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Integrated Management Of Pregnancy And Childbirth

I M P A C

Managing Complications in Pregnancy and Childbirth:

A guide for midwives and doctors

WHO UNFPA UNICEF World Bank

RHR Department of Reproductive Health and Research

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Major contributors:	Matthews Mathai Harshad Sanghvi Richard J. Guidotti
Contributors:	Fredrik Broekhuizen Beverley Chalmers Robert Johnson Anne Foster-Rosales Jeffrey M. Smith Jelka Zupan
Editing:	Melissa McCormick
Editing Assistance:	Ann Blouse David Bramley Kathleen Hines Georgeanna Murgatroyd Elizabeth Oliveras
Artist:	Mary Jane Orley
Cover design:	Máire Ní Mhearáin
Layout:	Deborah Brigade

The special contribution of George Povey, whose original work inspired the idea for this manual, is gratefully acknowledged.

Reviewers:

Sabaratnam Arulkumaran	Barbara Kinzie	Abdul Bari Saifuddin
Ann Davenport	André Lalonde	Willibrord Shasha
Michael Dobson	Jerker Liljestrand	Betty Sweet
Jean Emmanuel	Enriquito Lu	Paul Van Look
Susheela Engelbrecht	Florence Mirembe	Patrice White
Miguel Espinoza	Glen Mola	
Petra ten Hoope-Bender	Zahida Qureshi	
Monir Islam	Allan Rosenfield	

This guide represents a common understanding between WHO, UNFPA, UNICEF, and the World Bank of key elements of an approach to reducing maternal and perinatal mortality and morbidity. These agencies co-operate closely in efforts to reduce maternal and perinatal mortality and morbidity. The principles and policies of each agency are governed by the relevant decisions of each agency's governing body and each agency implements the interventions described in this document in accordance with these principles and policies and within the scope of its mandate.

The guide has also been reviewed and endorsed by the International Confederation of Midwives and the International Federation of Gynecology and Obstetrics.

International Federation of
Gynecology and Obstetrics

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PREFACE

In support of the Safe Motherhood Initiative, the WHO Making Pregnancy Safer Strategy focuses on the Health Sector's contribution to reducing maternal and newborn deaths.

The Integrated Management of Pregnancy and Childbirth (IMPAC) is the technical component of the aforementioned strategy and mainly addresses the following:

- Improving the skills of health workers through locally adapted guidelines and standards for the management of pregnancy and childbirth at different levels of the health care system;
- Interventions to improve the health care system's response to the needs of pregnant women and their newborns, and to improve the district level management of health services, including the provision of adequate staffing, logistics, supplies and equipment;
- Health education and promotion of activities that improve family and community attitudes and practices in relation to pregnancy and childbirth.

This manual, and a similar one on the management of preterm and sick newborns, is written for midwives and doctors working in district hospitals. This manual complements and is consistent with the Essential Care Practice Guide for Pregnancy and Childbirth which is prepared mainly for the primary health care level. Together these manuals will provide guidance for health workers who are responsible for the care of pregnant women and newborns at all levels of care.

The interventions described in these manuals are based on the latest available scientific evidence. Given that evidence-based medicine is the standard on which to base clinical practice, it is planned to update the manual as new information is acquired.

It is hoped that this manual will be used at the side of the patient, and be readily available whenever a midwife or doctor is confronted with an obstetric emergency.

INTRODUCTION

While most pregnancies and births are uneventful, all pregnancies are at risk. Around 15% of all pregnant women develop a potentially life-threatening complication that calls for skilled care and some will require a major obstetrical intervention to survive. This manual is written for midwives and doctors at the district hospital who are responsible for the care of women with complications of pregnancy, childbirth or the immediate postpartum period, including immediate problems of the newborn.

In addition to the care midwives and doctors provide women in facilities, they also have a unique role and relationship with:

- the community of health care providers within the district health system, including auxiliary and multipurpose health workers;
- family members of patients;
- community leaders;
- populations with special needs (e.g. adolescents, women with HIV/AIDS).

Midwives and doctors:

- support activites for the improvement of all district health services;
- strive for efficient and reliable referral systems;
- monitor the quality of health care services;
- advocate for community participation in health related matters.

A district hospital is defined as a facility that is capable of providing quality services, including operative delivery and blood transfusion. Although many of the procedures in this manual require specialized equipment and the expertise of specially trained providers, it should be noted that many of the life-saving procedures described can also be performed at health centres.

A woman presenting with a life-threatening obstetric complication is in an emergency situation requiring immediate diagnosis and management. Therefore, the main text of the manual is arranged by **symptom** (e.g. vaginal bleeding in early pregnancy). Because this symptom-based approach is different than most medical texts which are arranged by disease, a list of diagnoses with the page number of the corresponding diagnosis table is provided.

The emphasis of the manual is on rapid assessment and decision making. The clinical action steps are based on clinical assessment with limited reliance on laboratory or other tests and most are possible in a variety of clinical settings (e.g. district hospital or health centre).

Section 1 outlines the **clinical principles** of managing complications in pregnancy and childbirth and begins with a table that the health care worker can use to rapidly assess the woman's condition and initiate appropriate treatment. This section includes the general principles of emergency, general and operative care, including infection prevention, the use of blood and replacement fluids, antibiotics and anaesthesia and analgesia. A description of normal labour and childbirth, including use of the partograph and active management of the third stage, is included in this section in order to provide the health care worker the information needed to differentiate between the normal process and a complication. Guidance on the initial care of the normal newborn is also provided. Section 1 also includes information on providing emotional support to the woman and her family and outlines the linkage between the providers and their community.

Section 2 describes the **symptoms** by which women with complications of pregnancy and childbirth present. The symptoms reflect the major causes of mortality and morbidity. For each symptom there is a statement of general, initial management. Diagnosis tables then lead to identifying the diagnosis which is causing the symptom. Simplified management protocols for these specific diagnoses then follow. Where there are several choices of therapy, the most effective and inexpensive is chosen. Also in this section is information on management for immediate (within the first 24 hours) conditions or problems of the newborn.

Section 3 describes the **procedures** that may be necessary in the management of the condition. These procedures are not intended to be detailed "how-to" instructions but rather a summary of the main steps associated with each procedure. Because general operative care principles are summarized in Section 1, these are not repeated for each

procedure, unless there is care required specific to the procedure (e.g. post-procedure care for ketamine anaesthesia). Clear guidance is provided on drugs and dosages, a wide variety of anaesthesia options (e.g. safe caesarean section under local anaesthesia) and safe, effective and lower cost techniques (e.g. single layer closure of the uterus).

Section 4 contains a list of **essential drugs** and an **index**. The index is organized so that it can be used in an emergency situation to find relevant material quickly. The most critical information including diagnosis, management and steps for a procedure are listed first in bold. Other relevant entries follow in alphabetical order. Only the pages containing critical or relevant information are included, rather than listing every page that contains the word or phrase.

ABBREVIATIONS

AIDS	Acquired immunodeficiency syndrome
APH	Antepartum haemorrhage
BP	Blood pressure
HIV	Human immunodeficiency virus
IM	Intramuscular
IP	Infection prevention
IUD	Intrauterine device
IV	Intravenous
PID	Pelvic inflammatory disease
PPH	Postpartum haemorrhage
STD	Sexually transmitted disease

dL	decilitre
g	gram
kg	kilogram
L	litre
mcg	microgram
mg	milligram
mL	millilitre

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SECTION 1

CLINICAL PRINCIPLES

RAPID INITIAL ASSESSMENT

When a woman of childbearing age presents with a problem, rapidly assess her condition to determine her degree of illness.

TABLE C-1 Rapid initial assessment[a]

Assess	Danger Signs	Consider
Airway and breathing	**LOOK FOR**: • cyanosis (blueness) • respiratory distress **EXAMINE**: • skin: pallor • lungs: wheezing or rales	• severe anaemia • heart failure • pneumonia • asthma See **Difficulty in breathing, page S-125**
Circulation (signs of shock)	**EXAMINE**: • skin: cool and clammy • pulse: fast (110 or more) and weak • blood pressure: low (systolic less than 90 mm Hg)	**Shock, page S-1**
Vaginal bleeding (early or late pregnancy or after childbirth)	**ASK IF**: • pregnant, length of gestation • recently given birth • placenta delivered **EXAMINE**: • vulva: amount of bleeding, placenta retained, obvious tears • uterus: atony • bladder: full **DO NOT DO A VAGINAL EXAM AT THIS STAGE**	• abortion • ectopic pregnancy • molar pregnancy See **Vaginal bleeding in early pregnancy**, **page S-7** • abruptio placentae • ruptured uterus • placenta praevia See **Vaginal bleeding in later pregnancy and labour**, **page S-17** • atonic uterus • tears of cervix and vagina • retained placenta • inverted uterus See **Vaginal bleeding after childbirth, page S-25**

Unconscious or convulsing	**ASK IF**: • pregnant, length of gestation **EXAMINE**: • blood pressure: high (diastolic 90 mm Hg or more) • temperature: 38°C or more	• eclampsia • malaria • epilepsy • tetanus See **Convulsions or loss of consciousness**, **page S-35**

[a] This list does not include all the possible problems that a woman may face in a pregnancy or the puerperal period. It is meant to identify those problems that put the woman at greater risk of maternal morbidity and mortality.

TABLE C-1 Cont. Rapid initial assessment

Assess	Danger Signs	Consider
Dangerous fever	**ASK IF**: • weak, lethargic • frequent, painful urination	• urinary tract infection • malaria See **Fever during pregnancy and labour**, **page S-99**
	EXAMINE: • temperature: 38°C or more • unconscious • neck: stiffness • lungs: shallow breathing, consolidation • abdomen: severe tenderness • vulva: purulent discharge • breasts: tender	• metritis • pelvic abscess • peritonitis • breast infection See **Fever after childbirth, page S-107**
		• complications of abortion See **Vaginal bleeding in early pregnancy, page S-7**
		• pneumonia See **Difficulty in breathing, page S-123**

Abdominal pain	**ASK IF**: • pregnant, length of gestation **EXAMINE**: • blood pressure: low (systolic less than 90 mm Hg) • pulse: fast (110 or more) • temperature: 38°C or more • uterus: state of pregnancy	• ovarian cyst • appendicitis • ectopic pregnancy See **Abdominal pain in early pregnancy, page S-115** • possible term or preterm labour • amnionitis • abruptio placentae • ruptured uterus See **Abdominal pain in later pregnancy and after childbirth, page S-119**

The woman also needs **prompt attention** if she has any of the following signs:

- blood-stained mucus discharge (show) with palpable contractions;
- ruptured membranes;
- pallor;
- weakness;
- fainting;
- severe headaches;
- blurred vision;
- vomiting;
- fever;
- respiratory distress.

The woman should be sent to the front of the queue and promptly treated.

IMPLEMENTING A RAPID INITIAL ASSESSMENT SCHEME

Rapid initiation of treatment requires immediate recognition of the specific problem and quick action. This can be done by:

- training all staff—including clerks, guards, door-keepers or switchboard operators—to react in an agreed upon fashion ("sound the alarm", call for help) when a woman arrives at the facility with an obstetric emergency or pregnancy complication or when the facility is notified that a woman is being referred;
- clinical or emergency drills with staff to ensure their readiness at all levels;
- ensuring that access is not blocked (keys are available) and equipment is in working order (daily checks) and staff are properly trained to use it;
- having norms and protocols (and knowing how to use them) to recognize a genuine emergency and know how to react immediately;
- clearly identifying which women in the waiting room—even those waiting for routine consultations—warrant prompt or immediate attention from the health worker and should therefore pass to the front of the queue (agreeing that women in labour or pregnant women who have any of the problems noted in **Table C-1** should immediately be seen by a health worker);
- agreeing on schemes by which women with emergencies can be exempted from payment, at least temporarily (local insurance schemes, health committee emergency funds).

TALKING WITH WOMEN AND THEIR FAMILIES

Pregnancy is typically a time of joy and anticipation. It can also be a time of anxiety and concern. Talking effectively with a woman and her family can help build the woman's trust and confidence in her health care providers.

Women who develop complications may have difficulty talking to the provider and explaining their problem. It is the responsibility of the entire health care team to speak with the woman respectfully and put her at ease. Focusing on the woman means that the health care provider and staff:

- respect the woman's dignity and right to privacy;
- are sensitive and responsive to the woman's needs;
- are non-judgmental about the decisions that the woman and her family have made thus far regarding her care.

It is understandable to disagree with a woman's risky behaviour or a decision which has resulted in a delay in seeking care. It is **not acceptable**, however, to show disrespect for a woman or disregard for a medical condition that is a result of her behaviour. Provide corrective counselling after the complication has been dealt with, not before or during management of the problem.

RIGHTS OF WOMEN

Providers should be aware of the rights of women when receiving maternity care services:

- Every woman receiving care has a right to information about her health.
- Every woman has the right to discuss her concerns in an environment in which she feels confident.
- A woman should know in advance the type of procedure that is going to be performed.
- Procedures should be conducted in an environment (e.g. labour ward) in which the woman's right to privacy is respected.
- A woman should be made to feel as comfortable as possible when receiving services.
- The woman has a right to express her views about the service she receives.

When a provider talks to a woman about her pregnancy or a complication, s/he should use basic communication techniques. These techniques help the provider establish an honest, caring and trusting relationship with the woman. If a woman trusts the provider and feels that s/he has the best interests of the woman at heart, she will be more likely to return to the facility for delivery or come early if there is a complication.

COMMUNICATION TECHNIQUES

Speak in a calm, quiet manner and assure the woman that the conversation is confidential. Be sensitive to any cultural or religious considerations and respect her views. In addition, providers should:

- Encourage the woman and her family to speak honestly and completely about events surrounding the complication.
- Listen to what the woman and her family have to say and encourage them to express their concerns; try not to interrupt.
- Respect the woman's sense of privacy and modesty by closing the door or drawing curtains around the examination table.
- Let the woman know that she is being listened to and understood.
- Use supportive nonverbal communication such as nodding and smiling.
- Answer the woman's questions directly in a calm, reassuring manner.
- Explain what steps will be taken to manage the situation or complication.
- Ask the woman to repeat back to you the key points to assure her understanding.

If a **woman must undergo a surgical procedure**, explain to her the nature of the procedure and its risks and help to reduce her anxiety. Women who are extremely anxious have a more difficult time during surgery and recovery.

For more information on providing emotional support during an emergency, see **page C-7**.

EMOTIONAL AND PSYCHOLOGICAL SUPPORT

Emergency situations are often very disturbing for all concerned and evoke a range of emotions that can have significant consequences.

EMOTIONAL AND PSYCHOLOGICAL REACTIONS

How each member of the family reacts to an emergency situation depends on the:

- marital status of the woman and her relationship with her partner;
- social situation of the woman/couple and their cultural and religious practices, beliefs and expectations;
- personalities of the people involved and the quality and nature of social, practical and emotional support;
- nature, gravity and prognosis of the problem and the availability and quality of the health care services.

Common reactions to obstetric emergencies or death include:

- denial (feelings of “it can’t be true”);
- guilt regarding possible responsibility;
- anger (frequently directed towards health care staff but often masking anger that parents direct at themselves for “failure”);
- bargaining (particularly if the patient hovers for a while between life and death);
- depression and loss of self-esteem, which may be long-lasting;
- isolation (feelings of being different or separate from others), which may be reinforced by care givers who may avoid people who experience loss;
- disorientation.

GENERAL PRINCIPLES OF COMMUNICATION AND SUPPORT

While each emergency situation is unique, the following general principles offer guidance. Communication and genuine empathy are probably the most important keys to effective care in such situations.

AT THE TIME OF THE EVENT

- Listen to those who are distressed. The woman/family will need to discuss their hurt and sorrow.
- Do not change the subject and move on to easier or less painful topics of conversation. Show empathy.
- Tell the woman/family as much as you can about what is happening. Understanding the situation and its management can reduce their anxiety and prepare them for what happens next.
- Be honest. Do not hesitate to admit what you do not know. Maintaining trust matters more than appearing knowledgeable.
- If language is a barrier to communication, find a translator.
- Do not pass the problem on to nursing staff or junior doctors.
- Ensure that the woman has a companion of her choice and, where possible, the same care giver throughout labour and delivery. Supportive companionship can enable a woman to face fear and pain, while reducing loneliness and distress.
- Where possible, encourage companions to take an active role in care. Position the companion at the top of the bed to allow the companion to focus on caring for the woman's emotional needs.
- Both during and after the event, provide as much privacy as possible for the woman and her family.

AFTER THE EVENT

- Give practical assistance, information and emotional support.
- Respect traditional beliefs and customs and accommodate the family's needs as far as possible.
- Provide counselling for the woman/family and allow for reflection on the event.
- Explain the problem to help reduce anxiety and guilt. Many women/families blame themselves for what has happened.
- Listen and express understanding and acceptance of the woman's feelings. Nonverbal communication may speak louder than words: a squeeze of the hand or a look of concern can say an enormous amount.

- Repeat information several times and give written information, if possible. People experiencing an emergency will not remember much of what is said to them.
- Health care providers may feel anger, guilt, sorrow, pain and frustration in the face of obstetric emergencies that may lead them to avoid the woman/family. Showing emotion is not a weakness.
- Remember to care for staff who themselves may experience guilt, grief, confusion and other emotions.

MATERNAL MORTALITY AND MORBIDITY

MATERNAL MORTALITY

Death of a woman in childbirth or from pregnancy-related events is a devastating experience for the family and for surviving children. In addition to the principles listed above, remember the following:

AT THE TIME OF THE EVENT

- Provide psychological care as long as the woman is awake or even vaguely aware of what is or might be happening to her.
- If death is inevitable, provide emotional and spiritual comfort rather than focusing on the emergency (now futile) medical care.
- Provide dignity and respectful treatment at all times, even if the woman is unconscious or has already died.

AFTER THE EVENT

- Allow the woman's partner or family to be with her.
- Facilitate the family's arrangements for the funeral, if possible, and see that they have all the necessary documents.
- Explain what happened and answer any questions. Offer the opportunity for the family to return to ask additional questions.

SEVERE MATERNAL MORBIDITY

Childbirth sometimes leaves a woman with severe physical or psychological damage.

AT THE TIME OF THE EVENT

- Include the woman and her family in the proceedings of the delivery if possible, particularly if this is culturally appropriate.
- Ensure that a staff member cares for the emotional and informational needs of the woman and her partner, if possible.

AFTER THE EVENT

- Clearly explain the condition and its treatment so that it is understood by the woman and her companions.
- Arrange for treatment and/or referral, when indicated.
- Schedule a follow-up visit to check on progress and discuss available options.

NEONATAL MORTALITY OR MORBIDITY

While general principles of emotional support for women experiencing obstetrical emergencies apply, when a baby dies or is born with an abnormality some specific factors should be considered.

INTRAUTERINE DEATH OR STILLBIRTH

Many factors will influence the woman's reaction to the death of her baby. These include those mentioned above as well as:

- the woman's previous obstetric and life history;
- the extent to which the baby was "wanted";
- the events surrounding the birth and the cause of the loss;
- previous experiences with death.

AT THE TIME OF THE EVENT

- Avoid using sedation to help the woman cope. Sedation may delay acceptance of the death and may make reliving the experience later—part of the process of emotional healing—more difficult.
- Allow the parents to see the efforts made by the care givers to revive their baby.

- Encourage the woman/couple to see and hold the baby to facilitate grieving.
- Prepare the parents for the possibly disturbing or unexpected appearance of the baby (red, wrinkled, peeling skin). If necessary, wrap the baby so that it looks as normal as possible at first glance.
- Avoid separating the woman and baby too soon (before she indicates she is ready), as this can interfere with and delay the grieving process.

AFTER THE EVENT

- Allow the woman/family to continue to spend time with the baby. Parents of a stillborn still need to get to know their baby.
- People grieve in different ways, but for many remembrance is important. Offer the woman/family small mementos such as a lock of hair, a cot label or a name tag.
- Where it is the custom to name babies at birth, encourage the woman/family to call their baby by the name they have chosen.
- Allow the woman/family to prepare the baby for its funeral if they wish.
- Encourage locally-accepted burial practices and ensure that medical procedures (such as autopsies) do not preclude them.
- Arrange a discussion with both the woman and her partner to discuss the event and possible preventive measures for the future.

DESTRUCTIVE OPERATIONS

Craniotomy or other destructive operations on the dead fetus may be distressing and call for additional psychosocial care.

AT THE TIME OF THE EVENT

- It is crucial that you explain to the mother and her family that the baby is dead and that the priority is to save the mother.
- Encourage the partner to provide support and comfort for the mother until she is anaesthetized or sedated.
- If the mother is awake or partially awake during the procedure, protect her from visual exposure to the procedure and to the baby.

- After the intervention, arrange the baby so it can be seen and/or held by the woman/family if they wish, especially if the family is going to take care of the dead baby for burial.

AFTER THE EVENT

- Allow unlimited visiting time for the woman's companion.
- Counsel the mother and her companion and reassure them that an alternative was not available.
- Arrange a follow-up visit several weeks after the event to answer any questions and to prepare the woman for a subsequent pregnancy (or the inability/inadvisability of another pregnancy).
- Family planning should be provided, if appropriate (**Table S-3, page S-13**).

BIRTH OF A BABY WITH AN ABNORMALITY

The birth of a baby with a malformation is a devastating experience for the parents and family. Reactions may vary.

- Allow the woman to see and hold the baby. Some women accept their baby immediately while others may take longer.
- Disbelief, denial and sadness are normal reactions, especially if the abnormality is unpredicted. Feelings of unfairness, despair, depression, anxiety, anger, failure and apprehension are common.

AT THE TIME OF THE EVENT

- Give the baby to the parents at delivery. Allowing the parents to see the problem immediately may be less traumatic.
- In cases of severe deformity, wrap the baby before giving it to the mother to hold so that she can see the normality of the baby first. Do not force the mother to examine the abnormality.
- Provide a bed or cot in the room so the companion can stay with the woman if she chooses.

AFTER THE EVENT

- Discuss the baby and its problem with the woman and her family together, if possible.
- Allow the woman and her partner free access to their baby. Keep the baby with its mother at all times. The more the woman and her partner can do for the baby themselves, the more quickly they will accept the baby as their own.

- Ensure access to supportive professional individuals and groups.

PSYCHOLOGICAL MORBIDITY

Postpartum emotional distress is fairly common after pregnancy and ranges from mild postpartum blues (affecting about 80% of women), to postpartum depression or psychosis. Postpartum psychosis can pose a threat to the life of the mother or baby.

POSTPARTUM DEPRESSION

Postpartum depression affects up to 34% of women and typically occurs in the early postpartum weeks or months and may persist for a year or more. Depression is not necessarily one of the leading symptoms although it is usually evident. Other symptoms include exhaustion, irritability, weepiness, low energy and motivational levels, feelings of helplessness and hopelessness, loss of libido and appetite and sleep disturbances. Headache, asthma, backache, vaginal discharge and abdominal pain may be reported. Symptoms may include obsessional thinking, fear of harming the baby or self, suicidal thoughts and depersonalization.

The prognosis for postpartum depression is good with early diagnosis and treatment. More than two-thirds of women recover within a year. Providing a companion during labour may prevent postpartum depression.

Once established, postpartum depression requires psychological counselling and practical assistance. In general:

- Provide psychological support and practical help (with the baby and with home care).
- Listen to the woman and provide encouragement and support.
- Assure the woman that the experience is fairly common and that many other women experience the same thing.
- Assist the mother to rethink the image of motherhood and assist the couple to think through their respective roles as new parents. They may need to adjust their expectations and activities.
- If depression is severe, consider antidepressant drugs, if available. Be aware that medication can be passed through breastmilk and that breastfeeding should be reassessed.

Care can be home-based or can be offered through day-care clinics. Local support groups of women who have had similar experiences are most valuable.

POSTPARTUM PSYCHOSIS

Postpartum psychosis typically occurs around the time of delivery and affects less than 1% of women. The cause is unknown, although about half of the women experiencing psychosis also have a history of mental illness. Postpartum psychosis is characterized by abrupt onset of delusions or hallucinations, insomnia, a preoccupation with the baby, severe depression, anxiety, despair and suicidal or infanticidal impulses.

Care of the baby can sometimes continue as usual. Prognosis for recovery is excellent but about 50% of women will suffer a relapse with subsequent deliveries. In general:

- Provide psychological support and practical help (with the baby as well as with home care).
- Listen to the woman and provide support and encouragement. This is important for avoiding tragic outcomes.
- Lessen stress.
- Avoid dealing with emotional issues when the mother is unstable.
- If antipsychotic drugs are used, be aware that medication can be passed through breastmilk and that breastfeeding should be reassessed.

EMERGENCIES

Emergencies can happen suddenly, as with a convulsion, or they can develop as a result of a complication that is not properly managed or monitored.

PREVENTING EMERGENCIES

Most emergencies can be prevented by:

- careful planning;
- following clinical guidelines;
- close monitoring of the woman.

RESPONDING TO AN EMERGENCY

Responding to an emergency promptly and effectively requires that members of the clinical team know their roles and how the team should function to respond most effectively to emergencies. Team members should also know:

- clinical situations and their diagnoses and treatments;
- drugs and their use, administration and side effects;
- emergency equipment and how it functions.

The ability of a facility to deal with emergencies should be assessed and reinforced by frequent practice emergency drills.

INITIAL MANAGEMENT

In managing an emergency:

- Stay calm. Think logically and focus on the needs of the woman.
- Do not leave the woman unattended.
- Take charge. Avoid confusion by having one person in charge.
- **SHOUT FOR HELP.** Have one person go for help and have another person gather emergency equipment and supplies (e.g. oxygen cylinder, emergency kit).

- If the **woman is unconscious**, assess the airway, breathing and circulation.
- If **shock is suspected**, immediately begin treatment (**page S-1**). Even if signs of shock are not present, keep shock in mind as you evaluate the woman further because her status may worsen rapidly. If **shock develops**, it is important to begin treatment immediately.
- Position the woman lying down on her left side with her feet elevated. Loosen tight clothing.
- Talk to the woman and help her to stay calm. Ask what happened and what symptoms she is experiencing.
- Perform a quick examination including vital signs (blood pressure, pulse, respiration, temperature) and skin colour. Estimate the amount of blood lost and assess symptoms and signs.

INFECTION PREVENTION

- Infection prevention (IP) has two primary objectives:
  - prevent major infections when providing services;
  - minimize the risk of transmitting serious diseases such as hepatitis B and HIV/AIDS to the woman and to service providers and staff, including cleaning and housekeeping personnel.
- The recommended IP practices are based on the following principles:
  - Every person (patient or staff) must be considered potentially infectious;
  - Handwashing is the most practical procedure for preventing cross-contamination;
  - Wear gloves before touching anything wet—broken skin, mucous membranes, blood or other body fluids (secretions or excretions);
  - Use barriers (protective goggles, face masks or aprons) if splashes and spills of any body fluids (secretions or excretions) are anticipated;
  - Use safe work practices, such as not recapping or bending needles, proper instrument processing and proper disposal of medical waste.

HANDWASHING

- Vigorously rub together all surfaces of the hands lathered with plain or antimicrobial soap. Wash for 15–30 seconds and rinse with a stream of running or poured water.
- Wash hands:
  - before and after examining the woman (or having any direct contact);
  - after exposure to blood or any body fluids (secretions or excretions), even if gloves were worn;

- after removing gloves because the gloves may have holes in them.

- To encourage handwashing, programme managers should make every effort to provide soap and a continuous supply of clean water, either from the tap or a bucket, and single-use towels. Do not use shared towels to dry hands.
- To wash hands for surgical procedures, see **page C-48**.

GLOVES AND GOWNS

- Wear gloves:
  - when performing a procedure (**Table C-2, page C-19**);
  - when handling soiled instruments, gloves and other items;
  - when disposing of contaminated waste items (cotton, gauze or dressings).
- A separate pair of gloves must be used for each woman to avoid cross-contamination.
- Disposable gloves are preferred, but where resources are limited, surgical gloves can be reused if they are:
  - decontaminated by soaking in 0.5% chlorine solution for 10 minutes;
  - washed and rinsed;
  - sterilized by autoclaving (eliminates all microorganisms) or high-level disinfected by steaming or boiling (eliminates all microorganisms except some bacterial endospores).

  Note: If single-use disposable surgical gloves are reused, they should not be processed more than three times because invisible tears may occur.

Do not use gloves that are cracked, peeling or have detectable holes or tears.

- A clean, but not necessarily sterile, gown should be worn during all delivery procedures:
  - If the gown has long sleeves, the gloves should be put over the gown sleeve to avoid contamination of the gloves;

- Ensure that gloved hands (high-level disinfected or sterile) are held above the level of the waist and do not come into contact with the gown.

TABLE C-2 Glove and gown requirements for common obstetric procedures

Procedure	Preferred Gloves[a]	Alternative Gloves[b]	Gown
Blood drawing, starting IV infusion	Exam[c]	High-level disinfected surgical[d]	None
Pelvic examination	Exam	High-level disinfected surgical	None
Manual vacuum aspiration, dilatation and curettage, colpotomy, repair of cervical or perineal tears	High-level disinfected surgical	Sterile surgical	None
Laparotomy, caesarean section, hysterectomy, repair of ruptured uterus, salpingectomy, uterine artery ligation, delivery, bimanual compression of uterus, manual removal of placenta, correcting uterine inversion, instrumental delivery	Sterile surgical	High-level disinfected surgical	Clean, high-level disinfected or sterile
Handling and cleaning instruments	Utility[e]	Exam or surgical	None
Handling contaminated waste	Utility	Exam or surgical	None
Cleaning blood or body fluid spills	Utility	Exam or surgical	None

[a] Gloves and gowns are not required to be worn to check blood pressure or temperature, or to give injections.
[b] Alternative gloves are generally more expensive and require more preparation than preferred gloves.
[c] Exam gloves are single-use disposable latex gloves. If gloves are reusable, they should be decontaminated, cleaned and either sterilized or high-level disinfected before use.
[d] Surgical gloves are latex gloves that are sized to fit the hand.
[e] Utility gloves are thick household gloves.

HANDLING SHARP INSTRUMENTS AND NEEDLES

OPERATING THEATRE AND LABOUR WARD

- Do not leave sharp instruments or needles ("sharps") in places other than "safe zones" (**page C-51**).
- Tell other workers before passing sharps.

HYPODERMIC NEEDLES AND SYRINGES

- Use each needle and syringe only once.
- Do not disassemble needle and syringe after use.
- Do not recap, bend or break needles prior to disposal.
- Dispose of needles and syringes in a puncture-proof container.
- Make hypodermic needles unusable by burning them.

Note: Where disposable needles are not available and recapping is practiced, use the "one-handed" recap method:

- Place the cap on a hard, flat surface;
- Hold the syringe with one hand and use the needle to "scoop up" the cap;
- When the cap covers the needle completely, hold the base of the needle and use the other hand to secure the cap.

WASTE DISPOSAL

- The purpose of waste disposal is to:
  - prevent the spread of infection to hospital personnel who handle the waste;
  - prevent the spread of infection to the local community;
  - protect those who handle waste from accidental injury.
- Noncontaminated waste (e.g. paper from offices, boxes) poses no infectious risk and can be disposed of according to local guidelines.
- Proper handling of contaminated waste (blood- or body fluid-contaminated items) is required to minimize the spread of infection to hospital personnel and the community. Proper handling means:

- wearing utility gloves;
- transporting solid contaminated waste to the disposal site in covered containers;
- disposing of all sharp items in puncture-resistant containers;
- carefully pouring liquid waste down a drain or flushable toilet;
- burning or burying contaminated solid waste;
- washing hands, gloves and containers after disposal of infectious waste.

STARTING AN IV INFUSION

- Start an IV infusion (two if the woman is in shock) using a large-bore (16-gauge or largest available) cannula or needle.
- Infuse IV fluids (normal saline or Ringer's lactate) at a rate appropriate for the woman's condition.

  Note: If the **woman is in shock**, avoid using plasma substitutes (e.g. dextran). There is no evidence that plasma substitutes are superior to normal saline in the resuscitation of a shocked woman and dextran can be harmful in large doses.
- If a **peripheral vein cannot be cannulated**, perform a venous cut-down (**Fig S-1, page S-3**).

BASIC PRINCIPLES FOR PROCEDURES

Before any simple (nonoperative) procedure, it is necessary to:

- Gather and prepare all supplies. Missing supplies can disrupt a procedure.
- Explain the procedure and the need for it to the woman and obtain consent.
- Provide adequate pain medication according to the extent of the procedure planned. Estimate the length of time for the procedure and provide pain medication accordingly (**page C-37**).
- Place the patient in a position appropriate for the procedure being performed. The most common position used for obstetric procedures is the lithotomy position (**Fig C-1, page C-22**).

FIGURE C-1 The lithotomy position

- Wash hands with soap and water (**page C-17**) and put on gloves appropriate for the procedure (**Table C-2, page C-19**).
- If the **vagina and cervix need to be prepared with an antiseptic** for the procedure (e.g. manual vacuum aspiration):
  - Wash the woman's lower abdomen and perineal area with soap and water, if necessary;
  - Gently insert a high-level disinfected or sterile speculum or retractor(s) into the vagina;
  - Apply antiseptic solution (e.g. iodophors, chlorhexidine) three times to the vagina and cervix using a high-level disinfected or sterile ring forceps and a cotton or gauze swab.
- If the **skin needs to be prepared with an antiseptic** for the procedure (e.g. symphysiotomy):
  - Wash the area with soap and water, if necessary;
  - Apply antiseptic solution (e.g. iodophors, chlorhexidine) three times to the area using a high-level disinfected or sterile ring forceps and a cotton or gauze swab. If the swab is held with a gloved hand, care must be taken not to contaminate the glove by touching unprepared skin;
  - Begin at the centre of the area and work outward in a circular motion away from the area;
  - At the edge of the sterile field discard the swab.

- Never go back to the middle of the prepared area with the same swab. Keep your arms and elbows high and surgical dress away from the surgical field.

CLINICAL USE OF BLOOD, BLOOD PRODUCTS AND REPLACEMENT FLUIDS

Obstetric care may require blood transfusions. It is important to use blood, blood products and replacement fluids appropriately and to be aware of the principles designed to assist health workers in deciding when (and when not) to transfuse.

The appropriate use of blood products is defined as the transfusion of safe blood products to treat a condition leading to significant morbidity or mortality that cannot be prevented or managed effectively by other means.

Conditions that may require blood transfusion include:

- postpartum haemorrhage leading to shock;
- loss of a large volume of blood at operative delivery;
- severe anaemia, especially in later pregnancy or if accompanied by cardiac failure.

  Note: For anaemia in early pregnancy, treat the cause of anaemia and provide haematinics.

District hospitals should be prepared for the urgent need for blood transfusion. It is mandatory for obstetric units to keep stored blood available, especially type O negative blood and fresh frozen plasma, as these can be life-saving.

UNNECESSARY USE OF BLOOD PRODUCTS

Used correctly, blood transfusion can save lives and improve health. As with any therapeutic intervention it may, however, result in acute or delayed complications and it carries the risk of transmission of infectious agents. It is also expensive and uses scarce resources.

- Transfusion is often unnecessary because:
  - Conditions that may eventually require transfusion can often be prevented by early treatment or prevention programmes.
  - Transfusions of whole blood, red cells or plasma are often given to prepare a woman quickly for planned surgery, or to allow earlier discharge from the hospital. Other treatments, such as the infusion of IV fluids, are often cheaper, safer and equally effective (**page C-30**).

- Unnecessary transfusion can:
  - expose the woman to unnecessary risks;
  - cause a shortage of blood products for women in real need. Blood is an expensive, scarce resource.

RISKS OF TRANSFUSION

Before prescribing blood or blood products for a woman, it is essential to consider the risks of transfusing against the risks of not transfusing.

WHOLE BLOOD OR RED CELL TRANSFUSION

- The transfusion of red cell products carries a risk of incompatible transfusion and serious haemolytic transfusion reactions.
- Blood products can transmit infectious agents—including HIV, hepatitis B, hepatitis C, syphilis, malaria and Chagas disease—to the recipient.
- Any blood product can become bacterially contaminated and very dangerous if it is manufactured or stored incorrectly.

PLASMA TRANSFUSION

- Plasma can transmit most of the infections present in whole blood.
- Plasma can also cause transfusion reactions.
- There are very few clear indications for plasma transfusion (e.g. coagulopathy) and the risks very often outweigh any possible benefit to the woman.

BLOOD SAFETY

- The risks associated with transfusion can be reduced by:
  - effective blood donor selection, deferral and exclusion;
  - screening for transfusion-transmissible infections in the blood donor population (e.g. HIV/AIDS and hepatitis);
  - quality assurance programmes;

- high quality blood grouping, compatibility testing, component separation and storage and transportation of blood products;
- appropriate clinical use of blood and blood products.

SCREENING FOR INFECTIOUS AGENTS

- Every unit of donated blood should be screened for transfusion-transmissible infections using the most appropriate and effective tests, in accordance with both national policies and the prevalence of infectious agents in the potential blood donor population.
- All donated blood should be screened for the following:
  - HIV-1 and HIV-2;
  - Hepatitis B surface antigen (HBsAg);
  - *Treponema pallidum* antibody (syphilis).
- Where possible, all donated blood should also be screened for:
  - Hepatitis C;
  - Chagas disease, in countries where the seroprevalence is significant;
  - Malaria, in low-prevalence countries when donors have travelled to malarial areas. In areas with a high prevalence of malaria, blood transfusion should be accompanied by prophylactic antimalarials.
- No blood or blood product should be released for transfusion until all nationally required tests are shown to be negative.
- Perform compatibility tests on all blood components transfused even if, in life-threatening emergencies, the tests are performed after the blood products have been issued.

Blood that has not been obtained from appropriately selected donors and that has not been screened for transfusion-transmissible infectious agents (e.g. HIV, hepatitis), in accordance with national requirements, should not be issued for transfusion, other than in the most exceptional life-threatening situations.

PRINCIPLES OF CLINICAL TRANSFUSION

The fundamental principle of the appropriate use of blood or blood product is that transfusion is only one element of the woman's management. When there is sudden rapid loss of blood due to haemorrhage, surgery or complications of childbirth, the most urgent need is usually the rapid replacement of the fluid lost from circulation. Transfusion of red cells may also be vital to restore the oxygen-carrying capacity of the blood.

Minimize "wastage" of a woman's blood (to reduce the need for transfusion) by:

- using replacement fluids for resuscitation;
- minimizing the blood taken for laboratory use;
- using the best anaesthetic and surgical techniques to minimize blood loss during surgery;
- salvaging and reinfusing surgical blood lost during procedures (autotransfusion), where appropriate (**page S-14**).

Principles to remember:

- Transfusion is only one element of managing a woman.
- Decisions about prescribing a transfusion should be based on national guidelines on the clinical use of blood, taking the woman's needs into account.
- Blood loss should be minimized to reduce the woman's need for transfusion.
- The woman with acute blood loss should receive effective resuscitation (IV replacement fluids, oxygen, etc.) while the need for transfusion is being assessed.
- The woman's haemoglobin value, although important, should not be the sole deciding factor in starting the transfusion. The decision to transfuse should be supported by the need to relieve clinical signs and symptoms and prevent significant morbidity and mortality.
- The clinician should be aware of the risks of transfusion-transmissible infection in blood products that are available.
- Transfusion should be prescribed only when the benefits to the woman are likely to outweigh the risks.
- A trained person should monitor the transfused woman and respond immediately if any adverse effects occur (**page C-27**).

- The clinician should record the reason for transfusion and investigate any adverse effects (**page C-28**).

PRESCRIBING BLOOD

Prescribing decisions should be based on national guidelines on the clinical use of blood, taking the woman's needs into account.

- Before prescribing blood or blood products for a woman, keep in mind the following:
  - expected improvement in the woman's clinical condition;
  - methods to minimize blood loss to reduce the woman's need for transfusion;
  - alternative treatments that may be given, including IV replacement fluids or oxygen, before making the decision to transfuse;
  - specific clinical or laboratory indications for transfusion;
  - risks of transmitting HIV, hepatitis, syphilis or other infectious agents through the blood products that are available;
  - benefits of transfusion versus risk for the particular woman;
  - other treatment options if blood is not available in time;
  - need for a trained person to monitor the woman and immediately respond if a transfusion reaction occurs.
- Finally, if in doubt, ask yourself the following question:
  - If this blood was for myself or my child, would I accept the transfusion in these circumstances?

MONITORING THE TRANSFUSED WOMAN

For each unit of blood transfused, monitor the woman at the following stages:

- before starting the transfusion;
- at the onset of the transfusion;
- 15 minutes after starting the transfusion;
- at least every hour during the transfusion;
- at 4 hour intervals after completing the transfusion.

Closely monitor the woman during the first 15 minutes of the transfusion and regularly thereafter to detect early symptoms and signs of adverse effects.

At each of these stages, record the following information on the woman's chart:

- general appearance;
- temperature;
- pulse;
- blood pressure;
- respiration;
- fluid balance (oral and IV fluid intake, urinary output).

In addition, record:

- the time the transfusion is started;
- the time the transfusion is completed;
- the volume and type of all products transfused;
- the unique donation numbers of all products transfused;
- any adverse effects.

RESPONDING TO A TRANSFUSION REACTION

Transfusion reactions may range from a minor skin rash to anaphylactic shock. Stop the transfusion and keep the IV line open with IV fluids (normal saline or Ringer's lactate) while making an initial assessment of the acute transfusion reaction and seeking advice. If the **reaction is minor**, give promethazine 10 mg by mouth and observe.

MANAGING ANAPHYLACTIC SHOCK FROM MISMATCHED BLOOD TRANSFUSION

- Manage as for shock (**page S-1**) and give:
  - adrenaline 1:1 000 solution (0.1 mL in 10 mL IV normal saline or Ringer's lactate) IV slowly;

- promethazine 10 mg IV;
- hydrocortisone 1 g IV every 2 hours as needed.

- If **bronchospasm occurs**, give aminophylline 250 mg in normal saline or Ringer's lactate 10 mL IV slowly.
- Combine resuscitation measures above until stabilized.
- Monitor renal, pulmonary and cardiovascular functions.
- Transfer to referral centre when stable.

DOCUMENTING A TRANSFUSION REACTION

- Immediately after the reaction occurs, take the following samples and send with a request form to the blood bank for laboratory investigations.
  - immediate post-transfusion blood samples:
    - 1 clotted;
    - 1 anticoagulated (EDTA/sequestrene) from the vein opposite the infusion site;
  - the blood unit and giving set containing red cell and plasma residues from the transfused donor blood;
  - the first specimen of the woman's urine following the reaction.
- If **septic shock is suspected due to a contaminated blood unit**, take a blood culture in a special blood culture bottle.
- Complete a transfusion reaction report form.
- After the initial investigation of the transfusion reaction, send the following to the blood bank for laboratory investigations:
  - blood samples at 12 hours and 24 hours after the start of the reaction:
    - 1 clotted;
    - 1 anticoagulated (EDTA/sequestrene) taken from the vein opposite the infusion site;
  - all urine for at least 24 hours after the start of the reaction.
- Immediately report all acute transfusion reactions, with the exception of mild skin rashes, to a medical officer and to the blood bank that supplied the blood.

- Record the following information on the woman's chart:
  - type of transfusion reaction;
  - length of time after the start of transfusion that the reaction occurred;
  - volume and type of blood products transfused;
  - unique donation numbers of all products transfused.

REPLACEMENT FLUIDS: SIMPLE ALTERNATIVES TO TRANSFUSION

Only normal saline (sodium chloride 0.9%) or balanced salt solutions that have a similar concentration of sodium to plasma are effective replacement fluids. These should be available in all hospitals where IV replacement fluids are used.

Replacement fluids are used to replace abnormal losses of blood, plasma or other extracellular fluids by increasing the volume of the vascular compartment. They are used principally in:

- management of women with established hypovolaemia (e.g. haemorrhagic shock);
- maintenance of normovolaemia in women with on-going fluid losses (e.g. surgical blood loss).

INTRAVENOUS REPLACEMENT THERAPY

Intravenous replacement fluids are first-line treatment for hypovolaemia. Initial treatment with these fluids may be life-saving and can provide some time to control bleeding and obtain blood for transfusion if it becomes necessary.

CRYSTALLOID FLUIDS

- Crystalloid replacement fluids:
  - contain a similar concentration of sodium to plasma;
  - cannot enter cells because the cell membrane is impermeable to sodium;

- pass from the vascular compartment to the extracellular space (normally only a quarter of the volume of crystalloid infused remains in the vascular compartment) compartment.

- To restore circulating blood volume (intravascular volume), infuse crystalloids in a volume at least three times the volume lost.

Dextrose (glucose) solutions are poor replacement fluids. Do not use them to treat hypovolaemia unless there is no other alternative.

COLLOID FLUIDS

- Colloid solutions are composed of a suspension of particles that are larger than crystalloids. Colloids tend to remain in the blood where they mimic plasma proteins to maintain or raise the colloid osmotic pressure of blood.
- Colloids are usually given in a volume equal to the blood volume lost. In many conditions where the capillary permeability is increased (e.g. trauma, sepsis), leakage out of the circulation will occur and additional infusions will be necessary to maintain blood volume.

Points to remember:

- There is no evidence that colloid solutions (albumin, dextrans, gelatins, hydroxyethyl starch solutions) have advantages over normal saline or balanced salt solutions for resuscitation.
- There is evidence that colloid solutions may have an adverse effect on survival.
- Colloid solutions are much more expensive than normal saline and balanced salt solutions.
- Human plasma should not be used as a replacement fluid. All forms of plasma carry a similar risk as whole blood of transmitting infection, such as HIV and hepatitis.
- Plain water should never be infused intravenously. It will cause haemolysis and will probably be fatal.

There is a very limited role for colloids in resuscitation.

SAFETY

Before giving any IV infusion:

- check that the seal of the infusion bottle or bag is not broken;
- check the expiry date;
- check that the solution is clear and free from visible particles.

MAINTENANCE FLUID THERAPY

Maintenance fluids are crystalloid solutions, such as dextrose or dextrose in normal saline, used to replace normal physiological losses

through skin, lungs, faeces and urine. If it is anticipated that the woman will receive IV fluids for 48 hours or more, infuse a balanced electrolyte solution (e.g. potassium chloride 1.5 g in 1 L IV fluids) with dextrose. The volume of maintenance fluids required by a woman will vary, particularly if the woman has fever or with high ambient temperature or humidity, when losses will increase.

OTHER ROUTES OF FLUID ADMINISTRATION

There are other routes of fluid administration in addition to the IV route.

ORAL AND NASOGASTRIC ADMINISTRATION

- This route can often be used for women who are mildly hypovolaemic and for women who can receive oral fluids.
- Oral and nasogastric administration should not be used if:
  - the woman is severely hypovolaemic;
  - the woman is unconscious;
  - there are gastrointestinal lesions or reduced gut motility (e.g. obstruction);
  - imminent surgery with general anaesthesia is planned.

RECTAL ADMINISTRATION

- Rectal administration of fluids is not suitable for severely hypovolaemic women.
- Advantages of rectal administration include:
  - It allows the ready absorption of fluids.
  - Absorption ceases and fluids are ejected when hydration is complete.
  - It is administered through a plastic or rubber enema tube inserted into the rectum and connected to a bag or bottle of fluid.
  - The fluid rate can be controlled by using an IV set, if necessary.
  - The fluids do not have to be sterile. A safe and effective solution for rectal rehydration is 1 L of clean drinking water to which a teaspoon of table salt is added.

SUBCUTANEOUS ADMINISTRATION

- Subcutaneous administration can occasionally be used when other routes of administration are unavailable but is unsuitable for severely hypovolaemic women.
- Sterile fluids are administered through a cannula or needle inserted into the subcutaneous tissue (the abdominal wall is a preferred site).

Solutions containing dextrose can cause tissue to die and should not be given subcutaneously.

ANTIBIOTIC THERAPY

Infection during pregnancy and the postpartum period may be caused by a combination of organisms, including aerobic and anaerobic cocci and bacilli. Antibiotics should be started based on observation of the woman. If there is no clinical response, culture of uterine or vaginal discharge, pus or urine may help in choosing other antibiotics. In addition, blood culture may be done if septicaemia (bloodstream invasion) is suspected.

Uterine infection can follow an abortion or childbirth and is a major cause of maternal death. Broad spectrum antibiotics are often required to treat these infections. In cases of unsafe abortion and non-institutional delivery, anti-tetanus prophylaxis should also be provided (**Box S-5, page S-51**).

PROVIDING PROPHYLACTIC ANTIBIOTICS

Performing certain obstetrical procedures (e.g. caesarean section, manual removal of placenta) increases a woman's risk of infectious morbidity. This risk can be reduced by:

- following recommended infection prevention practices (**page C-17**);
- providing prophylactic antibiotics at the time of the procedure.

Prophylactic antibiotics are given to help prevent infection. **If a woman is suspected to have or is diagnosed as having an infection**, therapeutic antibiotics are more appropriate.

Give prophylactic antibiotics 30 minutes before the start of a procedure, when possible, to allow adequate blood levels of the antibiotic at the time of the procedure. An exception to this is caesarean section, for which prophylactic antibiotics should be given when the cord is clamped **after** delivery of the baby. One dose of prophylactic antibiotics is sufficient and is no less effective than three doses or 24 hours of antibiotics in preventing infection. If the **procedure lasts longer than 6 hours** or **blood loss is 1 500 mL or more**, give a second dose of prophylactic antibiotics to maintain adequate blood levels during the procedure.

PROVIDING THERAPEUTIC ANTIBIOTICS

- As a first defense against serious infections, give a combination of antibiotics:
  - ampicillin 2 g IV every 6 hours;
  - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
  - PLUS metronidazole 500 mg IV every 8 hours.

  Note: If the **infection is not severe**, amoxicillin 500 mg by mouth every 8 hours can be used instead of ampicillin. Metronidazole can be given by mouth instead of IV.
- If the **clinical response is poor after 48 hours**, ensure adequate dosages of antibiotics are being given, thoroughly re-evaluate the woman for other sources of infection or consider altering treatment according to reported microbial sensitivity (or adding an additional agent to cover anaerobes, if not yet given).
- If **culture facilities are not available**, re-examine for pus collection, especially in the pelvis, and for non-infective causes such as deep vein and pelvic vein thrombosis. Consider the possibility of infection due to organisms resistant to the above combination of antibiotics:
  - If **staphylococcal infection is suspected**, add:
    - cloxacillin 1 g IV every 4 hours;
    - OR vancomycin 1 g IV every 12 hours infused over 1 hour;
  - If **clostridial infection or Group A haemolytic streptococci is suspected**, add penicillin 2 million units IV every 4 hours;
  - If **neither of the above are possibilities**, add ceftriaxone 2 g IV every 24 hours.

  Note: To avoid phlebitis, the infusion site should be changed every 3 days or at the first sign of inflammation.
- If the **infection does not clear**, evaluate for the source of infection.

For the treatment of metritis, combinations of antibiotics are usually continued until the woman is fever-free for 48 hours. Discontinue antibiotics once the woman has been fever-free for 48 hours. There is no need to continue with oral antibiotics, as this has not been proven to have additional benefit. Women with blood-stream infections, however, will require antibiotics for at least 7 days.

ANAESTHESIA AND ANALGESIA

Pain relief is often required during labour and is required during and after operative procedures. Methods of pain relief discussed below include analgesic drugs and methods of support during labour, local anaesthesia, general principles for using anaesthesia and analgesia and postoperative analgesia.

ANALGESIC DRUGS DURING LABOUR

- The perception of pain varies greatly with the woman's emotional state. Supportive care during labour provides reassurance and decreases the perception of pain (**page C-57**).
- If the **woman is distressed by pain**, allow her to walk around or assume any comfortable position. Encourage her companion to massage her back or sponge her face between contractions. Encourage the use of breathing techniques and allow the woman to take a warm bath or shower if she chooses. For most women, this is enough to cope with the pain of labour. If necessary, give:
  - pethidine 1 mg/kg body weight (but not more than 100 mg) IM or IV slowly every 4 hours as needed or give morphine 0.1 mg/kg body weight IM;
  - promethazine 25 mg IM or IV if vomiting occurs.

Barbiturates and sedatives should not be used to relieve anxiety in labour.

DANGER

If **pethidine or morphine is given to the mother**, the baby may suffer from respiratory depression. Naloxone is the antidote.

Note: Do not administer naloxone to newborns whose mothers are suspected of having recently abused narcotic drugs.

- If there are **signs of respiratory depression** in the newborn, begin resuscitation immediately:
  - After vital signs have been established, give naloxone 0.1 mg/kg bodyweight IV to the newborn;

- If the **infant has adequate peripheral circulation after successful resuscitation**, naloxone can be given IM. Repeated doses may be required to prevent recurrent respiratory depression.

- If there are **no signs of respiratory depression** in the newborn, but **pethidine or morphine was given within 4 hours of delivery**, observe the baby expectantly for signs of respiratory depression and treat as above if they occur.

LOCAL ANAESTHESIA

Local anaesthesia (lignocaine with or without adrenaline) is used to infiltrate tissue and block the sensory nerves.

- Because a woman with local anaesthesia remains awake and alert during the procedure, it is especially important to ensure:
  - counselling to increase cooperation and minimize her fears;
  - good communication throughout the procedure as well as physical reassurance from the provider, if necessary;
  - time and patience as local anaesthetics do not take effect immediately.
- The following conditions are required for the safe use of local anaesthesia:
  - All members of the operating team must be knowledgeable and experienced in the use of local anaesthetics;
  - Emergency drugs and equipment (suction, oxygen, resuscitation equipment) should be readily available, and should be in usable condition and all members of the operating team trained in their use.

PREMEDICATION WITH PROMETHAZINE AND DIAZEPAM

Premedication is required for procedures that last longer than 30 minutes. The dose must be adjusted to the weight and condition of the woman and to the condition of the fetus (when present).

A popular combination is pethidine and diazepam:

- Give pethidine 1 mg/kg body weight (but not more than 100 mg) IM or IV slowly or give morphine 0.1 mg/kg body weight IM.
- Give diazepam in increments of 1 mg IV and wait at least 2 minutes before giving another increment. A safe and sufficient level of sedation has been achieved when the woman's upper eye lid droops and just covers the edge of the pupil. Monitor the respiratory rate every minute. If the **respiratory rate falls below 10 breaths per minute**, stop administration of all sedative or analgesic drugs.

Do not administer diazepam with pethidine in the same syringe as the mixture forms a precipitate. Use separate syringes.

LIGNOCAINE

Lignocaine preparations are usually 2% or 1% and require dilution before use (**Box C-1**). For most obstetric procedures, the preparation is diluted to 0.5%, which gives the maximum effect with the least toxicity.

BOX C-1 Preparation of lignocaine 0.5% solution

Combine:
- lignocaine 2%, 1 part;
- normal saline or sterile distilled water, 3 parts (do not use glucose solution as it increases the risk of infection).

or
- lignocaine 1%, 1 part;
- normal saline or sterile distilled water, 1 part.

ADRENALINE

Adrenaline causes local vasoconstriction. Its use with lignocaine has the following advantages:

- less blood loss;
- longer effect of anaesthetic (usually 1–2 hours);
- less risk of toxicity because of slower absorption into the general circulation.

If the **procedure requires a small surface to be anaesthetized** or **requires less than 40 mL of lignocaine**, adrenaline is not necessary.

For larger surfaces, however, especially when more than 40 mL is needed, adrenaline is required to reduce the absorption rate and thereby reduce toxicity.

The best concentration of adrenaline is 1:200 000 (5 mcg/mL). This gives maximum local effect with the least risk of toxicity from the adrenaline itself (**Table C-3, page C-40**).

Note: It is critical to measure adrenaline carefully and accurately using a syringe such as a BCG or insulin syringe. Mixtures must be prepared observing strict infection prevention practices (**page C-17**).

TABLE C-3 Formulas for preparing 0.5% lignocaine solutions containing 1:200 000 adrenaline

Desired Amount of Local Anaesthetic Needed	Normal Saline	Lignocaine 2%	Adrenaline 1:1 000
20 mL	15 mL	5 mL	0.1 mL
40 mL	30 mL	10 mL	0.2 mL
100 mL	75 mL	25 mL	0.5 mL
200 mL	150 mL	50 mL	1.0 mL

COMPLICATIONS

PREVENTION OF COMPLICATIONS

All local anaesthetic drugs are potentially toxic. Major complications from local anaesthesia are, however, extremely rare (**Table C-5, page C-41**). The best way to avoid complications is to prevent them:

- Avoid using concentrations of lignocaine stronger than 0.5%.
- If **more than 40 mL of the anaesthetic solution is to be used**, add adrenaline to delay dispersion. Procedures that may require more than 40 mL of 0.5% lignocaine are caesarean section or repair of extensive perineal tears.
- Use the lowest effective dose.
- Observe the maximum safe dose. For an adult, this is 4 mg/kg body weight of lignocaine without adrenaline and 7 mg/kg body weight of lignocaine with adrenaline. The anaesthetic effect should last for at least 2 hours. Doses can be repeated if needed after 2 hours (**Table C-4**).

TABLE C-4 Maximum safe doses of local anaesthetic drugs

Drug	Maximum Dose (mg/kg of body weight)	Maximum Dose for 60 kg Adult (mg)
Lignocaine	4	240
Lignocaine + adrenaline 1:200 000 (5 mcg/mL)	7	420

- Inject slowly.
- Avoid accidental injection into a vessel. There are three ways of doing this:
  - moving needle technique (preferred for tissue infiltration): the needle is constantly in motion while injecting; this makes it impossible for a substantial amount of solution to enter a vessel;
  - plunger withdrawal technique (preferred for nerve block when considerable amounts are injected into one site): the syringe plunger is withdrawn before injecting; if blood appears, the needle is repositioned and attempted again;
  - syringe withdrawal technique: the needle is inserted and the anaesthetic is injected as the syringe is being withdrawn.

To avoid lignocaine toxicity:
- use a dilute solution;
- add adrenaline when more than 40 mL will be used;
- use lowest effective dose;
- observe maximum dose;
- avoid IV injection.

DIAGNOSIS OF LIGNOCAINE ALLERGY AND TOXICITY

TABLE C-5 Symptoms and signs of lignocaine allergy and toxicity

Allergy	Mild Toxicity	Severe Toxicity	Life-Threatening Toxicity (very rare)
• Shock • Redness of skin • Skin rash/hives • Bronchospasm • Vomiting • Serum sickness	• Numbness of lips and tongue • Metallic taste in mouth • Dizziness/light headedness • Ringing in ears • Difficulty in focusing eyes	• Sleepiness • Disorientation • Muscle twitching and shivering • Slurred speech	• Tonic-clonic convulsions • Respiratory depression or arrest • Cardiac depression or arrest

MANAGEMENT OF LIGNOCAINE ALLERGY

- Give adrenaline 1:1 000, 0.5 mL IM, repeated every 10 minutes if necessary.
- In acute situations, give hydrocortisone 100 mg IV every hour.
- To prevent recurrence, give diphenhydramine 50 mg IM or IV slowly, then 50 mg by mouth every 6 hours.
- Treat bronchospasm with aminophylline 250 mg in normal saline 10 mL IV slowly.
- Laryngeal oedema may require immediate tracheostomy.
- For shock, begin standard shock management (**page S-1**).
- Severe or recurrent signs may require corticosteroids (e.g. hydrocortisone IV 2 mg/kg body weight every 4 hours until condition improves). In **chronic situations** give prednisone 5 mg or prednisolone 10 mg by mouth every 6 hours until condition improves.

MANAGEMENT OF LIGNOCAINE TOXICITY

Symptoms and signs of toxicity (**Table C-5, page C-41**) should alert the practitioner to immediately stop injecting and prepare to treat severe and life-threatening side effects. If **symptoms and signs of mild toxicity are observed**, wait a few minutes to see if the symptoms subside, check vital signs, talk to the woman and then continue the procedure, if possible.

CONVULSIONS

- Turn the woman to her left side, insert an airway and aspirate secretions.
- Give oxygen at 6–8 L per minute by mask or nasal cannulae.
- Give diazepam 1–5 mg IV in 1 mg increments. Repeat if convulsions recur.

  Note: The use of diazepam to treat convulsions may cause respiratory depression.

RESPIRATORY ARREST

- If the woman is **not breathing**, assist ventilation using an Ambu bag and mask or via endotracheal tube; Give oxygen at 4–6 L per minute.

CARDIAC ARREST

- Hyperventilate with oxygen.
- Perform cardiac massage.
- If the **woman has not yet delivered**, immediately deliver the baby by caesarean section (**page P-43**) using general anaesthesia.
- Give adrenaline 1:10 000, 0.5 mL IV.

ADRENALINE TOXICITY

- Systemic adrenaline toxicity results from excessive amounts or inadvertent IV administration and results in:
  - restlessness;
  - sweating;
  - hypertension;
  - cerebral haemorrhage;
  - rapid heart rate;
  - ventricular fibrillation.
- Local adrenaline toxicity occurs when the concentration is excessive and results in ischaemia at the infiltration site with poor healing.

GENERAL PRINCIPLES FOR ANAESTHESIA AND ANALGESIA

The keys to pain management and comfort of the woman are:

- supportive attention from staff before, during and after a procedure (helps reduce anxiety and lessen pain);
- a provider who is comfortable working with women who are awake and who is trained to use instruments gently;
- the selection of an appropriate type and level of pain medication.

- Tips for performing procedures on women who are awake include:
  - Explain each step of the procedure before performing it;
  - Use adequate premedication in cases expected to last longer than 30 minutes;

- Give analgesics or sedatives at an appropriate time before the procedure (30 minutes before for IM and 60 minutes before for oral medication) so that maximum relief will be provided during the procedure;
- Use dilute solutions in adequate amounts;
- Check the level of anaesthesia by pinching the area with forceps. If the woman feels the pinch, wait 2 minutes and then retest.
- Wait a few seconds after performing each step or task for the woman to prepare for the next one;
- Move slowly, without jerky or quick motions;
- Handle tissue gently and avoid undue retraction, pulling or pressure;
- Use instruments with confidence;
- Avoid saying things like “this won’t hurt” when, in fact, it will hurt; or “I’m almost finished” when you are not;
- Talk with the woman throughout the procedure.

• The need for supplemental analgesic or sedative medications (by mouth, IM or IV) will depend on:

- the emotional state of the woman;
- the procedure to be performed (**Table C-6, page C-45**);
- the anticipated length of the procedure;
- the skill of the provider and the assistance of the staff.

TABLE C-6 Analgesia and anaesthesia options

Procedure	Analgesia/Anaesthesia Options
Breech delivery	• General methods of labour support (**page C-57**) • Pudendal block (**page P-3**)
Caesarean section	• Local anaesthesia (**page P-7**) • Spinal anaesthesia (**page P-11**) • Ketamine (**page P-13**) • General anaesthesia
Cervical tears (extensive)	• Pethidine and diazepam (**page C-38**) • Ketamine (**page P-13**)
Colpotomy/Culdocentesis	• Local anaesthesia (**page C-38**)
Craniotomy/ Craniocentesis	• Emotional support and encouragement (**page C-7**) • Diazepam (**page C-38**) • Pudendal block (**page P-3**)
Dilatation and curettage	• Pethidine (**page C-38**) • Paracervical block (**page P-1**)
Episiotomy	• Local anaesthesia (**page C-38**) • Pudendal block (**page P-3**)
Forceps delivery	• Emotional support and encouragement (**page C-7**) • Pudendal block (**page P-3**)
Labour and childbirth	• General methods of labour support (**page C-57**) • Pethidine and promethazine (**page C-38**)
Laparotomy	• General anaesthesia C Spinal anaesthesia (**page P-11**)
Manual removal of placenta	• Pethidine and diazepam (**page C-38**) • Ketamine (**page P-13**)
Manual vacuum aspiration	• Paracervical block (**page P-1**)
Perineal tears (first and second degree)	• Local anaesthesia (**page C-38**) • Pudendal block (**page P-3**)
Perineal tears (third and fourth degree)	• Pudendal block (**page P-3**) • Ketamine (**page P-13**) • Local anaesthesia plus pethidine and diazepam (**page C-38**)

Procedure	Analgesia/Anaesthesia Options
Symphysiotomy	• Local anaesthesia (**page C-38**)
Uterine inversion (correction of)	• Pethidine and diazepam (**page C-38**) • General anaesthesia
Vacuum extraction	• Emotional support and encouragement (**page C-7**) • Pudendal block (**page P-3**)

POSTOPERATIVE ANALGESIA

Adequate postoperative pain control is important. A woman who is in severe pain does not recover well.

Note: Avoid over sedation as this will limit mobility, which is important during the postoperative period.

Good postoperative pain control regimens include:

- non-narcotic mild analgesics such as paracetamol 500 mg by mouth as needed;
- narcotics such as pethidine 1 mg/kg body weight (but not more than 100 mg) IM or IV slowly or morphine 0.1 mg/kg bodyweight IM every 4 hours as needed;
- combinations of lower doses of narcotics with paracetamol.

Note: If the **woman is vomiting**, narcotics may be combined with anti-emetics such as promethazine 25 mg IM or IV every 4 hours as needed.

OPERATIVE CARE PRINCIPLES

The woman is the primary focus of the physician/midwife and nurse during any procedure. The surgical or scrub nurse has her attention focused on the procedure and the needs of the physician/midwife performing the procedure.

PRE-OPERATIVE CARE PRINCIPLES

PREPARING THE OPERATING THEATRE

Ensure that:

- the operating theatre is clean (it should be cleaned after every procedure);
- necessary supplies and equipment are available, including drugs and an oxygen cylinder;
- emergency equipment is available and in working order;
- there are adequate supply of theatre dress for the anticipated members of the surgical team;
- clean linens are available;
- sterile supplies (gloves, gauze, instruments) are available and not beyond expiry date.

PREPARING THE WOMAN FOR A SURGICAL PROCEDURE

- Explain the procedure to be performed and its purpose to the woman. If the woman is unconscious, explain the procedure to her family.
- Obtain informed consent for the procedure.
- Assist the woman and her family to prepare emotionally and psychologically for the procedure (**page C-7**).
- Review the woman's medical history and check for any possible allergies.
- Send a blood sample for haemoglobin or haematocrit and type and screen. Order blood for possible transfusion. Do not delay transfusion if needed.

- Wash the area around the proposed incision site with soap and water, if necessary.
- Do not shave the woman's pubic hair as this increases the risk of wound infection. The hair may be trimmed, if necessary.
- Monitor and record vital signs (blood pressure, pulse, respiratory rate and temperature).
- Administer premedication appropriate for the anaesthesia used (**page C-38**).
- Give an antacid (sodium citrate 0.3% 30 mL or magnesium trisilicate 300 mg) to reduce stomach acid in case there is aspiration.
- Catheterize the bladder if necessary and monitor urine output.
- Ensure that all relevant information is passed on to other members of the team (doctor/midwife, nurse, anaesthetist, assistant and others).

INTRA-OPERATIVE CARE PRINCIPLES

POSITION

Place the woman in a position appropriate for the procedure to allow:

- optimum exposure of the operative site;
- access for the anaesthetist;
- access for the nurse to take vital signs and monitor IV drugs and infusions;
- safety of the woman by preventing injuries and maintaining circulation;
- maintenance of the woman's dignity and modesty.

Note: If the **woman has not delivered**, 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.

SURGICAL HANDSCRUB

- Remove all jewelry.

- Hold hands above the level of the elbow, wet hands thoroughly and apply soap.
- Begin at the fingertips and lather and wash, using a circular motion:
  - Wash between all fingers;
  - Move from the fingertips to the elbows of one hand and then repeat for the second hand.
- Rinse each arm separately, fingertips first, holding hands above the level of the elbows.
- Wash for 3–5 minutes.
- Use a separate towel to dry each hand. Wipe from the fingertips to the elbow and then discard the towel.
- Ensure that scrubbed hands do not come into contact with objects (e.g. equipment, protective gown) that are not high-level disinfected or sterile. If the **hands touch a contaminated surface**, repeat surgical handscrub.

PREPARING THE INCISION SITE

- Prepare the skin with an antiseptic (e.g. iodophors, chlorhexidine):
  - Apply antiseptic solution three times to the incision site using a high-level disinfected ring forceps and cotton or gauze swab. If the **swab is held with a gloved hand**, do not contaminate the glove by touching unprepared skin;
  - Begin at the proposed incision site and work outward in a circular motion away from the incision site;
  - At the edge of the sterile field discard the swab.
- Never go back to the middle of the prepared area with the same swab. Keep your arms and elbows high and surgical dress away from the surgical field.
- Drape the woman immediately after the area is prepared to avoid contamination:
  - If the drape has a window, place the window directly over the incision site first.
  - Unfold the drape away from the incision site to avoid contamination.

MONITORING

Monitor the woman's condition regularly throughout the procedure.

- Monitor vital signs (blood pressure, pulse, respiratory rate), level of consciousness and blood loss.
- Record the findings on a monitoring sheet to allow quick recognition if the woman's condition deteriorates.
- Maintain adequate hydration throughout surgery.

MANAGING PAIN

Maintain adequate pain management throughout the procedure (**page C-37**). Women who are comfortable during a procedure are less likely to move and cause injury to themselves. Pain management can include:

- emotional support and encouragement;
- local anaesthesia;
- regional anaesthesia (e.g. spinal);
- general anaesthesia.

ANTIBIOTICS

- Give prophylactic antibiotics before starting the procedure. If the **woman is going to have a caesarean section**, give prophylactic antibiotics **after** the baby is delivered (**page C-35**).

MAKING THE INCISION

- Make the incision only as large as necessary for the procedure.
- Make the incision with great care and proceed one layer at a time.

HANDLING TISSUE

- Handle tissue gently.
- When using clamps, close the clamp only one ratchet (click), when possible. This will minimize discomfort and reduce the amount of dead tissue that remains behind at the end of the procedure, thus decreasing the risk of infection.

HAEMOSTASIS

- Ensure haemostasis throughout the procedure.
- Women with obstetrical complications often have anaemia. Therefore, keep blood loss to a minimum.

INSTRUMENTS AND SHARPS

- Start and finish the procedure with a count of instruments, sharps and sponges:
  - Perform the count every time a body cavity (e.g. uterus) is closed;
  - Document in the woman's record that the surgical counts were correct.
- Use instruments, especially sharps, carefully to reduce the risk of injury (**page C-20**). Use "safe zones" when handling and passing instruments and sharps:
  - Use a pan such as a kidney basin to carry and pass sharp items and pass suture needles on a needle holder;
  - Alternatively, pass the instrument with the handle, rather than the sharp end, pointing toward the receiver.

DRAINAGE

- Always leave an abdominal drain in place if:
  - bleeding persists after hysterectomy;
  - a clotting disorder is suspected;
  - infection is present or suspected.
- A closed drainage system can be used or a corrugated rubber drain can be placed through the abdominal wall or pouch of Douglas.
- Remove the drain once the infection has cleared or when no pus or blood-stained fluid has drained for 48 hours.

SUTURE

- Select the appropriate type and size of suture for the tissue (**Table C-7**). Sizes are reported by a number of “0”s:
  - Smaller suture has a greater number of “0”s [e.g. 000 (3-0) suture is smaller than 00 (2-0) suture]; suture labeled as “1” is larger in diameter than “0” suture.
  - A suture that is too small will be weak and may break easily; a suture that is too large in diameter will tear through tissue.
- Refer to the appropriate section for the recommended size and type of suture for a procedure.

TABLE C-7 Recommended suture types

Suture Type	Tissue	Recommended Number of Knots
Plain catgut	Fallopian tube	3[a]
Chromic catgut	Muscle, fascia	3[a]
Polyglycolic	Muscle, fascia, skin	4
Nylon	Skin	6
Silk	Skin, bowel	3[a]

[a] Because these are natural sutures, do not use more than three knots because this will abrade the suture and weaken the knot.

DRESSING

At the conclusion of surgery, cover the surgical wound with a sterile dressing (**page C-53**).

POSTOPERATIVE CARE PRINCIPLES

INITIAL CARE

- Place the woman in the recovery position:
- Position the woman on her side with her head slightly extended to ensure a clear airway;

- Place the upper arm in front of the body for easy access to check blood pressure;
- Place legs so that they are flexed, with the upper leg slightly more flexed than the lower to maintain balance.

- Assess the woman's condition immediately after the procedure:
  - Check vital signs (blood pressure, pulse, respiratory rate) and temperature every 15 minutes during the first hour, then every 30 minutes for the next hour.
  - Assess the level of consciousness every 15 minutes until the woman is alert.

    Note: Ensure the woman has constant supervision until conscious.
- Ensure a clear airway and adequate ventilation.
- Transfuse if necessary (**page C-23**).
- If **vital signs become unstable** or if the **haematocrit continues to fall despite transfusion**, quickly return to the operating theatre because bleeding may be the cause.

GASTROINTESTINAL FUNCTION

Gastrointestinal function typically returns rapidly for obstetrical patients. For most uncomplicated procedures, bowel function should be normal within 12 hours of surgery.

- If the **surgical procedure was uncomplicated**, give the woman a liquid diet.
- If there **were signs of infection**, or if the **caesarean was for obstructed labour or uterine rupture**, wait until bowel sounds are heard before giving liquids.
- When the **woman is passing gas**, begin giving her solid food.
- If the **woman is receiving IV fluids**, they should be continued until she is taking liquids well.
- If you **anticipate that the woman will receive IV fluids for 48 hours or more**, infuse a balanced electrolyte solution (e.g. potassium chloride 1.5 g in 1 L IV fluids).

- If the **woman receives IV fluids for more than 48 hours**, monitor electrolytes every 48 hours. Prolonged infusion of IV fluids can alter electrolyte balance.
- Ensure the woman is eating a regular diet prior to discharge from hospital.

DRESSING AND WOUND CARE

The dressing provides a protective barrier against infection while a healing process known as “re-epithelialization” occurs. Keep the dressing on the wound for the first day after surgery to protect against infection while re-epithelialization occurs. Thereafter, a dressing is not necessary.

- If **blood or fluid is leaking through the initial dressing**, do not change the dressing:
  - Reinforce the dressing;
  - Monitor the amount of blood/fluid lost by outlining the blood stain on the dressing with a pen;
  - If **bleeding increases or the blood stain covers half the dressing or more**, remove the dressing and inspect the wound. Replace with another sterile dressing.
- If the **dressing comes loose**, reinforce with more tape rather than removing the dressing. This will help maintain the sterility of the dressing and reduce the risk of wound infection.
- Change the dressing using sterile technique.
- The wound should be clean and dry, without evidence of infection or seroma prior to the woman’s discharge from the hospital.

ANALGESIA

Adequate postoperative pain control is important (**page C-37**). A woman who is in severe pain does not recover well.

Note: Avoid over sedation as this will limit mobility, which is important during the postoperative period.

BLADDER CARE

A urinary catheter may be required for some procedures. Early catheter removal decreases the chance of infection and encourages the woman to walk.

- If the **urine is clear**, remove the catheter 8 hours after surgery or after the first postoperative night.
- If the **urine is not clear**, leave the catheter in place until the urine is clear.
- Wait 48 hours after surgery before removing the catheter if there was:
  - uterine rupture;
  - prolonged or obstructed labour;
  - massive perineal oedema;
  - puerperal sepsis with pelvic peritonitis.

  Note: Ensure that the urine is clear before removing the catheter.
- If the **bladder was injured** (either from uterine rupture or during caesarean section or laparotomy):
  - Leave the catheter in place for a minimum of 7 days and until the urine is clear;
  - If the **woman is not currently receiving antibiotics**, give nitrofurantoin 100 mg by mouth once daily until the catheter is removed, for prophylaxis against cystitis.

ANTIBIOTICS

- If there were **signs of infection or the woman currently has fever**, continue antibiotics until the woman is fever-free for 48 hours (**page C-35**).

SUTURE REMOVAL

Major support for abdominal incisions comes from the closure of the fascial layer. Remove skin sutures 5 days after surgery.

FEVER

- Fever (temperature 38°C or more) that occurs postoperatively should be evaluated (**page S-107**).
- Ensure the woman is fever-free for a minimum of 24 hours prior to discharge from hospital.

AMBULATION

Ambulation enhances circulation, encourages deep breathing and stimulates return of normal gastrointestinal function. Encourage foot and leg exercises and mobilize as soon as possible, usually within 24 hours.

NORMAL LABOUR

- Make a rapid evaluation of the general condition of the woman including vital signs (pulse, blood pressure, respiration, temperature).
- Assess fetal condition:
  - Listen to the fetal heart rate immediately after a contraction:
    - Count the fetal heart rate for a full minute at least once every 30 minutes during the active phase and every 5 minutes during the second stage;
    - If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute), suspect fetal distress (**page S-95**).
  - If the **membranes have ruptured**, note the colour of the draining amniotic fluid:
    - Presence of thick meconium indicates the need for close monitoring and possible intervention for management of fetal distress (**page S-95**);
    - Absence of fluid draining after rupture of the membranes is an indication of reduced volume of amniotic fluid, which may be associated with fetal distress.

SUPPORTIVE CARE DURING LABOUR AND CHILDBIRTH

- Encourage the woman to have personal support from a person of her choice throughout labour and birth:
  - Encourage support from the chosen birth companion;
  - Arrange seating for the companion next to the woman;
  - Encourage the companion to give adequate support to the woman during labour and childbirth (rub her back, wipe her brow with wet cloth, assist her to move about).
- Ensure good communication and support by staff:
  - Explain all procedures, seek permission and discuss findings with the woman;

- Provide a supportive, encouraging atmosphere for birth, respectful of the woman's wishes;
- Ensure privacy and confidentiality.

- Maintain cleanliness of the woman and her environment:
  - Encourage the woman to wash herself or bathe or shower at the onset of labour;
  - Wash the vulval and perineal areas before each examination;
  - Wash your hands with soap before and after each examination;
  - Ensure cleanliness of labouring and birthing area(s);
  - Clean up all spills immediately.
- Ensure mobility:
  - Encourage the woman to move about freely;
  - Support the woman's choice of position for birth (**Fig C-2, page C-59**).
- Encourage the woman to empty her bladder regularly.

  Note: Do not routinely give an enema to women in labour.
- Encourage the woman to eat and drink as she wishes. If the **woman has visible severe wasting or tires during labour**, make sure she is fed. Nutritious liquid drinks are important, even in late labour.
- Teach breathing techniques for labour and delivery. Encourage the woman to breathe out more slowly than usual and relax with each expiration.
- Help the woman in labour who is anxious, fearful or in pain:
  - Give her praise, encouragement and reassurance;
  - Give her information on the process and progress of her labour;
  - Listen to the woman and be sensitive to her feelings.
- If the **woman is distressed by pain**:
  - Suggest changes of position (**Fig C-2, page C-59**);
  - Encourage mobility;

- Encourage her companion to massage her back or hold her hand and sponge her face between contractions;
- Encourage breathing techniques;
- Encourage warm bath or shower;
- If necessary, give pethidine 1 mg/kg body weight (but not more than 100 mg) IM or IV slowly or give morphine 0.1 mg/kg body weight IM.

FIGURE C-2 Positions that a woman may adopt during labour

DIAGNOSIS

Diagnosis of labour includes:

- diagnosis and confirmation of labour;
- diagnosis of stage and phase of labour;
- assessment of engagement and descent of the fetus;
- identification of presentation and position of the fetus.

An incorrect diagnosis of labour can lead to unnecessary anxiety and interventions.

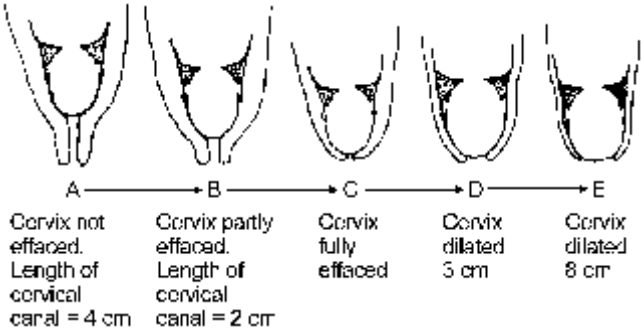
DIAGNOSIS AND CONFIRMATION OF LABOUR

- Suspect or anticipate labour if the woman has:
  - intermittent abdominal pain after 22 weeks gestation;
  - pain often associated with blood-stained mucus discharge (show);

- watery vaginal discharge or a sudden gush of water.

- Confirm the onset of labour if there is:
  - cervical effacement—the progressive shortening and thinning of the cervix during labour; and
  - cervical dilatation—the increase in diameter of the cervical opening measured in centimetres (**Fig C-3 A–E**).

FIGURE C-3 Effacement and dilatation of the cervix



DIAGNOSIS OF STAGE AND PHASE OF LABOUR

TABLE C-8 Diagnosis of stage and phase of labour[a]

Symptoms and Signs	Stage	Phase
• Cervix not dilated	False labour/ Not in labour	
• Cervix dilated less than 4 cm	First	Latent
• Cervix dilated 4–9 cm • Rate of dilatation typically 1 cm per hour or more • Fetal descent begins	First	Active
• Cervix fully dilated (10 cm) • Fetal descent continues • No urge to push	Second	Early (non-expulsive)

• Cervix fully dilated (10 cm) • Presenting part of fetus reaches pelvic floor • Woman has the urge to push	Second	Late (expulsive)

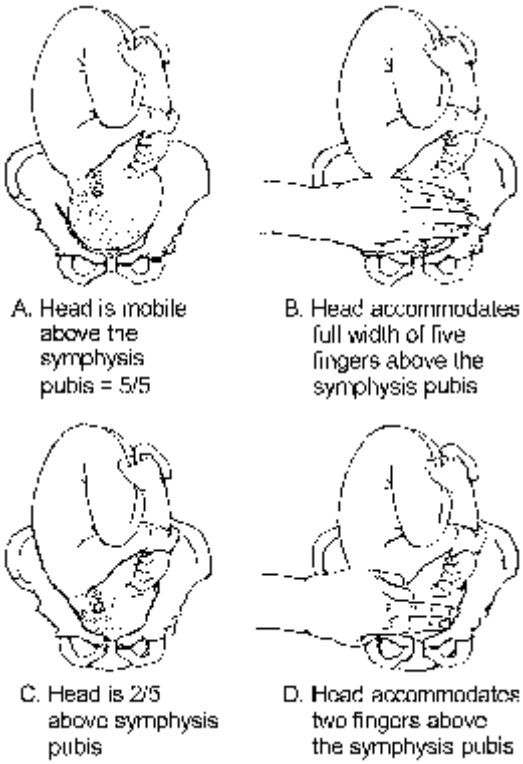
[a] The third stage of labour begins with delivery of the baby and ends with expulsion of placenta.

DESCENT

ABDOMINAL PALPATION

- By abdominal palpation, assess descent in terms of fifths of fetal head palpable above the symphysis pubis (**Fig C-4 A–D**):
  - A head that is entirely above the symphysis pubis is five-fifths (5/5) palpable (**Fig C-4 A–B**);
  - A head that is entirely below the symphysis pubis is zero-fifths (0/5) palpable.

FIGURE C-4 Abdominal palpation for descent of the fetal head

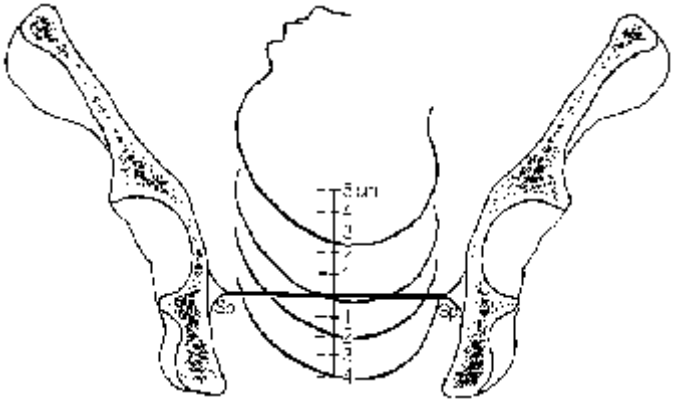


VAGINAL EXAMINATION

- If necessary, a vaginal examination may be used to assess descent by relating the level of the fetal presenting part to the ischial spines of the maternal pelvis (**Fig C-5, page C-62**).

  Note: When there is a **significant degree of caput or moulding**, assessment by abdominal palpation using fifths of head palpable is more useful than assessment by vaginal exam.

FIGURE C-5 Assessing descent of the fetal head by vaginal examination; 0 station is at the level of the ischial spine (Sp).

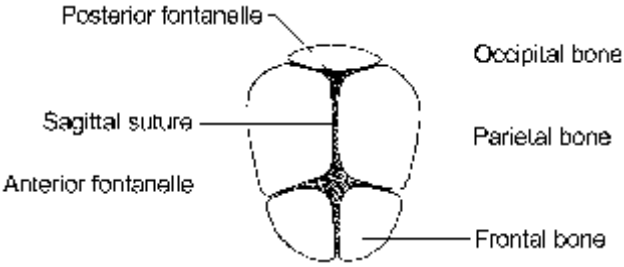


PRESENTATION AND POSITION

DETERMINE THE PRESENTING PART

- The most common presenting part is the vertex of the fetal head. If the **vertex is not the presenting part**, manage as a malpresentation (**Table S-12, page S-73**).
- If the **vertex is the presenting part**, use landmarks on the fetal skull to determine the position of the fetal head in relation to the maternal pelvis (**Fig C-6**).

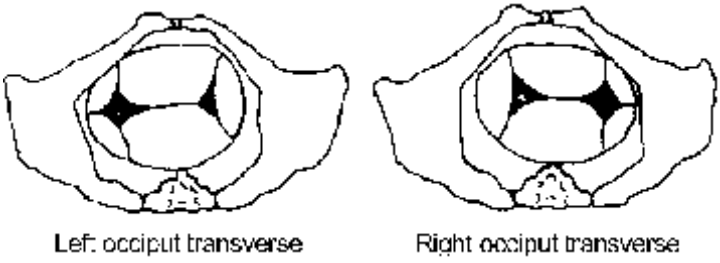
FIGURE C-6 Landmarks of the fetal skull



DETERMINE THE POSITION OF THE FETAL HEAD

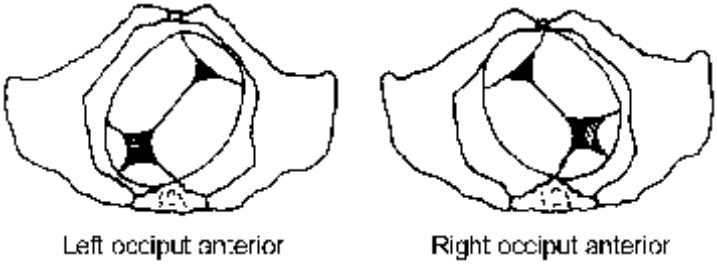
- The fetal head normally engages in the maternal pelvis in an **occiput transverse position**, with the fetal occiput transverse in the maternal pelvis (**Fig C-7**).

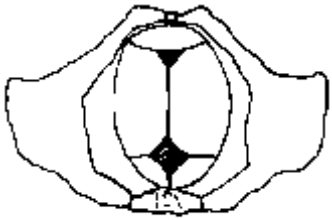
FIGURE C-7 Occiput transverse positions



- With descent, the fetal head rotates so that the fetal occiput is anterior in the maternal pelvis (**occiput anterior positions, Fig C-8**). Failure of an occiput transverse position to rotate to an occiput anterior position should be managed as an occiput posterior position (**page S-75**).

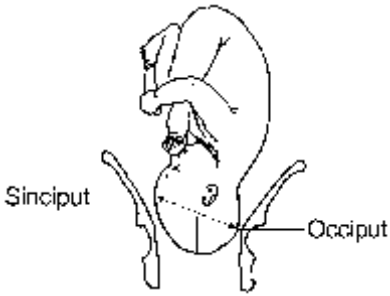
FIGURE C-8 Occiput anterior positions





- An additional feature of a normal presentation is a **well-flexed vertex** (**Fig C-9**), with the occiput lower in the vagina than the sinciput.

FIGURE C-9 Well-flexed vertex



ASSESSMENT OF PROGRESS OF LABOUR

Once diagnosed, progress of labour is assessed by:

- measuring changes in cervical effacement and dilatation (**Fig C-3 A–E, page C-60**) during the latent phase;
- measuring the rate of cervical dilatation and fetal descent (**Fig C-4, page C-61** and **Fig C-5, page C-62**) during the active phase;
- assessing further fetal descent during the second stage.

Progress of the first stage of labour should be plotted on a partograph once the woman enters the active phase of labour. A sample partograph is shown in **Fig C-10, page C-67**. Alternatively, plot a simple graph of

cervical dilatation (centimetres) on the vertical axis against time (hours) on the horizontal axis.

VAGINAL EXAMINATIONS

Vaginal examinations should be carried out at least once every 4 hours during the first stage of labour and after rupture of the membranes. Plot the findings on a partograph.

- At each vaginal examination, record the following:
  - colour of amniotic fluid;
  - cervical dilatation;
  - descent (can also be assessed abdominally).
- If the **cervix is not dilated on first examination** it may not be possible to diagnose labour.
  - If **contractions persist**, re-examine the woman after 4 hours for cervical changes. At this stage, if there is **effacement and dilatation**, the woman is in labour; if there is **no change**, the diagnosis is false labour.
- In the second stage of labour, perform vaginal examinations once every hour.

USING THE PARTOGRAPH

The WHO partograph has been modified to make it simpler and easier to use. The latent phase has been removed and plotting on the partograph begins in the active phase when the cervix is 4 cm dilated. A sample partograph is included (**Fig C-10, page C-67**). Note that the partograph should be enlarged to full size before use. Record the following on the partograph:

Patient information: Fill out name, gravida, para, hospital number, date and time of admission and time of ruptured membranes.

Fetal heart rate: Record every half hour.

Amniotic fluid: Record the colour of amniotic fluid at every vaginal examination:

- I: membranes intact;

- C: membranes ruptured, clear fluid;
- M: meconium-stained fluid;
- B: blood-stained fluid.

Moulding:

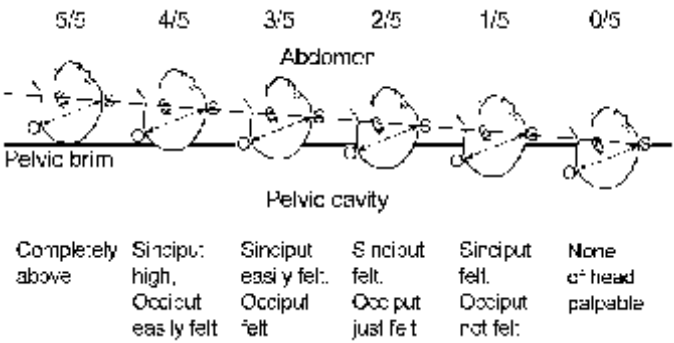
- 1: sutures apposed;
- 2: sutures overlapped but reducible;
- 3: sutures overlapped and not reducible.

Cervical dilatation: Assessed at every vaginal examination and marked with a cross (**X**). Begin plotting on the partograph at 4 cm.

Alert line: A line starts at 4 cm of cervical dilatation to the point of expected full dilatation at the rate of 1 cm per hour.

Action line: Parallel and 4 hours to the right of the alert line.

Descent assessed by abdominal palpation: Refers to the part of the head (divided into 5 parts) palpable above the symphysis pubis; recorded as a circle (**O**) at every vaginal examination. At 0/5, the sinciput (S) is at the level of the symphysis pubis.



Hours: Refers to the time elapsed since onset of active phase of labour (observed or extrapolated).

Time: Record actual time.

Contractions: Chart every half hour; palpate the number of contractions in 10 minutes and their duration in seconds.

- Less than 20 seconds: ▦
- Between 20 and 40 seconds: ▧
- More than 40 seconds: ■

Oxytocin: Record the amount of oxytocin per volume IV fluids in drops per minute every 30 minutes when used.

Drugs given: Record any additional drugs given.

Pulse: Record every 30 minutes and mark with a dot (**!**).

Blood pressure: Record every 4 hours and mark with arrows.

Temperature: Record every 2 hours.

Protein, acetone and volume: Record every time urine is passed.

FIGURE C-10 The modified WHO Partograph

Name Gravida Para Hospital number

Date of admission Time of admission Ruptured membranes hours

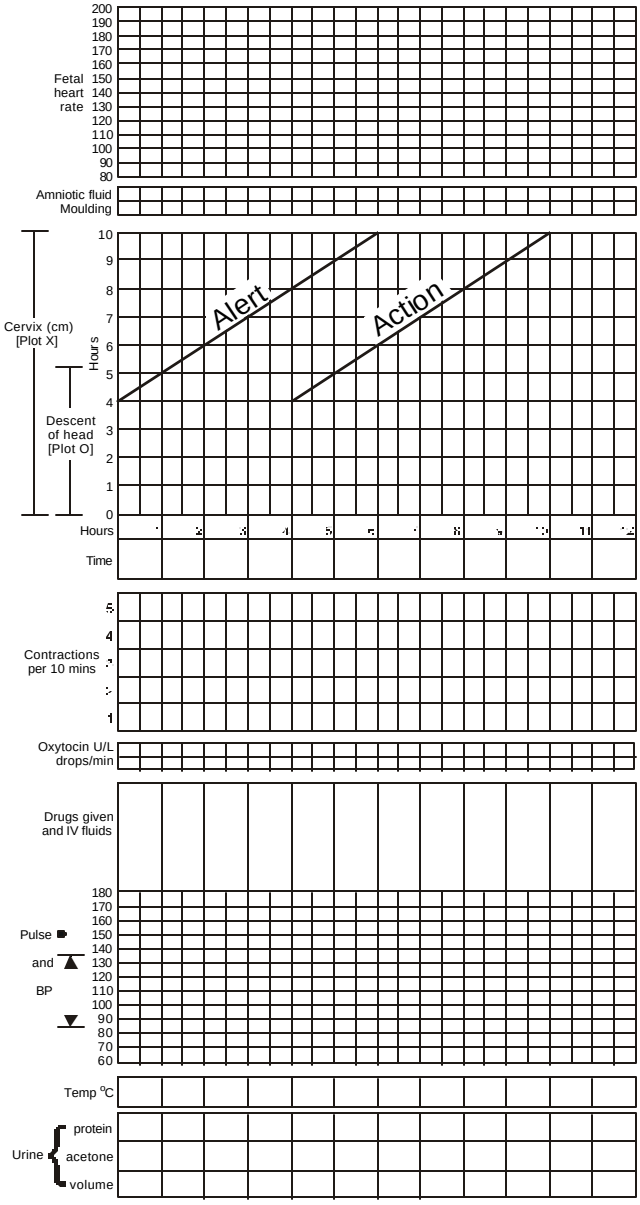


Figure C-11, page C-69 is a sample partograph for normal labour:

- A primigravida was admitted in the latent phase of labour at 5 AM:
  - fetal head 4/5 palpable;
  - cervix dilated 2 cm;
  - 3 contractions in 10 minutes, each lasting 20 seconds;
  - normal maternal and fetal condition.

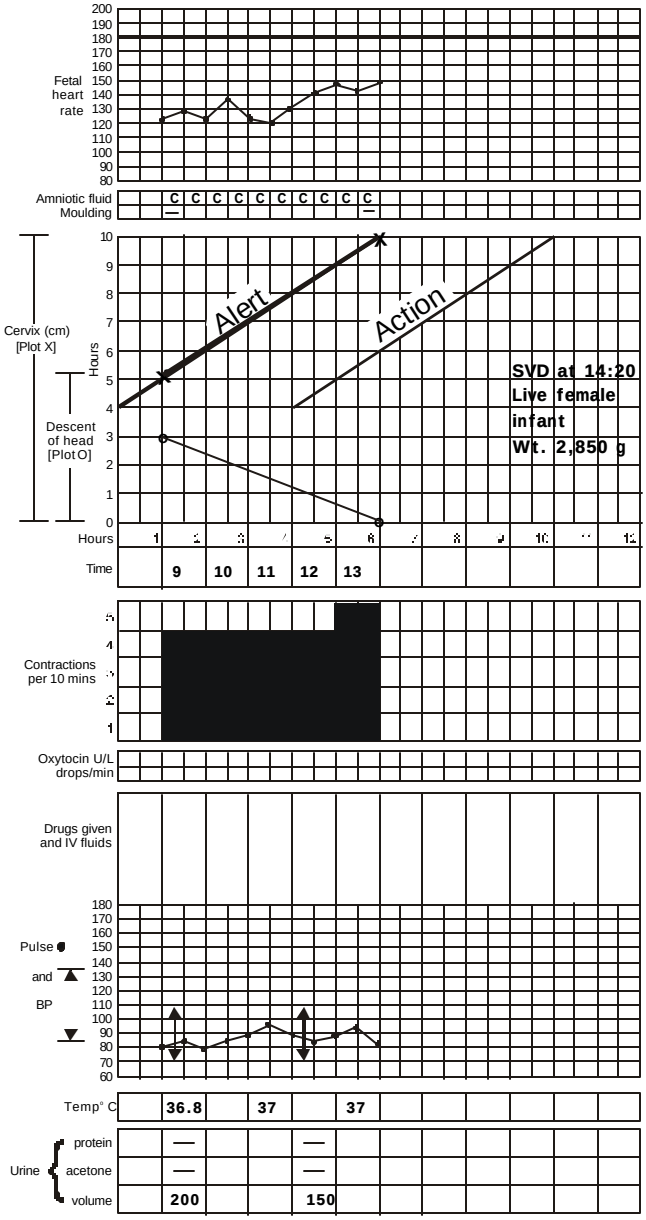
  Note: This information is not plotted on the partograph.
- At 9 AM:
  - fetal head is 3/5 palpable;
  - cervix dilated 5 cm;

  Note: The woman was in the active phase of labour and this information is plotted on the partograph. Cervical dilatation is plotted on the alert line.
  - 4 contractions in 10 minutes, each lasting 40 seconds;
  - cervical dilatation progressed at the rate of 1 cm per hour.
- At 2 PM:
  - fetal head is 0/5 palpable;
  - cervix is fully dilated;
  - 5 contractions in 10 minutes each lasting 40 seconds;
  - spontaneous vaginal delivery occurred at 2:20 PM.

FIGURE C-11 Sample partograph for normal labour

Name **Mrs. S** Gravida **3** Para **2+0** Hospital number **7886**

Date of admission **12.5.2000** Time of admission **5:00 A.M.** Ruptured membranes **1** hours



PROGRESS OF FIRST STAGE OF LABOUR

- Findings suggestive of **satisfactory progress** in first stage of labour are:
  - regular contractions of progressively increasing frequency and duration;
  - rate of cervical dilatation at least 1 cm per hour during the active phase of labour (cervical dilatation on or to the left of alert line);
  - cervix well applied to the presenting part.
- Findings suggestive of **unsatisfactory progress** in first stage of labour are:
  - irregular and infrequent contractions after the latent phase;
  - OR rate of cervical dilatation slower than 1 cm per hour during the active phase of labour (cervical dilatation to the right of alert line);
  - OR cervix poorly applied to the presenting part.

Unsatisfactory progress in labour can lead to prolonged labour (**Table S-10, page S-57**).

PROGRESS OF SECOND STAGE OF LABOUR

- Findings suggestive of **satisfactory progress** in second stage of labour are:
  - steady descent of fetus through birth canal;
  - onset of expulsive (pushing) phase.
- Findings suggestive of **unsatisfactory progress** in second stage of labour are:
  - lack of descent of fetus through birth canal;
  - failure of expulsion during the late (expulsive) phase.

PROGRESS OF FETAL CONDITION

- If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute), suspect fetal distress (**page S-95**).

- Positions or presentations in labour other than occiput anterior with a well-flexed vertex are considered malpositions or malpresentations (**page S-69**).
- If **unsatisfactory progress of labour** or **prolonged labour** is suspected, manage the cause of slow progress (**page S-57**).

PROGRESS OF MATERNAL CONDITION

Evaluate the woman for signs of distress:

- If the **woman's pulse is increasing**, she may be dehydrated or in pain. Ensure adequate hydration via oral or IV routes and provide adequate analgesia (**page C-37**).
- If the **woman's blood pressure decreases**, suspect haemorrhage (**page S-17**).
- If **acetone is present in the woman's urine**, suspect poor nutrition and give dextrose IV.

NORMAL CHILDBIRTH

General methods of supportive care during labour are most useful in helping the woman tolerate labour pains

- Once the **cervix is fully dilated** and the woman is **in the expulsive phase of the second stage**, encourage the woman to assume the position she prefers (**Fig C-12**) and encourage her to push.

FIGURE C-12 Positions that a woman may adopt during childbirth

Note: Episiotomy is no longer recommended as a routine procedure. There is no evidence that routine episiotomy decreases perineal damage, future vaginal prolapse or urinary incontinence. In fact, routine episiotomy is associated with an increase of third and fourth degree tears and subsequent anal sphincter muscle dysfunction.

D

Episiotomy (page P-71) should be considered only in the case of:
- complicated vaginal delivery (breech, shoulder dystocia, forceps, vacuum);
- scarring from female genital mutilation or poorly healed third or fourth degree tears;
- fetal distress.

ELIVERY OF THE HEAD

- Ask the woman to pant or give only small pushes with contractions as the baby's head delivers.
- To control birth of the head, place the fingers of one hand against the baby's head to keep it flexed (bent).
- Continue to gently support the perineum as the baby's head delivers.
- Once the baby's head delivers, ask the woman not to push.
- Suction the baby's mouth and nose.
- Feel around the baby's neck for the umbilical cord:
  - If the **cord is around the neck but is loose**, slip it over the baby's head;
  - If the **cord is tight around the neck**, doubly clamp and cut it before unwinding it from around the neck.

COMPLETION OF DELIVERY

- Allow the baby's head to turn spontaneously.
- After the head turns, place a hand on each side of the baby's head. Tell the woman to push gently with the next contraction.
- Reduce tears by delivering one shoulder at a time. Move the baby's head posteriorly to deliver the shoulder that is anterior.

Note: If there is **difficulty delivering the shoulders**, suspect shoulder dystocia (**page S-83**).

- Lift the baby's head anteriorly to deliver the shoulder that is posterior.
- Support the rest of the baby's body with one hand as it slides out.
- Place the baby on the mother's abdomen. Thoroughly dry the baby, wipe the eyes and assess the baby's breathing:

  Note: Most babies begin crying or breathing spontaneously within 30 seconds of birth.

  - If the **baby is crying or breathing** (chest rising at least 30 times per minute) leave the baby with the mother;
  - If **baby does not start breathing within 30 seconds**, **SHOUT FOR HELP** and take steps to resuscitate the baby (**page S-142**).

Anticipate the need for resuscitation and have a plan to get assistance for every baby but especially if the mother has a history of eclampsia, bleeding, prolonged or obstructed labour, preterm birth or infection.

- Clamp and cut the umbilical cord.
- Ensure that the baby is kept warm and in skin-to-skin contact on the mother's chest. Wrap the baby in a soft, dry cloth, cover with a blanket and ensure the head is covered to prevent heat loss.
- If the **mother is not well**, ask an assistant to care for the baby.
- Palpate the abdomen to rule out the presence of an additional baby(s) and proceed with active management of the third stage.

ACTIVE MANAGEMENT OF THE THIRD STAGE

Active management of the third stage (active delivery of the placenta) helps prevent postpartum haemorrhage. Active management of the third stage of labour includes:

- immediate oxytocin;
- controlled cord traction; and

- uterine massage.

OXYTOCIN

- Within 1 minute of delivery of the baby, palpate the abdomen to rule out the presence of an additional baby(s) and give oxytocin 10 units IM.
- Oxytocin is preferred because it is effective 2 to 3 minutes after injection, has minimal side effects and can be used in all women. If **oxytocin is not available**, give ergometrine 0.2 mg IM or prostaglandins. Make sure there is no additional baby(s) before giving these medications.

Do not give ergometrine to women with pre-eclampsia, eclampsia or high blood pressure because it increases the risk of convulsions and cerebrovascular accidents.

CONTROLLED CORD TRACTION

- Clamp the cord close to the perineum using sponge forceps. Hold the clamped cord and the end of forceps with one hand.
- Place the other hand just above the woman's pubic bone and stabilize the uterus by applying counter traction during controlled cord traction. This helps prevent inversion of the uterus.
- Keep slight tension on the cord and await a strong uterine contraction (2–3 minutes).
- When the **uterus becomes rounded or the cord lengthens**, very gently pull downward on the cord to deliver the placenta. Do not wait for a gush of blood before applying traction on the cord. Continue to apply counter traction to the uterus with the other hand.
- If the **placenta does not descend** during 30–40 seconds of controlled cord traction (i.e. there are no signs of placental separation), do not continue to pull on the cord:
  - Gently hold the cord and wait until the uterus is well contracted again. If necessary, use a sponge forceps to clamp the cord closer to the perineum as it lengthens;
  - With the next contraction, repeat controlled cord traction with counter traction.

Never apply cord traction (pull) without applying counter traction (push) above the pubic bone with the other hand.

- As the placenta delivers, the thin membranes can tear off. Hold the placenta in two hands and gently turn it until the membranes are twisted.
- Slowly pull to complete the delivery.
- If the **membranes tear**, gently examine the upper vagina and cervix wearing high-level disinfected gloves and use a sponge forceps to remove any pieces of membrane that are present.
- Look carefully at the placenta to be sure none of it is missing. If a **portion of the maternal surface is missing or there are torn membranes with vessels**, suspect retained placental fragments (**page S-32**).
- If **uterine inversion occurs**, reposition the uterus (**page P-91**).
- If the **cord is pulled off**, manual removal of the placenta may be necessary (**page P-77**).

UTERINE MASSAGE

- Immediately massage the fundus of the uterus through the woman's abdomen until the uterus is contracted.
- Repeat uterine massage every 15 minutes for the first 2 hours.
- Ensure that the uterus does not become relaxed (soft) after you stop uterine massage.

EXAMINATION FOR TEARS

- 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**).

INITIAL CARE OF THE NEWBORN

- Check the baby's breathing and colour every 5 minutes.

- If the **baby becomes cyanotic** (bluish) or is **having difficulty breathing** (less than 30 or more than 60 breaths per minute), give oxygen by nasal catheter or prongs (**page S-146**).
- Check warmth by feeling the baby's feet every 15 minutes:
  - If the **baby's feet feel cold**, check axillary temperature;
  - If the **baby's temperature is below 36.5°C**, rewarm the baby (**page S-148**).
- Check the cord for bleeding every 15 minutes. If the **cord is bleeding**, retie cord more tightly.
- Apply antimicrobial drops (1% silver nitrate solution or 2.5% povidone-iodine solution) or ointment (1% tetracycline ointment) to the baby's eyes.

  Note: Povidone-iodine should not be confused with tincture of iodine, which could cause blindness if used.
- Wipe off any meconium or blood from skin.
- Encourage breastfeeding when the baby appears ready (begins "rooting"). Do not force the baby to the breast.

Avoid separating mother from baby whenever possible. Do not leave mother and baby unattended at any time.

NEWBORN CARE PRINCIPLES

When a baby is born to a mother being treated for complications, the management of the newborn will depend on:

- whether the baby has a condition or problem requiring rapid treatment;
- whether the mother's condition permits her to care for her newborn completely, partially or not at all.

NEWBORNS WITH PROBLEMS

- If the **newborn has an acute problem that requires treatment within 1 hour of delivery**, health care providers in the labour ward will be required to give the care (**page S-141**). Problems or conditions of the newborn requiring urgent interventions include:
  - not breathing;
  - breathing with difficulty;
  - central cyanosis (blueness of skin);
  - low birth weight (less than 2 500 g);
  - lethargy;
  - hypothermia/cold stress (axillary temperature less than 36.5°C);
  - convulsions.
- The following conditions require early treatment:
  - possible bacterial infection in an apparently normal baby whose mother had prelabour or prolonged rupture of membranes;
  - possible syphilis (mother has positive serologic test or is symptomatic).
- If the **newborn has a malformation or other problem that does not require urgent (labour ward) care**:
  - Provide routine initial newborn care (**page C-76**);
  - Transfer the baby to the appropriate service to care for sick newborns as quickly as possible (**page C-78**).

NEWBORNS WITHOUT PROBLEMS

- If the **newborn has no apparent problems**, provide routine initial newborn care, including skin-to-skin contact with the mother and early breastfeeding (**page C-76**).
- If the **mother's condition permits**, keep the baby in skin-to-skin contact with the mother at all times;
- If the **mother's condition does not permit her to maintain skin-to-skin contact** with the baby after the delivery (e.g. caesarean section):
  - Wrap the baby in a soft, dry cloth, cover with a blanket and ensure the head is covered to prevent heat loss;
  - Observe frequently.
- If the **mother's condition requires prolonged separation** from the baby, transfer the baby to the appropriate service to care for newborns (see below).

TRANSFERRING BABIES

- Explain the baby's problem to the mother (**page C-5**).
- Keep the baby warm. Wrap the baby in a soft, dry cloth, cover with a blanket and ensure the head is covered to prevent heat loss.
- Transfer the baby in the arms of a health care provider if possible. If the **baby requires special treatment such as oxygen**, transfer in an incubator or bassinet.
- Initiate breastfeeding as soon as the baby is ready to suckle or as soon as the mother's condition permits.
- If **breastfeeding has to be delayed** due to maternal or newborn problems, teach the mother to express breastmilk as soon as possible and ensure that this milk is given to the newborn.
- Ensure that the service caring for the newborn receives the record of the labour and delivery and of any treatments given to the newborn.

CREATING AN IMPROVED HEALTH CARE ENVIRONMENT

The district hospital should strive to create a welcoming environment for women, communities and providers from peripheral health units. It should support the worthy efforts of other providers and work with them to correct deficiencies.

When dealing with other providers, doctors and midwives at the district hospital should:

- encourage and thank providers who refer patients, especially in the presence of the woman and her family;
- offer clinical guidance and corrective suggestions in private, so as to maintain the provider's credibility in the community;
- involve the provider (to an appropriate extent) in the continued care of the woman.

When dealing with the community, doctors and midwives at the district hospital should:

- invite members of the community to be part of the district hospital or health development committee;
- identify key persons in the community and invite them into the facility to learn about its role and function, as well as its constraints and limitations;
- create opportunities for the community to view the district hospital as a wellness facility (e.g. through vaccination campaigns and screening programs).

MEETING THE NEEDS OF WOMEN

To enhance its appeal to women and the community, the district hospital should be willing to examine its own service delivery practices. The facility should create a culturally sensitive and comfortable environment which:

- respects the woman's modesty and privacy;
- welcomes family members;

- provides a comfortable place for the woman and/or her newborn (e.g. lower delivery bed, warm and clean room).

With careful planning, the facility can create this environment without interfering with its ability to respond to complications or emergencies.

IMPROVING REFERRAL PATTERNS

Each woman who is referred to the district hospital should be given a standard referral slip containing the following information:

- general patient information (name, age, address);
- obstetrical history (parity, gestational age, complications in the antenatal period);
- relevant past obstetrical complications (previous caesarean section, postpartum haemorrhage);
- the specific problem for which she was referred;
- treatments applied thus far and the results of those treatments.

The referral slip should also include the outcome of the referral. The **referral slip should be sent back to the referring facility** with the woman or the person who brought her. Both the district hospital and the referring facility should keep a record of all referrals as a quality assurance mechanism:

- Referring facilities can assess the success and appropriateness of their referrals;
- The district hospital can review the records for patterns indicating that a provider or facility needs additional technical support or training.

PROVIDING TRAINING AND SUPPORTIVE SUPERVISION

District hospitals should offer clinical training for peripheral providers that is high-quality and **participatory**. Participatory training is skill-focused and is more effective than classroom-based training because it:

- improves the relationship between providers at the district hospital and the auxiliary and multipurpose workers from peripheral units;

- increases the familiarity of the peripheral providers with the clinical care provided at the district hospital;
- promotes team building and facilitates supervision of health workers once they return to their community to implement the skills they have learned.

SECTION 2

SYMPTOMS

SHOCK

Shock is characterized by failure of the circulatory system to maintain adequate perfusion of the vital organs. Shock is a **life-threatening condition** that requires **immediate and intensive treatment**.

Suspect or anticipate shock if at least one of the following is present:

- bleeding in early pregnancy (e.g. abortion, ectopic or molar pregnancy);
- bleeding in late pregnancy or labour (e.g. placenta praevia, abruptio placentae, ruptured uterus);
- bleeding after childbirth (e.g. ruptured uterus, uterine atony, tears of genital tract, retained placenta or placental fragments);
- infection (e.g. unsafe or septic abortion, amnionitis, metritis, pyelonephritis);
- trauma (e.g. injury to uterus or bowel during abortion, ruptured uterus, tears of genital tract).

SYMPTOMS AND SIGNS

Diagnose shock if the following symptoms and signs are present:

- fast, weak pulse (110 per minute or more);
- low blood pressure (systolic less than 90 mm Hg).

Other symptoms and signs of shock include:

- pallor (especially of inner eyelid, palms or around mouth);
- sweatiness or cold clammy skin;
- rapid breathing (rate of 30 breaths per minute or more);
- anxiousness, confusion or unconsciousness;
- scanty urine output (less than 30 mL per hour).

MANAGEMENT

IMMEDIATE MANAGEMENT

- **SHOUT FOR HELP.** Urgently mobilize all available personnel.

- Monitor vital signs (pulse, blood pressure, respiration, temperature).
- Turn the woman onto her side to minimize the risk of aspiration if she vomits and to ensure that an airway is open.
- Keep the woman warm but do not overheat her as this will increase peripheral circulation and reduce blood supply to the vital centres.
- Elevate the legs to increase return of blood to the heart (if possible, raise the foot end of the bed).

SPECIFIC MANAGEMENT

- Start an IV infusion (two if possible) using a large-bore (16-gauge or largest available) cannula or needle. Collect blood for estimation of haemoglobin, immediate cross-match and bedside clotting (see below), just before infusion of fluids:
  - Rapidly infuse IV fluids (normal saline or Ringer's lactate) initially at the rate of 1 L in 15–20 minutes;

    Note: Avoid using plasma substitutes (e.g. dextran). There is no evidence that plasma substitutes are superior to normal saline in the resuscitation of a shocked woman and dextran can be harmful in large doses.
  - Give at least 2 L of these fluids in the first hour. This is over and above fluid replacement for ongoing losses.

    Note: A more rapid rate of infusion is required in the management of shock resulting from bleeding. Aim to replace 2–3 times the estimated fluid loss.

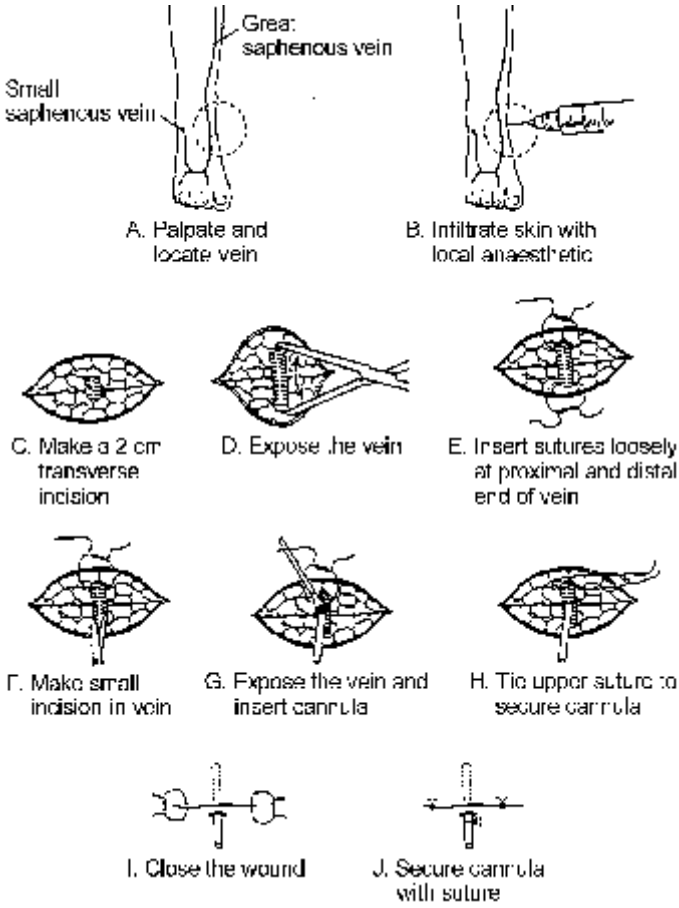
Do not give fluids by mouth to a woman in shock.

- If a **peripheral vein cannot be cannulated**, perform a venous cut-down (**Fig S-1**).
- Continue to monitor vital signs (every 15 minutes) and blood loss.
- Catheterize the bladder and monitor fluid intake and urine output.
- Give oxygen at 6–8 L per minute by mask or nasal cannulae.

BEDSIDE CLOTTING TEST

- Assess clotting status using this **bedside clotting test**:
  - Take 2 mL of venous blood into a small, dry, clean, plain glass test tube (approximately 10 mm x 75 mm);
  - Hold the tube in your closed fist to keep it warm (± 37°C);
  - After 4 minutes, tip the tube slowly to see if a clot is forming. Then tip it again every minute until the blood clots and the tube can be turned upside down;
  - Failure of a clot to form after 7 minutes or a soft clot that breaks down easily suggests coagulopathy (**page S-19**).

FIGURE S-1 Venous cut-down



DETERMINING AND MANAGING THE CAUSE OF SHOCK

Determine the cause of shock after the woman is stabilized.

- If **heavy bleeding** is suspected as the cause of shock:
  - Take steps simultaneously to stop bleeding (e.g. oxytocics, uterine massage, bimanual compression, aortic compression, preparations for surgical intervention);
  - Transfuse as soon as possible to replace blood loss (**page C-23**);
  - Determine the cause of bleeding and manage:
    - If **bleeding occurs during first 22 weeks of pregnancy**, suspect abortion, ectopic or molar pregnancy (**page S-7**);
    - If **bleeding occurs after 22 weeks or during labour but before delivery**, suspect placenta praevia, abruptio placentae or ruptured uterus (**page S-17**);
    - If **bleeding occurs after childbirth**, suspect ruptured uterus, uterine atony, tears of genital tract, retained placenta or placental fragments (**page S-25**).
  - Reassess the woman's condition for signs of improvement (**page S-5**).
- If **infection is suspected** as the cause of shock:
  - Collect appropriate samples (blood, urine, pus) for microbial culture before starting antibiotics, if facilities are available;
  - Give the woman a combination of antibiotics to cover aerobic and anaerobic infections and continue until she is fever-free for 48 hours (**page C-35**):
    - penicillin G 2 million units OR ampicillin 2 g IV every 6 hours;
    - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
    - PLUS metronidazole 500 mg IV every 8 hours.

Do not give antibiotics by mouth to a woman in shock.

  - Reassess the woman's condition for signs of improvement (**page S-5**).

- If **trauma is suspected** as the cause of shock, prepare for surgical intervention.

REASSESSMENT

- Reassess the woman's response to fluids within 30 minutes to determine if her condition is improving. Signs of improvement include:
  - stabilizing pulse (rate of 90 per minute or less);
  - increasing blood pressure (systolic 100 mm Hg or more);
  - improving mental status (less confusion or anxiety);
  - increasing urine output (30 mL per hour or more).
- If the woman's **condition improves**:
  - Adjust the rate of infusion of IV fluids to 1 L in 6 hours;
  - Continue management for the underlying cause of shock (**page S-4**).
- If the woman's condition **fails to improve or stabilize**, she requires further management (see below).

FURTHER MANAGEMENT

- Continue to infuse IV fluids, adjusting the rate of infusion to 1 L in 6 hours and maintain oxygen at 6–8 L per minute.
- Closely monitor the woman's condition.
- Perform laboratory tests including haematocrit, blood grouping and Rh typing and cross-match. If facilities are available, check serum electrolytes, serum creatinine and blood pH.

VAGINAL BLEEDING IN EARLY PREGNANCY

PROBLEM

- Vaginal bleeding occurs during the first 22 weeks of pregnancy.

GENERAL MANAGEMENT

- Make a **rapid evaluation** of the general condition of the woman including vital signs (pulse, blood pressure, respiration, temperature).
- If **shock is suspected**, immediately begin treatment (**page S-1**). Even if signs of shock are not present, keep shock in mind as you evaluate the woman further because her status may worsen rapidly. If **shock develops**, it is important to begin treatment immediately.
- If the **woman is in shock**, consider ruptured ectopic pregnancy (**Table S-4, page S-14**).
- Start an IV infusion and infuse IV fluids (**page C-21**).

DIAGNOSIS

- **Consider ectopic pregnancy** in any woman with anaemia, pelvic inflammatory disease (PID), threatened abortion or unusual complaints about abdominal pain.

  Note: If **ectopic pregnancy is suspected**, perform bimanual examination gently because an early ectopic pregnancy is easily ruptured.
- **Consider abortion** in any woman of reproductive age who has a missed period (delayed menstrual bleeding with more than a month having passed since her last menstrual period) and has one or more of the following: bleeding, cramping, partial expulsion of products of conception, dilated cervix or smaller uterus than expected.
- If **abortion is a possible diagnosis**, identify and treat any complications immediately (**Table S-2, page S-9**).

TABLE S-1 Diagnosis of vaginal bleeding in early pregnancy

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Light[a] bleeding • Closed cervix • Uterus corresponds to dates	• Cramping/lower abdominal pain • Uterus softer than normal	**Threatened abortion, page S-10**
• Light bleeding • Abdominal pain • Closed cervix • Uterus slightly larger than normal • Uterus softer than normal	• Fainting • Tender adnexal mass • Amenorrhoea • Cervical motion tenderness	**Ectopic pregnancy (Table S-4, page S-14)**
• Light bleeding • Closed cervix • Uterus smaller than dates • Uterus softer than normal	• Light cramping/lower abdominal pain • History of expulsion of products of conception	**Complete abortion, page S-12**
• Heavy[b] bleeding • Dilated cervix • Uterus corresponds to dates	• Cramping/lower abdominal pain • Tender uterus • No expulsion of products of conception	**Inevitable abortion, page S-11**
• Heavy bleeding • Dilated cervix • Uterus smaller than dates	• Cramping/lower abdominal pain • Partial expulsion of products of conception	**Incomplete abortion, page S-11**
• Heavy bleeding • Dilated cervix • Uterus larger than dates • Uterus softer than normal • Partial expulsion of products of conception which resemble grapes	• Nausea/vomiting • Spontaneous abortion • Cramping/lower abdominal pain • Ovarian cysts (easily ruptured) • Early onset pre-eclampsia • No evidence of a fetus	**Molar pregnancy, page S-15**

[a] Light bleeding: takes longer than 5 minutes for a clean pad or cloth to be soaked.
[b] Heavy bleeding: takes less than 5 minutes for a clean pad or cloth to be soaked.

TABLE S-2 Diagnosis and management of complications of abortion

Symptoms and Signs	Complication	Management
• Lower abdominal pain • Rebound tenderness • Tender uterus • Prolonged bleeding • Malaise • Fever • Foul-smelling vaginal discharge • Purulent cervical discharge • Cervical motion tenderness	**Infection/sepsis**	Begin antibiotics[a] as soon as possible before attempting manual vacuum aspiration (**page P-65**).
• Cramping/abdominal pain • Rebound tenderness • Abdominal distension • Rigid (tense and hard) abdomen • Shoulder pain • Nausea/vomiting • Fever	**Uterine, vaginal or bowel injuries**	Perform a laparotomy to repair the injury and perform manual vacuum aspiration (**page P-65**) simultaneously. Seek further assistance if required.

[a] Give ampicillin 2 g IV every 6 hours PLUS gentamicin 5 mg/kg body weight IV every 24 hours PLUS metronidazole 500 mg IV every 8 hours until the woman is fever-free for 48 hours (**page C-35**).

BOX S-1 Types of abortion

Spontaneous abortion is defined as the loss of a pregnancy before fetal viability (22 weeks gestation). The stages of spontaneous abortion may include:

- threatened abortion (pregnancy may continue);
- inevitable abortion (pregnancy will not continue and will proceed to incomplete/complete abortion);
- incomplete abortion (products of conception are partially expelled);
- complete abortion (products of conception are completely expelled).

Induced abortion is defined as a process by which pregnancy is terminated before fetal viability.

Unsafe abortion is defined as a procedure performed either by persons lacking necessary skills or in an environment lacking minimal medical standards or both.

Septic abortion is defined as abortion complicated by infection. Sepsis may result from infection if organisms rise from the lower genital tract following either spontaneous or unsafe abortion. Sepsis is more likely to occur if there are retained products of conception and evacuation has been delayed. Sepsis is a frequent complication of unsafe abortion involving instrumentation.

MANAGEMENT

If unsafe abortion is suspected, examine for signs of infection or uterine, vaginal or bowel injury (Table S-2, page S-9) and thoroughly irrigate the vagina to remove any herbs, local medications or caustic substances.

THREATENED ABORTION

- Medical treatment is usually not necessary.
- Advise the woman to avoid strenuous activity and sexual intercourse but bed rest is not necessary.
- If **bleeding stops**, follow up in antenatal clinic. Reassess if bleeding recurs.
- If **bleeding persists**, assess for fetal viability (pregnancy test/ultrasound) or ectopic pregnancy (ultrasound). Persistent bleeding, particularly in the presence of a uterus larger than expected, may indicate twins or molar pregnancy.

Do not give medications such as hormones (e.g. oestrogens or progestins) or tocolytic agents (e.g. salbutamol or indomethacin) as they will not prevent miscarriage.

INEVITABLE ABORTION

- If **pregnancy is less than 16 weeks**, plan for evacuation of uterine contents (**page P-65**). If **evacuation is not immediately possible**:
  - Give ergometrine 0.2 mg IM (repeated after 15 minutes if necessary) OR misoprostol 400 mcg by mouth (repeated once after 4 hours if necessary);
  - Arrange for evacuation of uterus as soon as possible.
- If **pregnancy is greater than 16 weeks**:
  - Await spontaneous expulsion of products of conception and then evacuate the uterus to remove any remaining products of conception (**page P-65**);
  - If necessary, infuse oxytocin 40 units in 1 L IV fluids (normal saline or Ringer's lactate) at 40 drops per minute to help achieve expulsion of products of conception.
- Ensure follow-up of the woman after treatment (**page S-12**).

INCOMPLETE ABORTION

- If **bleeding is light to moderate** and **pregnancy is less than 16 weeks**, use fingers or ring (or sponge) forceps to remove products of conception protruding through the cervix.

- If **bleeding is heavy** and **pregnancy is less than 16 weeks**, evacuate the uterus:
  - Manual vacuum aspiration is the preferred method of evacuation (**page P-65**). Evacuation by sharp curettage should only be done if manual vacuum aspiration is not available (**page P-61**);
  - If **evacuation is not immediately possible**, give ergometrine 0.2 mg IM (repeated after 15 minutes if necessary) OR misoprostol 400 mcg orally (repeated once after 4 hours if necessary).
- If **pregnancy is greater than 16 weeks**:
  - Infuse oxytocin 40 units in 1 L IV fluids (normal saline or Ringer's lactate) at 40 drops per minute until expulsion of products of conception occurs;
  - If necessary, give misoprostol 200 mcg vaginally every 4 hours until expulsion, but do not administer more than 800 mcg;
  - Evacuate any remaining products of conception from the uterus (**page P-65**).
- Ensure follow-up of the woman after treatment (see below).

COMPLETE ABORTION

- Evacuation of the uterus is usually not necessary.
- Observe for heavy bleeding.
- Ensure follow-up of the woman after treatment (see below).

FOLLOW-UP OF WOMEN WHO HAVE HAD AN ABORTION

Before discharge, tell a woman who has had a spontaneous abortion that spontaneous abortion is common and occurs in at least 15% (one in every seven) of clinically recognized pregnancies. Also reassure the woman that the chances for a subsequent successful pregnancy are good unless there has been sepsis or a cause of the abortion is identified that may have an adverse effect on future pregnancies (this is rare).

Some women may want to become pregnant soon after having an incomplete abortion. The woman should be encouraged to delay the next pregnancy until she is completely recovered.

It is important to counsel women who have had an unsafe abortion. If **pregnancy is not desired**, certain methods of family planning (**Table S-3, page S-13**) can be started immediately (within 7 days) provided:

- There are no severe complications requiring further treatment;
- The woman receives adequate counselling and help in selecting the most appropriate family planning method.

TABLE S-3 Family planning methods

Type of Contraceptive	Advise to Start
Hormonal (pills, injections, implants)	• Immediately
Condoms	• Immediately
Intrauterine device (IUD)	• Immediately • If infection is present or suspected, delay insertion until it is cleared • If Hb is less than 7 g/dL, delay until anaemia improves • Provide an interim method (e.g. condom)
Voluntary tubal ligation	• Immediately • If infection is present or suspected, delay surgery until it is cleared • If Hb is less than 7 g/dL, delay until anaemia improves • Provide an interim method (e.g. condom)

Also identify any other reproductive health services that a woman may need. For example some women may need:

- tetanus prophylaxis or tetanus booster;
- treatment for sexually transmitted diseases (STDs);
- cervical cancer screening.

ECTOPIC PREGNANCY

An ectopic pregnancy is one in which implantation occurs outside the uterine cavity. The fallopian tube is the most common site of ectopic implantation (greater than 90%).

Symptoms and signs are extremely variable depending on whether or not the pregnancy has ruptured (**Table S-4, page S-14**). Culdocentesis (cul-de-sac puncture, **page P-69**) is an important tool for the diagnosis of ruptured ectopic pregnancy, but is less useful than a serum pregnancy test combined with ultrasonography. If **non-clotting blood is obtained**, begin immediate management.

TABLE S-4 Symptoms and signs of ruptured and unruptured ectopic pregnancy

Unruptured Ectopic Pregnancy	Ruptured Ectopic Pregnancy
• Symptoms of early pregnancy (irregular spotting or bleeding, nausea, swelling of breasts, bluish discoloration of vagina and cervix, softening of cervix, slight uterine enlargement, increased urinary frequency) • Abdominal and pelvic pain	• Collapse and weakness • Fast, weak pulse (110 per minute or more) • Hypotension • Hypovolaemia • Acute abdominal and pelvic pain • Abdominal distension[a] • Rebound tenderness • Pallor

[a] Distended abdomen with shifting dullness may indicate free blood.

DIFFERENTIAL DIAGNOSIS

The most common differential diagnosis for ectopic pregnancy is threatened abortion. Others are acute or chronic PID, ovarian cysts (torsion or rupture) and acute appendicitis.

If available, ultrasound may help distinguish a threatened abortion or twisted ovarian cyst from an ectopic pregnancy.

IMMEDIATE MANAGEMENT

- Cross-match blood and arrange for immediate laparotomy. **Do not wait for blood before performing surgery**.
- At surgery, inspect both ovaries and fallopian tubes:
  - If there is **extensive damage to the tubes**, perform salpingectomy (the bleeding tube and the products of conception are excised together). This is the treatment of choice in most cases (**page P-109**);
  - Rarely, if there is **little tubal damage**, perform salpingostomy (the products of conception can be removed and the tube conserved). This should be done only when the conservation of fertility is very important to the woman, as the risk of another ectopic pregnancy is high (**page P-111**).

AUTOTRANSFUSION

If **significant haemorrhage occurs**, autotransfusion can be used if the **blood is unquestionably fresh and free from infection** (in later stages of

pregnancy, blood is contaminated with amniotic fluid, etc. and should not be used for autotransfusion). The blood can be collected prior to surgery or after the abdomen is opened:

- When the woman is on the operating table prior to surgery and the abdomen is distended with blood, it is sometimes possible to insert a needle through the abdominal wall and collect the blood in a donor set.
- Alternatively, open the abdomen:
  - Scoop the blood into a basin and strain through gauze to remove clots;
  - Clean the top portion of a blood donor bag with antiseptic solution and open it with a sterile blade;
  - Pour the woman's blood into the bag and reinfuse it through a filtered set in the usual way;
  - If a **donor bag with anticoagulant is not available**, add sodium citrate 10 mL to each 90 mL of blood.

SUBSEQUENT MANAGEMENT

- Prior to discharge, provide counselling and advice on prognosis for fertility. Given the increased risk of future ectopic pregnancy, family planning counselling and provision of a family planning method, if desired, is especially important (**Table S-3, page S-13**).
- Correct anaemia with ferrous sulfate or ferrous fumerate 60 mg by mouth daily for 6 months.
- Schedule a follow-up visit at 4 weeks.

MOLAR PREGNANCY

Molar pregnancy is characterized by an abnormal proliferation of chorionic villi.

IMMEDIATE MANAGEMENT

- If the **diagnosis of molar pregnancy is certain**, evacuate the uterus:
  - If **cervical dilatation is needed**, use a paracervical block (**page P-1**);

- Use vacuum aspiration (**page P-65**). Manual vacuum aspiration is safer and associated with less blood loss. The risk of perforation using a metal curette is high;
- Have three syringes cocked and ready for use during the evacuation. The uterine contents are copious and it is important to evacuate them rapidly.

- Infuse oxytocin 20 units in 1 L IV fluids (normal saline or Ringer's lactate) at 60 drops per minute to prevent haemorrhage once evacuation is under way.

SUBSEQUENT MANAGEMENT

- Recommend a hormonal family planning method for at least 1 year to prevent pregnancy (**Table S-3, page S-13**). Voluntary tubal ligation may be offered if the woman has completed her family.
- Follow up every 8 weeks for at least 1 year with urine pregnancy tests because of the risk of persistent trophoblastic disease or choriocarcinoma. If the **urine pregnancy test is not negative after 8 weeks** or **becomes positive again** within the first year, refer the woman to a tertiary care centre for further follow-up and management.

VAGINAL BLEEDING IN LATER PREGNANCY AND LABOUR

PROBLEMS

- Vaginal bleeding after 22 weeks of pregnancy.
- Vaginal bleeding in labour before delivery.

TABLE S-5 Types of bleeding

Type of Bleeding	Probable Diagnosis	Action
Blood-stained mucus (show)	Onset of labour	Proceed with management of normal labour and childbirth, **page C-57**
Any other bleeding	Antepartum haemorrhage	Determine cause (**Table S-6, page S-18**)

GENERAL MANAGEMENT

- **SHOUT FOR HELP.** Urgently mobilize all available personnel.
- Make a rapid evaluation of the general condition of the woman including vital signs (pulse, blood pressure, respiration, temperature).

Do not do a vaginal examination at this stage.

- If **shock is suspected**, immediately begin treatment (**page S-1**). Even if signs of shock are not present, keep shock in mind as you evaluate the woman further because her status may worsen rapidly. If **shock develops**, it is important to begin treatment immediately.
- Start an IV infusion and infuse IV fluids (**page C-21**).

DIAGNOSIS

TABLE S-6 Diagnosis of antepartum haemorrhage

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Bleeding after 22 weeks gestation (may be retained in the uterus) • Intermittent or constant abdominal pain	• Shock • Tense/tender uterus • Decreased/absent fetal movements • Fetal distress or absent fetal heart sounds	**Abruptio placentae, page S-18**
• Bleeding (intra-abdominal and/or vaginal) • Severe abdominal pain (may decrease after rupture)	• Shock • Abdominal distension/ free fluid • Abnormal uterine contour • Tender abdomen • Easily palpable fetal parts • Absent fetal movements and fetal heart sounds • Rapid maternal pulse	**Ruptured uterus, page S-20**
• Bleeding after 22 weeks gestation	• Shock • Bleeding may be precipitated by intercourse • Relaxed uterus • Fetal presentation not in pelvis/lower uterine pole feels empty • Normal fetal condition	**Placenta praevia, page S-21**

MANAGEMENT

ABRUPTIO PLACENTAE

Abruptio placentae is the detachment of a normally located placenta from the uterus before the fetus is delivered.

- Assess clotting status using a bedside clotting test (**page S-2**). Failure of a clot to form after 7 minutes or a soft clot that breaks down easily suggests coagulopathy (**page S-19**).
- Transfuse as necessary, preferably with fresh blood (**page C-23**).
- If **bleeding is heavy** (evident or hidden), deliver as soon as possible:
  - If the **cervix is fully dilated**, deliver by vacuum extraction (**page P-27**);
  - If **vaginal delivery is not imminent**, deliver by caesarean section (**page P-43**).

    Note: In every case of abruptio placentae, be prepared for postpartum haemorrhage (**page S-25**).
- If **bleeding is light to moderate** (the mother is not in immediate danger), the course of action depends on the fetal heart sounds:
  - If **fetal heart rate is normal or absent**, rupture the membranes with an amniotic hook or a Kocher clamp (**page P-17**):
    - If **contractions are poor**, augment labour with oxytocin (**page P-25**);
    - If the **cervix is unfavourable** (firm, thick, closed), perform caesarean section (**page P-43**).
  - If **fetal heart rate is abnormal** (less than 100 or more than 180 beats per minute):
    - Perform rapid vaginal delivery;
    - If **vaginal delivery is not possible**, deliver by immediate caesarean section (**page P-43**).

COAGULOPATHY (CLOTTING FAILURE)

Coagulopathy is both a cause and a result of massive obstetric haemorrhage. It can be triggered by abruptio placentae, fetal death in-utero, eclampsia, amniotic fluid embolism and many other causes. The clinical picture ranges from major haemorrhage, with or without thrombotic complications, to a clinically stable state that can be detected only by laboratory testing.

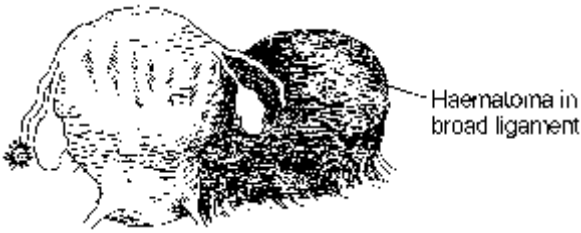
Note: In many cases of acute blood loss, the development of coagulopathy can be prevented if blood volume is restored promptly by infusion of IV fluids (normal saline or Ringer's lactate).

- Treat the possible cause of coagulation failure:
  - abruptio placentae (**page S-18**);
  - eclampsia (**page S-43**).
- Use blood products to help control haemorrhage (**page C-23**):
  - Give fresh whole blood, if available, to replace clotting factors and red cells;
  - If **fresh whole blood is not available**, choose one of the following based on availability:
    - fresh frozen plasma for replacement of clotting factors (15 mL/kg body weight);
    - packed (or sedimented) red cells for red cell replacement;
    - cryoprecipitate to replace fibrinogen;
    - platelet concentrates (if bleeding continues and the platelet count is less than 20 000).

RUPTURED UTERUS

Bleeding from a ruptured uterus may occur vaginally unless the fetal head blocks the pelvis. Bleeding may also occur intra-abdominally. Rupture of the lower uterine segment into the broad ligament, however, will not release blood into the abdominal cavity (**Fig S-2**).

FIGURE S-2 Rupture of lower uterine segment into broad ligament will not release blood into the abdominal cavity



- Restore blood volume by infusing IV fluids (normal saline or Ringer's lactate) before surgery.
- When stable, immediately perform caesarean section and deliver baby and placenta (**page P-43**).
- If the **uterus can be repaired with less operative risk** than hysterectomy would entail and the **edges of the tear are not necrotic**, repair the uterus (**page P-95**). This involves less time and blood loss than hysterectomy.

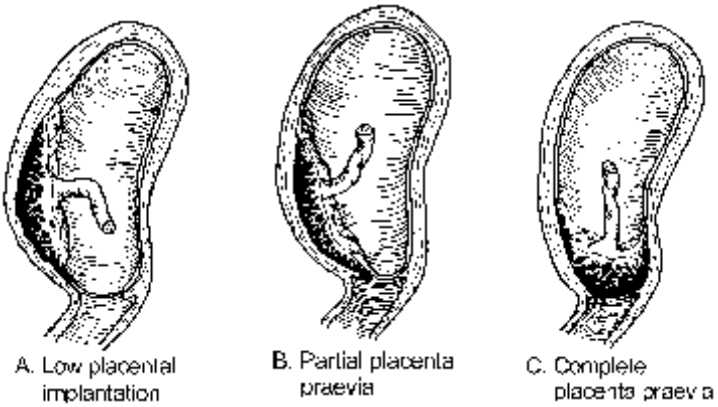
Because there is an increased risk of rupture with subsequent pregnancies, the option of permanent contraception needs to be discussed with the woman after the emergency is over.

- If the **uterus cannot be repaired**, perform subtotal hysterectomy (**page P-103**). If the **tear extends through the cervix and vagina**, total hysterectomy may be required.

PLACENTA PRAEVIA

Placenta praevia is implantation of the placenta at or near the cervix (**Fig S-3**).

FIGURE S-3 Implantation of the placenta at or near the cervix.



Warning: Do not perform a vaginal examination unless preparations have been made for immediate caesarean section. A careful speculum examination may be performed to rule out other causes of bleeding such

as cervicitis, trauma, cervical polyps or cervical malignancy. The presence of these, however, does not rule out placenta praevia.

- Restore blood volume by infusing IV fluids (normal saline or Ringer's lactate).
- Assess the amount of bleeding:
  - If **bleeding is heavy and continuous**, arrange for caesarean delivery irrespective of fetal maturity (**page P-43**);
  - If **bleeding is light or if it has stopped** and the **fetus is alive but premature**, consider expectant management until delivery or heavy bleeding occurs:
    - Keep the woman in the hospital until delivery;
    - Correct anaemia with ferrous sulfate or ferrous fumerate 60 mg by mouth daily for 6 months;
    - Ensure that blood is available for transfusion, if required;
    - If **bleeding recurs**, decide management after weighing benefits and risks for the woman and fetus of further expectant management versus delivery.

CONFIRMING THE DIAGNOSIS

- If a **reliable ultrasound examination** can be performed, localize the placenta. If **placenta praevia is confirmed and the fetus is mature**, plan delivery (**page S-23**).
- If **ultrasound is not available** or the report is unreliable and the **pregnancy is less than 37 weeks**, manage as placenta praevia until 37 weeks.
- If **ultrasound is not available** or the report is unreliable and the **pregnancy is 37 weeks or more**, examine under double set-up to exclude placenta praevia. The double set-up prepares for either vaginal or caesarean delivery, as follows:
  - IV lines are running and cross-matched blood is available;
  - The woman is in the operating theatre with the surgical team present;
  - A high-level disinfected vaginal speculum is used to see the cervix.

- If the **cervix is partly dilated and placental tissue is visible**, confirm placenta praevia and plan delivery (**page S-23**).
- If the **cervix is not dilated**, cautiously palpate the vaginal fornices:
  - If **spongy tissue is felt**, confirm placenta praevia and plan delivery (**page S-23**);
  - If a **firm fetal head is felt**, rule out major placenta praevia and proceed to deliver by induction (**page P-18**).
- If a **diagnosis of placenta praevia is still in doubt**, perform a cautious digital examination:
  - If **soft tissue is felt within the cervix**, confirm placenta praevia and plan delivery (below);
  - If **membranes and fetal parts are felt** both centrally and marginally, rule out placenta praevia and proceed to deliver by induction (**page P-17**).

DELIVERY

- Plan delivery if:
  - the fetus is mature;
  - the fetus is dead or has an anomaly not compatible with life (e.g. anencephaly);
  - the woman's life is at risk because of excessive blood loss.
- If there is **low placental implantation** (**Fig S-3 A**) and **bleeding is light**, vaginal delivery may be possible. Otherwise, deliver by caesarean section (**page P-43**).

  Note: Women with placenta praevia are at high risk for postpartum haemorrhage and placenta accreta/increta, a common finding at the site of a previous caesarean scar.
- If **delivered by caesarean section** and **there is bleeding from the placental site**:
  - Under-run the bleeding sites with sutures;
  - Infuse oxytocin 20 units in 1 L IV fluids (normal saline or Ringer's lactate) at 60 drops per minute.

- If **bleeding occurs during the postpartum period**, initiate appropriate management (**page S-25**). This may include artery ligation (**page P-99**) or hysterectomy (**page P-103**).

VAGINAL BLEEDING AFTER CHILDBIRTH

Vaginal bleeding in excess of 500 mL after childbirth is defined as postpartum haemorrhage (PPH). There are, however, some problems with this definition:

- Estimates of blood loss are notoriously low, often half the actual loss. Blood is mixed with amniotic fluid and sometimes with urine. It is dispersed on sponges, towels and linens, in buckets and on the floor.
- The importance of a given volume of blood loss varies with the woman's haemoglobin level. A woman with a normal haemoglobin level will tolerate blood loss that would be fatal for an anaemic woman.

Even healthy, non-anaemic women can have catastrophic blood loss.

- Bleeding may occur at a slow rate over several hours and the condition may not be recognized until the woman suddenly enters shock.

Risk assessment in the antenatal period does not effectively predict those women who will have PPH. **Active management of the third stage should be practiced on all women in labour since it reduces the incidence of PPH due to uterine atony (page C-73**). All postpartum women must be closely monitored to determine those that have PPH.

PROBLEMS

- Increased vaginal bleeding within the first 24 hours after childbirth (immediate PPH).
- Increased vaginal bleeding following the first 24 hours after childbirth (delayed PPH).

Continuous slow bleeding or sudden bleeding is an emergency; intervene early and aggressively.

GENERAL MANAGEMENT

- **SHOUT FOR HELP.** Urgently mobilize all available personnel.
- Make a rapid evaluation of the general condition of the woman including vital signs (pulse, blood pressure, respiration, temperature).
- If **shock is suspected**, immediately begin treatment (**page S-1**). Even if signs of shock are not present, keep shock in mind as you evaluate the woman further because her status may worsen rapidly. If **shock develops**, it is important to begin treatment immediately.
- Massage the uterus to expel blood and blood clots. Blood clots trapped in the uterus will inhibit effective uterine contractions.
- Give oxytocin 10 units IM.
- Start an IV infusion and infuse IV fluids (**page C-21**).
- Catheterize the bladder.
- Check to see if the placenta has been expelled and examine the placenta to be certain it is complete (**Table S-7, page S-27**).
- Examine the cervix, vagina and perineum for tears.
- After **bleeding is controlled** (24 hours after bleeding stops), determine haemoglobin or haematocrit to check for anaemia:
  - If **haemoglobin is below 7 g/dL** or **haematocrit is below 20%** (severe anaemia):
    - Give ferrous sulfate or ferrous fumerate 120 mg by mouth PLUS folic acid 400 mcg by mouth once daily for 3 months;
    - After 3 months, continue supplementation with ferrous sulfate or ferrous fumerate 60 mg by mouth PLUS folic acid 400 mcg by mouth once daily for 6 months.
  - If **haemoglobin is between 7–11 g/dL**, give ferrous sulfate or ferrous fumerate 60 mg by mouth PLUS folic acid 400 mcg by mouth once daily for 6 months;
  - Where **hookworm is endemic** (prevalence of 20% or more), give one of the following anthelmintic treatments:
    - albendazole 400 mg by mouth once;

- OR mebendazole 500 mg by mouth once or 100 mg two times per day for 3 days;
- OR levamisole 2.5 mg/kg body weight by mouth once daily for 3 days;
- OR pyrantel 10 mg/kg body weight by mouth once daily for 3 days.

- If **hookworm is highly endemic** (prevalence of 50% or more), repeat the anthelmintic treatment 12 weeks after the first dose.

DIAGNOSIS

TABLE S-7 Diagnosis of vaginal bleeding after childbirth

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Immediate PPH[a] • Uterus soft and not contracted	• Shock	**Atonic uterus, page S-28**
• Immediate PPH[a]	• Complete placenta • Uterus contracted	**Tears of cervix, vagina or perineum, page S-31**
• Placenta not delivered within 30 minutes after delivery	• Immediate PPH[a] • Uterus contracted	**Retained placenta, page S-31**
• Portion of maternal surface of placenta missing or torn membranes with vessels	• Immediate PPH[a] • Uterus contracted	**Retained placental fragments, page S-32**
• Uterine fundus not felt on abdominal palpation • Slight or intense pain	• Inverted uterus apparent at vulva • Immediate PPH[b]	**Inverted uterus, page S-33**
• Bleeding occurs more than 24 hours after delivery • Uterus softer and larger than expected for elapsed time since delivery	• Bleeding is variable (light or heavy, continuous or irregular) and foul-smelling • Anaemia	**Delayed PPH, page S-33**

• Immediate PPH[a] (bleeding is intra-abdominal and/or vaginal) • Severe abdominal pain (may decrease after rupture)	• Shock • Tender abdomen • Rapid maternal pulse	**Ruptured uterus, page S-20**

[a] Bleeding may be light if a clot blocks the cervix or if the woman is lying on her back.

[b] There may be no bleeding with complete inversion.

MANAGEMENT

ATONIC UTERUS

An atonic uterus fails to contract after delivery.

- Continue to massage the uterus.
- Use oxytocic drugs which can be given together or sequentially (**Table S-8**).

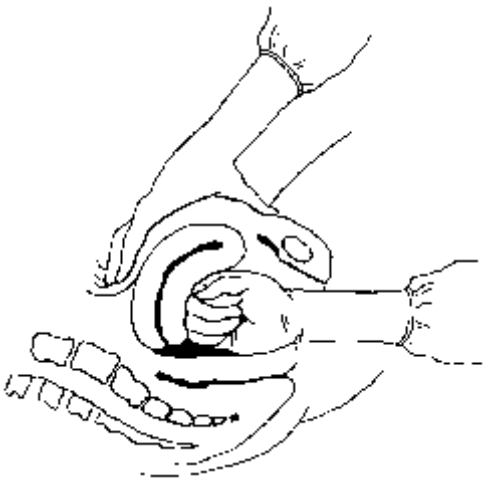
TABLE S-8 Use of oxytocic drugs

	Oxytocin	Ergometrine/ Methyl-ergometrine	15-methyl Prostaglandin $F_{2\alpha}$
Dose and route	IV: Infuse 20 units in 1 L IV fluids at 60 drops per minute IM: 10 units	IM or IV (slowly): 0.2 mg	IM: 0.25 mg
Continuing dose	IV: Infuse 20 units in 1 L IV fluids at 40 drops per minute	Repeat 0.2 mg IM after 15 minutes If required, give 0.2 mg IM or IV (slowly) every 4 hours	0.25 mg every 15 minutes
Maximum dose	Not more than 3 L of IV fluids containing oxytocin	5 doses (Total 1.0 mg)	8 doses (Total 2 mg)
Precautions/ Contrain-dications	Do not give as an IV bolus	Pre-eclampsia, hypertension, heart disease	Asthma

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

- Anticipate the need for blood early, and transfuse as necessary (**page C-23**).
- If **bleeding continues**:
  - Check placenta again for completeness;
  - If there are **signs of retained placental fragments** (absence of a portion of maternal surface or torn membranes with vessels), remove remaining placental tissue (**page S-32**);
  - Assess clotting status using a bedside clotting test (**page S-2**). Failure of a clot to form after 7 minutes or a soft clot that breaks down easily suggests coagulopathy (**page S-19**).
- If **bleeding continues** in spite of management above:
  - Perform bimanual compression of the uterus (**Fig S-4**):
    - Wearing high-level disinfected gloves, insert a hand into the vagina and form a fist;
    - Place the fist into the anterior fornix and apply pressure against the anterior wall of the uterus;
    - With the other hand, press deeply into the abdomen behind the uterus, applying pressure against the posterior wall of the uterus;
    - Maintain compression until bleeding is controlled and the uterus contracts.

FIGURE S-4 Bimanual compression of the uterus



- Alternatively, compress the aorta (**Fig S-5**):
  - Apply downward pressure with a closed fist over the abdominal aorta directly through the abdominal wall:
    - The point of compression is just above the umbilicus and slightly to the left;
    - Aortic pulsations can be felt easily through the anterior abdominal wall in the immediate postpartum period.
  - With the other hand, palpate the femoral pulse to check the adequacy of compression:
    - If the **pulse is palpable during compression**, the pressure exerted by the fist is inadequate;
    - If the **femoral pulse is not palpable**, the pressure exerted is adequate;
  - Maintain compression until bleeding is controlled.

FIGURE S-5 Compression of abdominal aorta and palpation of femoral pulse

Packing the uterus is ineffective and wastes precious time.

- If **bleeding continues** in spite of compression:
  - Perform uterine and utero-ovarian artery ligation (**page P-99**);
  - If **life-threatening bleeding continues** after ligation, perform subtotal hysterectomy (**page P-103**).

TEARS OF CERVIX, VAGINA OR PERINEUM

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

- Examine the woman carefully and repair tears to the cervix (**page P-81**) or vagina and perineum (**page P-83**).
- If **bleeding continues**, assess clotting status using a bedside clotting test (**page S-2**). Failure of a clot to form after 7 minutes or a soft clot that breaks down easily suggests coagulopathy (**page S-19**).

RETAINED PLACENTA

There may be no bleeding with retained placenta.

- If **you can see the placenta**, ask the woman to push it out. If **you can feel the placenta** in the vagina, remove it.
- Ensure that the bladder is empty. Catheterize the bladder, if necessary.
- If the **placenta is not expelled**, give oxytocin 10 units IM if not already done for active management of the third stage.

Do not give ergometrine because it causes tonic uterine contraction, which may delay expulsion.

- If the **placenta is undelivered after 30 minutes of oxytocin** stimulation and the **uterus is contracted**, attempt controlled cord traction (**page C-74**).

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

- If **controlled cord traction is unsuccessful**, attempt manual removal of placenta (**page P-77**).

  Note: Very adherent tissue may be placenta accreta. Efforts to extract a placenta that does not separate easily may result in heavy bleeding or uterine perforation which usually requires hysterectomy.

- If **bleeding continues**, assess clotting status using a bedside clotting test (**page S-2**). Failure of a clot to form after 7 minutes or a soft clot that breaks down easily suggests coagulopathy (**page S-19**).

- If **there are signs of infection** (fever, foul-smelling vaginal discharge), give antibiotics as for metritis (**page S-110**).

RETAINED PLACENTAL FRAGMENTS

There may be no bleeding with retained placental fragments.

When a portion of the placenta—one or more lobes—is retained, it prevents the uterus from contracting effectively.

- Feel inside the uterus for placental fragments. Manual exploration of the uterus is similar to the technique described for removal of the retained placenta (**page P-77**).

- Remove placental fragments by hand, ovum forceps or large curette.

  Note: Very adherent tissue may be placenta accreta. Efforts to extract fragments that do not separate easily may result in heavy bleeding or uterine perforation which usually requires hysterectomy.

- If **bleeding continues**, assess clotting status using a bedside clotting test (**page S-2**). Failure of a clot to form after 7 minutes or a soft clot that breaks down easily suggests coagulopathy (**page S-19**).

INVERTED UTERUS

The uterus is said to be inverted if it turns inside-out during delivery of the placenta. Repositioning the uterus should be performed immediately (**page P-91**). With the passage of time the constricting ring around the inverted uterus becomes more rigid and the uterus more engorged with blood.

- If the **woman is in severe pain**, give pethidine 1 mg/kg body weight (but not more than 100 mg) IM or IV slowly or give morphine 0.1 mg/kg body weight IM.

  Note: Do not give oxytocic drugs until the inversion is corrected.

- If **bleeding continues**, assess clotting status using a bedside clotting test (**page S-2**). Failure of a clot to form after 7 minutes or a soft clot that breaks down easily suggests coagulopathy (**page S-19**).

- 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 **there are signs of infection** (fever, foul-smelling vaginal discharge), give antibiotics as for metritis (**page S-110**).

- If **necrosis is suspected**, perform vaginal hysterectomy. This may require referral to a tertiary care centre.

DELAYED ("SECONDARY") POSTPARTUM HAEMORRHAGE

- If **anaemia is severe** (haemoglobin less than 7 g/dL or haematocrit less than 20%), arrange for a transfusion (**page C-23**) and provide oral iron and folic acid (**page S-26**).

- If **there are signs of infection** (fever, foul-smelling vaginal discharge), give antibiotics as for metritis (**page S-110**).

Prolonged or delayed PPH may be a sign of metritis.

- Give oxytocic drugs (**Table S-8, page S-28**).

- If the **cervix is dilated**, explore by hand to remove large clots and placental fragments. Manual exploration of the uterus is similar to the technique described for removal of the retained placenta (**page P-77**).
- If the **cervix is not dilated**, evacuate the uterus to remove placental fragments (**page P-65**).
- Rarely, if **bleeding continues**, consider uterine and utero-ovarian artery ligation (**page P-99**) or hysterectomy (**page P-103**).
- Perform histologic examination of curettings or hysterectomy specimen, if possible, to rule out trophoblastic tumour.

HEADACHE, BLURRED VISION, CONVULSIONS OR LOSS OF CONSCIOUSNESS, ELEVATED BLOOD PRESSURE

PROBLEMS

- A pregnant woman or a woman who recently delivered complains of severe headache or blurred vision.
- A pregnant woman or a woman who recently delivered is found unconscious or having convulsions (seizures).
- A pregnant woman has elevated blood pressure.

GENERAL MANAGEMENT

- If a **woman is unconscious or convulsing, SHOUT FOR HELP.** Urgently mobilize all available personnel.
- Make a rapid evaluation of the general condition of the woman including vital signs (pulse, blood pressure, respiration) while simultaneously finding out the history of her present and past illnesses either from her or from her relatives.
- If she is **not breathing** or **her breathing is shallow**:
  - Check airway and intubate if required;
  - If she is **not breathing**, assist ventilation using Ambu bag and mask or give oxygen at 4–6 L per minute via endotracheal tube;
  - If she **is breathing**, give oxygen at 4–6 L per minute by mask or nasal cannulae.
- If she is **unconscious**:
  - Check airway and temperature;
  - Position her on her left side;
  - Check for neck rigidity.
- If she is **convulsing**:
  - Position her on her left side to reduce the risk of aspiration of secretions, vomit and blood;

- Protect her from injuries (fall), but do not attempt to restrain her;
- Provide constant supervision;
- If **eclampsia is diagnosed** (**Table S-9, page S-38**), give magnesium sulfate (**Box S-3, page S-45**);
- If the **cause of convulsions has not been determined**, manage as eclampsia and continue to investigate other causes.

DIAGNOSIS OF HYPERTENSIVE DISORDERS

The hypertensive disorders of pregnancy include pregnancy-induced hypertension and chronic hypertension (elevation of the blood pressure before 20 weeks gestation). Headaches, blurred vision, convulsions and loss of consciousness are often associated with hypertension in pregnancy, but are not necessarily specific to it. Other conditions that may cause convulsions or coma include epilepsy, complicated malaria, head injury, meningitis, encephalitis, etc. See **Table S-9, page S-38** for more information on diagnosis.

- Diastolic blood pressure is a good indicator of prognosis for the management of hypertensive disorders in pregnancy:
  - Diastolic blood pressure is taken at the point at which the arterial sound disappears:
    - A falsely high reading is obtained if the cuff does not encircle at least three-fourths of the circumference of the arm;
    - A wider cuff should be used when the diameter of the upper arm is more than 30 cm;
  - Diastolic blood pressure measures peripheral resistance and does not vary with the woman's emotional state to the degree that systolic pressure does.
- If the **diastolic blood pressure is 90 mm Hg or more** on two consecutive readings taken 4 hours or more apart, diagnose hypertension (If **urgent delivery must take place** or if the **diastolic blood pressure is 110 mm Hg or more**, a time interval of less than 4 hours is acceptable):

- If hypertension occurs **after 20 weeks of gestation**, **during labour and/or within 48 hours of delivery** it is classified as pregnancy-induced hypertension;
- If hypertension occurs **before 20 weeks of gestation**, it is classified as chronic hypertension.

PROTEINURIA

The presence of proteinuria changes the diagnosis from pregnancy-induced hypertension to pre-eclampsia. Other conditions cause proteinuria and false positive results are possible. Urinary infection, severe anaemia, heart failure and difficult labour may all cause proteinuria. Blood in the urine due to catheter trauma, schistosomiasis and contamination from vaginal blood could give false positive results.

Random urine sampling such as the dipstick test for protein is a useful screening tool. A change from negative to positive during pregnancy is a warning sign. If **dipsticks are not available**, a sample of urine can be heated to boiling in a clean test tube. Add a drop of 2% acetic acid to check for persistent precipitates that can be quantified as a percentage of protein to the volume of the total sample. Vaginal secretions or amniotic fluid may contaminate urine specimens. Only clean-catch mid-stream specimens should be used. Catheterization for this purpose is not justified due to the risk of urinary tract infection.

Diastolic blood pressure alone is an accurate indicator of hypertension in pregnancy. Elevated blood pressure and proteinuria, however, define pre-eclampsia.

PREGNANCY-INDUCED HYPERTENSION

Women with pregnancy-induced hypertension disorders may progress from mild disease to a more serious condition. The classes of pregnancy-induced hypertension are:

- hypertension without proteinuria or oedema;
- mild pre-eclampsia;
- severe pre-eclampsia;
- eclampsia.

TABLE S-9 Diagnosis of headache, blurred vision, convulsions or loss of consciousness, elevated blood pressure

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Diastolic blood pressure 90 mm Hg or more before first 20 weeks of gestation		**Chronic hypertension, page S-49**
• Diastolic blood pressure 90–110 mm Hg before 20 weeks of gestation • Proteinuria up to 2+		**Chronic hypertension with superimposed mild pre-eclampsia, page S-42**
• Two readings of diastolic blood pressure 90–110 mm Hg 4 hours apart after 20 weeks gestation • No proteinuria		**Pregnancy-induced hypertension, page S-41**
• Two readings of diastolic blood pressure 90–110 mm Hg 4 hours apart after 20 weeks gestation • Proteinuria up to 2+		**Mild pre-eclampsia, page S-42**
• Diastolic blood pressure 110 mm Hg or more after 20 weeks gestation • Proteinuria 3+ or more	• Hyperreflexia • Headache (increasing frequency, unrelieved by regular analgesics) • Clouding of vision • Oliguria (passing less than 400 mL urine in 24 hours) • Upper abdominal pain (epigastric pain or pain in right upper quadrant) • Pulmonary oedema	**Severe pre-eclampsia[a], page S-43**
• Convulsions • Diastolic blood pressure 90 mm Hg or more after 20 weeks gestation • Proteinuria 2+ or more	• Coma (unconscious) • Other symptoms and signs of severe pre-eclampsia	**Eclampsia, page S-43**

• Trismus (difficulty opening mouth and chewing)	• Spasms of face, neck, trunk • Arched back • Board-like abdomen • Spontaneous violent spasms	**Tetanus, page S-50**

[a] If a woman has any one of the symptoms or signs listed under severe pre-eclampsia, diagnose severe pre-eclampsia.

TABLE S-9 Cont. Diagnosis of headache, blurred vision, convulsions or loss of consciousness and elevated blood pressure

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Convulsions • Past history of convulsions • Normal blood pressure		**Epilepsy[b], page S-51**
• Fever • Chills/rigors • Headache • Muscle/joint pain	• Enlarged spleen	**Uncomplicated malaria, page S-103**
• Symptoms and signs of uncomplicated malaria • Coma • Anaemia	• Convulsions • Jaundice	**Severe/complicated malaria, page S-52**
• Headache • Stiff neck • Photophobia • Fever	• Convulsions • Confusion • Drowsiness • Coma	**Meningitis[b,c]** or **Encephalitis[b,c]**
• Headache • Blurred vision	• Vomiting	**Migraine[d]**

[b] If a diagnosis of eclampsia cannot be ruled out, continue treatment for eclampsia.
[c] Examine spinal fluid and give appropriate treatment for meningitis or encephalitis.
[d] Give analgesics (e.g. paracetamol 500 mg by mouth as needed).

A small proportion of women with eclampsia have normal blood pressure. Treat all women with convulsions as if they have eclampsia until another diagnosis is confirmed.

Remember:

- Mild pre-eclampsia often has no symptoms.
- Increasing proteinuria is a sign of worsening pre-eclampsia.
- Oedema of the feet and lower extremities is not considered a reliable sign of pre-eclampsia.

In pregnancy-induced hypertension, there may be no symptoms and the only sign may be hypertension.

- Mild pre-eclampsia may progress rapidly to severe pre-eclampsia. The risk of complications, including eclampsia, increases greatly in severe pre-eclampsia.
- Convulsions with signs of pre-eclampsia indicates eclampsia. These convulsions:
  - can occur regardless of the severity of hypertension;
  - are difficult to predict and typically occur in the absence of hyperreflexia, headache or visual changes;
  - occur after childbirth in about 25% of cases;
  - are tonic-clonic and resemble grand mal convulsions of epilepsy;
  - may recur in rapid sequence, as in status epilepticus, and may end in death;
  - will not be observed if the woman is alone;
  - may be followed by coma that lasts minutes or hours depending on the frequency of convulsions.

Do not give ergometrine to women with pre-eclampsia, eclampsia or high blood pressure because it increases the risk of convulsions and cerebrovascular accidents.

MANAGEMENT OF PREGNANCY-INDUCED HYPERTENSION

Box S-2 Prevention of pregnancy-induced hypertension

- Restricting calories, fluids and salt intake does **NOT** prevent pregnancy-induced hypertension and may even be harmful to the fetus.
- The beneficial effects of aspirin, calcium and other agents in preventing pregnancy-induced hypertension have not yet been proven.
- **Early detection and management** in women with risk factors is critical to the management of pregnancy-induced hypertension and the prevention of convulsions. These women should be followed up regularly and given clear instructions on when to return to their health care provider. Education of immediate family members is equally important, not only so that they understand the significance of signs of pregnancy-induced hypertension progression but also to increase social support when hospitalization and changes in work activities are needed.

PREGNANCY-INDUCED HYPERTENSION

Manage on an outpatient basis:

- Monitor blood pressure, urine (for proteinuria) and fetal condition weekly.
- If **blood pressure worsens**, manage as mild pre-eclampsia (**page S-42**).
- If there are **signs of severe fetal growth restriction or fetal compromise**, admit the woman to the hospital for assessment and possible expedited delivery.
- Counsel the woman and her family about danger signals indicating pre-eclampsia or eclampsia.
- If all **observations remain stable**, allow to proceed with normal labour and childbirth (**page C-57**).

MILD PRE-ECLAMPSIA

GESTATION LESS THAN 37 WEEKS

If **signs remain unchanged or normalize**, follow up twice a week as an outpatient:

- Monitor blood pressure, urine (for proteinuria), reflexes and fetal condition.
- Counsel the woman and her family about danger signals of severe pre-eclampsia or eclampsia.
- Encourage additional periods of rest.
- Encourage the woman to eat a normal diet (salt restriction should be discouraged).
- Do not give anticonvulsants, antihypertensives, sedatives or tranquillizers.
- If **follow-up as an outpatient is not possible**, admit the woman to the hospital:
  - Provide a normal diet (salt restriction should be discouraged);
  - Monitor blood pressure (twice daily) and urine for proteinuria (daily);
  - Do not give anticonvulsants, antihypertensives, sedatives or tranquillizers unless blood pressure or urinary protein level increases;
  - Do not give diuretics. Diuretics are harmful and only indicated for use in pre-eclampsia with pulmonary oedema or congestive heart failure;
  - If the **diastolic pressure decreases to normal** levels or her **condition remains stable**, send the woman home:
    - Advise her to rest and to watch out for significant swelling or symptoms of severe pre-eclampsia;
    - See her twice weekly to monitor blood pressure, urine (for proteinuria) and fetal condition and to assess for symptoms and signs of severe pre-eclampsia;
    - If **diastolic pressure rises** again, readmit her;

- If the **signs remain unchanged**, keep the woman in the hospital. Continue the same management and monitor fetal growth by symphysis-fundal height;
- If there are **signs of growth restriction**, consider early delivery. If not, continue hospitalization until term.

- If **urinary protein level increases**, manage as severe pre-eclampsia (see below).

Note: Symptoms and signs of pre-eclampsia do not completely disappear until after pregnancy ends.

GESTATION MORE THAN 37 COMPLETE WEEKS

If there are **signs of fetal compromise**, assess the cervix (**page P-18**) and expedite delivery:

- If the **cervix is favourable** (soft, thin, partly dilated), rupture the membranes with an amniotic hook or a Kocher clamp and induce labour using oxytocin or prostaglandins (**page P-17**).
- If the **cervix is unfavourable** (firm, thick, closed), ripen the cervix using prostaglandins or a Foley catheter (**page P-24**) or deliver by caesarean section (**page P-43**).

SEVERE PRE-ECLAMPSIA AND ECLAMPSIA

Severe pre-eclampsia and eclampsia are managed similarly with the exception that delivery must occur within 12 hours of onset of convulsions in eclampsia. **ALL cases of severe pre-eclampsia should be managed actively**. Symptoms and signs of “impending eclampsia” (blurred vision, hyperreflexia) are unreliable and expectant management is not recommended.

MANAGEMENT DURING A CONVULSION

- Give anticonvulsive drugs (**page S-44**).
- Gather equipment (airway, suction, mask and bag, oxygen) and give oxygen at 4–6 L per minute.
- Protect the woman from injury but do not actively restrain her.
- Place the woman on her left side to reduce risk of aspiration of secretions, vomit and blood.

- After the convulsion, aspirate the mouth and throat as necessary.

GENERAL MANAGEMENT

- If **diastolic blood pressure remains above 110 mm Hg**, give antihypertensive drugs (**page S-46**). Reduce the diastolic blood pressure to less than 100 mm Hg but not below 90 mm Hg.
- Start an IV infusion and infuse IV fluids (**page C-21**).
- Maintain a strict fluid balance chart and monitor the amount of fluids administered and urine output to ensure that there is no fluid overload.
- Catheterize the bladder to monitor urine output and proteinuria.
- If **urine output is less than 30 mL per hour**:
  - Withhold magnesium sulfate and infuse IV fluids (normal saline or Ringer's lactate) at 1 L in 8 hours;
  - Monitor for the development of pulmonary oedema.
- **Never leave the woman alone**. A convulsion followed by aspiration of vomit may cause death of the woman and fetus.
- Observe vital signs, reflexes and fetal heart rate hourly.
- Auscultate the lung bases hourly for rales indicating pulmonary oedema. If **rales are heard**, withhold fluids and give frusemide 40 mg IV once.
- Assess clotting status with a bedside clotting test (**page S-2**). Failure of a clot to form after 7 minutes or a soft clot that breaks down easily suggests coagulopathy (**page S-19**).

ANTICONVULSIVE DRUGS

A key factor in anticonvulsive therapy is adequate administration of anticonvulsive drugs. Convulsions in hospitalized women are most frequently caused by under-treatment. **Magnesium sulfate is the drug of choice for preventing and treating convulsions in severe pre-eclampsia and eclampsia**. Administration is outlined in **Box S-3, page S-45**.

If **magnesium sulfate is not available**, diazepam may be used although there is a greater risk for neonatal respiratory depression because diazepam passes the placenta freely. A single dose of diazepam to abort a convulsion seldom causes neonatal respiratory depression. Long-term continuous IV administration increases the risk of respiratory depression in babies who may already be suffering from the effects of

utero-placental ischaemia and preterm birth. The effect may last several days. Administration of diazepam is outlined in **Box S-4, page S-46**.

BOX S-3 Magnesium sulfate schedules for severe pre-eclampsia and eclampsia

Loading dose

- Magnesium sulfate 20% solution, 4 g IV over 5 minutes.
- Follow promptly with 10 g of 50% magnesium sulfate solution, 5 g in each buttock as deep IM injection with 1 mL of 2% lignocaine in the same syringe. Ensure that aseptic technique is practiced when giving magnesium sulfate deep IM injection. Warn the woman that a feeling of warmth will be felt when magnesium sulfate is given.
- If **convulsions recur after 15 minutes**, give 2 g magnesium sulfate (50% solution) IV over 5 minutes.

Maintenance dose

- 5 g magnesium sulfate (50% solution) + 1 mL lignocaine 2% IM every 4 hours into alternate buttocks.
- Continue treatment with magnesium sulfate for 24 hours after delivery or the last convulsion, whichever occurs last.

Before repeat administration, ensure that:

- Respiratory rate is at least 16 per minute.
- Patellar reflexes are present.
- Urinary output is at least 30 mL per hour over 4 hours.

WITHHOLD OR DELAY DRUG IF:

- Respiratory rate falls below 16 per minute.
- Patellar reflexes are absent.
- Urinary output falls below 30 mL per hour over preceding 4 hours.

Keep antidote ready

- In case of respiratory arrest:
  Assist ventilation (mask and bag, anaesthesia apparatus, intubation).
  Give calcium gluconate 1 g (10 mL of 10% solution) IV slowly until respiration begins to antagonize the effects of magnesium sulfate.

BOX S-4 Diazepam schedules for severe pre-eclampsia and eclampsia

Note: Use diazepam only if magnesium sulfate is not available.

Intravenous administration

Loading dose

- Diazepam 10 mg IV slowly over 2 minutes.
- If **convulsions recur**, repeat loading dose.

Maintenance dose

- Diazepam 40 mg in 500 mL IV fluids (normal saline or Ringer's lactate) titrated to keep the woman sedated but rousable.
- Maternal respiratory depression may occur when dose exceeds 30 mg in 1 hour:

  Assist ventilation (mask and bag, anaesthesia apparatus, intubation), if necessary.

  Do not give more than 100 mg in 24 hours.

Rectal administration

- Give diazepam rectally when IV access is not possible. The loading dose is 20 mg in a 10 mL syringe. Remove the needle, lubricate the barrel and insert the syringe into the rectum to half its length. Discharge the contents and leave the syringe in place, holding the buttocks together for 10 minutes to prevent expulsion of the drug. Alternatively, the drug may be instilled in the rectum through a catheter.
- If **convulsions are not controlled within 10 minutes**, administer an additional 10 mg per hour or more, depending on the size of the woman and her clinical response.

ANTIHYPERTENSIVE DRUGS

If the **diastolic pressure is 110 mm Hg or more**, give antihypertensive drugs. The goal is to keep the diastolic pressure between 90 mm Hg and 100 mm Hg to prevent cerebral haemorrhage. Hydralazine is the drug of choice.

- Give hydralazine 5 mg IV slowly every 5 minutes until blood pressure is lowered. Repeat hourly as needed or give hydralazine 12.5 mg IM every 2 hours as needed.
- If **hydralazine is not available**, give:
  - labetolol 10 mg IV:

- If **response is inadequate** (diastolic blood pressure remains above 110 mm Hg) after 10 minutes, give labetolol 20 mg IV;
- Increase the dose to 40 mg and then 80 mg if satisfactory response is not obtained after 10 minutes of each dose;

- OR nifedipine 5 mg under the tongue:
- If **response is inadequate** (diastolic pressure remains above 110 mm Hg) after 10 minutes, give an additional 5 mg under the tongue.

Note: There is concern regarding a possibility for an interaction with magnesium sulfate that can lead to hypotension.

DELIVERY

Delivery should take place as soon as the woman's condition has stabilized. Delaying delivery to increase fetal maturity will risk the lives of both the woman and the fetus. Delivery should occur regardless of the gestational age.

In severe pre-eclampsia, delivery should occur within 24 hours of the onset of symptoms. In eclampsia, delivery should occur within 12 hours of the onset of convulsions.

- Assess the cervix (**page P-18**).
- If the **cervix is favourable** (soft, thin, partly dilated), rupture the membranes with an amniotic hook or a Kocher clamp and induce labour using oxytocin or prostaglandins (**page P-17**).
- If **vaginal delivery is not anticipated** within 12 hours (for eclampsia) or 24 hours (for severe pre-eclampsia), deliver by caesarean section (**page P-43**).
- If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute), deliver by caesarean section (**page P-43**).
- If the **cervix is unfavourable** (firm, thick, closed) and the **fetus is alive**, deliver by caesarean section (**page P-43**).
- If **safe anaesthesia is not available for caesarean section** or if the **fetus is dead or too premature for survival**:
  - Aim for vaginal delivery;

- If the **cervix is unfavourable** (firm, thick, closed), ripen the cervix using misoprostol, prostaglandins or a Foley catheter (**page P-24**).

Note: If **caesarean section is performed**, ensure that:

- Coagulopathy has been ruled out;
- Safe general anaesthesia is available. Spinal anaesthesia is associated with the risk of hypotension. This risk can be reduced if adequate IV fluids (500–1 000 mL) are infused prior to administration of the anaesthetic (**page P-11**).

Do not use local anaesthesia or ketamine in women with pre-eclampsia or eclampsia.

POSTPARTUM CARE

- Anticonvulsive therapy should be maintained for 24 hours after delivery or the last convulsion, whichever occurs last.
- Continue antihypertensive therapy as long as the diastolic pressure is 110 mm Hg or more.
- Continue to monitor urine output.

REFERRAL FOR TERTIARY LEVEL CARE

Consider referral of women who have:

- oliguria that persists for 48 hours after delivery;
- coagulation failure [e.g. coagulopathy (**page S-19**) or haemolysis, elevated liver enzymes and low platelets (HELLP) syndrome];
- persistent coma lasting more than 24 hours after convulsion.

COMPLICATIONS OF PREGNANCY-INDUCED HYPERTENSION

Complications may cause adverse perinatal and maternal outcomes. Because complications are often difficult to treat, efforts should be made to prevent them by early diagnosis and proper management. Health care providers should be aware that management can also lead to complications. Manage complications as follows:

- If **fetal growth restriction is severe**, expedite delivery.
- If there is **increasing drowsiness or coma**, suspect cerebral haemorrhage:
  - Reduce blood pressure slowly to reduce the risk of cerebral haemorrhage;
  - Provide supportive therapy.
- If **heart, kidney or liver failure is suspected**, provide supportive therapy and observe.
- If a clotting test shows **failure of a clot to form after 7 minutes or a soft clot that breaks down easily**, suspect coagulopathy (**page S-19**).
- If the **woman has IV lines and catheters**, she is prone to infection. Use proper infection prevention techniques (**page C-17**) and closely monitor for signs of infection.
- If the **woman is receiving IV fluids**, she is at risk of circulatory overload. Maintain a strict fluid balance chart and monitor the amount of fluids administered and urine output.

CHRONIC HYPERTENSION

- Encourage additional periods of rest.
- High levels of blood pressure maintain renal and placental perfusion in chronic hypertension; reducing blood pressure will result in diminished perfusion. Blood pressure should not be lowered below its pre-pregnancy level. There is no evidence that aggressive treatment to lower the blood pressure to normal levels improves either fetal or maternal outcome:
  - If the woman was on **anti-hypertensive medication before pregnancy** and the **disease is well-controlled**, continue the same medication if acceptable in pregnancy;
  - If **diastolic blood pressure is 110 mm Hg or more**, or systolic blood pressure is 160 mm Hg or more, treat with antihypertensive drugs (**page S-46**);
  - If **proteinuria or other signs and symptoms are present**, consider superimposed pre-eclampsia and manage as mild pre-eclampsia (**page S-42**).

- Monitor fetal growth and condition.
- If there are **no complications**, deliver at term.
- If **pre-eclampsia develops**, manage as mild pre-eclampsia (**page S-42**) or severe pre-eclampsia (**page S-43**).
- If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute), suspect fetal distress (**page S-95**).
- If **fetal growth restriction is severe** and **pregnancy dating is accurate**, assess the cervix (**page P-18**) and consider delivery:

  Note: Assessment of gestation by ultrasound in late pregnancy is not accurate.

  - If the **cervix is favourable** (soft, thin, partly dilated), rupture the membranes with an amniotic hook or a Kocher clamp and induce labour using oxytocin or prostaglandins (**page P-17**);
  - If the **cervix is unfavourable** (firm, thick, closed), ripen the cervix using prostaglandins or a Foley catheter (**page P-24**).
- Observe for complications including abruptio placentae (**page S-18**) and superimposed pre-eclampsia (see **Mild pre-eclampsia, page S-42**).

TETANUS

Clostridium tetani may enter the uterine cavity on unclean instruments or hands, particularly during non-professional abortions or non-institutional deliveries. The newborn is usually infected from unclean instruments used in cutting the cord or from contaminated substances applied as traditional cord dressings.

Treatment should begin as soon as possible.

- Control spasms with diazepam 10 mg IV slowly over 2 minutes. If **spasms are severe**, the woman may have to be paralyzed and put on a ventilator. This may be possible only at a tertiary care centre.
- Provide general care:
  - Nurse in a quiet room but monitor closely;
  - Avoid unnecessary stimuli;
  - Maintain hydration and nutrition;

- Treat secondary infection.

- Give tetanus antitoxin 3 000 units IM to neutralize absorbed toxin.
- Prevent further production of toxin:
  - Remove the cause of sepsis (e.g. remove infected tissue from uterine cavity in a septic abortion);
  - Give benzyl penicillin 2 million units IV every 4 hours for 48 hours, then give ampicillin 500 mg by mouth three times per day for 10 days.

BOX S-5 Tetanus immunization

When the mother has active immunity, the antibodies pass through the placenta, protecting the newborn. A woman is considered protected when she has received two vaccine doses at least 4 weeks apart and with an interval of at least 4 weeks between the last vaccine dose and pregnancy termination. Women who have received a vaccination series (five injections) more than 10 years before the present pregnancy should be given a booster. In most women a booster is recommended in every pregnancy.

If an immunized woman has had an **unsafe abortion** or unhygienic delivery, give her a booster injection of tetanus toxoid 0.5 mL IM. If she **has not been immunized before**, give her anti-tetanus serum 1 500 units IM followed by a booster injection of tetanus toxoid 0.5 mL IM after 4 weeks.

EPILEPSY

Women with epilepsy can present with convulsions in pregnancy. Like many chronic diseases, epilepsy worsens in some women during pregnancy but improves in others. In the majority of women, however, epilepsy is unaffected by pregnancy.

- Observe the woman closely. In general, pregnant women with epilepsy have an increased risk of:
  - pregnancy-induced hypertension;
  - preterm labour;
  - infants with low birth weights;
  - infants with congenital malformations;
  - perinatal mortality.
- Aim to control epilepsy with the smallest dose of a single drug. Avoid drugs in early pregnancy which are associated with congenital malformations (e.g. valproic acid).
- If the **woman is convulsing**, give diazepam 10 mg IV slowly over 2 minutes. Repeat if convulsions recur after 10 minutes.

- If **convulsions continue** (status epilepticus), infuse phenytoin 1 g (approximately 18 mg/kg body weight) in 50–100 mL normal saline over 30 minutes (final concentration not to exceed 10 mg per mL):

  Note: **Only normal saline can be used to infuse phenytoin**. All other IV fluids will cause crystallization of phenytoin.

  - Flush IV line with normal saline before and after infusing phenytoin;
  - Do not infuse phenytoin at a rate exceeding 50 mg per minute due to the risk of irregular heart beat, hypotension and respiratory depression;
  - Complete administration within 1 hour of preparation.

- If the **woman is known to be epileptic**, give her the same medication that she had been taking. Follow-up with her regularly and adjust the dose of medication according to the response.
- If the **woman is known to be epileptic but cannot recall details of her medication**, give her phenytoin 100 mg by mouth three times per day. Follow her up regularly and adjust the dose of medication according to the clinical situation.
- Folic acid deficiency may be caused by anticonvulsive drugs. Give folic acid 600 mcg by mouth once daily along with antiepileptic treatment in pregnancy.
- Phenytoin can cause neonatal deficiency of vitamin K-dependent clotting factors. This can be minimized by giving vitamin K 1 mg IM to the newborn.
- Evaluation for underlying causes of convulsions is indicated if convulsions are of recent onset. This may be possible only at the tertiary care level.

SEVERE/COMPLICATED MALARIA

Severe malaria in pregnancy may be misdiagnosed as eclampsia. **If a pregnant woman living in a malarial area has fever, headaches or convulsions and malaria cannot be excluded, it is essential to treat the woman for both malaria and eclampsia.**

Pregnant women with severe malaria are particularly prone to hypoglycaemia, pulmonary oedema, anaemia and coma.

ANTIMALARIAL DRUGS

Quinine remains the first line treatment in many countries and may be safely used throughout pregnancy. Where available, artesunate IV or artemether IM are the drugs of choice in the second and third trimesters. Their use in the first trimester must balance their advantages over quinine (better tolerability, less hypoglycaemia) against the limited documentation of pregnancy outcomes.

QUININE DIHYDROCHLORIDE

LOADING DOSE

- Infuse quinine dihydrochloride 20 mg/kg body weight in IV fluids (5% dextrose, normal saline or Ringer's lactate) over 4 hours:
  - **Never give an IV bolus injection of quinine**;
  - If it is **definitely known that the woman has taken an adequate dose of quinine** (1.2 g) within the preceding 12 hours, do **not** give the loading dose. Proceed with the maintenance dose (see below);
  - If the **history of treatment is not known or is unclear**, give the loading dose of quinine;
  - Use 100–500 mL IV fluids depending on the fluid balance state.
- Wait 4 hours before giving the maintenance dose.

MAINTENANCE DOSE

- Infuse quinine dihydrochloride 10 mg/kg body weight over 4 hours. Repeat every 8 hours (i.e. quinine infusion for 4 hours, no quinine for 4 hours, quinine infusion for 4 hours, etc.).

  Note: Monitor blood glucose levels for hypoglycaemia every hour while the woman is receiving quinine IV (**page S-55**).
- Continue the maintenance dosing schedule until the woman is conscious and able to swallow and then give:

- quinine dihydrochloride or quinine sulfate 10 mg/kg body weight by mouth every 8 hours to complete 7 days of treatment;
- OR in areas where sulfadoxine/pyrimethamine is effective, give sulfadoxine/pyrimethamine 3 tablets as a single dose.

INTRAVENOUS ARTESUNATE

LOADING DOSE

- Give artesunate 2.4 mg/kg body weight IV as a single bolus on the first day of treatment.

MAINTENANCE DOSE

- Give artesunate 1.2 mg/kg body weight IV as a single bolus once daily beginning on the second day of treatment.
- Continue the maintenance dosing schedule until the woman is conscious and able to swallow and then give artesunate 2 mg/kg body weight by mouth once daily to complete 7 days of treatment.

INTRAMUSCULAR ARTEMETHER

LOADING DOSE

- Give artemether 3.2 mg/kg body weight IM as a single dose on the first day of treatment.

MAINTENANCE DOSE

- Give artemether 1.6 mg/kg body weight IM once daily beginning on the second day of treatment.
- Continue the maintenance dosing schedule until the woman is conscious and able to swallow and then give artesunate 2 mg/kg body weight by mouth once daily to complete 7 days of treatment.

CONVULSIONS

- If **convulsions occur**, give diazepam 10 mg IV slowly over 2 minutes.
- If **eclampsia is diagnosed**, prevent subsequent convulsions with magnesium sulfate (**Box S-3, page S-45**).
- If **eclampsia is excluded**, prevent subsequent convulsions with phenytoin (below).

PHENYTOIN

LOADING DOSE

- Infuse phenytoin 1 g (approximately 18 mg/kg body weight) in 50–100 mL normal saline over 30 minutes (final concentration not to exceed 10 mg per mL):

  Note: **Only normal saline can be used to infuse phenytoin**. All other IV fluids will cause crystallization of phenytoin.

- Flush IV line with normal saline before and after infusing phenytoin;
- Do not infuse phenytoin at a rate exceeding 50 mg per minute due to the risk of irregular heart beat, hypotension and respiratory depression;
- Complete administration within 1 hour of preparation.

MAINTENANCE DOSE

- Give phenytoin 100 mg IV slowly over 2 minutes or by mouth every 8 hours beginning at least 12 hours after the loading dose.

FLUID BALANCE

- Maintain a strict fluid balance chart and monitor the amount of fluids administered and urine output to ensure that there is no fluid overload. Assess clinical status regularly.

  Note: Women with severe malaria are prone to fluid overload.

- If **pulmonary oedema develops**:
  - Prop the woman up;
  - Give oxygen at 4 L per minute by mask or nasal cannulae;
  - Give frusemide 40 mg IV as a single dose.
- If **urine output is poor** (less than 30 mL per hour):
  - Measure serum creatinine;
  - Rehydrate with IV fluids (normal saline, Ringer's lactate).
- If **urine output does not improve** , give frusemide 40 mg IV as a single dose and monitor urine output.
- If **urine output is still poor** (less than 30 mL per hour over 4 hours) and the **serum creatinine is more than 2.9 mg/dL**, refer the woman to a tertiary care centre for management of renal failure.

HYPOGLYCAEMIA

Hypoglycaemia is common and occurs at any time during the illness, especially after initiation of quinine therapy. There may be no symptoms.

- Monitor blood glucose levels using a stix test every 4 hours.

Note: If the **woman is receiving quinine IV**, monitor blood glucose levels every hour.

- If **hypoglycaemia is detected**, give 50% dextrose 50 mL IV followed by dextrose (5 or 10%) 500 mL infused over 8 hours.

  Note: Monitor blood glucose levels and adjust infusion accordingly.

- Monitor fluid balance carefully (**page S-55**).

ANAEMIA

Complicated malaria is often accompanied by anaemia.

- Monitor haemoglobin levels daily.
- Transfuse as necessary (**page C-23**).
- Monitor fluid balance (**page S-55**).
- Give frusemide 20 mg IV or by mouth with each unit of blood.
- Give ferrous sulfate or ferrous fumerate 60 mg by mouth PLUS folic acid 400 mcg by mouth once daily upon discharge.

PROBLEMS

- The latent phase is longer than 8 hours.
- Cervical dilatation is to the right of the alert line on the partograph.
- The woman has been experiencing labour pains for 12 hours or more without delivery (prolonged labour).

GENERAL MANAGEMENT

- Make a rapid evaluation of the condition of the woman and fetus and provide supportive care (**page C-57**).
- Test urine for ketones and treat with IV fluids if ketotic.
- Review partograph (**page C-65**).

DIAGNOSIS

TABLE S-10 Diagnosis of unsatisfactory progress of labour

Findings	Diagnosis
Cervix not dilated No palpable contractions/infrequent contractions	**False labour, page S-64**
Cervix not dilated beyond 4 cm after 8 hours of regular contractions	**Prolonged latent phase**, **page S-64**
Cervical dilatation to the right of the alert line on the partograph (**Fig S-6, page S-59**)	**Prolonged active phase**, **page S-65**
• Secondary arrest of cervical dilatation and descent of presenting part in presence of good contractions	• **Cephalopelvic disproportion, page S-65**
• Secondary arrest of cervical dilatation and descent of presenting part with large caput, third degree moulding, cervix poorly applied to presenting part, oedematous cervix, ballooning of lower uterine segment, formation of retraction band, maternal and fetal distress (**Fig S-7, page S-61**)	• **Obstruction, page S-66**
• Less than three contractions in 10 minutes, each lasting less than 40 seconds (**Fig S-8, page S-63**)	• **Inadequate uterine activity, page S-66**

• Presentation other than vertex with occiput anterior	• **Malpresentation or malposition, page S-69**
Cervix fully dilated and woman has urge to push, but there is no descent	**Prolonged expulsive phase, page S-67**

Figure S-6, **page S-59** is a sample partograph for prolonged active phase of labour:

- The woman was admitted in active labour at 10 AM:
  - fetal head 5/5 palpable;
  - cervix dilated 4 cm;
  - inadequate contractions (two in 10 minutes, each lasting less than 20 seconds).
- At 2 PM:
  - fetal head still 5/5 palpable;
  - cervix dilated 4 cm and to the right of the alert line;
  - membranes ruptured spontaneously and amniotic fluid is clear;
  - inadequate uterine contractions (one in 10 minutes, lasting less than 20 seconds).
- At 6 PM:
  - fetal head still 5/5 palpable;
  - cervix dilated 6 cm;
  - contractions still inadequate (two in 10 minutes, each lasting less than 20 seconds).
- At 9 PM:
  - fetal heart rate 80 per minute;
  - amniotic fluid stained with meconium;
  - no further progress in labour.
- Caesarean section was performed at 9:20 PM due to fetal distress.
- Note that the partograph was not adequately filled out. The diagnosis of prolonged labour was evident at 2 PM and labour should have been augmented with oxytocin at that time.

FIGURE S-6 Partograph showing prolonged active phase of labour

Name **Mrs. M** Gravida **1** Para **0+0** Hospital number **1248**

Date of admission **14.5.2000** Time of admission **10:00 A.M.** Ruptured membranes **13:30** hours

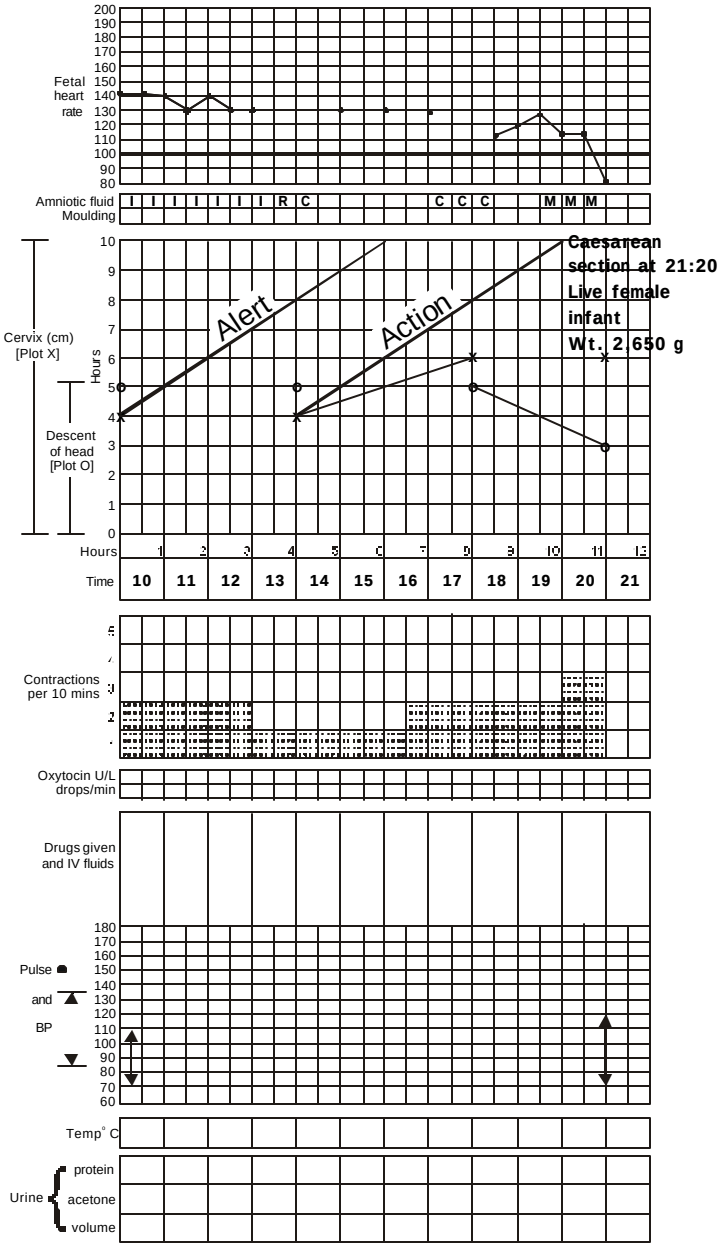


Figure S-7, page S-61 is a sample partograph showing arrest of dilatation and descent in the active phase of labour. Fetal distress and third degree moulding together with arrest of dilatation and descent in the active phase of labour in the presence of adequate uterine contractions indicates obstructed labour.

- The woman was admitted in active labour at 10 AM:
  - fetal head 3/5 palpable;
  - cervix dilated 4 cm;
  - three contractions in 10 minutes, each lasting 20–40 seconds;
  - clear amniotic fluid draining;
  - first degree moulding.
- At 2 PM:
  - fetal head still 3/5 palpable;
  - cervix dilated 6 cm and to the right of the alert line;
  - slight improvement in contractions (three in 10 minutes, each lasting 40 seconds);
  - second degree moulding.
- At 5 PM:
  - fetal head still 3/5 palpable;
  - cervix still dilated 6 cm;
  - third degree moulding;
  - fetal heart rate 92 per minute.
- Caesarean section was performed at 5:30 PM.

FIGURE S-7 Partograph showing obstructed labour

Name **Mrs. H** Gravida **4** Para **3+0** Hospital number **6639**

Date of admission **20.5.2000** Time of admission **10:00 A.M.** Ruptured membranes **1** hours

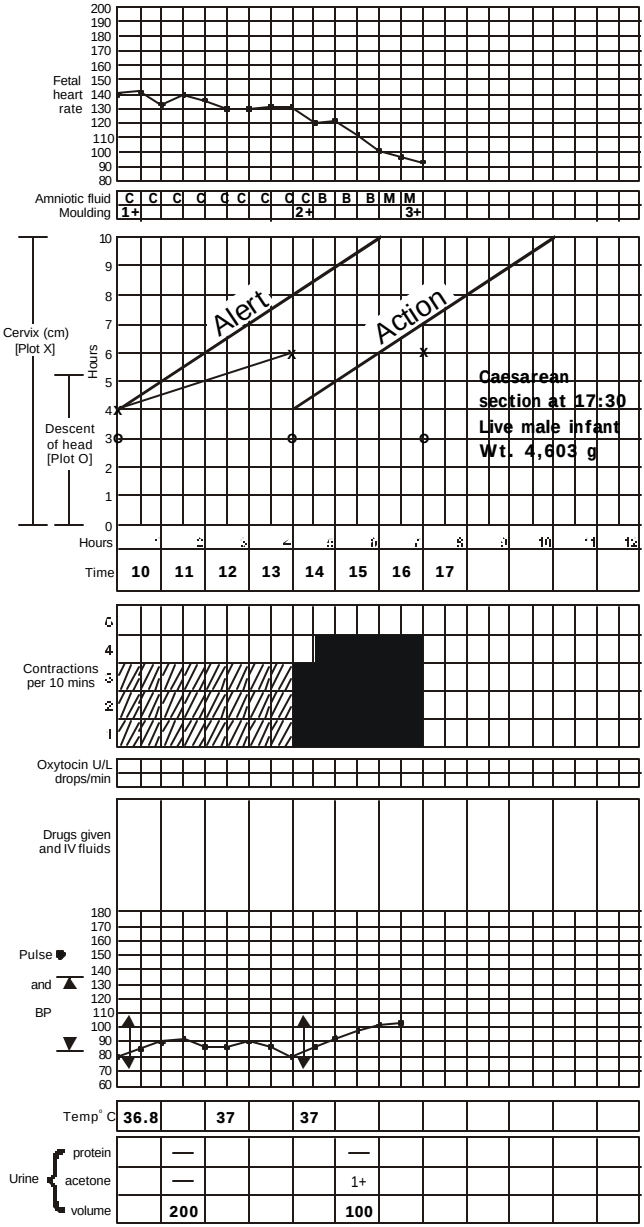


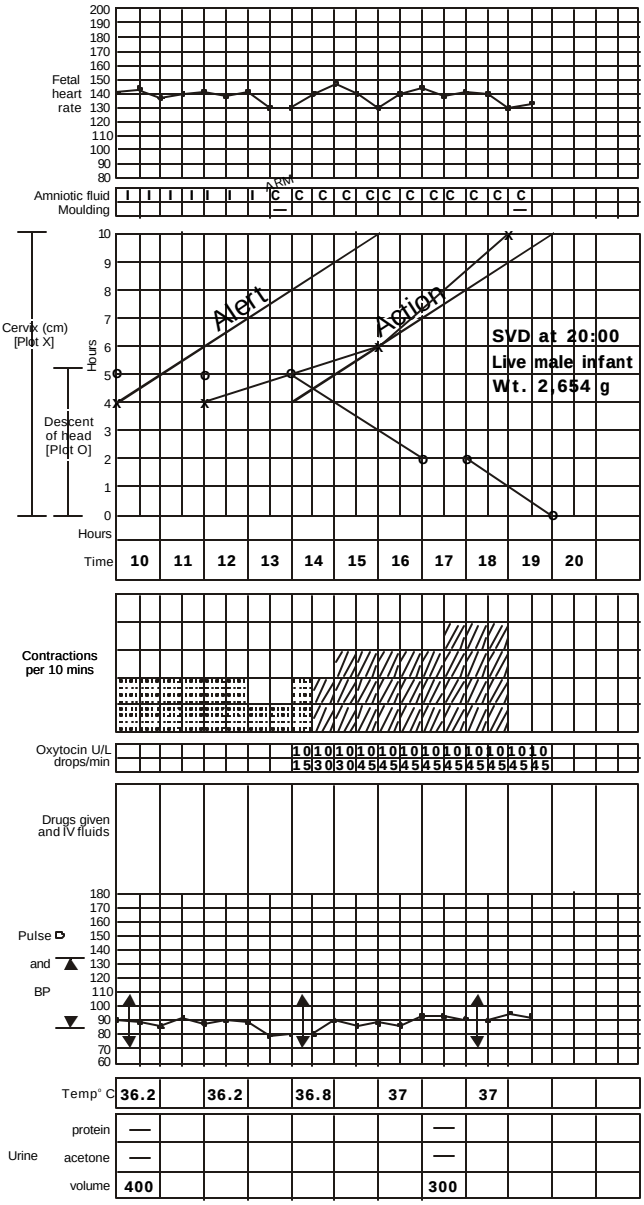
Figure S-8, page S-63 is a sample partograph for poor progress of labour due to inadequate uterine contractions corrected with oxytocin.

- The woman was admitted in active labour at 10 AM:
  - fetal head 5/5 palpable;
  - cervix dilated 4 cm;
  - two contractions in 10 minutes, each lasting less than 20 seconds.
- At 12 PM:
  - fetal head still 5/5 palpable;
  - cervix still dilated 4 cm and to the right of the alert line;
  - no improvement in contractions.
- At 2 PM:
  - poor progress of labour due to inefficient uterine contractions diagnosed;
  - augmented labour with oxytocin 10 units in 1 L IV fluids at 15 drops per minute;
  - escalated oxytocin until a good pattern of contractions was established;
  - contractions improved and were accompanied by descent of the presenting part and progressive cervical dilatation.
- Spontaneous vaginal delivery occurred at 8 PM.

FIGURE S-8 Partograph showing inadequate uterine contractions corrected with oxytocin

Name **Mrs. J** Gravida **1** Para **0+0** Hospital number **1443**

Date of admission **2.5.2000** Time of admission **10:00 A.M.** Ruptured membranes **13:30** hours



MANAGEMENT

FALSE LABOUR

Examine for urinary tract or other infection (**Table S-13, page S-100**) or ruptured membranes (**page S-135**) and treat accordingly. If none of these are present, discharge the woman and encourage her to return if signs of labour recur.

PROLONGED LATENT PHASE

The diagnosis of prolonged latent phase is made retrospectively. When contractions cease, the woman is said to have had false labour. When contractions become regular and dilatation progresses beyond 4 cm, the woman is said to have been in the latent phase.

Misdiagnosing false labour or prolonged latent phase leads to unnecessary induction or augmentation, which may fail. This may lead to unnecessary caesarean section and amnionitis.

If a **woman has been in the latent phase for more than 8 hours** and there is **little sign of progress**, reassess the situation by assessing the cervix:

- If there has been **no change in cervical effacement or dilatation** and there is no fetal distress, review the diagnosis. The woman may not be in labour.
- If there has been a **change in cervical effacement or dilatation**, rupture the membranes with an amniotic hook or a Kocher clamp and induce labour using oxytocin or prostaglandins (**page P-17**):
  - Reassess every 4 hours;
  - If the **woman has not entered the active phase after 8 hours of oxytocin** infusion, deliver by caesarean section (**page P-43**).
- If there are **signs of infection** (fever, foul-smelling vaginal discharge):
  - Augment labour immediately with oxytocin (**page P-25**);
  - Give a combination of antibiotics until delivery (**page C-35**):

- ampicillin 2 g IV every 6 hours;
- PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
- If the **woman delivers vaginally**, discontinue antibiotics postpartum;
- If the **woman has a caesarean section**, continue antibiotics PLUS give metronidazole 500 mg IV every 8 hours until the woman is fever-free for 48 hours.

PROLONGED ACTIVE PHASE

- If there are **no signs of cephalopelvic disproportion or obstruction** and the **membranes are intact**, rupture the membranes with an amniotic hook or a Kocher clamp (**page P-17**).
- Assess uterine contractions:
  - If **contractions are inefficient** (less than three contractions in 10 minutes, each lasting less than 40 seconds), suspect inadequate uterine activity (**page S-66**);
  - If **contractions are efficient** (three contractions in 10 minutes, each lasting more than 40 seconds) suspect cephalopelvic disproportion, obstruction, malposition or malpresentation (see below).
- General methods of labour support may improve contractions and accelerate progress (**page C-57**).

CEPHALOPELVIC DISPROPORTION

Cephalopelvic disproportion occurs because the fetus is too large or the maternal pelvis is too small. If **labour persists with cephalopelvic disproportion**, it may become arrested or obstructed. The best test to determine if a pelvis is adequate is a trial of labour. Clinical pelvimetry is of limited value.

- If **cephalopelvic disproportion is confirmed** (**Table S-10, page S-57**), deliver by caesarean section (**page P-43**).
- If the **fetus is dead**:
  - Deliver by craniotomy (**page P-57**);
  - If the **operator is not proficient in craniotomy**, deliver by caesarean section (**page P-43**).

OBSTRUCTION

Note: Rupture of an unscarred uterus is usually caused by obstructed labour.

- If the **fetus is alive, the cervix is fully dilated** and the **head is at 0 station or below**, deliver by vacuum extraction (**page P-27**);
- If there is an **indication for vacuum extraction and symphysiotomy** for relative obstruction and the fetal **head is at -2 station**:
  - Deliver by vacuum extraction (**page P-27**) and symphysiotomy (**page P-53**);
  - If the **operator is not proficient in symphysiotomy**, deliver by caesarean section (**page P-43**).
- If the **fetus is alive but the cervix is not fully dilated** or if the **fetal head is too high for vacuum extraction**, deliver by caesarean section (**page P-43**).
- If the **fetus is dead**:
  - Deliver by craniotomy (**page P-57**);
  - If the **operator is not proficient in craniotomy**, deliver by caesarean section (**page P-43**).

INADEQUATE UTERINE ACTIVITY

If **contractions are inefficient** and **cephalopelvic disproportion and obstruction have been excluded**, the most probable cause of prolonged labour is inadequate uterine activity.

Inefficient contractions are less common in a multigravida than in a primigravida. Hence, every effort should be made to rule out disproportion in a multigravida before augmenting with oxytocin.

- Rupture the membranes with an amniotic hook or a Kocher clamp and augment labour using oxytocin (**page P-17**).
- Reassess progress by vaginal examination 2 hours after a good contraction pattern with strong contractions has been established:
  - If there is **no progress** between examinations, deliver by caesarean section (**page P-43**);

- If **progress continues**, continue oxytocin infusion and re-examine after 2 hours. Continue to follow progress carefully.

PROLONGED EXPULSIVE PHASE

Maternal expulsive efforts increase fetal risk by reducing the delivery of oxygen to the placenta. Allow spontaneous maternal "pushing", but do not encourage prolonged effort and holding the breath.

- If **malpresentation and obvious obstruction have been excluded**, augment labour with oxytocin (**page P-25**).
- If there is **no descent after augmentation**:
  - If the **head is not more than 1/5 above** the symphysis pubis or the leading bony edge of the fetal **head is at 0 station**, deliver by vacuum extraction (**page P-27**) or forceps (**page P-33**);
  - If the **head is between 1/5 and 3/5 above** the symphysis pubis or the leading bony edge of the fetal **head is between 0 station and -2 station**:
    - Deliver by vacuum extraction (**page P-27**) and symphysiotomy (**page P-53**);
    - If the **operator is not proficient in symphysiotomy,** deliver by caesarean section (**page P-43**).
  - If the **head is more than 3/5 above** the symphysis pubis or the leading bony edge of the fetal **head is above -2 station**, deliver by caesarean section (**page P-43**).

MALPOSITIONS AND MALPRESENTATIONS

Malpositions are abnormal positions of the vertex of the fetal head (with the occiput as the reference point) relative to the maternal pelvis. Malpresentations are all presentations of the fetus other than vertex.

PROBLEM

- The fetus is in an abnormal position or presentation that may result in prolonged or obstructed labour.

GENERAL MANAGEMENT

- Make a rapid evaluation of the general condition of the woman including vital signs (pulse, blood pressure, respiration, temperature).
- Assess fetal condition:
  - Listen to the **fetal heart rate** immediately after a contraction:
    - Count the fetal heart rate for a full minute at least once every 30 minutes during the active phase and every 5 minutes during the second stage;
    - If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute), suspect fetal distress (**page S-95**).
  - If the **membranes have ruptured**, note the colour of the draining amniotic fluid:
    - Presence of thick meconium indicates the need for close monitoring and possible intervention for management of fetal distress (**page S-95**);
    - Absence of fluid draining after rupture of the membranes is an indication of reduced volume of amniotic fluid, which may be associated with fetal distress.
- Provide encouragement and supportive care (**page C-57**).
- Review progress of labour using a partograph (**page C-65**).

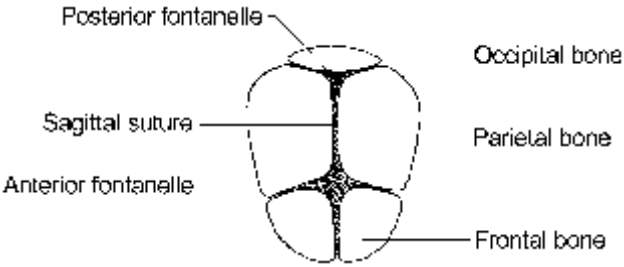
Note: Observe the woman closely. Malpresentations increase the risk for uterine rupture because of the potential for obstructed labour.

DIAGNOSIS

DETERMINE THE PRESENTING PART

- The most common presentation is the vertex of the fetal head. If the **vertex is not the presenting part**, see **Table S-12, page S-73**.
- If the **vertex is the presenting part**, use landmarks of the fetal skull to determine the position of the fetal head (**Fig S-9**).

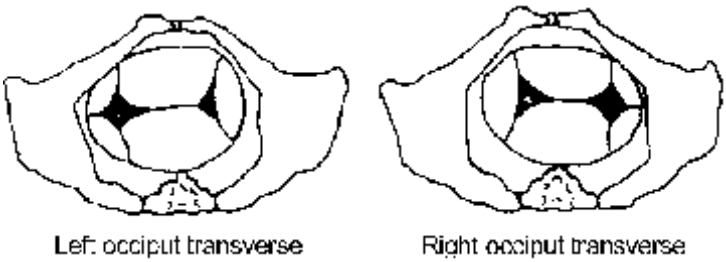
FIGURE S-9 Landmarks of the fetal skull



DETERMINE THE POSITION OF THE FETAL HEAD

- The fetal head normally engages in the maternal pelvis in an occiput transverse position, with the fetal occiput transverse in the maternal pelvis (**Fig S-10**).

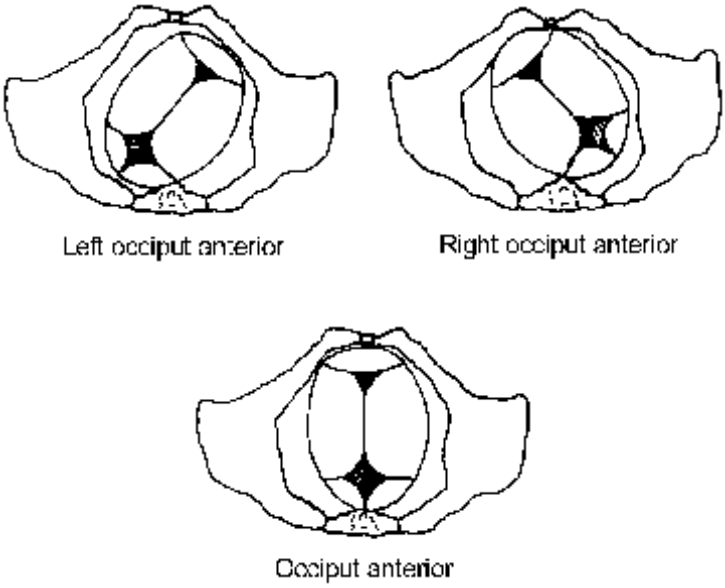
FIGURE S-10 Occiput transverse positions



- With descent, the fetal head rotates so that the fetal occiput is anterior in the maternal pelvis (**Fig S-11**). Failure of an occiput

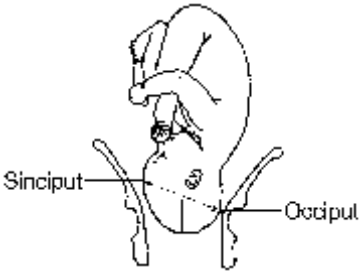
transverse position to rotate to an occiput anterior position should be managed as an occiput posterior position (**page S-75**).

FIGURE S-11 Occiput anterior positions



- An additional feature of a normal presentation is a well-flexed vertex (**Fig S-12**), with the fetal occiput lower in the vagina than the sinciput.

FIGURE S-12 Well-flexed vertex



- If the **fetal head is well-flexed** with **occiput anterior or occiput transverse** (in early labour), proceed with delivery (**page C-71**).
- If the **fetal head is not occiput anterior**, identify and manage the malposition (**Table S-11, page S-72**).

- If the **fetal head is not the presenting part** or the **fetal head is not well-flexed**, identify and manage the malpresentation (**Table S-12, page S-73**).

TABLE S-11 Diagnosis of malpositions

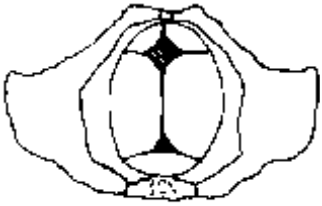
Symptoms and Signs	Figure
OCCIPUT POSTERIOR POSITION occurs when the fetal occiput is posterior in relation to the maternal pelvis (**Fig S-13** and **Fig S-14**). On **abdominal examination**, the lower part of the abdomen is flattened, fetal limbs are palpable anteriorly and the fetal heart may be heard in the flank. On **vaginal examination**, the posterior fontanelle is towards the sacrum and the anterior fontanelle may be easily felt if the head is deflexed. For management, see **page S-75**.	**FIGURE S-13**  Occiput posterior **FIGURE S-14**
OCCIPUT TRANSVERSE POSITION occurs when the fetal occiput is transverse to the maternal pelvis (**Fig S-15**). If an occiput transverse position persists into the later part of the first stage of labour, it should be managed as an occiput posterior position (**page S-75**).	**FIGURE S-15** Left occiput transverse

TABLE S-12 Diagnosis of malpresentations

Symptoms and Signs	Figure
BROW PRESENTATION is caused by partial extension of the fetal head so that the occiput is higher than the sinciput (**Fig S-16**). On **abdominal examination**, more than half the fetal head is above the symphysis pubis and the occiput is palpable at a higher level than the sinciput. On **vaginal examination**, the anterior fontanelle and the orbits are felt. For management, see **page S-76**.	**FIGURE S-16**
FACE PRESENTATION is caused by hyper-extension of the fetal head so that neither the occiput nor the sinciput are palpable on vaginal examination (**Fig S-17** and **Fig S-18**). On **abdominal examination**, a groove may be felt between the occiput and the back. On **vaginal examination**, the face is palpated, the examiner's finger enters the mouth easily and the bony jaws are felt. For management, see **page S-77**.	**FIGURE S-17** **FIGURE S-18**

TABLE S-12 Cont. Diagnosis of malpresentations

Symptoms and Signs	Figure
COMPOUND PRESENTATION occurs when an arm prolapses alongside the presenting part. Both the prolapsed arm and the fetal head present in the pelvis simultaneously (**Fig S-19**). For management, see **page S-78**.	**FIGURE S-19**

BREECH PRESENTATION occurs when the buttocks and/or the feet are the presenting parts.

On **abdominal examination**, the head is felt in the upper abdomen and the breech in the pelvic brim. Auscultation locates the fetal heart higher than expected with a vertex presentation.

On **vaginal examination during labour**, the buttocks and/or feet are felt; thick, dark meconium is normal.

For management, see **page S-79**.

COMPLETE (FLEXED) BREECH PRESENTATION occurs when both legs are flexed at the hips and knees (**Fig S-20**).

FRANK (EXTENDED) BREECH PRESENTATION occurs when both legs are flexed at the hips and extended at the knees (**Fig S-21**).

FOOTLING BREECH PRESENTATION occurs when a leg is extended at the hip and the knee (**Fig S-22**).

FIGURE S-20

FIGURE S-21

FIGURE S-22

TABLE S-12 Cont. **Diagnosis of malpresentations**

Symptoms and Signs	Figure

TRANSVERSE LIE AND SHOULDER PRESENTATION occur when the long axis of the fetus is transverse (**Fig S-23**). The shoulder is typically the presenting part.

On **abdominal examination**, neither the head nor the buttocks can be felt at the symphysis pubis and the head is usually felt in the flank.

On **vaginal examination**, a shoulder may be felt, but not always. An arm may prolapse and the elbow, arm or hand may be felt in the vagina.

For management, see **page S-81**.

FIGURE S-23

MANAGEMENT

OCCIPUT POSTERIOR POSITIONS

Spontaneous rotation to the anterior position occurs in 90% of cases. Arrested labour may occur when the head does not rotate and/or descend. Delivery may be complicated by perineal tears or extension of an episiotomy.

- If there are **signs of obstruction** or the **fetal heart rate is abnormal** (less than 100 or more than 180 beats per minute) at any stage, deliver by caesarean section (**page P-43**).
- If the **membranes are intact**, rupture the membranes with an amniotic hook or a Kocher clamp (**page P-17**).
- If the **cervix is not fully dilated** and there are **no signs of obstruction**, augment labour with oxytocin (**page P-25**).
- If the **cervix is fully dilated** but there is **no descent in the expulsive phase**, assess for signs of obstruction (**Table S-10, page S-57**):
  - If there are **no signs of obstruction**, augment labour with oxytocin (**page P-25**).

- If the **cervix is fully dilated and if**:
  - the **fetal head is more than 3/5 palpable above** the symphysis pubis or the leading bony edge of the **head is above -2 station**, perform caesarean section (**page P-43**);
  - the **fetal head is between 1/5 and 3/5 above** the symphysis pubis or the leading bony edge of the **head is between 0 station and -2 station**:
    - Delivery by vacuum extraction (**page P-27**) and symphysiotomy (**page P-53**);
    - If the **operator is not proficient in symphysiotomy**, perform caesarean section (**page P-43**);
  - the **head is not more than 1/5 above** the symphysis pubis or the leading bony edge of the fetal **head is at 0 station**, deliver by vacuum extraction (**page P-27**) or forceps (**page P-33**).

BROW PRESENTATION

In brow presentation, engagement is usually impossible and arrested labour is common. Spontaneous conversion to either vertex presentation or face presentation can rarely occur, particularly when the fetus is small or when there is fetal death with maceration. It is unusual for spontaneous conversion to occur with an average-sized live fetus once the membranes have ruptured.

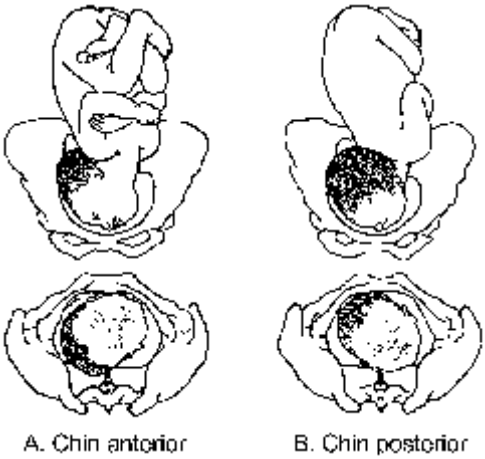
- If the **fetus is alive** , deliver by caesarean section (**page P-43**).
- If the **fetus is dead** and:
  - the **cervix is not fully dilated**, deliver by caesarean section (**page P-43**);
  - the **cervix is fully dilated**:
    - Deliver by craniotomy (**page P-57**);
    - If the **operator is not proficient in craniotomy**, deliver by caesarean section (**page P-43**).

Do not deliver brow presentation by vacuum extraction, outlet forceps or symphysiotomy.

FACE PRESENTATION

The chin serves as the reference point in describing the position of the head. It is necessary to distinguish only chin-anterior positions in which the chin is anterior in relation to the maternal pelvis (**Fig S-24 A**) from chin-posterior positions (**Fig S-24 B**).

FIGURE S-24 Face presentation



Prolonged labour is common. Descent and delivery of the head by flexion may occur in the chin-anterior position. In the chin-posterior position, however, the fully extended head is blocked by the sacrum. This prevents descent and labour is arrested.

CHIN-ANTERIOR POSITION

- If the **cervix is fully dilated**:
  - Allow to proceed with normal childbirth (**page C-71**);
  - If there is **slow progress** and **no sign of obstruction** (**Table S-10, page S-57**), augment labour with oxytocin (**page P-25**);
  - If **descent is unsatisfactory**, deliver by forceps (**page P-33**).
- If the **cervix is not fully dilated** and there are **no signs of obstruction**, augment labour with oxytocin (**page P-25**). Review progress as with vertex presentation.

CHIN-POSTERIOR POSITION

- If the **cervix is fully dilated**, deliver by caesarean section (**page P-43**).
- If the cervix is **not fully dilated**, monitor descent, rotation and progress. If there are **signs of obstruction**, deliver by caesarean section (**page P-43**).
- If the **fetus is dead**:
  - Deliver by craniotomy (**page P-57**);
  - If the **operator is not proficient in craniotomy**, deliver by caesarean section (**page P-43**).

Do not perform vacuum extraction for face presentation.

COMPOUND PRESENTATION

Spontaneous delivery can occur only when the fetus is very small or dead and macerated. Arrested labour occurs in the expulsive stage.

- Replacement of the prolapsed arm is sometimes possible:
  - Assist the woman to assume the knee-chest position (**Fig S-25**);
  - Push the arm above the pelvic brim and hold it there until a contraction pushes the head into the pelvis.
  - Proceed with management for normal childbirth (**page C-71**).

FIGURE S-25 Knee-chest position

- If the **procedure fails** or if the **cord prolapses**, deliver by caesarean section (**page P-43**).

BREECH PRESENTATION

Prolonged labour with breech presentation is an indication for urgent caesarean section. Failure of labour to progress must be considered a sign of possible disproportion (**Table S-10, page S-57**).

The frequency of breech presentation is high in preterm labour.

EARLY LABOUR

Ideally, every breech delivery should take place in a hospital with surgical capability.

- Attempt external version (**page P-15**) if:
  - breech presentation is present at or after 37 weeks (before 37 weeks, a successful version is more likely to spontaneously revert back to breech presentation);
  - vaginal delivery is possible;
  - membranes are intact and amniotic fluid is adequate;
  - there are no complications (e.g. fetal growth restriction, uterine bleeding, previous caesarean delivery, fetal abnormalities, twin pregnancy, hypertension, fetal death).
- If **external version is successful**, proceed with normal childbirth (**page C-71**).
- If **external version fails**, proceed with vaginal breech delivery (see below) or caesarean section (**page P-43**).

VAGINAL BREECH DELIVERY

- A vaginal breech delivery (**page P-37**) by a skilled health care provider is safe and feasible under the following conditions:
  - complete (**Fig S-20, page S-74**) or frank breech (**Fig S-21, page S-74**);
  - adequate clinical pelvimetry;
  - fetus is not too large;
  - no previous caesarean section for cephalopelvic disproportion;

- flexed head.

- Examine the woman regularly and record progress on a partograph (**page C-65**).
- If the **membranes rupture**, examine the woman immediately to exclude cord prolapse.

  Note: Do not rupture the membranes.

- If the **cord prolapses** and **delivery is not imminent**, deliver by caesarean section (**page P-43**).
- If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute) or **prolonged labour**, deliver by caesarean section (**page P-43**).

  Note: Meconium is common with breech labour and is not a sign of fetal distress if the fetal heart rate is normal.

The woman should not push until the cervix is fully dilated. Full dilatation should be confirmed by vaginal examination.

CAESAREAN SECTION FOR BREECH PRESENTATION

- A caesarean section (**page P-43**) is safer than vaginal breech delivery and recommended in cases of:

  - double footling breech;
  - small or malformed pelvis;
  - very large fetus;
  - previous caesarean section for cephalopelvic disproportion;
  - hyperextended or deflexed head.

  Note: Elective caesarean section does not improve the outcome in preterm breech delivery.

COMPLICATIONS

Fetal complications of breech presentation include:

- cord prolapse;
- birth trauma as a result of extended arm or head, incomplete dilatation of the cervix or cephalopelvic disproportion;

- asphyxia from cord prolapse, cord compression, placental detachment or arrested head;
- damage to abdominal organs;
- broken neck.

TRANSVERSE LIE AND SHOULDER PRESENTATION

- If the woman is in **early labour** and the **membranes are intact**, attempt external version (**page P-15**):
  - If **external version is successful**, proceed with normal childbirth (**page C-71**);
  - If **external version fails** or is not advisable, deliver by caesarean section (**page P-43**).
- Monitor for signs of cord prolapse. If the **cord prolapses** and **delivery is not imminent**, deliver by caesarean section (**page P-43**).

Note: Ruptured uterus may occur if the woman is left unattended (**page S-20**).

In modern practice, persistent transverse lie in labour is delivered by caesarean section whether the fetus is alive or dead.

SHOULDER DYSTOCIA (Stuck shoulders)

PROBLEM

- The fetal head has been delivered but the shoulders are stuck and cannot be delivered.

GENERAL MANAGEMENT

- Be prepared for shoulder dystocia at all deliveries, especially if a large baby is anticipated.
- Have several persons available to help.

Shoulder dystocia cannot be predicted.

DIAGNOSIS

- The fetal head is delivered but remains tightly applied to the vulva.
- The chin retracts and depresses the perineum.
- Traction on the head fails to deliver the shoulder, which is caught behind the symphysis pubis.

MANAGEMENT

- Make an adequate episiotomy (**page P-71**) to reduce soft tissue obstruction and to allow space for manipulation.
- With the woman on her back, ask her to flex both thighs, bringing her knees as far up as possible towards her chest (**Fig S-26, page S-84**). Ask two assistants to push her flexed knees firmly up onto her chest.

FIGURE S-26 Assistant pushing flexed knees firmly towards chest

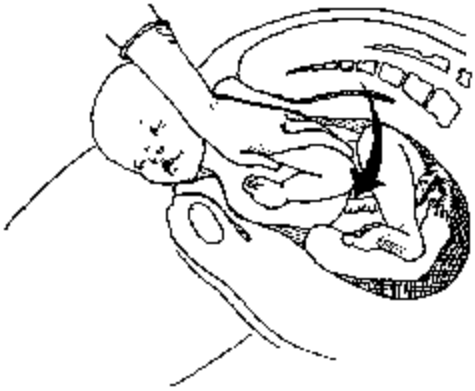
- Wearing high-level disinfected gloves:
  - Apply firm, continuous traction downwards on the fetal head to move the shoulder that is anterior under the symphysis pubis;

    Note: Avoid excessive traction on the head as this may result in brachial plexus injury;
  - Have an assistant simultaneously apply suprapubic pressure downwards to assist delivery of the shoulder;

    Note: Do not apply fundal pressure. This will further impact the shoulder and can result in uterine rupture.
- If the **shoulder still is not delivered**:
  - Wearing high-level disinfected gloves, insert a hand into the vagina;
  - Apply pressure to the shoulder that is anterior in the direction of the baby's sternum to rotate the shoulder and decrease the shoulder diameter;
  - If needed, apply pressure to the shoulder that is posterior in the direction of the sternum.
- If the **shoulder still is not delivered despite the above measures**:

- Insert a hand into the vagina;
- Grasp the humerus of the arm that is posterior and, keeping the arm flexed at the elbow, sweep the arm across the chest. This will provide room for the shoulder that is anterior to move under the symphysis pubis (**Fig S-27**).

FIGURE S-27 **Grasping the humerus of the arm that is posterior and sweeping the arm across the chest**



- If **all of the above measures fail to deliver the shoulder**, other options include:
  - Fracture the clavicle to decrease the width of the shoulders and free the shoulder that is anterior;
  - Apply traction with a hook in the axilla to extract the arm that is posterior.

LABOUR WITH AN OVERDISTENDED UTERUS

PROBLEM

- A woman in labour has an overdistended uterus or symphysis-fundal height more than expected for the period of gestation.

GENERAL MANAGEMENT

- Prop up the woman.
- Confirm accuracy of calculated gestational age, if possible.

DIAGNOSIS

- If **only one fetus is felt** on abdominal examination, consider wrong dates, a single large fetus (**page S-88**) or an excess of amniotic fluid (**page S-88**).
- If **multiple fetal poles and parts are felt** on abdominal examination, suspect multiple pregnancy. Other signs of multiple pregnancy include:
  - fetal head small in relation to the uterus;
  - uterus larger than expected for gestation;
  - more than one fetal heart heard with Doppler fetal stethoscope.

    Note: An acoustic fetal stethoscope cannot be used to confirm the diagnosis, as one heart may be heard in different areas.
- Use **ultrasound examination**, if available, to:
  - identify the number, presentations and sizes of fetuses;
  - assess the volume of amniotic fluid.
- If **ultrasound service is not available**, perform radiological examination (anterio-posterior view) for number of fetuses and presentations.

MANAGEMENT

SINGLE LARGE FETUS

- Manage as for normal labour (**page C-57**).
- Anticipate and prepare for prolonged and obstructed labour (**page S-57**), shoulder dystocia (**page S-83**) and postpartum haemorrhage (**page S-25**).

EXCESS AMNIOTIC FLUID

- Allow labour to progress and monitor progress using a partograph (**page C-65**).
- If the **woman is uncomfortable because of uterine distension**, aspirate excess amniotic fluid:
  - Palpate for location of fetus;
  - Prepare the skin with an antiseptic (**page C-22**);
  - Under aseptic conditions, insert a 20-gauge spinal needle through the abdominal and uterine walls and withdraw the stylet;
  - Aspirate the fluid using a large syringe. Alternatively, attach an infusion set to the needle and allow the fluid to slowly drain into a container;
  - When the woman is no longer distressed because of overdistension, replace the stylet and remove the needle.
- If **rupture of membranes is indicated** for other reasons, rupture the membranes with an amniotic hook or a Kocher clamp (**page P-17**).
- Check for cord prolapse when membranes rupture. If the **cord prolapses and delivery is not imminent,** deliver by caesarean section (**page P-43**).

MULTIPLE PREGNANCY

FIRST BABY

- Start an IV infusion and slowly infuse IV fluids (**page C-21**).
- Monitor fetuses by intermittent auscultation of the fetal heart rates. If **there are fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute), suspect fetal distress (**page S-95**).
- Check presentation:
  - If a **vertex presentation**, allow labour to progress as for a single vertex presentation (**page C-57**) and monitor progress in labour using a partograph (**page C-65**);
  - If a **breech presentation,** apply the same guidelines as for a singleton breech presentation (**page S-79**) and monitor progress in labour using a partograph (**page C-65**);
  - If a **transverse lie**, deliver by caesarean section (**page P-43**).

Leave a clamp on the maternal end of the umbilical cord and do not attempt to deliver the placenta until the last baby is delivered.

SECOND OR ADDITIONAL BABY(S)

- Immediately after the first baby is delivered:
  - Palpate the abdomen to determine lie of additional baby;
  - Correct to longitudinal lie by external version (**page P-15**);
  - Check fetal heart rate(s).
- Perform a vaginal examination to determine if:
  - the cord has prolapsed (**page S-97**);
  - the membranes are intact or ruptured.

VERTEX PRESENTATION

- If the **head is not engaged**, manoeuvre the head into the pelvis manually (hands on abdomen), if possible.
- If the **membranes are intact**, rupture the membranes with an amniotic hook or a Kocher clamp.

- Check fetal heart rate between contractions.
- If **contractions are inadequate after birth of first baby**, augment labour with oxytocin using rapid escalation (**Table P-8, page P-23**) to produce good contractions (three contractions in 10 minutes, each lasting more than 40 seconds).
- If **spontaneous delivery does not occur within 2 hours** of good contractions or if there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute), deliver by caesarean section (**page P-43**).

BREECH PRESENTATION

- If the **baby is estimated to be no larger than the first baby**, and if the **cervix has not contracted**, consider vaginal delivery (**page C-71**):
  - If there are **inadequate or no contractions after birth of first baby**, escalate oxytocin infusion at a rapid rate (**Table P-8, page P-23**) to produce good contractions (three contractions in 10 minutes, each lasting more than 40 seconds);
  - If the **membranes are intact** and the **breech has descended**, rupture the membranes with an amniotic hook or a Kocher clamp (**page P-17**);
  - Check fetal heart rate between contractions. If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute), deliver by breech extraction (**page P-42**);
- If **vaginal delivery is not possible**, deliver by caesarean section (**page P-43**).

TRANSVERSE LIE

- If the **membranes are intact**, attempt external version (**page P-15**);
- If **external version fails** and the **cervix is fully dilated and membranes are still intact**, attempt internal podalic version:

  Note: **Do not attempt internal podalic version** if the provider is untrained, the membranes have ruptured and the amniotic fluid has drained, or if the uterus is scarred. Do not persist if the baby does not turn easily.

  - Wearing high-level disinfected gloves, insert a hand into the uterus and grasp the baby's foot;

- Gently rotate the baby down;
- Proceed with breech extraction (**page P-42**).

- Check fetal heart rate between contractions;
- If **external version fails** and **internal podalic version is not advisable or fails**, deliver by caesarean section (**page P-43**).
- Give oxytocin 10 units IM or give ergometrine 0.2 mg IM within 1 minute after delivery of the last baby and continue active management of the third stage to reduce postpartum blood loss (**page C-73**).

COMPLICATIONS

- Maternal complications of multiple pregnancy include:
  - anaemia;
  - abortion;
  - pregnancy-induced hypertension and pre-eclampsia;
  - excess amniotic fluid;
  - poor contractions during labour;
  - retained placenta;
  - postpartum haemorrhage.
- Placental/fetal complications include:
  - placenta praevia;
  - abruptio placentae;
  - placental insufficiency;
  - preterm delivery;
  - low birth weight;
  - malpresentations;
  - cord prolapse;
  - congenital anomalies.

LABOUR WITH A SCARRED UTERUS

PROBLEM

- A woman in labour has a scarred uterus from a previous uterine surgery.

GENERAL MANAGEMENT

- Start an IV infusion and infuse IV fluids (**page C-21**).
- If possible, identify the reason for the uterine scar. Caesarean section and other uterine surgeries (e.g. repair of a previous uterine rupture, excision of an ectopic pregnancy implanted in the cornua) leave a scar in the uterine wall. This scar can weaken the uterus, leading to uterine rupture during labour (**Box S-6**).

BOX S-6 Rupture of uterine scars

- **Vertical scars** from a previous caesarean section may rupture before labour or during the latent phase.
- **Transverse scars** typically rupture during active labour or during the expulsive phase.
- The rupture may extend only a short distance into the myometrium with little pain or bleeding. The fetus and placenta may remain in the uterus and the fetus may survive for minutes or hours.

SPECIFIC MANAGEMENT

Studies have shown that some 50% of cases with low transverse caesarean scars can deliver vaginally. The frequency of rupture of low transverse scars during a careful trial of labour is reported as less than 1%.

TRIAL OF LABOUR

- Ensure that conditions are favourable for trial of labour, namely:
  - The previous surgery was a low transverse caesarean incision;

- The fetus is in a normal vertex presentation;
- Emergency caesarean section can be carried out immediately if required.

- If these **conditions are not met** or if the woman has a **history of two lower uterine segment caesarean sections or ruptured uterus**, deliver by caesarean section (**page P-43**).
- Monitor progress of labour using a partograph (**page C-65**).
- If **labour crosses the alert line** of the partograph, diagnose the cause of slow progress and take appropriate action:
  - If there is slow progress in labour due to **inefficient uterine contractions** (**Table S-10, page S-57**), rupture the membranes with an amniotic hook or a Kocher clamp and augment labour with oxytocin (**page P-17**);
  - If there are **signs of cephalopelvic disproportion or obstruction** (**Table S-10**), deliver immediately by caesarean section (**page P-43**).
- If there are **signs of impending uterine rupture** (rapid maternal pulse, persistent abdominal pain and suprapubic tenderness, fetal distress), deliver immediately by caesarean section (**page P-43**).
- If **uterine rupture is suspected**, deliver immediately by caesarean section (**page P-43**) and repair the uterus (**page P-95**) or perform hysterectomy (**page P-103**).

FETAL DISTRESS IN LABOUR

PROBLEMS

- Abnormal fetal heart rate (less than 100 or more than 180 beats per minute).
- Thick meconium-stained amniotic fluid.

GENERAL MANAGEMENT

- Prop up the woman or place her on her left side.
- Stop oxytocin if it is being administered.

ABNORMAL FETAL HEART RATE

BOX S-7 Abnormal fetal heart rate

- A **normal fetal heart rate** may slow during a contraction but usually recovers to normal as soon as the uterus relaxes.
- A **very slow fetal heart rate** in the absence of contractions or persisting after contractions is suggestive of fetal distress.
- A **rapid fetal heart rate** may be a response to maternal fever, drugs causing rapid maternal heart rate (e.g. tocolytic drugs), hypertension or amnionitis. In the absence of a rapid maternal heart rate, a rapid fetal heart rate should be considered a sign of fetal distress.

- If a **maternal cause is identified** (e.g. maternal fever, drugs), initiate appropriate management.
- If a **maternal cause is not identified** and the **fetal heart rate remains abnormal** throughout at least three contractions, perform a vaginal examination to check for explanatory signs of distress:
  - If there is **bleeding with intermittent or constant pain**, suspect abruptio placentae (**page S-18**);
  - If there are **signs of infection** (fever, foul-smelling vaginal discharge) give antibiotics as for amnionitis (**page S-139**);

- If the **cord is below the presenting part** or **in the vagina**, manage as prolapsed cord (**page S-97**).

- If **fetal heart rate abnormalities persist** or there are **additional signs of distress** (thick meconium-stained fluid), plan delivery:
  - If the **cervix is fully dilated** and the **fetal head is not more than 1/5 above** the symphysis pubis or the leading bony edge of the **head is at 0 station**, deliver by vacuum extraction (**page P-27**) or forceps (**page P-33**);
  - If the **cervix is not fully dilated** or the **fetal head is more than 1/5 above** the symphysis pubis or the leading bony edge of the **head is above 0 station**, deliver by caesarean section (**page P-43**).

MECONIUM

- Meconium staining of amniotic fluid is seen frequently as the fetus matures and by itself is not an indicator of fetal distress. A slight degree of meconium without fetal heart rate abnormalities is a warning of the need for vigilance.
- **Thick meconium** suggests passage of meconium in reduced amniotic fluid and may indicate the need for expedited delivery and meconium management of the neonatal upper airway at birth to prevent meconium aspiration (**page S-143**).
- In **breech presentation**, meconium is passed in labour because of compression of the fetal abdomen during delivery. This is not a sign of distress unless it occurs in early labour.

PROLAPSED CORD

PROBLEMS

- The umbilical cord lies in the birth canal below the fetal presenting part.
- The umbilical cord is visible at the vagina following rupture of the membranes.

GENERAL MANAGEMENT

- Give oxygen at 4–6 L per minute by mask or nasal cannulae.

SPECIFIC MANAGEMENT

PULSATING CORD

If the **cord is pulsating**, the fetus is alive.

- Diagnose stage of labour by an immediate vaginal examination (**Table C-8, page C-60**).
- If the woman is in the **first stage of labour**, in all cases:
  - Wearing high-level disinfected gloves, insert a hand into the vagina and push the presenting part up to decrease pressure on the cord and dislodge the presenting part from the pelvis;
  - Place the other hand on the abdomen in the suprapubic region to keep the presenting part out of the pelvis;
  - Once the presenting part is firmly held above the pelvic brim, remove the other hand from the vagina. Keep the hand on the abdomen until caesarean section;
  - If available, give salbutamol 0.5 mg IV slowly over 2 minutes to reduce contractions;
  - Perform immediate caesarean section (**page P-43**).
- If the woman is in the **second stage of labour**:
  - Expedite delivery with episiotomy (**page P-71**) and vacuum extraction (**page P-27**) or forceps (**page P-33**);

- If **breech presentation**, perform breech extraction (**page P-42**) and apply Piper or long forceps to the after-coming head (**page P-41**);
- Prepare for resuscitation of the newborn (**page S-142**).

CORD NOT PULSATING

If the **cord is not pulsating**, the fetus is dead. Deliver in the manner that is safest for the woman.

FEVER DURING PREGNANCY AND LABOUR

PROBLEM

- A woman has a fever (temperature 38°C or more) during pregnancy or labour.

GENERAL MANAGEMENT

- Encourage bed rest.
- Encourage increased fluid intake by mouth.
- Use a fan or tepid sponge to help decrease temperature.

DIAGNOSIS

TABLE S-13 Diagnosis of fever during pregnancy and labour

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Dysuria • Increased frequency and urgency of urination	• Retropubic/suprapubic pain • Abdominal pain	**Cystitis, page S-101**
• Dysuria • Spiking fever/chills • Increased frequency and urgency of urination • Abdominal pain	• Retropubic/suprapubic pain • Loin pain/tenderness • Tenderness in rib cage • Anorexia • Nausea/vomiting	**Acute pyelonephritis, page S-102**
• Foul-smelling vaginal discharge in first 22 weeks • Fever • Tender uterus	• Lower abdominal pain • Rebound tenderness • Prolonged bleeding • Purulent cervical discharge	**Septic abortion, Table S-2, page S-9**
• Fever/chills • Foul-smelling watery discharge after 22 weeks • Abdominal pain	• History of loss of fluid • Tender uterus • Rapid fetal heart rate • Light vaginal bleeding	**Amnionitis, page S-139**
• Fever • Difficulty in breathing • Cough with expectoration • Chest pain	• Consolidation • Congested throat • Rapid breathing • Rhonchi/rales	**Pneumonia, page S-129**
• Fever • Chills/rigors • Headache • Muscle/joint pain	• Enlarged spleen	**Uncomplicated malaria, page S-103**
• Symptoms and signs of uncomplicated malaria • Coma • Anaemia	• Convulsions • Jaundice	**Severe/complicated malaria, page S-52**

• Fever • Headache • Dry cough • Malaise • Anorexia • Enlarged spleen	• Confusion • Stupor	**Typhoid**[a]

[a] Give ampicillin 1 g by mouth four times per day OR give amoxicillin 1 g by mouth three times per day for 14 days. Alternative therapy will depend on local sensitivity patterns.

TABLE S-13 Cont. Diagnosis of fever during pregnancy and labour

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Fever • Malaise • Anorexia • Nausea • Dark urine and pale stool • Jaundice • Enlarged liver	• Muscle/joint pain • Urticaria • Enlarged spleen	**Hepatitis**[b]

[b] Provide supportive therapy and observe.

MANAGEMENT

URINARY TRACT INFECTIONS

Assume that a urinary tract infection involves all levels of the tract, from renal calyces to urethral meatus.

TESTS

Dipstick, microscopy and urine culture tests can be used to determine if a urinary tract infection is present, but will not differentiate between cystitis and acute pyelonephritis.

- A dipstick leukocyte esterase test can be used to detect white blood cells and a nitrate reductase test can be used to detect nitrites.

- Microscopy of urine specimen may show white cells in clumps, bacteria and sometimes red cells.
- Urine culture and sensitivity tests should be done, if available, to identify the organism and its antibiotic sensitivity.

Note: Urine examination requires a clean-catch mid-stream specimen to minimize the possibility of contamination.

CYSTITIS

Cystitis is infection of the bladder.

- Treat with antibiotics (**page C-35**):
  - amoxicillin 500 mg by mouth three times per day for 3 days;
  - OR trimethoprim/sulfamethoxazole 1 tablet (160/800 mg) by mouth two times per day for 3 days.
- If **treatment fails**, check urine culture and sensitivity, if available, and treat with an antibiotic appropriate for the organism.
- If **infection recurs two or more times**:
  - Check urine culture and sensitivity, if available, and treat with an antibiotic appropriate for the organism;
  - For prophylaxis against further infections, give antibiotics by mouth once daily at bedtime for the remainder of pregnancy and 2 weeks postpartum. Give:
    - trimethoprim/sulfamethoxazole 1 tablet (160/800 mg);
    - OR amoxicillin 250 mg.

    Note: Prophylaxis is indicated after recurrent infections, not after a single episode.

ACUTE PYELONEPHRITIS

Acute pyelonephritis is an acute infection of the upper urinary tract, mainly of the renal pelvis, which may also involve renal parenchyma.

- If **shock is present or suspected**, initiate immediate treatment (**page S-1**).
- Check urine culture and sensitivity, if possible, and treat with an antibiotic appropriate for the organism.

- If **urine culture is unavailable**, treat with antibiotics until the woman is fever-free for 48 hours (**page C-35**):
  - ampicillin 2 g IV every 6 hours;
  - PLUS gentamicin 5 mg/kg body weight IV every 24 hours.
- Once the **woman is fever-free for 48 hours**, give amoxicillin 1 g by mouth three times per day to complete 14 days of treatment.

  Note: Clinical response is expected within 48 hours. If there is **no clinical response in 72 hours**, re-evaluate results and antibiotic coverage.
- For prophylaxis against further infections, give antibiotics by mouth once daily at bedtime for the remainder of pregnancy and for 2 weeks postpartum. Give:
  - trimethoprim/sulfamethoxazole 1 tablet (160/800 mg);
  - OR amoxicillin 250 mg.
- Ensure adequate hydration by mouth or IV.
- Give paracetamol 500 mg by mouth as needed for pain and to lower temperature.
- If there are **palpable contractions and blood-stained mucus discharge**, suspect preterm labour (**page S-122**).

UNCOMPLICATED MALARIA

Two species of malaria parasites, *P. falciparum* and *P. vivax*, account for the majority of cases. Symptomatic falciparum malaria in pregnant women may cause severe disease and death if not recognized and treated early. When malaria presents as an acute illness with fever, it cannot be reliably distinguished from many other causes of fever on clinical grounds. Malaria should be considered the most likely diagnosis in a pregnant woman with fever who has been exposed to malaria.

- Women without pre-existing immunity to malaria (living in non-malarial area) are susceptible to the more severe complications of malaria (**page S-52**).
- Women with acquired immunity to malaria are at high risk for developing severe anaemia and delivering low birth weight babies.

TESTS

- If **facilities for testing are not available**, begin therapy with antimalarial drugs based on clinical suspicion (e.g. headache, fever, joint pain).
- Where available, the following tests will confirm the diagnosis:
  - microscopy of a thick and thin blood film:
    - thick blood film is more sensitive at detecting parasites (absence of parasites does not rule out malaria);
    - thin blood film helps to identify the parasite species.
  - rapid antigen detection tests.

FALCIPARUM MALARIA

ACUTE, UNCOMPLICATED P. FALCIPARUM MALARIA

Chloroquine-resistant falciparum malaria is widespread. Resistance to other drugs (e.g. quinine, sulfadoxine/pyrimethamine, mefloquine) also occurs. It is, therefore, important to follow the recommended national treatment guidelines. Drugs contraindicated in pregnancy include primaquine, tetracycline, doxycycline and halofantrine. Insufficient data currently exists on the use of atovoquone/proguanil and artemether/lumefantrine in pregnancy to recommend their use at this time.

AREA OF CHLOROQUINE-SENSITIVE P. FALCIPARUM PARASITES

- Give chloroquine base 10 mg/kg body weight by mouth once daily for 2 days followed by 5 mg/kg body weight on day 3.

  Note: Chloroquine is considered safe in all three trimesters of pregnancy.

AREA OF CHLOROQUINE-RESISTANT P. FALCIPARUM PARASITES

Oral sulfadoxine/pyrimethamine or quinine salt (dihydrochloride or sulfate) can be used for treating chloroquine-resistant malaria throughout pregnancy. Treatment options include:

- Sulfadoxine/pyrimethamine 3 tablets by mouth as a single dose;

  Note: Sulfadoxine/pyrimethamine should not be used if the woman is allergic to sulfonamides.

- OR Quinine salt 10 mg/kg body weight by mouth three times per day for 7 days.

  Note: If compliance with 7 days of quinine is not possible or side effects are severe, give a minimum of 3 days of quinine PLUS sulfadoxine/pyrimethamine 3 tablets by mouth as a single dose on the first day of treatment (providing sulfadoxine/pyrimethamine is effective; consult the national guidelines).

Mefloquine may also be used for treating symptomatic *P. falciparum* in pregnancy if treatment with quinine or sulfadoxine/pyrimethamine is unsuitable because of drug resistance or individual contraindications.

Note: Clinicians should carefully consider the use of mefloquine in early pregnancy due to limited safety data in the first trimester of pregnancy:

- In areas of mefloquine-sensitive parasites, give mefloquine 15 mg/kg body weight by mouth as a single dose;

- In areas of emerging mefloquine resistance, give mefloquine 15 mg/kg body weight by mouth followed by 10 mg/kg body weight 24 hours later.

AREA OF MULTIDRUG-RESISTANT P. FALCIPARUM MALARIA

Multidrug resistant *P. falciparum* malaria (resistant to chloroquine and sulfadoxine/pyrimethamine and quinine or mefloquine) is present in certain areas limiting treatment options. Consult the national treatment guidelines. Treatment options include:

- quinine salt (dihydrochloride or sulfate) 10 mg/kg body weight by mouth three times daily for 7 days;
- OR quinine salt 10 mg/kg body weight by mouth 3 times daily for 7 days PLUS clindamycin 300 mg 4 times daily for 5 days;

  Note: The quinine/clindamycin combination can be used in areas of quinine resistance.
- OR artesunate 4 mg/kg bodyweight by mouth in a divided loading dose on day 1, followed by 2 mg/kg bodyweight by mouth once daily for 6 days.

  Note: Artesunate can be used in the second and third trimester for treating uncomplicated malaria but there are insufficient data to recommend its use in the first trimester. Artesunate may be used, however, if no suitable alternative exists.

VIVAX MALARIA

AREA OF CHLOROQUINE-SENSITIVE P. VIVAX PARASITES

Chloroquine alone is the treatment of choice in areas with chloroquine-sensitive vivax malaria and areas with chloroquine-sensitive vivax and falciparum malaria. Where there is chloroquine-resistant *P. falciparum*, manage as a mixed infection (**page S-106**).

- Give chloroquine base 10 mg/kg body weight by mouth once daily for 2 days followed by 5 mg/kg body weight by mouth on day 3.

AREA OF CHLOROQUINE-RESISTANT P. VIVAX PARASITES

Chloroquine-resistant *P. vivax* has been reported in several countries and there are limited data available to determine the optimal treatment. Before considering second line drugs for treatment failure with chloroquine, clinicians should exclude poor patient compliance and a new infection with *P. falciparum*. If **diagnostic testing is not available**,

manage as a mixed infection (see below). Treatment options for confirmed chloroquine-resistant vivax malaria include:

- quinine salt (dihydrochloride or sulfate) 10 mg/kg body weight by mouth twice daily for 7 days;

  Note: The dose of quinine is less than that used for falciparum malaria; diagnosis of species is essential.

- OR mefloquine 15 mg/kg body weight by mouth as a single dose;
- OR sulfadoxine/pyrimethamine 3 tablets by mouth as a single dose;

  Note: Sulfadoxine/pyrimethamine is not generally recommended because it acts slowly to clear vivax parasites.

- OR artesunate 4 mg/kg body weight by mouth in a divided loading dose on day 1 followed by 2 mg/kg body weight daily for 6 days.

TREATMENT OF LIVER STAGES OF VIVAX MALARIA

Vivax malaria may remain dormant in the liver. From time to time, these dormant stages are released into the blood to cause a new, symptomatic vivax infection. Primaquine can be used to clear the liver stages but its use is not acceptable during pregnancy. Primaquine should be used after delivery. Dose regimes vary by geographic region; use the dose recommended in the national guidelines.

AREAS OF MIXED FALCIPARUM-VIVAX MALARIA

In areas of mixed transmission, the proportions of malaria species and their drug sensitivity patterns vary. Referral to the national treatment guidelines is essential. If **microscopic diagnosis is available**, specific treatment can be prescribed. Where unavailable, options include:

- assume the infection is due to *P. falciparum* and treat accordingly (follow national guidelines);
- in areas of chloroquine-resistant but sulfadoxine/pyrimethamine sensitive *P. falciparum* and chloroquine sensitive *P. vivax*, treat with standard dose chloroquine and standard dose sulfadoxine/pyrimethamine.

FEVER AFTER CHILDBIRTH

PROBLEM

- A woman has a fever (temperature 38°C or more) occurring more than 24 hours after delivery.

GENERAL MANAGEMENT

- Encourage bed rest.
- Ensure adequate hydration by mouth or IV.
- Use a fan or tepid sponge to help decrease temperature.
- If **shock is suspected**, immediately begin treatment (**page S-1**). Even if signs of shock are not present, keep shock in mind as you evaluate the woman further because her status may worsen rapidly. If **shock develops**, it is important to begin treatment immediately.

DIAGNOSIS

TABLE S-14 Diagnosis of fever after childbirth

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Fever/chills • Lower abdominal pain • Purulent, foul-smelling lochia • Tender uterus	• Light[a] vaginal bleeding • Shock	**Metritis, page S-110**
• Lower abdominal pain and distension • Persistent spiking fever/chills • Tender uterus	• Poor response to antibiotics • Swelling in adnexa or pouch of Douglas • Pus obtained upon culdocentesis	**Pelvic abscess, page S-110**
• Low-grade fever/chills • Lower abdominal pain • Absent bowel sounds	• Rebound tenderness • Abdominal distension • Anorexia • Nausea/vomiting • Shock	**Peritonitis, page S-111**
• Breast pain and tenderness • 3–5 days after delivery	• Hard enlarged breasts • Both breasts affected	**Breast engorgement, page S-111**
• Breast pain and tenderness • Reddened, wedge-shaped area on breast • 3–4 weeks after delivery	• Inflammation preceded by engorgement • Usually only one breast affected	**Mastitis, page S-112**
• Firm, very tender breast • Overlying erythema	• Fluctuant swelling in breast • Draining pus	**Breast abscess, page S-113**
• Unusually tender wound with bloody or serous discharge	• Slight erythema extending beyond edge of incision	**Wound abscess, wound seroma or wound haematoma, page S-113**
• Painful and tender wound • Erythema and oedema beyond edge of incision	• Hardened wound • Purulent discharge • Reddened area around wound	**Wound cellulitis, page S-114**

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Dysuria • Increased frequency and urgency of urination	• Retropubic/suprapubic pain • Abdominal pain	**Cystitis, page S-101**

[a] Light bleeding: takes longer than 5 minutes for a clean pad or cloth to be soaked.

TABLE S-14 Cont. Diagnosis of fever after childbirth

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Dysuria • Spiking fever/chills • Increased frequency and urgency of urination • Abdominal pain	• Retropubic/suprapubic pain • Loin pain/tenderness • Tenderness in rib cage • Anorexia • Nausea/vomiting	**Acute pyelonephritis, page S-102**
• Spiking fever despite antibiotics	• Calf muscle tenderness	**Deep vein thrombosis**[a]
• Fever • Difficulty in breathing • Cough with expectoration • Chest pain	• Consolidation • Congested throat • Rapid breathing • Rhonchi/rales	**Pneumonia, page S-129**
• Fever • Decreased breath sounds	• Typically occurs postoperative	**Atelectasis**[b]
• Fever • Chills/rigors • Headache • Muscle/joint pain	• Enlarged spleen	**Uncomplicated malaria, page S-103**
• Symptoms and signs of uncomplicated malaria • Coma • Anaemia	• Convulsions • Jaundice	**Severe/complicated malaria, page S-52**
• Fever • Headache • Dry cough • Malaise • Anorexia • Enlarged spleen	• Confusion • Stupor	**Typhoid**[c]
• Fever • Malaise • Anorexia • Nausea • Dark urine and pale stool • Jaundice • Enlarged liver	• Muscle/joint pain • Urticaria • Enlarged spleen	**Hepatitis**[d]

[a] Give heparin infusion.
[b] Encourage ambulation and deep breathing. Antibiotics are not necessary.
[c] Give ampicillin 1 g by mouth four times per day OR amoxicillin 1 g by mouth three times per day for 14 days. Alternative therapy will depend on local sensitivity patterns.
[d] Provide supportive therapy and observe.

MANAGEMENT

METRITIS

Metritis is infection of the uterus after delivery and is a major cause of maternal death. Delayed or inadequate treatment of metritis may result in pelvic abscess, peritonitis, septic shock, deep vein thrombosis, pulmonary embolism, chronic pelvic infection with recurrent pelvic pain and dyspareunia, tubal blockage and infertility.

- Transfuse as necessary. Use packed cells, if available (**page C-23**).
- Give a combination of antibiotics until the woman is fever-free for 48 hours (**page C-35**):
  - ampicillin 2 g IV every 6 hours;
  - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
  - PLUS metronidazole 500 mg IV every 8 hours;
  - If **fever is still present 72 hours after initiating antibiotics**, re-evaluate and revise diagnosis.

  Note: Oral antibiotics are not necessary after stopping IV antibiotics.
- If **retained placental fragments** are suspected, perform a digital exploration of the uterus to remove clots and large pieces. Use ovum forceps or a large curette if required.
- If there is **no improvement** with conservative measures and there are **signs of general peritonitis** (fever, rebound tenderness, abdominal pain), perform a laparotomy to drain the pus.
- If the **uterus is necrotic and septic**, perform subtotal hysterectomy (**page P-103**).

PELVIC ABSCESS

- Give a combination of antibiotics before draining the abscess and continue until the woman is fever-free for 48 hours (**page C-35**):
  - ampicillin 2 g IV every 6 hours;
  - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
  - PLUS metronidazole 500 mg IV every 8 hours.

- If the abscess is **fluctuant in the cul-de-sac**, drain the pus through the cul-de-sac (**page P-69**). If the **spiking fever continues**, perform a laparotomy.

PERITONITIS

- Provide nasogastric suction.
- Infuse IV fluids (**page C-21**).
- Give a combination of antibiotics until the woman is fever-free for 48 hours (**page C-35**):
  - ampicillin 2 g IV every 6 hours;
  - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
  - PLUS metronidazole 500 mg IV every 8 hours.
- If necessary, perform laparotomy for peritoneal lavage (wash-out).

BREAST ENGORGEMENT

Breast engorgement is an exaggeration of the lymphatic and venous engorgement that occurs prior to lactation. It is not the result of overdistension of the breast with milk.

BREASTFEEDING

- If the **woman is breastfeeding** and the **baby is not able to suckle**, encourage the woman to express milk by hand or with a pump.
- If the **woman is breastfeeding** and the **baby is able to suckle**:
  - Encourage the woman to breastfeed more frequently, using both breasts at each feeding;
  - Show the woman how to hold the baby and help it attach;
  - Relief measures before feeding may include:
    - Apply warm compresses to the breasts just before breastfeeding, or encourage the woman to take a warm shower;
    - Massage the woman’s neck and back;

    - Have the woman express some milk manually prior to breastfeeding and wet the nipple area to help the baby latch on properly and easily;
  - Relief measures after feeding may include:
    - Support breasts with a binder or brassiere;
    - Apply cold compress to the breasts between feedings to reduce swelling and pain;
    - Give paracetamol 500 mg by mouth as needed;
  - Follow up 3 days after initiating management to ensure response.

NOT BREASTFEEDING

- If the **woman is not breastfeeding**:
  - Support breasts with a binder or brassiere;
  - Apply cold compresses to the breasts to reduce swelling and pain;
  - Avoid massaging or applying heat to the breasts;
  - Avoid stimulating the nipples;
  - Give paracetamol 500 mg by mouth as needed;
  - Follow up 3 days after initiating management to ensure response.

BREAST INFECTION

MASTITIS

- Treat with antibiotics (**page C-35**):
  - cloxacillin 500 mg by mouth four times per day for 10 days;
  - OR erythromycin 250 mg by mouth three times per day for 10 days.
- Encourage the woman to:
  - continue breastfeeding;
  - support breasts with a binder or brassiere;

- apply cold compresses to the breasts between feedings to reduce swelling and pain.

- Give paracetamol 500 mg by mouth as needed.
- Follow up 3 days after initiating management to ensure response.

BREAST ABSCESS

- Treat with antibiotics (**page C-35**):
  - cloxacillin 500 mg by mouth four times per day for 10 days;
  - OR erythromycin 250 mg by mouth three times per day for 10 days.
- Drain the abscess:
  - General anaesthesia (e.g. ketamine, **page P-13**) is usually required;
  - Make the incision radially extending from near the alveolar margin towards the periphery of the breast to avoid injury to the milk ducts;
  - Wearing high-level disinfected gloves, use a finger or tissue forceps to break up the pockets of pus;
  - Loosely pack the cavity with gauze;
  - Remove the gauze pack after 24 hours and replace with a smaller gauze pack.
- If there is **still pus in the cavity**, place a small gauze pack in the cavity and bring the edge out through the wound as a wick to facilitate drainage of any remaining pus.
- Encourage the woman to:
  - continue breastfeeding even when there is collection of pus;
  - support breasts with a binder or brassiere;
  - apply cold compresses to the breasts between feedings to reduce swelling and pain.
- Give paracetamol 500 mg by mouth as needed.
- Follow up 3 days after initiating management to ensure response.

INFECTION OF PERINEAL AND ABDOMINAL WOUNDS

WOUND ABSCESS, WOUND SEROMA AND WOUND HAEMATOMA

- If there is **pus or fluid**, open and drain the wound.

- Remove infected skin or subcutaneous sutures and debride the wound. Do not remove fascial sutures.
- If there is an **abscess without cellulitis**, antibiotics are not required.

- Place a damp dressing in the wound and have the woman return to change the dressing every 24 hours.
- Advise the woman on the need for good hygiene and to wear clean pads or cloths that she changes often.

WOUND CELLULITIS AND NECROTIZING FASCIITIS

- If there is **fluid or pus**, open and drain the wound.
- Remove infected skin or subcutaneous sutures and debride the wound. Do not remove fascial sutures.
- If **infection is superficial and does not involve deep tissues**, monitor for development of an abscess and give a combination of antibiotics (**page C-35**):
  - ampicillin 500 mg by mouth four times per day for 5 days;
  - PLUS metronidazole 400 mg by mouth three times per day for 5 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 6 hours;
  - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
  - PLUS metronidazole 500 mg IV every 8 hours;
  - Once the **woman is fever-free for 48 hours**, give:
    - ampicillin 500 mg by mouth four times per day for 5 days;
    - PLUS metronidazole 400 mg by mouth three times per day for 5 days.

  Note: Necrotizing fasciitis requires wide surgical debridement. Perform secondary closure 2–4 weeks later, depending on resolution of infection.

- If the **woman has a severe infection or necrotizing fasciitis**, admit her to the hospital for management and change wound dressing twice daily.

ABDOMINAL PAIN IN EARLY PREGNANCY

PROBLEM

- The woman is experiencing abdominal pain in the first 22 weeks of pregnancy. Abdominal pain may be the first presentation in serious complications such as abortion or ectopic pregnancy.

GENERAL MANAGEMENT

- Make a **rapid evaluation** of the general condition of the woman including vital signs (pulse, blood pressure, respiration, temperature).
- If **shock is suspected**, immediately begin treatment (**page S-1**). Even if signs of shock are not present, keep shock in mind as you evaluate the woman further because her status may worsen rapidly. If **shock develops**, it is important to begin treatment immediately.

Note: Appendicitis should be suspected in any woman having abdominal pain. Appendicitis can be confused with other more common problems in pregnancy which cause abdominal pain (e.g. ectopic pregnancy, abruptio placentae, twisted ovarian cysts, pyelonephritis).

DIAGNOSIS

TABLE S-15 Diagnosis of abdominal pain in early pregnancy

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Abdominal pain • Adnexal mass on vaginal examination	• Palpable, tender discrete mass in lower abdomen • Light[b] vaginal bleeding	**Ovarian cyst[a], page S-117**
• Lower abdominal pain • Low-grade fever • Rebound tenderness	• Abdominal distension • Anorexia • Nausea/vomiting • Paralytic ileus • Increased white blood cells • No mass in lower abdomen • Site of pain higher than expected	**Appendicitis, page S-117**
• Dysuria • Increased frequency and urgency of urination • Abdominal pain	• Retropubic/suprapubic pain	**Cystitis, page S-101**
• Dysuria • Spiking fever/chills • Increased frequency and urgency of urination • Abdominal pain	• Retropubic/suprapubic pain • Loin pain/tenderness • Tenderness in rib cage • Anorexia • Nausea/vomiting	**Acute pyelonephritis, page S-102**
• Low-grade fever/chills • Lower abdominal pain • Absent bowel sounds	• Rebound tenderness • Abdominal distension • Anorexia • Nausea/vomiting • Shock	**Peritonitis, page S-111**

• Abdominal pain • Light bleeding • Closed cervix • Uterus slightly larger than normal • Uterus softer than normal	• Fainting • Tender adnexal mass • Amenorrhoea • Cervical motion tenderness	**Ectopic pregnancy, page S-13**

[a] Ovarian cysts may be asymptomatic and are sometimes first detected on physical examination.

[b] Light bleeding: takes longer than 5 minutes for a clean pad or cloth to be soaked.

MANAGEMENT

OVARIAN CYSTS

Ovarian cysts in pregnancy may cause abdominal pain due to torsion or rupture. Ovarian cysts most commonly undergo torsion and rupture during the first trimester.

- If the **woman is in severe pain**, suspect torsion or rupture. Perform immediate laparotomy.

  Note: If **findings at laparotomy are suggestive of malignancy** (solid areas in the tumour, growth extending outside the cyst wall), the specimen should be sent for immediate histological examination and the woman should be referred to a tertiary care centre for evaluation and management.

- If the **cyst is more than 10 cm and is asymptomatic**:
  - If it is **detected during the first trimester**, observe for growth or complications;
  - If it is **detected during the second trimester**, remove by laparotomy to prevent complications.
- If the **cyst is between 5–10 cm**, follow up. Laparotomy may be required if the cyst increases in size or fails to regress.
- If the **cyst is less than 5 cm**, it will usually regress on its own and does not require treatment.

APPENDICITIS

- Give a combination of antibiotics before surgery and continue until the woman is postoperative and fever-free for 48 hours (**page C-35**):
  - ampicillin 2 g IV every 6 hours;
  - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
  - PLUS metronidazole 500 mg IV every 8 hours.
- Perform an immediate surgical exploration (regardless of stage of gestation) and perform appendectomy, if required.

Note: Delaying diagnosis and treatment can result in rupture of the appendix which may lead to generalized peritonitis.

- If there are **signs of peritonitis** (fever, rebound tenderness, abdominal pain), give antibiotics as for peritonitis (**page S-111**).

  Note: The presence of peritonitis increases the likelihood of abortion or preterm labour.

- If the **woman is in severe pain**, give pethidine 1 mg/kg body weight (but not more than 100 mg) IM or IV slowly or give morphine 0.1 mg/kg body weight IM.

- Tocolytic drugs may be needed to prevent preterm labour (**Table S-17, page S-123**).

ABDOMINAL PAIN IN LATER PREGNANCY AND AFTER CHILDBIRTH

PROBLEMS

- The woman is experiencing abdominal pain after 22 weeks of pregnancy.
- The woman is experiencing abdominal pain during the first 6 weeks after childbirth.

GENERAL MANAGEMENT

- Make a **rapid evaluation** of the general condition of the woman including vital signs (pulse, blood pressure, respiration, temperature).
- If **shock is suspected**, immediately begin treatment (**page S-1**). Even if signs of shock are not present, keep shock in mind as you evaluate the woman further because her status may worsen rapidly. If **shock develops**, it is important to begin treatment immediately.

Note: Appendicitis should be suspected in any woman having abdominal pain. Appendicitis can be confused with other more common problems in pregnancy which cause abdominal pain. If **appendicitis occurs in late pregnancy**, the infection may be walled off by the gravid uterus. The size of the uterus rapidly decreases after delivery, allowing the infection to spill into the peritoneal cavity. In these cases, appendicitis presents as generalized peritonitis.

DIAGNOSIS

TABLE S-16 Diagnosis of abdominal pain in later pregnancy and after childbirth

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Palpable contractions • Blood-stained mucus discharge (show) or watery discharge before 37 weeks	• Cervical dilatation and effacement • Light[a] vaginal bleeding	**Possible preterm labour, page S-122**
• Palpable contractions • Blood-stained mucus discharge (show) or watery discharge at or after 37 weeks	• Cervical dilatation and effacement • Light vaginal bleeding	**Possible term labour, page C-57**
• Intermittent or constant abdominal pain • Bleeding after 22 weeks gestation (may be retained in the uterus)	• Shock • Tense/tender uterus • Decreased/absent fetal movements • Fetal distress or absent fetal heart sounds	**Abruptio placentae, page S-18**
• Severe abdominal pain (may decrease after rupture) • Bleeding (intra-abdominal and/or vaginal)	• Shock • Abdominal distension/ free fluid • Abnormal uterine contour • Tender abdomen • Easily palpable fetal parts • Absent fetal movements and fetal heart sounds • Rapid maternal pulse	**Ruptured uterus, page S-20**
• Abdominal pain • Foul-smelling watery vaginal discharge after 22 weeks gestation • Fever/chills	• History of loss of fluid • Tender uterus • Rapid fetal heart rate • Light vaginal bleeding	**Amnionitis, page S-139**

• Abdominal pain • Dysuria • Increased frequency and urgency of urination	• Retropubic/suprapubic pain	**Cystitis, page S-101**

[a] Light bleeding: takes longer than 5 minutes for a clean pad or cloth to be soaked.

TABLE S-16 Cont. Diagnosis of abdominal pain in later pregnancy and after childbirth

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Dysuria • Abdominal pain • Spiking fever/chills • Increased frequency and urgency of urination	• Retropubic/suprapubic pain • Loin pain/tenderness • Tenderness in rib cage • Anorexia • Nausea/vomiting	**Acute pyelonephritis, page S-102**
• Lower abdominal pain • Low-grade fever • Rebound tenderness	• Abdominal distension • Anorexia • Nausea/vomiting • Paralytic ileus • Increased white blood cells • No mass in lower abdomen • Site of pain higher than expected	**Appendicitis, page S-117**
• Lower abdominal pain • Fever/chills • Purulent, foul-smelling lochia • Tender uterus	• Light vaginal bleeding • Shock	**Metritis, page S-110**
• Lower abdominal pain and distension • Persistent spiking fever/chills • Tender uterus	• Poor response to antibiotics • Swelling in adnexa or pouch of Douglas • Pus obtained upon culdocentesis	**Pelvic abscess, page S-110**
• Lower abdominal pain • Low-grade fever/chills • Absent bowel sounds	• Rebound tenderness • Abdominal distension • Anorexia • Nausea/vomiting • Shock	**Peritonitis, page S-111**
• Abdominal pain • Adnexal mass on vaginal examination	• Palpable, tender discrete mass in lower abdomen • Light vaginal bleeding	**Ovarian cyst[b], page S-117**

[b] Ovarian cysts may be asymptomatic and are sometimes first detected on physical examination.

PRETERM LABOUR

Preterm delivery is associated with higher perinatal morbidity and mortality. Management of preterm labour consists of tocolysis (trying to stop uterine contractions) or allowing labour to progress. Maternal problems are chiefly related to interventions carried out to stop contractions (see below).

Make every effort to confirm the gestational age of the fetus.

TOCOLYSIS

This intervention aims to delay delivery until the effect of corticosteroids has been achieved (see below).

- Attempt tocolysis if:
  - gestation is less than 37 weeks;
  - the cervix is less than 3 cm dilated;
  - there is no amnionitis, pre-eclampsia or active bleeding;
  - there is no fetal distress.
- Confirm the diagnosis of preterm labour by documenting cervical effacement or dilatation over 2 hours.
- If **less than 37 weeks gestation**, give corticosteroids to the mother to improve fetal lung maturity and chances of neonatal survival:
  - betamethasone 12 mg IM, two doses 12 hours apart;
  - OR dexamethasone 6 mg IM, four doses 6 hours apart.

  Note: Do not use corticosteroids in the presence of frank infection.
- Give a tocolytic drug (**Table S-17**) and monitor maternal and fetal condition (pulse, blood pressure, signs of respiratory distress, uterine contractions, loss of amniotic fluid or blood, fetal heart rate, fluid balance, blood glucose, etc.).

  Note: Do not give tocolytic drugs for more than 48 hours.

If preterm labour continues despite use of tocolytic drugs, arrange for the baby to receive care at the most appropriate service with neonatal facilities.

TABLE S-17 Tocolytic drugs[a] to stop uterine contractions

Drug	Initial Dose	Subsequent Dose	Side Effects and Precautions
Salbutamol	10 mg in 1 L IV fluids. Start IV infusion at 10 drops per minute.	If **contractions persist**, increase infusion rate by 10 drops per minute every 30 minutes until contractions stop or maternal pulse rate exceeds 120 per minute. If **contractions stop**, maintain the same infusion rate for at least 12 hours after the last contraction.	If **maternal heart rate increases** (more than 120 per minute), reduce infusion rate; If the **woman is anaemic**, use with caution. If steroids and salbutamol are used, **maternal pulmonary oedema may occur**. Restrict fluids, maintain fluid balance and stop drug.
Indomethacin	100 mg loading dose by mouth or rectum	25 mg every 6 hours for 48 hours	If **gestation is more than 32 weeks**, avoid use to prevent premature closure of fetal ductus arteriosus. Do not use for more than 48 hours.

[a] Alternative drugs include terbutaline, nifedipine and ritodrine.

ALLOWING LABOUR TO PROGRESS

- Allow labour to progress if:
  - gestation is more than 37 weeks;
  - the cervix is more than 3 cm dilated;
  - there is active bleeding;

- the fetus is distressed, dead or has an anomaly incompatible with survival;
- there is amnionitis or pre-eclampsia.

• Monitor progress of labour using the partograph (**page C-65**).

Note: Avoid delivery by vacuum extraction as the risks of intracranial haemorrhage in the preterm baby are high.

• Prepare for management of preterm or low birth weight baby and anticipate the need for resuscitation (**page S-141**).

DIFFICULTY IN BREATHING

PROBLEM

- A woman is short of breath during pregnancy, labour or after delivery.

GENERAL MANAGEMENT

- Make a rapid evaluation of the general condition of the woman including vital signs (pulse, blood pressure, respiration, temperature).
- Prop up the woman on her left side.
- Start an IV infusion and infuse IV fluids (**page C-21**).
- Give oxygen at 4–6 L per minute by mask or nasal cannulae.
- Obtain haemoglobin estimates using haemoglobinometer or other simple method.

DIAGNOSIS

TABLE S-18 Diagnosis of difficulty in breathing

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Difficulty in breathing • Pallor of conjunctiva, tongue, nail beds and/or palms • Haemoglobin 7g per dL or less • Haematocrit 20% or less	• Lethargy and fatigue • Flat or concave nails	**Severe anaemia, page S-127**
• Symptoms and signs of severe anaemia	• Oedema • Cough • Rales • Swelling of legs • Enlarged liver • Prominent neck veins	**Heart failure due to anaemia, page S-127**
• Difficulty in breathing • Diastolic murmur and/or • Harsh systolic murmur with palpable thrill	• Irregular heart beat • Enlarged heart • Rales • Cyanosis (blueness) • Cough • Swelling of legs • Enlarged liver • Prominent neck veins	**Heart failure due to heart disease, page S-128**
• Difficulty in breathing • Fever • Cough with expectoration • Chest pain	• Consolidation • Congested throat • Rapid breathing • Rhonchi/rales	**Pneumonia, page S-129**
• Difficulty in breathing • Wheezing	• Cough with expectoration • Rhonchi/rales	**Bronchial asthma, page S-129**
• Difficulty in breathing • Hypertension • Proteinuria	• Rales • Frothy cough	**Pulmonary oedema associated with pre-eclampsia**[a]

[a] Withhold fluids and give frusemide 40 mg IV once (**page S-44**).

MANAGEMENT

SEVERE ANAEMIA

- Transfuse as necessary (**page C-23**):
  - Use packed cells;
  - If **blood cannot be centrifuged**, let it hang until the cells have settled. Infuse the cells slowly and dispose of the remaining serum;
  - Give frusemide 40 mg IV with each unit of packed cells.
- If ***Plasmodium falciparum* malaria is suspected**, manage as severe malaria (**page S-52**).
- Give ferrous sulfate or ferrous fumerate 120 mg by mouth PLUS folic acid 400 mcg by mouth once daily for 6 months during pregnancy. Continue for 3 months postpartum.
- Where **hookworm is endemic** (prevalence of 20% or more), give one of the following anthelmintic treatments:
  - albendazole 400 mg by mouth once;
  - OR mebendazole 500 mg by mouth once or 100 mg two times per day for 3 days;
  - OR levamisole 2.5 mg/kg body weight by mouth once daily for 3 days;
  - OR pyrantel 10 mg/kg body weight by mouth once daily for 3 days.
- If **hookworm is highly endemic** (prevalence of 50% or more), repeat the anthelmintic treatment 12 weeks after the first dose.

HEART FAILURE

HEART FAILURE DUE TO ANAEMIA

- Transfusion is almost always necessary in heart failure due to anaemia (**page C-23**):
  - Use packed or sedimented cells as described for severe anaemia (above);

- Give frusemide 40 mg IV with each unit of packed cells.

HEART FAILURE DUE TO HEART DISEASE

- Treat acute heart failure. Drugs used may include:
  - morphine 10 mg IM as a single dose;
  - OR frusemide 40 mg IV, repeated as necessary;
  - OR digoxin 0.5 mg IM as a single dose;
  - OR nitroglycerine 0.3 mg under the tongue, repeated in 15 minutes, if necessary.
- Refer to a higher level if needed.

MANAGEMENT OF HEART FAILURE DURING LABOUR

- Prop up the woman on her left side.
- Limit infusion of IV fluids to decrease the risk of circulatory overload and maintain a strict fluid balance chart.
- Ensure adequate analgesia (**page C-37**).
- If **oxytocin infusion is required**, use a higher concentration at a slower rate while maintaining a fluid balance chart (e.g. the concentration may be doubled if the drops per minute is decreased by half, **Table P-7, page P-22**).

  Note: Do not give ergometrine.
- Have the woman avoid sustained bearing down efforts during the expulsive stage, if possible.
- If **necessary to decrease the woman's workload during delivery**, perform an episiotomy (**page P-71**) and assist delivery by vacuum extraction (**page P-27**) or forceps (**page P-33**).
- Ensure active management of third stage (**page C-73**).

Heart failure is not an indication for caesarean section.

MANAGEMENT OF HEART FAILURE DURING CAESAREAN SECTION

- Use local infiltration anaesthesia with conscious sedation (**page P-7**). Avoid spinal anaesthesia.
- Deliver baby and placenta (**page P-43**).

PNEUMONIA

Inflammation in pneumonia affects the lung parenchyma and involves respiratory bronchioles and alveoli. There is loss of lung capacity that is less tolerated by pregnant women.

- A radiograph of the chest may be required to confirm the diagnosis of pneumonia.
- Give erythromycin base 500 mg by mouth four times per day for 7 days.
- Give steam inhalation.

Consider the possibility of tuberculosis in areas where it is prevalent.

BRONCHIAL ASTHMA

Bronchial asthma complicates 3–4% of pregnancies. Pregnancy is associated with worsening of the symptoms in one-third of affected women.

- If **bronchospasm occurs**, give bronchodilators (e.g. salbutamol 4 mg by mouth every 4 hours or 250 mcg aerosol every 15 minutes for 3 doses).
- If there is **no response to bronchodilators**, give corticosteroids such as hydrocortisone IV 2 mg/kg body weight every 4 hours as needed.
- If **there are signs of infection** (bronchitis), give ampicillin 2 g IV every 6 hours.
- Avoid the use of prostaglandins. For prevention and treatment of postpartum haemorrhage, give oxytocin 10 units IM or give ergometrine 0.2 mg IM.
- After acute exacerbation has been managed, continue treatment with inhaled bronchodilators and inhaled corticosteroids to prevent recurrent acute episodes.

LOSS OF FETAL MOVEMENTS

PROBLEM

- Fetal movements are not felt after 22 weeks of gestation or during labour.

GENERAL MANAGEMENT

- Reassure the woman and provide emotional support (**page C-7**).
- Check the fetal heart rate:
  - If the **mother has had sedatives**, wait for the effect of the drugs to wear off and then recheck;
  - If the **fetal heart cannot be heard**, ask several other persons to listen or use a Doppler stethoscope, if available.

DIAGNOSIS

TABLE S-19 Diagnosis of loss of fetal movements

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Decreased/absent fetal movements • Intermittent or constant abdominal pain • Bleeding after 22 weeks gestation (may be retained in the uterus)	• Shock • Tense/tender uterus • Fetal distress or absent fetal heart sounds	**Abruptio placentae, page S-18**
• Absent fetal movements and fetal heart sounds • Bleeding (intra-abdominal and/or vaginal) • Severe abdominal pain (may decrease after rupture)	• Shock • Abdominal distension/ free fluid • Abnormal uterine contour • Tender abdomen • Easily palpable fetal parts • Rapid maternal pulse	**Ruptured uterus, page S-20**
• Decreased/absent fetal movements • Abnormal fetal heart rate (less than 100 or more than 180 beats per minute)	• Thick meconium-stained fluid	**Fetal distress, page S-95**
• Absent fetal movements and fetal heart sounds	• Symptoms of pregnancy cease • Symphysis-fundal height decreases • Uterine growth decreases	**Fetal death, page S-132**

FETAL DEATH

Intrauterine death may be the result of fetal growth restriction, fetal infection, cord accident or congenital anomalies. Where syphilis is prevalent, a large proportion of fetal deaths are due to this disease.

- If **x-ray is available**, confirm fetal death after 5 days. Signs include overlapping skull bones, hyper flexed spinal column, gas bubbles in heart and great vessels and oedema of the scalp.

- Alternatively, if **ultrasound is available**, confirm fetal death. Signs include absent fetal heart activity, abnormal fetal head shape, reduced or absent amniotic fluid and doubled-up fetus.
- Explain the problem to the woman and her family (**page C-7**). Discuss with them the options of expectant or active management.
- If **expectant management is planned**:
  - Await spontaneous onset of labour during the next 4 weeks;
  - Reassure the woman that in 90% of cases the fetus is spontaneously expelled during the waiting period with no complications.
- If **platelets are decreasing** or **4 weeks have passed without spontaneous labour**, consider active management.
- If **active management is planned**, assess the cervix (**page P-18**):
  - If the **cervix is favourable** (soft, thin, partly dilated), induce labour using oxytocin or prostaglandins (**page P-18**);
  - If the **cervix is unfavourable** (firm, thick, closed), ripen the cervix using prostaglandins or a Foley catheter (**page P-24**);

    Note: Do not rupture the membranes due to risk of infection.
  - Deliver by caesarean section only as a last resort.
- If **spontaneous labour does not occur within 4 weeks**, **platelets are decreasing** and the **cervix is unfavourable** (firm, thick, closed), ripen the cervix using misoprostol:
  - Place misoprostol 25 mcg in the upper vagina. Repeat after 6 hours if required;
  - If there is **no response after two doses of 25 mcg**, increase to 50 mcg every 6 hours;

    Note: Do not use more than 50 mcg at a time and do not exceed 4 doses.

Do not use oxytocin within 8 hours of using misoprostol. Monitor uterine contractions and fetal heart rate of all women undergoing induction of labour with prostaglandins.

- If there are **signs of infection** (fever, foul-smelling vaginal discharge), give antibiotics as for metritis (**page S-110**).
- If a **clotting test shows failure of a clot to form after 7 minutes or a soft clot that breaks down easily**, suspect coagulopathy (**page S-19**).

PRELABOUR RUPTURE OF MEMBRANES

PROBLEM

- Watery vaginal discharge after 22 weeks gestation.

GENERAL MANAGEMENT

- Confirm accuracy of calculated gestational age, if possible.
- Use a high-level disinfected speculum to assess vaginal discharge (amount, colour, odour) and exclude urinary incontinence.

If the woman complains of bleeding in later pregnancy (after 22 weeks), do not do a digital vaginal examination.

DIAGNOSIS

TABLE S-20 Diagnosis of vaginal discharge

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Watery vaginal discharge	• Sudden gush or intermittent leaking of fluid • Fluid seen at introitus • No contractions within 1 hour	**Prelabour rupture of membranes, page S-136**
• Foul-smelling watery vaginal discharge after 22 weeks • Fever/chills • Abdominal pain	• History of loss of fluid • Tender uterus • Rapid fetal heart rate • Light[a] vaginal bleeding	**Amnionitis, page S-139**
• Foul-smelling vaginal discharge • No history of loss of fluid	• Itching • Frothy/curdish discharge • Abdominal pain • Dysuria	**Vaginitis/cervicitis[b]**
• Bloody vaginal discharge	• Abdominal pain • Loss of fetal movements • Heavy, prolonged vaginal bleeding	**Antepartum haemorrhage, page S-17**
• Blood-stained mucus or watery vaginal discharge (show)	• Cervical dilatation and effacement • Contractions	**Possible term labour, page C-57** or **Possible preterm labour, page S-122**

[a] Light bleeding: takes longer than 5 minutes for a clean pad or cloth to be soaked.
[b] Determine cause and treat accordingly.

MANAGEMENT

PRELABOUR RUPTURE OF MEMBRANES

Prelabour rupture of membranes (PROM) is rupture of the membranes before labour has begun. PROM can occur either when the fetus is immature (preterm or before 37 weeks) or when it is mature (term).

CONFIRMING THE DIAGNOSIS

The typical odour of amniotic fluid confirms the diagnosis.

If **membrane rupture is not recent** or when **leakage is gradual**, confirming the diagnosis may be difficult:

- Place a vaginal pad over the vulva and examine it an hour later visually and by odour.
- Use a high-level disinfected speculum for vaginal examination:
  - Fluid may be seen coming from the cervix or forming a pool in the posterior fornix;
  - Ask the woman to cough; this may cause a gush of fluid.

Do not perform a digital vaginal examination as it does not help establish the diagnosis and can introduce infection.

- If available, do tests:
  - The **nitrazine test** depends upon the fact that vaginal secretions and urine are acidic while amniotic fluid is alkaline. Hold a piece of nitrazine paper in a haemostat and touch it against the fluid pooled on the speculum blade. A change from yellow to blue indicates alkalinity (presence of amniotic fluid). Blood and some vaginal infections give false positive results;
  - For the **ferning test**, spread some fluid on a slide and let it dry. Examine it with a microscope. Amniotic fluid crystallizes and may leave a fern-leaf pattern. False negatives are frequent.

MANAGEMENT

- If there is **vaginal bleeding with intermittent or constant abdominal pain**, suspect abruptio placentae (**page S-18**).
- If there are **signs of infection** (fever, foul-smelling vaginal discharge), give antibiotics as for amnionitis (**page S-139**).
- If there are **no signs of infection** and the **pregnancy is less than 37 weeks** (when fetal lungs are more likely to be immature):
  - Give antibiotics to reduce maternal and neonatal infective morbidity and to delay delivery (**page C-35**):

    - erythromycin base 250 mg by mouth three times per day for 7 days;
    - PLUS amoxicillin 500 mg by mouth three times per day for 7 days;
  - Consider transfer to the most appropriate service for care of the newborn, if possible;
  - Give corticosteroids to the mother to improve fetal lung maturity:
    - betamethasone 12 mg IM, two doses 12 hours apart;
    - OR dexamethasone 6 mg IM, four doses 6 hours apart.

    Note: Corticosteroids should not be used in the presence of frank infection.
  - Deliver at 37 weeks;
  - If there are **palpable contractions and blood-stained mucus discharge**, suspect preterm labour (**page S-122**).
- If there are **no signs of infection** and the **pregnancy is 37 weeks or more**:
  - If the **membranes have been ruptured for more than 18 hours**, give prophylactic antibiotics (**page C-35**) in order to help reduce Group B streptococcus infection in the neonate:
    - ampicillin 2 g IV every 6 hours;
    - OR penicillin G 2 million units IV every 6 hours until delivery;
    - If there are **no signs of infection after delivery**, discontinue antibiotics.
  - Assess the cervix (**page P-18**):
    - If the **cervix is favourable** (soft, thin, partly dilated), induce labour using oxytocin (**page P-17**);
    - If the **cervix is unfavourable** (firm, thick, closed), ripen the cervix using prostaglandins and infuse oxytocin (**page P-24**) or deliver by caesarean section (**page P-43**).

AMNIONITIS

- Give a combination of antibiotics until delivery (**page C-35**):
  - ampicillin 2 g IV every 6 hours;
  - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
  - If the **woman delivers vaginally**, discontinue antibiotics postpartum;
  - If the **woman has a caesarean section**, continue antibiotics and give metronidazole 500 mg IV every 8 hours until the woman is fever-free for 48 hours.
- Assess the cervix (**page P-18**):
  - If the **cervix is favourable** (soft, thin, partly dilated), induce labour using oxytocin (**page P-17**).
  - If the **cervix is unfavourable** (firm, thick, closed), ripen tge cervix using prostaglandins and infuse oxytocin (**page P-24**) or deliver by caesarean section (**page P-43**).
- If **metritis is suspected** (fever, foul-smelling vaginal discharge), give antibiotics (**page S-110**).
- If **newborn sepsis is suspected**, arrange for a blood culture and antibiotics (**page S-149**).

IMMEDIATE NEWBORN CONDITIONS OR PROBLEMS

PROBLEMS

- The newborn has serious conditions or problems:
  - not breathing or is gasping;
  - breathing with difficulty (less than 30 or more than 60 breaths per minute, indrawing of the chest or grunting);
  - cyanosis (blueness);
  - preterm or very low birth weight (less than 32 weeks gestation or less than 1 500 g);
  - lethargy;
  - hypothermia;
  - convulsions.
- The newborn has other conditions or problems that require attention in the delivery room:
  - low birth weight (1 500–2 500 g);
  - possible bacterial infection in an apparently normal newborn whose mother had prelabour or prolonged rupture of membranes;
  - possible congenital syphilis in newborn whose mother has a positive serologic test for syphilis or is symptomatic.

IMMEDIATE MANAGEMENT

Three situations require immediate management: no breathing (or gasping, below), cyanosis (blueness) or breathing with difficulty (**page S-146**).

NO BREATHING OR GASPING

GENERAL MANAGEMENT

- Dry the baby, remove the wet cloth and wrap the baby in a dry, warm cloth.

- Clamp and cut the cord immediately if not already done.
- Move the baby to a firm, warm surface under a radiant heater for resuscitation.
- Observe standard infection prevention practices when caring for and resuscitating a newborn (**page C-17**).

RESUSCITATION

Box S-8 Resuscitation equipment

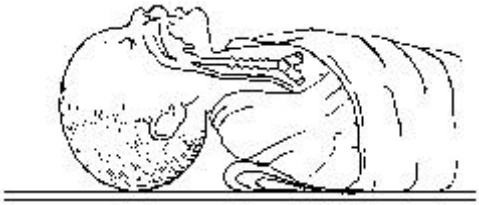
To avoid delays during an emergency situation, it is vital to ensure that equipment is in good condition before resuscitation is needed:

- Have the appropriate size masks available according to the expected size of the baby (size 1 for a normal weight newborn and size 0 for a small newborn).
- Block the mask by making a tight seal with the palm of your hand and squeeze the bag:
  - If you feel pressure against your hand, the bag is generating adequate pressure;
  - If the bag reinflates when you release the grip, the bag is functioning properly.

OPENING THE AIRWAY

- Position the newborn (**Fig S-28**):
  - Place the baby on its back;
  - Position the head in a slightly extended position to open the airway;
  - Keep the baby wrapped or covered, except for the face and upper chest.

FIGURE S-28 Correct position of the head for ventilation; note that the neck is less extended than in adults



- Clear the airway by suctioning first the mouth and then the nostrils. If **blood or meconium is in the baby's mouth or nose**, suction immediately to prevent aspiration.

  Note: Do not suction deep in the throat as this may cause the baby's heart to slow or the baby may stop breathing.

- Reassess the baby:

  - If the **newborn starts crying or breathing**, no further immediate action is needed. Proceed with initial care of the newborn (**page C-76**);

  - If the **baby is still not breathing**, start ventilating (see below).

VENTILATING THE NEWBORN

- Recheck the newborn's position. The neck should be slightly extended (**Fig S-2, page S-142**).

- Position the mask and check the seal (**Fig S-29**):

  - Place the mask on the newborn's face. It should cover the chin, mouth and nose;

  - Form a seal between the mask and the face;

  - Squeeze the bag with two fingers only or with the whole hand, depending on the size of the bag;

  - Check the seal by ventilating twice and observing the rise of the chest.

FIGURE S-29 Ventilation with bag and mask

- Once a seal is ensured and chest movement is present, ventilate the newborn. Maintain the correct rate (approximately 40 breaths per minute) and the correct pressure (observe the chest for an easy rise and fall):
  - If the **baby's chest is rising**, ventilation pressure is probably adequate;
  - If the **baby's chest is not rising**:
    - Recheck and correct, if necessary, the position of the newborn (**Fig S-28, page S-142**);
    - Reposition the mask on the baby's face to improve the seal between mask and face;
    - Squeeze the bag harder to increase ventilation pressure;
    - Repeat suction of mouth and nose to remove mucus, blood or meconium from the airway.
- If the **mother of the newborn received pethidine or morphine** prior to delivery, consider administering naloxone **after** vital signs have been established (**Box S-9, page S-145**).
- Ventilate for 1 minute and then stop and quickly assess if the newborn is breathing spontaneously:
  - If **breathing is normal** (30–60 breaths per minute) and there is **no indrawing of the chest** and **no grunting for 1 minute**, no further resuscitation is needed. Proceed with initial care of the newborn (**page C-76**);
  - If the **newborn is not breathing**, or the **breathing is weak**, continue ventilating until spontaneous breathing begins.

- If the **newborn starts crying**, stop ventilating and continue observing breathing for 5 minutes after crying stops:
  - If **breathing is normal** (30–60 breaths per minute) and there is **no indrawing of the chest** and **no grunting for 1 minute**, no further resuscitation is needed. Proceed with initial care of the newborn (**page C-76**);
  - If the **frequency of breathing is less than 30 breaths per minute**, continue ventilating;
  - If there is **severe indrawing of the chest**, ventilate with oxygen, if available (**Box S-10, page S-147**). Arrange to transfer the baby to the most appropriate service for the care of sick newborns.
- If the **newborn is not breathing regularly after 20 minutes of ventilation**:
  - Transfer the baby to the most appropriate service for the care of sick newborns;
  - During the transfer, keep the newborn warm and ventilated, if necessary.
- If there is **no gasping or breathing at all after 20 minutes of ventilation**, stop ventilating; the baby is stillborn. Provide emotional support to the family (**page C-7**).

Box S-9 Counteracting respiratory depression in the newborn caused by narcotic drugs

If the **mother received pethidine or morphine**, naloxone is the antidote for counteracting respiratory depression in the newborn caused by these drugs.

Note: Do not administer naloxone to newborns whose mothers are suspected of having recently abused narcotic drugs.

- If there are **signs of respiratory depression**, begin resuscitation immediately:
  - After vital signs have been established, give naloxone 0.1 mg/kg body weight IV to the newborn;
  - Naloxone may be given IM after successful resuscitation if the infant has adequate peripheral circulation. Repeated doses may be required to prevent recurrent respiratory depression.
- If there are **no signs of respiratory depression**, but **pethidine or morphine was given within 4 hours of delivery**, observe the baby expectantly for signs of respiratory depression and treat as above if they occur.

CARE AFTER SUCCESSFUL RESUSCITATION

- Prevent heat loss:
  - Place the baby skin-to-skin on the mother's chest and cover the baby's body and head;
  - Alternatively, place the baby under a radiant heater.
- Examine the newborn and count the number of breaths per minute:
  - If the **baby is cyanotic** (bluish) or is **having difficulty breathing** (less than 30 or more than 60 breaths per minute, indrawing of the chest or grunting), give oxygen by nasal catheter or prongs (below).
- Measure the baby's axillary temperature:
  - If the **temperature is 36°C or more**, keep the baby skin-to-skin on the mother's chest and encourage breastfeeding;
  - If the **temperature is less than 36°C**, rewarm the baby (**page S-148**).

- Encourage the mother to begin breastfeeding. A newborn that required resuscitation is at higher risk of developing hypoglycaemia:
  - If **suckling is good**, the newborn is recovering well;
  - If **suckling is not good**, transfer the baby to the appropriate service for the care of sick newborns.
- Ensure frequent monitoring of the newborn during the next 24 hours. If **signs of breathing difficulties recur**, arrange to transfer the baby to the most appropriate service for the care of sick newborns.

CYANOSIS OR BREATHING DIFFICULTY

- If the **baby is cyanotic** (bluish) or is **having difficulty breathing** (less than 30 or more than 60 breaths per minute, indrawing of the chest or grunting) give oxygen by nasal catheter or prongs:
  - Suction the mouth and nose to ensure the airways are clear;
  - Give oxygen at 0.5 L per minute by nasal catheter or nasal prongs (**Box S-10, page S-147**);
  - Transfer the baby to the appropriate service for the care of sick newborns.
- Ensure that the baby is kept warm. Wrap the baby in a soft, dry cloth, cover with a blanket and ensure the head is covered to prevent heat loss.

Box S-10 Use of oxygen

When using oxygen, remember:

- Supplemental oxygen should only be used for difficulty in breathing or cyanosis;
- If the baby is having **severe indrawing of the chest**, is **gasping for breath** or is **persistently cyanotic**, increase the concentration of oxygen by nasal catheter, nasal prongs or oxygen hood.

Note: Indiscriminate use of supplemental oxygen for premature infants has been associated with the risk of blindness.

ASSESSMENT

Many serious conditions in newborns—bacterial infections, malformations, severe asphyxia and hyaline membrane disease due to preterm birth—present in a similar way with difficulty in breathing, lethargy and poor or no feeding.

It is difficult to distinguish between the conditions without diagnostic methods. Nevertheless, treatment must start immediately even without a clear diagnosis of a specific cause. Babies with any of these problems should be suspected to have a serious condition and should be transferred without delay to the appropriate service for the care of sick newborns.

MANAGEMENT

VERY LOW BIRTH WEIGHT OR VERY PRETERM BABY

If the **baby is very small** (less than 1 500 g or less than 32 weeks), severe health problems are likely and include difficulty in breathing, inability to feed, severe jaundice and infection. The baby is susceptible to hypothermia without special thermal protection (e.g. incubator).

Very small newborns require special care. They should be transferred to the appropriate service for caring for sick and small babies as early as possible. Before and during transfer:

- Ensure that the baby is kept warm. Wrap the baby in a soft, dry cloth, cover with a blanket and ensure the head is covered to prevent heat loss.
- If **maternal history indicates possible bacterial infection**, give first dose of antibiotics:
  - gentamicin 4 mg/kg body weight IM (or give kanamycin);
  - PLUS ampicillin 100 mg/kg body weight IM (or give benzyl penicillin).
- If the **baby is cyanotic** (bluish) or is **having difficulty breathing** (less than 30 or more than 60 breaths per minute, indrawing of the chest or grunting), give oxygen by nasal catheter or prongs (**page S-146**).

LETHARGY

If the **baby is lethargic** (low muscular tone, does not move), it is very likely that the baby has a severe illness and should be transferred to the appropriate service for the care of sick of newborns.

HYPOTHERMIA

Hypothermia can occur quickly in a very small baby or a baby who was resuscitated or separated from the mother. In these cases, temperature may quickly drop below 35°C. Rewarm the baby as soon as possible:

- If the **baby is very sick** or **is very hypothermic** (axillary temperature less than 35°C):
  - Use available methods to begin warming the baby (incubator, radiant heater, warm room, heated bed);
  - Transfer the baby as quickly as possible to the appropriate service for the care of preterm or sick newborns;
  - If the **baby is cyanotic** (bluish) or is **having difficulty breathing** (less than 30 or more than 60 breaths per minute, indrawing of the chest or grunting), give oxygen by nasal catheter or prongs (**page S-146**).
- If the **baby is not very sick** and axillary temperature is **35°C or more**:

- Ensure that the baby is kept warm. Wrap the baby in a soft, dry cloth, cover with a blanket and ensure the head is covered to prevent heat loss;
- Encourage the mother to begin breastfeeding as soon as the baby is ready;
- Monitor axillary temperature hourly until normal;
- Alternatively, the baby can be placed in an incubator or under a radiant heater.

CONVULSIONS

Convulsions in the first hour of life are rare. They could be caused by meningitis, encephalopathy or severe hypoglycaemia.

- Ensure that the baby is kept warm. Wrap the baby in a soft, dry cloth, cover with a blanket and ensure the head is covered to prevent heat loss.
- Transfer the baby to the appropriate service for the care of sick newborns as quickly as possible.

MODERATELY PRETERM OR LOW BIRTH WEIGHT BABY

Moderately preterm (33–38 weeks) or low birth weight (1 500–2 500 g) babies may start to develop problems soon after birth.

- If the **baby has no breathing difficulty** and **remains adequately warm** while in skin-to-skin contact with the mother:
  - Keep the baby with the mother;
  - Encourage the mother to initiate breastfeeding within the first hour if possible.
- If the **baby is cyanotic** (bluish) or is **having difficulty breathing** (less than 30 or more than 60 per minute, indrawing of the chest or grunting), give oxygen by nasal catheter or prongs (**page S-146**).
- If **axillary temperature drops below 35°C**, rewarm the baby (**page S-148**).

PRETERM AND/OR PROLONGED RUPTURE OF MEMBRANES AND AN ASYMPTOMATIC NEWBORN

The following are suggested guidelines which may be modified according to local situations:

- If the **mother has clinical signs of bacterial infection** or if **membranes were ruptured for more than 18 hours** before delivery even if the mother has no clinical signs of infection:
  - Keep the baby with the mother and encourage her to continue breastfeeding;
  - Make arrangements with the appropriate service that cares for sick newborns to take a blood culture and start the newborn on antibiotics.
- If **these conditions are not met**, do not treat with antibiotics. Observe the baby for signs of infection for three days:
  - Keep the baby with the mother and encourage her to continue breastfeeding;
  - If **signs of infection occur within 3 days**, make arrangements with the appropriate service that cares for sick newborns to take a blood culture and start the newborn on antibiotics.

CONGENITAL SYPHILIS

- If the **newborn shows signs of syphilis**, transfer the baby to the appropriate service for the care of sick newborns. Signs of syphilis include:
  - generalized oedema;
  - skin rash;
  - blisters on palms or soles;
  - rhinitis;
  - anal condylomata;
  - enlarged liver/spleen;
  - paralysis of one limb;
  - jaundice;
  - pallor;
  - spirochetes seen on darkfield examination of lesion, body fluid or cerebrospinal fluid.

- If the **mother has a positive serologic test for syphilis** or is symptomatic **but the newborn shows no signs of syphilis**, whether or not the mother was treated, give benzathine penicillin 50 000 units/kg body weight IM as a single dose.

SECTION 3

PROCEDURES

TABLE P-1 Indications and precautions for paracervical block

Indications	Precautions
• Dilatation and curettage • Manual vacuum aspiration	• 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 (the 10 o'clock or 12 o'clock position is usually used).

  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 2 minutes and then pinch the cervix with forceps. If the **woman feels the pinch**, wait 2 more minutes and then retest.

Anaesthetize early to provide sufficient time for effect.

FIGURE P-1 Paracervical block injection sites

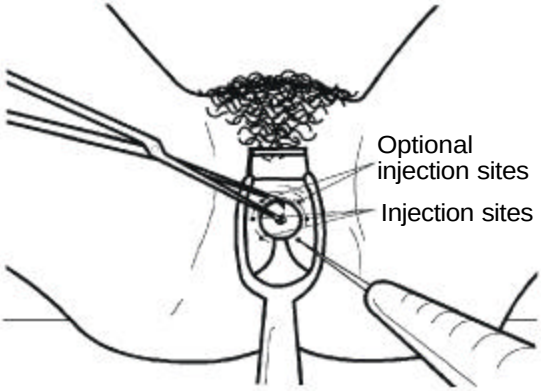


TABLE P-2 Indications and precautions for pudendal block

Indications	Precautions
• Instrumental or breech delivery • Episiotomy and repair of perineal tears • Craniotomy or craniocentesis • Manual removal of placenta	• 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.

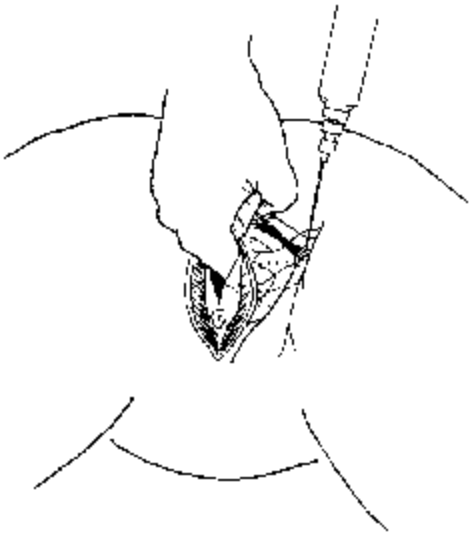
The perineal approach requires no special instrument. For the vaginal approach, a special needle guide ("trumpet"), if available, provides protection for the provider's fingers.

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 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



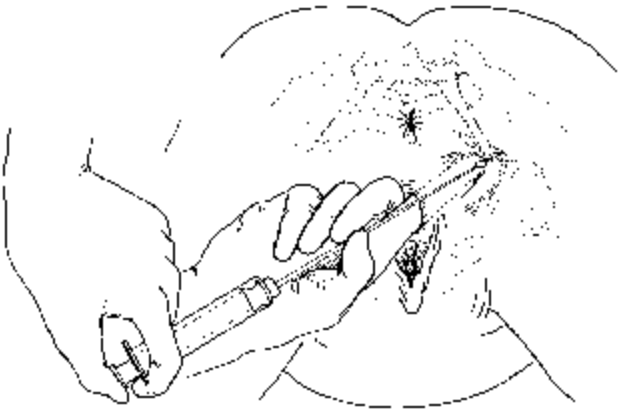
- Inject 10 mL of lignocaine solution in the angle between the ischial spine and the ischial tuberosity.
- Pass the needle through the sacrospinous ligament and inject another 10 mL of lignocaine solution.
- Repeat the procedure on the opposite side.
- If an **episiotomy is to be performed**, infiltrate the episiotomy site in the usual manner at this time (**page P-71**).
- At the conclusion of the set of injections, wait 2 minutes and then pinch the area with forceps. If the **woman can feel the pinch**, wait 2 more minutes and then retest.

Anaesthetize early to provide sufficient time for effect.

VAGINAL APPROACH

- Wearing high-level disinfected 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 2 minutes and then pinch the area with forceps. If the **woman can feel the pinch**, wait 2 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
• Caesarean section (especially in women with heart failure)	• Avoid use in women with eclampsia, severe pre-eclampsia or previous laparotomy • Avoid use in women that are obese, apprehensive or allergic to lignocaine or related drugs • Avoid use if the surgeon is inexperienced at caesarean section. • Do not inject into a vessel.

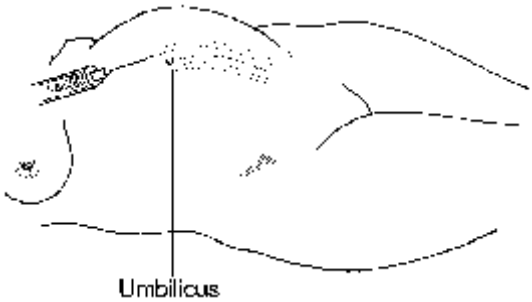
- Review general care principles (**page C-17**) and start an IV infusion (**page C-21**).
- Prepare 200 mL of 0.5% lignocaine with 1:200 000 adrenaline (**page C-39**). Usually less than half this volume (approximately 80 mL) is needed in the first hour.
- If the **fetus is alive** , give pethidine 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 2 minutes and then pinch the incision site with forceps. If the **woman feels the pinch**, wait 2 more minutes and then retest.

Anaesthetize early to provide sufficient time for effect.

Note: When local anaesthesia is used, perform 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, requires more lignocaine and retraction is poorer.

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.
- Remove the placenta by controlled cord traction (**page C-73**).
- 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
• Caesarean section • Laparotomy • Dilatation and curettage • Manual removal of placenta • Repair of third and fourth degree perineal tears	• 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 500–1 000 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 (1:1 000) 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. You will feel 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 2 minutes and then pinch the incision site with forceps. If the **woman can feel the pinch**, wait 2 minutes and then retest.

Anaesthetize early to provide sufficient time for effect.

- After surgery, keep the woman flat for at least 6 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
• 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 for general anaesthesia is used without inhalation apparatus	• 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 2 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 slowly administering ketamine 2 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 feels the pinch**, wait 2 minutes and then retest.
- Monitor vital signs (pulse, blood pressure, respiration, temperature) every 10 minutes during the procedure.

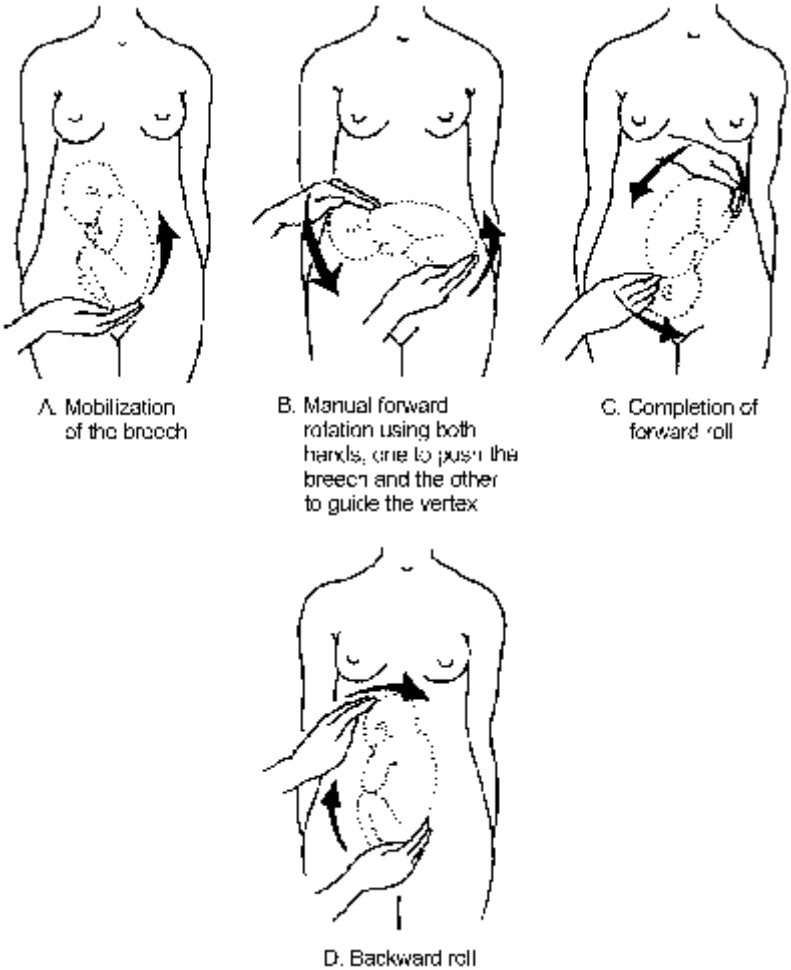
POST-PROCEDURE CARE

- Discontinue ketamine infusion and administer a postoperative analgesic suited to the type of surgery performed (**page C-37**).
- 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.
- 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.
- Palpate the abdomen to confirm 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. If an **abnormality is detected**:
  - Have the woman turn on to her left side;
  - Give oxygen at 4-6 L per minute by mask or nasal cannulae;
  - Reassess every 15 minutes.
- 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 fetal heart rate is good**, tocolytics may increase the chances of successful version. Give:
  - terbutaline 250 mcg IV slowly over 5 minutes;
  - OR salbutamol 0.5 mg IV slowly over 5 minutes.
- If the **procedure is still unsuccessful**, attempt version again after 1 week or if the woman presents in early labour with breech or transverse lie.
- If there are **fetal heart abnormalities**:
  - Turn the woman onto her left side;

- Reassess the fetal heart rate every 5 minutes;
- If the **fetal heart rate does not stabilize within the next 30 minutes**, deliver by caesarean section (**page P-43**).

FIGURE P-5 External version of a breech presentation.



INDUCTION AND AUGMENTATION OF LABOUR

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 practice 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 of high HIV prevalence 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 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 **delivery is not anticipated within 18 hours**, give prophylactic antibiotics in order 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 6 hours until delivery;
  - If there are **no signs of infection after delivery**, discontinue antibiotics.
- If **good labour is not established 1 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

	Rating			
Factor	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 observations 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.

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 (contractions lasting more than 40 seconds and occurring three times in 10 minutes).
- 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 5 minutes;
  - OR salbutamol 10 mg in 1 L IV fluids (normal saline or Ringer's lactate) at 10 drops per minute.
- If there are **not three contractions in 10 minutes**, each lasting **more than 40 seconds** 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 satisfactory contraction pattern is established or the maximum rate of 60 drops per minute is reached.

• If **labour 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**);
- In **primigravida**, infuse oxytocin at a higher concentration (rapid escalation, **Table P-8**):
  - Infuse oxytocin 10 units in 500 mL dextrose (or normal saline) at 30 drops per minute;
  - Increase infusion rate by 10 drops per minute every 30 minutes until good contractions are established;
  - If **good contractions are not established at 60 drops per minute** (60 mIU per minute), 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.

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 good labour is established and then maintain infusion at that rate.

TABLE P-8 Rapid escalation for primigravida: 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.

- Check 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 E_2 (PGE_2) 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 6 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 4 weeks and platelets are decreasing.

- Place misoprostol 25 mcg in the posterior fornix of the vagina. Repeat after 6 hours, if required;
- If there is **no response after two doses of 25 mcg**, increase to 50 mcg every 6 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 speculum into the vagina.
- Hold the catheter with a high-level disinfected 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 in the vagina.
- Leave the catheter inside until contractions begin, or for at least 12 hours.
- Deflate the bulb before removing the catheter and then proceed with oxytocin.

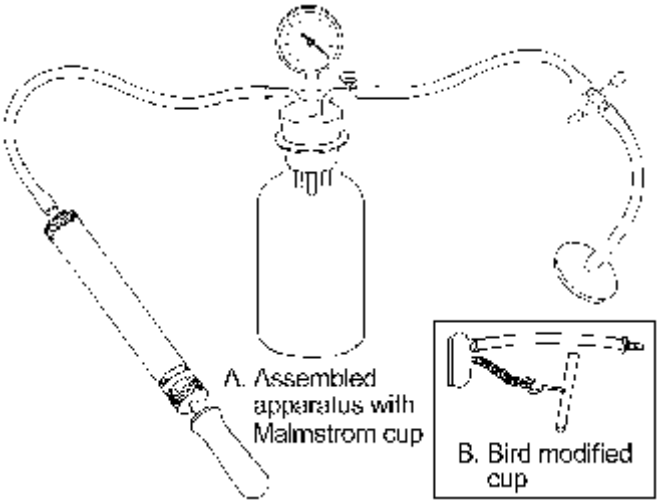
AUGMENTATION OF LABOUR WITH OXYTOCIN

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

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

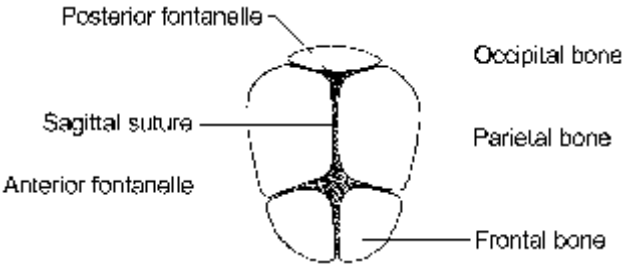
Figure P-6 shows the essential components of the vacuum extractor.

FIGURE P-6 Vacuum extractor



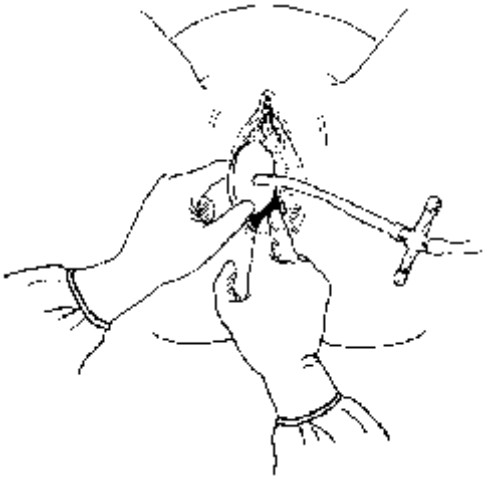
- Review for conditions:
  - vertex presentation;
  - term fetus;
  - cervix fully dilated;
  - head at least at 0 station or no more than 2/5 above symphysis pubis.
- Check all connections and test the vacuum on a gloved hand.
- Provide emotional support and encouragement. If necessary, use a pudendal block (**page P-3**).
- 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**).

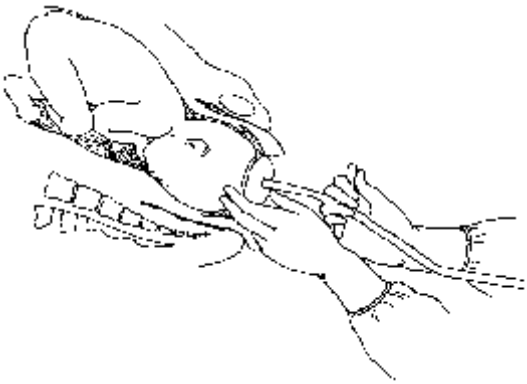
FIGURE P-8 Applying the Malmstrom cup



- 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/cm^2 negative pressure and check the application.
- Increase the vacuum to 0.8 kg/cm^2 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**). Wearing high-level disinfected gloves, 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 head does not advance with each pull;
  - The fetus is undelivered after three pulls with no descent, or after 30 minutes;
  - The 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 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 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 (artificial caput or chignon) under the vacuum cup is harmless and disappears in a few hours.
- Cephalohaematoma requires observation and usually will clear in 3–4 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**).

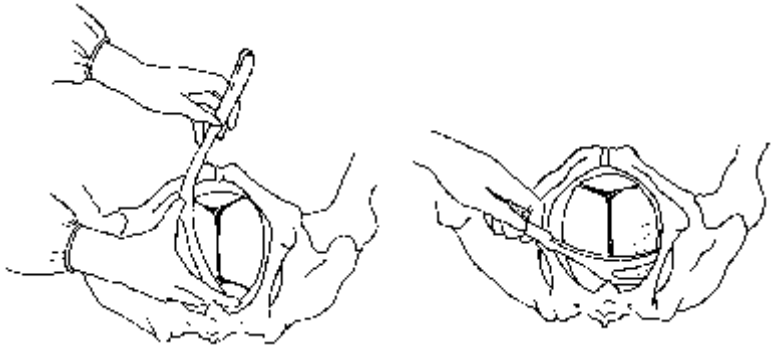
- Review for conditions:
  - vertex presentation or face presentation with chin-anterior or entrapped after-coming head in breech delivery (**page P-41**);
  - cervix fully dilated;
  - head at +2 or +3 station or 0/5 palpable.

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 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**).

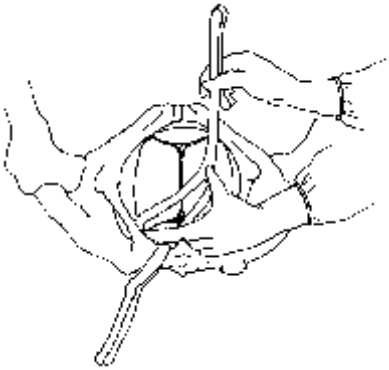
A biparietal, bimalar application is the only safe application.

FIGURE P-10 Applying the left blade of the forceps



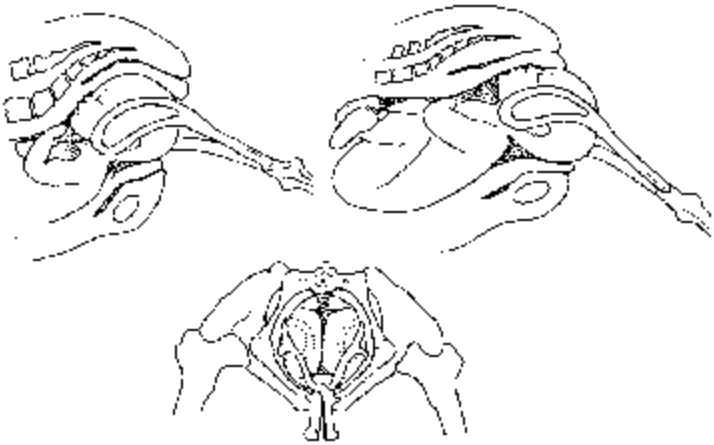
- Repeat the same manoeuvre on the other side, using the left hand and the right blade of the forceps (**Fig P-11, page P-34**).

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 (**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 there is no descent 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 is usually self-limiting.
- 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**).

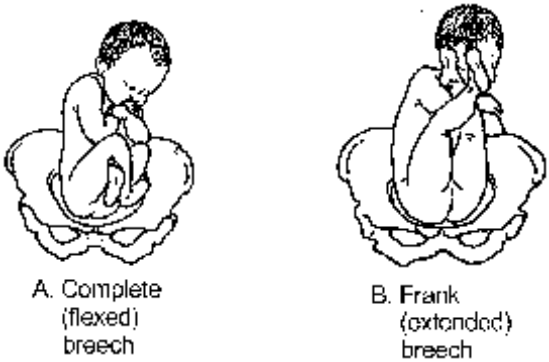
- Uterine rupture may occur and requires immediate treatment (**page P-95**).

BREECH DELIVERY

- 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 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

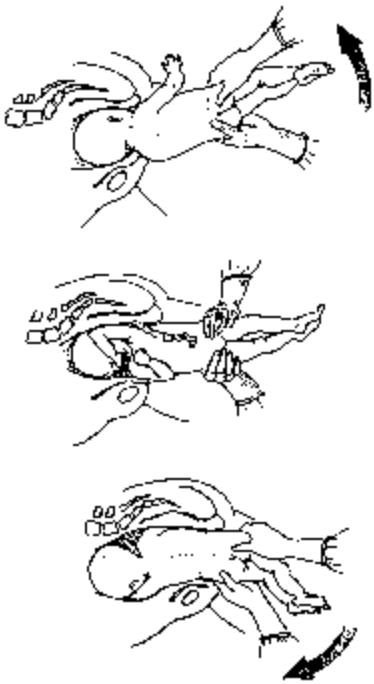
- Allow the arms to disengage spontaneously one by one. Only assist if necessary.
- After spontaneous delivery of the first arm, lift the buttocks towards the mother's abdomen to enable the second arm to deliver spontaneously.
- If the **arm does not spontaneously deliver**, place one or two fingers 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



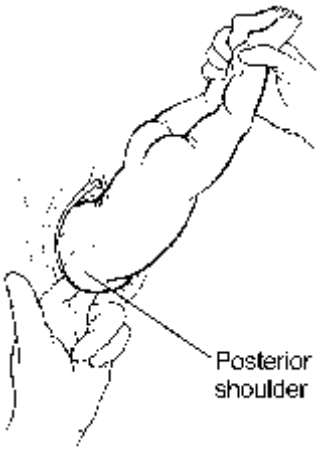
BABY'S BODY CANNOT BE TURNED

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

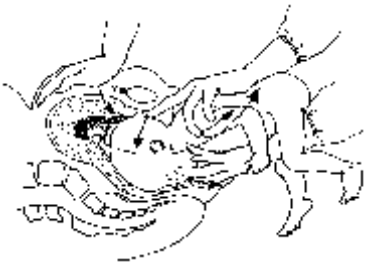
Deliver the head by the Mauriceau Smellie Veit manoeuvre (**Fig P-17, page P-41**) as follows:

- 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 applying downward pressure 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 the baby's head and deliver the 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).
- To deliver the baby vaginally:
  - Grasp the baby's ankles with one hand;
  - If **only one foot presents**, insert a hand (wearing high-level disinfected gloves) into the vagina and gently pull the other foot down;
  - Gently pull the baby downwards by the ankles;
  - Deliver the baby until the buttocks are seen;
  - Proceed with delivery of the arms (**page P-38**).

BREECH EXTRACTION

- Wearing high-level disinfected gloves, insert a hand into the uterus and grasp the baby's foot.
- Hold the foot and pull it out through the vagina.
- Exert traction on the foot until the buttocks 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 1 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 operative care principles (**page C-47**).
- Use local infiltration with lignocaine (**page P-7**), ketamine (**page P-13**), spinal anaesthesia (**page P-11**) 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 should use instruments and handle tissue as gently as possible, keeping in mind that the woman is awake and alert.

  Note: In the case of heart failure, use local infiltration anaesthesia with conscious sedation. Avoid spinal anaesthesia.
- Start an IV infusion (**page C-21**).
- 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 into 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 peformed under local anaesthesia**, make the 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

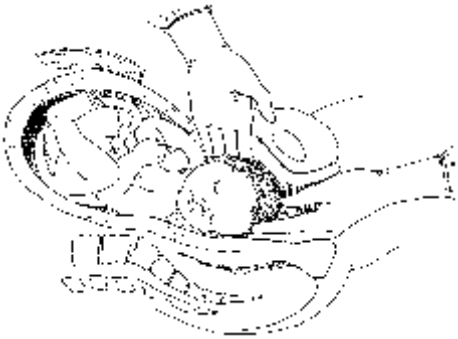
DELIVERY OF THE BABY AND PLACENTA

- 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 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 2 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.

CLOSING THE UTERINE INCISION

Note: If a **Couvelaire uterus** (swollen and discolored by blood) is seen at caesarean section, close it in the normal manner and observe.

- Grasp the corners of the uterine incision with clamps.
- Grasp the bottom edge 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 at 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 6 hours;
  - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
  - PLUS metronidazole 500 mg IV every 8 hours.
- Give appropriate analgesic drugs (**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 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.

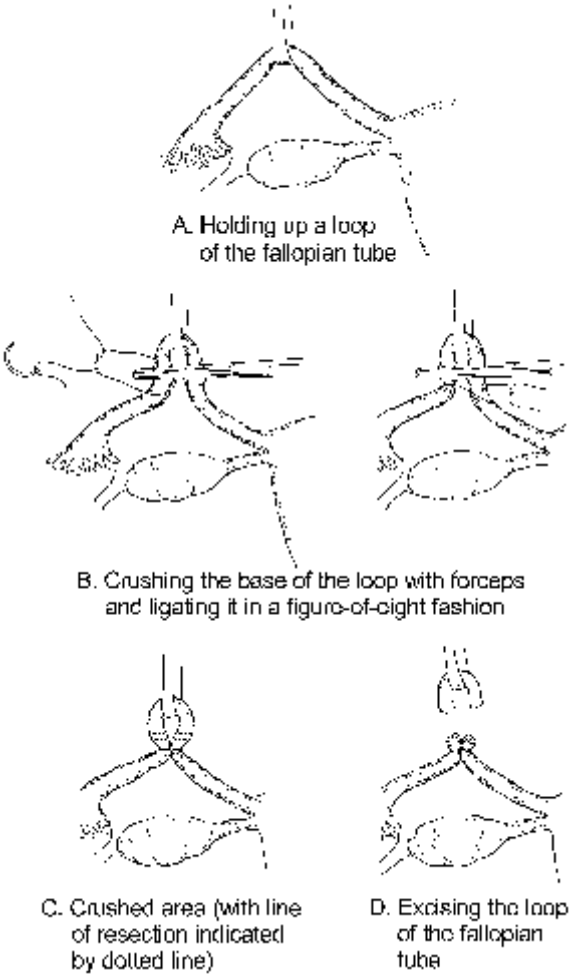
TUBAL LIGATION AT CAESAREAN

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

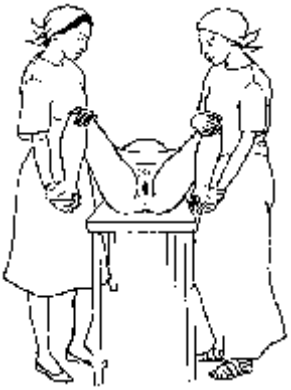
Symphysiotomy results in a temporary increase in pelvic diameter (up to 2 cm) by surgically dividing the ligaments of the symphysis under local anaesthesia. This procedure should be carried out only in combination with vacuum extraction (**page P-27**). Symphysiotomy in combination with vacuum extraction 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;
  - 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/ from the midline (**Fig P-25, page P-54**).

Abduction of the thighs more than 45/ 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**).

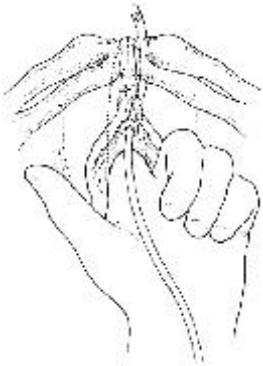
  Note: Aspirate (pull back on the plunger) to be sure that no vessel has been penetrated. If **blood is returned in the syringe with aspiration**, remove the needle. Recheck the position carefully and try again. Never inject if blood is aspirated. **The woman can suffer seizures and death if IV injection occurs.**
- At the conclusion of the set of injections, wait 2 minutes and then pinch the incision site with forceps. If the **woman feels the pinch**, wait 2 more minutes and then retest.

Anaesthetize early to provide sufficient time for effect.

- Insert a firm catheter to identify the urethra.

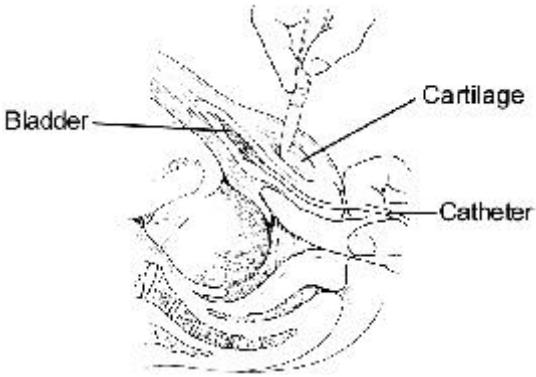
- Apply antiseptic solution to the suprapubic skin (**page C-22**).
- Wearing high-level disinfected gloves, place an index finger in the vagina and push the catheter, and with it the urethra, away from the midline (**Fig P-26**).

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 6 hours;
  - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
  - PLUS metronidazole 500 mg IV every 8 hours.
- Give appropriate analgesic drugs (**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 5 days.
- Encourage the woman to drink plenty of fluids to ensure a good urinary output.
- Encourage bed rest for 7 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.

CRANIOTOMY AND CRANIOCENTESIS

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

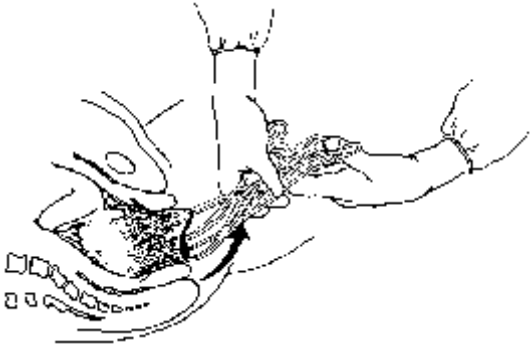
- Make a cruciate (cross-shaped) incision on the scalp (**Fig P-28**).

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's) 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.

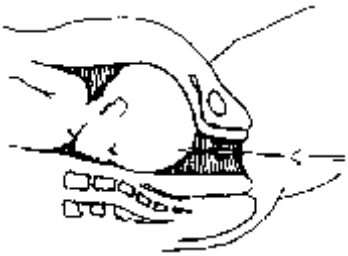
CRANIOCENTESIS (skull puncture)

- 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



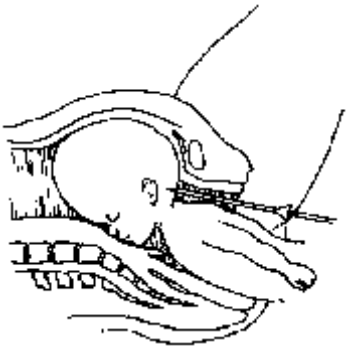
CLOSED CERVIX

- 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.

DILATATION AND CURETTAGE

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 and give pethidine IM or IV before the procedure. If necessary, 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.
- 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 lip of the cervix with a vulsellum or single-toothed tenaculum (**Fig P-32, page P-62**).

  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.
- 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 (the 10 o'clock or 12 o'clock position is usually used).
- 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

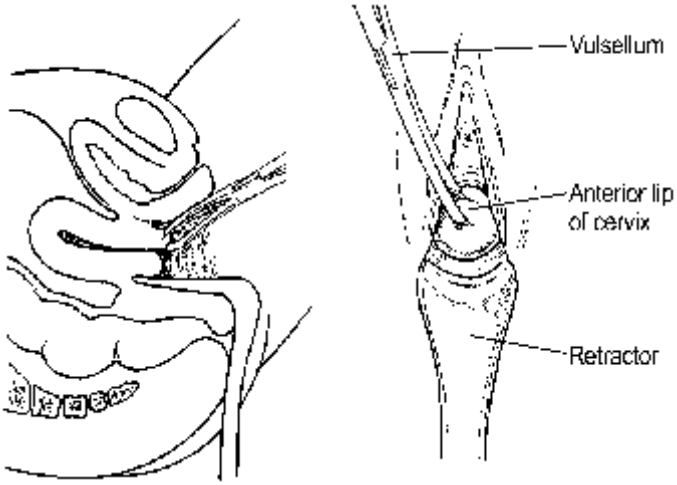
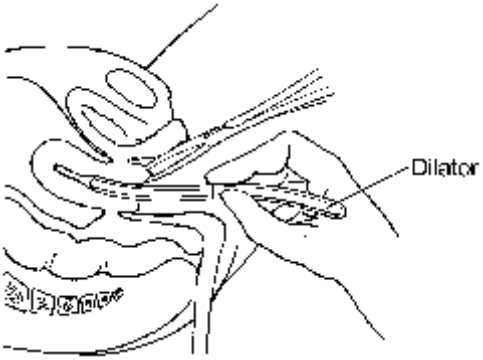


FIGURE P-33 Dilating the cervix

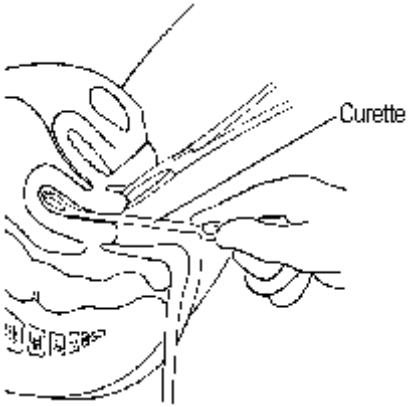


- Gently pass a uterine sound through the cervix to assess the length and direction of the uterus.

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



- Perform a bimanual pelvic examination to check the size and firmness of the uterus.
- Examine the evacuated material (**page P-67**). Send material for histopathological 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 1–2 hours.
- Advise the woman to watch for symptoms and signs requiring immediate attention:
  - prolonged cramping (more than a few days);
  - prolonged bleeding (more than 2 weeks);
  - bleeding more than normal menstrual bleeding;
  - severe or increased pain;

- fever, chills or malaise;
- fainting.

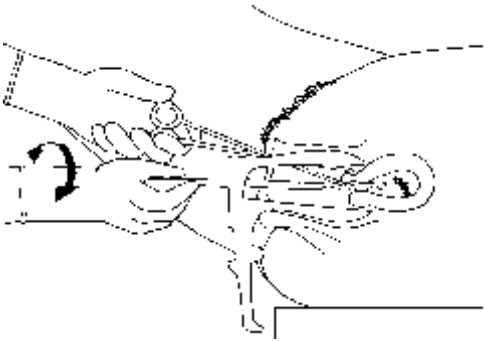
- Review for indications (inevitable abortion before 16 weeks, incomplete abortion, molar pregnancy or delayed PPH due to retained placental fragments).
- Review general care principles (**page C-17**).
- Provide emotional support and encouragement and give paracetamol 30 minutes before the procedure. Rarely, a paracervical block may be needed (**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.
- 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 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 (the 10 o’clock or 12 o’clock position is usually used).

- 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



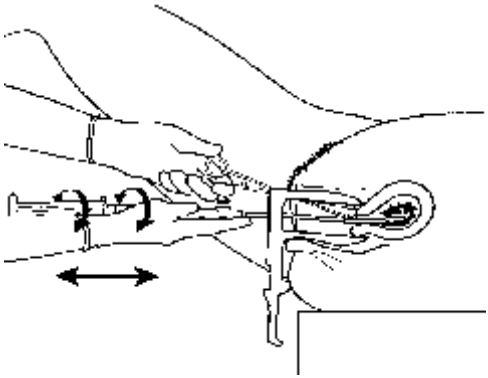
- Slowly push the cannula into the uterine cavity until it touches the fundus, but not more than 10 cm. Measure the depth of the uterus by dots visible on the cannula and then withdraw the cannula slightly.
- Attach the prepared MVA syringe to the cannula by holding the vulsellum (or tenaculum) and the 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 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 tray or container until you are certain the procedure is complete.
- 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 to the pathology laboratory, if indicated.

- 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.

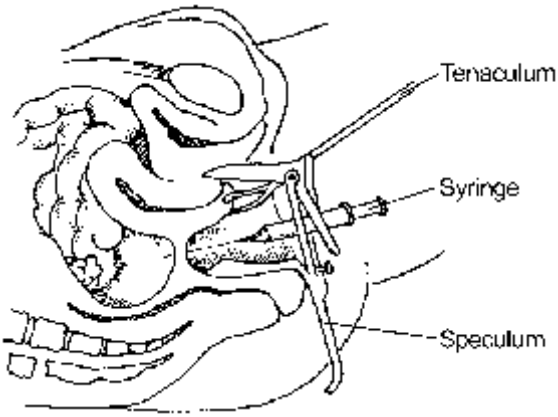
POST-PROCEDURE CARE

- 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 1–2 hours.
- Advise the woman to watch for symptoms and signs requiring immediate attention:
  - prolonged cramping (more than a few days);
  - prolonged bleeding (more than 2 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**).

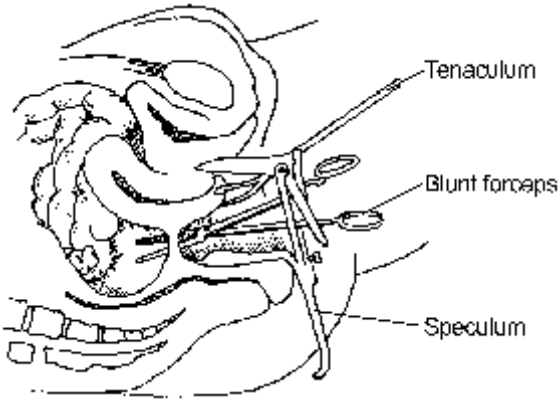
- If **no fluid** is obtained, remove the needle, re-insert it and aspirate again. If no fluid is obtained, the woman may have an unruptured ectopic pregnancy (**page S-13**).
- If **pus is obtained**, keep the needle in place and proceed to colpotomy (see below).

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 soft rubber corrugated drain through the incision;

  Note: A drain can be prepared by cutting off the fingertips of a high-level disinfected rubber 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

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);
- 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 seizures and death if IV injection of lignocaine occurs.**
- At the conclusion of the set of injections, wait 2 minutes and then pinch the incision site with forceps. If the **woman feels the pinch**, wait 2 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 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

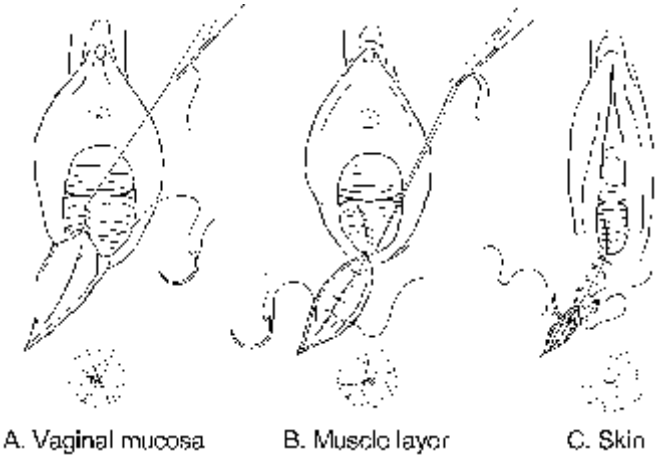
Note: It is important that absorbable sutures be used for closure. Polyglycolic sutures are preferred over chromic catgut for their tensile strength, non-allergenic properties and lower probability of infectious complications and episiotomy breakdown. Chromic catgut is an acceptable alternative, but 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 5 days;

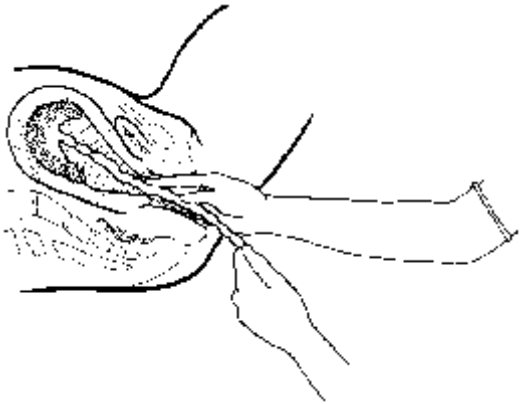
    - PLUS metronidazole 400 mg by mouth three times per day for 5 days.

- 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 6 hours;
    - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
    - PLUS metronidazole 500 mg IV every 8 hours;
    - Once the **woman is fever-free for 48 hours**, give:
        - ampicillin 500 mg by mouth four times per day for 5 days;
        - PLUS metronidazole 400 mg by mouth three times per day for 5 days;

Note: Necrotizing fasciitis requires wide surgical debridement. Perform secondary closure in 2–4 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**).
- 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 gloves, insert a hand into the vagina and up into the uterus (**Fig P-42**).

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

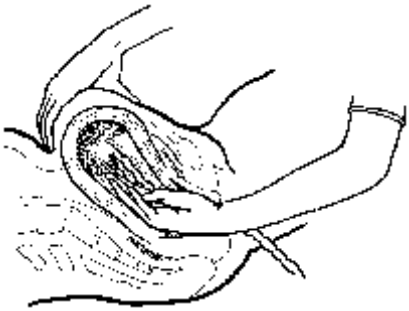


- Let go of the cord and move the hand up over the abdomen in order to support the fundus of the uterus and to provide counter-traction during removal to prevent inversion of the uterus (**Fig P-43, page P-78**).

  Note: If **uterine inversion occurs**, reposition the uterus (**page P-91**).
- Move the fingers of the hand laterally until the edge of the placenta is located.

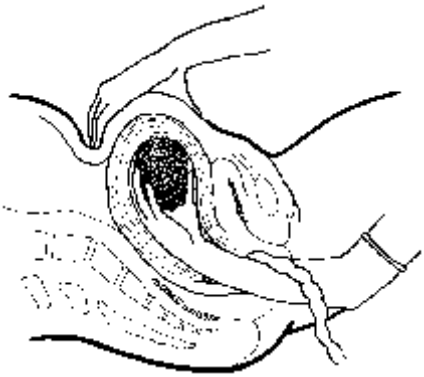
- If the **cord has been detached previously**, insert a hand into the uterine cavity. Explore the entire cavity until a line of cleavage is identified between the placenta and the uterine wall.

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, 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.
- Have an assistant 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 S-81**) or vagina (**page S-83**), or repair episiotomy (**page S-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.

POST-PROCEDURE CARE

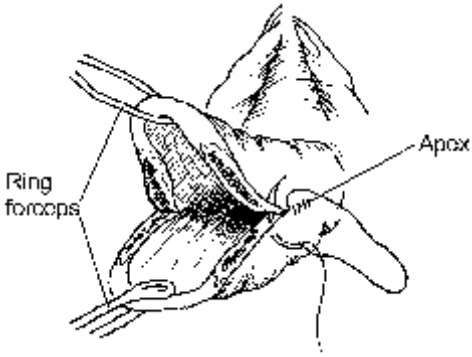
- Observe the woman closely until the effect of IV sedation has worn off.
- Monitor the vital signs (pulse, blood pressure, respiration) every 30 minutes for the next 6 hours or until stable.
- Palpate the uterine fundus to ensure that the uterus remains contracted.

- Check for excessive lochia.
- Continue infusion of IV fluids.
- Transfuse as necessary (**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 massage the uterus and provide fundal pressure.
- 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**, it may be possible to grasp it with artery or ring forceps. Leave the forceps in place for 4 hours. Do not persist in attempts to ligate the bleeding points as such attempts may increase the bleeding. Then:
  - After 4 hours, open the forceps partially but do not remove;
  - After another 4 hours, remove the forceps completely.

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

FIGURE P-45 **Repai of a ervic htear**



REPAIR OF VAGINAL AND PERINEAL TEARS

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.

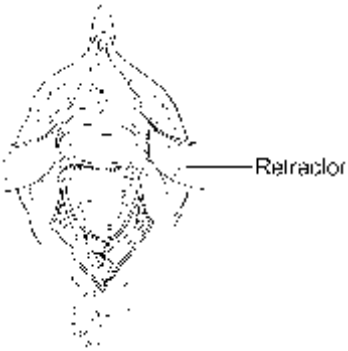
REPAIR OF FIRST AND SECOND DEGREE TEARS

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 massage the uterus and provide fundal pressure.
- 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 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 P-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.**

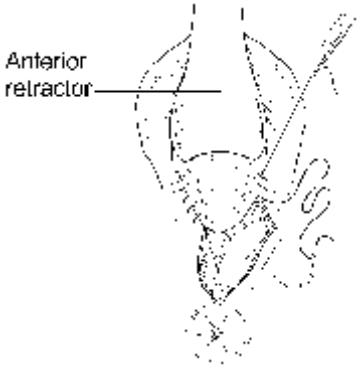
- At the conclusion of the set of injections, wait 2 minutes and then pinch the area with forceps. If the **woman feels the pinch**, wait 2 more minutes and then retest.

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**) or ketamine (**page P-13**). 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 massage the uterus and provide fundal pressure.
- 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 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 P-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 2 minutes and then pinch the area with forceps. If the **woman feels the pinch**, wait 2 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**).

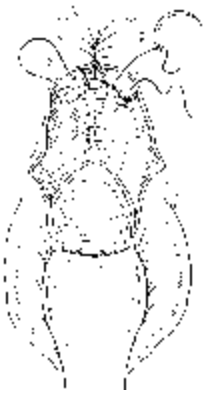
  Remember: Place the suture through the muscularis (not all the way through the mucosa).

  - 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 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 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 2 weeks.
- Give stool softener by mouth for 1 week, if possible.

MANAGEMENT OF NEGLECTED CASES

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

- For **first and second degree tears**, leave the wound open.
- For **third and fourth degree tears**, close the rectal mucosa with some supporting tissue and approximate the fascia of the anal sphincter with 2 or 3 sutures. Close the muscle and vaginal mucosa and the perineal skin 6 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 5 days;
    - PLUS metronidazole 400 mg by mouth three times per day for 5 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 6 hours;
    - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
    - PLUS metronidazole 500 mg IV every 8 hours;
    - Once the **woman is fever-free for 48 hours**, give:
      - ampicillin 500 mg by mouth four times per day for 5 days;

- PLUS metronidazole 400 mg by mouth three times per day for 5 days.

Note: Necrotizing fasciitis requires wide surgical debridement. Perform secondary closure in 2–4 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 undertaken 3 months or more after delivery.
- Rectovaginal fistula requires reconstructive surgery 3 months or more postpartum.

CORRECTING UTERINE INVERSION

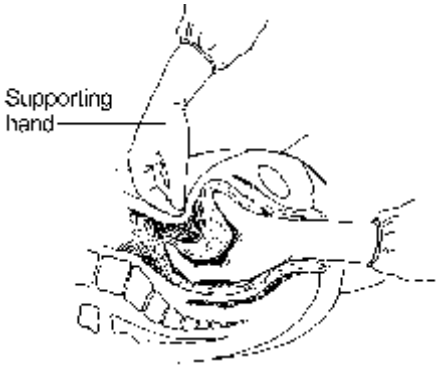
- Review for indications.
- Review general care principles (**page C-17**) and start an IV infusion (**page C-21**).
- Give pethidine and diazepam IV slowly (do not mix in the same syringe). If necessary, use general anaesthesia.
- Thoroughly cleanse the inverted uterus using antiseptic solution.
- Apply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

MANUAL CORRECTION

- Wearing high-level disinfected gloves, grasp the uterus and push it through the cervix towards the umbilicus to its normal position, using the other hand to support the uterus (**Fig P-52**). If the **placenta is still attached**, perform manual removal **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 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 (**Fig P-52, page P-91**). If the **placenta is still attached**, perform a manual removal **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 posteriorly (where the incision is least likely to injure the bladder or uterine vessels) and repeat digital dilatation, tenaculum and traction steps.
- 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 6 hours;
  - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
  - PLUS metronidazole 500 mg IV every 8 hours.
- Give appropriate analgesic drugs (**page C-37**).

- Review for indications.
- Review 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 1 cm below the upper 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 **woman has requested tubal ligation**, perform the procedure at this time (**page P-51**).

- 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.
- Place an abdominal drain (**page C-51**).
- 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 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 7 days and until urine is clear. Continue IV fluids to ensure flushing of the bladder.

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 6 hours;
  - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
  - PLUS metronidazole 500 mg IV every 8 hours.
- Give appropriate analgesic drugs (**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.

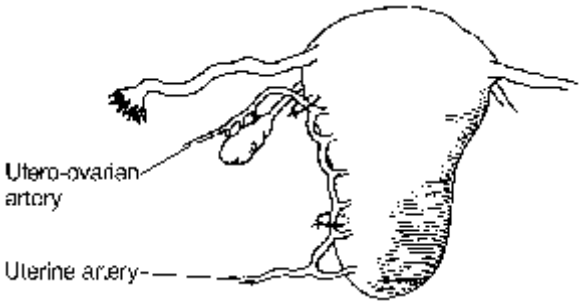
Because there is an increased risk of rupture with subsequent pregnancies, the option of permanent contraception needs to be discussed with the woman after the emergency is over.

UTERINE AND UTERO-OVARIAN ARTERY LIGATION

- Review for indications.
- Review 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**).

- 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 6 hours;
  - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
  - PLUS metronidazole 500 mg IV every 8 hours.
- Give appropriate analgesic drugs (**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

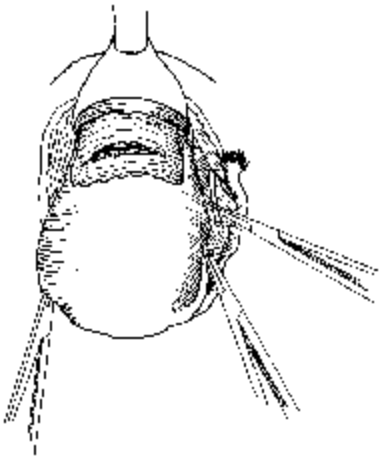
Postpartum hysterectomy can be **subtotal** unless the cervix and lower uterine segment are involved. **Total** hysterectomy may be necessary in the case of a tear of the lower segment that extends into the cervix or bleeding after placenta praevia.

- Review for indications.
- Review 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.

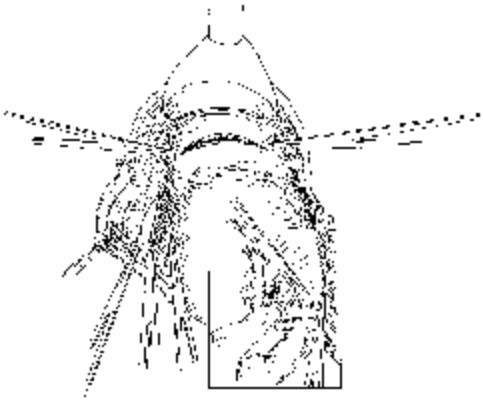
FIGURE P-54 Dividing the round ligaments



- 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**).

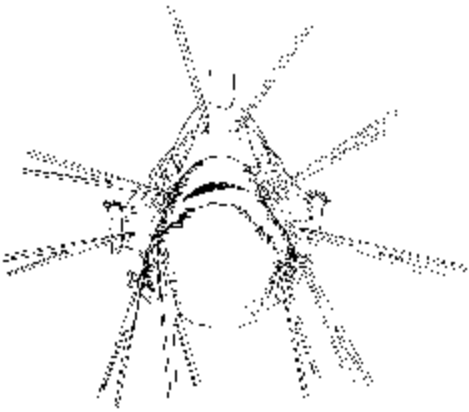
The ureters are close to the uterine vessels. The ureter must be identified and exposed to avoid injuring it during surgery or including it in a stitch.

FIGURE P-55 Dividing the tube and ovarian ligaments



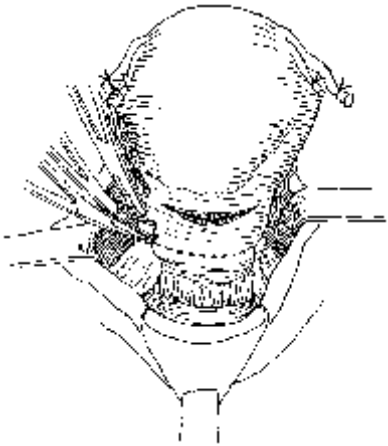
- Divide the posterior leaf of the broad ligament downwards towards the uterosacral ligaments, using scissors.
- Grasp the edge of the bladder flap with forceps or a small clamp. Using fingers or scissors, dissect the bladder downwards off of the lower uterine segment. Direct the pressure downwards but inwards toward the cervix and the lower uterine segment.
- 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/ 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.
- 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**).

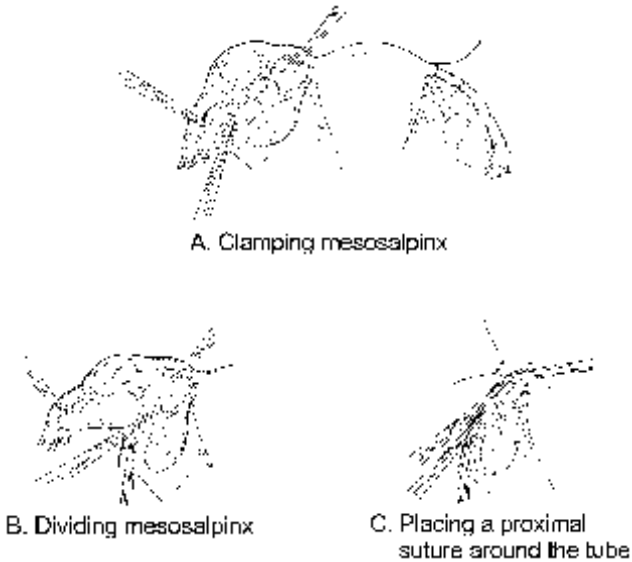
POSTOPERATIVE CARE

- 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 6 hours;
  - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
  - PLUS metronidazole 500 mg IV every 8 hours.
- Give appropriate analgesic drugs (**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 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



- 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.

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 6 hours;
  - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
  - PLUS metronidazole 500 mg IV every 8 hours.
- Give appropriate analgesic drugs (**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**).

SECTION 4

APPENDIX

ESSENTIAL DRUGS FOR MANAGING COMPLICATIONS IN PREGNANCY AND CHILDBIRTH

ANTIBIOTICS

Amoxicillin
Ampicillin
Benzathine penicillin
Benzyl penicillin
Cefazolin
Ceftriaxone
Cloxacillin
Erythromycin
Gentamicin
Kanamycin
Metronidazole
Nitrofurantoin
Penicillin G
Procaine penicillin G
Trimethoprim/Sulfamethoxazole

STEROIDS

Betamethasone
Dexamethasone
Hydrocortisone

DRUGS USED IN EMERGENCIES

Adrenaline
Aminophylline
Atropine sulfate
Calcium gluconate
Digoxin
Diphenhydramine
Ephedrine
Frusemide
Naloxone
Nitroglycerine
Prednisone
Prednisolone
Promethazine

IV FLUIDS

Dextrose 10%
Glucose (5%, 10%, 50%)
Normal saline
Ringer's lactate

ANTICONVULSANTS

Diazepam
Magnesium sulfate
Phenytoin

ANTIHYPERTENSIVES

Hydralazine
Labetolol
Nifedipine

OXYTOCICS

15-methyl prostaglandin F2α
Ergometrine
Methylergometrine
Misoprostol
Oxytocin
Prostaglandin E2

ANAESTHETICS

Halothane
Ketamine
Lignocaine 2% or 1%

ANALGESICS

Indomethacin
Morphine
Paracetamol
Pethidine

SEDATIVES

Diazepam
Phenobarbitone

ANTIMALARIAL

Artemether
Artesunate
Chloroquine
Clindamycin
Mefloquine
Quinidine
Quinine dihydrochloride
Quinine sulfate
Sulfadoxine/Pyrimethamine

TOCOLYTICS

Indomethacin
Nifedipine
Ritodrine
Salbutamol
Terbutaline

OTHER

Anti-tetanus serum
Ferrous fumerate
Ferrous sulfate
Folic acid
Heparin
Magnesium trisilicate
Sodium citrate
Tetanus antitoxin
Tetanus toxoid
Vitamin K

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Integrated Management Of Pregnancy And Childbirth

IMPAC

The Integrated Management of Pregnancy and Childbirth (IMPAC) is a strategy to improve access to and quality of maternal and neonatal health care. It comprises:

- **evidence-based norms and standards of care;**
- **managerial tools to strengthen the capacity of the health care system;**
- **a process to foster involvement of individuals, families and communities;**

  and
- **an implementation strategy.**

IMPAC is designed to be adapted to local situations and to be implemented in countries by the government, in collaboration with UN and bilateral agencies, non-governmental organizations and other partners at the national level.

RHR
Reproductive Health and Research
World Health Organization, Geneva