

CHAPTER 6

POSTPARTUM HEMORRHAGE

Learning Objectives

By the end of this chapter, the participant will:

1. Define postpartum hemorrhage, differentiate between primary and secondary postpartum hemorrhage.
2. Describe appropriate prevention (active management of the third stage of labour) and treatment of postpartum hemorrhage.
3. Recall the four Ts as causes of postpartum hemorrhage.
4. Identify possible risk factors for postpartum hemorrhage.
5. Describe the implications of postpartum hemorrhage on the health and well-being of the mother and her new baby.

Incidence

Postpartum hemorrhage (PPH) is the world's leading cause of maternal mortality, accounting for one-third of all maternal deaths worldwide (Derman, 2006: 1248). PPH causes up to 60% of all maternal deaths in developing countries. The majority of these deaths occur within 4 hours of delivery, indicating they are a consequence of events in the third stage of labour (Ramanathan, 2006: 967).

All health care providers providing maternity care require a range of life-saving skills to enable them to make a significant contribution to reducing maternal deaths and to promote safe motherhood. Women must have access to skilled attendants.

Definition and Recognition

Primary (immediate) postpartum hemorrhage is defined as excessive bleeding that occurs within the first 24 hours after delivery. About 70% of immediate PPH cases are due to uterine atony. Atony of the uterus is defined as the failure of the uterus to contract adequately after the child is born.

Secondary (late) postpartum hemorrhage is defined as excessive bleeding occurring between 24 hours after delivery of the baby and 6 weeks postpartum. Most late PPH is due to retained products of conception, or infection, or both combined.

Traditionally, PPH has been defined as blood loss in excess of 500 cc in vaginal deliveries and in excess of 1,000 cc in cesarean section deliveries. For clinical purposes, any blood loss that has the potential to produce hemodynamic compromise should be considered a PPH.

The amount of blood loss required to cause hemodynamic compromise will depend on the pre-existing condition of the woman. Hemodynamic compromise is more likely to occur in conditions such as anemia (e.g. iron deficiency, sickle cell, and thalassemia) or volume contracted states (e.g. dehydration, gestational hypertension with proteinuria).

Clinical Findings With Varying Amounts of Blood Loss

The amount of blood loss will determine the degree of change in clinical findings. Blood loss will result in changes to the state of consciousness, the pulse rate, the respiratory rate, the temperature, the blood pressure, the status of the skin and mucous membranes, capillary refilling, and urine output.

Mild hypovolemia, loss of <20% of the blood volume, will result in mild tachycardia, mottled skin, cool extremities due to increased systemic vascular resistance and prolonged capillary refilling, and the urinary output may be decreased. The woman may report dizziness, although her neurologic status usually remains normal.

With moderate hypovolemia, i.e. loss of 20% to 40% of the blood volume, the woman will become increasingly anxious. Her pulse will become very fast and weak, >110/bpm (tachycardia). Her respiratory rate will increase to a rate of >30/bpm. She will exhibit marked pallor; her eyelids, palms, and mucous membranes will be very pale. Her blood pressure may be normal when she is in the supine position. However, there may be significant postural hypotension.

When blood loss is severe, i.e. >40% of the blood volume, the classic signs of shock will appear. The blood pressure declines and becomes unstable even in the supine position. The woman will develop marked tachycardia, oliguria or anuria, and agitation or confusion. Loss of consciousness is an ominous sign.

The transition from mild to severe hypovolemic shock can happen slowly over several hours or be extremely rapid, depending on the cause of blood loss.

Aggressive resuscitation can reverse severe shock and prevent irreversible damage to organs or death. Early intervention is essential. As more time elapses between the onset of shock and the start of resuscitation, the percentage of women surviving PPH decreases. For maximal survival, resuscitation must begin as soon as signs and symptoms of shock are detected.

Estimating Blood Loss

Research has shown that all health care providers have significant difficulty estimating blood loss (Bose, 2006, 473). Accurate estimation of blood loss is essential in the recognition and management of obstetric hemorrhage. Underestimation of blood loss may result in lack of recognition of PPH, and inadequate or inappropriate management. Blood and fluid replacement may be insufficient resulting in associated complications.

Smaller blood losses of up to 300 ml are more likely to be accurately estimated; errors are more common with larger amounts of blood loss. Actual blood loss should be compared with estimated blood loss. Frequent measuring of birth fluids may help health care providers become more skilled in assessing blood loss. Health care providers should become familiar with the absorbency of maternity pads, under pads, and other surfaces on which maternal blood may accumulate during delivery in their practice location. Further ideas to facilitate estimation of blood loss include:

- Using standardized absorbent materials for labour, delivery, and postpartum to increase accuracy in identifying the quantity of blood loss (Prata, 2005, 236)
- Practicing blood loss estimation by spilling fresh blood or substances that look like blood (e.g. red coloured water) on maternity pads, absorbent under pads, delivery beds, etc. to visualize the appearance of differing amounts of blood absorbed by these items
- Developing visual aids that may be carried in a “birth kit” or posted discretely in the labour and delivery area
- Comparing the weight of blood-soaked pads to the weight of a 500cc or 1,000cc bag of IV fluids.

Consider what will work best in your practice setting and implement this technique for educating health care providers on estimating blood loss.

REMEMBER

- Blood loss is consistently underestimated.
- Underestimation may result in inadequate treatment resulting in complications or death.
- Ongoing trickling can lead to significant blood loss.
- Blood loss is generally well tolerated by healthy women, to a point.
- Anemia and other underlying health conditions may profoundly affect a woman’s ability to tolerate any amount of blood loss.

Complications Associated With Postpartum Hemorrhage

Significant blood loss can occur very quickly. Women can lose up to 500 ml of blood in 1 minute during a PPH. The average woman has approximately 5 litres of blood in her circulation. At this rate, it is possible for a woman to become exsanguinated (lose all of her blood) within 10 minutes. Rapid, efficient action must be taken to save the woman's life and to prevent complications related to significant blood loss. The potential significance of these effects is increased in the presence of chronic anemia and in women with chronic health problems including HIV/AIDS, malaria, hookworm, hemoglobinopathies, and tuberculosis.

PPH is associated with orthostatic hypotension, anemia, and fatigue. Postpartum anemia is associated with lactation failure placing the health of the newly born infant at risk. It is also associated with postpartum depression that may in turn affect maternal bonding with the newborn. Maternal attachment to the newborn is essential for the long-term well-being of the infant. Extreme fatigue resulting from anemia may make maternal care of the newborn and other siblings more difficult.

Less commonly myocardial ischemia, dilutional coagulopathy, and death may occur. More rarely, in women who survive hemorrhagic shock, damage to the anterior pituitary gland may result in delay or failure of lactation as well as secondary infertility.

Etiology

It is helpful to think of the causes of PPH in terms of the four T's:

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

The most common and important cause of PPH is uterine atony. The primary mechanism of immediate hemostasis following delivery is myometrial contraction causing occlusion of uterine blood vessels, the so-called "living ligatures" of the uterus. Uterine atony can often be effectively managed with uterine massage in conjunction with administration of uterotonic.

Retained products of conception, most often a retained placenta or retained placental fragments, must be removed to stop bleeding. Rarely, an invasive placenta may be present. Hysterectomy is the most common treatment.

Trauma resulting from the birth process can result in significant blood loss. The source of trauma must be quickly identified and treated.

Coagulation disorders are often known in advance in developed countries. They may result from underlying coagulopathies, or develop during pregnancy, or from excessive bleeding. A coagulation disorder should be considered in women who have not responded to usual treatments, who are not forming clots, or who are oozing from puncture sites, i.e. IV puncture sites. Management consists of treating the underlying disease process, supporting intravascular volume, and replacing appropriate blood components, where possible.

In severe PPH, uterus-conserving techniques include uterine tamponade procedures, uterine compression sutures, pelvic artery ligation, and uterine artery embolization. However, sub-total hysterectomy will be necessary in some cases.

The table below outlines "risk factors" that make a PPH more likely to occur. It is important to understand that "risk factors" do not predict complications. Selecting women with these "risk factors" for specialized management is not useful. Evidence has shown that many women categorized as "high risk" for developing a complication frequently do NOT go on to develop that complication, whereas many women classified as "low risk" do experience complications. Health care providers need to be prepared for the possibility of life-threatening complications in all women, with or without known "risk factors."

Table - Risk factors for postpartum hemorrhage

	Etiologic Process (Cause)	Clinical Risk Factors
Abnormalities of Uterine Contraction (Tone)	• Over-distended uterus	• Polyhydramnios • Multiple gestation • Macrosomia
	• Uterine muscle exhaustion	• Rapid labour • Prolonged labour • High parity
	• Intraamniotic infection	• Fever • Prolonged rupture of membranes (ROM)
	• Functional or anatomic distortion of the uterus, i.e. distended bladder may prevent contraction of the uterus (Ramanathan, 2006, 449)	• Fibroid uterus • Placenta previa or abruptio • Uterine anomalies
	• Uterine-relaxing medications	• Halogenated anesthetics, nitroglycerin, magnesium sulphate
Retained Products of Conception (Tissue)	• Retained products abnormal placentation retained cotyledon or succinuriate lobe	• Incomplete placenta at delivery • previous uterine surgery • High parity • Abnormal placenta on ultrasound
	• Retained blood clots	• Atonic uterus
Genital Tract Trauma (Trauma)	• Tears (lacerations) of the cervix, vagina, or perineum • Ruptured vulval varicosities	• Precipitous delivery • Operative delivery • Mistimed or inappropriate use of episiotomy
	• Extensions, lacerations at cesarean section	• Malposition • Deep engagement
	• Uterine rupture	• Previous uterine surgery
	• Uterine inversion	• High parity • Fundal placenta
Abnormalities of Coagulation (Thrombin)	• Pre-existing states - hemophilia A - von Willebrand's disease ¹	• History of hereditary coagulopathies • History of liver disease
	• Acquired in pregnancy - idiopathic thrombocytopenic purpura ² - thrombocytopenia with preeclampsia - disseminated intravascular coagulation - preeclampsia - dead fetus in utero - severe infection/sepsis - placental abruption - amniotic fluid embolus	• bruising • elevated BP • elevated BP • fetal demise • fever • elevated white blood cells • antepartum hemorrhage • sudden collapse
	• Therapeutic anticoagulation	• history of thrombotic disease

¹ von Willebrand's disease is a common hereditary bleeding disorder caused by a deficiency or abnormality of the blood proteins that control platelet activity.

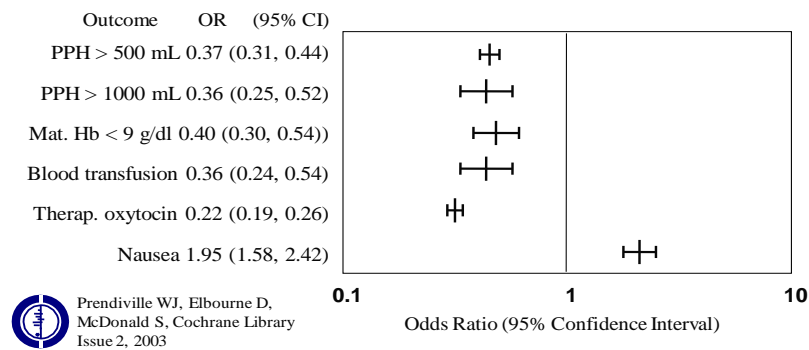
² Idiopathic thrombocytopenic purpura is an autoimmune disease where the body makes antibodies against its own platelets. There is no known cause. Most cases are asymptomatic. Very low platelet counts can result in a tendency to bruise easily, and/or excessive bleeding following trauma or surgery, including childbirth.

Prevention

Compared to expectant management, active management of the third stage of labour (AMTSL) is associated with reduced maternal blood loss, reduced postpartum hemorrhage, reduced postpartum anemia, reduced need for blood transfusions and a decrease in the incidence of prolonged third stage of labour.

In the Figure 1 meta-analysis, AMTSL included routine use of uterotonics and controlled cord traction on the umbilical cord.

Figure 1 – Active management versus expectant management



Therefore, AMTSL is strongly advocated for all births taking place in all settings. During the third stage, the muscles of the uterus contract downward and the placenta begins to separate from the uterine wall. The amount of blood lost depends on how quickly this happens. If the uterus does not contract normally (uterine atony), the blood vessels at the placental site remain open, and severe bleeding results. AMTSL speeds delivery of the placenta by increasing uterine contractions and prevents PPH by avoiding uterine atony.

Counseling and informing women about AMTSL is part of providing a “mother-friendly delivery.” Involving women in decision making about her care and obtaining her consent for procedures respects the woman’s sexual and reproductive rights. This counseling may take place prenatally or, if not possible then, during the early part of labour. Counseling should include an explanation as to why AMTSL is done, what drugs may be used, and the possible side effects of these drugs. Informed choice discussions about AMTSL should be documented in the woman’s chart (International Confederation of Midwives, 2003: 474). See Appendix 2 and 3 for the joint statements by FIGO and ICM regarding AMTSL and new advances in the treatment and prevention of PPH.

AMTSL includes the following procedures:

1. Following the delivery of the baby, palpate the abdomen to rule out the presence of an additional baby, and give oxytocin 10 units IM.³ Never give an uterotonic before the delivery of the anterior shoulder. Oxytocin may also be give by other routes including 5 units IV push or 20-50 units in 1L of normal saline at 60 drops/minute.
2. If oxytocin is not available, give:
 - Ergometrine 0.2 mg IM
 - OR
 - Syntometrine (1 ampoule) IM
 - OR
 - Misoprostol 400–600 µg orally

³ Oxytocin is available in a Uniject™, a prefilled, non-reusable syringe. See Appendix 4 for product information.

3. After delivery of the baby, wait until pulsation has stopped (approximately 2 to 5 minutes) before clamping and dividing the cord. Clamp the cord close to the perineum. If it is your institutional policy, take the cord blood samples including blood gases.
4. Keep slight tension on the cord while waiting for a strong uterine contraction (approximately 2–3 minutes)
5. With the strong uterine contraction, encourage the mother to push, and very gently pull downward and outward on the cord to deliver the placenta while applying suprapubic counter-pressure on the uterus with the other hand. Pulling too hard on the cord may cause the cord to tear off the placenta or cause uterine inversion—an acute obstetrical emergency. See Figure 2.
6. If the placenta does not descend during 30-40 seconds of controlled cord traction, do not continue to pull on the cord:
 - a. Continue to gently hold the cord, and wait until there is another strong contraction.
 - b. With the next contraction, repeat controlled cord traction with counter-pressure.



Figure 2 - Controlled cord traction

7. As the placenta delivers, hold the placenta in both hands. Gently turn it until the membranes are twisted. Gently pull to complete the delivery.
8. If the membranes tear, gently examine the upper vagina and cervix wearing sterile gloves. Use a ring (sponge) forceps to grasp and remove any pieces of membranes.
9. Examine the placenta carefully to ensure that it is complete.
10. Check the fundus to ensure that it is well contracted. Palpate for a contracted uterus every 15 minutes and repeat uterine massage as needed during the first 2 hours.

In addition

- Consider the need for an oxytocin infusion after delivery of the placenta, if the woman has increased risk factors for PPH or if the uterus is soft or boggy.
- Inspect the lower genital tract after all deliveries. When lacerations are minor, often pressure is sufficient to control bleeding. Apply pressure with a sterile pad or gauze. Check after 5 minutes. If bleeding persists, the tear will need repair. Tears through the anal sphincter (third degree tears), and tears through the anal sphincter into the rectum (fourth degree tears) often bleed significantly. They **MUST** be repaired properly to stop bleeding and to prevent complications such as rectovaginal fistulas and/or fecal incontinence for the woman. See Appendix 5 for instructions on repair of third and fourth degree tears.

- The cervix and upper vagina should be inspected following all operative vaginal deliveries. Place four fingers in the vagina and depress the posterior vaginal wall. The anterior lip of the cervix will come into view. If necessary, grasp this with the ring forceps and pull upwards to bring the entire cervix into view or “walk around” the cervix with the ring forceps. Push the cervix up into the vaginal vault to inspect the whole vagina for lacerations. Upper vaginal tract or cervical tears must be promptly repaired as they can result in significant blood loss. See Appendix 6 for instructions for repair of cervical and upper vaginal tract tears.

Effective Uterotonics

Uterotonics, used in combination with cord traction and uterine massage as part of AMTSL, are the primary interventions known to reduce the incidence of PPH. Oxytocics (oxytocin, ergometrine, and combinations of the two) and prostaglandins (e.g. misoprostol, carboprost) have various advantages and disadvantages; there is not yet an ideal agent for all low-resource settings.

Oxytocins

Oxytocin is the preferred uterotonic. It stimulates the smooth muscle tissue of the upper segment of the uterus causing it to contract rhythmically, constricting blood vessels, and decreasing blood flow through the uterus. It is a safe and effective first choice for treatment of PPH. Oxytocin may be IV or IM injected. It acts almost immediately for IV injections, and within 3 to 5 minutes for IM injections. For a sustained effect, IV infusion is preferred because it provides a steady flow of the drug. Uterine response subsides within 1 hour of cessation of IV administration. Ideally, oxytocin should be stored in a cool, dry place, such as a refrigerator at 2– 8°C. It may be stored at a controlled room temperature, (15°C to 25°C) for up to 30 days. After 30 days, it should be discarded because it can become unstable.

As described above, the usual dose given as part of AMTSL is 10 IU IM. This initial dose may be repeated after 15 to 20 minutes if heavy bleeding persists. Oxytocin may also be give by other routes including 5 units IV push OR 20–50 units in 1L of normal saline at 60 drops/minute. Oxytocin is also now available in a Uniject™ device developed by Program for Appropriate Technology in Health (PATH) for safer oxytocin administration where injection skills, lack of sterile equipment, and difficulty measuring correct dose are issues. The device comes as a single dose, individually packed prefilled, non-refillable, sterile injection that is easy to use, with a fixed needle that can be "activated" for use after opening the sterile packet. See Appendix 4 for product information. However, Uniject™ with oxytocin still requires the availability of a cold chain to maintain stability (Miller, et al 2004). Side effects with oxytocin are not common. They include nausea, vomiting, and headache.

- Carbetocin (Duratocin®)
For women who have had a cesarean section, carbetocin, a long acting oxytocin analogue, has been shown to decrease the incidence of PPH and the need for therapeutic oxytocics. The recommended dose of carbetocin is 100µg IM or IV bolus over 1 minute. The pharmacokinetics of both administration routes are almost the same. There is no evidence for its use in women who deliver vaginally, but few studies have been published (Dansereau, 1999: 451). Carbetocin should be used with caution in women with asthma or hypertension. Side effects include nausea, vomiting, diarrhea, hypertension, headache, flushing, and pyrexia. Consider using carbetocin instead of oxytocin for PPH associated with cesarean section, if it is available. If combined with other uterotonics, there is significant potential for an additive effect. Carbetocin has a limited role to play in low-resource settings because of cost and because it requires a continuous cold chain. Although it may remain stable at room temperature for five days, it is recommended to be kept at 2°C to 8°C.

Ergot alkaloids

Ergot alkaloids, such as ergometrine, methergine, or syntometrine, cause the smooth muscle of both the upper and lower uterus to contract tetanically. The usual dose of methergine or ergometrine is 0.2 mg IM. This initial dose may be repeated after 15 minutes, if heavy bleeding persists. After this second dose, subsequent doses may be repeated as required at intervals of two to four hours to a maximum of five doses or a total of 1.0 mg per day. It takes five to seven minutes to take effect when given intramuscularly, and has an effect lasting approximately 2 to 4

hours. Ergot alkaloids are contraindicated in women with hypertension or preeclampsia because they increase blood pressure. Adverse effects include nausea and vomiting. Ergot alkaloids should be stored in a refrigerator between 2°C–8°C and away from light. These storage requirements may make it inappropriate in certain clinical settings if they are not able to maintain a cool, dark environment. While often used in lower resource settings, without refrigeration, it can become unstable when stored at high temperatures, and therefore ineffective. Syntometrine is a combination of oxytocin 5 IU and ergometrine 0.5 mg, combining the effects of rapid acting oxytocin and the sustained action of ergometrine. Syntometrine may produce temporary hypertension and vomiting.

Prostaglandins

Prostaglandins work by causing vasoconstriction and enhancing contractibility of the uterine muscles.

- Misoprostol is safe and effective both as a treatment and prophylaxis (AMTSL) for PPH. It is available in 100 µg or 200 µg tablets that may be given orally, sublingually, or rectally for prevention or treatment of PPH. The usual dose is 400–600 µg. It acts more rapidly as an uterotonic when given orally or sublingually; however when the rectal route is used, it acts for a greater period of time. This may be useful, especially when there is a delay anticipated in the management of PPH. Rectal administration (800 to 1000 µg) is preferred if the woman is unable to take medications by mouth. Misoprostol may be used in addition to other uterotonics. It is relatively inexpensive, is easy to store, and is stable at room temperature. It is also easy to administer, and may be given by several different routes, depending on the needs of the woman and the preference of the health care provider. The side effects associated misoprostol, shivering and fever, are generally mild. These features make misoprostol an important option for areas of the world with limited access to health care resources (Derman, 2006: 188).
- Carboprost (Hemabate®)
This is a very effective drug in the treatment of a massive PPH due to uterine atony. The 0.25mg dose may be given IM or IMM and may be repeated every 15 minutes to a maximum dose of 2 mg. Side effects include nausea, vomiting, diarrhea, headache, hypertension and bronchospasm due to smooth muscle contraction as well as flushing, restlessness and oxygen desaturation. The following are contraindications to its use: major cardiovascular, pulmonary, renal or hepatic dysfunction. In spite of these potential risks, serious side effects are rare and most are self limiting. Carboprost must be refrigerated at 2° to 8° C (36° to 46° F).

Management of Primary Postpartum Hemorrhage

The management of PPH requires that all health care providers and the facilities that they work within are prepared with a well-established protocol; this is fundamental to safe care. Ensure that all health care providers involved in maternity care are familiar with the procedures and tools available to them to manage PPH. Ensure all maternal health care providers have access to necessary supplies and equipment to effectively respond to complications of pregnancy, birth, and the early postpartum. Remember that delay in accessing appropriate treatment may result in death. Role play the management of emergencies to become familiar with procedures and tools, and to develop a standardized approach to maternal and/or neonatal resuscitation.

General skills required for the management of PPH include administering necessary drugs, setting up and monitoring intravenous transfusions, maintaining fluid balance, taking blood samples for analysis including type and cross-match, setting up and monitoring blood transfusions, urinary catheterization, and developing and maintaining health care records; the later is especially important for the safe referral and transfer of women experiencing complications. See Appendix 7 for information on referral and transfer. See Chapter 7, Infections, for information on universal precautions for prevention of infection.

Specific skills for the prevention and management of primary postpartum hemorrhage

Prevention

- Identification and management, if possible, of the factors that place woman at risk for PPH
- AMTSL

Management

- External and internal bi-manual uterine massage
- Aortic compression
- Umbilical vein injection (injection of uterotonic into the umbilical cord attached to the undelivered placenta)
- Manual exploration of the uterus and manual removal of the placenta
- Repair of perineal trauma including repair of episiotomy
- Repair of cervical and high vaginal tears
- Use of an anti-shock garment to treat shock
- Use of a hydrostatic balloon tamponade
- Uterine compression sutures
- Systematic pelvic devascularization
- Uterine artery embolization
- Total or sub-total hysterectomy.

Description of Interventions to Manage Primary Postpartum Hemorrhage by Practice Site or Level of Care

To facilitate the decision-making process, the required interventions to manage PPH have been presented according to four levels of care:

1. Community setting without skilled attendant
2. Community setting with skilled attendant
3. District or referral hospital
4. Tertiary care or university hospital

As the primary cause of PPH is uterine atony, the first interventions described are those that address management of an atonic uterus. This is followed by descriptions of interventions that address retained tissue, trauma, and coagulopathy.

1. Community setting <u>without</u> skilled attendant
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Apply AMTSL.

REMEMBER the ABCs. (A=airway, B=breathing, C=circulation. Ensure the woman's airway is open, that she is breathing and that her blood is circulating, i.e. she has a pulse. Be ready to perform cardio-pulmonary resuscitation (CPR))

- Talk with the woman.
- Monitor her vital signs.
- Elevate her legs to increase return of blood to the heart.

Call for HELP from an individual who is culturally appropriate to the community and the family.

Estimate blood loss.

Ask the woman to urinate.

Put the baby to the breast or stimulate the nipples manually to stimulate natural production of oxytocin.

Compress the uterus using external bimanual massage.

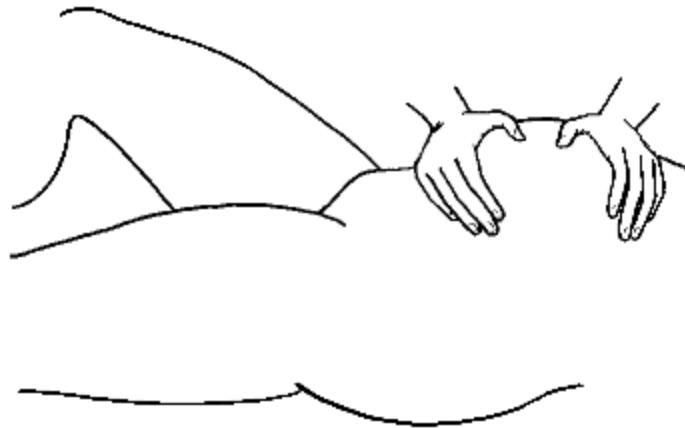


Figure 3 - External bimanual massage

Adapted from: *Managing Postpartum Haemorrhage: Education Material for Teachers of Midwifery*, Second Edition. Geneva: World Health Organization, 2006.p. 157. Available from: http://whqlibdoc.who.int/publications/2006/9241546662_5_eng.pdf

Give uterotonic:

Oxytocin 10 units IM (Uniject™: See Appendix 4 for product information.)

OR

Misoprostol

- 400–600 µg oral

OR

- 400 µg sublingual

OR

- 800 to 1000 µg rectal

Observe the condition of the woman:

If she is pale, sweaty, or dizzy, place her on a flat surface with her feet higher than her head.

Keep the woman warm; cover her with a blanket even if it is hot outside.

If bleeding does not stop, prepare her for transfer to the next level of care.

- Attempt to stabilize her by giving oral fluids, if she is conscious. Give oral rehydration solution (ORS) by mouth if available.
- Continue external uterine massage.
- Arrange transportation.
- Gather people who can go with the bleeding woman and who may be available to provide fresh blood for transfusion, if necessary.

The birth attendant should accompany the woman during transfer.

See Appendix 7 for more information on planning for referral and transport.

Note: All birth attendants should have a “job aid” in their delivery kit. A job aid is a simple picture describing PPH management.

2. Community setting with a skilled attendant (basic emergency obstetrical care)

Have a PPH management protocol poster displayed in the maternity or case room.

Apply AMTSL.

REMEMBER ABCs.

- Talk with the woman.
- Monitor vital signs.
- Elevate the legs to increase return of blood to the heart.

Call for HELP from an individual who is culturally appropriate to the community and the family to assist with the emergency:

- Request a third person to care for the baby.
- Call for help to arrange referral and transfer, including arranging transportation, if necessary.
- Call for friends and relatives to start getting people ready to provide blood,

Estimate or measure the actual blood loss.

Place the woman on a flat surface, such as a delivery table or birthing bed, with her feet higher than her head.

Ask the woman to urinate. If she is unable to urinate, catheterize her bladder.

Start oxygen, if available.

Give uterotonic:

Oxytocin

- 10 units IM (Uniject™)
- OR
- 5 units IV push
- OR
- 20-50 units in 1L of normal saline at 60 drops/minute
- OR

Ergometrine

- 0.2 mg IM every five minutes until bleeding is under control up to maximum of five doses maximum cumulative dose of 1.0 mg per day
- hypertension is a relative contraindication because of the risk of stroke and/or hypertensive crisis
- contraindicated with concomitant use of certain drugs used to treat HIV (e.g. protease inhibitors, non-nucleoside reverse transcriptase inhibitors)

OR

Syntometrine (1 ampoule) IM

OR

Misoprostol

- 400–600 µg oral
- OR
- 400 µg sublingual
- OR
- 800 to 1000 µg rectal

Determine the source of bleeding.

Assess the fundus.

If boggy, compress the uterus using external bi-manual massage.

If atonia persists, consider internal bimanual massage:

- Wear a sterile glove.
- Introduce your right hand into the vagina, clench your fist, with the back of your hand directed posteriorly and your knuckles in the anterior fornix.
- Place your other hand on the abdomen behind the uterus and squeeze the uterus firmly between your two hands.
- Massage the uterus between your gloved hand in the vagina against the cervix and your other hand on the fundus. See Figure 4.

- Continue compression until bleeding stops (there is no bleeding when compression is released).
- If bleeding persists, apply aortic compression and prepare the woman for transfer to a higher-level facility.

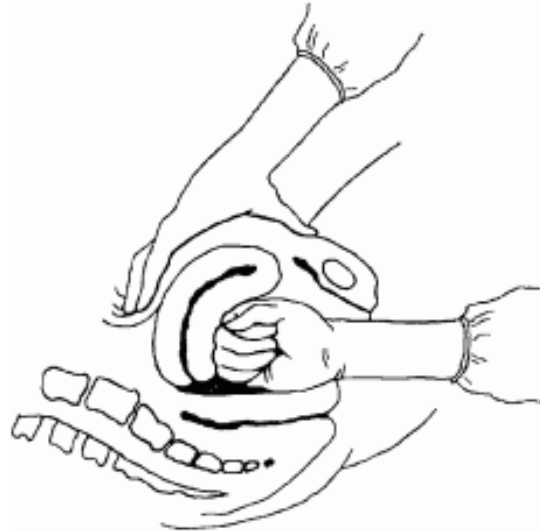


Figure 4 - Bimanual compression of the uterus

Reproduced from: *Managing complications in pregnancy and childbirth: a guide for doctors and midwives*. Geneva: World Health Organization; 2003. Available from: <http://www.who.int/reproductive-health/impac/mcpc.pdf>.

Have an assistant re-examine the placenta to ensure it is complete. If the placenta and membranes appear incomplete, consider exploration of the uterus at this stage to rule out retained products. This procedure may also identify a uterine inversion or uterine rupture. Manual exploration of the uterus is similar to the technique used for removal of a retained placenta, which is described below.

Examine the placenta

A healthy full-term placenta is:

- Blue-red in colour
- Flat and circular in shape
- 15–20 cm in diameter
- 2–4 cm thick
- 400–600 g in weight (15% of normal neonatal weight)

Examine the mother's side first by wiping away any clots. Hold the placenta in your hands so that it spreads out; look to see if there are any areas that look torn and/or are continuing to bleed. It is difficult to confirm retained pieces of the placenta and cotyledons by visual inspection. Areas that are bleeding suggest that there are pieces of placenta and cotyledons that are still in the uterus. Cup the placenta in your hands and check to see if these torn areas join evenly and match up. Wipe away any blood, and re-check very carefully for missing pieces; **if there is bleeding, it is probable that there are retained placental fragments**. Check all along the edges to see that nothing appears to have been torn away.

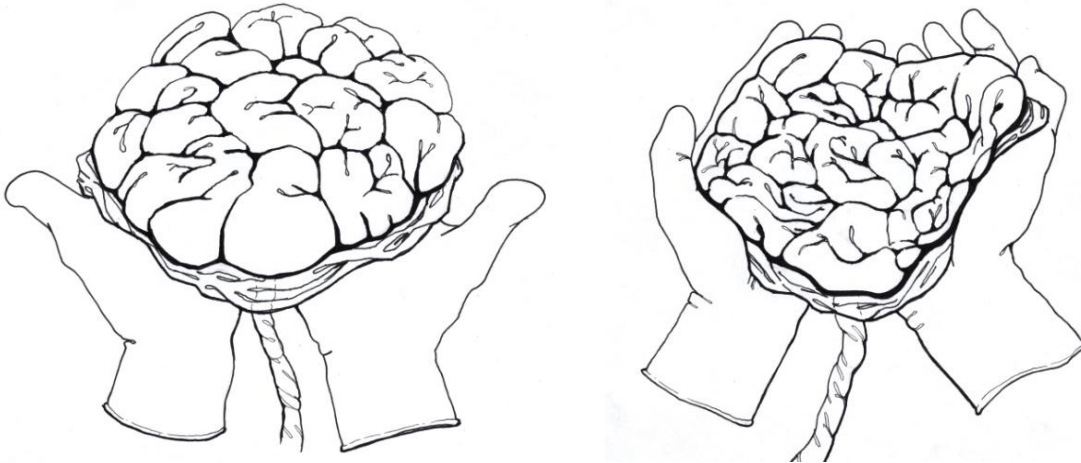


Figure 5a - Examining the maternal side of the placenta

Examine the fetal side by turning the placenta over. Check the number of blood vessels in the cord; there should be three tiny holes at the cut end, two arteries, and one vein. Look for where the cord joins the placenta; it is usually in the center. Sometimes it is at the edge. Very rarely, the vessels are suspended in the membranes. Check to see that there are no vessels that look torn at the edge of the placenta. Hold up the membranes; the membranes should form a bag with a hole through which the baby was born.

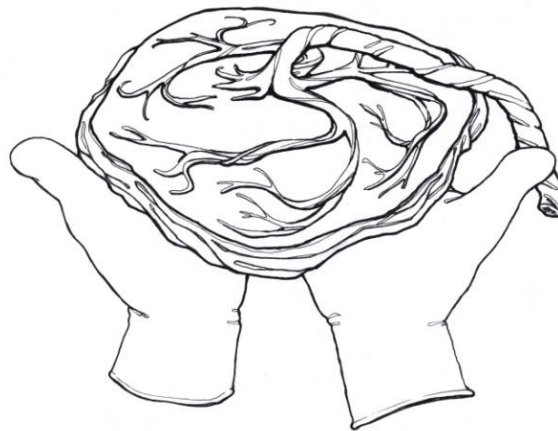


Figure 5b - Examining the fetal side of the placenta

Retained placental fragments (pieces) including pieces of membrane may cause continued bleeding. Even a small piece of placental tissue can cause severe hemorrhage. These pieces of tissue may have to be removed manually. Sometimes, these pieces are sitting at the opening of the cervix, other times they are inside the uterus.

Retained Placenta

In a term pregnancy, the normal third stage of labour lasts 10 to 15 minutes. It is considered prolonged when the placenta has not delivered within the first 30 to 60 minutes after the birth of the baby. Between 30 and 45 minutes following the birth, spontaneous delivery of the placenta can be expected in 20% to 30% of cases. In a minority of cases, the placenta will deliver between 45 and 60 minutes of the delivery. Beyond 60 minutes, spontaneous placental delivery is highly unlikely. AMTSL will shorten the usual length of third stage labour, but some placentas will still not deliver within the first 30 minutes following the birth.

Because the incidence of PPH increases when the duration of the third stage of labour exceeds 30 minutes, it seems sensible to intervene during this risk period, i.e. between 30 and 60 minutes into the third stage. It is important to differentiate between a retained, adherent placenta and a placenta that has separated but has not yet delivered.

Assessment

If the placenta has not delivered within the first 30 minutes after the birth, ensure that the woman's bladder is empty. Ask the mother to urinate or catheterize the bladder if necessary. Often getting into an upright position to squat over a bowl or absorbent pads or cloths will bring on uterine contractions resulting in spontaneous delivery of the placenta.

If the placenta still has not delivered:

- Performing a visual inspection of the introitus may reveal the placenta sitting just inside the vagina. If you can see the placenta, ask the woman to push it out.
- If the placenta is not immediately visible, a vaginal examination may reveal the placenta sitting in the upper vaginal vault. In that case, if the uterus is well contracted, you may be able to deliver the placenta using controlled cord traction while applying suprapubic counter-pressure on the uterus with the other hand. This will usually result in delivery of the placenta.

Note: *Avoid forceful cord traction and fundal pressure as they may cause uterine inversion.*

- If the placenta is **still not expelled**, give oxytocin 10 units IM if not already done for AMTSL. Proceed with delivery of the placenta following the same steps as for AMTSL:
 - Keep slight tension on the cord while waiting for a strong uterine contraction (approximately 2–3 minutes)
 - With the strong uterine contraction, encourage the mother to push, and very gently pull downward and outward on the cord to deliver the placenta while applying suprapubic counter-pressure on the uterus with the other hand.
 - If the placenta does not descend during 30–40 seconds of controlled cord traction, do not continue to pull on the cord:
 - Continue to gently hold the cord, and wait until there is another strong contraction.
 - With the next contraction, repeat controlled cord traction with counter-pressure.
 - **Never** pull on the cord when the uterus is not contracted.
 - The risk of uterine inversion is increased whenever the uterus is not well contracted.

Do **NOT** give ergot alkaloids because they cause tonic uterine contractions, which may delay expulsion of the placenta.

If the placenta is still undelivered after these steps, consider intra-umbilical vein injection in the absence of bleeding or manual removal of the placenta with active bleeding.

Intra-umbilical Vein Injection

Intra-umbilical vein injection is an inexpensive, effective, and non-invasive method that has been described as a useful technique to assist the delivery of a retained placenta when administration of systemic uterotonics, combined with controlled cord traction, have failed to deliver the placenta. It is a relatively easy technique to learn, and therefore is a viable method of management of prolonged third stage of labour in the absence of hemorrhage. Introduction of this technique for management of retained placenta is likely to reduce maternal mortality when manual removal of the placenta is not an immediate option or where travel to a health care facility with adequate resources for manual removal of the placenta is not immediately possible.

Intra-umbilical vein injection has been studied to determine the most effective method of administration of the solution as well as the efficacy of normal saline alone or in combination with different uterotonics. The most effective technique involves insertion of a feeding tube or urinary catheter into the umbilical vein to administer the uterotonic. This results in improved delivery of the medications to the placental bed (Pipingas, 1993). The most effective uterotonic solution is 800 µg misoprostol dissolved in 30 ml of normal saline (Rogers, 2007).

Step-by-step technique

1. Explain the procedure to the woman, and obtain and document her consent.
2. Dissolve 800 µg misoprostol in 30 ml normal saline solution in a 50 ml syringe under aseptic conditions. This will produce a cloudy solution.
The medicated solution can be prepared in advance and stored up to 3 days in a refrigerator at 2– 8°C. If not used within this time period, it should be discarded and replaced.
3. If the umbilical vein is not easily visualized, re-cut the end of the umbilical cord.
4.
 - a. Insert a size 10 nasogastric suction catheter along the umbilical vein until the most of the catheter has been inserted and resistance is felt, indicating that the catheter tip has reached the placenta.
 - b. Withdraw the catheter 3 to 4 cm to ensure the tip is in the umbilical vein and not in a branch of the placental circulatory system.
 - c. If resistance is felt before most of the catheter has been inserted, withdraw the catheter 1–2 cm and then attempt to advance it further. If the catheter cannot be advanced further, inject the medicated solution from this position.
5. Attach the syringe filled with the medicated solution to the catheter, and inject the solution.
Alternately, attach a needle to the syringe and inject the medicated solution into the catheter. Clamp the umbilical cord with the catheter in situ.
6. Note the time of injection of the medicated solution.
The placenta will likely deliver within the next 10 to 30 minutes.

If the placenta does not deliver within 30 minutes from the time of injection of the medicated solution or if significant bleeding occurs proceed to manual removal of the placenta.

Manual Removal of the Placenta

When the placenta has not delivered and there is bleeding, immediate action to deliver the placenta is required.

Manual removal of the placenta is a life-saving procedure. It is an invasive procedure associated with increased risk of infection, perforation of the uterine wall, or genital tract trauma. For these reasons, it should NOT be done routinely or prophylactically. The procedure may increase the risk of complications rather than prevent them. The procedure is painful, and wherever possible an appropriate analgesic should be used. The same technique is used to determine if there are retained placental fragments and remove them.

Explain the procedure to the woman; if she is conscious, obtain and document her consent.

Assign someone to provide emotional support throughout the procedure, especially if no pain relief is available.

Step-by-step technique

1. Wearing sterile gloves insert your dominant hand (the one you write with) into the vagina and follow the umbilical cord up into the uterus. See Figure 6a.

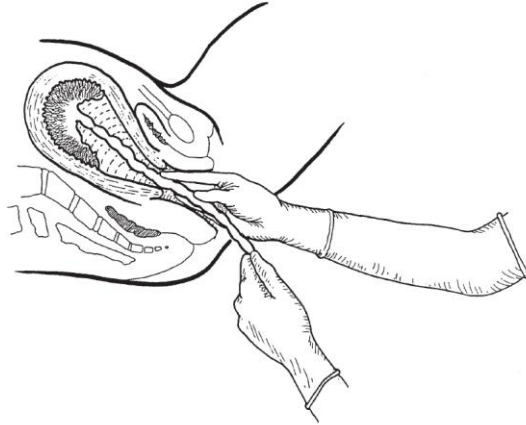


Figure 6a - Manual removal of the placenta

Adapted from: *Managing Postpartum Haemorrhage: Education Material for Teachers of Midwifery*, Second Edition. Geneva: World Health Organization, 2006.p. 173. Available from: http://whqlibdoc.who.int/publications/2006/9241546662_5_eng.pdf

2. At the same time, place your second hand (the non-dominant hand) up over the abdomen in order to support the fundus of the uterus. This provides counter-traction during exploration and prevents inversion of the uterus.
3. Gently palpate (feel around) the inside of the uterine cavity to ensure that all placental tissue has been delivered.

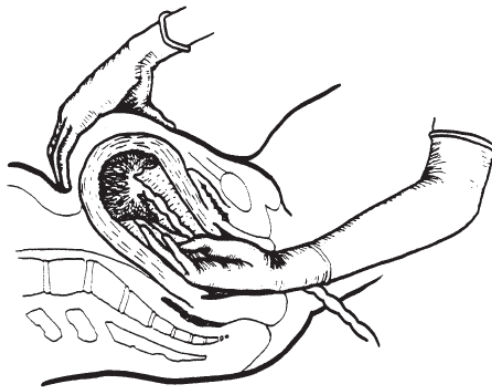


Figure 6b - Manual removal of the placenta

Adapted from: *Managing Postpartum Haemorrhage: Education Material for Teachers of Midwifery*, Second Edition. Geneva: World Health Organization, 2006.p. 173. Available from: http://whqlibdoc.who.int/publications/2006/9241546662_5_eng.pdf

4. If placental fragments are found, explore the entire cavity of the uterus until a line of cleavage (the edge of the placenta where it meets the wall of the uterus) is identified between the placenta and the uterine wall.

5. To detach the placenta, placental lobes (cotyledons), or fragments from the implantation site, keep your fingers tightly held together and use the edge of the hand to gradually make a space between the placenta and the uterine wall.

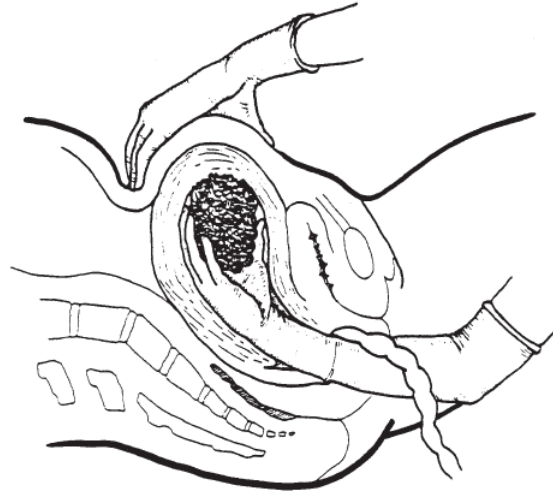


Figure 6c - Manual removal of the placenta

Adapted from: *Managing Postpartum Haemorrhage: Education Material for Teachers of Midwifery*, Second Edition. Geneva: World Health Organization, 2006.p. 174. Available from:

http://whqlibdoc.who.int/publications/2006/9241546662_5_eng.pdf

6. Proceed slowly all around the placental bed until the whole placenta, placental lobe, or fragment(s) feel as if they have been peeled or detached from the uterine wall.
7. Slowly withdraw your hand from the uterus while holding the placental lobe or fragment(s)
8. At the same time, use your other hand to provide counter-pressure to the fundus by pushing it in the opposite direction of the hand that you are withdrawing.
9. Following removal of the placenta or placental lobe, examine it for completeness.

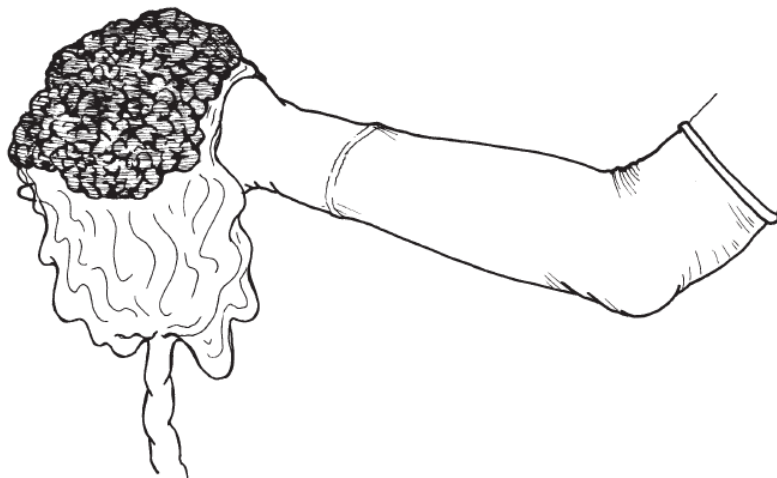


Figure 6d - Manual removal of the placenta

Adapted from: *Managing Postpartum Haemorrhage: Education Material for Teachers of Midwifery*, Second Edition. Geneva: World Health Organization, 2006.p. 174. Available from:

http://whqlibdoc.who.int/publications/2006/9241546662_5_eng.pdf

If you have difficulty separating the placenta from the uterine wall, suspect placenta accreta and refer the woman to a higher-level health facility for laparotomy. She may require a sub-total hysterectomy. No bleeding will occur from the uterine wall if the placenta remains attached to the uterus. Bleeding will only occur from areas where the placenta has separated. More information about placenta accreta is found later in this chapter.

Following manual uterine exploration, administer an uterotonic such as oxytocin or misoprostol, and consider prophylactic antibiotic therapy.

Dispose of the placenta in a correct, safe, and culturally appropriate manner.

Trauma

If the fundus is firm and bleeding continues, evaluate for evidence of trauma:

- Examine the upper vaginal tract and repair any tears.
- Examine the genital area for tears, apply pressure to slow or stop bleeding, and repair if necessary.

If bleeding does not stop, and/or the woman requires further care, prepare the woman for transfer to the next available level of care, if possible.

Start or continue IV with a large bore catheter, preferably 16 gauge or larger.

- Infuse 1 litre normal saline (NS) with oxytocin 20 units/L.
- If exhibiting symptoms of shock: systolic BP 90 mmHg, pulse >110, or with heavy vaginal bleeding:
 - Infuse 1 litre NS in 15-20 minutes (as rapidly as possible).
 - Infuse 1 litre NS in 30 minutes at 30ml/minute. Repeat if necessary.
 - Reduce infusion rate to 3 ml/minute to 1 litre NS in 6–8 hours, when shock symptoms begin to resolve.
- If intravenous access not available or not possible
 - Give ORS by mouth if able to drink, or by nasogastric tube.
 - Quantity of ORS: 300 ml to 500 ml in one hour.

Consider these potentially life-saving procedures for uterine atony, if the required materials and expertise is available:

Hydrostatic intrauterine balloon tamponade

- i. Condom or glove tamponade
“This is a ‘balloon’ made of a rubber glove, condom, or other device [that] is attached to [a] rubber urinary catheter and is [then] inserted into the uterus under aseptic conditions. This device is attached to a syringe and filled with sufficient saline solution, usually 300 ml to 500 mL, to exert enough counter-pressure to stop bleeding. When the bleeding stops, the care provider folds and ties the outer end of the catheter to maintain pressure. An oxytocin infusion is continued for 24 hours. If bleeding persists, add more saline solution. If bleeding has stopped and the woman is in constant pain, remove 50 ml to 100 mL of the saline solution. The ‘balloon’ is left in place for 24 to 48 hours; it is gradually deflated over two hours, and then removed. If bleeding starts again during the deflating period, re-inflate the balloon tamponade and wait another 24 to 48 hours before trying to deflate a second time. A balloon tamponade may arrest or stop bleeding in 77.5% to 88.8% or more cases without any further need for surgical treatment.” (Lalonde, FIGO 2006: 246)
- ii. Bakri SOS balloon
This specialized device works as an intrauterine tamponade. It is costly and may not be suitable for lower-resource settings.
- iii. Rusch urological hydrostatic balloon
OR
- iv. Sengstaken-Blakemore esophageal catheter
The Rusch urologic hydrostatic balloon catheter and the Sengstaken-Blakemore esophageal catheter have been used to control hemorrhage unresponsive to uterotonics. Both work by creating pressure within the uterus to stop bleeding. However, they are both expensive and not available in many low-resource countries.

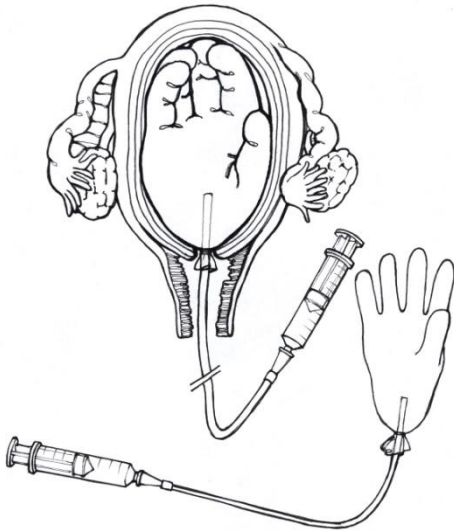


Figure 7a - Hydrostatic intrauterine balloon tamponade, glove

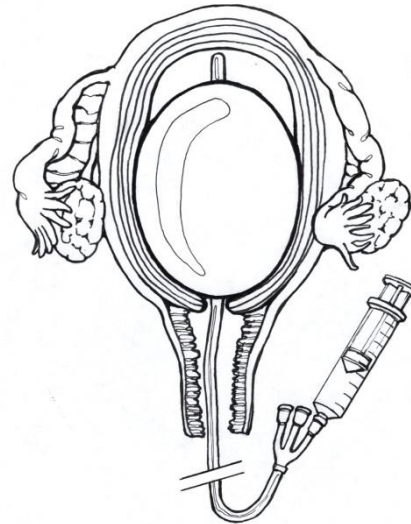


Figure 7b - Hydrostatic intrauterine balloon tamponade, Bakri SOS Balloon

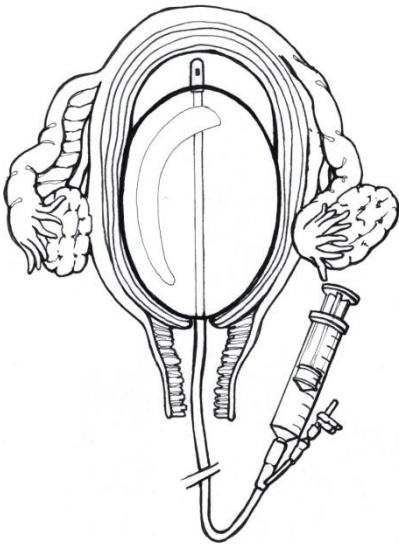


Figure 7c - Rusch urological hydrostatic balloon

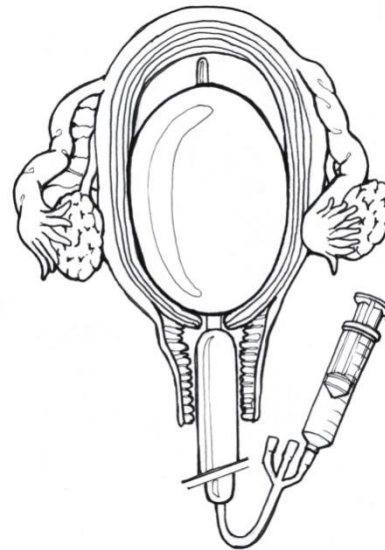


Figure 7d - Sengstaken-Blakemore esophageal catheter

Anti-shock garment to treat shock

Anti-shock garments work through application of counter-pressure to the lower body which may reverse shock by returning blood to the vital organs, thereby restoring consciousness, pulse, and blood pressure; slowing blood flow to the lower body; and decreasing bleeding.

The non-pneumatic anti-shock garment, (NASG), also known as medical anti-shock trousers, is a USFDA-approved obstetrical first aid device (Tsu, 2004). The neoprene reusable trousers attach with Velcro closures. They are relatively inexpensive (\$150.00US), can be reused up to 100 times, can be applied rapidly by one person, are lightweight, and do not require sterilization.

Use of the NASG:

Begin application of NASG with segment 1 at the ankles. Apply each segment numerical order. Segment 4 is applied just above symphysis pubis.

Criteria for Removal:

Hgb 7.5 and stable vital signs for 2 hours

Removal of the NASG:

- START AT ANKLES
- Wait 15 minutes between removing each segment
- Check vital signs before removing the next segment

Do not continue with REMOVAL (stop) of the NASG if:

- BP decreases by 20 mm Hg
- OR
- Pulse increases by 20 beats per minute

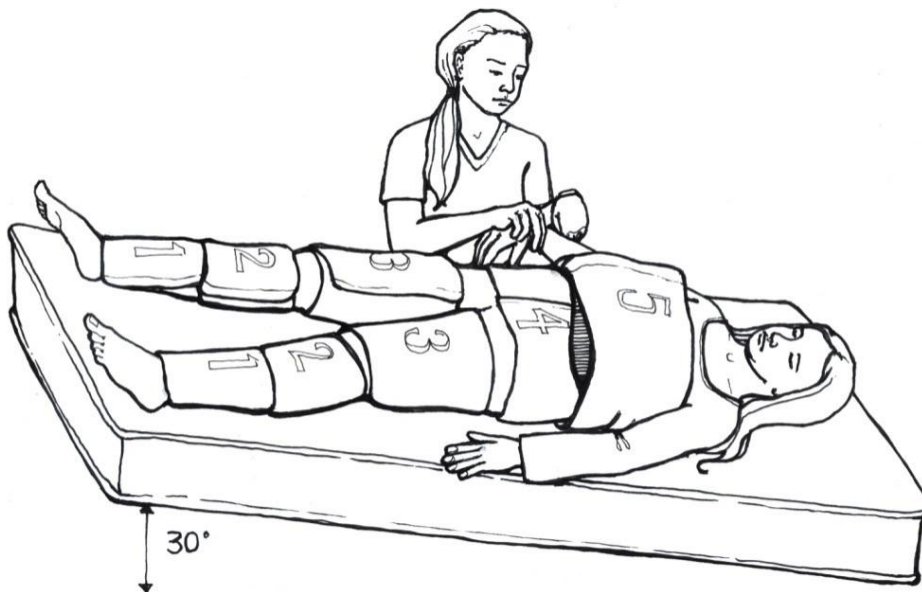


Figure 8 - Anti-shock garment

Aortic compression

Aortic compression is a life saving intervention when there is a heavy bleeding, whatever the cause. It may be considered at several different points during management of PPH. Aortic compression does not prevent or delay any of the other steps to be taken to clarify the cause of PPH and remedy it. Circulating blood volume is restricted to the upper part of the body and thereby to the vital organs. Blood pressure is kept higher, blood is prevented from reaching the bleeding area in the pelvis, and volume is conserved. Initially, the most qualified person at hand may have to carry out the compression to stop massive bleeding. As soon as possible, this technique is assigned to a helper so the most qualified person is not tied up and interventions delayed. While preparing for a necessary intervention, blood is conserved by cutting off the blood supply to the pelvis by the compression.

Step-by-step technique

1. Explain the procedure to the woman, if she is conscious, and reassure her.
2. Stand on the left side of the woman.
3. Place right fist just above and to the left of the woman's umbilicus.
4. Lean over the woman so that your weight increases the pressure on the aorta. You should be able to feel the aorta against your knuckles. Do not use your arm muscles; this is very tiring.
5. Before exerting aortic compression, feel the femoral artery for a pulse using the index and third fingers of the left hand.
6. Once the aorta and femoral pulse have been identified, slowly lean over the woman and increase the pressure over the aorta to seal it off. To confirm proper sealing of the aorta, check the femoral pulse.
7. There must be no palpable pulse in the femoral artery if the compression is effective. Should the pulse become palpable, adjust the right fist and the pressure until the pulse is gone again.
8. The fingers should be kept on the femoral artery as long as the aorta is compressed to make sure that the compression is efficient at all times.

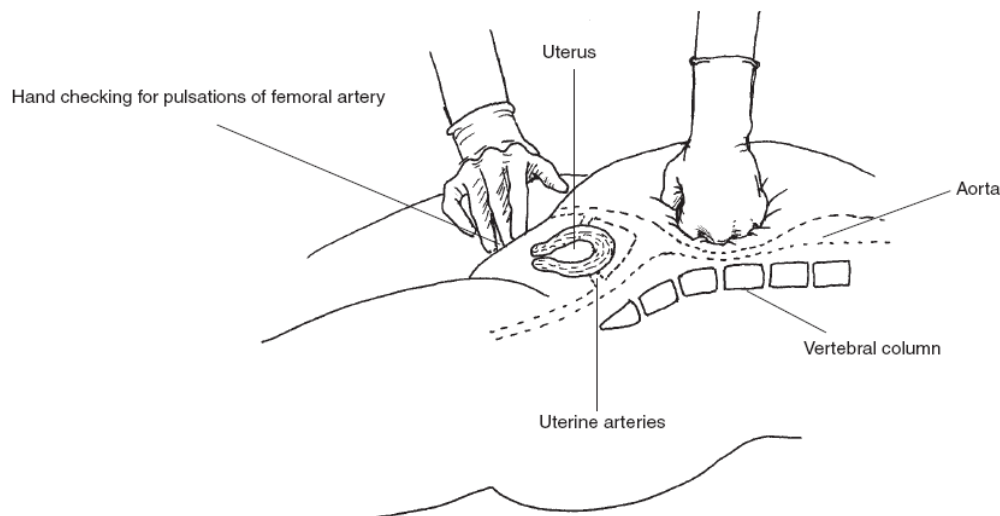


Figure 9 - Compression of abdominal aorta and palpation of femoral pulse

Adapted from: Managing Postpartum Haemorrhage: Education Material for Teachers of Midwifery, Second Edition. Geneva: World Health Organization, 2006.p. 128. Available from: http://whqlibdoc.who.int/publications/2006/9241546662_5_eng.pdf

Note 1: Aortic compression may be used to stop bleeding at any stage. It is a simple life-saving skill to learn.

Note 2: Ideally, the birth attendant should accompany the woman during transfer.

3. District or referral hospital

Display a PPH management protocol poster in the maternity or case room.

Apply AMTSL.

Remember the ABCs.

Perform any of the procedures described above that are applicable.

If these procedures have not stopped the bleeding, consider:

- Use of intrauterine tamponade for diagnosis and treatment
- Apply anti-shock garment, if not already done.
- Give blood transfusion, if resources available (consider asking family members to donate blood).
- Perform surgical repair of vaginal and cervical tears.

If unable to control the bleeding or if expertise or specialized resources are unavailable, prepare the woman for referral and transfer to next level health care facility,

4. Tertiary care or university hospital

Display a PPH management protocol poster in the maternity or case room.

Apply AMTSL.

Remember the ABCs.

Perform any of the procedures described above that are applicable.

Replace lost fluid volume with fresh blood or blood products.

If these procedures have not stopped the bleeding, consider the following procedures depending on the severity of the bleeding and the condition of the woman:

- Laparotomy to apply compression sutures using B-Lynch or Cho techniques (See Appendix 8 for more details)
- Systematic pelvic devascularization : Uterine and utero-ovarian artery ligation (See Appendix 9 for more details)
- Interventional radiology: Uterine artery embolization
Selective arterial embolization may be useful in situations where preservation of fertility is desired. The procedure requires immediate access to radiological expertise. The time required to organize and complete the procedure in an emergency may make it a non-viable option. Rare complications include blood vessel perforation, hematoma formation, infection, allergic reactions to contrast dyes used as part of the procedure, and uterine necrosis.
- Hysterectomy (sub-total or total)
Although a last resort, hysterectomy must be considered prior to the progression of hemorrhage to the point of cardiovascular collapse. Sub-total hysterectomy may be effective for bleeding due to uterine atony, and is associated with less morbidity and mortality. However, it may not be effective in controlling bleeding from trauma to the lower segment, cervix, or upper vaginal tract.

Serious Complications Associated with Significant Blood Loss

Coagulopathy

Clotting failure may occur both as a cause of and as a result of massive PPH. Coagulopathy may follow abruptio placenta, intrauterine death, septic shock, severe preeclampsia and eclampsia, amniotic fluid embolism, or other occurrences. See Chapter 10, Coagulation and Hematological Disorders in Pregnancy for more information on disseminated intravascular coagulation.

If bleeding continues and is originating from a firm uterus:

- Evaluate for an acquired coagulopathy.
- Assess clotting status using a bedside clotting test. Failure of a clot to form after 7 minutes or a soft clot that breaks down easily suggests coagulopathy.

Technique

1. Take 2 ml of venous blood into a small, dry, clean, plain glass test tube (approximately 10 mm H 75 mm).
2. Hold the tube in your closed fist to keep it warm (+37°C)
3. After 4 minutes, tip the tube slowly to see if a clot is forming. Then tip it again every minute until the blood clots and the tube can be turned upside down;
4. Failure of a clot to form after 7 minutes or a soft clot that breaks down easily suggests coagulopathy.

If coagulation is abnormal:

- If available, correct with fresh frozen plasma, cryoprecipitate, platelets, and packed red blood cells.
- If NOT available, give fresh blood.

If the coagulation is normal:

- Continue with intrauterine tamponade for 24 to 48 hours, or if applicable, during transfer to next available level of care.
- Prepare for the operating room, if tamponade is unsuccessful
- Rule out uterine rupture or inadequately repaired incision.
- Consider compression sutures (B-Lynch or Cho technique) artery ligation or embolization.
- Consider total or sub-total hysterectomy.

Clotting failure following very heavy blood loss may be prevented by restoring blood volume promptly with an IV infusion of normal saline or Ringer's lactate.

Uterine inversion

Uterine inversion occurs rarely, approximately 1 in every 25,000 deliveries. It is often iatrogenic, meaning it is caused by health care providers, often resulting from overly vigorous umbilical cord traction. Uterine inversion is more common in grand multiparous women.

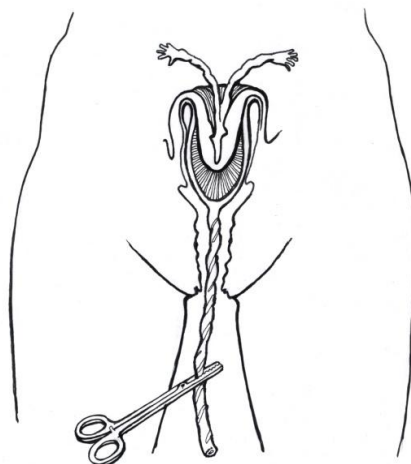


Figure 10 - Uterine inversion caused by excessive cord traction

A large, purplish mass appears at the introitus. The placenta may still be attached. The woman will quickly become unstable. She may experience bradycardia caused by increased vagal tone. The uterus must be replaced promptly, without removing the placenta if it is attached. Administration of a uterine relaxant may facilitate this manoeuvre.

Replacement is by “last out, first in,” with pressure applied around the leading point. An exploratory laparotomy for replacement may be useful if manual replacement fails, when and where expertise and resources exist.



Figure 11 - Replacement of the uterus

Following replacement of the uterus:

- Add 20 IU oxytocin to IV fluids (normal saline or Ringer’s lactate) at 10 drops per minute.

If the uterus does not contract after adding oxytocin to the IV fluid, give either:

- Ergometrine (0.2 mg) IM

OR

- Misoprostol (400-600 µg oral OR 400 µg sublingual OR 800 to 1000 µg rectal)

Give a single dose of prophylactic antibiotics:

- Ampicillin 2 g IV PLUS metronidazole 500 mg IV

OR

- Cefazolin 1 g IV PLUS metronidazole 500 mg IV.

If there are signs of infection or the woman currently has fever, give a combination of antibiotics until she is fever-free for 48 hours:

- Ampicillin 2 g IV every 6 hours

PLUS

- Gentamicin 5 mg/kg body weight IV every 24 hours

PLUS

- Metronidazole 500 mg IV every 8 hours

Uterine rupture

Uterine rupture is most common in women who have had a prolonged and/or obstructed labour and in women with prior uterine surgery. It may also occur in grand multiparous women and in women undergoing induction or augmentation. In See Chapter 4, Management of Labour, for more information on the prevention of uterine rupture due to prolonged and obstructed labour.

The signs and symptoms associated with rupture of the uterus include:

- Severe shock (rapid, weak pulse, low blood pressure, pallor, sweating, rapid breathing, anxiousness, confusion or unconsciousness, scanty urine output)
- Collapse
- Marked abdominal tenderness
- Abdominal distension
- Abnormal uterine contour (during labour or birth)
- Easily palpable fetal parts (during labour or birth)
- Absent fetal heart sounds and movements (during labour or birth)
- Maternal tachycardia

Following vaginal delivery, a defect or opening in the uterine wall may be palpated on manual removal of a placenta or manual exploration of the uterus for possible retained placental fragments. If the woman is not bleeding and is stable, the discovery of a dehiscence of old uterine scar needs no treatment. Routine exploration of the uterus is NOT indicated after vaginal delivery after cesarean section when there is no abnormal bleeding.

Vigorous resuscitation is promptly required. Emergency laparotomy is indicated. Where operating facilities do not exist, consult, refer, and arrange immediate transfer to the most appropriate health care facility. Use of an anti-shock garment is advised, if available.

Following repair of the uterus:

Give a single dose of prophylactic antibiotics:

- Ampicillin 2 g IV PLUS metronidazole 500 mg IV

OR

- Cefazolin 1 g IV PLUS metronidazole 500 mg IV.

If there are signs of infection or the woman currently has fever, give a combination of antibiotics until she is fever-free for 48 hours:

- Ampicillin 2 g IV every 6 hours

PLUS

- Gentamicin 5 mg/kg body weight IV every 24 hours

PLUS

- Metronidazole 500 mg IV every 8 hours

Before discharge from the health care facility:

- Provide family planning counseling.
- Provide education about the increased risk of uterine rupture in future pregnancies; if the woman wishes to have more children, advise her to have elective cesarean section for future pregnancies.
- If the ruptured uterus could not be conserved, provide culturally appropriate counselling and support related to loss of fertility.

Placenta accreta

Placenta accreta is most common in women with prior uterine surgery especially when the placenta was attached on the anterior wall of the uterus. Women with placenta previa and grand multiparas are at risk of this complication, as well.

Placenta accreta commonly presents as a retained placenta. If the placenta seems adherent (stuck or unable to be removed) at the time of attempted manual removal of the placenta, consider placenta accreta. Appropriate resuscitation of the woman and prompt consultation are indicated. A hysterectomy may be indicated as a life-saving procedure. Where operating facilities do not exist, consult, refer, and arrange immediate transfer to the most appropriate health care facility.

Other variations of abnormal placental implantation are shown in Figure 12. The deeper the placenta is attached or embedded into the uterus, the greater is the probability of the need for a hysterectomy, and the greater the risk to the woman's life.

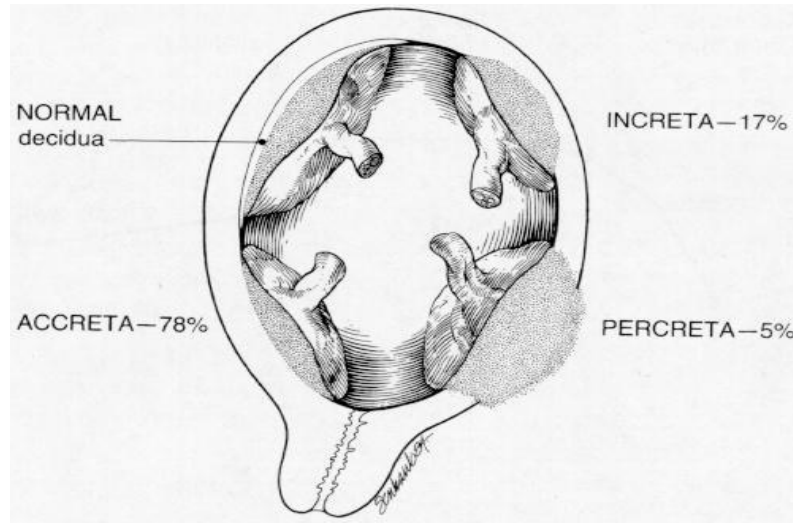


Figure 12 - Variations of abnormal placental implantation

Management of Secondary PPH

The primary causes of secondary hemorrhage include retained placental fragments or membranes, infection, shedding of dead tissue following an obstructed labour, and breakdown of a uterine wound after a cesarean section or ruptured uterus.

When the woman reports to the health care facility, proceed quickly.

- Assess the woman's condition carefully:
 - Temperature
 - Pulse
 - Respiration
 - Blood pressure
 - General condition (e.g. colour, level of consciousness, nausea, vomiting)
 - Amount of blood loss as well as lochia, presence of clots, membranes, tissue, smell, consistency, evidence of pus
 - Fluid intake and urinary output
- If it is still palpable, massage the uterus to bring about a contraction.
- If bleeding is significant, give oxytocin 10 IU IM to stimulate uterine contractions.
- If the woman is exhibiting signs of shock:
 - Start an IV infusion using normal saline or Ringer's lactate.
 - Infuse 1 litre (NS) in 15–20 minutes (as rapidly as possible).
 - Infuse 1 litre (NS) in 30 minutes at 30ml/minute. Repeat if necessary.
 - Reduce infusion rate to 3 ml/minute to 1 litre NS in 6–8 hours when shock symptoms begin to resolve.
 - If bleeding is significant, add 20 IU oxytocin per litre of IV solution, and run at 40 drops per minute.
 - If intravenous access not available or not possible:
 - Give ORS by mouth if able to drink, or by nasogastric tube.
 - Quantity of ORS: 300 to 500 ml in 1 hour.
- Take blood for hemoglobin, group and cross-match, if laboratory facilities are available.

- Perform a vaginal examination to rule out retained products of conception. If available, consider ultrasound.
 - a) If cervix is open, explore the uterus by hand and remove any retained placental fragments. This procedure is described in detail earlier in this chapter.
 - b) If the cervix is not open, prepare for manual vacuum aspiration to empty the uterus. This procedure is described in Chapter 8, Post-Abortal Care. If expertise or resources are not available, consult and transfer to the most appropriate facility.
- If there are signs of infection, such as fever or foul-smelling vaginal discharge, give antibiotics as follows:
 - Ampicillin 2 g IV every 6 hours
 - AND
 - Gentamicin 5 mg/kg body weight IV every 24 hours,
 - AND
 - Metronidazole 500 mg IV every 8 hoursContinue until the woman is free of fever for 48 hours.
- Provide anti-tetanus prophylaxis, if necessary
- If there is no improvement with the above treatments, refer the woman promptly for further assessment and treatment.

Continued Care of the Woman

Once the bleeding has been controlled, and the woman is stable, careful monitoring over the next 24–48 hours is required. Signs that the woman is stabilizing include a rising blood pressure—aim for a systolic blood pressure of at least 100 mm Hg— and a stabilizing heart rate—aim for a pulse under 90.

Adequate monitoring includes:

- Checking that the uterus is firm and well contracted, and remains contracted
- Estimating ongoing blood loss: To estimate bleeding accurately, put a sanitary napkin or other clean material under the woman's buttocks and ask her to extend her legs and cross them at the ankles for about 20–30 minutes: the blood will then collect in the area of the pubic triangle.
- Assessment of her vital signs:
 - Temperature
 - Pulse
 - Respiration
 - Blood pressure
 - General condition (e.g. colour, level of consciousness)
- Ensuring adequate fluid intake
 - After the woman has stabilized, IV fluids should be given at a rate of 1 litre in 4–6 hours.
 - If intravenous access not available or not possible, give ORS by mouth if able to drink, or by nasogastric tube. Quantity of ORS: 300 to 500 ml in 1 hour.
- Monitoring blood transfusion, including the volume of blood and other fluids that have been transfused. The transfused amount recorded as part of the fluid intake.
- Monitoring urinary output
- Keeping accurate records of the woman's conditions and any further interventions needed
- Ensuring the continuous presence of a skilled attendant, until bleeding is controlled, and her general condition is good

Before the woman is discharged from the health care facility, consider these interventions:

- Check her hemoglobin
- Give iron and folate supplementation as indicated by the woman's condition. Blood loss leads to depletion of iron stores in the body. Iron stores need to be replaced to prevent lactation failure, to prevent postpartum depression and fatigue, and to ensure the woman's ongoing health.
- Examine the woman for hookworm infestation, malaria, HIV/AIDS or other co-existing conditions that may make her recovery slower and more complicated. Treatment for these conditions will support her future health and well-being.

- Provide treatment where hookworm is endemic.
 - Albendazole 400 mg by mouth once
 - OR
 - Mebendazole 500 mg by mouth once, or 100 mg twice a day for three days.
- Provide the mother and her family with information about her experience of PPH, the probable reasons for its occurrence, prevention techniques in future pregnancies and deliveries, the importance of a skilled birth attendant at all future deliveries, and the need for adequate rest and nutrition for a good recovery.
- Ensure that lactation has been established. Breastfeeding is key to infant survival. If the woman is not able to produce adequate breast milk for her baby, alternative options may need to be considered. A healthy family member may be able to act as a wet nurse to provide some or all of the newborn's feeds. Breast milk substitutes may be advised if no one is available to wet nurse. This option may also be chosen by some women. If breast milk substitutes are used, it is essential for the long-term health and well-being of the newborn that ready access to formula and safe drinking water be provided.
- Educate the mother and her family about the importance of close monitoring of her baby to ensure adequate growth.

Anemia and Postpartum Hemorrhage

Anemia is a major concern when dealing with PPH. Most women with low hemoglobin have an iron deficiency. A blood loss of 500 cc in a woman that has a low hemoglobin can be catastrophic. It is for this reason that emphasis must be placed on iron supplement during the prenatal period. See the Appendix 1 in Chapter 10, Coagulation and Hematologic Disorders in Pregnancy, for more information on anemia.

Documentation

Every health care provider is responsible for documenting the condition of women under their care in a chart. This should include a summary of all interventions provided. The following elements may also serve as a template to dictate a delivery summary or consult letter:

Chart notes should be done as soon as possible after the emergency or incident.

- Date/Time of birth
- Name of Physician or other health care provider
- Performed AMTSL: YES/NO. Results:
- Time of Delivery of the Placenta: Spontaneous, by controlled cord traction, by umbilical vein injection or by manual removal
- Examination of Placenta and Membranes, and person who examined. Results:
- Estimated or Actual (Measured) Blood Loss
- Level of Hemoglobin Before and After Delivery
Treatment Offered: Iron and/or folate supplements and/or blood transfusion
- Spontaneous Urination or Catheterization
- Techniques Used to Stop Blood Loss
 - Administration of uterotonics
 - Type, Route, Dose: _____ Results:
 - External Uterine Massage: YES/NO. Results:
 - Bimanual Uterine Massage: YES/NO. Results:
 - Umbilical Vein Injection: YES/NO. Results:
 - Manual Removal of the Placenta: YES/NO. Results:
 - Repair of Upper or Lower Reproductive Tract Tears: YES/NO
 - Describe: _____
 - Balloon Tamponade: Type _____ Results:
 - Surgical Technique: Type _____ Results:
 - Cauterization Technique: Describe _____

- Measures Used to Resuscitate:
 - Administration of Oxygen
 - Positioning: left side
 - Administration of Intravenous Fluids
Describe: _____
 - Administration of Blood or Blood Products
Describe: _____
 - Use of Aortic Compression: YES/NO. Results:
 - Use of Anti-Shock Garment: YES/NO. Results:
- Transfer to another facility: YES/NO
Describe Rationale: _____
- Coagulopathy:
 - Bedside Clot Test: YES/NO. Results:
 - Other Tests: _____ Results:
 - Describe Treatment: _____
- Other Associated Complications:
 - Uterine Inversion:
 - Uterine Rupture:
 - Placenta Accreta:
- Maternal Mortality: If Yes: Date, Time, Time in Relation to Delivery, Cause of Death
- Maternal Audit Performed: YES/NO



Key Messages

1. PPH is a time-sensitive obstetrical emergency that needs to be quickly managed using appropriate medical and or surgical treatments.
2. AMTSL is a key intervention in the strategy to reduce maternal mortality and morbidity.
3. As with antepartum hemorrhage, women who deliver in a community setting and have experienced a PPH rely heavily on a referral system to receive effective treatment. Referral and transfer guidelines should be well defined and known by all health care providers.

Suggestion for Applying the Sexual and Reproductive Rights Approach to this Chapter

During antenatal visits or during labour, take time to describe to women and their spouses the major components and benefits of active management of the third stage of labour. By doing so, the woman will feel prepared and will understand why these procedures are done. This will decrease anxiety and contribute to her sense of control.

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APPENDIX 1



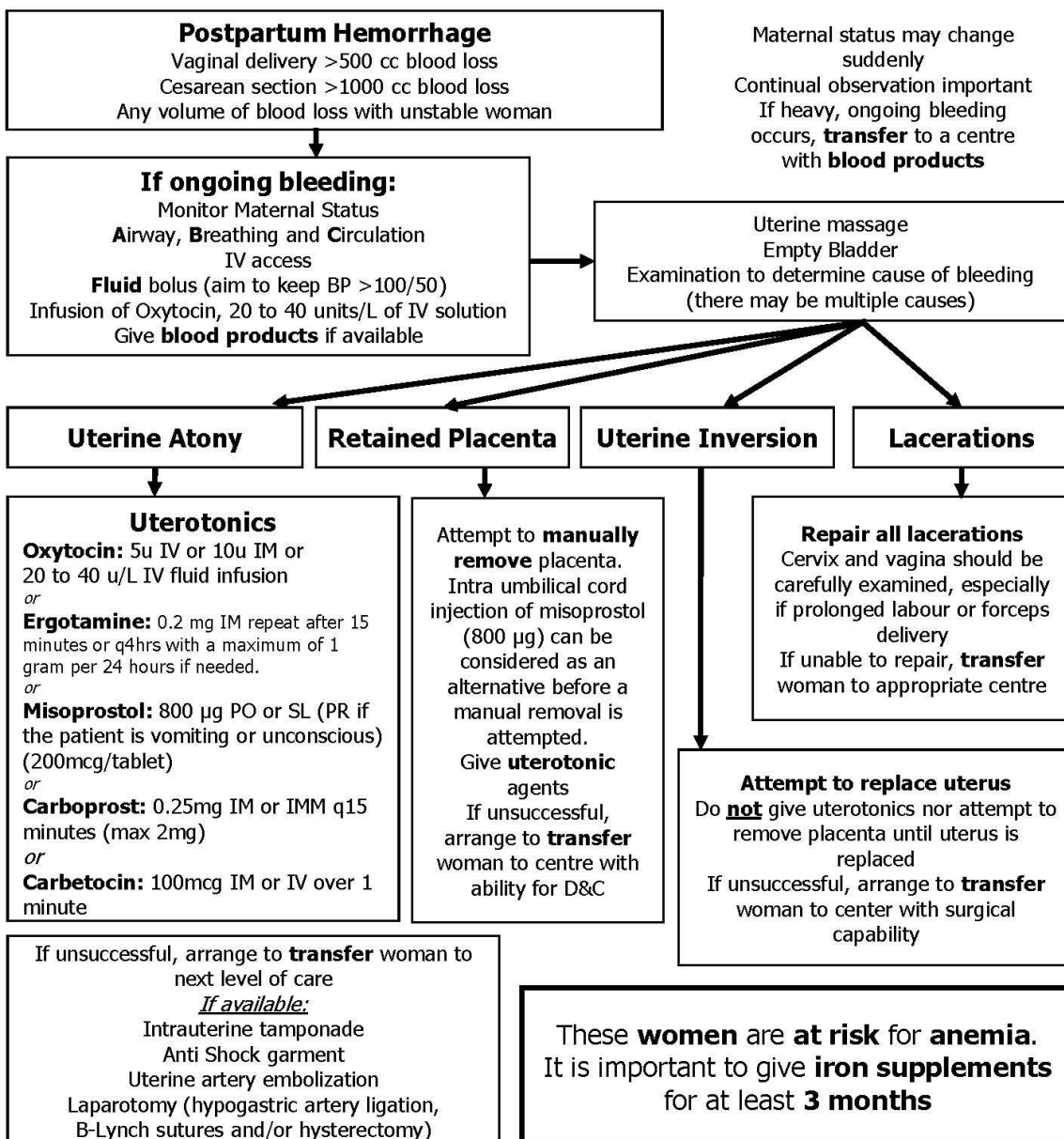
www.sogc.org

Post-Partum Hemorrhage Prevention and Management

Prevention

Active Management of the Third Stage of Labour

- Administration of uterotonic agents: Oxytocin 10 iu IM or Misoprostol 600 µg if Oxytocin unavailable
- Controlled cord traction
- Uterine massage after delivery of the placenta, as appropriate



APPENDIX 2

Joint Statement
Management of the Third Stage of Labour to Prevent Post-Partum Haemorrhage

International Confederation of Midwives (ICM)

International Federation of Gynaecologists and Obstetricians (FIGO)

ICM and FIGO are key partners in global Safe Motherhood efforts to reduce maternal death and disability in the world. Their mission statements share a common commitment in promoting the health, human rights and well-being of all women, most especially those at greatest risk for death and disability associated with childbearing. FIGO and ICM promote evidence-based, effective interventions that, when used properly with informed consent, can reduce the incidence of maternal mortality and morbidity in the world.

Severe bleeding is the single most important cause of maternal death worldwide. More than half of all maternal deaths occur within 24 hours of delivery, mostly from excessive bleeding. Every pregnant woman may face life-threatening blood loss at the time of delivery; women with anemia are particularly vulnerable since they may not tolerate even moderate amounts of blood loss. Every woman needs to be closely observed and, if needed, stabilized during the immediate post-partum period.

Upon review of the available evidence, FIGO and ICM agree that active management of the third stage of labour is proven to reduce the incidence of post-partum haemorrhage, the quantity of blood loss, and the use of blood transfusion.

Active management of the third stage of labour should be offered to women since it reduces the incidence of post-partum haemorrhage due to uterine atony.

Active management of the third stage of labour consists of interventions designed to facilitate the delivery of the placenta by increasing uterine contractions and to prevent PPH by averting uterine atony. The usual components include:

- Administration of uterotonic agents
- Controlled cord traction
- Uterine massage after delivery of the placenta, as appropriate.

Every attendant at birth needs to have the knowledge, skills and critical judgment needed to carry out active management of the third stage of labour and access to needed supplies and equipment.

In this regard, national professional associations have an important and collaborative role to play in:

- Advocacy for skilled care at birth;
- Dissemination of this statement to all members of the organisation and facilitation of its implementation;
- Public education about the need for adequate prevention and treatment of post-partum haemorrhage;
- Publication of the statement in national midwifery, obstetric and medical journals, newsletters and websites;
- Address legislative and other barriers that impede the prevention and treatment of post-partum haemorrhage;
- Incorporation of active management of the third stage of labour in national standards and clinical guidelines, as appropriate;
- Incorporation of active management of the third stage into pre-service and in-service curricula for all skilled birth attendants;
- Working with national pharmaceutical regulatory agencies, policymakers and donors to assure that adequate supplies of uterotonics and injection equipment are available.

MANAGEMENT OF THE THIRD STAGE OF LABOUR TO PREVENT POST-PARTUM HAEMORRHAGE

HOW TO USE UTEROTONIC AGENTS

- Within one minute of the delivery of the baby, palpate the abdomen to rule out the presence of an additional baby(s) and give oxytocin 10 units IM. Oxytocin is preferred over other uterotonic drugs because it is effective 2-3 minutes after injection, has minimal side effects and can be used in all women.
- If oxytocin is not available, other uterotonics can be used such as: ergometrine 0.2 mg IM, syntometrine (1 ampoule) IM or misoprostol 400-600 µg orally. Oral administration of misoprostol should be reserved for situations when safe administration and/or appropriate storage conditions for injectable oxytocin and ergot alkaloids are not possible.
- Uterotonics require proper storage:
 - Ergometrine: 2-8°C and protect from light and from freezing.
 - Misoprostol: room temperature, in a closed container.
 - Oxytocin: 15-30°C, protect from freezing
- Counselling on the side effects of these drugs should be given.

Warning! Do not give ergometrine or syntometrine (because it contains ergometrine) to women with preeclampsia, eclampsia or high blood pressure.

HOW TO DO CONTROLLED CORD TRACTION

- Clamp the cord close to the perineum (once pulsation stops in a healthy newborn) and hold in one hand.
- Place the other hand just above the woman's pubic bone and stabilize the uterus by applying counter-pressure during controlled cord traction.
- Keep slight tension on the cord and await a strong uterine contraction (2-3 minutes).
- With the strong uterine contraction, encourage the mother to push and very gently pull downward on the cord to deliver the placenta. Continue to apply counter-pressure to the uterus.
- If the placenta does not descend during 30-40 seconds of controlled cord traction do not continue to pull on the cord:
 - Gently hold the cord and wait until the uterus is well contracted again;
 - With the next contraction, repeat controlled cord traction with counter-pressure.

Never apply cord traction (pull) without applying counter-traction (push) above the pubic bone on a well-contracted uterus.

- As the placenta delivers, hold the placenta in two hands and gently turn it until the membranes are twisted. Slowly pull to complete the delivery.
- If the membranes tear, gently examine the upper vagina and cervix wearing sterile/disinfected gloves and use a sponge forceps to remove any pieces of membrane that are present.
- Look carefully at the placenta to be sure none of it is missing. If a portion of the maternal surface is missing or there are torn membranes with vessels, suspect retained placenta fragments and take appropriate action (ref Managing Complications in Pregnancy and Childbirth).

HOW TO DO UTERINE MASSAGE

- Immediately massage the fundus of the uterus until the uterus is contracted.
- Palpate for a contracted uterus every 15 minutes and repeat uterine massage as needed during the first 2 hours.
- Ensure that the uterus does not become relaxed (soft) after you stop uterine massage.

In all of the above actions, explain the procedures and actions to the woman and her family. Continue to provide support and reassurance throughout.

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APPENDIX 3



Prevention and Treatment of Post-partum Haemorrhage: New Advances for Low Resource Settings



Joint Statement

***International Confederation of Midwives (ICM)
International Federation of Gynaecologists and Obstetricians (FIGO)***

The International Confederation of Midwives (ICM) and the International Federation of Gynaecologists and Obstetricians (FIGO) are key partners in the global effort to reduce maternal death and disability around the world. Their mission statements share a common commitment in promoting the health, human rights and well-being of all women, most especially those at greatest risk for death and disability associated with childbearing. FIGO and ICM promote evidence-based interventions that, when used properly with informed consent, can reduce the incidence of maternal morbidity and mortality.

This statement reflects the current (2006) state-of-the-art and science of prevention and treatment of post-partum haemorrhage (PPH) in low resource settings. It incorporates new research evidence that has become available since the 2003 publication of the first FIGO/ICM Joint Statement: *Management of the Third Stage of Labour to Prevent Post-partum Haemorrhage*.¹

Approximately 30 per cent of direct maternal deaths worldwide are due to haemorrhage, mostly in the post-partum period.² Most maternal deaths due to PPH occur in developing countries in settings (both hospital and community) where there are no birth attendants or where birth attendants lack the necessary skills or equipment to prevent and manage PPH and shock. The Millennium Development Goal of reducing the maternal mortality ratio by 75 per cent by 2015³ will remain beyond our reach unless we confront the problem of PPH in the developing world as a priority.

Both ICM and FIGO endorse international recommendations that emphasise the provision of skilled birth attendants and improved obstetric services as central to efforts to reduce maternal and neonatal mortality. Such policies reflect what should be a basic right for every woman. Addressing PPH will require a combination of approaches to expand access to skilled care and, at the same time, extend life-saving interventions along a continuum of care from community to hospital. The different settings where women deliver along this continuum require different approaches to PPH prevention and treatment.

Call to Action

Despite Safe Motherhood activities since 1987, women are still dying in childbirth. Women living in low resource settings are most vulnerable due to concurrent disease, poverty, discrimination and limited access to health care. The ICM and FIGO have a central role to play in improving the capacity of national obstetric societies and midwifery associations to reduce maternal mortality through safe, effective, feasible and sustainable approaches to reducing deaths and disabilities resulting from PPH. In turn, national obstetric and midwifery associations must lead the effort to implement the approaches described in this statement.

Professional associations can mobilise to:

- Lobby governments to ensure healthcare for all women;
- Advocate for every woman to have a midwife, doctor or other skilled attendant at birth;
- Disseminate this statement to all members through all available means including publication in national newsletters or professional journals;
- Educate their members, other health care providers, policy makers, and the public about the approaches described in this statement and about the need for skilled care during childbirth;
- Address legislative and regulatory barriers that impede access to life-saving care, especially policy barriers that currently prohibit midwives and other birth attendants from administering uterotonic drugs;
- Ensure that all birth attendants have the necessary training, appropriate to the settings where they work, to safely administer uterotonic drugs and implement other approaches described in this statement and that uterotonics are available in sufficient quantity to meet the need;

- Call upon national regulatory agencies and policy makers to approve misoprostol for PPH prevention and treatment;
- Incorporate the recommendations from this statement into current guidelines, competencies and curricula.

We also call upon funding agencies to help underwrite initiatives aimed at reducing PPH through the use of cost-effective, resource-appropriate interventions.

Prevention of Post-partum Haemorrhage

Every pregnant woman may face life-threatening blood loss at the time of delivery. Anaemic women are more vulnerable to even moderate amounts of blood loss. Fortunately, most PPH can be prevented. Different approaches may be employed depending on the setting and availability of skilled birth attendants and supplies. Physiologic (expectant) management is not recommended as an alternative to active management of the third stage of labour.

Active Management of the Third Stage of Labour (AMTSL)

Data support the use of active management of the third stage of labour (AMTSL) by all skilled birth attendants regardless of where they practice. AMTSL reduces the incidence of PPH, the quantity of blood loss and the use of blood transfusion⁴, and thus should be included in any programme of interventions aimed at reducing deaths from PPH.

The usual components of AMTSL include:

- Administration of oxytocin* or another uterotonic drug within one minute after the birth of the baby
- Controlled cord traction**
- Uterine massage after delivery of the placenta as appropriate.

(For more detailed information on AMTSL, see the FIGO/ICM Joint Statement: *Management of the Third Stage of Labour to Prevent Post-partum Haemorrhage*.)

Misoprostol and the Prevention of Post-Partum Haemorrhage

In situations where no oxytocin is available or birth attendants' skills are limited, administering misoprostol soon after the birth of the baby reduces the occurrence of haemorrhage^{7, 8}. The most common side effects are transient shivering and pyrexia. Education of women and birth attendants in the proper use of misoprostol is essential.

The usual components of giving misoprostol include:

- Administration of 600 micrograms (mcg) misoprostol orally or sublingually after the birth of the baby***
- Controlled cord traction ONLY when a skilled attendant is present at the birth
- Uterine massage after the delivery of the placenta as appropriate.

Management of the Third Stage of Labour in the Absence of Uterotonic Drugs

In some settings there will be no uterotonics available due to interruptions of supplies or the setting of birth. In the absence of current evidence, ICM and FIGO recommend that when no uterotonic drugs are available to either the skilled or non-skilled birth attendant, management of the third stage of labour includes the following components:

- Waiting for signs of separation of the placenta (cord lengthening, small blood loss, uterus firm and globular on palpation at the umbilicus)
- Encouraging maternal effort to bear down with contractions and, if necessary, to encourage an upright position
- Controlled cord traction is not recommended in the absence of uterotonic drugs, or prior to signs of separation of the placenta, as this can cause partial placental separation, a ruptured cord, excessive bleeding and uterine inversion
- Uterine massage after the delivery of the placenta as appropriate.

* The preferred storage of oxytocin is refrigeration but it may be stored at temperatures up to 30°C up to three months without significant loss of potency.⁵

** Delaying cord clamping by one to three minutes reduces anaemia in the newborn.⁶

***Data from two trials comparing misoprostol with placebo show that misoprostol 600 mcg given orally or sublingually reduces PPH with or without controlled cord traction or use of uterine massage.^{7,8}

Treatment of Post-partum Haemorrhage

Even with major advances in prevention of PPH, some women will still require treatment for excessive bleeding. Timely and appropriate referral and transfer to basic or comprehensive Emergency Obstetric Care (EmOC) facilities for treatment is essential to saving lives of women. Currently, the standard of care in basic EmOC facilities includes administration of IV/IM uterotonic drugs and manual removal of the placenta and retained products of conception; comprehensive emergency obstetrical care facilities would also include blood transfusion and/or surgery.⁹

Community-based Emergency Care – Home-based Life-saving Skills (HBLSS)

Anyone who attends a delivery can be taught simple home-based life-saving skills. Community-based obstetric first aid with home-based life-saving skills (HBLSS) is a family and community-focused programme that aims to increase access to basic life-saving measures and decrease delays in reaching referral facilities. Family and community members are taught techniques such as uterine fundal massage and emergency preparedness. Field tests suggest that HBLSS can be a useful adjunct in a comprehensive PPH prevention and treatment programme.¹⁰ Key to the effectiveness of treatment is the early identification of haemorrhage and prompt initiation of treatment.

Misoprostol in the Treatment of Post-partum Haemorrhage

While there is less information about the effect of misoprostol for treatment of PPH, it may be appropriate for use in low resource settings and has been used alone, in combination with oxytocin, and as a last resort for PPH treatment. In the published literature, a variety of doses and routes of administration have shown promising results.¹¹ In home births without a skilled attendant, misoprostol may be the only technology available to control PPH. An optimal treatment regimen has not yet been determined. One published study on treatment of PPH found that 1000 mcg rectally significantly reduces heavy bleeding and the need for additional interventions.¹² Studies are ongoing to determine the most effective and safe dose for the treatment of PPH. A rare case of non-fatal hyperpyrexia has been reported after 800 mcg of oral misoprostol.¹³

NOTE: Repeated doses of misoprostol are not recommended.

Innovative techniques

Other promising techniques appropriate for low resource settings for assessment and treatment of PPH include easy and accurate blood loss measurement,^{14,15} oxytocin in Uniject,¹⁶ uterine tamponade,¹⁷ and the anti-shock garment.¹⁸ These innovations are still under investigation for use in low resource settings but may prove programmatically important, especially for women living far from skilled care.

Research Needs

Important strides have been made in identifying life-saving approaches and interventions appropriate for PPH prevention and treatment in low resource settings. The field is rapidly evolving and the following issues have been identified as priorities for further research in low resource settings:

- Determine the optimal dose and route of misoprostol for prevention and treatment of PPH that will still be highly effective but will minimize the risk of side effects.
- Determine the most effective method of third stage management when no uterotonics are available.
- Assess the impact of better measurement of blood loss (e.g. with a calibrated drape or other means) on birth attendants' delivery practices.
- Assess options for treatment of PPH in lower-level (basic EmOC) facilities, in particular, uterine tamponade and the anti-shock garment.
- Identify the most efficient and effective means of teaching and supporting the skills needed by birth attendants and for community empowerment to address PPH.

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APPENDIX 4

Technology Solutions for Global Health

May 2006

Oxytocin in Uniject™

Health need

Hemorrhage is the leading cause of maternal mortality. Annually, approximately 130,000 women are known to die due to hemorrhage during childbirth. It is a particular problem in home deliveries of infants because the short response time required makes referral and transport to a more sophisticated health care facility impractical in most cases. The percentage of maternal deaths due to postpartum hemorrhage has been reported as 25 percent in sub-Saharan Africa, 27 percent in West Africa, and 45 percent in Indonesia. The use of oxytocin for routine management of the third stage of labor can significantly reduce the incidence of postpartum hemorrhage. The World Health Organization recommends use of a 10 IU dose of oxytocin given intramuscularly. To facilitate the recommended use of oxytocin in developing countries, particularly in peripheral health settings and in home deliveries (attended by a person with midwifery skills), a prefilled, easy-to-use, injection-ready dose of oxytocin would be ideal.

Technology solution

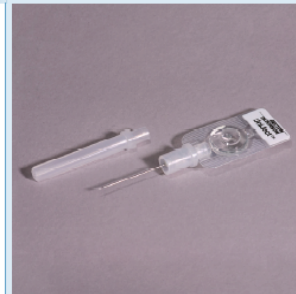
Uniject, a prefilled, nonreusable syringe, can help ensure the delivery of the life-saving benefits of oxytocin to women in peripheral health care settings and homes. This easy-to-use, injection-ready format ensures that an accurate dose is given in a nonreusable, sterile device with minimal preparation and minimum waste. These benefits can greatly improve the ability of midwives and village health workers to administer oxytocin outside of hospital facilities and in emergencies or remote locations.

Current status and results

Instituto Biologico Argentino (BIOL), an Argentine pharmaceutical manufacturer collaborating with PATH, is conducting the research and development and product registration necessary to make oxytocin-Uniject commercially available. Pending positive stability study results, BIOL and PATH anticipate clinical trial lot production in late 2006 with registration following in 2007. Collaborations with organizations interested in conducting field evaluations of Oxytocin-Uniject are invited.

PATH and the Vietnam Ministry of Health completed a field trial in Vietnam, conducted as part of the Averting Maternal Death and Disability project. Results from that study, *Reducing Postpartum Hemorrhage in Thanh Hoa, Viet Nam: Assessing the Role of Active Management of Third Stage of Labor and of Oxytocin in Ampoules and Uniject Devices* are available online via PATH's website at http://www.path.org/files/CP_vietnam_pph_oxytocin.pdf.

Uniject is a trademark of BD.



Prefilled, single-use injection device filled with oxytocin.

“Uniject [with oxytocin] was well tolerated and offers an alternative for oxytocin administration.”

Strand RT, et al. Postpartum hemorrhage: A prospective, comparative study in Angola using a new disposable device for oxytocin administration. *Acta Obstetrica et Gynecologica Scandinavica*. 2005;84:260-265.

Availability

Uniject devices and the associated equipment for filling and packaging are available to vaccine and pharmaceutical companies from BD Pharmaceutical Systems, New Jersey, USA, Roderick Hausser, Tel: (201) 847-5185, Fax: (201) 847-4869. For more information regarding this project, contact Steve Brooke at sbrooke@path.org.

Donor support

Funding for this project is provided by the **United States Agency for International Development** under PATH's HealthTech program.

1455 NW Leary Way, Seattle, WA 98107 USA
Tel: (206) 285-3500, Fax: (206) 285-6619, www.path.org



Accessed from -- http://www.path.org/files/TS_update_uniject_oxytocin.pdf

APPENDIX 5

REPAIR OF 3RD AND 4TH DEGREE LACERATIONS

This appendix has been adapted from -- Managing Complications in Pregnancy and Childbirth: A guide for doctors and midwives. Geneva: World Health Organization; 2000. Available from: http://www.who.int/reproductive-health/impac/Procedures/Repair_vaginal_P83_P90.html and Managing Postpartum Haemorrhage: Education Material for Teachers of Midwifery, Second Edition. Geneva: World Health Organization; 2006.p. 157. Available from http://whqlibdoc.who.int/publications/2006/9241546662_5_eng.pdf

Discussion

Trauma resulting from the birth process can result in significant blood loss, suddenly due to lacerated blood vessels or by trickle hemorrhage over several hours. The source of trauma must be quickly identified and treated. Bleeding may result from injury to the cervix, vagina, and/or perineum, or the anus and rectum. Genital tract trauma is classified by the tissues involved.

First degree tears involve the perineal skin and vaginal mucosa, but the underlying muscles are intact.

Second degree tears involve the perineal skin, vaginal mucosa, and underlying muscles. Vaginal tears may be central or may extend up one or both sides of the vagina.

Third degree tears involve the damage to the above structures as well as complete transection of the anal sphincter.

Fourth degree tears involve the rectal mucosa in addition to the structures defined above.

First degree tears usually close spontaneously without sutures. If bleeding, pressure is often sufficient to control bleeding. Apply pressure with a sterile pad or gauze. Check after 5 minutes. If bleeding persists, the tear will need repair.

Deeper tears may bleed profusely. Failure to properly repair third and fourth degree tears will have significant life-long impact. The woman may suffer loss of control over bowel movements and gas 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).

The health care provider must decide whether they are competent to perform the required repair. If repairing the tear is beyond the skill level of the health care provider, it is strongly advised to refer and transfer the woman's care to another more experienced health care provider or health care facility with better resources.

General Care Principles

- Explain the procedure to the woman, obtain her consent, and document this appropriately in her chart.
- Provide emotional support and encouragement. Encourage the woman to have a support person present.
- While performing the procedure, explain what you are doing. Be gentle when performing the repair.
- Provide pain relief appropriate to the severity of tear. Use local infiltration with lignocaine or a pudendal block. Make sure there are no known allergies to lignocaine or related drugs.
- If the woman is unable to void on her own, catheterize the bladder if it is full.
- Ask the woman to lie on her back in the lithotomy position. This position allows for good visualization of the relevant anatomy and careful examination of the vagina, perineum, and cervix to assess the extent of the trauma. Ensure good lighting.
- Ask an assistant to massage the uterus, and continue monitor the woman's vital signs throughout the repair procedure.

- Ensure aseptic technique is essential to prevent infection.
- When there is active bleeding, the tear must be repaired with accuracy and speed. Maintain a sensitive approach to the woman during the repair procedure.
- If bleeding has been heavy or if vital signs are unstable, start an IV with either normal saline or Ringer's lactate and run it quickly until hypovolaemia is corrected. A blood transfusion may be required if blood loss has been heavy.

Equipment and Supplies Needed

- a) Antiseptic solution
- b) Sterile gloves
- c) Needle holder or toothed clamp
- d) Allis clamp: Have teeth on each side to grasp tissue.
- e) Two sponge or ring forceps
- f) Absorbable suture with needle
- g) Thumb forceps, also called tissue forceps
- h) Local anesthetic, such as 1% lignocaine
- i) 20 cc syringe
- j) 1½ inch (or 3 cm) 22 gauge needle is ideal, but use whatever is available
- k) Cotton gauze, 2 H 2 squares, but use whatever is available

Step-by-Step Technique

Initial examination

1. Wearing sterile gloves, carefully examine the vagina, perineum, cervix, and rectum.

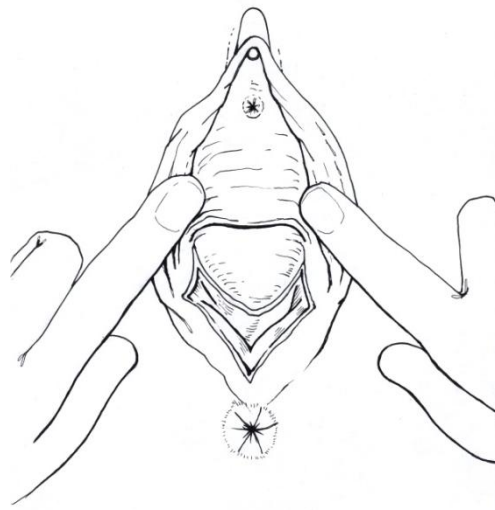


Figure 1 - Examining the genital tract for tears

- a) If the tear is long and deep through the perineum, inspect to be sure there is no third or fourth degree tear.
- Place a gloved finger in the anus.
 - Gently lift the finger and identify the sphincter.
 - Feel for the tone or tightness of the sphincter. If absent,
 - Feel the surface of the rectum and look carefully for a tear.

If the anal sphincter or rectal mucosa is torn, proceed as described below.

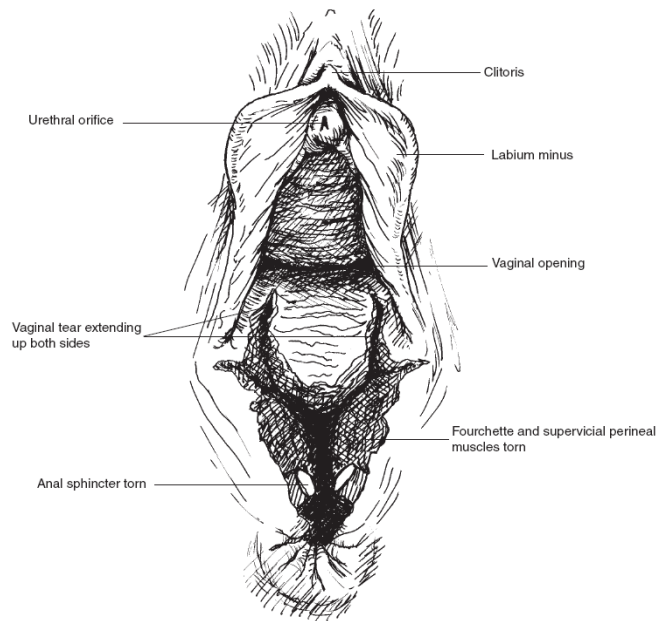


Figure 2 - Identifying a third or fourth degree tear

- b) If the baby was delivered with forceps or vacuum, examine the cervix and upper vagina.
- Place four fingers in the vagina and depress the posterior vaginal wall.
 - The anterior lip of the cervix will come into view. If necessary, grasp this with the ring forceps and pull upwards to bring the entire cervix into view or “walk around” the cervix with ring forceps.
 - Push the cervix up into the vaginal vault to inspect the whole vagina for tears. Upper vaginal tract or cervical lacerations can result in significant blood loss, and must be repaired.

If the cervix or upper vagina is torn, refer to Appendix 6 for further instructions on repair.

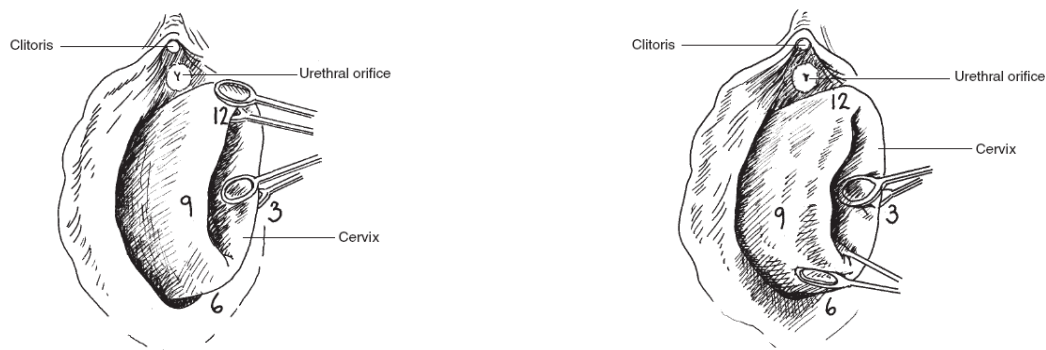


Figure 3 - Inspecting the cervix for tears

2. Change to another pair of sterile gloves.
3. Clean the skin around the area of the tear with an antiseptic solution, and remove any fecal material, if present.
4. Put a 22 gauge 1½ inch (3 cm) needle on a 20 cc syringe
5. Fill the syringe with 0.5% or 1% lignocaine.
6. Infiltrate local anaesthetic beneath the vaginal mucosa, beneath the skin of the perineum, and deeply into the perineal muscle around the tear by inserting the whole length of the needle and injecting as you slowly withdraw the needle (see Figure 4)

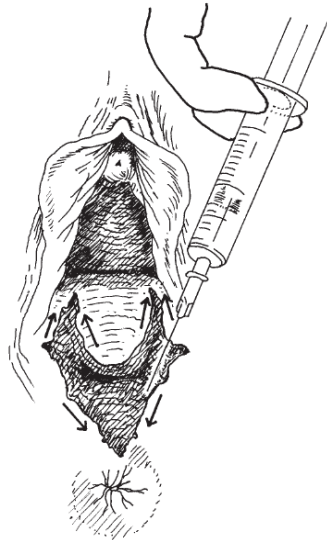


Figure 4 - Technique of infiltration of local anesthetic before repair of a tear

7. Before injecting the local anaesthetic, pull back on the plunger of the syringe, and check for blood each time the needle is reinserted in a new site. If the local anaesthetic is injected directly into a blood vessel, it can cause heart irregularity, seizure, and death.
8. Approximately 10–30 ml of local anaesthetic is usually required.
9. A set of injections is required in the vaginal mucosa, beneath the skin and deeply into the perineal muscle on both sides of the tear.
10. At the conclusion of the set of injections, wait for at least 2 minutes for the local anaesthetic to take effect. To assess effectiveness of the local anaesthetic, pinch the area with tissue forceps. If the woman feels the pinch, wait for a further 2 minutes, then retest.

Repair technique

1. Repair the rectum using interrupted 3/0 or 4/0 sutures 0.5 cm apart to bring together the mucosa.
 - a) Place the suture through the muscularis, but not all the way through the mucosa.
 - b) Cover the muscularis layer by bringing together the fascial layer with interrupted sutures.
 - c) Apply antiseptic solution to the area frequently.

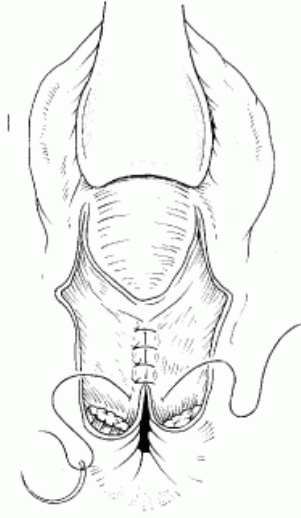


Figure 4 - Closing the muscle wall of the rectum

2. If the anal sphincter is torn:
 - a) Grasp each end of the sphincter with an Allis clamp. The sphincter retracts when torn. The sphincter is strong. It will not tear while pulling with the clamp.
 - b) Repair the sphincter with two or three interrupted stitches of 2/0 suture.
 - c) Examine the anus sphincter with a gloved finger to ensure the correct repair of the rectum and sphincter. The sphincter should feel tight.
 - d) Perform a rectal examination to make sure that no stitches are in the rectum; if there are stitches in the rectum, the suturing must be undone and the tear resutured, taking care to avoid stitches in the rectum.
 - e) Apply antiseptic solution to the area again.

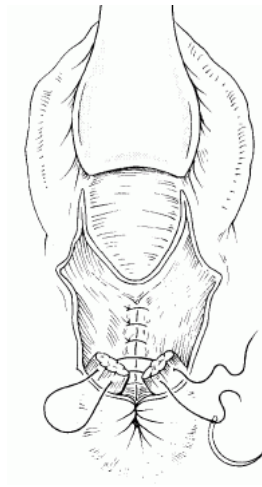


Figure 5 - Suturing the anal sphincter

3. Change to clean,sterile gloves.
4. Proceed with repair the vaginal mucosa, perineal muscles, and skin.
 - Repair the vaginal mucosa using a continuous 2/0 suture.
 - Start the repair about 1 cm above the apex (top) of the vaginal tear. Continue sutures to the vaginal opening.
 - At the opening of the vagina, bring together the edges of the vaginal opening.
 - Bring the needle under the vaginal opening and out through the perineal tear. Tie the suture here.



Figure 6 - Repairing the vagina mucosa

5. 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.

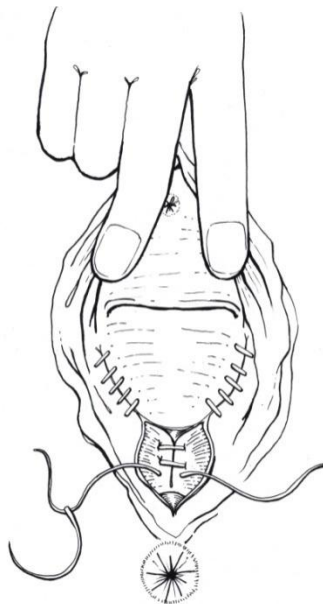


Figure 7 - Repairing the perineal muscles

6. Repair the skin using interrupted or subcuticular 2/0 sutures starting at the vaginal opening.

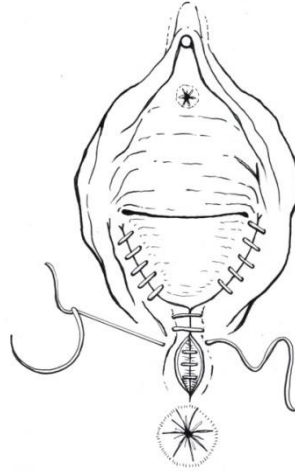


Figure 8 - Repairing the skin

Post-Procedure Care

1. Following repair of third or fourth degree tears, give a single dose of prophylactic antibiotics:
 - Ampicillin 500 mg by mouth
 - PLUS
 - Metronidazole 400 mg by mouth
2. Give stool softener by mouth for 1 week, if possible.
3. Avoid giving enemas or rectal examinations for 2 weeks.
4. The woman should be encouraged to void frequently. If she is unable to void urine on her own, an indwelling catheter may need to be inserted to avoid straining.
5. Advise the woman to clean the genital area, including the suture line, with clean water twice daily, and always after defecation.
6. Examine the sutured perineum for healing and any signs of infection e.g. marked inflammation, excessive swelling, and pus.
7. Follow up closely for signs of wound infection.

If the wound becomes infected:

 - a) If the infection is mild, antibiotics are not required.
 - b) If the infection is severe but does not involve deep tissues, give a combination of antibiotics:
 - Ampicillin 500 mg by mouth 3 times per day for 5 days;
 - PLUS
 - Metronidazole 400 mg by mouth 3 times per day for 5 days
 - c) If the infection is deep, involves muscles, and is causing necrosis, give a combination of antibiotics until necrotic tissues has been removed and the woman is fever-free for 48 hours:
 - Penicillin G 2 million units IV every 6 hours
 - PLUS
 - Gentamicin 5 mg/kg body weight IV every 24 hours
 - PLUS
 - Metronidazole 500 mg IV every 8 hours
 - d) Once the woman is fever-free for 48 hours, give:
 - Ampicillin 500 mg by mouth 4 times per day for 5 days
 - PLUS
 - Metronidazole 400 mg by mouth 3 times per day for 5 days

APPENDIX 6

REPAIR CERVICAL AND UPPER VAGINAL TRACT LACERATIONS

This appendix has been adapted from -- Managing complications in pregnancy and childbirth: a guide for doctors and midwives. Geneva: World Health Organization; 2000. Available from: http://www.who.int/reproductive-health/impac/Procedures/Repair_cervical_P81.html and

Managing Postpartum Haemorrhage: Education Material for Teachers of Midwifery, Second Edition. Geneva: World Health Organization; 2006. Available from: http://whqlibdoc.who.int/publications/2006/9241546662_5_eng.pdf

Discussion

Cervical and upper vaginal tract tears may result in significant blood loss, scarring, infection, and death. Cervical tears usually occur laterally, either on one or both sides. Tears in the cervix may originate from a lower uterine segment rupture. It is also possible that a cervical tear extends upwards into the lower uterus. A cervical tear may involve branches of the uterine artery resulting in significant bleeding. Upper vaginal tract tears are usually associated with tears in the cervix.

These lacerations are commonly associated with operative deliveries, particularly deliveries assisted with forceps. The cervix and upper vagina should be inspected following all operative vaginal deliveries.

Cervical tears also may occur when an anterior lip of the cervix is caught or trapped between the head baby's head and the symphysis pubis. The swollen and bruised cervix tears rather than stretching,.

Less commonly, tears may be associated with a precipitate labour, whether it occurs spontaneously or occurs due to oxytocin stimulation.

Failure to repair an upper vaginal tract or cervical tear may result in death due to significant blood loss, especially if a branch of the uterine artery has been lacerated. If a cervical tear is not repaired, the cervix may become "incompetent," i.e. it will not stay closed during a future pregnancy, and the woman will have early preterm deliveries. Cervical scarring due to an unrepaired cervical tear may also lead to prolonged labour in subsequent pregnancies because the cervix may not dilate properly.

Scarring and vaginal stenosis (narrowing) may occur in neglected tears of the vagina. This may result in pain during intercourse and obstructed labour in subsequent deliveries. Vesicovaginal, vesicocervical, or rectovaginal fistulae can occur if vaginal or cervical tears extend into the bladder or rectum.

The attending health care provider must decide whether they are competent to perform the required repair. If repairing the tear is beyond the skill level of the health care provider, it is strongly advised to refer and transfer the woman's care to another more experienced health care provider or health care facility with better resources.

General Care Principles

- Explain the procedure to the woman, obtain her consent, and document this appropriately in her chart.
- Provide emotional support and encouragement. Encourage the woman to have a support person present.
- While performing the procedure, explain what you are doing. Be gentle when performing the repair.
- Provide pain relief appropriate to the severity of tear. Use local infiltration with lignocaine or a pudendal block. Make sure there are no known allergies to lignocaine or related drugs.
- If the woman is unable to void on her own, catheterize the bladder if it is full.
- Ask the woman to lie on her back in the lithotomy position. This position allows for good visualization of the relevant anatomy and careful examination of the vagina, perineum, and cervix to assess the extent of the trauma. Ensure good lighting.

- Ask an assistant massage the uterus, and continue monitor the woman's vital signs throughout the repair procedure.
- Ensure aseptic technique, which is essential to prevent infection.
- When there is active bleeding, the tear must be repaired with accuracy and speed. Maintain a sensitive approach to the woman during the repair procedure.
- If bleeding has been heavy or if vital signs are unstable, start an IV with either normal saline or Ringer's lactate and run it quickly until hypovolaemia is corrected. A blood transfusion may be required if blood loss has been heavy.

Equipment and Supplies Needed

- Antiseptic solution
- Sterile gloves
- Needle holder or toothed clamp
- Two sponge or ring forceps
- 2/0 absorbable suture with needle
- Thumb forceps, also called tissue forceps
- Local anaesthetic such as 1% lignocaine
- 20 cc syringe
- 1½ inch (or 3 cm) 22 gauge needle is ideal, but use whatever is available
- Cotton gauze, 2 x 2 squares, but use whatever is available
- Specula, optional

Step-by-Step Technique

Initial examination

- Wearing sterile gloves, carefully examine the vagina, perineum, cervix, and rectum.

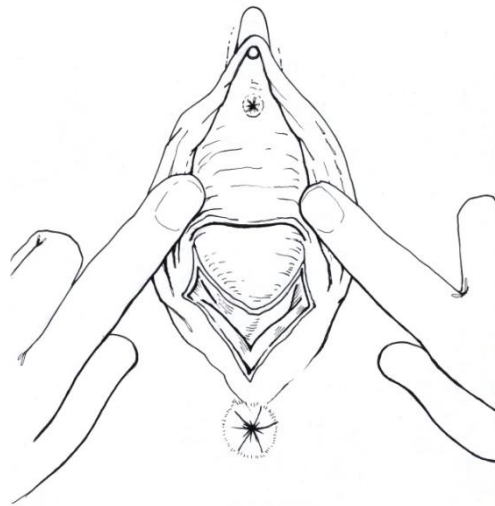


Figure 1 - Examining the genital tract for tears

- If the tear is long and deep through the perineum, inspect to be sure there is no third or fourth degree tear.
 - Place a gloved finger in the anus.
 - Gently lift the finger and identify the sphincter.
 - Feel for the tone or tightness of the sphincter. If absent,
 - Feel the surface of the rectum and look carefully for a tear.

If the anal sphincter or rectal mucosa is torn, proceed as described in Appendix 5.

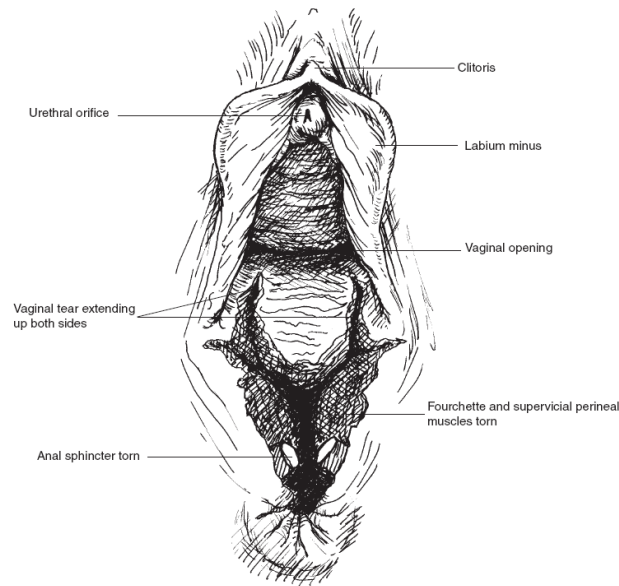


Figure 2 - Identifying a third or fourth degree tear

- b) If the baby was delivered with forceps or vacuum, examine the cervix and upper vagina.
 - Place four fingers in the vagina and depress the posterior vaginal wall.
 - The anterior lip of the cervix will come into view.
 - Grasp the cervix with the ring forceps and pull upwards to bring the entire cervix into view or “walk around” the cervix with ring forceps. (It is helpful to imagine that the cervix is a clock.)
 - Push the cervix up into the vaginal vault to inspect the whole vagina for lacerations.
 - If there is blood in the way and it is difficult to see where the bleeding is coming from, take a sterile gauze or cloth and wipe the blood away.
- c) If the cervix or upper vagina is torn, proceed with repair as described below.
- d) If the tear appears to extend into the lower uterine segment, a laparotomy is required to repair the tear. Consult, refer, and transfer as needed.

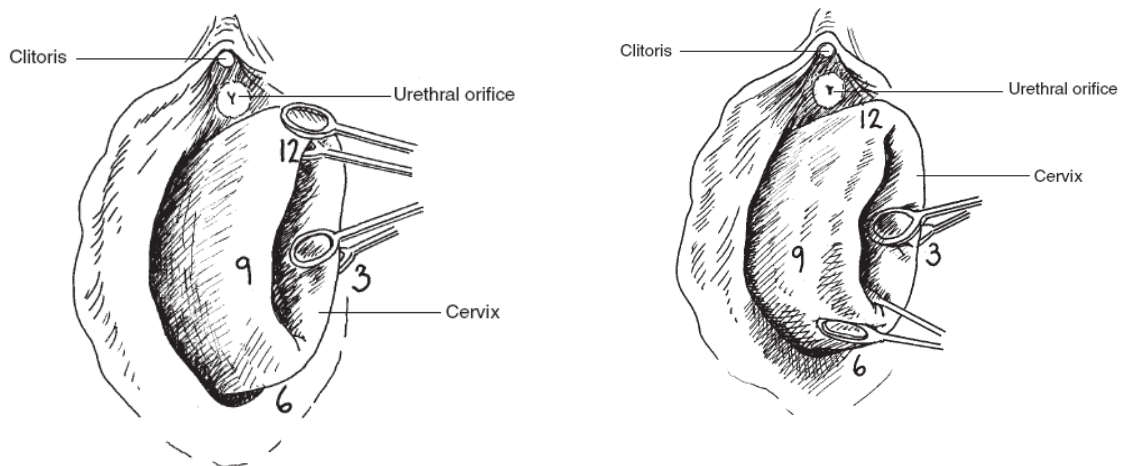


Figure 3 - Inspecting the cervix for tears

1. Change to another pair of sterile gloves.
2. Clean the area of the tear with an antiseptic solution.
3. Anesthesia is not required for most cervical tears. If other repairs to the vagina, perineum, anal sphincter or rectum are required, infiltrate with local anesthetic as described in Appendix 5.

Procedure for Repair of the Cervix

1. Grasp the cervix on either side of the tear with ring forceps to hold it steady while suturing.

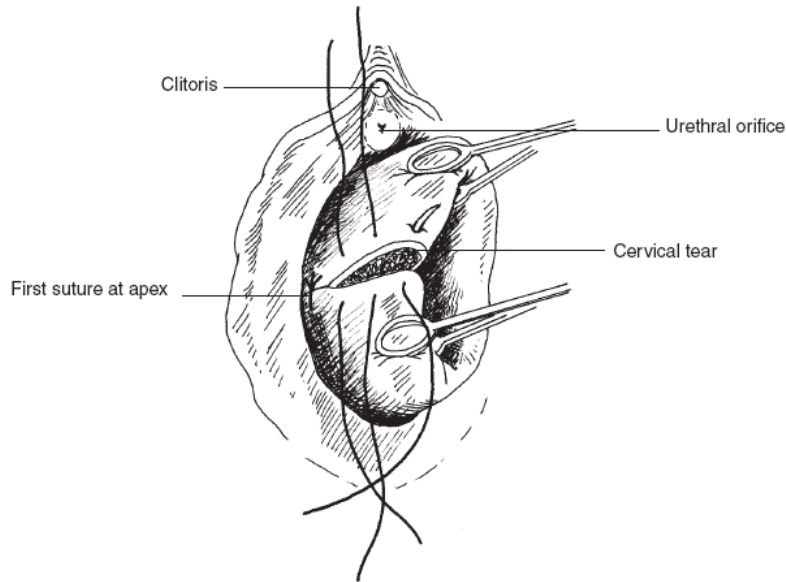


Figure 4 - Holding the cervix with ring forceps

2. Start suturing from the apex (top) of the tear. Choose either interrupted or uninterrupted continuous sutures.

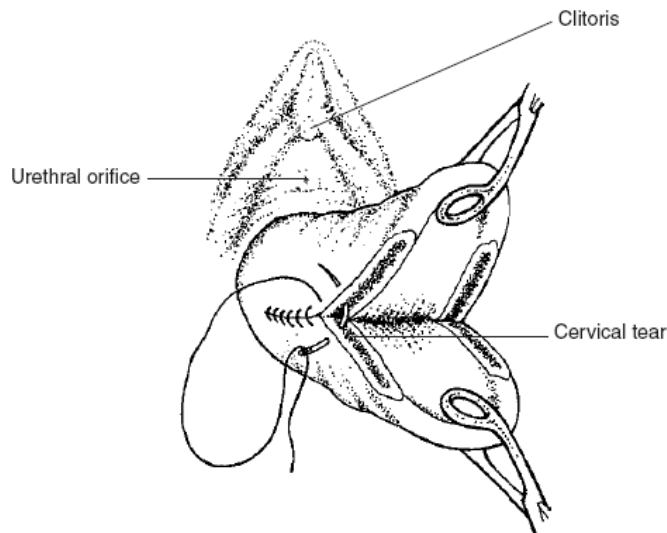


Figure 5 - Using uninterrupted sutures on the cervix

Procedure for Repair of Upper Vaginal Tract Tears

A laparotomy may be required to repair a cervical tear that has extended deep into the vaginal vault.

1. Expose the tear in the vagina. Use sterile gauze to wipe away any blood that is in the way.
2. Infiltrate with a local anesthetic as described in Appendix 5.
3. Suture the tear with a continuous suture. Suture the torn deep tissue, not only the vaginal lining, because tears of the vagina are often accompanied by injury to the underlying tissue.
4. If the tear is in the upper third of the vagina, be aware that the urethra lies 1.5 cm above the lateral vaginal fornix. Avoid a deep bite with the needle at this site.

Bleeding from a cervical or vaginal laceration may be profuse, so speed is essential. Maintain a sensitive approach to the woman during the repair procedure.

Post-Procedure Care

1. Following repair of third or fourth degree tears, give a single dose of prophylactic antibiotics:
 - Ampicillin 500 mg by mouthPLUS
 - Metronidazole 400 mg by mouth
2. Give stool softener by mouth for 1 week, if possible.
3. Avoid giving enemas or rectal examinations for 2 weeks.
4. The woman should be encouraged to void frequently. If she is unable to void urine on her own, an indwelling catheter may need to be inserted to avoid straining.
5. Advise the woman to clean the genital area, including the suture line, with clean water twice daily, and always after defecation.
6. Examine the sutured areas for healing and any signs of infection, e.g. marked inflammation, excessive swelling, and pus.
7. Follow up closely for signs of wound infection.
If the wound becomes infected:
 - a) If the infection is mild, antibiotics are not required.
 - b) If the infection is severe but does not involve deep tissues, give a combination of antibiotics:
 - Ampicillin 500 mg by mouth 3 times per day for 5 daysPLUS
 - Metronidazole 400 mg by mouth 3 times per day for 5 days
 - c) If the infection is deep, involves muscles, and is causing necrosis, give a combination of antibiotics until necrotic tissues has been removed and the woman is fever-free for 48 hours:
 - Penicillin G 2 million units IV every 6 hoursPLUS
 - Gentamicin 5 mg/kg body weight IV every 24 hoursPLUS
 - Metronidazole 500 mg IV every 8 hours
 - d) Once the woman is fever-free for 48 hours, give:
 - Ampicillin 500 mg by mouth 4 times per day for 5 daysPLUS
 - Metronidazole 400 mg by mouth 3 times per day for 5 days.

SOGC POLICY STATEMENT

No 165, October 2005

Maternal Transport Policy

This policy statement has been reviewed by the Clinical Practice Obstetrics Committee and reviewed by the Executive and Council of the Society of Obstetricians and Gynaecologists of Canada

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J Obstet Gynaecol Can 2005;27(10):956-958

The transport of pregnant women at high risk for problems to a facility that can provide the required obstetric and neonatal care is recognized as an essential component of modern perinatal care. Outcomes for the newborn are improved if women are transported antenatally, especially for those preterm infants who are born at less than 30 weeks' gestation.¹ Therefore, transferring a woman with the baby in utero is preferable to neonatal transport and should be a primary goal.

When antenatal transfers are necessary, the needs and requirements of mother and fetus as well as the capacity of local resources and facilities should be considered in order to determine the most appropriate accepting centre. This consultation and assessment may permit women to remain closer to their homes and more accessible to their families during a time of anxiety and uncertainty.

Key Words: Maternal transport, maternal transfer, newborn transfer

The "Family-Centred Maternity and Newborn Care: National Guidelines" provides the following description of the components of an effective regional referral and transport system:

- An assessment of problems that will benefit from consultation and/or transport
- A continuum of care provided to family members as they move between the referring and receiving centres
- Equipment and personnel to facilitate transfer in a safe and effective manner as required
- Interagency collaboration and communication
- Facilitating the family's ability to remain together
- Frequent updates, information, and support for the family in this time of stress and grief
- 24-hour availability of the referral and transport system
- Reliable, accurate, comprehensive communication systems between referring hospitals and between the transport teams and hospitals, regarding response times, capabilities, and facilities
- Systems for the mother to return to her community when appropriate, without undue financial stress
- Registries of requests for transport and how they are handled, for purposes of quality audit
- Ongoing performance evaluations
- Ongoing health-care professional and public education initiatives²

An important part of an effective regional transport system is the availability of transport personnel who have expertise, technical skills, and clinical judgment to provide proficient care for any emergency that may arise during transport. Regions and/or facilities may identify a pool of care providers with these attributes from which can be drawn the skill mix to meet the individual needs of women being transported. Care providers involved in maternal transport should have the ability to assess the condition of the mother and fetus; to respond in an

This statement reflects emerging clinical and scientific advances as of the date issued and are subject to change. The information should not be construed as dictating an exclusive course of treatment or procedure to be followed. Local institutions can dictate amendments to this policy statement. They should be well documented if modified at the local level. None of these contents may be reproduced in any form without prior written permission of the SOGC.

appropriate fashion to any subsequent changes; and to conduct emergency birth. As well, all individuals involved in transport should be able to monitor neonatal vital signs, to perform neonatal resuscitation as well as adult cardiopulmonary resuscitation, and to administer intravenous therapy.

The reason for a maternal transport may be related to either the woman or the fetus, or both. Transport should be considered by the primary physician or midwife when the resources for both immediate and ongoing care of the pregnant woman or her infant, if born in the local community or at home, are inadequate to manage anticipated complications. Transport is indicated when, after assessment, it is determined that the pregnant woman requires the advanced resources and skilled personnel at a Level II or III facility, and/or if it is expected that the newborn will require specialized neonatal intensive care. Factors that need to be considered in planning for transport include the distance to the nearest appropriate facility and the geographic and climatic conditions at the time.

The most common indications for maternal transport may include, but are not restricted to:

- Preterm labour
- Preterm rupture of membranes
- Severe gestational hypertension or other hypertensive complications
- Antepartum hemorrhage
- Medical complications of pregnancy such as diabetes, renal disease, hepatitis
- Multiple gestation
- Intrauterine growth restriction
- Fetal abnormalities
- Inadequate progress in labour
- Malpresentation
- Maternal trauma

When pre-labour complications are anticipated, early consultation and referral as necessary to the appropriate facility is recommended. It is always desirable to avoid, if possible, emergency maternal transport.

Under some circumstances, transport is either not desirable or not possible. Contraindications to maternal transport may include the following:

- The woman's condition is insufficiently stable for transport.
- The fetus' condition is unstable and threatening to deteriorate rapidly.
- The birth is imminent.
- No experienced attendants are available to accompany the woman.
- Weather conditions are hazardous for travel, or present dilemmas for transport.

A number of important issues must be taken into consideration when developing a transport plan. Communication is fundamentally important to effective transport strategies, and all perinatal care providers and/or facilities must be familiar with the mechanisms in place for initiating transport and confirming

the ability of the receiving institution to provide the necessary care. Each region should be responsible for developing transport protocols for specific clinical situations (such as preterm labour or gestational hypertension) that are based on the current evidence regarding best practices, and these should be documented and communicated to all partners in the region.

The need for transport must be communicated and discussed with the woman and her family, with adequate opportunity provided, as circumstances permit, for the woman's questions and concerns. Information provided to the woman and her family should include:

- The reasons for transport
- The scheduled date, time, and duration of the transport
- The destination of the woman
- The mode of travel
- The names of staff members who will accompany the woman and/or family
- The visiting hours and telephone numbers of the receiving hospital
- The anticipated length of hospital stay
- Travel directions/maps to receiving hospital by car, or information on other modes of transportation
- The accommodation options for family members²

Patients are transported from the care of one physician or midwife to another physician. Discussion between the referring physician/midwife and the accepting physician prior to transport is essential to the provision of optimal care. Components of the discussion must include the reason for the transport, the condition and stabilization of the mother and/or fetus, and the plan for transport. Decisions regarding the mode of transport (road or air ambulance) and the need for accompanying personnel and the required skill set will be made by the referring centre with input from the receiving centre.

The proposed receiving hospital should document the request for transfer. The following is required information: the names of the woman and her physician/midwife; the reason for the transport; the current condition of the woman and fetus; any decisions regarding treatment and transport; the type of health professional accompanying the woman/fetus; and the name and contact information for the accompanying support person. This documentation should be completed whether or not a decision is made to transport.²

The referring physician/midwife or institution should complete a maternal transfer form, which should be available from their health-care institution. Photocopies of the antenatal record, the pertinent hospital records, and ultrasound reports should be included, and, if unavailable at the time of transport, should be faxed or otherwise forwarded as soon as possible.

Interventions necessary for stabilization, such as initiation of intravenous infusion, should be conducted prior to transport. The availability and functioning of all transport equipment should be checked before departure (see Appendix A). Sufficient oxygen for transport should be available. For air transport, consideration should be given to administering oxygen to the woman during high-altitude flights.³

During transport, care should be individualized to meet the nature of the problem and should take into consideration the distance and conditions of the transport. All assessments should be documented on the maternal transfer form. Both mother and fetus need to be monitored during transport, with the frequency of monitoring dependant upon their condition and the judgment of the attendant. Assessments should include uterine activity, maternal vital signs, and fetal heart rate. The noise level will need to be considered with respect to determining the appropriate instruments for assessment; for example, the noise levels in air transport may necessitate the use of a digital sphygmomanometer and fetal Doppler with digital display. In order to minimize the risk of supine hypotension and fetal hypoxia, the woman should be positioned on her side during transit. The care of the woman during transport is the responsibility of the referring institution, unless the receiving institution has sent a transport team.

All care providers involved in maternal transport must be

attentive to the emotional needs of the woman and her family during what is frequently a frightening and sometimes grief-filled experience. The establishment of a support system is important to the woman's well-being. Even in emergency situations, it is important not to neglect the principles of family-centred care.

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1. Lee SK, McMillan DD, Ohlsson A, Boulton J, Lee DS, Ting S, et al. The benefit of preterm birth at tertiary care centers is related to gestational age. *Am J Obstet Gynecol* 2003;188(3):617-22.
2. Health Canada. Family-centred maternity and newborn care: national guidelines. Ottawa: Minister of Public Works and Government Services; 2000.
3. Society of Obstetricians and Gynaecologists of Canada. Guidelines for physicians and nurses in maternal/fetal transport. Ottawa: Author; 1992.

Appendix A

EQUIPMENT FOR MATERNAL TRANSPORT*

Basic Equipment

Check that all equipment is available and functioning before departure. The equipment and kits should be ready at all times and all staff should know where they are located. Check with local ambulance services to determine what equipment is available in the ambulance.

General Equipment

- Maternal transfer form
- Stethoscope
- Thermometer
- Emesis basin
- Flashlight
- Sphygmomanometer
- Doppler (battery operated or fetal stethoscope)
- Infusion pump (battery operated)
- Sterile gloves (3 pairs, various sizes)
- Peripads
- Sterile lubricant
- Antiseptic solution

IV Fluids and Maternal Medications

- 1000 cc 5% D/W
- 1000 cc Ringer's Lactate
- 2 solusets

- Tape
- Tourniquet
- Intracaths: 2 each of # 16, # 18, # 20
- Butterfly: 2 of # 21
- Assorted needles and syringes
- Alcohol swabs
- 5 ampules magnesium sulphate 1 g/amp
- 4 ampules oxytocin 10 units/mL
- 2 ampules hydralazine 20 mg/amp
- 2 ampules Valium 10 mg/amp
- Indomethacin 50 mg suppositories or nifedipine 10 mg tablets

Emergency Birth Sterile Kit

- 1 pair scissors
- 2 Kelly's forceps
- Six 4 x 4 gauze squares
- 1 small drape
- DeLee mucous suction or a mechanical suction and # 10 Fr. suction catheters
- 2 cord clamps
- 2 plastic bags (placenta and garbage)
- Blanket for baby
- Mylar emergency blanket

Infant Resuscitation Equipment

- Neonatal laryngoscope and small straight blade, size 0
- Neonatal self-inflating bag and masks, sizes 0, 1, 2, to administer 100% oxygen
- Clear endotracheal tubes with stylets and connectors, size 2.5 to 4
- Epinephrine 1:10 000 – 1 mL ampules x 3 or preloaded syringes
- Naloxone 0.4 mg/mL – 1 mL ampules x 3 or preloaded syringes
- 1 mL syringes
- 2 mL syringes
- # 20 needles

- # 25 needles
- Orogastric feeding tubes
- Elastoplast tape and scissors

Adult Resuscitation Equipment

- Oxygen – check availability and amount in ambulance
- Self-inflating bag and mask
- Airway # 3

*Adapted from “Family-Centred Maternity and Newborn Care: National Guidelines”²

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APPENDIX 8**LAPAROTOMY TO APPLY COMPRESSION SUTURES**

*The directions provided that are provided below were taken directly from the website:
<http://www.cblynch.com/HTML/bjog1.html> Accessed on August 29, 2007*

The following steps are involved in the competent application of the B-Lynch suturing technique:

1. The patient under general anaesthesia is catheterised and placed in the Lloyd Davies position for access to the vagina to assess the control of bleeding objectively by swabbing.
2. The abdomen is opened by an appropriate sized Pfannenstiel incision or if the patient has had cesarean section following which she bled, the same incision is re-opened.
3. On entering the abdomen either a lower segment incision is made after dissecting off the bladder or sutures of a recent cesarean section are removed and the cavity entered. The uterine cavity is evacuated, examined and swabbed out.
4. The uterus is exteriorised and rechecked to identify any bleeding point, if the bleeding is diffuse such as in cases of uterine atony or coagulopathy, profuse placenta bed bleeding placenta accreta or inertia where no obvious bleeding point is observed then bi- manual compression is first tried to assess the potential chance of success of the B-Lynch, suturing technique. The vagina is swabbed out to confirm adequate control of bleeding.
5. If vaginal bleeding is controlled, for a left handed surgeon or the surgeon electing to stand on the left side of the patient, the procedure is as follows:
 - A. A 70 mm round bodied hand needle on which a No. 2 chromic catgut suture is mounted is used to puncture the uterus 3 cm from the right lower edge of the uterine incision and 3 cm from the right lateral border.
 - B. The mounted No. 2 chromic catgut is threaded through the uterine cavity to emerge at the upper incision margin 3 cm above and approximately 4 cm from the lateral border (because the uterus widens from below upwards).
 - C. The chromic catgut now visible is passed over to compress the uterine fundus approximately 3 - 4 cm from the right cornual border.
 - D. The catgut is fed posteriorly and vertically to enter the posterior wall of the uterine cavity at the same level as the upper anterior entry point.
 - E. The chromic catgut is pulled under moderate tension assisted by manual compression exerted by the first assistant. The length of the catgut is passed back posteriorly through the same surface marking as for the right side the suture lying horizontally.
 - F. The catgut is fed through posteriorly and vertically over the fundus to lie anteriorly and vertically compressing the fundus on the left side as occurred on the right. The needle is passed in the same fashion on the left side through the uterine cavity and out approximately 3 cm anteriorly and below the lower incision margin on the left side.
6. The two lengths of catgut are pulled taught assisted by bi-manual compression to minimise trauma and to achieve or aid compression. During such compression the vagina is checked that the bleeding is controlled.
7. As good hemostasis is secured and whilst the uterus is compressed by an experienced assistant the principal surgeon throws a knot (double throw) followed by two or three further throws to secure tension.
8. The lower transverse uterine incision is now closed in the normal way, in two layers, with or without closure of the lower uterine segment peritoneum.
9. For a major placenta previa we suggest that an independent figure of eight suture is placed at the beginning anteriorly or posteriorly or both prior to the application of the B-Lynch suturing technique as described above if necessary.

UTERINE COMPRESSION SUTURES

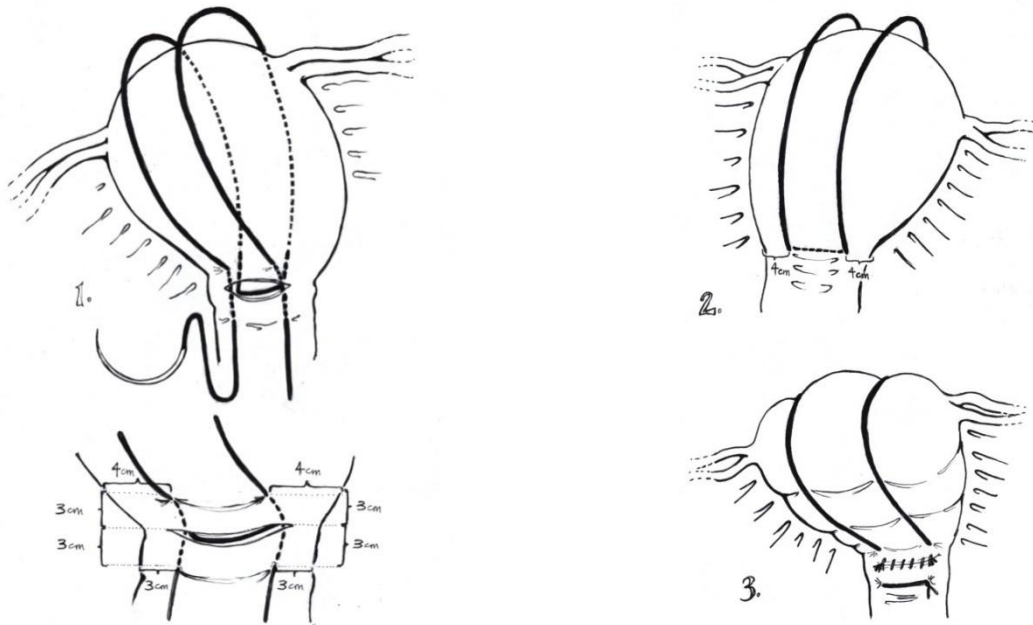


Figure 1, 2 and 3 - B-Lynch technique: The sutures are placed so that they will exert continuous vertical compression on the vascular system of the uterus.

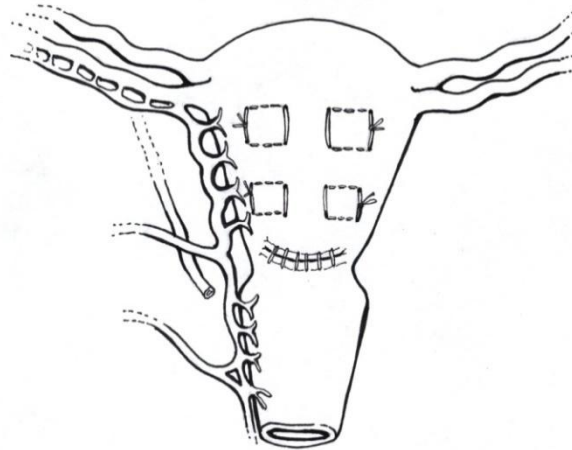


Figure 4 - Cho technique: Multiple square sutures are placed, compressing the anterior to the posterior uterine walls.

For a detailed description of these procedures, see B-Lynch, *Conservative Surgical Management*, in B-Lynch C, Keith LG, Lalonde AB, Karoshi M, editors. *A textbook of postpartum hemorrhage: a comprehensive guide to evaluation, management and surgical intervention*. Duncow (UK): Sapiens Publishing; 2006: 287-298. Available from: http://www.sapienspublishing.com/pph_pdf/PPH-Chap-31.pdf.

APPENDIX 9

UTERINE AND UTERO-OVARIAN ARTERY LIGATION

Adapted from: *Managing complications in pregnancy and childbirth: a guide for doctors and midwives*. Geneva: World Health Organization; 2000. Available from: <http://www.who.int/reproductive-health/impac/mcpc.pdf>.

Discussion

Ligation of the uterine and utero-ovarian arteries is one of several uterus-conserving techniques. It is a relatively simple and effective procedure should be taught during obstetric and gynecologic training.

Step-by-Step Technique

Prepare the woman for surgery.

- If not already done, start an IV infusion of normal saline or Ringer's lactate.
- Give a single dose of prophylactic antibiotics:
 - Ampicillin 2 g IVOR
 - Cefazolin 1 g IV
- **Open the abdomen.**
 - Make a midline vertical incision below the umbilicus to the pubic hair, through the skin and to the level of the fascia.
 - Make a 2–3 cm vertical incision in the fascia.
 - Hold the fascial edge with forceps and lengthen the incision up and down using scissors.
 - Use fingers or scissors to separate the rectus muscles (abdominal wall muscles).
 - 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.
 - Place a bladder retractor over the pubic bone and place self-retaining abdominal retractors.
- Pull on the uterus to expose the lower part of the broad ligament.
- Feel for pulsations of the uterine artery near the junction of the uterus and cervix.
- Using 0 chromic catgut (or polyglycolic) suture on a large needle, pass the needle around the artery and through 2–3 cm of myometrium (uterine muscle) at the level where a transverse lower uterine segment incision would be made. Tie the suture securely (Site C on Figure 1).
- Place the sutures as close to the uterus as possible because the ureter is generally only 1 cm lateral to the uterine artery.
- Repeat on the other side.
- If the **artery has been torn**, clamp and tie the bleeding ends.
- Ligate the utero-ovarian artery just below the point where the ovarian suspensory ligament joins the uterus (Site A on Figure 1).
- Repeat on the other side.
- Observe for continued bleeding or formation of hematoma.

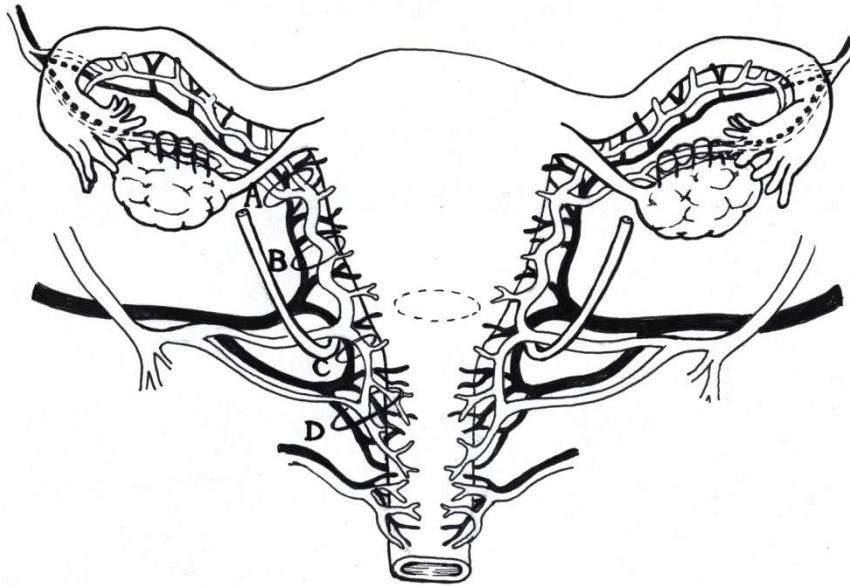


Figure 1 - Sites for ligating uterine and utero-ovarian arteries

- **Close the abdomen.**
 - Ensure that there is no bleeding. Remove clots using a sponge.
 - Examine carefully for injuries to the bladder and repair any found.
 - Close the fascia with continuous 0 chromic catgut (or polyglycolic) suture.

Note: *There is no need to close the bladder peritoneum or the abdominal peritoneum.*

- 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.
- 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.

Post-Procedure Care

- If there are **signs of infection** or the woman currently has fever, give a combination of antibiotics until she is fever-free for 48 hours:
 - Ampicillin 2 g IV every 6 hours
PLUS
 - Gentamicin 5 mg/kg body weight IV every 24 hours
PLUS
 - Metronidazole 500 mg IV every 8 hours
- Give appropriate analgesic drugs.
- If there are **no signs of infection**, remove the abdominal drain after 48 hours.