

SECTION 3
PROCEDURES

TABLE P-1 Indications and precautions for paracervical block

Indications	Precautions
<ul style="list-style-type: none"> • Dilatation and curettage • Manual vacuum aspiration 	<ul style="list-style-type: none"> • Make sure there are no known allergies to lignocaine or related drugs • Do not inject into a vessel • Maternal complications are rare but may include haematoma

- Review general care principles (**page C-17**).
- Prepare 20 mL 0.5% lignocaine solution without adrenaline (**page C-39**).
- Use a 3.5-cm, 22-gauge or 25-gauge needle to inject the lignocaine solution.
- If **using a tenaculum to grasp the cervix**, first inject 1 mL of 0.5% lignocaine solution into the anterior or posterior lip of the cervix which has been exposed by the speculum.

Note: With incomplete abortion, a ring (sponge) forceps is preferable, as it is less likely than the tenaculum to tear the cervix with traction and does not require the use of lignocaine for placement.

- With the tenaculum or ring forceps on the cervix vertically (one tooth in the external os, the other on the face of the cervix), use slight traction and movement to help identify the area between the smooth cervical epithelium and the vaginal tissue. This is the site for insertion of the needle around the cervix.
- Insert the needle just under the epithelium.

Tip: Some practitioners have suggested the following step to divert the woman's attention from the insertion of the needle: Place the tip of the needle just over the site selected for insertion and ask the woman to cough. This will "pop" the needle just under the surface of the tissue.

Note: Aspirate (pull back on the plunger) to be sure that no vessel has been penetrated. If **blood is returned in the syringe with aspiration**, remove the needle. Recheck the position carefully and try again. Never inject if blood is aspirated. **The woman can suffer convulsions and death if IV injection of lignocaine occurs.**

- Inject 2 mL of lignocaine solution just under the epithelium, not deeper than 3 mm, at 3, 5, 7 and 9 o'clock (**Fig P-1**). Optional injection sites are at 2 and 10 o'clock. When correctly placed, a swelling and blanching of the tissue can be noted.
- At the conclusion of the set of injections, wait two minutes and then pinch the cervix with forceps. If the **woman can feel the pinch**, wait two more minutes and then retest.

Anaesthetize early to provide sufficient time for effect.

FIGURE P-1 Paracervical block injection sites

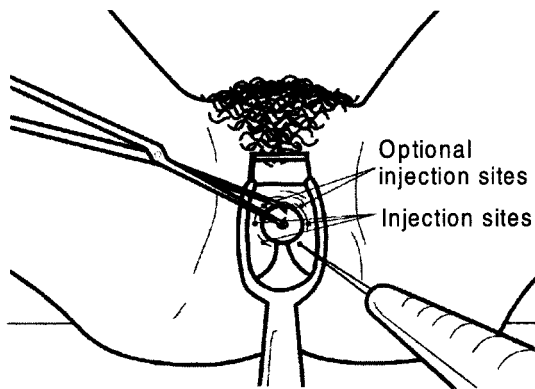


TABLE P-2 Indications and precautions for pudendal block

Indications	Precautions
<ul style="list-style-type: none"> Instrumental or breech delivery Episiotomy and repair of perineal tears Craniotomy or craniocentesis 	<ul style="list-style-type: none"> Make sure there are no known allergies to lignocaine or related drugs Do not inject into a vessel

- Review general care principles (**page C-17**).
- Prepare 40 mL 0.5% lignocaine solution without adrenaline (**page C-39**).

Note: It is best to limit the pudendal block to 30 mL of solution so that a maximum of 10 mL of additional solution may be injected into the perineum during repair of tears, if needed.

- Use a 15-cm, 22-gauge needle to inject the lignocaine.

The target is the pudendal nerve as it passes through the lesser sciatic notch. There are two approaches:

- through the perineum;
- through the vagina.

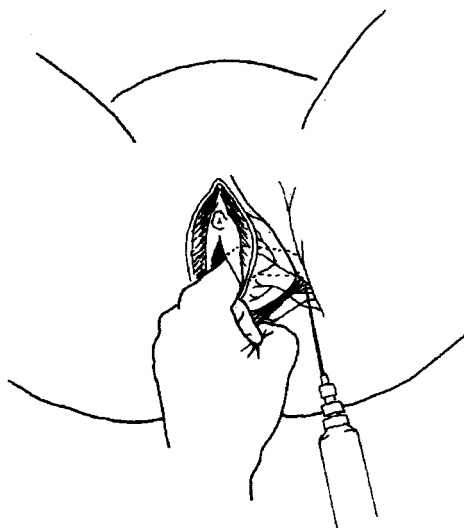
The perineal approach requires no special instrument. For the vaginal approach, a special needle guide (“trumpet”), if available, provides protection for the provider’s fingers.

PERINEAL APPROACH

- Infiltrate the perineal skin on both sides of the vagina using 10 mL of lignocaine solution.

Note: Aspirate (pull back on the plunger) to be sure that no vessel has been penetrated. If **blood is returned in the syringe with aspiration**, remove the needle. Recheck the position carefully and try again. Never inject if blood is aspirated. **The woman can suffer convulsions and death if IV injection of lignocaine occurs.**

- Wearing high-level disinfected or sterile gloves, place two fingers in the vagina and guide the needle through the perineal tissue to the tip of the woman’s left ischial spine (**Fig P-2, page P-4**).

FIGURE P-2 Perineal approach

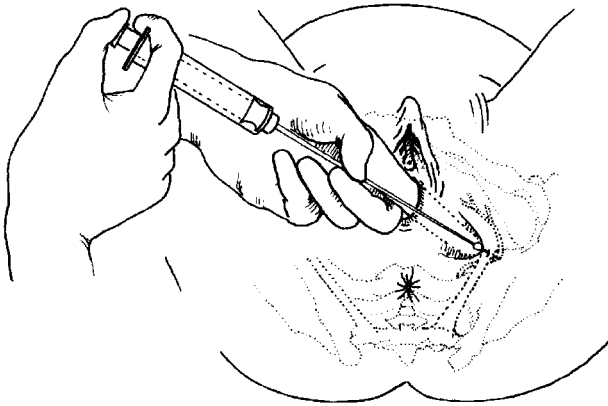
- Inject 10 mL of lignocaine solution in the angle between the ischial spine and the ischial tuberosity.
- Pass the needle through the sacrospinous ligament and inject another 10 mL of lignocaine solution.
- Repeat the procedure on the opposite side.
- If an **episiotomy is to be performed**, infiltrate the episiotomy site in the usual manner at this time (**page P-71**).
- At the conclusion of the set of injections, wait two minutes and then pinch the area with forceps. If the **woman can feel the pinch**, wait two more minutes and then retest.

Anaesthetize early to provide sufficient time for effect.

VAGINAL APPROACH

- Wearing high-level disinfected or sterile gloves, use the left index finger to palpate the woman's left ischial spine through the vaginal wall (Fig P-3).

FIGURE P-3 Vaginal approach without a needle guide



- Use the right hand to advance the needle guide (“trumpet”) towards the left spine, keeping the left fingertip at the end of the needle guide.
- Place the needle guide just below the tip of the ischial spine.

Remember to keep the fingertip near the end of the needle guide. Do not place the fingertip beyond the end of the needle guide as needle-stick injury can easily occur.

- Advance a 15-cm, 22-gauge needle with attached syringe through the guide.
- Penetrate the vaginal mucosa until the needle pierces the sacrospinous ligament.

Note: Aspirate (pull back on the plunger) to be sure that no vessel has been penetrated. If **blood is returned in the syringe with aspiration**, remove the needle. Recheck the position carefully and try again. Never inject if blood is aspirated. **The woman can**

suffer convulsions and death if IV injection of lignocaine occurs.

- Inject 10 mL of lignocaine solution.
- Withdraw the needle into the guide and reposition the guide to just above the ischial spine.
- Penetrate the vaginal mucosa and aspirate again to be sure that no vessel has been penetrated.
- Inject another 5 mL of lignocaine solution.
- Repeat the procedure on the other side, using the right index finger to palpate the woman's right ischial spine. Use the left hand to advance the needle and needle guide and inject the lignocaine solution.
- If an **episiotomy is to be performed**, infiltrate the episiotomy site in the usual manner at this time (**page P-71**).
- At the conclusion of the set of injections, wait two minutes and then pinch the area with forceps. If the **woman can feel the pinch**, wait two more minutes and then retest.

Anaesthetize early to provide sufficient time for effect.

LOCAL ANAESTHESIA FOR CAESAREAN SECTION

Local anaesthesia is a safe alternative to general, ketamine or spinal anaesthesia when these anaesthetics or persons trained in their use are not available.

The use of local anaesthesia for caesarean section requires that the provider counsel the woman and reassure her throughout the procedure. The provider must keep in mind that the woman is awake and alert, and should use instruments and handle tissue as gently as possible.

TABLE P-3 Indications and precautions for local anaesthesia for caesarean section

Indications	Precautions
<ul style="list-style-type: none">• Caesarean section (especially in women with heart failure)	<ul style="list-style-type: none">• Avoid use in women with eclampsia, severe pre-eclampsia or previous laparotomy• Avoid use in women who are obese, apprehensive or allergic to lignocaine or related drugs• Avoid use if little experience at caesarean section• Do not inject into a vessel

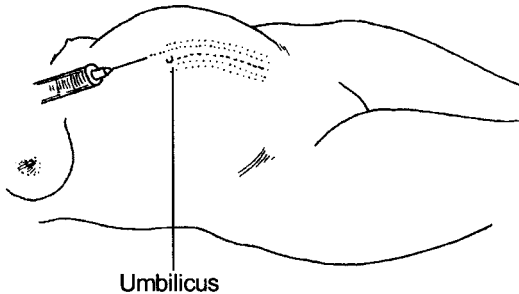
- Review general care principles (**page C-17**) and start an IV infusion (**page C-21**).
- Prepare 200 mL of 0.5% lignocaine solution with 1:200 000 adrenaline (**page C-39**). Usually less than half this volume (approximately 80 mL) is needed in the first hour.
- If the **fetus is alive**, give pethidine 1 mg/kg body weight (but not more than 100 mg) IV slowly (or give morphine 0.1 mg/kg body weight IM) and promethazine 25 mg IV **after** delivery. Alternatively, pethidine and promethazine may be given before delivery, but the baby may need to be given naloxone 0.1 mg/kg body weight IV at birth.
- If the **fetus is dead**, give pethidine 1 mg/kg body weight (but not more than 100 mg) IV slowly (or give morphine 0.1 mg/kg body weight IM) and promethazine 25 mg IV.

Talk to the woman and reassure her throughout the procedure.

- Using a 10-cm needle, infiltrate one band of skin and subcutaneous tissue on either side of the proposed incision, two finger breadths apart (Fig P-4).

Note: Aspirate (pull back on the plunger) to be sure that no vessel has been penetrated. If **blood is returned in the syringe with aspiration**, remove the needle. Recheck the position carefully and try again. Never inject if blood is aspirated. **The woman can suffer convulsions and death if IV injection of lignocaine occurs.**

FIGURE P-4 Infiltration of skin and subcutaneous tissue with local anaesthesia for caesarean section



- Raise a long wheal of lignocaine solution 3–4 cm on either side of the midline from the symphysis pubis to a point 5 cm above the umbilicus.
- Infiltrate the lignocaine solution down through the layers of the abdominal wall. The needle should remain almost parallel to the skin. Take care not to pierce the peritoneum and insert the needle into the uterus, as the abdominal wall is very thin at term.
- At the conclusion of the set of injections, wait two minutes and then pinch the incision site with forceps. If the **woman can feel the pinch**, wait two more minutes and then retest.

Anaesthetize early to provide sufficient time for effect.

Note: If the **caesarian section is performed under local anaesthesia**, make a midline incision that is about 4 cm longer than when general anaesthesia is used. A **Pfannenstiel incision** should

not be used as it takes longer, retraction is poorer and it requires more local anaesthetic.

The anaesthetic effect can be expected to last about 60 minutes.

Proceed with caesarean section (**page P-43**) keeping the following in mind:

- Do not use abdominal packs. Use retractors as little as possible and with a minimum of force.
- Inject 30 mL of lignocaine solution beneath the uterovesical peritoneum as far laterally as the round ligaments. No additional anaesthetic is required. The peritoneum is sensitive to pain; the myometrium is not.
- Inform the woman that she will feel some discomfort from traction when the baby is delivered. This is usually no more than occurs during vaginal delivery.
- Repair the uterus without removing it from the abdomen.
- Additional local anaesthesia may be necessary to repair the abdominal wall.

TABLE P-4 Indications and precautions for spinal anaesthesia

Indications	Precautions
<ul style="list-style-type: none"> • Caesarean section • Laparotomy • Repair of third and fourth degree perineal tears 	<ul style="list-style-type: none"> • Make sure there are no known allergies to lignocaine or related drugs • Avoid use in women with uncorrected hypovolaemia, severe anaemia, coagulation disorders, haemorrhage, local infection, severe pre-eclampsia, eclampsia or heart failure due to heart disease

- Review general care principles (**page C-17**) and start an IV infusion (**page C-21**).
- Infuse 500–1000 mL of IV fluids (normal saline or Ringer’s lactate) to pre-load the woman and avoid hypotension. This should be done 30 minutes before anaesthesia.
- Prepare 1.5 mL of the local anaesthetic: 5% lignocaine in 5% dextrose. Add 0.25 mL of adrenaline (1:1000) if the anaesthetic needs to be effective for longer than 45 minutes.
- Ask the woman to lie on her side (or sit up), ensuring that the lumbar spine is well flexed. Ask the woman to flex her head onto her chest and round her back as much as possible.
- Identify and, if required, mark the proposed site of injection. A vertical line from the iliac crest upward will cross the woman’s vertebral column between the spines of the fourth and fifth lumbar vertebrae. Choose this space or the space just above it.

Sterility is critical. Do not touch the point or shaft of the spinal needle with your hand. Hold the needle only by its hub.

- Inject 1% lignocaine solution using a fine needle to anaesthetize the woman’s skin.
- Introduce the finest spinal needle available (22- or 23-gauge) in the midline through the wheal, at a right angle to the skin in the vertical plane.

Note: Fine needles tend to bend.

- If the **needle hits bone**, it may not be in the midline. Withdraw the needle and reinsert it, directing it slightly upwards while aiming for the woman’s umbilicus.

- Advance the spinal needle towards the subarachnoid space. A distinct loss of resistance will be felt as the needle pierces the ligamentum flavum.
- Once the needle is through the ligamentum flavum, push the needle slowly through the dura. There will be another slight loss of resistance as the dura is pierced.
- Remove the stylet. Cerebrospinal fluid should flow out the needle.
- If **cerebrospinal fluid does not come out**, reinsert the stylet and rotate the needle gently. Remove the stylet to see if the fluid is flowing out. If you fail two times, try another space.
- Inject 1–1.25 mL of the local anaesthetic solution. For pregnant women who have not delivered, a smaller dose of the drug is needed since the available subarachnoid space is reduced due to engorged epidural veins.
- Help the woman to lie on her back. Have the operating table tilted to the left or place a pillow or folded linen under her right lower back to decrease supine hypotension syndrome.
- Recheck the woman's blood pressure. A fall in blood pressure is likely. If **there is significant hypotension**, give the woman more IV fluids (500 mL quickly):
 - If this **does not raise her blood pressure**, give ephedrine 0.2 mg/kg body weight IV in 3 mg increments;
 - If **blood pressure continues to fall after giving IV ephedrine** boluses four times, give ephedrine 30 mg IM.
- Give oxygen at 6–8 L per minute by mask or nasal cannulae.
- After injecting the local anaesthetic solution, wait two minutes and then pinch the incision site with forceps. If the **woman can feel the pinch**, wait two minutes and then retest.

Anaesthetize early to provide sufficient time for effect.

- After surgery, keep the woman flat for at least six hours with only a single pillow beneath her head to prevent post-spinal headache. She must not sit up or strain during this period.

TABLE P-5 Indications and precautions for ketamine anaesthesia

Indications	Precautions
<ul style="list-style-type: none"> • Any procedure that is relatively short (less than 60 minutes) and where muscle relaxation is not required (e.g. repair of perineal tears or extensive cervical tears, manual removal of placenta, caesarean section, drainage of breast abscess) • Suitable as a back-up if inhalation apparatus (or gas supply for a Boyle’s anaesthesia machine) fails or if general anaesthesia is used without an inhalation apparatus 	<ul style="list-style-type: none"> • When used alone, ketamine can cause unpleasant hallucinations. Avoid use in women with a history of psychosis. To prevent hallucinations, give diazepam 10 mg IV after the baby is delivered • By itself ketamine does not provide muscular relaxation, so the incision for caesarean section may need to be longer • Ketamine should not be used in women with elevated blood pressure, pre-eclampsia, eclampsia or heart disease

- Review general care principles (**page C-17**) and start an IV infusion (**page C-21**).
- Ketamine may be given IM, IV or by infusion. The dose of ketamine is variable:
 - Most women will require 6–10 mg/kg body weight IM. Surgical anaesthesia is reached within 10 minutes and lasts up to 30 minutes;
 - Alternatively, give 2 mg/kg body weight IV slowly over two minutes (in which case the action lasts for only 15 minutes);
 - Infusion of ketamine is described below. This is suitable for caesarean section;
 - When additional pain relief is needed, give ketamine 1 mg/kg body weight IV.

Ketamine anaesthesia should not be used in women with elevated blood pressure, pre-eclampsia, eclampsia or heart disease.

KETAMINE INFUSION

PREMEDICATION

- Give atropine sulfate 0.6 mg IM 30 minutes prior to surgery.
- Give diazepam 10 mg IV at the time of induction to prevent hallucinations (for caesarean section, give diazepam **after** the baby is delivered).
- Give oxygen at 6–8 L per minute by mask or nasal cannulae.

INDUCTION AND MAINTENANCE

- Check the woman's vital signs (pulse, blood pressure, respiration, temperature).
- Insert a mouth gag to prevent airway obstruction by the tongue.
- Induction of anaesthesia is achieved by administering ketamine two mg/kg body weight IV slowly over 2 minutes. For short procedures lasting less than 15 minutes, this will provide adequate anaesthesia.
- For longer procedures, infuse ketamine 200 mg in 1 L dextrose at 2 mg per minute (i.e. 20 drops per minute).
- Check the level of anaesthesia before proceeding with the surgery. Pinch the incision site with forceps. If the **woman can feel the pinch**, wait two minutes and then retest.
- Monitor vital signs (pulse, blood pressure, respiration, temperature) every 10 minutes during the procedure.

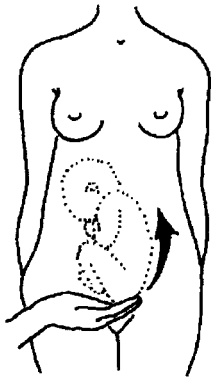
POST-PROCEDURE CARE

- Discontinue ketamine infusion and administer a postoperative analgesic suited to the type of surgery performed (**page C-46**).
- Maintain observations every 30 minutes until the woman is fully awake; ketamine anaesthesia may take up to 60 minutes to wear off.

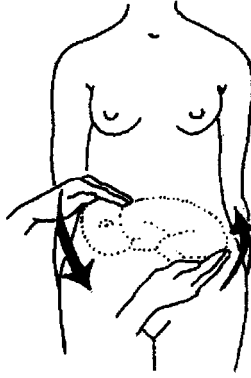
- Review for indications. Do not perform this procedure before 37 weeks or if facilities for emergency caesarian section are not available.
- Have the woman lie on her back, and elevate the foot of the bed.
- Listen to and note the fetal heart rate. If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute):
 - Do not proceed with external version;
 - Manage as for fetal distress (**page S-95**).
- Palpate the abdomen to confirm the presentation and position of the fetal head, back and hips.
- To mobilize the breech, gently lift the lowest part of the fetus from the pelvic inlet by grasping above the pubic bone (**Fig P-5 A, page P-16**).
- Bring the head and buttocks of the fetus closer to each other to achieve forward rotation. Rotate the fetus slowly by guiding the head in a forward roll as the buttocks are lifted (**Fig P-5 B–C, page P-16**).
- Listen to the fetal heart rate after every attempt at external version. If an **abnormal fetal heart rate is detected**:
 - Manage as for fetal distress (**page S-95**);
 - Reassess every 15 minutes;
 - If the **fetal heart rate does not stabilize within the next 30 minutes**, deliver by caesarean section (**page P-43**).
- If the **procedure is successful**, have the woman remain lying down for 15 minutes. Counsel her to return if bleeding or pain occurs or if she believes the baby has returned to the previous presentation.
- If the **procedure is unsuccessful**, try again using a backward roll (**Fig P-5 D**).
- If the **procedure is still unsuccessful and the fetal heart rate is good**, tocolytics may increase the chances of successful version. Give:
 - terbutaline 250 mcg IV slowly over five minutes;
 - OR salbutamol 0.5 mg IV slowly over five minutes.

- If the **procedure is still unsuccessful**, attempt version again after one week or if the woman presents in early labour with breech or transverse lie.

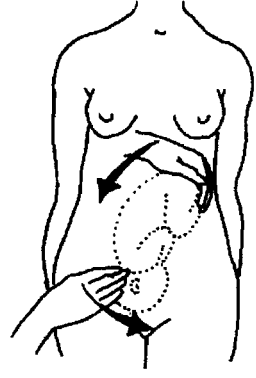
FIGURE P-5 External version of a breech presentation.



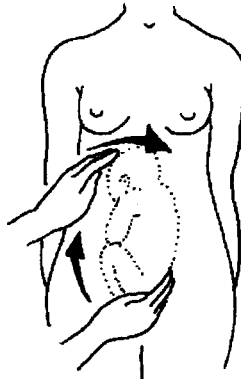
A. Mobilization of the breech



B. Manual forward rotation using both hands, one to push the breech and the other to guide the vertex



C. Completion of forward roll



D. Backward roll

Induction of labour and augmentation of labour are performed for different indications but the methods are the same.

- **Induction of labour:** stimulating the uterus to begin labour.
- **Augmentation of labour:** stimulating the uterus during labour to increase the frequency, duration and strength of contractions.

A good labour pattern is established when there are three contractions in 10 minutes, each lasting more than 40 seconds.

If the **membranes are intact**, it is recommended practise in both induction and augmentation of labour to first perform artificial rupture of membranes (ARM). In some cases, this is all that is needed to induce labour. Membrane rupture, whether spontaneous or artificial, often sets off the following chain of events:

- Amniotic fluid is expelled;
- Uterine volume is decreased;
- Prostaglandins are produced, stimulating labour;
- Uterine contractions begin (if the woman is not in labour) or become stronger (if she is already in labour).

ARTIFICIAL RUPTURE OF MEMBRANES

- Review for indications.

Note: In areas where HIV and/or hepatitis are highly prevalent, it is prudent to leave the membranes intact for as long as possible to reduce perinatal transmission of HIV.

- Listen to and note the fetal heart rate.
- Ask the woman to lie on her back with her legs bent, feet together and knees apart.
- Wearing high-level disinfected or sterile gloves, use one hand to examine the cervix and note the consistency, position, effacement and dilatation.
- Use the other hand to insert an amniotic hook or a Kocher clamp into the vagina.
- Guide the clamp or hook towards the membranes along the fingers in the vagina.

- Place two fingers against the membranes and gently rupture the membranes with the instrument in the other hand. Allow the amniotic fluid to drain slowly around the fingers.
- Note the colour of the fluid (clear, greenish, bloody). If **thick meconium is present**, suspect fetal distress (**page S-95**).
- After ARM, listen to the fetal heart rate during and after a contraction. If the **fetal heart rate is abnormal** (less than 100 or more than 180 beats per minute), suspect fetal distress (**page S-95**).
- If **membranes have been ruptured for 18 hours**, give prophylactic antibiotics to help reduce Group B streptococcus infection in the neonate (**page C-35**):
 - penicillin G 2 million units IV;
 - OR ampicillin 2 g IV, every six hours until delivery;
 - If there are **no signs of infection after delivery**, discontinue antibiotics.
- If **good labour is not established one hour after ARM**, begin oxytocin infusion (**page P-19**).
- If **labour is induced because of severe maternal disease** (e.g. sepsis or eclampsia), begin oxytocin infusion at the same time as ARM.

INDUCTION OF LABOUR

ASSESSMENT OF THE CERVIX

The success of induction of labour is related to the condition of the cervix at the start of induction. To assess the condition of the cervix, a cervical exam is performed and a score is assigned based on the criteria in **Table P-6**:

- If the **cervix is favourable** (has a score of 6 or more), labour is usually successfully induced with oxytocin alone.
- If the **cervix is unfavourable** (has a score of 5 or less), ripen the cervix using prostaglandins (**page P-24**) or a Foley catheter (**page P-25**) before induction.

TABLE P-6 Assessment of cervix for induction of labour

Factor	Rating			
	0	1	2	3
Dilatation (cm)	closed	1-2	3-4	more than 5
Length of cervix (cm)	more than 4	3-4	1-2	less than 1
Consistency	Firm	Average	Soft	-
Position	Posterior	Mid	Anterior	-
Descent by station of head (cm from ischial spines)	-3	-2	-1, 0	+1, +2
Descent by abdominal palpation (fifths of head palpable)	4/5	3/5	2/5	1/5

OXYTOCIN

Use oxytocin with great caution, as fetal distress can occur from hyperstimulation and, rarely, uterine rupture can occur. Multiparous women are at higher risk for uterine rupture.

Carefully observe women receiving oxytocin.

The effective dose of oxytocin varies greatly between women. Cautiously administer oxytocin in IV fluids (dextrose or normal saline), gradually increasing the rate of infusion until good labour is established (three contractions in 10 minutes, each lasting more than 40 seconds). Maintain this rate until delivery. The uterus should relax between contractions.

When oxytocin infusion results in a good labour pattern, maintain the same rate until delivery.

- Monitor the woman's pulse, blood pressure and contractions, and check the fetal heart rate.
- Review for indications.

Be sure induction is indicated, as failed induction is usually followed by caesarean section.

- Ensure that the woman is on her left side.
- Record the following on a partograph every 30 minutes (**page C-65**):
 - rate of infusion of oxytocin (see below);
 - Note:** Changes in arm position may alter the flow rate;
 - duration and frequency of contractions;
 - fetal heart rate. Listen every 30 minutes, always immediately after a contraction. If the **fetal heart rate is less than 100 beats per minute**, stop the infusion and manage for fetal distress (**page S-95**).

Women receiving oxytocin should never be left alone.

- Infuse oxytocin 2.5 units in 500 mL of dextrose (or normal saline) at 10 drops per minute (**Table P-7, page P-22 and Table P-8, page P-23**). This is approximately 2.5 mIU per minute.
- Increase the infusion rate by 10 drops per minute every 30 minutes until a good contraction pattern is established (three contractions in 10 minutes, each lasting more than 40 seconds).
- Maintain this rate until delivery is completed.
- If **hyperstimulation occurs** (any contraction lasts longer than 60 seconds) or if there are **more than four contractions in 10 minutes**, stop the infusion and relax the uterus using tocolytics:
 - terbutaline 250 mcg IV slowly over five minutes;
 - OR salbutamol 10 mg in 1 L IV fluids (normal saline or Ringer's lactate) at 10 drops per minute.
- If a **good contraction pattern has not been established with the infusion rate at 60 drops per minute**:
 - Increase the oxytocin concentration to 5 units in 500 mL of dextrose (or normal saline) and adjust the infusion rate to 30 drops per minute (15 mIU per minute);

- Increase the infusion rate by 10 drops per minute every 30 minutes until a good contraction pattern is established or the maximum rate of 60 drops per minute is reached.
- **If a good contraction pattern still has not been established** using the higher concentration of oxytocin:
 - In **multigravida** and in **women with previous caesarean scars**, induction has failed; deliver by caesarean section (**page P-43**);

Do not use oxytocin 10 units in 500 mL (i.e. 20 mIU/mL) in multigravida and women with previous caesarean section.

- In **primigravida**:
 - Infuse oxytocin at the higher concentration (10 units in 500 mL) according to the protocol in **Table P-8**;
 - If **good contractions are not established at the maximum dose**, deliver by caesarean section (**page P-43**).

**TABLE P-7 Oxytocin infusion rates for induction of labour
(Note 1 mL 20 drops)**

Time Since Induction (hours)	Oxytocin Concentration	Drops per Minute	Approximate Dose (mIU/minute)	Volume Infused	Total Volume Infused
0.00	2.5 units in 500 mL dextrose or normal saline (5 mIU/mL)	10	3	0	0
0.50	Same	20	5	15	15
1.00	Same	30	8	30	45
1.50	Same	40	10	45	90
2.00	Same	50	13	60	150
2.50	Same	60	15	75	225
3.00	5 units in 500 mL dextrose or normal saline (10 mIU/mL)	30	15	90	315
3.50	Same	40	20	45	360
4.00	Same	50	25	60	420
4.50	Same	60	30	75	495
5.00	10 units in 500 mL dextrose or normal saline (20 mIU/mL)	30	30	90	585
5.50	Same	40	40	45	630
6.00	Same	50	50	60	690
6.50	Same	60	60	75	765
7.00	Same	60	60	90	855

Increase the rate of oxytocin infusion only to the point where a good contraction pattern is established and then maintain the infusion at that rate.

TABLE P-8 Rapid escalation for primigravida only: Oxytocin infusion rates for induction of labour (Note 1 mL 20 drops)

Time Since Induction (hours)	Oxytocin Concentration	Drops per Minute	Approximate Dose (mIU/minute)	Volume Infused	Total Volume Infused
0.00	2.5 units in 500 mL dextrose or normal saline (5 mIU/mL)	15	4	0	0
0.50	Same	30	8	23	23
1.00	Same	45	11	45	68
1.50	Same	60	15	68	135
2.00	5 units in 500 mL dextrose or normal saline (10 mIU/mL)	30	15	90	225
2.50	Same	45	23	45	270
3.00	Same	60	30	68	338
3.50	10 units in 500 mL dextrose or normal saline (20 mIU/mL)	30	30	90	428
4.00	Same	45	45	45	473
4.50	Same	60	60	68	540
5.00	Same	60	60	90	630

PROSTAGLANDINS

Prostaglandins are highly effective in ripening the cervix during induction of labour.

- Monitor the woman's pulse, blood pressure and contractions, and check the fetal heart rate. Record findings on a partograph (**page C-65**).
- Review for indications.
- Prostaglandin E₂ (PGE₂) is available in several forms (3 mg pessary or 2–3 mg gel). The prostaglandin is placed high in the posterior fornix of the vagina and may be repeated after six hours if required.

Monitor uterine contractions and fetal heart rate of all women undergoing induction of labour with prostaglandins.

- Discontinue use of prostaglandins and begin oxytocin infusion if:
 - membranes rupture;
 - cervical ripening has been achieved;
 - good labour has been established;
 - OR 12 hours have passed.

MISOPROSTOL

- Use misoprostol to ripen the cervix **only in highly selected situations** such as:
 - severe pre-eclampsia or eclampsia when the cervix is unfavourable and safe caesarean section is not immediately available or the baby is too premature to survive;
 - fetal death in-utero if the woman has not gone into spontaneous labour after four weeks and platelets are decreasing.
- Place misoprostol 25 mcg in the posterior fornix of the vagina. Repeat after six hours, if required;
- If there is **no response after two doses of 25 mcg**, increase to 50 mcg every six hours;
- Do not use more than 50 mcg at a time and do not exceed four doses (200 mcg).

Do not use oxytocin within 8 hours of using misoprostol. Monitor uterine contractions and fetal heart rate.

FOLEY CATHETER

The Foley catheter is an effective alternative to prostaglandins for cervical ripening and labour induction. It should, however, be avoided in women with obvious cervicitis or vaginitis.

If there is a history of bleeding or ruptured membranes or obvious vaginal infection, do not use a Foley catheter.

- Review for indications.
- Gently insert a high-level disinfected or sterile speculum into the vagina.
- Hold the catheter with a high-level disinfected or sterile forceps and gently introduce it through the cervix. Ensure that the inflatable bulb of the catheter is beyond the internal os.
- Inflate the bulb with 10 mL of water.
- Coil the rest of the catheter and place it in the vagina.
- Leave the catheter in place until contractions begin, or for at least 12 hours.
- Deflate the bulb before removing the catheter and then proceed with oxytocin infusion.

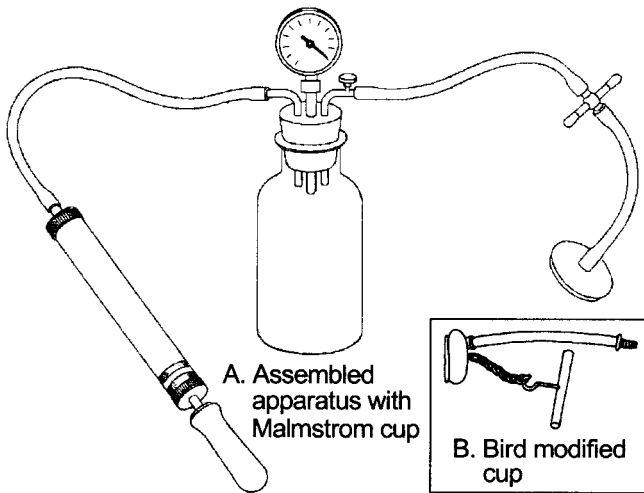
AUGMENTATION OF LABOUR WITH OXYTOCIN

- Review for indications.
- Infuse oxytocin as described for induction of labour (**page P-19**).

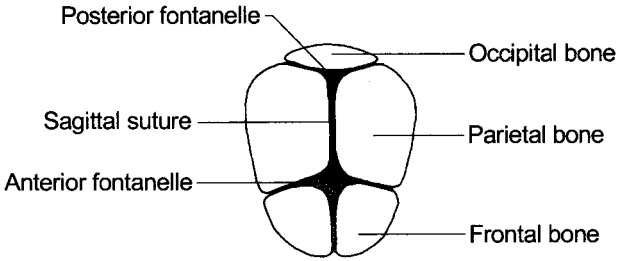
Note: Do not use rapid escalation for augmentation of labour.

Figure P-6 shows the essential components of the vacuum extractor.

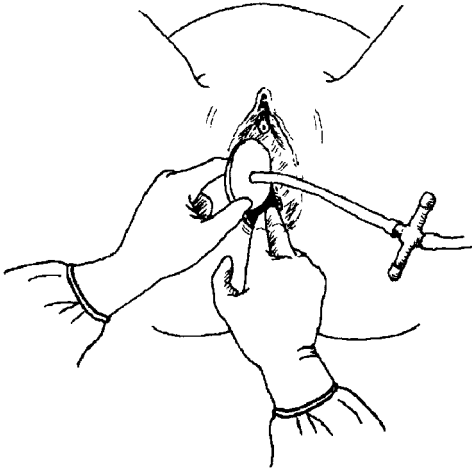
FIGURE P-6 Vacuum extractor



- Review for conditions:
 - vertex presentation;
 - term fetus;
 - cervix fully dilated;
 - fetal head at least at 0 station or no more than 2/5 palpable above symphysis pubis.
- Check all connections and test the vacuum on a gloved hand.
- Provide emotional support and encouragement. If necessary, use a pudendal block (**page P-3**).
- Wearing high-level disinfected or sterile gloves, assess the position of the fetal head by feeling the sagittal suture line and the fontanelles.
- Identify the posterior fontanelle (**Fig P-7, page P-28**).

FIGURE P-7 Landmarks of the fetal skull

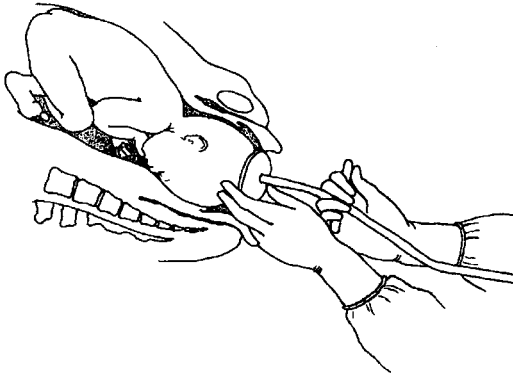
- Apply the largest cup that will fit, with the center of the cup over the flexion point, 1 cm anterior to the posterior fontanelle. This placement will promote flexion, descent and autorotation with traction (**Fig P-8**).

FIGURE P-8 Applying the Malmstrom cup

- An episiotomy may be needed for proper placement at this time (**page P-71**). If an **episiotomy is not necessary for placement**, delay the episiotomy until the head stretches the perineum or the perineum interferes with the axis of traction. This will avoid unnecessary blood loss.
- Check the application. Ensure there is no maternal soft tissue (cervix or vagina) within the rim.

- With the pump, create a vacuum of 0.2 kg/cm² negative pressure and check the application.
- Increase the vacuum to 0.8 kg/cm² and check the application.
- After maximum negative pressure, start traction in the line of the pelvic axis and perpendicular to the cup. If the **fetal head is tilted to one side or not flexed well**, traction should be directed in a line that will try to correct the tilt or deflexion of the head (i.e. to one side or the other, not necessarily in the midline).
- With each contraction, apply traction in a line perpendicular to the plane of the cup rim (**Fig P-9**). Place a finger on the scalp next to the cup during traction to assess potential slippage and descent of the vertex.

FIGURE P-9 **Applying traction**



- Between contractions check:
 - fetal heart rate;
 - application of the cup.

TIPS

- Never use the cup to actively rotate the baby's head. Rotation of the baby's head will occur with traction.
- The first pulls help to find the proper direction for pulling.
- Do not continue to pull between contractions and expulsive efforts.
- With progress, and in the absence of fetal distress, continue the "guiding" pulls for a maximum of 30 minutes.

FAILURE

- Vacuum extraction failed if the:
 - fetal head does not advance with each pull;
 - fetus is undelivered after three pulls with no descent, or after 30 minutes;
 - cup slips off the head twice at the proper direction of pull with a maximum negative pressure.
- Every application should be considered a trial of vacuum extraction. Do not persist if there is no descent with every pull.
- If **vacuum extraction fails**, use vacuum extraction in combination with symphysiotomy (see below) or perform a caesarean section (**page P-43**).

VACUUM EXTRACTION AND SYMPHYSIOTOMY

- Vacuum extraction may be used in combination with symphysiotomy (**page P-53**) in the following circumstances:
 - the fetal head is at least at -2 station or no more than 3/5 palpable above the symphysis pubis;
 - caesarean section is not feasible or immediately available;
 - the provider is experienced and proficient in symphysiotomy;
 - vacuum extraction alone has failed or is expected to fail;
 - there is no major degree of disproportion.

COMPLICATIONS

Complications usually result from not observing the conditions of application or from continuing efforts beyond the time limits stated above.

FETAL COMPLICATIONS

- Localized scalp oedema (caput succedaneum or chignon) under the vacuum cup is harmless and disappears in a few hours.
- Cephalohaematoma requires observation and usually will clear in three to four weeks.

- Scalp abrasions (common and harmless) and lacerations may occur. Clean and examine lacerations to determine if sutures are necessary. Necrosis is extremely rare.
- Intracranial bleeding is extremely rare and requires immediate intensive neonatal care.

MATERNAL COMPLICATIONS

- Tears of the genital tract may occur. Examine the woman carefully and repair any tears to the cervix (**page P-81**) or vagina (**page P-83**) or repair episiotomy (**page P-73**).

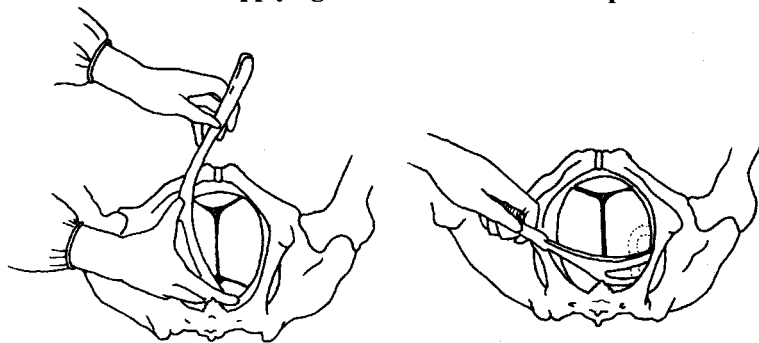
- Review for conditions:
 - vertex presentation or face presentation with chin-anterior or entrapped after-coming head in breech delivery (**page P-41**);
 - cervix fully dilated;
 - fetal head at +2 or +3 station or 0/5 palpable above the symphysis pubis.

At a minimum, the sagittal suture should be in the midline and straight, guaranteeing an occiput anterior or occiput posterior position.

- Provide emotional support and encouragement. If necessary, use a pudendal block (**page P-3**).
- Assemble the forceps before application. Ensure that the parts fit together and lock well.
- Lubricate the blades of the forceps.
- Wearing high-level disinfected or sterile gloves, insert two fingers of the right hand into the vagina on the side of the fetal head. Slide the left blade gently between the head and fingers to rest on the side of the head (**Fig P-10**).

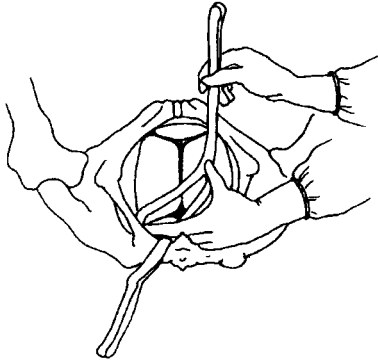
A biparietal, bimalar application is the only safe application.

FIGURE P-10 Applying the left blade of the forceps



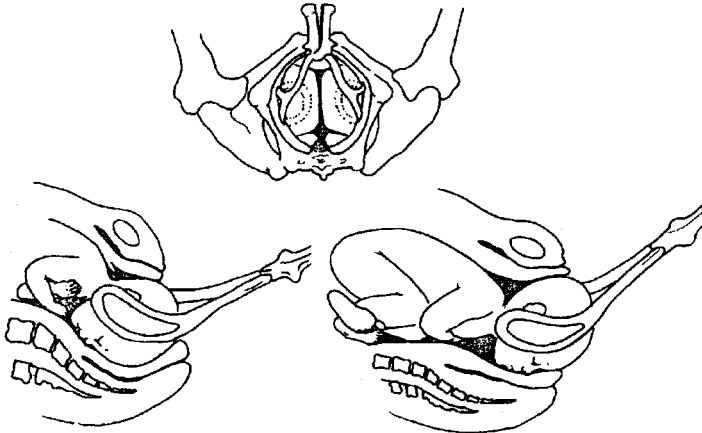
- Repeat the same manoeuvre on the other side, using the left hand and the right blade of the forceps (**Fig P-11, page P-34**).

FIGURE P-11 Applying the right blade of the forceps



- Depress the handles and lock the forceps.
- Difficulty in locking usually indicates that the application is incorrect. In this case, remove the blades and recheck the position of the head. Reapply only if rotation is confirmed.
- After locking, apply steady traction inferiorly and posteriorly with each contraction (**Fig P-12**).

FIGURE P-12 Locking and applying traction



- Between contractions check:
 - fetal heart rate;
 - application of forceps.

- When the head crowns, make an adequate episiotomy, if necessary (**page P-71**).
- Lift the head slowly out of the vagina between contractions.

The head should descend with each pull. Only two or three pulls should be necessary.

FAILURE

- Forceps failed if:
 - fetal head does not advance with each pull;
 - fetus is undelivered after three pulls with no descent or after 30 minutes.
- Every application should be considered a trial of forceps. Do not persist if the head does not descend with every pull.
- If **forceps delivery fails**, perform a caesarean section (**page P-43**).

Symphysiotomy is not an option with failed forceps.

COMPLICATIONS

FETAL COMPLICATIONS

- Injury to facial nerves requires observation. This injury usually resolves spontaneously.
- Lacerations of the face and scalp may occur. Clean and examine lacerations to determine if sutures are necessary.
- Fractures of the face and skull require observation.

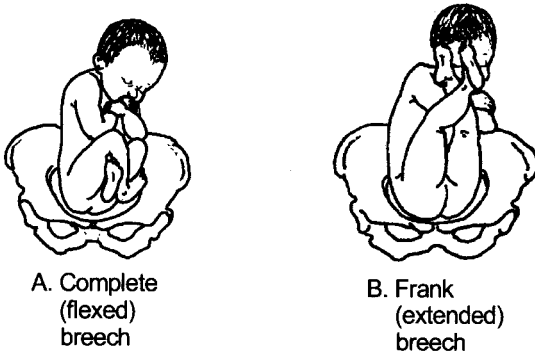
MATERNAL COMPLICATIONS

- Tears of the genital tract may occur. Examine the woman carefully and repair any tears to the cervix (**page P-81**) or vagina (**page P-83**) or repair episiotomy (**page P-73**).
- Uterine rupture may occur and requires immediate treatment (**page P-95**).

- Review for indications. Ensure that all conditions for safe vaginal breech delivery are met.
- Review general care principles (**page C-17**) and start an IV infusion (**page C-21**).
- Provide emotional support and encouragement. If necessary, use a pudendal block (**page P-3**).
- Perform all manoeuvres gently and without undue force.

COMPLETE OR FRANK BREECH

FIGURE P-13 Breech presentation



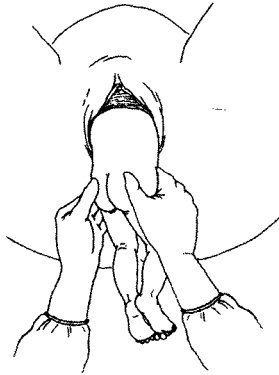
DELIVERY OF THE BUTTOCKS AND LEGS

- Once the buttocks have entered the vagina and the cervix is fully dilated, tell the woman she can bear down with the contractions.
- If the **perineum is very tight**, perform an episiotomy (**page P-71**).
- Let the buttocks deliver until the lower back and then the shoulder blades are seen.
- Gently hold the buttocks in one hand, but do not pull.
- If the legs do not deliver spontaneously, deliver one leg at a time:
 - Push behind the knee to bend the leg;
 - Grasp the ankle and deliver the foot and leg;
 - Repeat for the other leg.

Do not pull the baby while the legs are being delivered.

- Hold the baby by the hips, as shown in **Fig P-14**. Do not hold the baby by the flanks or abdomen as this may cause kidney or liver damage.

FIGURE P-14 **Hold the baby at the hips, but do not pull**



DELIVERY OF THE ARMS

ARMS ARE FELT ON CHEST

- Allow the arms to disengage spontaneously one by one. Only assist if necessary.
- After spontaneous delivery of the first arm, lift the buttocks towards the mother's abdomen to enable the second arm to deliver spontaneously.
- If the **arm does not spontaneously deliver**, place one or two fingers in the elbow and bend the arm, bringing the hand down over the baby's face.

ARMS ARE STRETCHED ABOVE THE HEAD OR FOLDED AROUND THE NECK

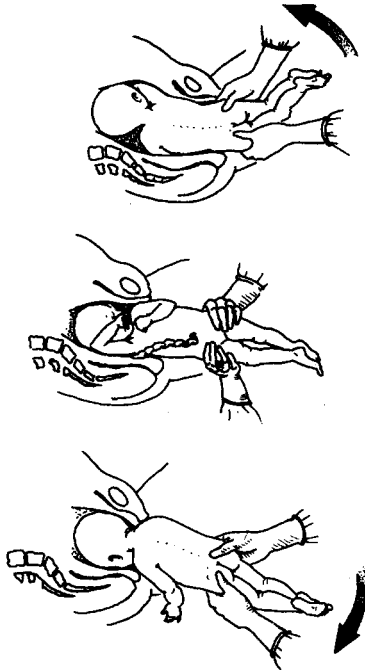
Use the Lovset's manoeuvre (**Fig P-15**):

- Hold the baby by the hips and turn half a circle, keeping the back uppermost and applying downward traction at the same time, so

that the arm that was posterior becomes anterior and can be delivered under the pubic arch.

- Assist delivery of the arm by placing one or two fingers on the upper part of the arm. Draw the arm down over the chest as the elbow is flexed, with the hand sweeping over the face.
- To deliver the second arm, turn the baby back half a circle, keeping the back uppermost and applying downward traction, and deliver the second arm in the same way under the pubic arch.

FIGURE P-15 Lovset's manoeuvre



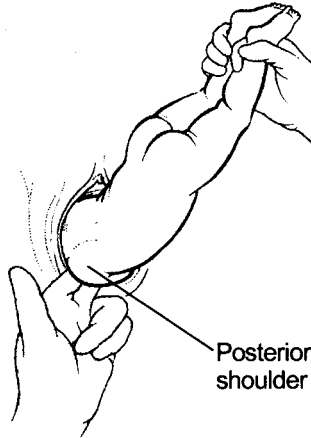
BABY'S BODY CANNOT BE TURNED

If the **baby's body cannot be turned to deliver the arm that is anterior first**, deliver the shoulder that is posterior (**Fig P-16**):

- Hold and lift the baby up by the ankles.
- Move the baby's chest towards the woman's inner leg. The shoulder that is posterior should deliver.
- Deliver the arm and hand.

- Lay the baby back down by the ankles. The shoulder that is anterior should now deliver.
- Deliver the arm and hand.

FIGURE P-16 **Delivery of the shoulder that is posterior**



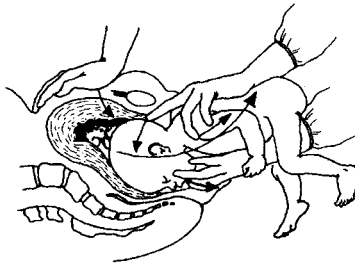
DELIVERY OF THE HEAD

Deliver the head by the Mauriceau Smellie Veit manoeuvre (**Fig P-17, page P-41**) as follows:

- Lay the baby face down with the length of its body over your hand and arm.
- Place the first and third fingers of this hand on the baby's cheekbones and place the second finger in the baby's mouth to pull the jaw down and flex the head.
- Use the other hand to grasp the baby's shoulders.
- With two fingers of this hand, gently flex the baby's head towards the chest while pulling on the jaw to bring the baby's head down until the hairline is visible.
- Pull gently to deliver the head.

Note: Ask an assistant to push above the mother's pubic bone as the head delivers. This helps to keep the baby's head flexed.

- Raise the baby, still astride the arm, until the mouth and nose are free.

FIGURE P-17 The Mauriceau Smellie Veit manoeuvre**ENTRAPPED (STUCK) HEAD**

- Catheterize the bladder.
- Have an assistant available to hold the baby while applying Piper or long forceps.
- Be sure the cervix is fully dilated.
- Wrap the baby's body in a cloth or towel and hold the baby up.
- Place the left blade of the forceps.
- Place the right blade and lock handles.
- Use the forceps to flex and deliver the baby's head.
- If **unable to use forceps**, apply firm pressure above the mother's pubic bone to flex the baby's head and push it through the pelvis.

FOOTLING BREECH

A footling breech baby (**Fig P-18**) should usually be delivered by caesarean section (**page P-43**).

FIGURE P-18 Single footling breech presentation, with one leg extended at hip and knee

- Limit vaginal delivery of a footling breech baby to:
 - advanced labour with fully dilated cervix;
 - preterm baby that is not likely to survive after delivery;
 - delivery of additional baby(s) in multiple gestation.
- To deliver the baby vaginally:
 - Grasp the baby's ankles with one hand;
 - If **only one foot presents**, insert a hand into the vagina and gently pull the other foot down;
 - Gently pull the baby downwards by the ankles;
 - Deliver the baby until the back and shoulder blades are seen;
 - Proceed with delivery of the arms (**page P-38**).

BREECH EXTRACTION

- Wearing high-level disinfected or sterile gloves (wear long gloves if available), insert a hand into the uterus and grasp the baby's foot.
- Hold the foot and pull it out through the vagina.
- Gently pull on the foot until the back and shoulder blades are seen.
- Proceed with delivery of the arms (**page P-38**).
- Give a single dose of prophylactic antibiotics after breech extraction (**page C-35**):
 - ampicillin 2 g IV PLUS metronidazole 500 mg IV;
 - OR cefazolin 1 g IV PLUS metronidazole 500 mg IV.

POST-DELIVERY CARE

- Suction the baby's mouth and nose.
- Clamp and cut the cord.
- Give oxytocin 10 units IM within one minute of delivery and continue active management of the third stage (**page C-73**).
- Examine the woman carefully and repair any tears to the cervix (**page P-81**) or vagina (**page P-83**) or repair episiotomy (**page P-73**).

- Review for indications. Ensure that vaginal delivery is not possible.
- Check for fetal life by listening to the fetal heart rate and examine for fetal presentation.
- Review general care principles (**page C-17**) and operative care principles (**page C-47**), and start an IV infusion (**page C-21**).
- Use spinal anaesthesia (**page P-11**), local infiltration with lignocaine (**page P-7**), ketamine (**page P-13**) or general anaesthesia:
 - Local anaesthesia is a safe alternative to general, ketamine or spinal anaesthesia when these anaesthetics or persons trained in their use are not available;
 - The use of local anaesthesia for caesarean section requires that the provider counsel the woman and reassure her throughout the procedure. The provider must keep in mind that the woman is awake and alert, and should use instruments and handle tissue as gently as possible.

Note: In the case of heart failure, use local infiltration anaesthesia with conscious sedation. Avoid spinal anaesthesia.

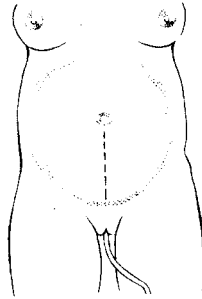
- Determine if a **high vertical incision (page P-50)** is indicated:
 - an inaccessible lower segment due to dense adhesions from previous caesarean sections;
 - transverse lie (with baby's back down) for which a lower uterine segment incision cannot be safely performed;
 - fetal malformations (e.g. conjoined twins);
 - large fibroids over the lower segment;
 - a highly vascular lower segment due to placenta praevia;
 - carcinoma of the cervix.
- If the **baby's head is deep down in the pelvis** as in obstructed labour, prepare the vagina for assisted caesarean delivery (**page C-22**).
- Have the operating table tilted to the left or place a pillow or folded linen under the woman's right lower back to decrease supine hypotension syndrome.

OPENING THE ABDOMEN

- Make a midline vertical incision below the umbilicus to the pubic hair, through the skin and to the level of the fascia (**Fig P-19**).

Note: If the **caesarean section is performed under local anaesthesia**, make a midline incision that is about 4 cm longer than when general anaesthesia is used. A **Pfannenstiel incision should not be used**, as it takes longer, retraction is poorer and it requires more local anaesthetic.

FIGURE P-19 **Site of abdominal incision**



- 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.
- Use forceps to pick up the loose peritoneum covering the anterior surface of the lower uterine segment and incise with scissors.
- Extend the incision by placing the scissors between the uterus and the loose serosa and cutting about 3 cm on each side in a transverse fashion.

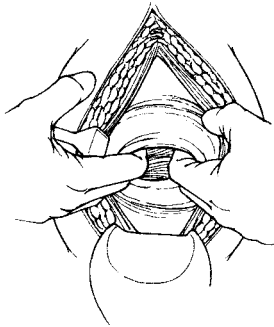
- Use two fingers to push the bladder downwards off of the lower uterine segment. Replace the bladder retractor over the pubic bone and bladder.

OPENING THE UTERUS

- Use a scalpel to make a 3 cm transverse incision in the lower segment of the uterus. It should be about 1 cm below the level where the vesico-uterine serosa was incised to bring the bladder down.
- Widen the incision by placing a finger at each edge and gently pulling upwards and laterally at the same time (**Fig P-20**).
- If the **lower uterine segment is thick and narrow**, extend the incision in a crescent shape, using scissors instead of fingers to avoid extension of the uterine vessels.

It is important to make the uterine incision big enough to deliver the head and body of the baby without tearing the incision.

FIGURE P-20 **Enlarging the uterine incision**



DELIVERY OF THE BABY AND PLACENTA

- To deliver the baby, place one hand inside the uterine cavity between the uterus and the baby's head.
- With the fingers, grasp and flex the head.
- Gently lift the baby's head through the incision (**Fig P-21, page, P-46**), taking care not to extend the incision down towards the cervix.
- With the other hand, gently press on the abdomen over the top of the uterus to help deliver the head.

- If the **baby's head is deep down in the pelvis or vagina**, ask an assistant (wearing high-level disinfected or sterile gloves) to reach into the vagina and push the baby's head up through the vagina. Then lift and deliver the head (**Fig P-22**).

FIGURE P-21 Delivering the baby's head

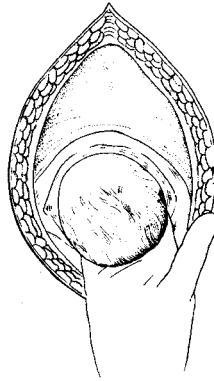
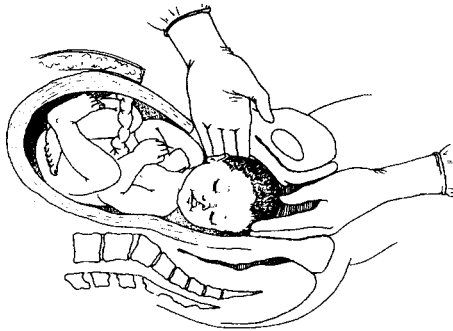


FIGURE P-22 Delivering the deeply engaged head



- Suction the baby's mouth and nose when delivered.
- Deliver the shoulders and body.
- Give oxytocin 20 units in 1 L IV fluids (normal saline or Ringer's lactate) at 60 drops per minute for two hours.
- Clamp and cut the umbilical cord.
- Hand the baby to the assistant for initial care (**page C-76**).
- Give a single dose of prophylactic antibiotics **after** the cord is clamped and cut (**page C-35**):

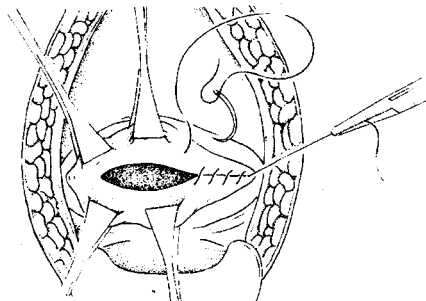
- ampicillin 2 g IV;
- OR cefazolin 1 g IV.
- Keep gentle traction on the cord and massage (rub) the uterus through the abdomen.
- Deliver the placenta and membranes. Use ring forceps to ensure that all membranes are removed.

CLOSING THE UTERINE INCISION

Note: If a **Couvelaire uterus** (swollen and discoloured by blood) is seen at caesarean section, close it in the normal manner. Observe for bleeding and assess uterine tone. Be prepared to manage coagulopathy (**page S-19**) or atonic uterus (**page S-28**).

- Grasp the corners of the uterine incision with clamps.
- Grasp the edges of the incision with clamps. Make sure it is separate from the bladder.
- Look carefully for any extensions of the uterine incision.
- Repair the incision and any extensions with a continuous locking stitch of 0 chromic catgut (or polyglycolic) suture (**Fig P-23**).
- If there is any **further bleeding from the incision site**, close with figure-of-eight sutures. There is no need for a routine second layer of sutures in the uterine incision.

FIGURE P-23 **Closing the uterine incision**



CLOSING THE ABDOMEN

- Look carefully at the uterine incision before closing the abdomen. Make sure there is no bleeding and the uterus is firm. Use a sponge to remove any clots inside the abdomen.
- Examine carefully for injuries to the bladder and repair any found (**page P-97**).
- 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.
- Gently push on the abdomen over the uterus to remove clots from the uterus and vagina.

PROBLEMS DURING SURGERY

BLEEDING IS NOT CONTROLLED

- Massage the uterus.
- If the **uterus is atonic**, continue to infuse oxytocin and give ergometrine 0.2 mg IM and prostaglandins, if available. These drugs can be given together or sequentially (**Table S-8, page S-28**).
- Transfuse as necessary (**page C-23**).
- Have an assistant press fingers over the aorta to reduce the bleeding until the source of bleeding can be found and stopped.
- If **bleeding is not controlled**, perform uterine and utero-ovarian artery ligation (**page P-99**) or hysterectomy (**page P-103**).

BABY IS BREECH

- If the **baby is breech**, grasp a foot and deliver it through the incision.
- Complete the delivery as in a vaginal breech delivery (**page P-37**):
 - Deliver the legs and the body up to the shoulders, then deliver the arms;
 - Flex (bend) the head using the Mauriceau Smellie Veit manoeuvre (**page P-40**).

BABY IS TRANSVERSE

THE BABY'S BACK IS UP

- If **the back is up** (near the top of the uterus), reach into the uterus and find the baby's ankles.
- Grasp the ankles and pull gently through the incision to deliver the legs and complete the delivery as for a breech baby (**page P-38**).

THE BABY'S BACK IS DOWN

- If the **back is down**, a high vertical uterine incision is the preferred incision (**page P-50**).
- After the incision is made, reach into the uterus and find the feet. Pull them through the incision and complete the delivery as for a breech baby (**page P-38**).
- To repair the vertical incision, you will need several layers of suture (**page P-50**).

PLACENTA PRAEVIA

- If a **low anterior placenta** is encountered, incise through it and deliver the fetus.
- After delivery of the baby, if the **placenta cannot be detached manually**, the diagnosis is placenta accreta, a common finding at the site of a previous caesarean scar. Perform a hysterectomy (**page P-103**).
- Women with placenta praevia are at high risk of postpartum haemorrhage. If there is **bleeding from the placental site**, under-run the bleeding sites with chromic catgut (or polyglycolic) sutures.

- Watch for bleeding in the immediate postpartum period and take appropriate action (**page S-25**).

POST-PROCEDURE CARE

- Review postoperative care principles (**page C-52**).
- If **bleeding occurs**:
 - Massage the uterus to expel blood and blood clots. Presence of blood clots will inhibit effective uterine contractions;
 - Give oxytocin 20 units in 1 L IV fluids (normal saline or Ringer's lactate) at 60 drops per minute and ergometrine 0.2 mg IM and prostaglandins (**Table S-8, page S-28**). These drugs can be given together or sequentially.
- 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 (**page C-35**):
 - ampicillin 2 g IV every six hours;
 - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
 - PLUS metronidazole 500 mg IV every eight hours.
- Give appropriate analgesic drugs (**page C-37**).

HIGH VERTICAL (“CLASSICAL”) INCISION

- Open the abdomen through a midline incision skirting the umbilicus. Approximately one-third of the incision should be above the umbilicus and two-thirds below.
- Use a scalpel to make the incision:
 - Check the position of the round ligaments and ensure that the incision is in the midline (the uterus may have twisted to one side);
 - Make the uterine incision in the midline over the fundus of the uterus;
 - The incision should be approximately 12–15 cm in length and the lower limit should not extend to the utero-vesical fold of the peritoneum.

- Ask an assistant (wearing high-level disinfected or sterile gloves) to apply pressure on the cut edges to control the bleeding.
- Cut down to the level of the membranes and then extend the incision using scissors.
- After rupturing the membranes, grasp the baby's foot and deliver the baby.
- Deliver the placenta and membranes.
- Grasp the edges of the incision with Allis or Green Armytage forceps.
- Close the incision using at least three layers of suture:
 - Close the first layer closest to the cavity, but avoiding the decidua, with a continuous 0 chromic catgut (or polyglycolic) suture;
 - Close the second layer of uterine muscle using interrupted 1 chromic catgut (or polyglycolic) sutures;
 - Close the superficial fibres and the serosa using a continuous 0 chromic catgut (or polyglycolic) suture with an atraumatic needle.
- Close the abdomen as for lower segment caesarean section (**page P-48**).

The woman should not labour with future pregnancies.

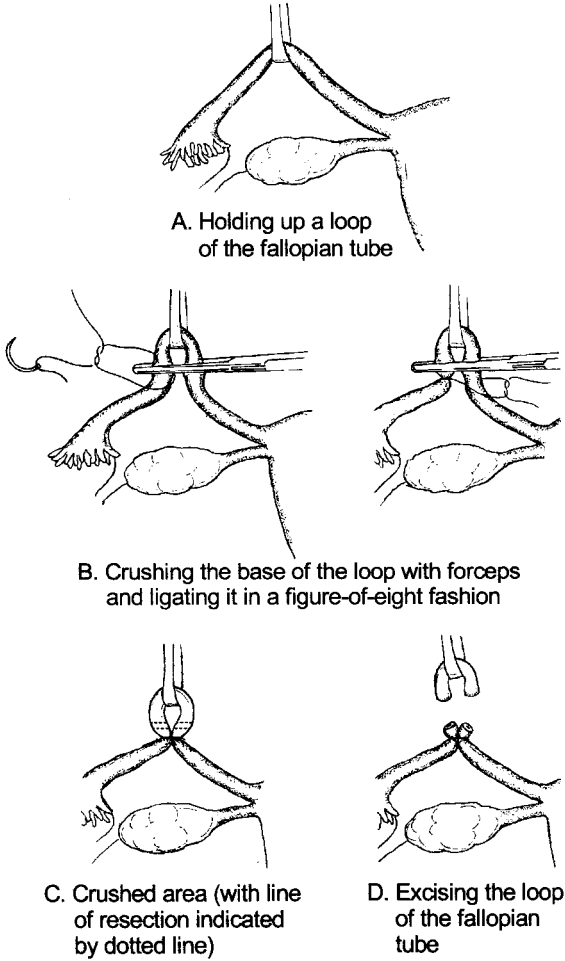
TUBAL LIGATION AT CAESAREAN

Tubal ligation can be done immediately following caesarean section if the woman requested the procedure **before** labour began (during prenatal visits). Adequate counselling and informed decision-making and consent must precede voluntary sterilization procedures; this is often not possible during labour and delivery.

- Review for consent of patient.
- Grasp the least vascular, middle portion of the fallopian tube with a Babcock or Allis forceps.
- Hold up a loop of tube 2.5 cm in length (**Fig P-24 A, page P-52**).

- Crush the base of the loop with artery forceps and ligate it with 0 plain catgut suture (Fig P-24 B, page P-52).
- Excise the loop (a segment 1 cm in length) through the crushed area (Fig P-24 C–D).
- Repeat the procedure on the other side.

FIGURE P-24 Tubal ligation



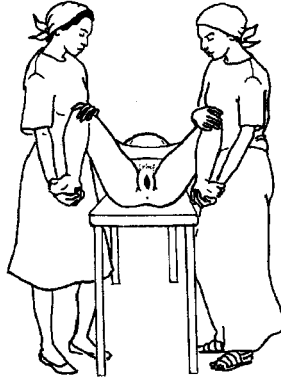
Symphysiotomy results in a temporary increase in pelvic diameter (up to 2 cm) by surgically dividing the ligaments of the symphysis under local anaesthesia. This procedure should be carried out only in combination with vacuum extraction (**page P-27**). Symphysiotomy in combination with vacuum extraction is a life-saving procedure in areas where caesarean section is not feasible or immediately available. Symphysiotomy leaves no uterine scar and the risk of ruptured uterus in future labours is not increased.

These benefits must, however, be weighed against the risks of the procedure. Risks include urethral and bladder injury, infection, pain and long-term walking difficulty. Symphysiotomy should, therefore, be carried out only when there is no safe alternative.

- Review for indications:
 - contracted pelvis;
 - vertex presentation;
 - prolonged second stage;
 - failure to descend after proper augmentation;
 - AND failure or anticipated failure of vacuum extraction alone.
- Review conditions for symphysiotomy:
 - fetus is alive;
 - cervix is fully dilated;
 - fetal head at -2 station or no more than 3/5 above the symphysis pubis;
 - no over-riding of the head above the symphysis;
 - caesarean section is not feasible or immediately available;
 - the provider is experienced and proficient in symphysiotomy.
- Review general care principles (**page C-17**).
- Provide emotional support and encouragement. Use local infiltration with lignocaine (**page C-38**).
- Ask two assistants to support the woman's legs with her thighs and knees flexed. The thighs should be abducted no more than 45 degrees from the midline (**Fig P-25, page P-54**).

Abduction of the thighs more than 45 degrees from the midline may cause tearing of the urethra and bladder.

FIGURE P-25 Position of the woman for symphysiotomy



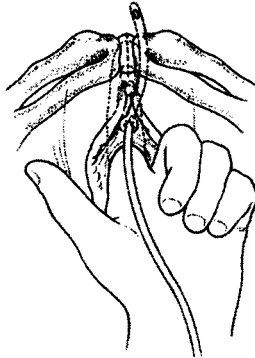
- Perform a mediolateral episiotomy (**page P-71**). If an **episiotomy is already present**, enlarge it to minimize stretching of the vaginal wall and urethra.
- Infiltrate the anterior, superior and inferior aspects of the symphysis with lignocaine 0.5% solution (**page C-39**).
Note: Aspirate (pull back on the plunger) to be sure that no vessel has been penetrated. If **blood is returned in the syringe with aspiration**, remove the needle. Recheck the position carefully and try again. Never inject if blood is aspirated. **The woman can suffer convulsions and death if IV injection occurs.**
- At the conclusion of the set of injections, wait two minutes and then pinch the incision site with forceps. If the **woman feels the pinch**, wait two more minutes and then retest.

Anaesthetize early to provide sufficient time for effect.

- Insert a firm catheter to identify the urethra.
- Apply antiseptic solution to the suprapubic skin (**page C-22**).

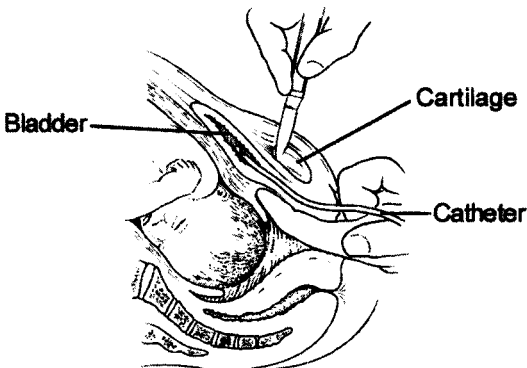
- Wearing high-level disinfected or sterile gloves, place an index finger in the vagina and push the catheter, and with it the urethra, away from the midline (**Fig P-26**).

FIGURE P-26 Pushing urethra to one side after inserting the catheter



- With the other hand, use a thick, firm-bladed scalpel to make a vertical stab incision over the symphysis.
- Keeping to the midline, cut down through the cartilage joining the two pubic bones until the pressure of the scalpel blade is felt on the finger in the vagina.
- Cut the cartilage downwards to the bottom of the symphysis, then rotate the blade and cut upwards to the top of the symphysis.
- Once the symphysis has been divided through its whole length, the pubic bones will separate.

FIGURE P-27 Dividing the cartilage



- After separating the cartilage, remove the catheter to decrease urethral trauma.
- Deliver by vacuum extraction (**page P-27**). Descent of the head causes the symphysis to separate 1 or 2 cm.
- After delivery, catheterize the bladder with a self-retaining bladder catheter.

There is no need to close the stab incision unless there is bleeding.

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 (**page C-35**):
 - ampicillin 2 g IV every six hours;
 - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
 - PLUS metronidazole 500 mg IV every eight hours.
- Give appropriate analgesic drugs (**page C-37**).
- Apply elastic strapping across the front of the pelvis from one iliac crest to the other to stabilize the symphysis and reduce pain.
- Leave the catheter in the bladder for a minimum of five days.
- Encourage the woman to drink plenty of fluids to ensure a good urinary output.
- Encourage bed rest for seven days after discharge from hospital.
- Encourage the woman to begin to walk with assistance when she is ready to do so.
- If **long-term walking difficulties and pain** are reported (occur in 2% of cases), treat with physical therapy.

In certain cases of obstructed labour with fetal death, reduction in the size of the fetal head by craniotomy makes vaginal delivery possible and avoids the risks associated with caesarean delivery. Craniocentesis can be used to reduce the size of a hydrocephalic head to make vaginal delivery possible.

- Provide emotional support and encouragement. If necessary, give diazepam IV slowly or use a pudendal block (**page P-3**).

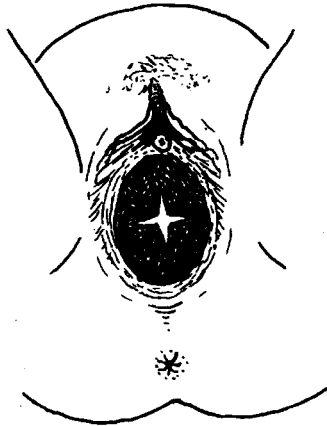
CRANIOTOMY (skull perforation)

- Review for indications.
- Review general care principles (**page C-17**) and apply antiseptic solution to the vagina (**page C-22**).
- Perform an episiotomy, if required (**page P-71**).

CEPHALIC PRESENTATION

- Make a cruciate (cross-shaped) incision on the scalp (**Fig P-28**).

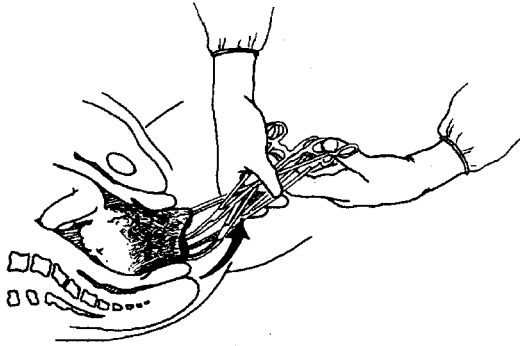
FIGURE P-28 **Cruciate incision on scalp**



- Open the cranial vault at the lowest and most central bony point with a craniotome (or large pointed scissors or a heavy scalpel). In face presentation, perforate the orbits.
- Insert the craniotome into the fetal cranium and fragment the intracranial contents.

- Grasp the edges of the skull with several heavy-toothed forceps (e.g. Kocher) and apply traction in the axis of the birth canal (**Fig P-29**).

FIGURE P-29 Extraction by scalp traction



- As the head descends, pressure from the bony pelvis will cause the skull to collapse, decreasing the cranial diameter.
- If the **head is not delivered easily**, perform caesarean section (**page P-43**).
- After delivery, examine the woman carefully and repair any tears to the cervix (**page P-81**) or vagina (**page P-83**), or repair episiotomy (**page P-73**).
- Leave a self-retaining catheter in place until it is confirmed that there is no bladder injury.
- Ensure adequate fluid intake and urinary output.

BREECH PRESENTATION WITH ENTRAPPED HEAD

- Make an incision through the skin at the base of the neck.
- Insert a craniotome (or large pointed scissors or a heavy scalpel) through the incision and tunnel subcutaneously to reach the occiput.
- Perforate the occiput and open the gap as widely as possible.
- Apply traction on the trunk to collapse the skull as the head descends.

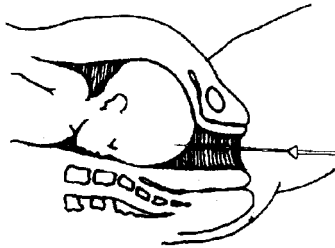
CRANIOCENTESIS (skull puncture)

- Review for indications.
- Review general care principles (**page C-17**) and apply antiseptic solution to the vagina (**page C-22**).
- Make a large episiotomy, if required (**page P-71**).

FULLY DILATED CERVIX

- Pass a large-bore spinal needle through the dilated cervix and through the sagittal suture line or fontanelles of the fetal skull (**Fig P-30**).
- Aspirate the cerebrospinal fluid until the fetal skull has collapsed, and allow normal delivery to proceed.

FIGURE P-30 **Craniocentesis with a dilated cervix**



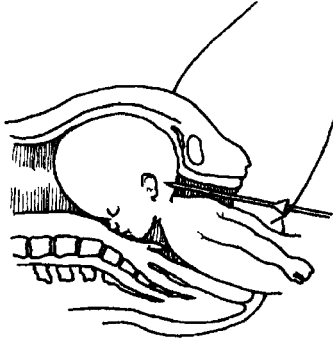
CLOSED CERVIX

- Palpate for location of fetal head.
- Apply antiseptic solution to the suprapubic skin (**page C-22**).
- Pass a large-bore spinal needle through the abdominal and uterine walls and through the hydrocephalic skull.
- Aspirate the cerebrospinal fluid until the fetal skull has collapsed, and allow normal delivery to proceed.

AFTERCOMING HEAD DURING BREECH DELIVERY

- After the rest of the body has been delivered, insert a large-bore spinal needle through the dilated cervix and foramen magnum (**Fig P-31**).
- Aspirate the cerebrospinal fluid and deliver the aftercoming head as in breech delivery (**page P-40**).

FIGURE P-31 **Craniocentesis of the aftercoming head**



DURING CAESAREAN SECTION

- After the uterine incision is made, pass a large-bore spinal needle through the hydrocephalic skull.
- Aspirate the cerebrospinal fluid until the fetal skull has collapsed.
- Deliver the baby and placenta as in caesarean section (**page P-45**).

POST-PROCEDURE CARE

- After delivery, examine the woman carefully and repair any tears to the cervix (**page P-81**) or vagina (**page P-83**), or repair episiotomy (**page P-73**).
- Leave a self-retaining catheter in place until it is confirmed that there is no bladder injury.
- Ensure adequate fluid intake and urinary output.

The preferred method of evacuation of the uterus is by manual vacuum aspiration (**page P-65**). **Dilatation and curettage should be used only if manual vacuum aspiration is not available.**

- Review for indications (**page P-65**).
- Review general care principles (**page C-17**).
- Provide emotional support and encouragement. Give pethidine IM or IV before the procedure or use a paracervical block (**page P-1**).
- Administer oxytocin 10 units IM or ergometrine 0.2 mg IM before the procedure to make the myometrium firmer and reduce the risk of perforation.
- Perform a bimanual pelvic examination to assess the size and position of the uterus and the condition of the fornices.
- Insert a speculum or vaginal retractor into the vagina.
- Apply antiseptic solution to the vagina and cervix (especially the os) (**page C-22**).
- Check the cervix for tears or protruding products of conception. If **products of conception are present in the vagina or cervix**, remove them using ring or sponge forceps.
- Gently grasp the anterior or posterior lip of the cervix with a vulsellum or single-toothed tenaculum (**Fig P-32, page P-62**).

Note: With incomplete abortion, a ring or sponge forceps is preferable, as it is less likely than the tenaculum to tear the cervix with traction and does not require the use of lignocaine for placement.

- If **using a tenaculum to grasp the cervix**, first inject 1 mL of 0.5% lignocaine solution into the anterior or posterior lip of the cervix which has been exposed by the speculum.
- Dilatation is needed only in cases of missed abortion or when some retained products of conception have remained in the uterus for several days:
 - Gently introduce the widest gauge cannula or curette;
 - Use graduated dilators only if the cannula or curette will not pass. Begin with the smallest dilator and end with the largest dilator that ensures adequate dilatation (usually 10–12 mm) (**Fig P-33, page P-62**);
 - Take care not to tear the cervix or to create a false opening.

FIGURE P-32 Inserting a retractor and holding the anterior lip of the cervix

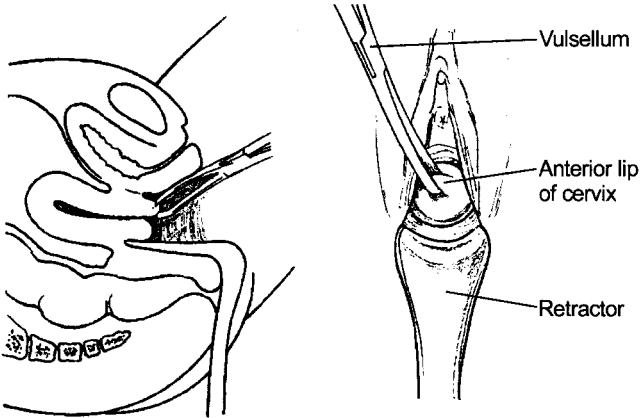
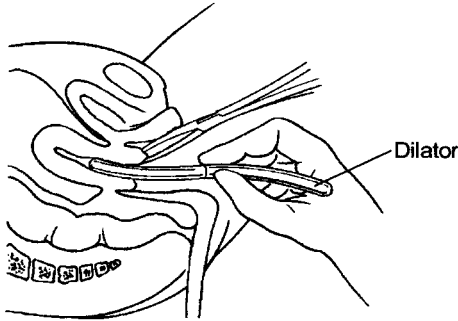


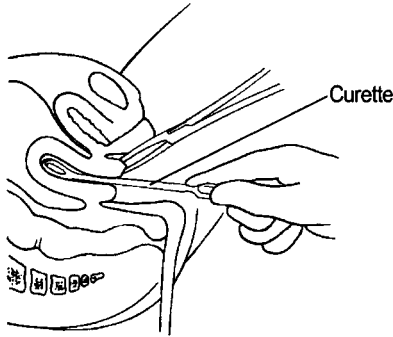
FIGURE P-33 Dilating the cervix



- Gently pass a uterine sound through the cervix to assess the length and direction of the uterus.

The uterus is very soft in pregnancy and can be easily injured during this procedure.

- Evacuate the contents of the uterus with ring forceps or a large curette (**Fig P-34, page P-63**). Gently curette the walls of the uterus until a grating sensation is felt.

FIGURE P-34 **Curetting the uterus**

- Remove the speculum or retractors and perform a bimanual pelvic examination to check the size and firmness of the uterus.
- Examine the evacuated material (**page P-67**). Send material for histopathologic examination, if required.

POST-PROCEDURE CARE

- Give paracetamol 500 mg by mouth as needed.
- Encourage the woman to eat, drink and walk about as she wishes.
- Offer other health services, if possible, including tetanus prophylaxis, counselling or a family planning method (**page S-12**).
- Discharge uncomplicated cases in one to two hours.
- Advise the woman to watch for symptoms and signs requiring immediate attention:
 - prolonged cramping (more than a few days);
 - prolonged bleeding (more than two weeks);
 - bleeding more than normal menstrual bleeding;
 - severe or increased pain;
 - fever, chills or malaise;
 - fainting.

- Review for indications for manual vacuum aspiration (MVA; inevitable abortion before 16 weeks, incomplete abortion, molar pregnancy or delayed PPH due to retained placental fragments).
- Review general care principles (**page C-17**).
- Provide emotional support and encouragement and give paracetamol 30 minutes before the procedure. Use a paracervical block may if necessary (**page P-1**).
- Prepare the MVA syringe:
 - Assemble the syringe;
 - Close the pinch valve;
 - Pull back on the plunger until the plunger arms lock.

Note: For molar pregnancy, when the uterine contents are likely to be copious, have three syringes ready for use.

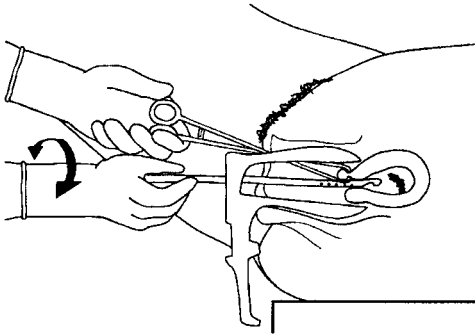
- Even if bleeding is slight, give oxytocin 10 units IM or ergometrine 0.2 mg IM before the procedure to make the myometrium firmer and reduce the risk of perforation.
- Perform a bimanual pelvic examination to assess the size and position of the uterus and the condition of the fornices.
- Insert a speculum or vaginal retractor into the vagina.
- Apply antiseptic solution to the vagina and cervix (especially the os) (**page C-22**).
- Check the cervix for tears or protruding products of conception. If **products of conception are present in the vagina or cervix**, remove them using ring or sponge forceps.
- Gently grasp the anterior or posterior lip of the cervix with a vulsellum or single-toothed tenaculum.

Note: With incomplete abortion, a ring or sponge forceps is preferable as it is less likely than the tenaculum to tear the cervix with traction and does not require the use of lignocaine for placement.

- **If using a tenaculum to grasp the cervix**, first inject 1 mL of 0.5% lignocaine solution into the anterior or posterior lip of the cervix which has been exposed by the speculum.
- Dilatation is needed only in cases of missed abortion or when products of conception have remained in the uterus for several days:

- Gently introduce the widest gauge suction cannula;
- Use graduated dilators only if the cannula will not pass. Begin with the smallest dilator and end with the largest dilator that ensures adequate dilatation (usually 10–12 mm) (**Fig P-33, page P-62**);
- Take care not to tear the cervix or to create a false opening.
- While gently applying traction to the cervix, insert the cannula through the cervix into the uterine cavity just past the internal os (**Fig P-35**). (Rotating the cannula while gently applying pressure often helps the tip of the cannula pass through the cervical canal.)

FIGURE P-35 Inserting the cannula

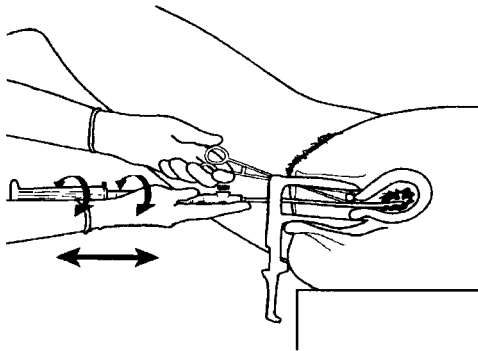


- Slowly push the cannula into the uterine cavity until it touches the fundus, but not more than 10 cm. Measure the depth of the uterus by dots visible on the cannula and then withdraw the cannula slightly.
- Attach the prepared MVA syringe to the cannula by holding the vulsellum (or tenaculum) and the end of the cannula in one hand and the syringe in the other.
- Release the pinch valve(s) on the syringe to transfer the vacuum through the cannula to the uterine cavity.
- Evacuate remaining uterine contents by gently rotating the syringe from side to side (10 to 12 o'clock) and then moving the cannula gently and slowly back and forth within the uterine cavity (**Fig P-36, page P-67**).

Note: To avoid losing the vacuum, do not withdraw the cannula opening past the cervical os. If the **vacuum is lost** or if the **syringe is more than half full**, empty it and then re-establish the vacuum.

Note: Avoid grasping the syringe by the plunger arms while the vacuum is established and the cannula is in the uterus. If the plunger arms become unlocked, the plunger may accidentally slip back into the syringe, pushing material back into the uterus.

FIGURE P-36 **Evacuating the contents of the uterus**



- Check for signs of completion:
 - Red or pink foam but no more tissue is seen in the cannula;
 - A grating sensation is felt as the cannula passes over the surface of the evacuated uterus;
 - The uterus contracts around (grips) the cannula.
- Withdraw the cannula. Detach the syringe and place the cannula in decontamination solution.
- With the valve open, empty the contents of the MVA syringe into a strainer by pushing on the plunger.

Note: Place the empty syringe on a high-level disinfected or sterile tray or container until you are certain the procedure is complete.

- Remove the speculum or retractors and perform a bimanual examination to check the size and firmness of the uterus.
- Quickly inspect the tissue removed from the uterus:
 - for quantity and presence of products of conception;
 - to assure complete evacuation;
 - to check for a molar pregnancy (rare).

If necessary, strain and rinse the tissue to remove excess blood clots, then place in a container of clean water, saline or weak acetic

acid (vinegar) to examine. Tissue specimens may also be sent for histopathologic examination, if required.

- If **no products of conception** are seen:
 - All of the products of conception may have been passed before the MVA was performed (complete abortion);
 - The uterine cavity may appear to be empty but may not have been emptied completely. Repeat the evacuation;
 - The vaginal bleeding may not have been due to an incomplete abortion (e.g. breakthrough bleeding, as may be seen with hormonal contraceptives or uterine fibroids);
 - The uterus may be abnormal (i.e. cannula may have been inserted in the nonpregnant side of a double uterus).

Note: Absence of products of conception in a woman with symptoms of pregnancy raises the strong possibility of ectopic pregnancy (**page S-13**).

- Gently insert a speculum into the vagina and examine for bleeding. If the **uterus is still soft and not smaller** or if there is **persistent, brisk bleeding**, repeat the evacuation.

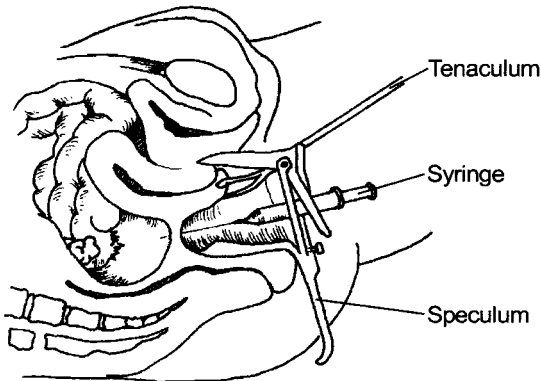
POST-PROCEDURE CARE

- Give paracetamol 500 mg by mouth as needed.
- Encourage the woman to eat, drink and walk about as she wishes.
- Offer other health services, if possible, including tetanus prophylaxis, counselling or a family planning method (**page S-12**).
- Discharge uncomplicated cases in one to two hours.
- Advise the woman to watch for symptoms and signs requiring immediate attention:
 - prolonged cramping (more than a few days);
 - prolonged bleeding (more than two weeks);
 - bleeding more than normal menstrual bleeding;
 - severe or increased pain;
 - fever, chills or malaise;
 - fainting.

CULDOCENTESIS

- Review for indications.
- Review general care principles (**page C-17**) and apply antiseptic solution to the vagina (especially the posterior fornix) (**page C-22**).
- Provide emotional support and encouragement. If necessary, use local infiltration with lignocaine (**page C-38**).
- Gently grasp the posterior lip of the cervix with a tenaculum and gently pull to elevate the cervix and expose the posterior vagina.
- Place a long needle (e.g. spinal needle) on a syringe and insert it through the posterior vagina, just below the posterior lip of the cervix (**Fig P-37**).

FIGURE P-37 Diagnostic puncture of the cul-de-sac



- Pull back on the syringe to aspirate the cul-de-sac (the space behind the uterus).
- If **non-clotting blood** is obtained, suspect ectopic pregnancy (**page S-13**).
- If **clotting blood** is obtained, a vein or artery may have been aspirated. Remove the needle, re-insert it and aspirate again.
- If **clear or yellow fluid** is obtained, there is no blood in the peritoneum. The woman may, however, still have an unruptured ectopic pregnancy and further observations and tests may be needed (**page S-13**).

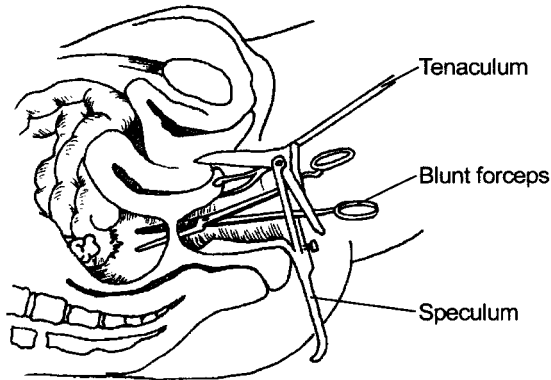
- If **no fluid** is obtained, remove the needle, re-insert it and aspirate again. If no fluid is obtained, the woman may have an unruptured ectopic pregnancy (**page S-13**).
- If **pus is obtained**, keep the needle in place and proceed to colpotomy (see below).

COLPOTOMY

If **pus is obtained** on culdocentesis, keep the needle in place and make a stab incision at the site of the puncture:

- Remove the needle and insert blunt forceps or a finger through the incision to break loculi in the abscess cavity (**Fig P-38**).

FIGURE P-38 Colpotomy for pelvic abscess



- Allow the pus to drain.
 - Insert a high-level disinfected or sterile soft rubber corrugated drain through the incision.
- Note:** A drain can be prepared by cutting off the fingertips of a high-level disinfected or sterile examination glove.
- If required, use a stitch through the drain to anchor it in the vagina.
 - Remove the drain when there is no more drainage of pus.
 - If **no pus is obtained**, the abscess may be higher than the pouch of Douglas. A laparotomy will be required for peritoneal lavage (wash-out).

Episiotomy should not be performed routinely.

- Review for indications.

Episiotomy should be considered only in the case of:

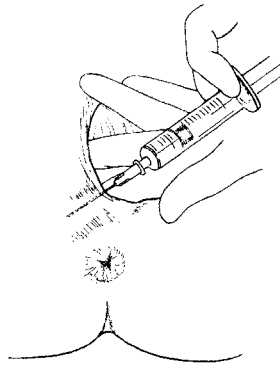
- complicated vaginal delivery (breech, shoulder dystocia, forceps, vacuum extraction);
- scarring from female genital cutting or poorly healed third or fourth degree tears;
- fetal distress.

- Review general care principles (**page C-17**) and apply antiseptic solution to the perineal area (**page C-22**).
- Provide emotional support and encouragement. Use local infiltration with lignocaine (**page C-38**) or a pudendal block (**page P-3**).
- Make sure there are no known allergies to lignocaine or related drugs.
- Infiltrate beneath the vaginal mucosa, beneath the skin of the perineum and deeply into the perineal muscle (**Fig P-39, page P-72**) using about 10 mL 0.5% lignocaine solution (**page C-39**).

Note: Aspirate (pull back on the plunger) to be sure that no vessel has been penetrated. If **blood is returned in the syringe with aspiration**, remove the needle. Recheck the position carefully and try again. Never inject if blood is aspirated. **The woman can suffer convulsions and death if IV injection of lignocaine occurs.**

- At the conclusion of the set of injections, wait two minutes and then pinch the incision site with forceps. If the **woman feels the pinch**, wait two more minutes and then retest.

Anaesthetize early to provide sufficient time for effect.

FIGURE P-39 Infiltration of perineal tissue with local anaesthetic

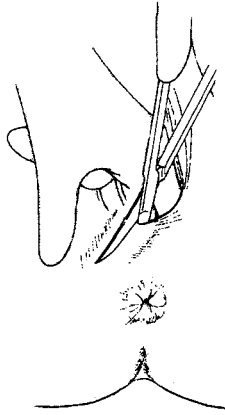
- Wait to perform episiotomy until:
 - the perineum is thinned out; and
 - 3–4 cm of the baby’s head is visible during a contraction.

Performing an episiotomy will cause bleeding. It should not, therefore, be done too early.

- Wearing high-level disinfected or sterile gloves, place two fingers between the baby’s head and the perineum.
- Use scissors to cut the perineum about 3–4 cm in the mediolateral direction (**Fig P-40, page P-73**).
- Use scissors to cut 2–3 cm up the middle of the posterior vagina.
- Control the baby’s head and shoulders as they deliver, ensuring that the shoulders have rotated to the midline to prevent an extension of the episiotomy.
- Carefully examine for extensions and other tears and repair (see below).

FIGURE P-40

Making the incision while inserting two fingers to protect the baby's head



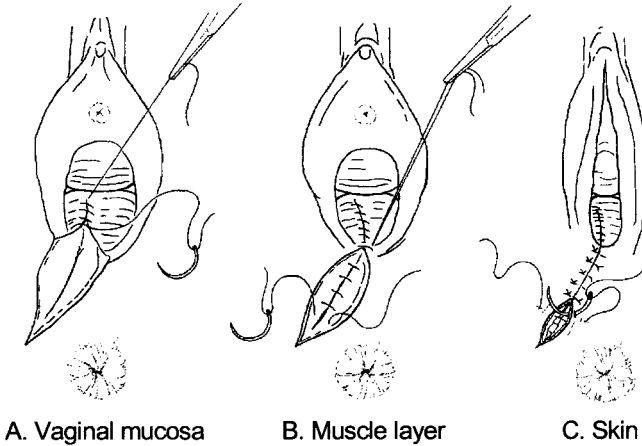
REPAIR OF EPISIOTOMY

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

- Apply antiseptic solution to the area around the episiotomy (**page C-22**).
- If the **episiotomy is extended** through the anal sphincter or rectal mucosa, manage as third or fourth degree tears, respectively (**page P-86**).
- Close the vaginal mucosa using continuous 2-0 suture (**Fig P-41 A**, **page P-74**):
 - Start the repair about 1 cm above the apex (top) of the episiotomy. Continue the suture to the level of the vaginal opening;
 - At the opening of the vagina, bring together the cut edges of the vaginal opening;

- Bring the needle under the vaginal opening and out through the incision and tie.
- Close the perineal muscle using interrupted 2-0 sutures (**Fig P-41 B**).
- Close the skin using interrupted (or subcuticular) 2-0 sutures (**Fig P-41 C**).

FIGURE P-41 Repair of episiotomy



COMPLICATIONS

- If a **haematoma** occurs, open and drain. If there are **no signs of infection** and **bleeding has stopped**, reclose the episiotomy.
- If there are **signs of infection**, open and drain the wound. Remove infected sutures and debride the wound:
 - If the **infection is mild**, antibiotics are not required;
 - If the **infection is severe but does not involve deep tissues**, give a combination of antibiotics (**page C-35**):
 - ampicillin 500 mg by mouth four times per day for five days;
 - PLUS metronidazole 400 mg by mouth three times per day for five days.
 - If the **infection is deep, involves muscles and is causing necrosis** (necrotizing fasciitis), give a combination of

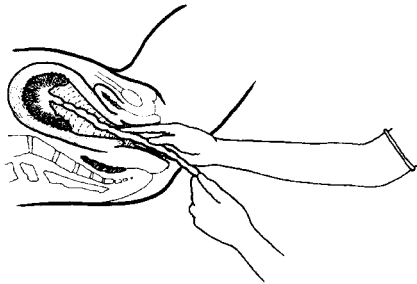
antibiotics until necrotic tissue has been removed and the woman is fever-free for 48 hours (**page C-35**):

- penicillin G 2 million units IV every six hours;
- PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
- PLUS metronidazole 500 mg IV every eight hours;
- Once the **woman is fever-free for 48 hours**, give:
 - ampicillin 500 mg by mouth four times per day for five days;
 - PLUS metronidazole 400 mg by mouth three times per day for five days.

Note: Necrotizing fasciitis requires wide surgical debridement. Perform delayed primary closure in two to four weeks (depending on resolution of the infection).

- Review for indications.
- Review general care principles (**page C-17**) and start an IV infusion (**page C-21**).
- Provide emotional support and encouragement. Give pethidine and diazepam IV slowly (do not mix in the same syringe) or use ketamine (**page P-13**).
- Catheterize the bladder or ensure that it is empty.
- Give a single dose of prophylactic antibiotics (**page C-35**):
 - ampicillin 2 g IV PLUS metronidazole 500 mg IV;
 - OR cefazolin 1 g IV PLUS metronidazole 500 mg IV.
- Hold the umbilical cord with a clamp. Pull the cord gently until it is parallel to the floor.
- Wearing high-level disinfected or sterile gloves (use long gloves if available), insert the other hand into the vagina and up into the uterus (**Fig P-42**).

FIGURE P-42 **Introducing one hand into the vagina along cord**

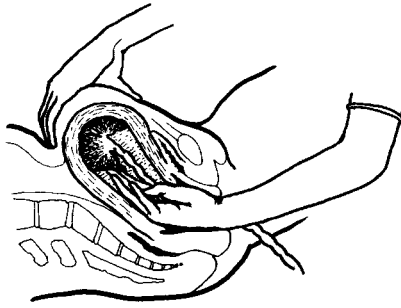


- Let go of the cord and move the hand up over the abdomen in order to support the fundus of the uterus and to provide counter-traction during removal to prevent inversion of the uterus (**Fig P-43, page P-78**).

Note: If **uterine inversion** occurs, reposition the uterus (**page P-91**).

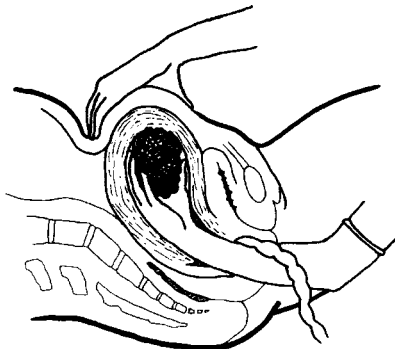
- Move the fingers of the hand in the uterus laterally until the edge of the placenta is located.
- If the **cord has been detached previously**, insert a hand into the uterine cavity. Explore the entire cavity until a line of cleavage is identified between the placenta and the uterine wall.

FIGURE P-43

Supporting the fundus while detaching the placenta

- Detach the placenta from the implantation site by keeping the fingers tightly together and using the edge of the hand to gradually make a space between the placenta and the uterine wall.
- Proceed slowly all around the placental bed until the whole placenta is detached from the uterine wall.
- If the **placenta does not separate from the uterine surface** by gentle lateral movement of the fingertips at the line of cleavage, remove placental fragments (**page S-32**). If the **tissue is very adherent**, suspect placenta accreta and proceed to laparotomy and possible subtotal hysterectomy (**page P-103**).
- Hold the placenta and slowly withdraw the hand from the uterus, bringing the placenta with it (**Fig P-44**).
- With the other hand, continue to provide counter-traction to the fundus by pushing it in the opposite direction of the hand that is being withdrawn.

FIGURE P-44

Withdrawing the hand from the uterus

- Palpate the inside of the uterine cavity to ensure that all placental tissue has been removed.
- Give oxytocin 20 units in 1 L IV fluids (normal saline or Ringer's lactate) at 60 drops per minute.
- Ask an assistant to massage the fundus of the uterus to encourage a tonic uterine contraction.
- If there is **continued heavy bleeding**, give ergometrine 0.2 mg IM or prostaglandins (**Table S-8, page S-28**).
- Examine the uterine surface of the placenta to ensure that it is complete. If any **placental lobe or tissue is missing**, explore the uterine cavity to remove it.
- Examine the woman carefully and repair any tears to the cervix (**page P-81**) or vagina (**page P-83**), or repair episiotomy (**page P-73**).

PROBLEMS

- If the **placenta is retained due to a constriction ring** or if **hours or days have passed since delivery**, it may not be possible to get the entire hand into the uterus. Extract the placenta in fragments using two fingers, ovum forceps or a wide curette (**page S-32**).

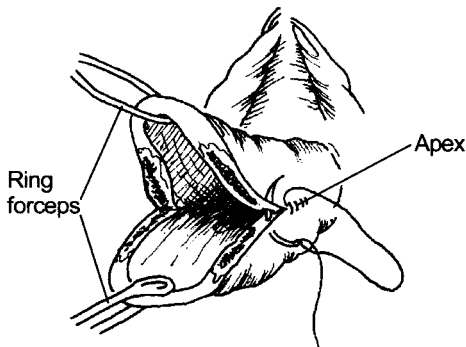
POST-PROCEDURE CARE

- Observe the woman closely until the effect of IV sedation has worn off.
- Monitor vital signs (pulse, blood pressure, respiration) every 30 minutes for the next six hours or until stable.
- Palpate the uterine fundus to ensure that the uterus remains contracted.
- Check for excessive lochia.
- Continue infusion of IV fluids.
- Transfuse as necessary (**page C-23**).

- Review general care principles (**page C-17**) and apply antiseptic solution to the vagina and cervix (**page C-22**).
- Provide emotional support and encouragement. Anaesthesia is not required for most cervical tears. For tears that are high and extensive, give pethidine and diazepam IV slowly (do not mix in the same syringe) or use ketamine (**page P-13**).
- Ask an assistant to gently provide fundal pressure to help push the cervix into view.
- Use vaginal retractors as necessary to expose the cervix.
- Gently grasp the cervix with ring or sponge forceps. Apply the forceps on both sides of the tear and gently pull in various directions to see the entire cervix. There may be several tears.
- Close the cervical tears with continuous 0 chromic catgut (or polyglycolic) suture starting at the apex (upper edge of tear), which is often the source of bleeding (**Fig P-45**).
- If a **long section of the rim of the cervix is tattered**, under-run it with continuous 0 chromic catgut (or polyglycolic) suture.
- If the **apex is difficult to reach and ligate**, grasp it with artery or ring forceps. Leave the forceps in place for four hours. Do not persist in attempts to ligate the bleeding points as such attempts may increase the bleeding. Then:
 - After four hours, open the forceps partially but do not remove;
 - After another four hours, remove the forceps completely.

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

FIGURE P-45 **Repair of a cervical tear**



There are four degrees of tears that can occur during delivery:

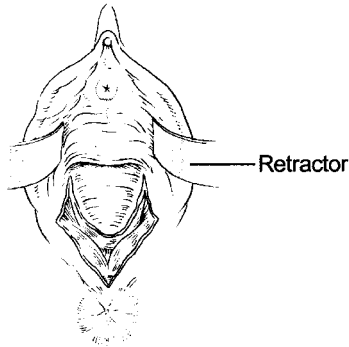
- First degree tears involve the vaginal mucosa and connective tissue.
- Second degree tears involve the vaginal mucosa, connective tissue and underlying muscles.
- Third degree tears involve complete transection of the anal sphincter.
- Fourth degree tears involve the rectal mucosa.

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

REPAIR OF FIRST AND SECOND DEGREE TEARS

Most first degree tears close spontaneously without sutures.

- Review general care principles (**page C-17**).
- Provide emotional support and encouragement. Use local infiltration with lignocaine (**page C-38**). If necessary, use a pudendal block (**page P-3**).
- Ask an assistant to check the uterus and ensure that it is contracted.
- Carefully examine the vagina, perineum and cervix (**Fig P-46, page P-84**).
- 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.
- Change to clean, high-level disinfected or sterile gloves.
- If the **sphincter is injured**, see the section on repair of third and fourth degree tears (**page P-86**).
- If the **sphincter is not injured**, proceed with repair.

FIGURE P-46 Exposing a perineal tear

- Apply antiseptic solution to the area around the tear (**page C-22**).
- Make sure there are no known allergies to lignocaine or related drugs.

Note: If more than 40 mL of lignocaine solution will be needed for the repair, add adrenaline to the solution (**page C-39**).

- Infiltrate beneath the vaginal mucosa, beneath the skin of the perineum and deeply into the perineal muscle using about 10 mL 0.5% lignocaine solution (**page C-39**).

Note: Aspirate (pull back on the plunger) to be sure that no vessel has been penetrated. If **blood is returned in the syringe with aspiration**, remove the needle. Recheck the position carefully and try again. Never inject if blood is aspirated. **The woman can suffer convulsions and death if IV injection of lignocaine occurs.**

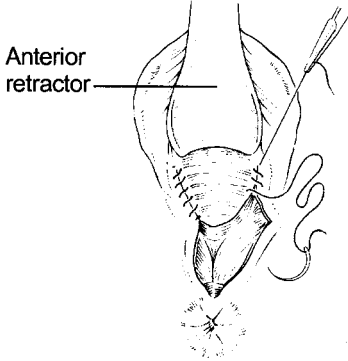
- At the conclusion of the set of injections, wait two minutes and then pinch the area with forceps. If the **woman feels the pinch**, wait two more minutes and then retest.

Anaesthetize early to provide sufficient time for effect.

- Repair the vaginal mucosa using a continuous 2-0 suture (**Fig P-47, page P-85**):
 - Start the repair about 1 cm above the apex (top) of the vaginal tear. Continue the suture to the level of the vaginal opening;
 - At the opening of the vagina, bring together the cut edges of the vaginal opening;

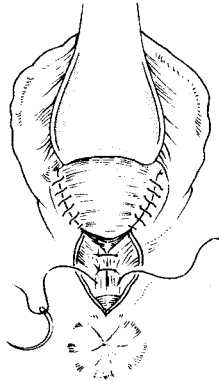
- Bring the needle under the vaginal opening and out through the perineal tear and tie.

FIGURE P-47 Repairing the vaginal mucosa



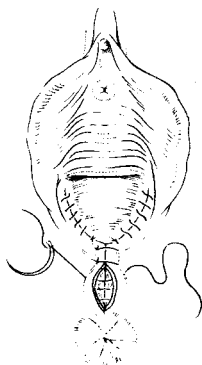
- Repair the perineal muscles using interrupted 2-0 suture (**Fig P-48**). If the **tear is deep**, place a second layer of the same stitch to close the space.

FIGURE P-48 Repairing the perineal muscles



- Repair the skin using interrupted (or subcuticular) 2-0 sutures starting at the vaginal opening (**Fig P-49, page P-86**).
- If the **tear was deep**, perform a rectal examination. Make sure no stitches are in the rectum.

FIGURE P-49 **Repairing the skin**



REPAIR OF THIRD AND FOURTH DEGREE PERINEAL TEARS

Note: 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).

Repair the tear in the operating room.

- Review general care principles (**page C-17**).
- Provide emotional support and encouragement. Use a pudendal block (**page P-3**), ketamine (**page P-13**) or spinal anaesthesia (**page P-11**). Rarely, if all edges of the tear can be seen, the repair can be done using local infiltration with lignocaine (see above) and pethidine and diazepam IV slowly (do not mix in the same syringe).
- Ask an assistant to check the uterus and ensure that it is contracted.
- Examine the vagina, cervix, perineum and rectum.
- To see if the anal sphincter is torn:
 - Place a gloved finger in the anus and lift slightly;
 - Identify the sphincter, or lack of it;
 - Feel the surface of the rectum and look carefully for a tear.
- Change to clean, high-level disinfected or sterile gloves.

- Apply antiseptic solution to the tear and remove any faecal material, if present (**page C-22**).
- Make sure there are no known allergies to lignocaine or related drugs.
- Infiltrate beneath the vaginal mucosa, beneath the skin of the perineum, and deeply into the perineal muscle using about 10 mL 0.5% lignocaine solution (**page C-39**).

Note: Aspirate (pull back on the plunger) to be sure that no vessel has been penetrated. If **blood is returned in the syringe with aspiration**, remove the needle. Recheck the position carefully and try again. Never inject if blood is aspirated. **The woman can suffer convulsions and death if IV injection of lignocaine occurs.**

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

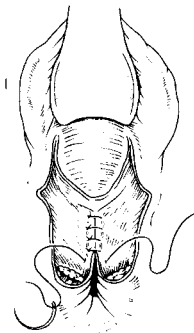
Anaesthetize early to provide sufficient time for effect.

- Repair the rectum using interrupted 3-0 or 4-0 sutures 0.5 cm apart to bring together the mucosa (**Fig P-50**):

Remember: Place the suture through the muscularis (not all the way through the mucosa).

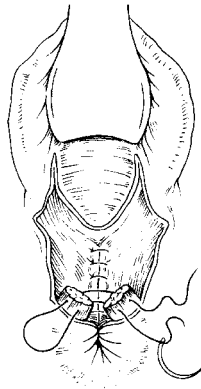
- Cover the muscularis layer by bringing together the fascial layer with interrupted sutures;
- Apply antiseptic solution to the area frequently.

FIGURE P-50 **Closing the muscle wall of the rectum**



- If the **sphincter is torn**:
 - Grasp each end of the sphincter with an Allis clamp (the sphincter retracts when torn). The fascial sheath around the sphincter is strong and will not tear when pulling with the clamp (**Fig P-51, page P-88**);
 - Repair the sphincter with two or three interrupted stitches of 2-0 suture.

FIGURE P-51 Suturing the anal sphincter



- Apply antiseptic solution to the area again.
- Examine the anus with a gloved finger to ensure the correct repair of the rectum and sphincter. Then change to clean, high-level disinfected or sterile gloves.
- Repair the vaginal mucosa, perineal muscles and skin (**page P-84**).

POST-PROCEDURE CARE

- If there is a **fourth degree tear**, give a single dose of prophylactic antibiotics (**page C-35**):
 - ampicillin 500 mg by mouth;
 - PLUS metronidazole 400 mg by mouth.
- Follow up closely for signs of wound infection.
- Avoid giving enemas or rectal examinations for two weeks.
- Give stool softener by mouth for one week, if possible.

MANAGEMENT OF NEGLECTED CASES

A perineal tear may be contaminated with faecal material. If **closure is delayed more than 12 hours**, infection is likely. Delayed primary closure is indicated in such cases.

- For **first and second degree tears**, have the woman return in six days. If there are no signs of infection, proceed with delayed primary closure.
- For **third and fourth degree tears**, close the rectal mucosa with some supporting tissue and approximate the fascia of the anal sphincter with two or three sutures. Close the muscle and vaginal mucosa and the perineal skin six days later.

COMPLICATIONS

- If a **haematoma is observed**, open and drain it. If there are **no signs of infection and the bleeding has stopped**, the wound can be reclosed.
- If there are **signs of infection**, open and drain the wound. Remove infected sutures and debride the wound:
 - If the **infection is mild**, antibiotics are not required;
 - If the **infection is severe but does not involve deep tissues**, give a combination of antibiotics (**page C-35**):
 - ampicillin 500 mg by mouth four times per day for five days;
 - PLUS metronidazole 400 mg by mouth three times per day for five days.
 - If the **infection is deep, involves muscles and is causing necrosis** (necrotizing fasciitis), give a combination of antibiotics until necrotic tissue has been removed and the woman is fever-free for 48 hours (**page C-35**):
 - penicillin G 2 million units IV every six hours;
 - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
 - PLUS metronidazole 500 mg IV every eight hours;
 - Once the **woman is fever-free for 48 hours**, give:

- ampicillin 500 mg by mouth four times per day for five days;
- PLUS metronidazole 400 mg by mouth three times per day for five days.

Note: Necrotizing fasciitis requires wide surgical debridement. Perform delayed primary closure in two to four weeks (depending on resolution of the infection).

- Faecal incontinence may result from complete sphincter transection. Many women are able to maintain control of defaecation by the use of other perineal muscles. When incontinence persists, reconstructive surgery must be performed three months or more after delivery.
- Rectovaginal fistula requires reconstructive surgery three months or more postpartum.

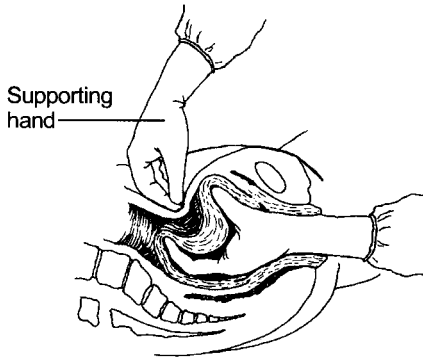
- Review for indications.
- Review general care principles (**page C-17**) and start an IV infusion (**page C-21**).
- Give pethidine and diazepam IV slowly (do not mix in the same syringe). If necessary, use general anaesthesia.
- Thoroughly cleanse the inverted uterus using antiseptic solution.
- Apply compression to the inverted uterus with a moist, warm sterile towel until ready for the procedure.

MANUAL CORRECTION

- Wearing high-level disinfected or sterile gloves, grasp the inverted uterus and push it through the cervix in the direction of the umbilicus to its normal anatomic position, using the other hand to stabilize the uterus (**Fig P-52**). If the **placenta is still attached**, manually remove the placenta **after** correction.

It is important that the part of the uterus that came out last (the part closest to the cervix) goes in first.

FIGURE P-52 **Manual replacement of the inverted uterus**



- If **correction is not achieved**, proceed to hydrostatic correction (**page P-92**).

HYDROSTATIC CORRECTION

- Place the woman in deep Trendelenburg position (lower her head about 0.5 metres below the level of the perineum).
- Prepare a high-level disinfected or sterile douche system with large nozzle and long tubing (2 metres) and a warm water reservoir (3 to 5 L).

Note: This can also be done using warmed normal saline and an ordinary IV administration set.

- Identify the posterior fornix. This is easily done in partial inversion when the inverted uterus is still in the vagina. In other cases, the posterior fornix is recognized by where the rugose vagina becomes the smooth vagina.
- Place the nozzle of the douche in the posterior fornix.
- At the same time, with the other hand hold the labia sealed over the nozzle and use the forearm to support the nozzle.
- Ask an assistant to start the douche with full pressure (raise the water reservoir to at least 2 metres). Water will distend the posterior fornix of the vagina gradually so that it stretches. This causes the circumference of the orifice to increase, relieves cervical constriction and results in correction of the inversion.

MANUAL CORRECTION UNDER GENERAL ANAESTHESIA

- If **hydrostatic correction is not successful**, try manual repositioning under general anaesthesia using halothane. Halothane is recommended because it relaxes the uterus.
- Grasp the inverted uterus and push it through the cervix in the direction of the umbilicus to its normal anatomic position, using the other hand to stabilize the uterus (**Fig P-52, page P-91**). If the **placenta is still attached**, manually remove the placenta **after** correction.

COMBINED ABDOMINAL-VAGINAL CORRECTION

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

- Review for indications.

- Review operative care principles (**page C-47**).
- 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 or scissors to make an opening in the peritoneum near the umbilicus. Use scissors to lengthen the incision up and down. Carefully, to prevent bladder injury, use scissors to separate layers and open the lower part of the peritoneum;
 - Place a bladder retractor over the pubic bone and place self-retaining abdominal retractors.
- Dilate the constricting cervical ring digitally.
- Place a tenaculum through the cervical ring and grasp the inverted fundus.
- Apply gentle continuous traction to the fundus while an assistant attempts manual correction vaginally.
- If **traction fails**:
 - Incise the constricting cervical ring vertically and posteriorly (where the incision is least likely to injure the bladder or uterine vessels);
 - Repeat digital dilatation, tenaculum and traction steps;
 - Close the constriction ring.
- If **correction is successful**, close the abdomen:
 - Make sure there is no bleeding. Use a sponge to remove any clots inside the abdomen;
 - 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

- Once the inversion is corrected, infuse oxytocin 20 units in 500 mL IV fluids (normal saline or Ringer's lactate) at 10 drops per minute:
 - If **haemorrhage is suspected**, increase the infusion rate to 60 drops per minute;
 - If the **uterus does not contract after oxytocin**, give ergometrine 0.2 mg or prostaglandins (**Table S-8, page S-28**).
- Give a single dose of prophylactic antibiotics after correcting the inverted uterus (**page C-35**):
 - ampicillin 2 g IV PLUS metronidazole 500 mg IV;
 - OR cefazolin 1 g IV PLUS metronidazole 500 mg IV.
- If **combined abdominal-vaginal correction** was used, see postoperative care principles (**page C-52**).
- 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 (**page C-35**):
 - ampicillin 2 g IV every six hours;
 - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
 - PLUS metronidazole 500 mg IV every eight hours.
- Give appropriate analgesic drugs (**page C-37**).

- Review for indications.
- Review general care principles (**page C-17**) and operative care principles (**page C-47**), and start an IV infusion (**page C-21**).
- Give a single dose of prophylactic antibiotics (**page C-35**):
 - ampicillin 2 g IV;
 - OR 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;
 - Examine the abdomen and the uterus for site of rupture and remove clots;
 - Place a bladder retractor over the pubic bone and place self-retaining abdominal retractors.
- Deliver the baby and placenta.
- Infuse oxytocin 20 units in 1 L IV fluids (normal saline or Ringer's lactate) at 60 drops per minute until the uterus contracts and then reduce to 20 drops per minute.
- Lift the uterus out of the pelvis in order to note the extent of the injury.
- Examine both the front and the back of the uterus.
- Hold the bleeding edges of the uterus with Green Armytage clamps (or ring forceps).
- Separate the bladder from the lower uterine segment by sharp or blunt dissection. If the **bladder is scarred to the uterus**, use fine scissors.

RUPTURE THROUGH CERVIX AND VAGINA

- If the **uterus is torn through the cervix and vagina**, mobilize the bladder at least 2 cm below the tear.
- If possible, place a suture 2 cm above the lower end of the cervical tear and keep traction on the suture to bring the lower end of the tear into view as the repair continues.

RUPTURE Laterally THROUGH UTERINE ARTERY

- If the **rupture extends laterally to damage one or both uterine arteries**, ligate the injured artery.
- Identify the arteries and ureter prior to ligating the uterine vessels (**Fig P-53, page P-100**).

RUPTURE WITH BROAD LIGAMENT HAEMATOMA

- If the **rupture has created a broad ligament haematoma** (**Fig S-2, page S-20**), clamp, cut and tie off the round ligament.
- Open the anterior leaf of the broad ligament.
- Drain off the haematoma manually, if necessary.
- Inspect the area carefully for injury to the uterine artery or its branches. Ligate any bleeding vessels.

REPAIRING THE UTERINE TEAR

- Repair the tear with a continuous locking stitch of 0 chromic catgut (or polyglycolic) suture. If **bleeding is not controlled** or if the **rupture is through a previous classical or vertical incision**, place a second layer of suture.

Ensure that the ureter is identified and exposed to avoid including it in a stitch.

- If the **rupture is too extensive for repair**, proceed with hysterectomy (**page P-103**).

- Control bleeding by clamping with long artery forceps and ligating. If the **bleeding points are deep**, use figure-of-eight sutures.
- If the **woman has requested tubal ligation**, perform the procedure at this time (**page P-51**).
- Place an abdominal drain (**page C-51**).
- Close the abdomen:
 - Ensure that there is no bleeding. Remove clots using a sponge.
 - In all cases, check for injury to the bladder. If a **bladder injury is identified**, repair the injury (see below).
 - 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.

REPAIR OF BLADDER INJURY

- Identify the extent of the injury by grasping each edge of the tear with a clamp and gently stretching. Determine if the injury is close to the bladder trigone (ureters and urethra).
- Dissect the bladder off the lower uterine segment with fine scissors or with a sponge on a clamp.
- Free a 2 cm circle of bladder tissue around the tear.
- Repair the tear in two layers with continuous 3-0 chromic catgut (or polyglycolic) suture:
 - Suture the bladder mucosa (thin inner layer) and bladder muscle (outer layer);
 - Invert (fold) the outer layer over the first layer of suture and place another layer of suture;
 - Ensure that sutures do not enter the trigone area.

- Test the repair for leaks:
 - Fill the bladder with sterile saline or water through the transurethral catheter;
 - If **leaks are present**, remove the suture, repair and test again.
- If it is **not certain that the repair is well away from the ureters and urethra**, complete the repair and refer the woman to a higher-level facility for an intravenous pyelogram.
- Keep the bladder catheter in place for at least seven days and until urine is clear. Continue IV fluids to ensure flushing of the bladder, and encourage the woman to drink fluids.

POST-PROCEDURE CARE

- Review postoperative care principles (**page C-52**).
- 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 (**page C-35**):
 - ampicillin 2 g IV every six hours;
 - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
 - PLUS metronidazole 500 mg IV every eight hours.
- Give appropriate analgesic drugs (**page C-37**).
- If there are **no signs of infection**, remove the abdominal drain after 48 hours.
- Offer other health services, if possible (**page S-13**).
- If **tubal ligation was not performed**, offer family planning (**Table S-3, page S-13**). If the **woman wishes to have more children**, advise her to have elective caesarean section for future pregnancies.

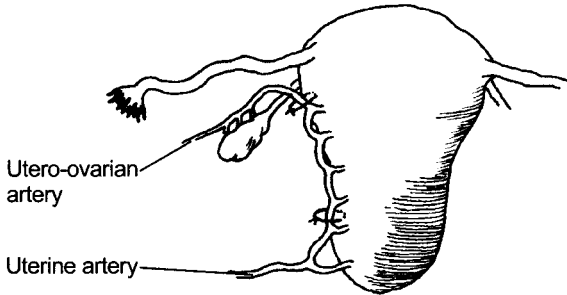
Because there is an increased risk of rupture with subsequent pregnancies, the option of permanent contraception needs to be discussed with the woman after the emergency is over. Permanent contraception should not be performed without informed consent from the woman.

UTERINE AND UTERO-OVARIAN ARTERY LIGATION

- Review for indications.
- Review general care principles (**page C-17**) and operative care principles (**page C-47**), and start an IV infusion (**page C-21**).
- Give a single dose of prophylactic antibiotics (**page C-35**):
 - ampicillin 2 g IV;
 - OR 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.
- Place the sutures as close to the uterus as possible, as 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 (**Fig P-53**).
- Repeat on the other side.
- Observe for continued bleeding or formation of haematoma.

FIGURE P-53 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 (**page P-97**);
 - 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

- Review postoperative care principles (**page C-52**).

- Monitor urine output. If there is **blood in the urine** or the **woman has loin pain**, refer the woman to a tertiary centre, if possible, for treatment of an obstructed ureter.
- 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 (**page C-35**):
 - ampicillin 2 g IV every six hours;
 - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
 - PLUS metronidazole 500 mg IV every eight hours.
- Give appropriate analgesic drugs (**page C-37**).
- If there are **no signs of infection**, remove the abdominal drain after 48 hours.
- Offer other health services, if possible (**page S-13**).

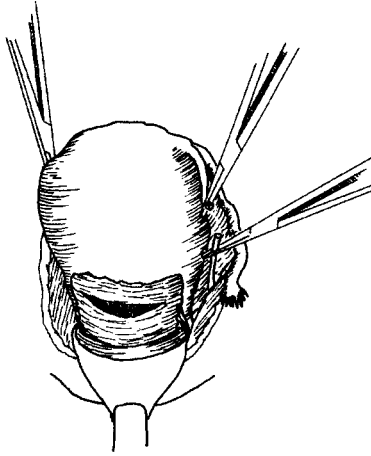
Postpartum hysterectomy can be **subtotal** (supracervical) unless the cervix and lower uterine segment are involved. **Total** hysterectomy may be necessary in the case of a tear of the lower segment that extends into the cervix or bleeding after placenta praevia.

- Review for indications.
- Review general care principles (**page C-17**) and operative care principles (**page C-47**), and start an IV infusion (**page C-21**).
- Give a single dose of prophylactic antibiotics (**page C-35**):
 - ampicillin 2 g IV;
 - OR cefazolin 1 g IV.
- If there is **uncontrollable haemorrhage following vaginal delivery**, keep in mind that speed is essential. To 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.
- If the **delivery was by caesarean section**, clamp the sites of bleeding along the uterine incision:
 - In case of **massive bleeding**, have an assistant press fingers over the aorta in the lower abdomen. This will reduce intraperitoneal bleeding;
 - Extend the skin incision, if needed.

SUBTOTAL (SUPRACERVICAL) HYSTERECTOMY

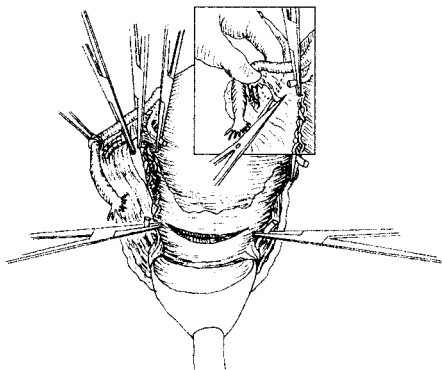
- Lift the uterus out of the abdomen and gently pull to maintain traction.
- Doubly clamp and cut the round ligaments with scissors (**Fig P-54**). Clamp and cut the pedicles, but ligate after the uterine arteries are secured to save time.

FIGURE P-54 **Dividing the round ligaments**

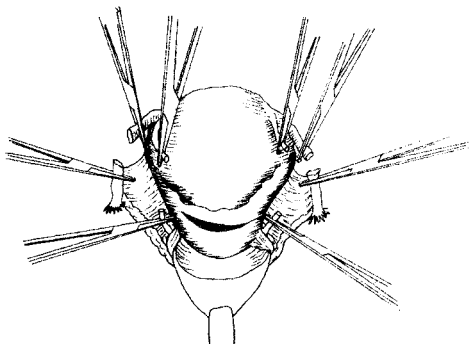


- From the edge of the cut round ligament, open the anterior leaf of the broad ligament. Incise to:
 - the point where the bladder peritoneum is reflected onto the lower uterine surface in the midline; or
 - the incised peritoneum at a caesarean section.
- Use two fingers to push the posterior leaf of the broad ligament forward, just under the tube and ovary, near the uterine edge. Make a hole the size of a finger in the broad ligament, using scissors. Doubly clamp and cut the tube, the ovarian ligament and the broad ligament through the hole in the broad ligament (**Fig P-55, page P-105**).

The ureters are close to the uterine vessels. The ureter must be identified and exposed to avoid injuring it during surgery or including it in a stitch.

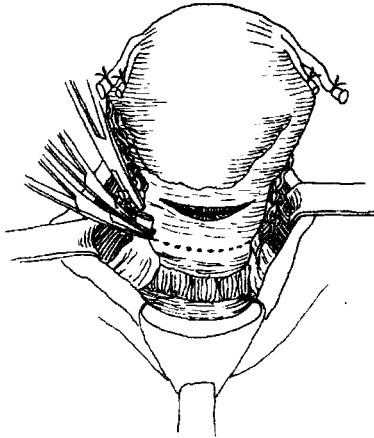
FIGURE P-55 **Dividing the tube and ovarian ligaments**

- Divide the posterior leaf of the broad ligament downwards towards the uterosacral ligaments, using scissors.
- Grasp the edge of the bladder flap with forceps or a small clamp. Using fingers or scissors, dissect the bladder downwards off of the lower uterine segment. Direct the pressure downwards but inwards toward the cervix and the lower uterine segment.
- Reposition the bladder blade and retract the bladder inferiorly.
- Locate the uterine artery and vein on each side of the uterus. Feel for the junction of the uterus and cervix.
- Doubly clamp across the uterine vessels at a 90 degree angle on each side of the cervix. Cut and doubly ligate with 0 chromic catgut (or polyglycolic) suture (**Fig P-56**).

FIGURE P-56 **Dividing the uterine vessels**

- Observe carefully for any further bleeding. If the **uterine arteries are ligated correctly**, bleeding should stop and the uterus should look pale.
- Return to the clamped pedicles of the round ligaments and tubo-ovarian ligaments and ligate them with 0 chromic catgut (or polyglycolic) suture.
- Amputate the uterus above the level where the uterine arteries are ligated, using scissors (**Fig P-57**).

FIGURE P-57 **Line of amputation**



- Close the cervical stump with interrupted 2-0 or 3-0 chromic catgut (or polyglycolic) sutures.
- Carefully inspect the cervical stump, leaves of the broad ligament and other pelvic floor structures for any bleeding.
- If **slight bleeding persists or a clotting disorder is suspected**, place a drain through the abdominal wall (**page C-51**). Do not place a drain through the cervical stump, as this can cause postoperative infection.
- Close the abdomen:
 - Ensure that there is no bleeding. Remove clots using a sponge;
 - In all cases, check for injury to the bladder. If a **bladder injury is identified**, repair the injury (**page P-97**);
 - 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.

TOTAL HYSTERECTOMY

The following additional steps are required for total hysterectomy:

- Push the bladder down to free the top 2 cm of the vagina.
- Open the posterior leaf of the broad ligament.
- Clamp, ligate and cut the uterosacral ligaments.
- Clamp, ligate and cut the cardinal ligaments, which contain the descending branches of the uterine vessels. This is the critical step in the operation:
 - Grasp the ligament vertically with a large-toothed clamp (e.g. Kocher);
 - Place the clamp 5 mm lateral to the cervix and cut the ligament close to the cervix, leaving a stump medial to the clamp for safety;
 - If the **cervix is long**, repeat the step two or three times as needed.

The upper 2 cm of the vagina should now be free of attachments.

- Circumcise the vagina as near to the cervix as possible, clamping bleeding points as they appear.
- Place haemostatic angle sutures, which include round, cardinal and uterosacral ligaments.
- Place continuous sutures on the vaginal cuff to stop haemorrhage.
- Close the abdomen (as above) after placing a drain in the extraperitoneal space near the stump of the cervix (**page C-51**).

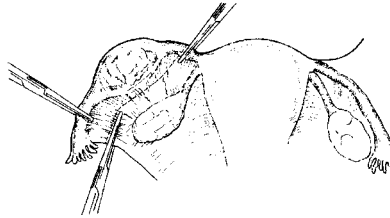
POST-PROCEDURE CARE

- Review postoperative care principles (**page C-52**).
- Monitor urine output. If there is **blood in the urine or the woman has loin pain**, refer the woman to a tertiary centre, if possible, for treatment of an obstructed ureter.
- 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 (**page C-35**):
 - ampicillin 2 g IV every six hours;
 - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
 - PLUS metronidazole 500 mg IV every eight hours.
- Give appropriate analgesic drugs (**page C-37**).
- If there are **no signs of infection**, remove the abdominal drain after 48 hours.
- Offer other health services, if possible (**page S-13**).

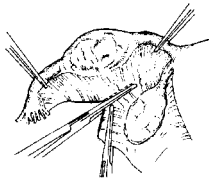
- Review for indications.
- Review general care principles (**page C-17**) and operative care principles (**page C-47**), and start an IV infusion (**page C-21**).
- Give a single dose of prophylactic antibiotics (**page C-35**):
 - ampicillin 2 g IV;
 - OR cefazolin 1 g IV.
- Open the abdomen:
 - Make 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.
- Identify and bring to view the fallopian tube with the ectopic gestation and its ovary.
- Apply traction forceps (e.g. Babcock) to increase exposure and clamp the mesosalpinx to stop haemorrhage.
- Aspirate blood from the lower abdomen and remove blood clots.
- Apply gauze moistened with warm saline to pack off the bowel and omentum from the operative field.
- Divide the mesosalpinx using a series of clamps (**Fig P-58 A–C, page P-110**). Apply each clamp close to the tubes to preserve ovarian vasculature.
- Transfix and tie the divided mesosalpinx with 2-0 chromic catgut (or polyglycolic) suture before releasing the clamps.

- Place a proximal suture around the tube at its isthmic end and excise the tube.

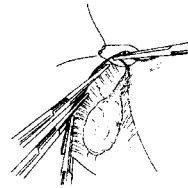
FIGURE P-58 Clamping, dividing and cutting the mesosalpinx



A. Clamping mesosalpinx



B. Dividing mesosalpinx



C. Placing a proximal suture around the tube

- Close the abdomen:
 - Ensure that there is no bleeding. Remove clots using a sponge;
 - Close the fascia with continuous 0 chromic catgut (or polyglycolic) suture;
 - 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.

SALPINGOSTOMY

Rarely, when there is little damage to the tube, the gestational sac can be removed and the tube conserved. This should be done only in cases where the conservation of fertility is very important to the woman since she is at risk for another ectopic pregnancy.

- Open the abdomen and expose the appropriate ovary and fallopian tube (**page P-109**).
- Apply traction forceps (e.g. Babcock) on either side of the unruptured tubal pregnancy and lift to view.
- Use a scalpel to make a linear incision through the serosa on the side opposite to the mesentery and along the axis of the tube, but do not cut the gestational sac.
- Use the scalpel handle to slide the gestational sac out of the tube.
- Ligate bleeding points.
- Return the ovary and fallopian tube to the pelvic cavity.
- Close the abdomen (**page P-110**).

POST-PROCEDURE CARE

- Review postoperative care principles (**page C-52**).
- 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 (**page C-35**):
 - ampicillin 2 g IV every six hours;
 - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
 - PLUS metronidazole 500 mg IV every eight hours.
- Give appropriate analgesic drugs (**page C-37**).
- Offer other health services, if possible (**page S-13**).
- If **salpingostomy was performed**, advise the woman of the risk for another ectopic pregnancy and offer family planning (**Table S-3, page S-13**).

