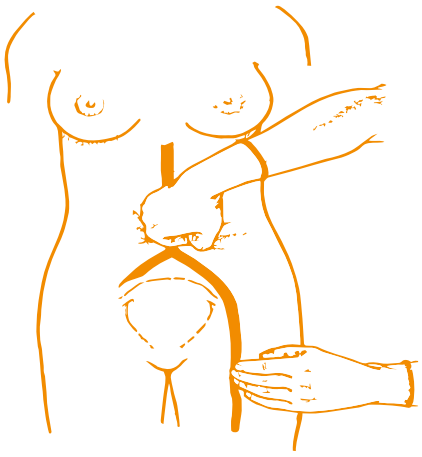


4.3.9.2.b Procedure: external aortic compression

Compress the aorta (see Fig. 4.3.3) as a temporizing measure until appropriate care is available.

- Apply downward pressure with a closed fist over the abdominal aorta directly through the abdominal wall.
- The point of compression is just above the umbilicus and slightly to the left.
- Aortic pulsations can be felt easily through the anterior abdominal wall in the immediate postpartum period.
- With the other hand, palpate the femoral pulse to check the adequacy of compression.
  - If the pulse is palpable during compression, the pressure exerted by the fist is inadequate.
  - If the femoral pulse is not palpable, the pressure exerted is adequate.
- Maintain compression until bleeding is controlled or alternative measures can be taken.

Fig. 4.3.3 Compression of abdominal aorta and palpation of femoral pulse



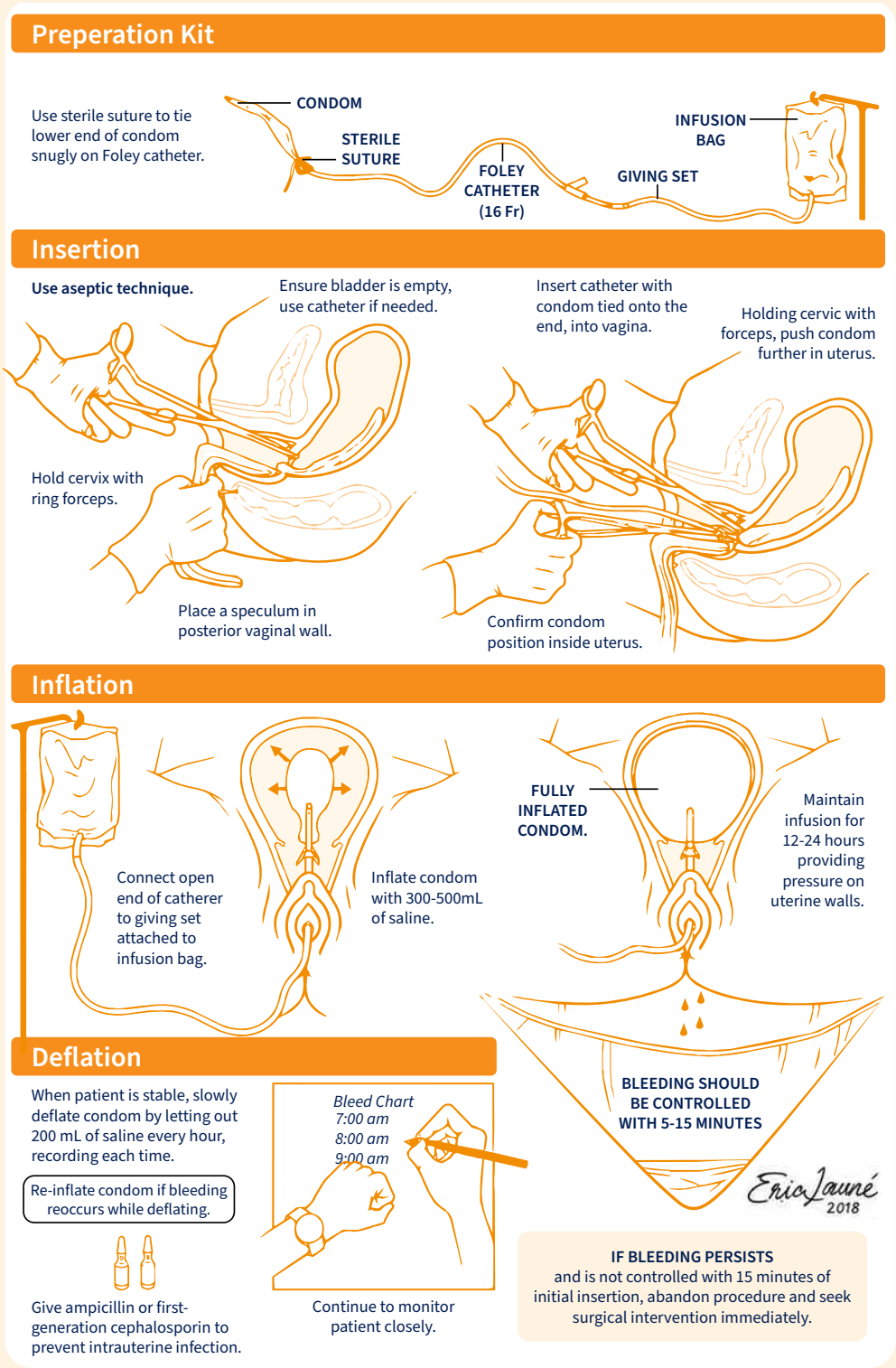
Packing the uterus is ineffective, wastes precious time and is potentially harmful.

4.3.9.2.c Procedure: uterine balloon tamponade

In the absence of adequate uterine contraction, the placental bed may continue to bleed. Applying pressure to this area may help to reduce blood loss.

Uterine balloon tamponade uses the pressure exerted by a balloon catheter (or low-cost adaptations like a condom inflated with saline) to reduce the bleeding from the placental bed after vaginal birth or during a caesarean section (see Fig. 4.3.4).

Fig. 4.3.4 Intrauterine balloon tamponade



Indications

If bleeding continues in spite of initial medical management, perform uterine balloon tamponade, provided the following conditions are met.

- Immediate recourse to surgical management and access to blood products is possible if needed.
- A primary PPH first-line treatment protocol (use of uterotonics, IV fluids and TXA) has been implemented.
- Other causes of PPH (e.g. retained tissue, trauma) have been reasonably excluded.
- The procedure is performed by trained personnel skilled in the management of PPH including use of uterine balloon tamponade.
- Maternal condition can be monitored for prompt identification of any deterioration.
- When a balloon catheter designed specifically for treatment of PPH is not available, low-cost adaptations such as a condom balloon tamponade can function as a substitute (see Fig. 4.3.4).

Preparation

Before performing the procedure for uterine balloon tamponade:

- provide emotional support and encouragement; if feasible, ensure a companion of her choice is available to the woman;
- insert an indwelling Foley catheter into the bladder;
- ensure other treatment modalities for primary PPH have been administered; these include uterotonics, TXA and IV fluids;
- ensure other causes of PPH such as retained placenta and trauma have been excluded.

Pain relief

No specific measures of pain relief are needed. Provide emotional support to the woman.

For more information, see Section 5.2 Pain relief for procedures.

Preventing infection

A single dose of antibiotics (ampicillin or first-generation cephalosporin) is recommended:

- ampicillin 2 g IV OR
- cefazolin 1 g IV.

Procedure

1. Apply the principles of respectful care and principles of clinical care. Provide information to the woman and her family, ensuring that the woman has a companion of her choice, adhering to infection prevention and control measures and providing emotional support as required.
2. Apply antiseptic solution to the perineal area and vagina.
3. Prior to commencing procedure, secure a condom to the end of a Foley catheter.
4. Perform a vaginal examination to identify the cervix.
5. Gently insert a high-level disinfected or sterile speculum into the vagina.
6. Gently grasp the anterior lip of the cervix with a ring or sponge forceps. Note: a ring or sponge forceps is preferable, as it is less likely than the tenaculum to tear the cervix.
7. Hold the catheter with a high-level disinfected or sterile forceps and gently introduce it through the cervix. Ensure that the inflatable bulb or catheter is beyond the internal cervical os.
8. Alternately, the catheter can also be introduced through the cervix by feel.
9. Once the balloon end has been placed in the uterine cavity, inflate the condom with 300–500 ml of warm saline solution.
10. Inflate the condom until it is visible in the cervix. Beware of overfilling the balloon as this might cause the balloon to bulge out of the cervix and be expelled.
11. If there is no bleeding through the cervix, the tamponade test is positive. No further fluid is added and further surgery is not required at this stage.
12. If bleeding continues, consider surgical interventions.
13. Pack the upper vagina with roller gauze to prevent expulsion of the balloon.
14. Palpate the uterine fundus abdominally and mark with a pen. Note: this mark is used as a reference line from which any uterine enlargement or distension would be noted during the period of observation.

Post-procedure care

- Give oxytocin 20 units in 1 L IV fluids (NS or RL) at 60 drops per minute.
- Monitor vital signs, uterine fundal height and vaginal bleeding.
- Monitor urine output every hour.

Deflating the balloon

- After 6–24 hours, if the uterus fundus remains at the same level and there is no active vaginal bleeding, deflate the balloon 50–100 ml every hour as long as there is no further bleeding at each interval.
- If there is no further vaginal bleeding 30 minutes after the balloon is totally deflated, remove the balloon and stop the oxytocin.
- If the woman starts to bleed when the balloon is deflated or the oxytocin has stopped, reinflate the balloon and recommence the oxytocin infusion; prepare for surgical interventions when her condition becomes stable.
- Remove the urinary catheter once the woman is stable.

4.3.9.2.d Procedure: non-pneumatic anti-shock garments

If available, apply an NASG as a temporizing measure while managing PPH until substantive care is available. An NASG applies pressure to the lower body and abdomen, thereby stabilizing vital signs and resolving hypovolaemic shock. In addition, it may be useful in other conditions where there is haemodynamic instability due to bleeding from the pelvis (e.g. ruptured ectopic pregnancy, post-abortion haemorrhage, ruptured uterus).

The NASG can be applied rapidly and may be done prior to the other compressive measures. Bimanual compression and balloon tamponade can be performed with the NASG in place. Doing it early can also maintain perfusion so that an IV can more easily be started on women in shock with collapsed veins.

Follow these manufacturer's instructions to apply and remove the NASG.

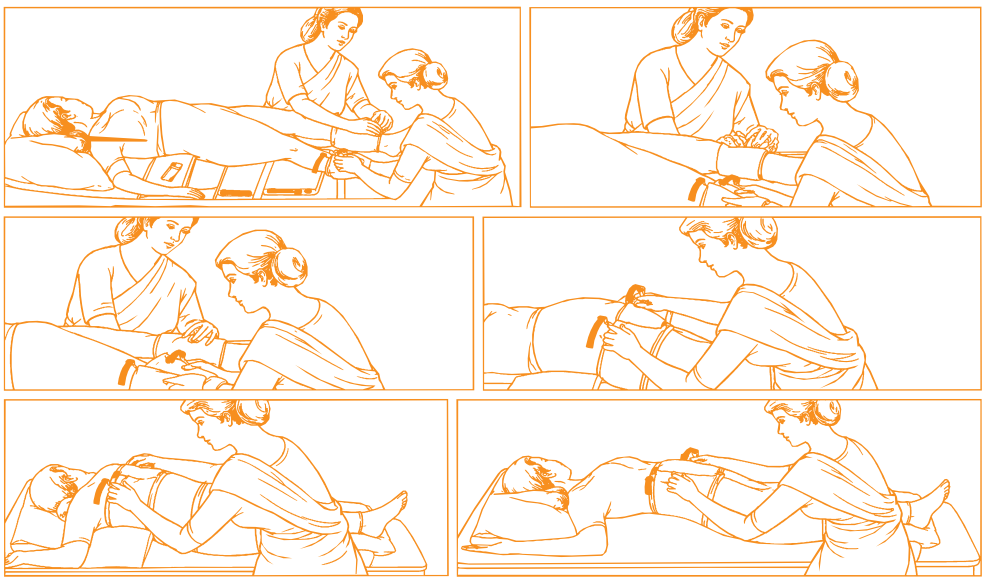
Instructions for application

1. Place the NASG under the woman, with the top edge at the level of her lowest rib.
2. Close segments 1 tightly around the ankles; check for snap sound.
3. Close segments 2 tightly around each calf; check for snap sound; leave the knee free so that the leg can bend.
4. Close segments 3 tightly around each thigh; check for snap sound; leave the knee free so that the leg can bend.
5. Close segment 4 around the pelvis with the lower edge at the level of the pubic bone.
6. Close segment 5 with the pressure ball over the umbilicus.
7. Finish closing the NASG using segment 6.

- Segments 1, 2 and 3 can be applied by one person alone or two persons simultaneously.
- Segments 4, 5 and 6 should only be applied by one person.
- Ask the woman to take a deep breath and make sure the woman can breathe normally with segment 6 in place.

See Fig. 4.3.5.

Fig. 4.3.5 Non-pneumatic anti-shock garment



1. Only remove the NASG when the woman has been stable for 2 hours (bleeding < 50 ml per hour; pulse < 100 bpm; blood pressure > 90/60 mmHg).
2. The NASG should only be removed by health workers who have been trained to do so.
3. Take pulse and blood pressure. Confirm that both are stable. Simultaneously remove segments 1 from around both ankles. Wait 15 minutes. Take pulse and blood pressure. If no change, move on to step 4.
4. Simultaneously remove segments 2 from around both calves. Wait 15 minutes. Take pulse and blood pressure. If no change, move on to step 5.
5. Simultaneously remove segments 3 from around both thighs. Wait 15 minutes. Take pulse and blood pressure. If no change, move on to step 6.
6. Remove segment 4 from around the pelvis. Wait 15 minutes. Take pulse and blood pressure. If no change, move on to step 7.
7. Simultaneously remove segments 5 and 6 from around the abdomen. Wait 15 minutes before allowing the woman to sit up.

Caution: if blood pressure falls by 20 mm Hg or pulse increases by 20 bpm after any segment is removed, rapidly replace all segments in any order and consider the need for more saline or blood transfusion.

4.3.9.3 Procedure: surgical interventions in the treatment of postpartum haemorrhage

- If bleeding does not stop in spite of treatment with uterotonic drugs, other available conservative interventions (e.g. uterine massage, balloon tamponade), and external or internal pressure on the uterus, surgical interventions should be initiated.
- Conservative approaches should be tried first, followed – if these are not successful – by more invasive procedures. For example, compression sutures may be attempted first; if that intervention fails, uterine or utero-ovarian ligation can be tried.
- If life-threatening bleeding continues even after ligation, subtotal (also called supracervical) or total hysterectomy should be performed.
- If other measures have failed and if the necessary resources are available, the use of uterine artery embolization is recommended as a treatment for PPH due to uterine atony. This is a highly specialized procedure that requires the availability of interventional radiology services, including trained personnel, appropriate imaging equipment and around-the-clock access. This limits its use to well-resourced, typically Level 3 facilities.

4.3.9.3.a Indications

- In cases of atonic PPH following vaginal birth where the uterus continues to be atonic despite management with uterotonics.
- In cases of atonic PPH following caesarean section where the uterus continues to be atonic despite management with uterotonics.
- Uterine and utero-ovarian artery ligation can also be used in cases of placenta praevia, both before birth of the placenta and after, to reduce bleeding from the placental bed.

4.3.9.3.b Indications for referral

- No expertise to perform the procedure.
- Lack of capacity to perform laparotomy, including lack of operation theatre facilities or anaesthetists.
- Inability to transfuse blood

4.3.9.3.c Preparation

- Apply the principles of respectful care, including providing emotional support and
- Encouragement to the woman. Where feasible, ensure that the woman has a support person of her choice with her while she is being cared for.
- Apply the principles of clinical care and surgical care.
- Start an IV infusion if one is not already running.
- Manage PPH appropriately, including administering uterotonics and TXA, and IV fluids as required.
- Apply temporizing measures such as bimanual uterine compression, NASG or external aortic compression. NASG can remain in place during surgery – open only the 5/6 segments immediately before the first incision and close after the surgery.
- Explain to the woman and her support person what you are about to do, in simple terms, and obtain consent. Explain that if bleeding is not controlled with conservative surgeries, hysterectomy may be needed.

4.3.9.3.d Pain relief

Since this procedure is usually done in a woman who is bleeding excessively and may be in shock, general anaesthesia is preferred.

4.3.9.3.e Preventing infection

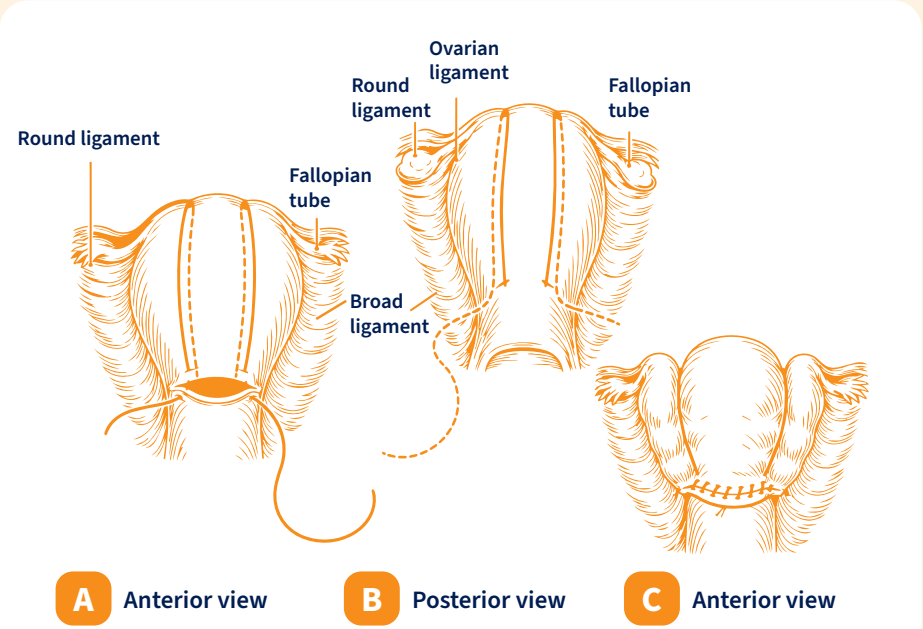
Give a single dose of prophylactic antibiotics:

- ampicillin 2 g IV
- OR cefazolin 1 g IV.

4.3.9.3.f Procedure for uterine compression sutures – B-Lynch sutures

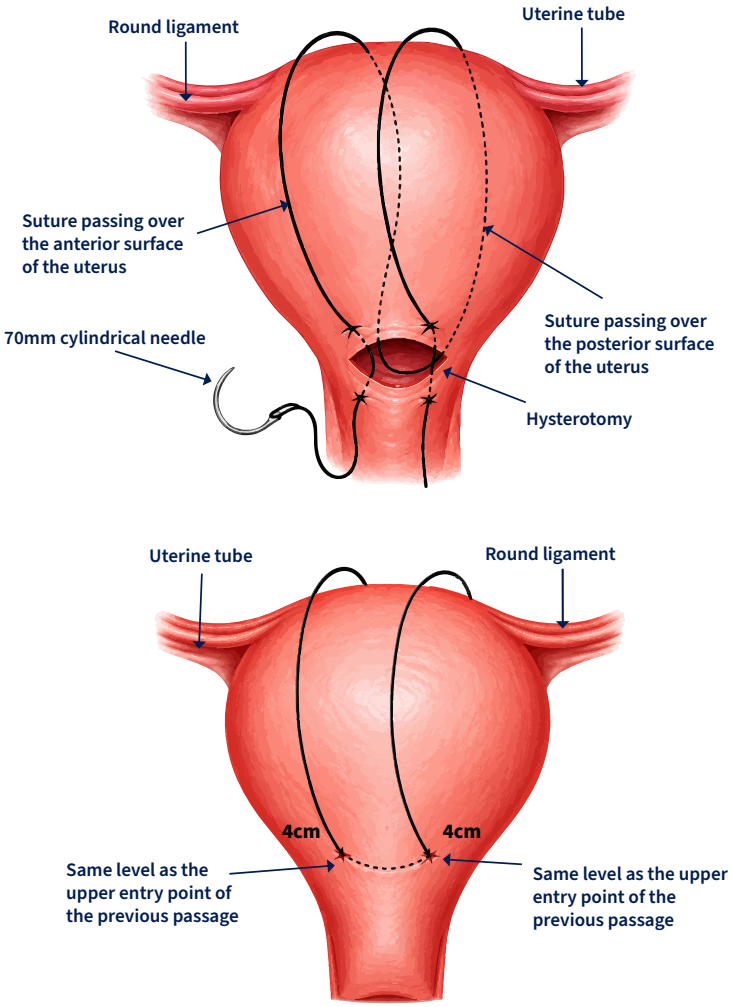
In the absence of adequate uterine contraction, the placental bed may continue to bleed. Applying pressure to this area may help to reduce blood loss. Compression sutures compress the uterine cavity thereby reducing bleeding from the placental bed (see Fig. 4.3.6).

Fig. 4.3.6 Uterine compression sutures



1. Apply principles of clinical care and surgical care.
2. Ensure that an IV infusion is in place with 20 IU of oxytocin in 1 L of NS at 40 drops per minute (0.04 IU/minute or 2 ml/minute)
3. Open the abdomen; reflect the uterovesical fold.
4. Lift the uterus out of the pelvis and apply pressure on it between two hands.
5. To ensure that the uterus remains exteriorized and compressed throughout the procedure, an assistant should compress the uterus with both hands. Note: if vaginal bleeding stops with the compression between the hands, there is a good chance that the compression suture will be successful.
6. Using a 36-inch long 0 or 1 polyglycolic (or chromic catgut) suture with round- bodied needle, apply the following sutures.
    a. Place the first stitch in the lower segment of the uterus, approximately 3 cm from the edge of the right border and 3 cm below the level where the peritoneum was opened. Thread the suture through the uterine cavity to emerge 4 cm above the insertion point and 4 cm from the edge of the right border. Note: the needle should not completely penetrate the entire thickness of the wall of the uterine cavity.
    b. Loop the suture over the fundus and re-enter the right lower uterine segment through the posterior wall, symmetrical to that on the front wall.
    c. Cross the suture to the other side of the lower uterine segment and exit through the left posterior wall.
    d. Loop the suture back over the fundus to enter the left anterior lower uterine segment opposite and parallel to the initial stitches. This creates sutures that act like “suspenders” over the top of the uterus.
    e. Pull the free end tightly and ask the assistant to compress the uterus so that the sutures can be tightened snugly over the uterus. Tie down securely to compress the uterus.
    f. If bleeding has stopped, close the abdomen (see Fig. 4.3.7).

Fig. 4.3.7 B-Lynch suture technique



Source: Osanan, Charry & Alves 2021.

4.3.9.3.g Procedure for uterine or utero-ovarian artery ligation

These conservative surgical measures can also be tried alone or together with compression sutures if bleeding is not resolved with uterotonic drugs, massage and balloon tamponade.

Uterine and utero-ovarian artery ligation are conservative surgical procedures which can be done as an alternative to hysterectomy, thus preserving fertility and avoiding the morbidity resulting from hysterectomy.

The ligation of the vessels supplying the uterus reduces the perfusion pressure to the uterus, thus reducing the bleeding – these techniques do not treat the cause of PPH but reduce the bleeding while waiting for definitive management to take effect.

1. Open the abdomen through a midline vertical incision.
    a. Make a midline vertical incision below the umbilicus to the pubic hair, through the skin and to the level of the fascia.
    b. Make a 2–3 cm vertical incision in the fascia.
    c. Hold the fascial edge with forceps and lengthen the incision up and down using scissors.
    d. Use fingers or scissors to separate the rectus muscles (abdominal wall muscles).
    e. Use fingers to make an opening in the peritoneum near the umbilicus. Use scissors to lengthen the incision up and down in order to see the entire uterus. Carefully, to prevent bladder injury, use scissors to separate layers and open the lower part of the peritoneum.
    f. Place a bladder retractor over the pubic bone and place self-retaining abdominal retractors.
    g. Note: if she has had a caesarean section and the abdomen is already closed, reopen the abdomen through the same incision used for the caesarean section.
2. Exteriorize the uterus carefully.
3. Perform careful and sharp dissection of bladder to push the ureters down.
4. Palpate the uterine artery at the base of the broad ligament, near the junction of the uterus and cervix.
5. Introduce an index finger behind the broad ligament and identify an avascular space in the broad ligament. Take a stitch with 0 chromic catgut or 0 polyglycolic acid suture through this avascular window and include the vascular bundle and a 2–3 cm bite of myometrium at the level of the lower uterine segment. Tie the suture securely. Be careful to stay as close to the uterus as possible to avoid including the ureter in the stitch. The ureter is generally only 1 cm lateral to the uterine artery (see Fig. 4.3.8).
6. Repeat the procedure on the other side.
7. If bleeding persists, double ligation of the uterine artery can be done slightly at a lower level than the previous stich on both sides. It should be tied as close to the uterus as possible as the ureter lies close to the uterine artery here.
8. To ligate the utero-ovarian anastomosis, identify an avascular space in the broad ligament at the level of the ovarian suspensory ligament. Take a stitch along with some myometrium just below the point where the ovarian suspensory ligament joins the uterus and tie it (see Fig. 4.3.8).
9. Repeat on the other side.
10. Observe for bleeding or haematoma formation.
11. If the artery has been torn, clamp and tie the bleeding ends.
12. Ensure that there is no bleeding. Remove clots using a sponge.
13. Examine carefully for injuries to the bladder and repair any found.
14. Close the abdomen.
    a. Close the fascia with continuous polyglycolic suture.
    b. Note: there is no need to close the bladder peritoneum or the abdominal peritoneum.
    c. If there are no signs of infection, close the skin with vertical mattress sutures of 3–0 nylon (or silk) and apply a sterile dressing.
    d. If there are signs of infection, pack the subcutaneous tissue with gauze and place loose 0 catgut (or polyglycolic) sutures. Close the skin with a delayed closure after the infection has cleared.

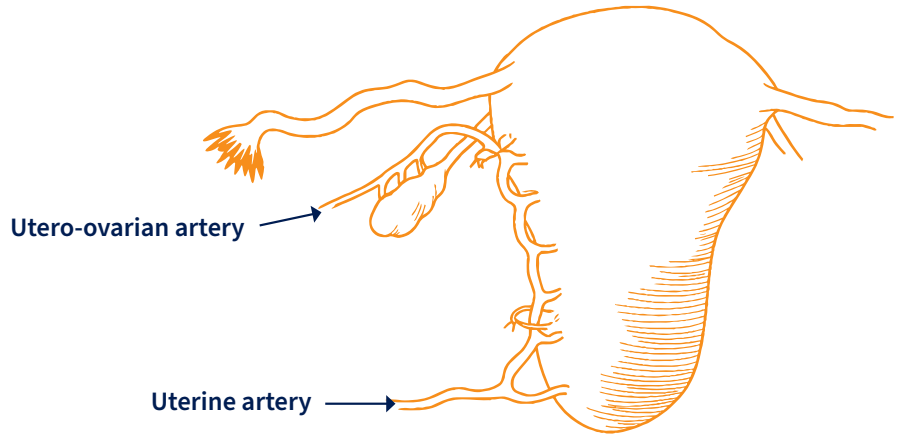
4.3.9.3.h Challenges and complications

- If the uterine artery has been torn, clamp and tie the bleeding ends.
- The most important step in the procedure is to dissect and push the bladder down so that the ureters are not tied inadvertently.
- Postoperatively, monitor urine output. If there is blood in the urine or the woman has loin pain (i.e. pain in the sides between the lower ribs and pelvis, and/or in the lower part of the back), refer the woman to a Level 3 centre, if possible. These signs and symptoms may suggest an obstructed ureter which needs to be addressed urgently.

4.3.9.3.i Post-procedure care

- Apply postoperative and general care principles.
- If there are signs of infection or the woman currently has a fever, give a combination of antibiotics until she is fever-free for 48 hours:
- clindamycin phosphate 600 mg IV every 8 hours
- PLUS, gentamicin 5 mg/kg body weight IV every 24 hours.
- Give appropriate analgesics.
- Check for anaemia postoperatively and treat with oral or IV iron as per local protocols.
- Reassure the woman that the uterus will continue to receive blood supply from other blood vessels even though the uterine arteries have been ligated or compression sutures have been applied. There will be no effect on future fertility or future pregnancies.

Fig. 4.3.8 Sites for ligating uterine and utero-ovarian arteries



4.3.9.4 Procedure: postpartum hysterectomy

Postpartum hysterectomy can be subtotal (supracervical) unless the cervix and lower uterine segment are involved. Total hysterectomy may be necessary in the case of a tear of the lower segment that extends into the cervix or bleeding after placenta praevia.

4.3.9.4.a Indications

- Ruptured uterus where repair is not possible
- Severe atonic PPH where all other management fails
- Placenta accrete spectrum

4.3.9.4.b Preparation

- Apply principles of clinical care and surgical care.
- Start an IV infusion and manage shock.
- In clear and simple language, explain to the woman and her family the clinical condition, the treatment planned and the prognosis. Explain why removal of the uterus is needed and that not doing so may endanger her life. Explain the need for immediate laparotomy, the possibility of hysterectomy if the tear is not amenable to repair (in case of ruptured uterus), or if bleeding cannot be controlled by more conservative measures. Explain its implications for future childbearing. Provide details regarding the condition of the fetus (if not yet birthed) and its prognosis. Obtain the woman's consent for surgery.
- Where feasible, ensure that a trusted person of her choice is present to provide emotional support.

4.3.9.4.c Pain relief

General anaesthesia is preferred as it is quick and does not cause further hypotension.

4.3.9.4.d Preventing infection

Give a single dose of prophylactic antibiotics:

- cefazolin 2 g IV.

4.3.9.4.e Procedure

If there is uncontrollable haemorrhage following vaginal birth or ruptured uterus, keep in mind that speed is essential.

1. Open the abdomen through a vertical incision (preferred because it is quick and offers better exposure).
    a. Make a midline vertical incision below the umbilicus to the pubic hair, through the skin and to the level of the fascia.
    b. Make a 2–3 cm vertical incision in the fascia.
    c. Hold the fascial edge with forceps and lengthen the incision up and down using scissors.
    d. Use fingers or scissors to separate the rectus muscles (abdominal wall muscles).
    e. Use fingers to make an opening in the peritoneum near the umbilicus. Use scissors to lengthen the incision up and down in order to see the entire uterus. Carefully, to prevent bladder injury, use scissors to separate layers and open the lower part of the peritoneum.
    f. Examine the abdomen and the uterus for the site of rupture and remove clots.
    g. Place a bladder retractor over the pubic bone and place self-retaining abdominal retractors.
2. If the birth was by caesarean, clamp the sites of bleeding along the uterine incision.
    a. In case of massive bleeding, have an assistant press their fingers over the aorta in the lower abdomen. This will reduce intraperitoneal bleeding.
    b. Extend the skin incision, if needed.

Subtotal (supracervical) hysterectomy

3. Lift the uterus out of the abdomen and gently pull to maintain traction.
4. Doubly clamp the round ligaments and cut with scissors. Clamp and cut the pedicles, but ligate after the uterine arteries are secured to save time.
5. From the edge of the cut round ligament, open the anterior leaf of the broad ligament. Incise to:
    a. the point where the bladder peritoneum is reflected onto the lower uterine surface in the midline; or
    b. the point where the peritoneal incision was made for the current or a previous caesarean.

6. Use two fingers to push the posterior leaf of the broad ligament forward, just under the fallopian tube and ovary, near the uterine edge. Make a hole the size of a finger in the broad ligament, using scissors. Doubly clamp and cut the tube, the ovarian ligament and the broad ligament through the hole in the broad ligament.
7. The ureters are close to the uterine vessels. The ureter must be identified and exposed to avoid injuring it during surgery or including it in a stitch.
8. Divide the posterior leaf of the broad ligament downwards towards the uterosacral ligaments, using scissors.
9. Grasp the edge of the bladder flap with forceps or a small clamp. Using fingers or scissors, dissect the bladder downwards off of the lower uterine segment. Direct the pressure downwards but inwards towards the cervix and the lower uterine segment.
10. Reposition the bladder retractor and retract the bladder inferiorly.
11. Locate the uterine artery and vein on each side of the uterus. Feel for the junction of the uterus and cervix.
12. Doubly clamp across the uterine vessels at a 90-degree angle on each side of the cervix. Cut and doubly ligate with 0 polyglycolic (or chromic catgut) suture.
13. Observe carefully for any further bleeding. If the uterine arteries are ligated correctly, bleeding should stop and the uterus should look pale.
14. Return to the clamped pedicles of the round ligaments and tubo-ovarian ligaments and ligate them with 0 polyglycolic (or chromic catgut) suture.
15. Amputate the uterus above the level where the uterine arteries are ligated, using scissors.
16. Close the cervical stump with interrupted 2–0 or 3–0 polyglycolic (or chromic catgut) sutures.
17. Carefully inspect the cervical stump, leaves of the broad ligament and other pelvic floor structures for any bleeding.
18. In all cases, check for injury to the bladder. If a bladder injury is identified, repair the injury.
19. If slight bleeding persists or a clotting disorder is suspected, place a drain through the abdominal wall. Do not place a drain through the cervical stump, as this can cause postoperative infection.
20. Close the abdomen.
    a. Ensure that there is no bleeding. Remove clots using a sponge.
    b. Close the fascia with continuous 0 polyglycolic (or chromic catgut) suture.
    c. Note: there is no need to close the bladder peritoneum or the abdominal peritoneum.
    d. If there are signs of infection, pack the subcutaneous tissue with gauze and place loose 0 polyglycolic (or catgut) sutures. Close the skin with a delayed closure after the infection has cleared.
21. If there are no signs of infection, close the skin with vertical mattress sutures of 3–0 nylon (or silk) and apply a sterile dressing.

See Figures 4.3.9–4.3.12.

Fig. 4.3.9 Dividing the round ligaments

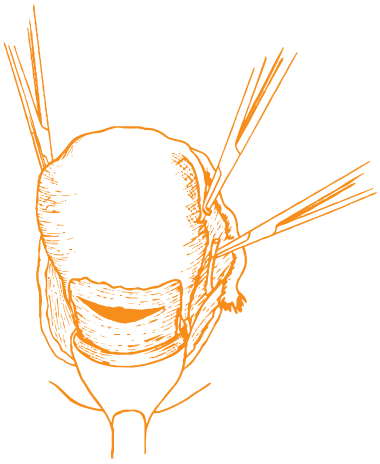


Fig. 4.3.10 Dividing the tube and ovarian ligaments

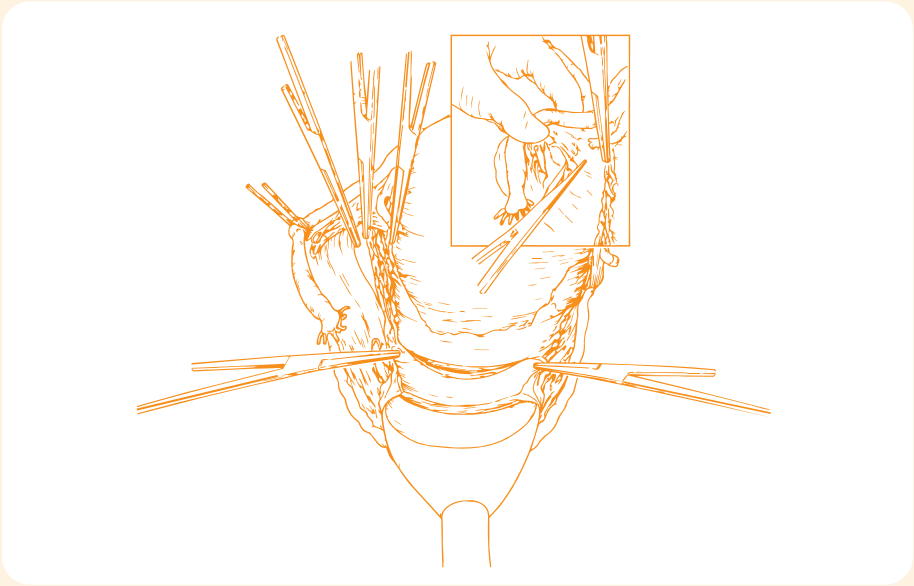


Fig. 4.3.11 Dividing the uterine vessels

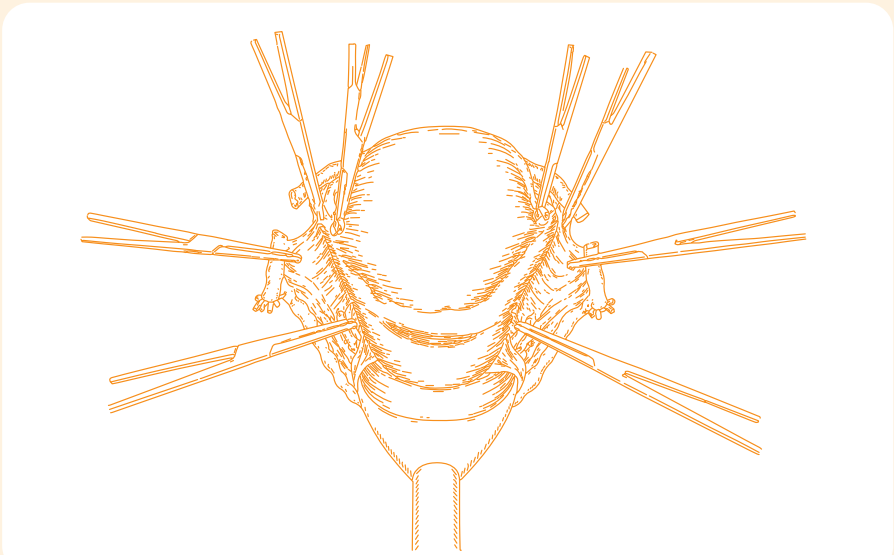
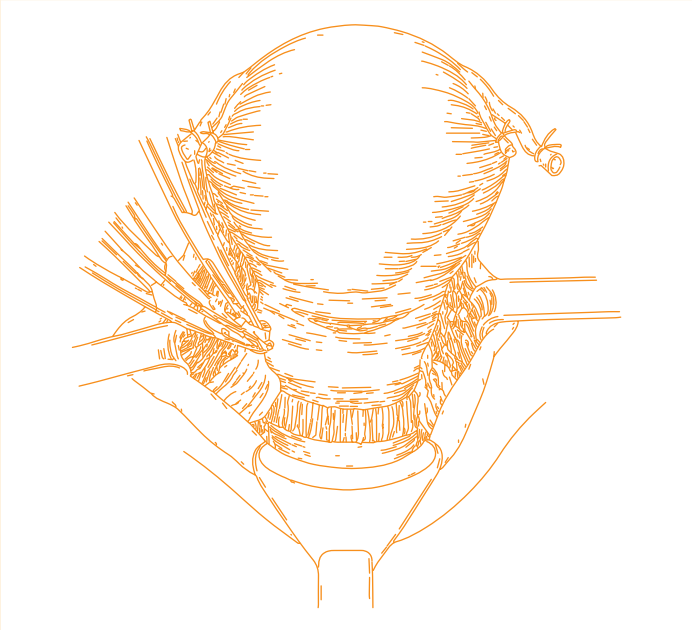


Fig. 4.3.12 Line of amputation



Total hysterectomy

The following additional steps are required for total hysterectomy.

1. Push the bladder down to free the top 2 cm of the vagina.
2. Open the posterior leaf of the broad ligament.
3. Clamp, ligate and cut the uterosacral ligaments.
4. Clamp, ligate and cut the cardinal ligaments, which contain the descending branches of the uterine vessels. This is the critical step in the operation.
    a. Grasp the ligament vertically with a large-toothed clamp (e.g. Kocher). Place the clamp 5 mm lateral to the cervix and cut the ligament close to the cervix, leaving a stump medial to the clamp for safety.
    b. If the cervix is long, repeat the above step two or three times as needed.
    c. The upper 2 cm of the vagina should now be free of attachments.
5. Clamp and transect the vagina as near to the cervix as possible, clamping bleeding points as they appear.
6. Place haemostatic angle sutures, to include round, cardinal and uterosacral ligaments.
7. Place continuous sutures on the vaginal cuff to stop haemorrhage.
8. Close the abdomen (see the final bullet in the previous list entitled “Subtotal (supracervical) hysterectomy”) after placing a drain in the extraperitoneal space near the stump of the cervix.

4.3.9.4.f Post-procedure care

- Apply postoperative care principles.
- Monitor urine output. If there is blood in the urine or the woman has loin pain (i.e. pain in the sides between the lower ribs and pelvis and/or in the lower part of the back), refer the woman to a Level 3 facility, if possible, for treatment of an obstructed ureter.
- If there are signs of infection or the woman currently has a fever, give a combination of antibiotics until she is fever-free for 48 hours:
    - clindamycin phosphate 600 mg IV every 8 hours
    - PLUS gentamicin 5 mg/kg body weight IV every 24 hours.
- Give appropriate analgesics.
- If there are no signs of infection, remove the abdominal drain after 48 hours.
- Refer her to other health services including mental health support, if needed.

4.3.10 Specific management of tears of cervix, vagina or perineum

Tears of the birth canal are the second most frequent cause of PPH. Tears may coexist with atonic uterus. Postpartum bleeding with a contracted uterus is usually due to a cervical or vaginal tear (see Table 4.3.4).

4.3.10.1 Repair of vaginal and perineal tears

Because all women who give birth vaginally are at risk of genital tract tears, a routine inspection of the vagina and perineum should be conducted for all women immediately after vaginal birth. An unrepaired laceration can lead to haemorrhage, anaemia, abscess formation, wound breakdown, anal incontinence and/or rectovaginal fistula. These consequences of unrepaired or poorly repaired tears can affect women not only physically but also psychologically.

Table 4.3.4 Specific management of tears by facility level

Level 1	Level 2
If you suspect PPH to be due to trauma, examine the perineum, vagina and cervix carefully for tears. **For perineal tears:** • examine the tear and the degree; • if third- or fourth-degree tears (involving the anal sphincter or anal/rectal mucosa), and no one in your facility has the skills for repair, refer the woman to a higher level of care; • for other tears, apply pressure over the tear with a sterile pad or gauze and put legs together; check after 5 minutes; if still bleeding, suture the tear. **For cervical tears:** • suture the tear if you have the facilities and skills to do so; • if not, refer the woman to a higher level of care; continue external aortic compression or NASG during transport. If bleeding continues, assess clotting status using a bedside clotting test. Failure of a clot to form after 7 minutes suggests coagulopathy. She will need blood products to control haemorrhage. Refer to a higher level of care where blood and blood products are available.	In addition to actions listed under Level 1, do the following: • examine the woman carefully and repair tears to the cervix or vagina and perineum.

NASG: non-pneumatic anti-shock garment; PPH: postpartum haemorrhage.

4.3.10.1.a Procedure: examination and classification of tears

Indication

- Carry out an examination for vaginal and perineal tears systematically after every birth to determine if there has been a tear.
- In case of a second-degree perineal tear, perform a digital rectal exam to rule out a third- or fourth-degree tear.
- In cases of assisted vaginal birth (forceps or vacuum-assisted birth) or if there is excessive bleeding after birth, examine the cervix too.
- Once a laceration is identified, it must be determined how extensive it is in order to repair it adequately.
- There are four degrees of perineal tears that can occur during a vaginal birth.
    - First-degree tears involve the vaginal mucosa and connective tissue.
    - Second-degree tears involve the vaginal mucosa, connective tissue and underlying muscles.
    - Third-degree tears involve complete transection of the anal sphincter.
    - Fourth-degree tears involve the rectal mucosa.

Preparation

- Explain to the woman what you are about to do and obtain her verbal consent.
- Ensure good lighting.
- Ensure that the woman is in a suitable position to enable visualization of the entire genital tract.
- If bleeding from the uterus is obstructing a clear view, a vaginal pack can be used above the tear, both while examining and while repairing. However, always remember to remove the pack at the end of the procedure. Tag the pack with a forceps clamped at its end and left outside the vagina to ensure that it is not forgotten inside. Alternatively, NASG can be applied to decrease bleeding from the uterus during repair.

Procedure

1. Visually assess the extent of perineal trauma to include the structures involved, the apex of the injury and any bleeding.
2. Use instruments or gauze pads to assist with visualization to ensure that you see the apex of any tear or laceration.
3. If the tear is long and deep through the perineum, inspect it to be sure that there is no third- or fourth-degree tear.
    a. Place a gloved finger in the anus.
    b. Gently lift the finger and identify the sphincter, or lack of it.
    c. Feel for the tone or tightness of the sphincter.

- Note: the sphincter may be lax if the woman is under regional analgesia.

    d. Feel the surface of the rectum and look carefully for protrusion of the finger into the vagina, which shows a tear.
    e. Change gloves after the rectal exam, carefully wash and dry hands and put on a new pair of sterile gloves to repair any identified tears. An alternative option would be to double-glove for the rectal exam or put an extra finger of a glove on the gloved finger that is in the rectum and then remove after the rectal exam.

4. If the woman is bleeding and there is suspicion of a cervical tear, ask an assistant to press down firmly on the woman's uterus. This will move the cervix lower in the vagina so that you can examine it more easily. Note: a woman can have significant vaginal tears without experiencing tears of the perineum.
5. Identify the type of trauma and classify the degree of the tear.

4.3.10.1.b **Procedure**: repair of first- and second-degree tears

Most first-degree tears close spontaneously without sutures. (See Figures 4.3.13a–h.)

Fig. 4.3.13a First-degree tear (involves fourchette only; vaginal and perineal skin torn, muscles intact)

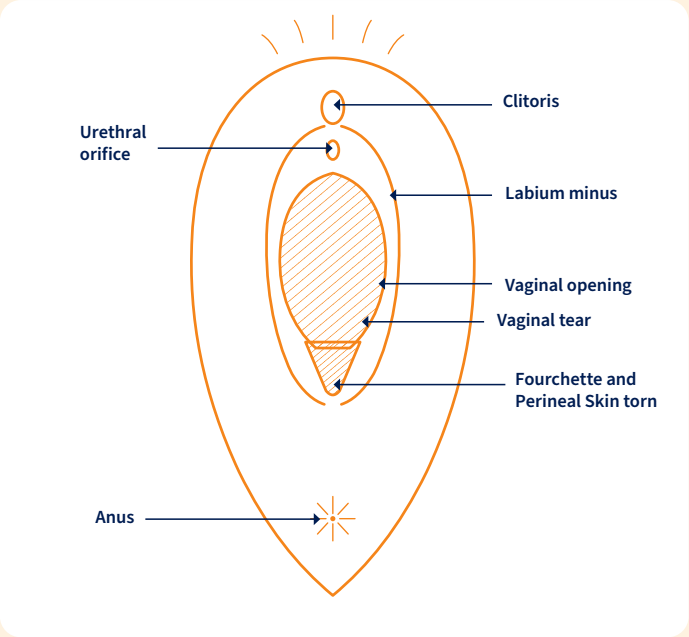


Fig. 4.3.13b Second-degree tear (involves fourchette and superficial perineal muscles; vaginal tear often extends up both sides)

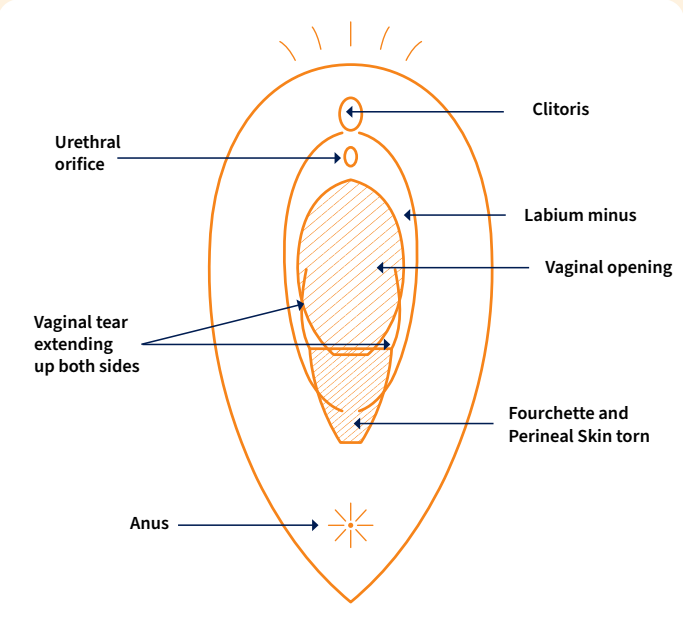


Fig. 4.3.13c Third-degree tear (involves fourchette and superficial perineal muscles and anal sphincter)

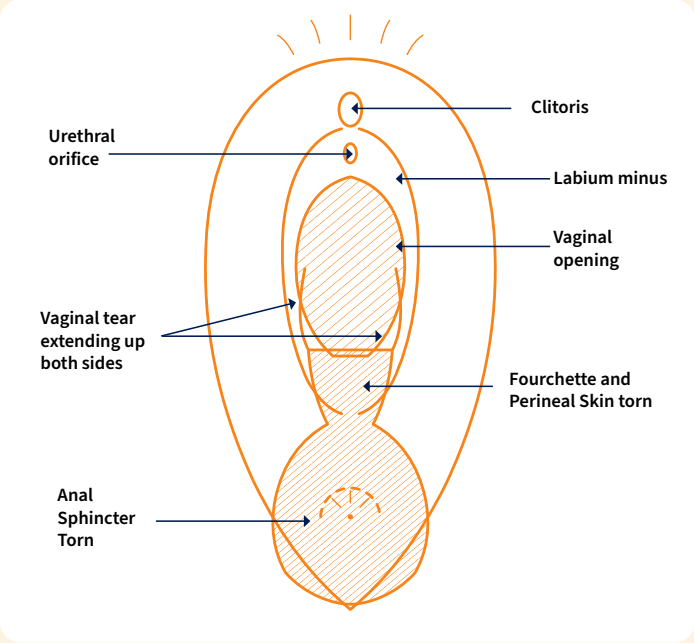


Fig. 4.3.13d Exposing a perineal tear

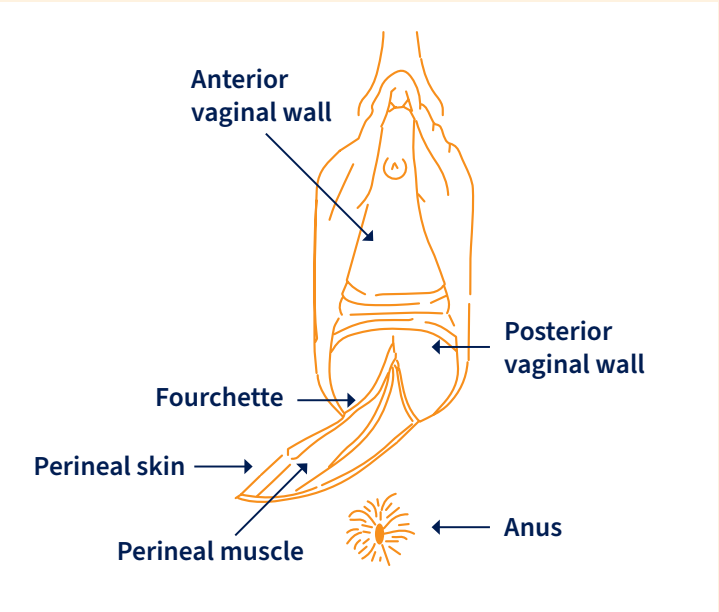


Fig. 4.3.13e Technique of infiltration of local anaesthetic before repair of a tear

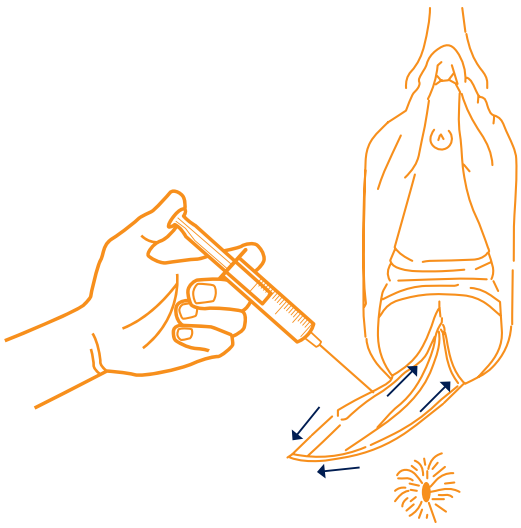


Fig. 4.3.13f Repairing the vaginal mucosa

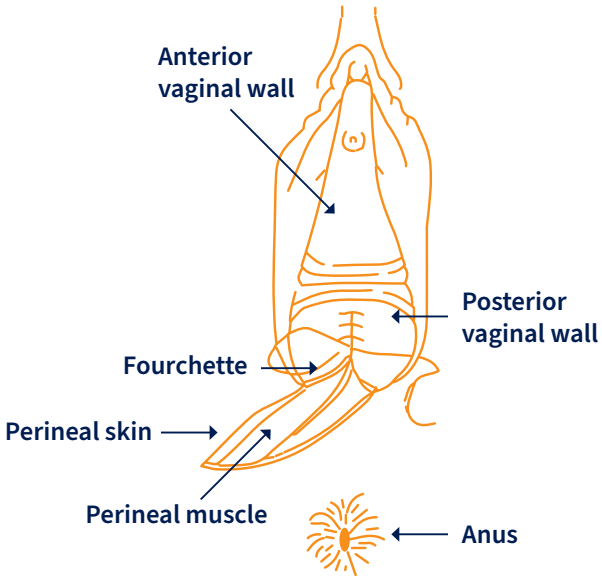


Fig. 4.3.13g Repairing the perineal muscles

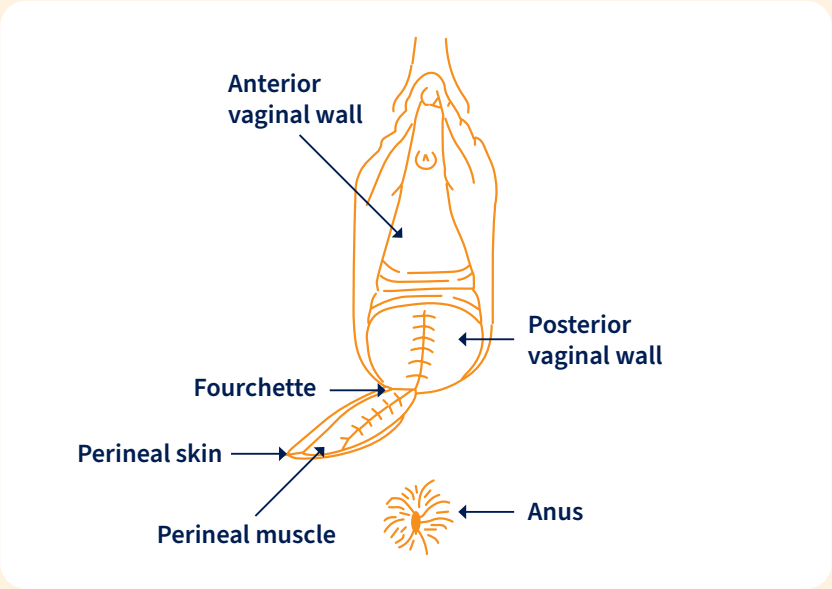
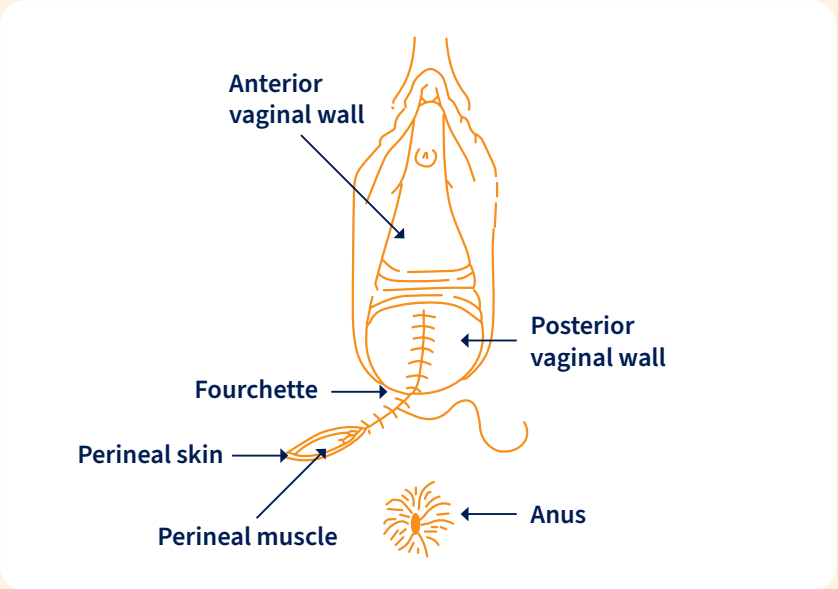


Fig. 4.3.13h Repairing the skin



Preparation

- Apply the principles of respectful care, including providing emotional support and encouragement and the principles of clinical and surgical care.
- Ask an assistant to check the uterus at 15-minute intervals and ensure that it is contracted.
- Ensure good lighting.
- Ensure that the woman is in a suitable position to enable visualization of the entire genital tract.

Infection prevention

- Expose the tear.
- Apply antiseptic solution to the area around the tear.

Antibiotic prophylaxis is not required for first- and second-degree perineal tears.

Pain relief

Adequate pain relief is essential for repair of perineal tears. Anaesthetize early to provide sufficient time for effect.

- Make sure there are no known allergies to lidocaine or related medicines. Use local infiltration with lidocaine solution. If necessary, use a pudendal block.
  - Note: if > 40 ml of lidocaine solution will be needed for the repair, add adrenaline to the solution (see Section 5.2 Pain relief for procedures).
- Infiltrate beneath the vaginal mucosa, beneath the skin of the perineum and deeply into the perineal muscle using about 10 ml 0.5% lidocaine solution.
  - Note: aspirate (pull back on the plunger) to be sure that no vessel has been penetrated. If blood is returned in the syringe with aspiration, remove the needle. Recheck the position carefully and try again. Never inject if blood is aspirated. The woman can suffer convulsions and death if IV injection of lidocaine occurs.
- At the conclusion of the set of injections, wait 2 minutes and then pinch the area with forceps. If the woman feels the pinch, wait 2 more minutes and then retest.

Procedure

Note: it is important that absorbable sutures are used for closure. Polyglycolic sutures are preferred over chromic catgut for their tensile strength, non-allergenic properties and lower probability of infectious complications. Chromic catgut is an acceptable alternative, but it is not ideal.

1. Repair the vaginal mucosa using a continuous 2–0 suture.
   a. Start the repair about 1 cm above the apex (top) of the vaginal tear. Continue the suture to the level of the vaginal opening.
   b. At the opening of the vagina, bring together the cut edges of the vaginal opening. Note that one side of the vaginal mucosa may retract more than the other and this will need to be compensated for when suturing.
   c. Bring the needle under the vaginal opening and out through the perineal tear and tie.
2. Repair the perineal muscles using interrupted 2–0 suture. If the tear is deep, place a second layer of the same stitch to close the space. Alternately, the muscles can be sutured using continuous sutures with care taken to avoid suturing more deeply on the medial side.
3. Repair the perineal skin using interrupted or subcuticular 2–0 sutures, starting at the vaginal opening. Subcuticular sutures cause less post-procedure discomfort.
4. If the tear was deep, perform a rectal examination. Make sure no stitches are in the rectum; if there are stitches in the rectum, undo the sutures and resuture the tear, taking care to avoid stitches in the rectum.

4.3.10.1.c Repair of third- and fourth-degree perineal tears

Note: a woman may suffer loss of control over bowel movements and gas (faecal or flatal incontinence) if a torn anal sphincter is not repaired correctly. If a tear in the rectum is not repaired, the woman can suffer from infection and rectovaginal fistula (passage of stool through the vagina).

Preparation

- Repair the tear in the operating room with optimal lighting.
- Ensure that a health worker skilled in suturing of third- and fourth-degree tears is available to carry out the repair. If such a skilled health worker is not available, consider transferring the woman to a higher level of care where a health worker with the needed skills is available.
- Apply the principles of respectful care, including providing emotional support and encouragement, and the principles of clinical and surgical care.
- Ask an assistant to check the uterus at 15-minute intervals and ensure that it is contracted.
- Ensure good lighting.
- Ensure that the woman is in a suitable position to enable visualization of the entire genital tract.

Infection prevention

- Give a single dose of prophylactic antibiotics before beginning repair:
- ampicillin 500 mg by mouth.
- Apply antiseptic solution to the tear and remove any faecal material, if present.

Pain relief

- Use a pudendal block, ketamine or spinal anaesthesia.
- Rarely, if all edges of the tear can be seen, the repair can be done using local infiltration with lidocaine and morphine IV slowly.
    - Make sure there are no known allergies to lidocaine or related medicines.
    - Infiltrate beneath the vaginal mucosa, beneath the skin of the perineum and deeply into the perineal muscle, using about 10 ml 0.5% lidocaine solution.
        - → Note: aspirate (pull back on the plunger) to be sure that no vessel has been penetrated. If blood is returned in the syringe with aspiration, remove the needle. Recheck the position carefully and try again. Never inject if blood is aspirated. The woman can suffer convulsions and death if IV injection of lidocaine occurs.

Anaesthetize early to provide sufficient time for effect.

- At the conclusion of the set of injections, wait 2 minutes and then pinch the area with forceps. If the woman feels the pinch, wait 2 more minutes and then retest.

Procedure

1. If the rectal mucosa is torn, repair the rectum using interrupted 3–0 or 4–0 sutures 0.5 cm apart to bring together the mucosa. Place the first suture about 0.5 cm above the apex of the tear in the rectal mucosa. (See Fig. 4.3.14.)
2. Remember: place the suture through the muscularis (not all the way through the mucosa).
3. Cover the muscularis layer by bringing together the fascial layer with interrupted sutures.
4. Apply antiseptic solution to the area frequently.
5. If the sphincter is torn:
    a. grasp each end of the sphincter with an Allis clamp (the sphincter retracts when torn); the fascial sheath around the sphincter is strong and will not tear when pulled with the clamp;
    b. repair the sphincter with two or three interrupted stitches of 2–0 suture; this can be done either end-to-end or using an overlapping technique (see Fig. 4.3.15).
6. Apply antiseptic solution to the area again.
7. Examine the anus with a gloved finger to ensure the correct repair of the rectum and sphincter. If there are stitches in the rectum, undo the sutures and resuture the tear, taking care to avoid stitches in the rectum.
8. Remove gloves after the rectal exam, carefully wash and dry hands and put on a new pair of sterile gloves to continue the repair.
9. Repair the vaginal mucosa, perineal muscles and skin.

Fig. 4.3.14 Closing the muscle wall of the rectum

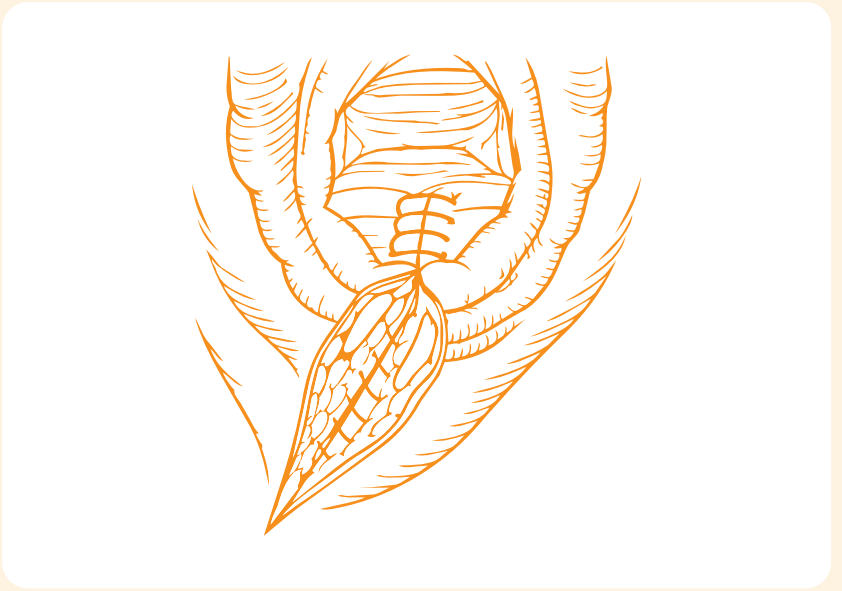


Fig. 4.3.15 Suturing the anal sphincter



4.3.10.1.d Challenges and complications

1. Neglected perineal tears: a perineal tear can become contaminated with faecal material. If closure is delayed > 12 hours, infection is likely. Delayed primary closure is indicated in such cases.
    a. For first- and second-degree tears, have the woman return in 6 days.
        i. If there are no signs of infection, proceed with delayed primary closure.
    b. For third- and fourth-degree tears:
        i. close the rectal mucosa with some supporting tissue and approximate the fascia of the anal sphincter with two or three sutures;
        ii. close the muscle and vaginal mucosa and the perineal skin 6 days later.
2. If a haematoma is observed, open and drain it. If there are no signs of infection and the bleeding has stopped, the wound can be reclosed.
3. If there are signs of infection, open and drain the wound. Remove infected sutures and debride the wound.
    a. If infection is superficial and does not involve deep tissues, monitor for development of an abscess and give a combination of antibiotics:
        i. ephalexin 500 mg by mouth every 8 hours for 5 days
        ii. OR cloxacillin 500 mg by mouth every 6 hours for 5 days.
    b. If the infection is deep, involves muscles and is causing necrosis (necrotizing fasciitis), give a combination of antibiotics until the necrotic tissue has been removed and the woman is fever-free for 48 hours:
        i. piperacillin + tazobactam 4 g + 500 mg every 6 hours IV, combined with
        ii. clindamycin 900 mg every 8 hours IV.
    c. If streptococcus pyogenes has been excluded:
        i. ceftriaxone 2 g IV every 24 hours
        ii. PLUS metronidazole 500 mg IV every 8 hours.
    d. If methicillin-resistant Staphylococcus aureus (MRSA) is suspected, add
        i. vancomycin 15–20 mg/kg IV every 12 hours.
    e. Note: necrotizing fasciitis requires wide surgical debridement. Perform delayed primary closure in 2–4 weeks (depending on resolution of the infection).
4. Faecal incontinence may result from complete sphincter transection. Many women are able to maintain control of defaecation by using other perineal muscles. When incontinence persists, reconstructive surgery must be performed 3 months or more after childbirth.
5. Rectovaginal fistula requires reconstructive surgery by a skilled health worker trained in the repair technique. Refer the woman for evaluation and follow-up.

4.3.10.1.e Post-procedure care

- Explain to the woman in clear and simple language what has been done.
- Explain to her that she may have pain and discomfort for a few days to weeks and provide appropriate pain relief.
- Advise the woman to clean the genital area, including the suture line, with clean water twice daily and always after defecation.
- Advise the woman of danger signs and when and where to seek care if they occur.
- Follow up closely for signs of wound infection (e.g. marked inflammation, excessive swelling, pus).
- Avoid giving enemas or rectal examinations for 2 weeks.
- Give stool softener by mouth for 1 week, if possible. Avoid bulk laxatives as these can cause wound dehiscence.
- No dietary restrictions are needed. Advise her to eat a diet rich in fibre and drink plenty of fluids to avoid constipation.
- Explain that sexual intercourse may be resumed after 4–6 weeks depending on her comfort levels. Counsel and provide suitable contraceptive methods.

4.3.10.1.f Follow-up care

- Encourage her to attend a follow-up visit even if she has no complaints and give clear instructions on where and when she should come for this. This is particularly important for women who have had repair of third- and fourth-degree tears.
- Check whether she is suffering from any flatal/faecal incontinence.

4.3.10.2 Procedure: repair of cervical tears

4.3.10.2.a Indications

Examine for a cervical tear when there is persistent bleeding after childbirth, with a well contracted uterus.

4.3.10.2.b Indications for referral

- If the apex is high up and difficult to ligate from below:
  - the apex should be grasped with a ring forceps as described in the sections below, and the woman transferred with the forceps in place; ensure she is haemodynamically stable before transfer and continue care during transit; NASG may be an option for stabilization during transfer.
- If the tear has extended deep beyond the vaginal vault and requires a laparotomy for repair.

4.3.10.2.c Preparation

- Apply the principles of respectful care, including providing emotional support and apply the principles of clinical and surgical care.
- Apply antiseptic solution to the vagina and cervix.
- If there is excessive bleeding, manage with the protocol for PPH including infusing IV fluids, oxytocics and TXA.
- While waiting for preparations for the procedure to be done, temporizing measures such as external aortic compression or NASG are useful to reduce the bleeding.
- Explain to the woman in simple language and using easily understandable terms the need for the procedure and what will be done. Obtain her verbal consent to perform the procedure.

4.3.10.2.d Pain relief

Anaesthesia is not required for repair of most cervical tears. For tears that are high and extensive, give morphine IV slowly or use ketamine. If tears are extensive and difficult to visualize, spinal anaesthesia is an option if available.

4.3.10.2.e Infection prevention

- Antibiotic prophylaxis is NOT recommended for repair of cervical tears alone.
- Cleanse the vagina and cervix with antiseptic solution.

4.3.10.2.f Procedure

1. Ask an assistant to gently provide fundal pressure to help push the cervix into view.
2. Use vaginal retractors as necessary to expose the cervix.
3. Gently grasp the cervix with ring or sponge forceps.
4. To diagnose and identify cervical tears it is usually necessary to walk around the cervix with ring or sponge holding forceps, alternating as you go and inspecting the section of cervix between the two pairs of forceps until a complete circuit around the cervix is completed. There may be more than one tear.
5. Apply the forceps on both sides of the tear, and gently pull in various directions to see the entire cervix. There may be several tears. Remember that the cervix can look bruised and ragged after birth. Only suture if the tear is large (i.e. > 1 cm) and bleeding.

6. Close the cervical tears with continuous 0 chromic catgut (or polyglycolic) suture starting at the apex (upper edge of tear), which is often the source of bleeding (see Fig. 4.3.16).
7. If a long section of the rim of the cervix is tattered, under-run it with continuous 0 chromic catgut (or polyglycolic) suture.

4.3.10.2.g Challenges and complications

- The apex may sometimes be difficult to reach. Try to get the best possible exposure with the help of an assistant, additional vaginal retractors and additional analgesia, if required.
- If the apex is difficult to reach and ligate, grasp it with artery or ring forceps. Leave the forceps in place for 4 hours. Do not persist in attempts to ligate the bleeding points as such attempts may increase the bleeding.
  - Then:
    - → after 4 hours, open the forceps partially but do not remove
    - → after another 4 hours, remove the forceps completely.
- Note: a laparotomy may be required to repair a cervical tear that has extended deep beyond the vaginal vault.
- If a "bucket handle" or spiral tear of the cervix is identified, it may sometimes be necessary to amputate that part of the cervix rather than repair it, as with extensive tears of this nature, there is a risk of tissue necrosis. The adjoining part of the cervix should be oversewn with blanket stitch in this case to promote haemostasis.

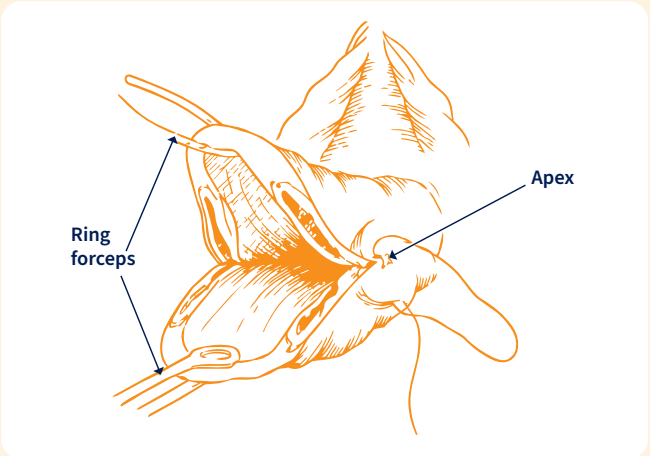
4.3.10.2.h Post-procedure care

- If sedation has been used, observe the woman closely until the effect of IV sedation has worn off.
- Monitor vital signs (pulse, blood pressure, respiration, ongoing bleeding) every 15 minutes for 2 hours and then every 30 minutes for the next 6 hours or until stable.
- Check haemoglobin if the woman had excessive bleeding and/or is anaemic and transfuse as necessary.
- Document procedure and post-procedure care, including any medicines given.
- Ask the woman if she has any questions about the procedure that has been done and ensure she understands what the procedure was and why it was done. Explain to her that the sutures will get absorbed and need not be removed.
- Provide postnatal care in the facility for at least 24 hours after childbirth.
- At discharge, explain any danger signs she needs to watch out for and when to return for care. These include excessive bleeding and signs of infection such as fever and foul- smelling lochia.

4.3.10.2.i Follow-up care

- In addition to routine postnatal care, encourage the woman to come for a follow-up visit and explain why, and give her clear instructions on when and where she should come.
- Explain to her that the repair of the cervical tear may impact future pregnancies and that she would need examination and close follow-up during future pregnancies.

Fig. 4.3.16 Repair of cervical tear



4.3.11 Specific management of retained placenta

Retained placenta is defined as lack of expulsion of the placenta within 30 minutes of the birth of the baby. There is no evidence for a specific time frame to wait to diagnose retained placenta. The delay used to diagnose this condition is left to the judgement of the health worker, based on the woman's condition, haemodynamic stability and amount of bleeding.

Sometimes there is no bleeding with retained placenta. In the absence of bleeding, spontaneous expulsion of the placenta can still occur; thus, a conservative approach is advised and the timing of manual removal as the definitive treatment is left to the judgement of the health worker.

Table 4.3.5 Immediate management of retained placenta by facility level

Level 1	Level 2
Sometimes a full bladder will hinder birth of the placenta. Ensure that the bladder is empty. Catheterize the bladder, if necessary. Ensure that a uterotonic drug has been given as part of the third stage and apply controlled cord traction to remove the placenta. Note: avoid forceful cord traction and fundal pressure, as they can cause uterine inversion or cord evulsion. If the placenta is not expelled, give an additional 10 IU oxytocin IM/IV in combination with controlled cord traction. If the placenta is still not expelled and the woman is bleeding, proceed to manual removal of placenta. If you do not have the skills to perform a manual removal of placenta, refer her for further management to a higher level of care. Ensure continuing care during transfer. NASG may be considered to stabilize during transfer. If the woman is haemodynamically unstable or bleeding heavily, it may not be possible to transfer her safely to a different facility. In such situations, proceed with manual removal of placenta following the procedure detailed in the chapter on manual removal of placenta. Compression measures, such as external aortic pressure or NASG, can help to stabilize the woman during the procedure.	In addition to actions listed under Level 1, do the following. • If the placenta is not expelled and the woman is bleeding, attempt manual removal of the placenta. Note: a single dose of antibiotics (ampicillin or first-generation cephalosporin) is recommended if manual removal of the placenta is attempted. Note: very adherent tissue may be placenta accreta. Efforts to extract a placenta that does not separate easily may result in heavy bleeding or uterine perforation, which usually require hysterectomy. • If bleeding continues, assess clotting status using a bedside clotting test. Failure of a clot to form after 7 minutes suggests coagulopathy. • If there are signs of infection (e.g. fever, foul-smelling vaginal discharge), give antibiotics as for postpartum endometritis.

IM: intramuscular; IV: intravenous; NASG: non-pneumatic anti-shock garment.

Do not use ergometrine for retained placenta because it causes tonic uterine contraction, which might delay expulsion.

Do not use prostaglandin E2 alpha (dinoprostone or sulprostone) for management of retained placenta.

4.3.11.1 Retained placental fragments

When a portion of the placenta – one or more lobes – is retained, it prevents the uterus from contracting effectively (see Table 4.3.6).

Table 4.3.6 Managing retained placental fragments by level of care

Level 1	Level 2

• When an incomplete placenta is suspected, feel inside the uterus for placental fragments. Manual exploration of the uterus is similar to the technique described for removal of the retained placenta.
• Administer a single dose of antibiotics (ampicillin or first-generation cephalosporin) if the uterus is explored:
  ○ ampicillin 2 g IV
  ○ OR cefazolin 1 g IV.
 	
Note: sometimes there is no bleeding with retained placental fragments.
 	
• Remove placental fragments by hand, ovum forceps or wide curette.
• If you do not have the skills to remove retained placental fragments, refer her for further management to a higher level of care. Ensure continuing care during transfer. NASG may be considered to stabilize during transfer.
	In addition to actions listed under Level 1, do the following.
	
	• When an incomplete placenta is suspected, perform manual exploration of the uterus and remove placental fragments by hand, ovum forceps or wide curette.
	• Administer a single dose of antibiotics (ampicillin or first-generation cephalosporin) if the uterus is explored:
	  ○ ampicillin 2 g IV
	  ○ OR cefazolin 1 g IV.

IV: intravenous; NASG: non-pnuematic anti-shock garment; IV: intravenous; NASG: non-pnuematic anti-shock garment.

Very adherent tissue may be placenta accrete. Efforts to extract fragments that do not separate easily may result in heavy bleeding or uterine perforation, which usually requires a hysterectomy. The woman requires care in a Level 3 facility where adequately skilled human resources and facilities, and blood and blood products, are available.

If bleeding continues, assess clotting status using a bedside clotting test. Failure of a clot to form after 7 minutes suggests coagulopathy.

4.3.11.2 Procedure: manual removal of placenta

4.3.11.2.a Indications

- If the placenta is not expelled spontaneously, give additional oxytocin (10 IU, IV/IM) and perform controlled cord traction. Umbilical vein injection of oxytocin for the treatment of retained placenta is currently recommended only in the context of rigorous research.
- There is no evidence for a specific time frame to wait to diagnose retained placenta. Use your clinical judgement based on the woman's condition, haemodynamic stability and amount of bleeding before deciding to proceed to manual removal of placenta. Explain to the woman the clinical condition and the options available and consider her wishes in deciding to proceed with manual removal of placenta.
- A conservative approach is generally advised. However, if the woman is bleeding heavily, manual removal of the placenta should be attempted.
- NASG may be used as a temporizing measure while waiting for the procedure or if the woman needs to be transferred to a higher level of care.

4.3.11.2.b Indications for referral

Consider transferring the woman to a higher level of care in the following situations:

- no expertise is available to perform manual removal of placenta;
- no appropriate analgesia is available for manual removal of placenta (see Section 4.3.11.2.d);
- suspicion of adherent placenta;
- failed attempt to remove placenta and no ability to perform laparotomy.

Ensure that the woman is haemodynamically stable before transfer and ensure continuing care including IV fluids and oxytocin during transit.

If the woman is haemodynamically unstable or bleeding heavily, it may not be possible to transfer her safely to a different facility. In such situations, proceed with manual removal of placenta following the procedure detailed in the sections below.

4.3.11.2.c Preparation

- Do not use ergometrine for retained placenta because it causes tonic uterine contraction, which might delay expulsion.
- Do not use prostaglandin E2 alpha (dinoprostone or sulprostone) for management of retained placenta.
- While ergometrine and prostaglandin E2 are used for treatment of atonic PPH, these should not be used when the placenta is retained.

- Apply principles of respectful care, including providing emotional support and encouragement, and apply principles of clinical and surgical care.
- Start an IV infusion.
- Manage PPH appropriately, including administering uterotonics and TXA, and IV fluids as required; compression measures, such as external aortic compression or NASG, can be applied during the procedure.
- Where feasible, ensure that the woman has a companion of her choice with her while she is being cared for.
- Explain the procedure in simple terms. Explain that a partially separated placenta can lead to excessive bleeding. Explain that excessive bleeding can also occur after manual removal of the placenta if the uterus does not contract adequately after that, and in such a situation, further treatment to control the bleeding may be needed.
- Obtain her consent to perform the procedure.

4.3.11.2.d Pain relief

- Depending on the availability of resources in your setting and the availability of anaesthetists, give morphine IV slowly or use ketamine or regional anaesthesia.
- In cases of haemorrhagic shock, avoid the administration of medicines that could cause mental status changes in the woman (i.e. opioids and sedatives).

4.3.11.2.e Preventing infection

Give a single dose of prophylactic antibiotics:

- ampicillin 2 g IV
- OR cefazolin 1 g IV.

4.3.11.2.f Procedure

It would be best to carry out the procedure in the operation theatre with the support of an anaesthetist. If that is not possible, carry it out in the birth room with adequate aseptic precautions and analgesia (for more information, see Section 5.2 Pain relief for procedures – obstetric and newborn).

1. Catheterize the bladder or ensure that it is empty.
2. Wash and dry hands. Put on sterile gloves (use long gloves covering up to the elbow if available).
3. Hold the umbilical cord with a clamp. Pull the cord gently with one hand until it is parallel to the floor.
4. Insert the other hand into the vagina and up into the uterus.
5. Let go of the cord and move the hand up over the abdomen in order to support the fundus of the uterus and provide counter-traction during removal, to prevent inversion of the uterus.
    a. Note: if uterine inversion occurs, reposition the uterus.
6. Move the fingers of the hand in the uterus laterally until the edge of the placenta is located.
7. If the cord has been detached previously, insert a hand into the uterine cavity. Explore the entire cavity until a line of cleavage is identified between the placenta and the uterine wall.
8. Detach the placenta from the implantation site by keeping the fingers tightly together and using the edge of the hand to gradually make a space between the placenta and the uterine wall.
9. Proceed slowly all around the placental bed until the whole placenta is detached from the uterine wall.
10. When the placenta is completely separated:
    a. palpate the inside of the uterine cavity to ensure that all placental tissue has been removed;
    b. slowly withdraw the hand from the uterus, bringing the placenta with it;
    c. continue to provide counter-traction to the fundus by pushing it in the opposite direction of the hand that is being withdrawn.
11. Give oxytocin 20 units in 1 L IV fluids (NS or RL) at 60 drops per minute.
12. Ask an assistant to massage the fundus of the uterus to encourage a tonic uterine contraction.
13. If there is continued heavy bleeding, give ergometrine 0.2 mg IM or prostaglandins.
14. Examine the uterine surface of the placenta to ensure that it is complete. If any placental lobe or tissue is missing, explore the uterine cavity to remove it.
15. Examine the cervix, vagina and perineum carefully and repair any tears to the cervix or vagina and perineum, or repair episiotomy.

4.3.11.2.g Challenges and complications

- If the placenta does not separate from the uterine surface by gentle lateral movement of the fingertips at the line of cleavage, remove placental fragments. If the tissue is very adherent, suspect placenta accreta. Leave the placenta in situ and proceed to laparotomy and possible subtotal hysterectomy. If facilities for laparotomy are not available in your facility, and if the woman is haemodynamically stable and not bleeding heavily, transfer to a higher level of care where laparotomy can be safely undertaken. Ensure continuing care is provided during transfer.
- If the placenta is retained due to a constriction ring, or if hours or days have passed since the woman gave birth, it might not be possible to get the entire hand into the uterus. Extract the placenta in fragments using two fingers, ovum forceps or a wide curette.

4.3.11.2.h Post-procedure care

- Observe the woman closely until the effect of IV sedation has worn off.
- Monitor vital signs (i.e. pulse, blood pressure, respiration) every 15 minutes for 2 hours and then every 30 minutes for the next 6 hours or until stable.
- Palpate the uterine fundus to ensure that the uterus remains contracted.
- Check for excessive lochia.
- Continue infusion of IV fluids.
- Transfuse as necessary.
- Document procedure and post-procedure care, including any medicines given.
- Ask the woman if she has any questions about the procedure.
- Provide postnatal care in the facility for at least 24 hours after childbirth.

4.3.12 Specific management of inverted uterus

The uterus is said to be inverted if it turns inside-out during birth of the placenta.

Withhold or do not give uterotonic drugs until the inversion is corrected.

4.3.12.1 Procedure: correcting uterine inversion

4.3.12.1.a Indications

Uterine inversion is when the uterus partially or completely turns inside out with the uterine fundus collapsing into the endometrial cavity.

Uterine inversion is a critical emergency and is usually accompanied by severe atonic PPH and shock. The inversion should be corrected immediately as soon as possible while simultaneously managing the shock. If it is not corrected immediately, not only will there be PPH/shock, but correcting the inversion becomes more difficult.

4.3.12.1.b Diagnosis of uterine inversion

Uterine inversion is usually diagnosed in the presence of severe bleeding and shock and the presence of a rounded mass protruding outside the vagina. On abdominal palpation, the uterine fundus is not palpable at the umbilicus.

4.3.12.1.c Preparation

- Apply principles of respectful care, including providing emotional support and encouragement, and apply the principles of clinical and surgical care.
- Call for help and assemble all available personnel including midwives, nurses, doctors and anaesthetists.
- Prepare for immediate repositioning of uterus – any delay causes the formation of a constriction ring and makes repositioning difficult.
- Explain to the woman the need for the procedure and what will be done using simple language. Quickly explain that you have concerns about her uterus that will need to be addressed to prevent bleeding and that the procedure may be painful. This can be explained to her while proceeding with uterine correction to avoid loss of time. Obtain her consent to perform the procedure.
- Treat shock. Start an IV infusion and infuse crystalloids (NS or RL) rapidly.
- DO NOT give uterotonics. Discontinue any uterotonics being given to allow the uterus to relax and facilitate repositioning.

- DO NOT remove the placenta before repositioning as that may cause torrential bleeding.
- If you are not able to correct immediately, apply compression to the inverted uterus with a moist, warm sterile towel until ready for the procedure. Please note however that prompt intervention is critical – any delay in correction results in PPH and shock and makes correction difficult later due to the formation of a constriction ring.

4.3.12.1.d Pain relief

Uterine inversion can be accompanied by severe lower abdominal pain. Give morphine IV slowly for pain relief. If correction of the inversion is being done in the operation theatre, general anaesthetics can be given for both pain relief and to achieve uterine relaxation.

4.3.12.1.e Preventing infection

Give a single dose of prophylactic antibiotics:

- ampicillin 2 g IV
- OR cefazolin 1 g IV.

4.3.12.1.f Procedure

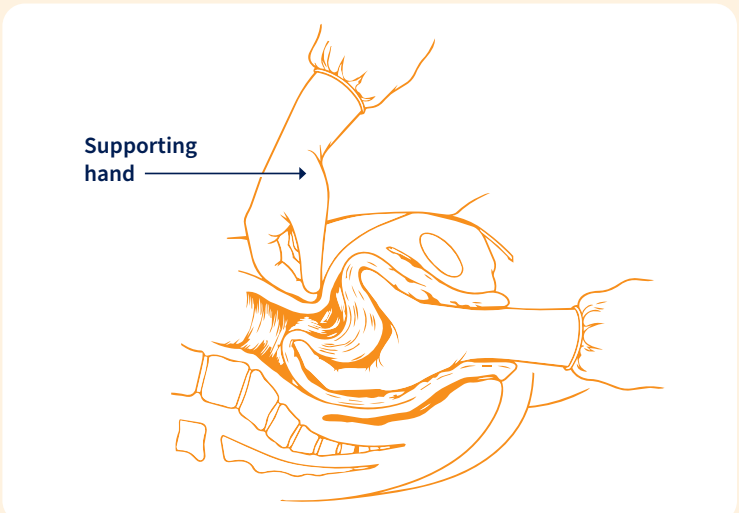
To correct the uterine inversion, the following procedures should be attempted in the sequence given below.

1. Attempt manual correction. If that is unsuccessful, it can be attempted again after administering a uterine relaxant.
2. If manual correction is unsuccessful, proceed to hydrostatic correction.
3. If that is unsuccessful, or if the woman is already in the operating theatre, or if the woman is haemodynamically unstable, a laparotomy can be performed to correct the inversion abdominally.

Manual correction

1. Wearing sterile gloves, grasp the inverted uterus and push it through the cervix in the direction of the umbilicus to its normal anatomic position, using the other hand to support the uterus. It is important that the part of the uterus that came out last (the part closest to the cervix) goes in first. "Last out, first in" (see Fig. 4.3.17). If the placenta is still attached, manually remove the placenta after correction.
2. If manual repositioning is unsuccessful, it can be reattempted after giving a uterine relaxant. Nitroglycerine 50 µg IV, repeated up to 4 doses as needed, can be used. Alternatively, terbutaline 0.25 mg subcutaneously can be used. Note that administration of uterine relaxants may exacerbate bleeding.
3. If correction is not achieved, proceed to hydrostatic correction. If the woman is already in the operating theatre or is haemodynamically unstable, proceed to perform a laparotomy and correct the inversion abdominally.

Fig. 4.3.17 Manual replacement of the inverted uterus





Hydrostatic correction

- Place the woman in deep Trendelenburg position (i.e. lower her head about 0.5 m below the level of the perineum).

1. Prepare a high-level disinfected or sterile douche system with a large nozzle, long tubing (2 m) and a warm water reservoir (3–5 L).
    a. Note: this can also be done using warmed NS and an ordinary IV administration set.
2. Identify the posterior fornix. This is easily done in partial inversion when the inverted uterus is still in the vagina. In other cases, the posterior fornix is recognized by where the rugose vagina becomes the smooth vagina.
3. Place the nozzle of the douche in the posterior fornix.
4. At the same time, with the other hand, hold the labia sealed over the nozzle and use the forearm to support the nozzle.
5. Ask an assistant to start the douche with full pressure (raise the water reservoir to at least 2 m). Water will distend the posterior fornix of the vagina gradually so that it stretches. This causes the circumference of the orifice to increase, relieves cervical constriction and results in correction of the inversion.

Manual correction under general anaesthesia

1. If hydrostatic correction is not successful, try manual repositioning under general anaesthesia to relax the uterus. Grasp the inverted uterus and push it through the cervix in the direction of the umbilicus to its normal anatomic position, using the other hand to support the uterus. If the placenta is still attached, manually remove the placenta after correction.

Combined abdominal-vaginal correction

Abdominal-vaginal correction under general anaesthesia may be required if the above measures fail.

1. Open the abdomen.
    a. Make a midline vertical incision below the umbilicus to the pubic hair, through the skin and to the level of the fascia.
    b. Make a 2–3 cm vertical incision in the fascia.
    c. Hold the fascial edge with forceps and lengthen the incision up and down using scissors.
    d. Use fingers or scissors to separate the rectus muscles (abdominal wall muscles).
    e. Use fingers or scissors to make an opening in the peritoneum near
    f. the umbilicus. Use scissors to lengthen the incision up and down. Carefully, to prevent bladder injury, use scissors to separate layers and open the lower part of the peritoneum.
    g. Place a bladder retractor over the pubic bone and place self-retaining abdominal retractors.
2. Through the abdominal incision, dilate the constricting cervical ring digitally.
3. Place a tenaculum through the cervical ring and grasp the inverted fundus. Alternatively, two tenaculums can be used to grasp the round ligaments on either side.
4. Apply gentle continuous traction to the fundus or round ligaments while an assistant attempts manual correction vaginally.
5. If traction fails:
    a. incise the constricting cervical ring vertically on the posterior side of the uterus (where the incision is least likely to injure the bladder or uterine vessels);
    b. repeat digital dilatation, tenaculum and traction steps;
    c. once correction has been achieved, repair the posterior uterine incision on the constriction ring.
6. If correction is successful, close the abdomen.
    a. Make sure there is no bleeding. Use a sponge to remove any clots inside the abdomen.
    b. Close the fascia with continuous 0 polyglycolic (or chromic catgut) suture.
    c. Note: there is no need to close the bladder peritoneum or the abdominal peritoneum.
    d. If there are signs of infection, pack the subcutaneous tissue with gauze and place loose 0 catgut (or polyglycolic) sutures. Close the skin with a delayed closure after the infection has cleared.
    e. If there are no signs of infection, close the skin with vertical mattress sutures of 3–0 nylon (or silk) and apply a sterile dressing.
7. Start IV oxytocin infusion as soon as correction is achieved to treat atonic PPH. Administer TXA. Wait for spontaneous expulsion of the placenta. Alternatively, manually remove the placenta.

4.3.12.1.g Challenges and complications

- Uterine inversion should be corrected as soon as possible as any delay results in the formation of a constriction ring, making correction difficult.
- Uterine inversion is often accompanied by severe atonic PPH. DO NOT give uterotonics before correction. DO NOT remove the placenta before correcting inversion as that can cause torrential bleeding. Treat the shock aggressively with crystalloids. Transfuse blood and blood products as needed.

4.3.12.1.h Post-procedure care

- Once the inversion is corrected, infuse oxytocin 20 units in 500 ml IV fluid (NS or RL) at 10 drops per minute.
  - If haemorrhage is suspected, increase the infusion rate to 60 drops per minute.
  - If the uterus does not contract after oxytocin, give ergometrine 0.2 mg or prostaglandins. Misoprostol 800–1000 µg vaginally or rectally can be given.
- If there are signs of infection or the woman currently has a fever, give a combination of antibiotics until she is fever-free for 48 hours:
  - clindamycin phosphate 600 mg IV every 8 hours
  - PLUS gentamicin 5 mg/kg body weight IV every 24 hours.
- Give appropriate analgesics

4.3.13 Secondary postpartum haemorrhage

Secondary PPH is defined as increased vaginal bleeding between 24 hours and 6 weeks after childbirth (see Table 4.3.7).

Secondary PPH might be due to postpartum endometritis and/or retained products of conception.

Table 4.3.7 Managing secondary postpartum haemorrhage by facility level

Level 1	Level 2
• If bleeding is severe, follow steps for general management • If there are signs of infection (e.g. fever, foul-smelling vaginal discharge), give antibiotics as for postpartum endometritis. Give uterotonic drugs (see Table 4.3.3). • Refer the woman to a higher level of care for further management after stabilizing her. Use of compression measures such as external aortic compression or NASG will help stabilize her.	In addition to actions listed under Level 1, do the following. • If the cervix is dilated, explore by hand to remove large clots and placental fragments. Manual exploration of the uterus is similar to the technique described for removal of the retained placenta. • If the cervix is not dilated, evacuate the uterus to remove placental fragments. • Rarely, if bleeding continues, it may be necessary to consider surgical intervention with uterine and utero-ovarian artery ligation or hysterectomy. • Perform histopathologic examination of curettings or hysterectomy specimen, if possible, to rule out trophoblastic tumour.

NASG: non-pneumatic anti-shock garment.

4.3.14 Care after postpartum haemorrhage

Women who have suffered PPH require careful follow-up and education and counselling about self-care and risk of infection.

4.3.14.1 General self-care principles after postpartum haemorrhage

Each woman who has been through an emergency situation will respond differently. To deliver effective care, it is important to foster good communication and demonstrate empathy. Women who have experienced PPH will likely require support from family members once they are discharged from the hospital. Including key support people in discussions after care is important (see Counselling for maternal and newborn health care: a handbook for building skills).

Key principles of care after PPH are as follows.

- Explain the events that occurred and the treatment(s) that were given in simple language so that they are understood by the woman and her support person.
- Provide information on the symptoms of anaemia and emphasize the importance of an immediate return to the hospital with any symptoms of severe anaemia, increased bleeding or persistent bleeding that does not improve.
- Women who have had excessive bleeding and/or intrauterine procedures are at risk of developing uterine infections. Provide information on the signs and symptoms of intrauterine infection and encourage her to return to the hospital with any fever, persistent pelvic pain and/or foul-smelling discharge.
- Emphasize the importance of good nutrition, including iron-rich foods, to address the woman's anaemia and improve her general health, and to facilitate milk production and breastfeeding.
- Discuss the importance of maternal recovery and rest, and healthy birth spacing. Discuss all available methods of contraception and facilitate initiation of the woman's method of choice.
- Explain to the woman and her family the importance of follow-up in addition to routine postnatal care. Schedule a follow-up visit to check on her progress and address any questions or concerns.

4.3.14.2 Treatment of anaemia and prevention of future anaemia

- Check for anaemia and evidence of haemodynamic instability after bleeding has been stopped for 24 hours.
  - If there is evidence of haemodynamic instability, arrange for a transfusion.
  - If haemoglobin is < 7 g/dl or haematocrit is < 20% (severe anaemia), arrange for a transfusion and give oral iron and folic acid.
    - → Give ferrous sulfate or ferrous fumarate 120 mg orally plus folic acid 400 µg orally once daily for 3 months.
    - → After 3 months, continue supplementation with ferrous sulfate or ferrous fumarate 60 mg orally plus folic acid 400 µg orally once daily for 3 months.
    - → IV iron therapy is recommended over oral iron therapy when oral iron cannot be used or is not tolerated or there is a clinical need to treat women with severe iron-deficiency anaemia rapidly, as long as staff are trained to evaluate and manage anaphylactic reactions.
  - If haemoglobin is 7–11 g/dl, give ferrous sulfate or ferrous fumarate 60 mg by mouth plus folic acid 400 µg by mouth once daily for 3 months.
- Where hookworm is endemic (prevalence of ≥ 20%), give one of the following anthelminthic treatments:
  - albendazole 400 mg by mouth in a single dose;
  - OR mebendazole 500 mg by mouth as a single dose or 100 mg every 12 hours for 3 days;
  - if hookworm is highly endemic (prevalence of ≥ 50%), repeat the anthelminthic treatment 12 weeks after the first dose.

4.3.15 Further reading

Key WHO resources

Counselling for maternal and newborn health care: a handbook for building skills. Geneva: World Health Organization; 2013 (https://iris.who.int/handle/10665/44016).

Bleeding after birth: course on prevention, diagnosis and treatment of postpartum haemorrhage. Geneva: World Health Organization; 2025a (https://iris.who.int/handle/10665/382922). License: CC BY-NC-SA 3.0 IGO.

Consolidated guidelines for the prevention, diagnosis and treatment of postpartum haemorrhage. Geneva: World Health Organization; 2025b (https://iris.who.int/handle/10665/382923). License: CC BY-NC-SA 3.0 IGO.

Other resources

Osanan GC, Charry RC, Alves AL. Non-conservative and conservative surgical management of PPH. In: Fernanda Escobar Vidarte M., editor. *The Continuous Textbook of Women's Medicine series – Obstetrics Module. Volume 13 Obstetric emergencies*. Preston, UK: The Global Library of Women's Medicine; 2021 (https://doi.org/10.3843/GLOWM.413063).

Video resources

How to perform a B-lynch uterine compression suture [video]. YouTube; 30 June 2018 (https://www.youtube.com/watch?v=sskjFqJ17hk).