Surgical Care at the District Hospital

Emergency and essential surgical care at resource limited health care facilities

Teaching Slides
Organization and management of the surgical service at local hospital

Key Points
1.1 THE LOCAL HOSPITAL

- Leadership is a part of your job as a senior member of the health care team.

- Apply the medical skills of evaluation and planning to your work as a manager.

- Every institution has a history and the legacy of what has happened and why things have worked or not worked is held in the memory of the employees.
1.1 THE LOCAL HOSPITAL

- The pride people feel in their workplace and the services they offer is a valuable commodity and is the greatest resource of any health care facility.

- In addition to identifying the opinion leaders, you must be sensitive to any groups and subgroups whose voices are unlikely to be heard.

- Responsibility is the essence of leadership.
1.2 LEADERSHIP, TEAM SKILLS AND MANAGEMENT

- Respect the knowledge and expertise of senior staff

- The leader is not expected to make all the decisions or do all the work, but must encourage others and co-ordinate efforts; the final responsibility for any endeavor rests with the leader

- Be a role model: in the way you work, demonstrate the behaviors you value.
1.2 LEADERSHIP, TEAM SKILLS AND MANAGEMENT

Leadership skills include

- Listening
- Observing
- Organizing
- Making decisions
- Communicating effectively and working well with others
- Encouraging and facilitating others
- Fostering enthusiasm and vision
- Goal setting and evaluation
- Giving and receiving feedback
- Coordinating the efforts of others
- Chairing a meeting
- Willing to accept a responsibility
1.2 LEADERSHIP, TEAM SKILLS AND MANAGEMENT

Listening

• Active listeners are attentive: they communicate interest and concern with their words and body language.

• Effective listeners summarize: what they have heard and how they understand what has been said.
1.2 LEADERSHIP, TEAM SKILLS AND MANAGEMENT

Communicating effectively and working well with others

- Encourage new ideas and efforts
- Help people and groups find common ground in times of difference and conflict
- Feedback comments should be constructive and specific rather than an opinion
1.3 ETHICS

• Work within the limits of your training.

• Be realistic about what you can accomplish as an individual and as part of your organisation.

• Be attentive to legal, religious, cultural, linguistic and family norms and differences.
1.3 ETHICS

• Some factors are beyond your control like shortage of resources, theft or corruption.

• You did not create the situation but you can speak the truth and work for improvement.

• Put systems for reporting, evaluation and remedy in place.

• Before performing a procedure it is important to receive the consent from patient
1.3 ETHICS

Patient Consent

• If the patient is too ill or unconscious, or the condition will not allow further delay, you should proceed, without formal consent, acting in the best interest of the patient. Record your reasoning and plan.
### 1.3 ETHICS

**Patient Consent**

- Informed consent means that the patient and the patient’s family understand
  - what is to take place,
  - including the potential risks and complications of both proceeding and not proceeding, and
  - have given permission for a course of action.
1.4 EDUCATION

• Poor performance can be related to knowledge, skills or attitudes

• Planning, implementation and evaluation are the keys to successful educational initiatives.

• Organising structured in-service training on new technology, medications, treatment regimens is an important way of improving patient care as well as challenging and stimulating the interest of the staff.
1.4 EDUCATION
Planning

- Education alongside and during active provision of patient care is necessary because people may forget what they are told but will remember what they do.

- Try to include activities and time to practise skills being reviewed.
1.4 EDUCATION

Planning

• Give everyone a chance to present information and ask questions.

• In addition to clinical skills, staff need to learn information that relates to specific tasks.

• Consider making use of distance learning programmes.
1.4 EDUCATION
Planning

• Do not forget your own professional education.

• When learning:
  – Ask questions
  – Try to understand new information in relation to what you already know
  – How do your new ideas change your old ideas?
  – Find people who can help you think through problems or develop new skills.
1.5 RECORD KEEPING

• Even if your hospital maintains records, it is essential that patients receive a written note of any diagnosis or procedure performed.

• All records should be clear, accurate, complete, and signed.
1.5 RECORD KEEPING

- **Clinical notes** are an important means of communication for the team involved in a patient’s care by documenting the management plan and the care offered;

- they can also be used to improve patient care when reviewed as part of an audit.

- they may also be requested for insurance and medico-legal purposes.
1.5 RECORD KEEPING

• **Admission note/preoperative note**
  - The preoperative assessment should be documented, including a full history and physical examination, as well as the management plan and patient consent.

• **Delivery book**
  - should contain a chronological list of deliveries and procedures, including interventions, complications and outcomes.
1.5 RECORD KEEPING

- **Operating room records**
  - standardized forms save time and encourage staff to record all required information.

- **A theatre record usually includes:**
  - Patient identity
  - Procedure performed
  - Persons involved
  - Complications

- The operative note must be written in the patient’s clinical notes. Include orders for postoperative care with your operative note.
1.5 RECORD KEEPING

- **Postoperative notes**
  - All patients should be assessed at least once a day, even those who are not seriously ill.
  - Vital signs should be taken as dictated by the patient’s condition and recorded; this can be done on a standard form or graph and can also include the fluid balance record.

- **Progress notes**
  - need not be long, but must comment on the patient’s condition and note any changes in the management plan.
  - they should be signed by the person writing the note.
1.5 RECORD KEEPING

• **Discharge note**

On discharging the patient from the ward, record:

- Admitting and definitive diagnoses
- Summary of patient’s course in hospital
- Instructions about further management as an outpatient, including any medication and the length of administration and planned follow-up.
1.5 RECORD KEEPING

Notes can be organized in the “SOAP” format:

- **Subjective**- How the patient feels
- **Objective**- Findings on physical examination, vital signs and laboratory results
- **Assessment** -What the practitioner thinks
- **Plan**- Management plan may also include directives which can be written in a specific location as “orders”.

1.5 RECORD KEEPING

Inter-hospital communication

• Each patient who is transferred to another hospital should be accompanied by a letter of referral which includes:

1. Patient identity
2. Name and position of the practitioner making the referral
3. Patient history, findings and management plan to date
4. Reason for referral.
1.5 RECORD KEEPING

Standard operating procedures

• Create and record standard operating procedures for the hospital.

• These should be followed by all staff at all times.

• Keep copies of these procedures in a central location as well as the place where each procedure is performed so they are available for easy reference.
1.6 EVALUATION

• By looking at records of all procedures, a hospital can evaluate occurrences such as:
  – complications and
  – postoperative wound infections or
  – review the type and number of procedures being performed.

• Such evaluation:
  – should be the regular duty of one member of the hospital team,
  – permits assessment of the application of aseptic routine within the hospital and allows for future planning.
1.6 EVALUATION

- Evaluation is an essential part of ensuring high quality care

- With any change:
  - Plan (observe, consult and set goals)
  - Implement the change
  - Evaluate the outcome
The surgical domain:
Creating the environment

Key Points
2.1 INFECTION CONTROL AND ASEPSIS

Infection Prevention and Universal Precautions

- Treat all body substances of all people as potentially infectious

- Asepsis depends on standard procedures, staff training, personal discipline and careful attention to detail.

- Hand washing, use of barrier protection such as gloves and aprons, the safe handling and disposal of "sharps" and medical waste and proper cleaning, disinfection and sterilization are all part of creating a safe hospital.
Hand washing

• Hand washing is the single most important measure for the prevention of infection

• Plain soap and water is effective for removal of visible contaminants.

• Wash your hands with a vigorous mechanical action on all surfaces of the hands. Continue for at least 15 seconds. Wash above the wrists and remove jewellery, if possible. Nails are the areas of greatest contamination.

• Rinse under poured or running water.
2.1 INFECTION CONTROL AND ASEPSIS

Prevention of transmission of HIV

- A safe injection does not harm the recipient, does not expose the provider to any avoidable risk and does not result in any waste that is dangerous for other people
  - Use a sterile syringe and needle for each injection and to reconstitute each unit of medication
  - Ideally, use new, quality controlled disposable syringes and needles
    - If single-use syringes and needles are unavailable, use equipment designed for steam sterilization
Preparation of injection solutions:

- Prepare each injection in a clean, designated area where blood or body fluid contamination is unlikely.
- If multi-dose vials must be used, always pierce the septum with a sterile needle; avoid leaving a needle in place in the stopper of the vial.
- Once opened, store multi-dose vials in refrigerator.

Infection Control and Asepsis:

Prevention of transmission of HIV
Aseptic technique

- Anyone entering the operating room, for whatever reason, should first put on:
  - Clean clothes
  - An impermeable mask to cover the mouth and nose
  - A cap to cover all the hair on the head and face
  - A clean pair of shoes or clean shoe-covers.

- Caps, gowns and masks are worn to decrease the risk of patient exposure to contamination or infection from the surgical team.

- Sterile instruments, gloves and drapes are also key elements in the fight against contamination.
2.2 EQUIPMENT

- Equipment and instruments should be strictly for use in the
  - operating room,
  - treatment room or
  - emergency department

in order to ensure that it will be available, in good repair and sterilized or cleaned ready for use.
2.2 EQUIPMENT

Care and repair

• It is essential that all personnel check the medications and equipment they will be using prior to beginning a case or procedure.

• Have a regular plan of maintenance for equipment and plan in advance for the repair and replacement of equipment.

• Create a list (inventory) of the equipment.
2.2 EQUIPMENT

Use three-point control

Most procedures are performed with a #3 handle. Use a:
- #10 blade for large incisions
- #11 for stab incision
- #15 for fine precision work
2.2 EQUIPMENT

When using the scalpel for dissection, use a smaller knife and hold the instrument like a pen with your thumb, third finger and index finger holding the knife and your index finger controlling the dissection.

Figure 2.3
2.3 OPERATING ROOM

- Keep all the doors to the operating room closed except as needed for the passage of equipment, personnel and the patient.

- Store some sutures and extra instruments.

- Keep to a minimum the number of people allowed to enter.

- Keep the room uncluttered and easy to clean.

- Between cases, clean and disinfect the table and instrument surfaces.
2.3 OPERATING ROOM

• At the end of each day

1. Clean the operating room
2. Sterilize all surgical instruments and supplies after use
3. Store them protected and ready for the next use
4. Leave the room ready for use in case of an emergency
2.3 OPERATING ROOM

Sponge and instrument counts

- Count supplies (instruments, needles and sponges)
  - before beginning a case
  - before final closure
  - on completing the procedure
- Aim is to ensure that materials are not left behind or lost.
- Pay special attention to small items and sponges
- Create standard list of equipment for use as a checklist.
- Also make a check list of the instruments for a specific case.
2.3 OPERATING ROOM
Scrubbing and gowning

• Before each operation all members of the surgical team will scrub.

• When scrubbing-
  – Remove all jewellery and trim the nails
  – Use soap, a brush (on the nails and finger tips) and running water to clean thoroughly around and underneath the nails.
  – Scrub your hands and arms up to the elbows.
  – After scrubbing hold up your arms to allow water to drip off your elbows
  – Turn off the tap with your elbow.
2.3 OPERATING ROOM

Scrubbing

Figure 2.4
2.3 OPERATING ROOM

Scrubbing and gowns

- After scrubbing your hands
  - Dry them with a sterile towel and make sure that towel does not become contaminated.
  - Hold your hands and forearms away from your body and higher than your elbows until you put on a sterile gown and gloves.
2.3 OPERATING ROOM

Figure 2.5

Figure 2.6
2.3 OPERATING ROOM

Skin preparation

• Patient should bathe the night before an elective operation.

• Just before the operation, wash the operation site and area surrounding it with soap and water.

• Prepare the skin with antiseptic solution, starting in the centre and moving out to the periphery.

• Chlorhexidine gluconate and iodine are preferable to alcohol and are less irritating to skin.

• The solution should remain wet on the skin for at least two minutes.
2.3 OPERATING ROOM

Skin Preparation

Prepare the skin with antiseptic solution, starting in the centre and moving out to the periphery.
2.3 OPERATING ROOM

Draping

• Do not place drapes on the patient until you are scrubbed, gowned and gloved

• Leave uncovered only the operative field and those areas necessary for the maintenance of anaesthesia.

• Secure the drapes with towel clips at each corner.
2.3 OPERATING ROOM

Draping

Figure 2.8
2.4 DISINFECTION, CLEANING, AND STERILIZATION

- **Disinfection** decreases the viral and bacterial burden of an instrument, but does not clean debris or confer sterility.

- **Cleaning** removes debris.

- **Sterilization** kills microbes.
2.4 DISINFECTION, CLEANING AND STERILIZATION

- It is important to use all disinfectant solutions within their expiry date as some solutions like hypochlorite lose their activity very quickly.

- They must always be available for cleaning working surfaces, equipment that cannot be autoclaved and non disposable items and for dealing with any spillage involving pathological specimens.

- All disinfectants have "Contact Time", which means they must be left in contact with an infectious agent for a certain period of time.
2.4 DISINFECTION, CLEANING AND STERILIZATION

• After disinfection, clean with normal detergent and water to remove the inactivated material and the used disinfectant.

• Before sterilization all equipment must be disinfected and then cleaned to remove debris.

• Sterilization is intended to kill living organisms, but is not a method of cleaning.
2.4 DISINFECTION, CLEANING AND STERILIZATION

• The methods of sterilization in common use are:
  – Autoclaving or steam sterilization
  – Exposure to dry heat
  – Treatment with chemical antiseptics

• Autoclaving should be the main form of sterilization at the district hospital.
2.4 DISINFECTION, CLEANING AND STERILIZATION

Autoclaving

- All viruses including HIV, are inactivated by autoclaving for 20 minutes at 121-131 °C, for 30 minutes if the instruments are in wrapped packs.

- It is often more practical to use a small autoclave several times a day than to use a large machine once.

- At the end of the procedure, the outside of the packs of instruments should not have wet spots, which may indicate that sterilization has not occurred.
2.4 DISINFECTION, CLEANING AND STERILIZATION

**Dry Heat**

- It is suitable only for metal instruments and a few natural suture material.

- They can be sterilized by dry heat for 1-2 hours at 170 C.

- Boiling instruments is now regarded as an unreliable means of sterilization and is not recommended as a routine in hospital practice.
2.4 DISINFECTION, CLEANING AND STERILIZATION

Antiseptics

- Instruments are no longer stored in liquid antiseptic.
- Sharp instruments, other delicate equipment and certain catheters and tubes can be sterilised by exposure to formaldehyde, glutaral, or chlorohexidine.
2.4 DISINFECTION, CLEANING AND STERILIZATION

Antiseptics contd.

- When using formaldehyde, carefully clean the equipment and then expose it to vapour from paraformaldehyde tablets in a closed container for 48 hours.

- Glutaral is extremely effective against bacteria, fungi and a wide range of viruses.
2.4 DISINFECTION, CLEANING AND STERILIZATION

Failure of normal methods of sterilization

- Failure of an autoclave or power supply may suddenly interrupt normal sterilization procedures.

- If an extra set of sterile equipment and drapes are not available, the "antiseptic technique" will allow some surgery to continue.
2.4 DISINFECTION, CLEANING AND STERILIZATION

Antiseptic technique

1. Immerse towels and drapes for 1 hour in a reliable antiseptic such as aqueous chlorhexidine, wring them out and lay them moist on the skin of the patient.

2. Treat gauze packs and swabs similarly but rinse in diluted (1:1000) chlorhexidine for using them in wounds.

3. Immerse instruments, needles and natural suture materials in strong antiseptic for 1 hour and rinse them in weak antiseptic just before use.
2.5 WASTE DISPOSAL

• Separate non contaminated material such as waste paper, packaging and non sterile but not biologically contaminated materials.

• Make separate disposal containers available where waste is created. so that staff can sort the waste as it is being discarded.

• All infected waste should be disposed of by incineration.

• Do not mix waste chemicals unless you are certain that a chemical reaction will not take place.
2.5 WASTE DISPOSAL

• Burying waste is the only option in some areas.

• Small amounts of infected waste should be soaked in a hypochlorite solution for at least 12 hours, put into a pit and then covered.

• Large quantities should be put into a pit with a final concentration of 10% sodium hypochlorite solution, before covering immediately.
2.5 WASTE DISPOSAL

- A container for the safe disposal of sharp objects should be:
  - Well labelled, puncture proof, watertight and break resistant
  - Opening large enough to pass needles and scalpel blades, but never large enough for someone to reach into.
  - Secured to a surface such as wall or counter to ensure stability during use.
  - Removable for disposal.
The surgical patient
Adult or paediatric

Key Points
3.1 APPROACH TO THE SURGICAL PATIENT

History and physical examination

- Talk to, examine, and think about the patient

- The patient's history and physical examination are key parts of surgical decision making

- The history and physical examination should not delay resuscitation of the acutely ill surgical patient
3.1 APPROACH TO THE SURGICAL PATIENT

History and physical examination

- A full medical history includes the following:
  - Patient’s identification
  - Presenting complaint
  - History of present symptoms / illness
  - Past medical history
  - Family history
  - Social history
  - Functional inquiry which reviews all systems

- Examine the whole patient, assess his or her general health, nutrition and volume status and look for anaemia.
3.1 APPROACH TO THE SURGICAL PATIENT

History and physical examination

• Past medical history especially previous surgery and any complications, including:
  – allergies,
  – medications including non-prescription and locally obtained drugs, immunizations,
  – use of alcohol, tobacco,
  – chronic or incurrent illness
3.1 APPROACH TO THE SURGICAL PATIENT

Investigations

• Use laboratory and diagnostic imaging investigations to confirm a clinical hypothesis; they will not make the diagnosis in isolation.

• Only ask for an investigation if:
  – You know why you want it and can interpret the result.
  – Your management plan depends on the result.

• Do not delay an urgent procedure if laboratory services or diagnostic imaging are not available.
3.1 APPROACH TO THE SURGICAL PATIENT

Decision making

- Your clinical assessment of the patient may indicate that surgery is required. If so, consider the following important issues:
  - Can we do the procedure here?
  - Can we manage this patient?
  - If the answer to any of these questions is "No", it is inadvisable to proceed with surgery.
  - Is this patient stable enough to be transferred elsewhere?
  - If the transfer is not possible or the patient could not withstand such a stress, then be aware of, and communicate, the increased risk of the procedure.
3.1 APPROACH TO THE SURGICAL PATIENT

Decision making

- Make a diagnosis and treatment plan. Manage and care for the patient while awaiting transfer and while in transit.

- Do not refer unless the referral centre can provide a higher level of expertise and care and patient can tolerate the transfer.

- When possible, talk to the person to whom you are sending the patient.

- Identify the transportation options available and decide which is best for the patient.
3.1 APPROACH TO THE SURGICAL PATIENT

- Stabilize the patient before transfer.

- The highest priorities are airway, breathing and circulation (ABC).

- Immobilize fractures, control bleeding, pain and prevent further injury. Place a nasogastric tube if nasogastric obstruction is suspected.

- Assess the need for care and intervention during the transport. Send the patient with the equipment and staffing required.

- Pain management is our job.
3.2 THE PAEDIATRIC PATIENT

- Infants and children differ from adults in significant physiological and anatomical ways.

- Infants and small children have much smaller physiological reserves than adults and minor deviations from normal levels require early attention.

- Infants and children are at special risk of becoming dehydrated and hypoglycaemic.
3.2 THE PAEDIATRIC PATIENT

- Malnutrition can impair the response of children to injury and their ability to heal and recover.

- Good nutrition helps healing. Poor nutrition prevents it.

- When completing a preoperative assessment on a child, consider nutritional status and anaemia; treat chronic anaemia as part of the preparation for surgery.

- Infants and young children, especially those with little subcutaneous fat, are unable to maintain a normal body temperature when there are wide variations in the ambient temperature or when they are anaesthetized.
• Monitor fluid status, electrolytes, and haemoglobin diligently and correct any abnormalities promptly

• Maintenance fluid requirements must be supplemented to compensate for all losses

• Fluid requirements in surgical patients commonly exceed maintenance requirements.

• Whenever possible, give fluids by mouth.

• Use the intravenous route for rapid resuscitations (20 ml/kg bolus of normal saline) and for cases where the oral route is not available or inadequate

• Intra-osseous puncture can provide the quickest access to the circulation in a shocked child if venous cannulation is impossible
3.2 THE PAEDIATRIC PATIENT

- The most sensitive indicator of fluid status in a child is urine output.

- Normal Urine output:
  - Infants 1-2 ml/kg/hour
  - Children 1mg/kg/hour

- Infants are unable to concentrate urine as well as adults, making them more susceptible to electrolyte abnormalities.
3.2 THE PAEDIATRIC PATIENT

- Underlying malnutrition and immuno-suppression from chronic parasitic infections greatly affect wound healing and the risk of infection.

- Abscess, pyomyositis, osteomyelitis and septic arthritis have similar presentations and treatment in children as in adults.
3.2 THE PAEDIATRIC PATIENT

The systemic illness and fever may overshadow localizing symptoms.

Careful history and physical examination is necessary to avoid the pitfall of identifying all childhood fever as malaria.

- Pain is the most important symptom and tenderness the most important sign suggesting infection.

- Most causes of peritonitis require laparotomy.
3.2 THE PAEDIATRIC PATIENT

Surgical problems in neonates

- By recognizing common congenital conditions you can identify when urgent referral is required.

- Jaundice in the newborn is usually physiological or due to ABO incompatibility; if it is progressive, however, consider a congenital abnormality of the biliary tree.
3.2 THE PAEDIATRIC PATIENT

Surgical problems in neonates

- Injuries, including burns and surgical infections, are common problems in children; the calculation of doses, based on weight, for fluids, transfusions and drugs is crucial to correct management.

- The principles of priority apply to children with injuries.

- Burns, especially scald injuries, are very common in children; children with burns are at increased risk for infection.
Surgical techniques

Key Points
4.1 TISSUE HANDLING

Technique
4.1 TISSUE HANDLING

Haemostasis

• Handle tissues gently

• Prevent bleeding.

• Minimizing blood loss minimizes the need for blood replacement or transfusion. This is especially important in areas where a safe and consistent blood supply is in doubt.

• Minimizing blood loss is essential and is of the highest priority in patients who are medically compromised by anemia or chronic illness.
4.1 TISSUE HANDLING
Haemostasis technique

Figure 4.4
4.2 SUTURE AND SUTURE TECHNIQUE

Needles

- Surgical needles are classified into three categories
  - Round bodied
  - Cutting
  - Trochar
Needles

- Needles are attached to the suture commercially (sweged on: Figure 4.5) or have eyes to pass the suture through (free needles)
4.2 SUTURE AND SUTURE TECHNIQUE

- There are many types of suture and a variety of materials; learn the properties of each, become confident using a few and regularly use those you are most comfortable with.

- Suturing is the most versatile, least expensive and most widely used technique of securing tissue during an operative procedure.
4.2 SUTURE AND SUTURE TECHNIQUE
4.2 SUTURE AND SUTURE TECHNIQUE
4.2 SUTURE AND SUTURE TECHNIQUE

Figure 4.13

Figure 4.14
4.2 SUTURE AND SUTURE TECHNIQUE

Figure 4.15

Figure 4.16
4.2 SUTURE AND SUTURE TECHNIQUE

Figure 4.17

Figure 4.18

Figure 4.19

Figure 4.20
4.2 SUTURE AND SUTURE TECHNIQUE
4.3 PROPHYLAXIS
Antibiotic Prophylaxis

- Give prophylactic antibiotics in cases of wound contamination

- Immunize the non-immune patient against tetanus with tetanus toxoid and give immune globulin if the wound is tetanus prone.

- Do not give tetanus immune globulin if the person is known to have had two primary doses of tetanus toxoid (TT) or diphtheria vaccine (TD)
### 4.3 PROPHYLAXIS

Tetanus prophylaxis regime

<table>
<thead>
<tr>
<th>Clean wounds</th>
<th>Moderate risk</th>
<th>High risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Immunized and booster within 5 years</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>• Immunized and 5–10 years since booster</td>
<td>Nil</td>
<td>TT or TD</td>
</tr>
<tr>
<td>• Immunized and &gt;10 years since booster</td>
<td>TT or TD</td>
<td>TT or TD</td>
</tr>
<tr>
<td>• Incomplete immunization or unknown</td>
<td>TT or TD</td>
<td>TT or TD and TIG</td>
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Basic Surgical Procedures

Key Points
5.1 WOUND MANAGEMENT

- Many important procedures can be performed under local anaesthesia and do not require a surgical specialist.

- In most outpatient procedures, local or field block anaesthesia will be sufficient but general anaesthesia, including ketamine, may be necessary in children and should be available.

- Irrespective of the seriousness of a wound, give initial management priority to the airway, breathing and circulation.
5.1 WOUND MANAGEMENT

- Good lighting and basic instruments are important for adequate wound examination and management.

- Work efficiently to avoid prolonging the operation unnecessarily; the risk of infection increases with time.

- Universal precautions are necessary to avoid the transmission of the HIV, hepatitis, Ebola and other viruses.
5.1 WOUND MANAGEMENT

Secondary healing

- Clear the operative field of devitalized tissue and foreign material

- While not a substitute for appropriate haemostasis, placement of a drain is an option if a wound is oozing; the collection of fluid and blood leads to increased risk of infection and delayed healing

- Minimize dead space when closing a wound.
5.1 WOUND MANAGEMENT

Secondary healing

Figure 5.1

Figure 5.2

Figure 5.3
5.1 WOUND MANAGEMENT

Drains

- Suction drains are active and closed
- Differential pressure drains are closed and passive
- Latex drains, which function by capillary action, are passive and open.
5.1 WOUND MANAGEMENT

Split skin grafting technique
5.2 SPECIFIC LACERATIONS AND WOUNDS

- Lacerations may be associated with neurovascular or other serious injury; a complete examination is required to identify injuries that are not immediately obvious.

- Minor problems are important because mismanagement can lead to major detrimental consequences.
5.2 SPECIFIC LACERATIONS AND WOUNDS

LIP LACERATIONS

Figure 5.8

Figure 5.9

Figure 5.10
5.2 SPECIFIC LACERATIONS AND WOUNDS

WOUNDS OF THE TONGUE

Figure 5.11 Figure 5.12
5.2 SPECIFIC LACERATIONS AND WOUNDS

Ear Lacerations

Figure 5.13
Figure 5.14
Figure 5.15
5.2 SPECIFIC LACERATIONS AND WOUNDS

Nose Bleed (Epistaxis)

Common site of bleeding

Figure 5.16

Figure 5.17
5.2 SPECIFIC LACERATIONS AND WOUNDS

OCULAR TRAUMA

Figure 5.18
Figure 5.19
Figure 5.20
5.2 SPECIFIC LACERATIONS AND WOUNDS

TENDON LACERATIONS

Figure 5.21

Figure 5.22

Figure 5.23

Figure 5.24
5.4 FOREIGN BODIES

• The removal of a foreign body may be
  – urgent, as in the case of airway compromise or
  – unnecessary, as in the case of some deep metal fragments

• Foreign body removal may be difficult or time-consuming; the patient should therefore be anaesthetized

• X-ray or fluoroscopy is recommended for the removal of radiopaque objects

• Foreign bodies in the cranium, chest or abdomen or in close proximity to vital structures must be removed in an operating room with a team prepared to manage possible complications.
5.4 FOREIGN BODIES

Ear
5.5 CELLULITIS AND ABSCESS

- Failure of a superficial infection to respond to medical management may be
  - due to resistance to the antibiotic or
  - to the presence of an abscess cavity

- If an abscess cavity is identified, drain it with a surgical incision

- Adequate surgical drainage requires anaesthesia to ensure that all parts of the abscess cavity are exposed.
5.5 CELLULITIS AND ABSCESS

Technique

- If in doubt about the diagnosis of abscess, confirm the presence of pus with needle aspiration.
- Prepare the skin and give adequate anaesthesia.
- Perform the preliminary aspiration using an 18 gauge or larger needle to confirm the presence of pus.
5.5 CELLULITIS AND ABSCESS

**Technique**

- Introduce the tip of a pair of artery forceps into the abscess cavity and open the jaws.
- Explore the cavity with a finger to break down all the septa.
- Extend the incision if necessary for complete drainage.
5.5 CELLULITIS AND ABSCESS

Specific sites

Dental abscess

Figure 5.32

Figure 5.33

Figure 5.34
5.5 CELLULITIS AND ABSCESS

Specific sites

Throat and neck abscesses

Figure 5.35

Figure 5.36

Figure 5.37
5.5 CELLULITIS AND ABSCESS

Mastitis and breast abscess

Figure 5.28

Figure 5.39

Figure 5.40

Figure 5.41
5.5 CELLULITIS AND ABSCESS

Infections of the hand

Figure 5.42
Figure 5.43
Figure 5.44
Figure 5.45
Figure 5.46
Figure 5.47
Figure 5.48
5.5 CELLULITIS AND ABSCESS

PERIANAL, RECTAL AND PILONIDAL SEPSIS
5.5 CELLULITIS AND ABSCESS

PERIANAL, RECTAL AND PILONIDAL SEPSIS

Figure 5.51

Figure 5.52

Figure 5.53
5.6 EXCISION AND BIOPSIES

- Excise benign lesions for treatment and confirmation of the diagnosis

- Establish the diagnosis of malignant disease by biopsy before beginning definitive treatment

- Obtain material for histological examination with:
  - Incision biopsies when part of the tumour is removed
  - Excision biopsies when the whole tumour is removed with a margin of surrounding normal tissue
  - Needle biopsies when a core of tissue is removed
5.6 EXCISION AND BIOPSIES

• Obtain material for cytological examination with a fine needle aspiration; false negative results occur if the biopsy does not include the lesion or if the lesion is necrotic

• Necrosis occurs with the use of electro-cautery, therefore excise the tumour with a scalpel

• False negative results occur in needle biopsies and aspirates due to sampling error; repeat a biopsy if the results are inconsistent with the clinical context

• Do not refer patients far from home if they have incurable metastatic disease
5.6 EXCISION AND BIOPSIES

- Specimen must arrive to the laboratory in an acceptable condition.

- Communication with the laboratory is essential on how the specimen are to be prepared, and the preservatives, fixatives or solutions that are best for local situations.

- Put the biopsies in a wide mouthed container

- Fix all biopsies in 10% formalin with volume ten times of the tissue.

- Label all samples appropriately.
5.6 EXCISION AND BIOPSIES

Specific Procedures
5.6 EXCISION AND BIOPSIES

Lymph Node Biopsy
5.6 EXCISION AND BIOPSIES

Eye
5.6 EXCISION AND BIOPSIES

**Needle aspiration**

**Needle biopsy**
5.6 EXCISION AND BIOPSIES

Gynaecological Biopsies
5.6 EXCISION AND BIOPSIES

Anorectal Endoscopy

Figure 5.68

Figure 5.69

Figure 5.70
5.6 EXCISION AND BIOPSIES

Sigmoidoscopy
5.6 EXCISION AND BIOPSIES

Anal Dilation Technique

Figure 5.76

Figure 5.77

Figure 5.78
6

Laparotomy and abdominal trauma

Key Points
6.1 LAPAROTOMY

- Patients with life threatening abdominal conditions, including trauma, should be given life saving treatment at the district hospital, particularly if they are likely to die before arrival at a referral hospital.

- Most abdominal emergencies initially present for care at the district hospital and preparations for diagnosis and resuscitation should be in place there.

- Appendectomy, drainage of abdominal and pelvic abscesses, small bowel anastomosis, colostomy and elective herniorrhaphy capability should be available at district hospitals.
6.1 LAPAROTOMY

Laparotomy is used to expose the abdominal organs so as to institute definitive diagnosis and treatment of abdominal trauma and acute abdominal conditions.

At the district hospital, nonspecialist practitioners with specific training can capably perform laparotomy and, on occasion, will perform laparotomy on complex cases in order to save lives.
6.1 LAPAROTOMY

- In an emergency, a midline incision is the incision of choice.

- A general anaesthetic should be given for an upper midline incision; spinal anaesthesia may be used for low midline incisions in the stable patient.

- If there is doubt about the diagnosis, you may use a short paraumbilical incision and extend it up or down in the midline, as indicated.
6.1 LAPAROTOMY

Midline incision

Figure 6.1

Figure 6.2

Figure 6.3

Figure 6.4

Figure 6.5

Figure 6.6

Figure 6.7

Figure 6.8

Figure 6.9

Figure 6.10
ABDOMINAL TRAUMA

- Abdominal trauma is classified as blunt or penetrating

- Intra-abdominal bleeding or gastrointestinal perforation may be present without any evidence of abdominal wall injury

- Intra-abdominal bleeding may be confirmed by peritoneal lavage with saline, but a negative result does not exclude injury, particularly in retroperitoneal trauma
6.2 ABDOMINAL TRAUMA

- Suspect intra-abdominal bleeding in cases of multiple trauma, especially if hypotension is unexplained.

- In the presence of hypovolaemia, the chest, pelvis and femur are alternative sites of major blood loss.
Paediatric cases

- Many blunt abdominal injuries can be managed without operation
- Non-operative management is indicated if the child is haemodynamically stable and can be monitored closely
- Place a nasogastric tube if the abdomen is distended, as children swallow large amount of air.
Diagnostic peritoneal lavage:

- Is indicated when abdominal findings are equivocal in the trauma patient
- Should not be performed if there are indications for immediate laparotomy
- Should be performed only after the insertion of a nasogastric tube and Foley catheter
- Is rapid, sensitive, and inexpensive
Diagnostic peritoneal lavage (contd.):

- may rule out significant abdominal trauma in the district hospital where the patient may otherwise be unobserved and unmonitored for extended periods of time
- gross evaluation of the returned fluid must be performed and decisions made on that evaluation if laboratory evaluation is not available
- ignore a negative result on diagnostic peritoneal lavage if the patient subsequently develops an acute abdomen: trauma laparotomy is then indicated.
6.2 ABDOMINAL TRAUMA

Diagnostic Peritoneal Lavage
6.2 ABDOMINAL TRAUMA

Ruptured Spleen

- Diagnostic features of a ruptured spleen include:
  - History of trauma with pain in the left upper abdomen
  - Nausea and vomiting
  - Signs of hypovolaemia
  - Abdominal tenderness and rigidity and a diffuse palpable mass
  - Chest X ray showing left lower rib fractures and a shadow in the upper left quadrant displacing the gastric air bubble medially
6.2 ABDOMINAL TRAUMA

Ruptured Spleen

- Splenectomy is the treatment for severe injuries to the spleen, but consider preserving the spleen if bleeding is not profuse.

- The spleen has blood supplied from the splenic artery and the short gastric arteries.

- Vaccination with pneumovax and prophylactic antibiotics are indicated due to the immune deficiency occurring in splenectomized patients.
6.2 ABDOMINAL TRAUMA

Ruptured Spleen

Splenectomy Technique
6.2 ABDOMINAL TRAUMA

Lacerations of the liver

- Liver injuries follow blunt trauma to the right upper quadrant of the abdomen and may result in significant bleeding.

- Many liver injuries stop bleeding spontaneously and you should not suture them as this may result in significant bleeding which is difficult to stop.

- Large liver lacerations should not be closed; bleeding vessels should be ligated and the liver defect packed with omentum or, if this is unsuccessful, with gauze.

- A large drain is indicated in all patients with liver injuries. It should be removed after about 48 hours unless bile continues to drain.
6.2 ABDOMINAL TRAUMA

Lacerations of the liver

Technique
6.2 ABDOMINAL TRAUMA

Small Intestine

Closure of a small wound
6.2 ABDOMINAL TRAUMA

Small Intestine

- In nonviable small intestine:
  - Bowel will be black or deep blue without peristalsis
  - Mesenteric veins may appear thrombosed
  - Arterial pulsation may be absent
  - The serosa will have lost its shiny appearance
The technique for small bowel resection is the same as for trauma and gangrene secondary to hernia or adhesions.
The bacterial count in the small bowel is low so anastomosis is almost always appropriate.
6.2  ABDOMINAL TRAUMA

Small Intestine Anastomosis contd.
6.2 ABDOMINAL TRAUMA

Colostomy

- It is important for the practitioner at the district hospital to be capable of performing a colostomy.

- Closing a colostomy may be difficult and should be performed electively by a specialist surgeon.

- Colostomy closure should not be performed earlier than 3 months.
6.2 ABDOMINAL TRAUMA

Selecting the Type of Colostomy

Figure 6.48
6.2 ABDOMINAL TRAUMA
Loop Colostomy
6.2 ABDOMINAL TRAUMA

Double-barrelled Colostomy

Figure 6.53

Figure 6.54

Figure 6.55
6.2 ABDOMINAL TRAUMA
End Colostomy

Figure 6.56

Figure 6.57

Figure 6.58

Figure 6.59

Figure 6.60
6.2 ABDOMINAL TRAUMA
Rupture of the bladder

• Bladder rupture, usually due to trauma, can be extraperitoneal or intraperitoneal

• Extraperitoneal rupture is most commonly associated with fracture of the pelvis

• Intraperitoneal rupture is often the result of a direct blow to the bladder or a sudden deceleration.

• If possible, urgently refer patients with rupture of the bladder to a surgical specialist
6.2 ABDOMINAL TRAUMA
Rupture of the bladder

- For extraperitoneal rupture:
  - construct a suprapubic cystostomy; if the rupture is large, also place a latex drain.

- For intraperitoneal rupture:
  - close the rupture and drain the bladder with a large urethral catheter or a suprapubic drain; if the rupture is large, also place a latex drain.

- Evaluate your patient carefully to ensure that other injuries are not missed. A ruptured bladder is an indication for a full trauma laparotomy to rule out other abdominal injuries.
6.2 ABDOMINAL TRAUMA
Rupture of the Bladder
Acute abdominal conditions

Key Points
7.1 ASSESSMENT AND DIAGNOSIS

Referred abdominal pain

• **Fore gut pain** (stomach, duodenum, gall bladder) is referred to the upper abdomen

• **Mid gut pain** (small intestine, appendix, right colon) is referred to the mid abdomen

• **Hind gut pain** (mid transverse, descending, sigmoid colon and rectum) occurs in lower abdomen
Referred abdominal pain

- Diseased retroperitoneal organs (kidney, pancreas) may present with back pain

- Ureteric pain radiates to the testicle or labia

- Diaphragmatic irritation presents as shoulder tip pain.
7.2 INTESTINAL OBSTRUCTION

- In small bowel obstruction, pain is mid-abdominal while in large bowel obstruction the pain is below the umbilicus.
- The more proximal the bowel obstruction, the more frequent the vomiting.
- The more distal the bowel obstruction, the more distended the abdomen.
• For paralytic ileus (non-mechanical obstruction):
  – Provide nasogastric suction and intravenous fluids until gut function returns
  – Maintain fluid and electrolyte balance
  – Treat the underlying medical cause
  – Treat the underlying surgical cause with operation, as indicated.
Intestinal gangrene is:

- An indication for laparotomy and intestinal resection
- Suspected when there is continuous abdominal pain
- Associated with tachycardia and fever
- Often associated with reduced blood pressure (shock is a late sign)
- Associated with abdominal tenderness, guarding and absent bowel sounds.
7.2 INTESTINAL OBSTRUCTION
Operative management of small intestinal obstruction

- Gangrene is an indication for small bowel resection

- Strangulated hernia and small bowel obstructions from adhesions can lead to gangrene

- The technique for anastomosis of the small bowel is the same for all indications.
7.3 Peritonitis

- Intestinal obstruction may respond to nonoperative management, but peritonitis indicates gangrene or perforation and therefore requires surgery.

- Surgical intervention will depend on the diagnosis of the cause of the peritonitis: for example, appendectomy, closure of a perforation or drainage of an abscess.
7.3 Peritonitis

Causes

The major causes of peritonitis include:

- Appendicitis
- Perforated peptic ulcer
- Anastomotic leak following surgery
- Strangulated bowel
- Pancreatitis
- Cholecystitis
- Intra-abdominal abscess
- Haematogenous spread of infective agents such as typhoid or tuberculosis
- Typhoid perforation
- Ascending infection: for example, in salpingitis and postpartum infection.
7.3 Peritonitis
Clinical features

- Clinical features of peritonitis include:
  - Sharp pain, which is worse on movement or coughing
  - Fever
  - Abdominal distension, tenderness and guarding
  - Diminished or absent bowel sounds
  - Shoulder pain (referred from diaphragm)
  - Tenderness on rectal or vaginal examination (suggests pelvic peritonitis).

- These features may be minimal in elderly patients, the very young and those with immune suppression.
7.3 Peritonitis Management

1. Make a differential diagnosis of the most likely underlying cause of the peritonitis/abscess.

2. Administer normal saline or Ringer’s lactate, depending on the serum electrolyte results.

3. Insert a nasogastric tube and commence aspirations.

4. Give triple antibiotic therapy intravenously, providing aerobic, gram negative and anaerobic coverage: For example, ampicillin 2 g IV every hours plus gentamicin 5 mg/kg body weight IV every 24 hours plus metronidazole 500 mg IV every 8 hours.

5. Record fluid balance and vital signs on the bedside chart every six hours.
7.4 STOMACH AND DUODENUM

- Peptic ulcers are caused by helicobacter pylori infection

- The treatment of helicobacter pylori is **triple medical therapy**:
  - Proton inhibitors
  - Antibiotics
  - Bismuth subsalicylate

- Surgery is indicated for obstruction, bleeding and perforations

- Surgical treatment of bleeding or obstructive complications of peptic ulcer should be performed by a specialist.
7.4 STOMACH AND DUODENUM

Perforated Peptic Ulcer
7.5 GALLBLADDER

Cholecystitis:

• Caused by obstruction of the cystic duct by gall stones

• Presents with epigastric cramps then pain which radiates to the right upper quadrant

• May be treated by drainage of the gallbladder (cholecystostomy)

• When complicated with pyogenic infection, requires urgent cholecystostomy and intravenous antibiotics

• Should be referred to a surgical specialist if the patient is jaundiced.
7.5 GALLBLADDER
Cholecystostomy
7.6 APPENDIX

Acute appendicitis

- Untreated, the infection progresses to:
  1. Local peritonitis with formation of an appendicular mass
  2. Abscess formation
  3. Gangrene of the appendix
  4. Perforation
  5. General peritonitis.

- Treat acute, gangrenous or perforated appendix with appendectomy

- Treat appendicular mass with medical management

- Treat appendicular abscess with incision and drainage
7.6 APPENDIX

Acute appendicitis

• Pulse and temperature are normal in early appendicitis

• Tenderness in the right lower quadrant is the most reliable sign

• Retroceacal and pelvic appendicitis may not have right lower quadrant tenderness

• Rectal examination assists in the diagnosis of a pelvic appendix

• Vaginal examination will help differentiate salpingitis and ectopic pregnancy

• Rectal examination should always be performed
7.6 APPENDIX

Emergency Appendectomy
7.6 APPENDIX

Emergency Appendectomy
Surgery for intussusception:

- Do not pull on the ileum; rather, squeeze the leading edge through the colon

- Do not perform an incidental appendectomy: if the intussusception recurs, repeat procedures will be compromised

- The last few centimetres of manual reduction are the most difficult, be patient

- Sero-muscular splits may occur but are not a problem if the mucosa is intact.
7.6 APPENDIX

Intussusception

Operative Technique
7.6 APPENDIX
Sigmoid Volvulus

**Volvulus of the sigmoid colon:**

- Usually sub-acute
- Associated with repeated previous episodes
- The most common cause of large bowel obstruction seen at the district hospital
- Associated with massive but soft abdominal distension
- Seen in well hydrated patients
- Complicated with vomiting and abdominal pain as a late finding
Sigmoid Volvulus

- When neglected, can progress to strangulation and gangrene
- Sub-acute sigmoid volvulus can be reduced by the placement of a rectal tube
- Refer patients after non-operative or operative volvulus reduction for elective surgical management
- Suspect gangrene if you see darkened bowel or blood stained fluid at sigmoidoscopy
- Operate if you suspect gangrene and, if necessary, perform a sigmoid resection with colostomy
7.6 APPENDIX

Sigmoid Volvulus

The generalist at the district hospital should be capable of performing a colostomy but should refer patients to a qualified surgeon for colonic anastomosis and colostomy closures.
Abdominal wall hernia

Key Points
8.1 GROIN HERNIAS

- Inguinal hernia bulges above the inguinal ligament, with the hernia neck above and medial to the pubic tubercle.

- Inguinal hernia is most common in males.

- Femoral hernia bulges below the inguinal ligament in the upper thigh, with the hernia neck below and lateral to the pubic tubercle.

- Femoral hernia, which occurs less frequently than inguinal hernia, is more common in women.
8.1 GROIN HERNIAS

Complications

- Strangulation is the most dangerous complication of a hernia.
- Recurrence is the commonest complication of hernia operation.
• If there is a moderate to large defect in the posterior inguinal canal in an indirect hernia, a repair is indicated.

• Indirect hernia in children should be treated with a high ligation of the sac and no repair should be performed.
8.2 SURGICAL REPAIR OF INGUINAL HERNIA

- Indirect hernia in young men with a strong inguinal canal should not be repaired.
- Tightening of the internal ring with one or two sutures is appropriate.
- The inferior epigastric artery is on the lower edge of the ring and should be avoided.
8.2 SURGICAL REPAIR OF INGUINAL HERNIA (Indirect Inguinal)
8.2 SURGICAL REPAIR OF INGUINAL HERNIA (Indirect Inguinal Continued)
8.2 SURGICAL REPAIR OF INGUINAL HERNIA (Sliding Hernia)
Repair of the posterior wall of the inguinal canal is required in a direct hernia.
8.3 SURGICAL REPAIR OF FEMORAL HERNIA

- A femoral hernia is below the posterior wall of the inguinal canal.
- Open the posterior wall of the inguinal canal with blunt dissection
8.4 SURGICAL TREATMENT OF STRANGULATED GROIN HERNIA

• In strangulated inguinal hernia, extend the inferior end of the skin incision over the hernia mass. This gives good access to the incarcerated mass.

• Always consider strangulated inguinal or femoral hernia as a cause of small bowel obstruction.
8.4 SURGICAL TREATMENT OF STRANGULATED GROIN HERNIA

- Operation for incarceration can be difficult:
  - in children,
  - in patients with recurrent hernias, and
  - in those with large, inguinoscrotal hernias.

- In these cases, consider non-operative reduction when patients present early with no signs of inflammation in the region of the hernia.
8.4 SURGICAL TREATMENT OF STRANGULATED GROIN HERNIA

- To achieve non-operative reduction:
  - place the patient in the Trendelenburg position,
  - support both sides of the neck of the hernia with one hand and apply gentle, firm and continuous pressure to the sac with the opposite hand,
  - narcotic analgesia may be helpful.

- Failure of reduction within 4 hours is an indication for operation.

- Observe the patient for at least 12 hours after a successful non-operative reduction.
8.5 SURGICAL REPAIR OF UMBILICAL AND PARA-UMBILICAL HERNIA
Urinary tract and perineum

Key Points
9.1 THE URINARY BLADDER

URINARY RETENTION

- Acute retention of urine is an indication for emergency drainage of the bladder.
- The common causes of acute retention in the male are urethral stricture and benign prostatic hypertrophy.
- Other causes of acute retention are urethral trauma and prostatic cancer.
- If the bladder cannot be drained through the urethra, it requires supra-pubic drainage.
9.1 THE URINARY BLADDER
URINARY RETENTION

• In chronic retention of urine, because the obstruction develops slowly, the bladder is distended (stretched) very gradually over weeks, so pain is not a feature.

• The bladder often overfills and the patient with chronic retention presents with dribbling of urine, referred to as “retention with overflow”.
9.1 THE URINARY BLADDER
URINARY RETENTION

• Urethral catheterization or bladder puncture is usually adequate, but cystostomy may become necessary for
  – the removal of a bladder stone or foreign body, or
  – more prolonged drainage, for example after rupture of the posterior urethra or
  – if there is a urethral stricture with complications.

• If a catheter’s balloon fails to deflate, inject 3 ml of ether into the tube leading to the balloon. This will rupture the balloon. Cut it off and remove it.

• Prior to removing the catheter, irrigate the bladder with 30 ml of saline.
THE URINARY BLADDER

9.1 URINARY RETENTION

• Emergency drainage of the bladder in acute retention may be undertaken by:
  – Urethral catheterization
  – Suprapubic puncture
  – Suprapubic cystostomy.
9.1 THE URINARY BLADDER

URINARY RETENTION

- Treatment of chronic retention is not urgent, but drainage of the bladder will help you to determine the volume of residual urine and prevent renal failure, which is associated with retention.

- Arrange to refer patients with chronic urinary retention for definitive management.
Urethral Catheterization in the male patient

Technique

Figure 9.1
Fixation of the Catheter

- If you fail to pass a catheter, proceed to filiforms and followers (Figure 9.2) or use a Foley catheter with a guide.
- If these procedures are unsuccessful, abandon them in favour of suprapubic puncture.
- Forcing the catheter or a metal bougie can create a false passage, causing urethral bleeding and intolerable pain, and increasing the risk of infection.
9.1 THE URINARY BLADDER

Suprapubic Puncture
9.1 THE URINARY BLADDER
Suprapubic Cystostomy
9.2 THE MALE URETHRA

Urethral Stricture

- Filiforms and followers are the safest means of dilating acute strictures.
- Chronic strictures can be managed safely with repeat dilations using metal bougies.
- Suprapubic puncture or cystostomy should not be thought of as the last resort and are much preferable to continued instrumentation, which can lead to urethral traumatization.
9.2 THE MALE URETHRA

Urethral Stricture
9.2 THE MALE URETHRA
Urethral Stricture

• Possible complications
  – Trauma-bleeding or creation of a false passage
  – Bacteraemia
  – Septicaemia and septic shock.

• Minimize complications by asepsis and the use of antibiotics.
9.2 THE MALE URETHRA

Male Circumcision

Figure 9.27

Figure 9.28

Figure 9.29

Figure 9.30

Figure 9.31

Figure 9.32

Figure 9.33

Figure 9.34
9.2 THE MALE URETHRA
Paraphimosis

- Occurs most commonly in children.

- Diagnose it by recognizing a retracted, swollen and painful foreskin. The glans penis is visible, and is surrounded by an oedematous ring with a proximal constricting ring.
9.2 THE MALE URETHRA

- Paraphimosis should be treated urgently with manual reduction of the foreskin or dorsal slit.
- Phimosis is prevented by reduction of the foreskin and cleansing of the glans penis on a regular basis.
- Phimosis may be treated definitively by circumcision or with a dorsal slit, if necessary.
9.2 THE MALE URETHRA

Reduction of the Foreskin

Figure 9.36

Figure 9.37

Figure 9.38

Figure 9.39
9.2 THE MALE URETHRA

- Phimosis and paraphimosis are definitively treated with circumcision, but can be treated with a dorsal slit of the foreskin.

- Dorsal slit can be performed with direct infiltration of the foreskin with xylocaine 1% without epinephrine (adrenaline).

- Clamp the foreskin with two artery forceps and make an incision between them.
9.2 THE MALE URETHRA
torsion of the testis

- In torsion, the testicle can become gangrenous in 4 hours; treatment is thus an emergency.

- The non-affected side should be fixed at the same time as the subsequent incidence of torsion on the opposite side is high.

- When the testis is dead, orchidectomy should be performed to protect the other testis from loss due to autoimmune disease.

- One testicle is enough for normal fertility.
Scrotal hydrocoele is an abnormal accumulation of fluid in the tunica vaginalis sac.

Figure 9.41
9.2 THE MALE URETHRA

Scrotal hydrocoele

- A hydrocoele is differentiated from hernia in that it:
  - Does not extend above the inguinal ligament
  - Transilluminates
  - Does not reduce
  - Does not transmit a cough impulse
9.2 THE MALE URETHRA
Scrotal hydrocoele

- In children, the hydrocoele often communicates with the peritoneal cavity; it is a variation of hernia and is managed as a hernia.

- Non-communicating hydrocoele in children under the age of 1 year often resolve without intervention.

- The surgical management of adult hydrocoele is not appropriate for children.
9.2 THE MALE URETHRA
Scrotal hydrocoele Treatment
9.2 THE MALE URETHRA

Vasectomy
Female genital mutilation

- There is no health indication for female genital mutilation

- Acute complications include:
  - Haemorrhage
  - Shock
  - Urinary retention
  - Damage to the urethra and anus
  - Cellulitis
  - Abscesses
9.3 THE PERINEUM

Female genital mutilation

- Chronic complications include:
  - Sexual dysfunction
  - Psychological disturbance
  - Urinary obstruction
  - Keloids
  - Large epidermal inclusion cysts
  - Difficult micturition
  - Vaginal stenosis, which can cause obstructed labour, often complicated by vesical or rectal vaginal fistulae.
9.3 THE PERINEUM

**Perineal Abscesses**

**Haematocolpos**

Figure 9.60

Figure 9.61

Figure 9.62
10

Hypertension in pregnancy

Key Points
10.1 HYPERTENSION

- Hypertensive disorders in pregnancy include:
  - Pregnancy induced hypertension
  - Chronic hypertension
  - Pre-eclampsia
  - Eclampsia.

- Untreated hypertension in pregnancy can cause maternal and perinatal deaths

- Delivery is the only cure for pre-eclampsia and eclampsia
10.1 HYPERTENSION

- Hypertension is diagnosed when:
  - the systolic blood pressure is 140 mmHg
  - the diastolic blood pressure is 90 mmHg on two consecutive readings taken 4 hours or more apart.

- A time interval of less than 4 hours is acceptable if urgent delivery must take place, or if the diastolic blood pressure is equal to or greater than 110 mmHg.
10.1 HYPERTENSION

- Hypertension is classified as **pregnancy induced hypertension** if it occurs for the first time:
  - After 20 weeks of gestation
  - During labour and/or within 48 hours after delivery

- If it occurs before 20 weeks of gestation, it is classified as **chronic hypertension**.

- If the blood pressure prior to 20 weeks of gestation is unknown, differentiation may be impossible; in this case, manage as pregnancy induced hypertension.
10.1 HYPERTENSION

Testing for proteinuria

- Presence of proteinuria changes the diagnosis from pregnancy induced hypertension to **eclampsia**.

- Only clean catch mid-stream specimens should be used for testing.

- Catheterization for the sole purpose of testing is not justified due to the risk of urinary tract infection.
• Other conditions that cause proteinuria or false positive results include:
  – Urinary infection
  – Severe anaemia
  – Heart failure
  – Difficult labour
  – Blood in the urine due to catheter trauma
  – Schistosomiasis
  – Contamination from vaginal blood
  – Vaginal secretions or amniotic fluid contaminating urine specimens.
10.1 HYPERTENSION

CLINICAL FEATURES

- Pregnancy induced hypertension is more common among women who are pregnant for the first time.

- Women with multiple pregnancies, diabetes and underlying vascular problems are at higher risk of developing pregnancy induced hypertension.

- The spectrum of the disease includes:
  - Hypertension without proteinuria
  - Mild pre-eclampsia
  - Severe pre-eclampsia
  - Eclampsia.
10.1 HYPERTENSION

CLINICAL FEATURES

• Mild pre-eclampsia is often symptomless.

• Rising blood pressure may be the only clinical sign. A woman with hypertension may feel perfectly well until seizure suddenly occurs.

• Proteinuria is a late manifestation of the disease.

• When pregnancy induced hypertension is associated with proteinuria, the condition is called pre-eclampsia.
10.1 HYPERTENSION

CLINICAL FEATURES

- Increasing proteinuria is a sign of worsening pre-eclampsia.

- Mild pre-eclampsia could progress to severe pre-eclampsia; the rate of progression could be rapid.

- The risk of complications, including eclampsia, increases greatly in severe pre-eclampsia.
10.1 HYPERTENSION

Eclampsia

- Eclampsia is characterized by convulsions, together with signs of pre-eclampsia.

- Convulsions can occur regardless of severity of hypertension, are difficult to predict and typically occur in the absence of hyperreflexia, headache or visual changes.

- Convulsions are tonic-clonic and resemble grand-mal seizures of epilepsy. Seizures may recur in rapid sequence, as in status epilepticus, and end in death.
10.1 HYPERTENSION

Eclampsia

- Convulsion may be followed by coma that lasts minutes or hours, depending on the frequency of seizures. 25% of eclamptic fits occur after delivery of the baby.

- Eclampsia must be differentiated from other conditions that may be associated with convulsions and coma.
10.1 HYPERTENSION

Eclampsia

• Eclampsia must be differentiated from other conditions that may be associated with convulsions and coma:
  - Epilepsy
  - Cerebral malaria
  - Head injury
  - Cerebrovascular accident
  - Intoxication (alcohol, drugs, poisons), drug withdrawal, metabolic disorders, Water intoxication
  - Meningitis, encephalitis
  - Hypertensive encephalopathy
  - Hysteria.
## 10.1 HYPERTENSION

### Severe pre-eclampsia and eclampsia

Severe pre-eclampsia is present if one or more of the conditions in column three of the table below are present.

<table>
<thead>
<tr>
<th></th>
<th>Mild pre-eclampsia</th>
<th>Severe pre-eclampsia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diastolic blood pressure</strong></td>
<td>&lt;110</td>
<td>110</td>
</tr>
<tr>
<td><strong>Proteinuria</strong></td>
<td>Up to 2+</td>
<td>3+ or more</td>
</tr>
<tr>
<td><strong>Headache</strong></td>
<td>No</td>
<td>One or more of these conditions may be present</td>
</tr>
<tr>
<td><strong>Visual disturbances</strong></td>
<td>No</td>
<td></td>
</tr>
<tr>
<td><strong>Hyperreflexia</strong></td>
<td>No</td>
<td></td>
</tr>
<tr>
<td><strong>Urine output &lt;400 ml in 24 hours</strong></td>
<td>No</td>
<td></td>
</tr>
<tr>
<td><strong>Epigastric or right upper quadrant pain</strong></td>
<td>No</td>
<td></td>
</tr>
<tr>
<td><strong>Pulmonary oedema</strong></td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>
10.2 ASSESSMENT AND MANAGEMENT
Severe pre-eclampsia and eclampsia

- All case of severe pre-eclampsia should be managed actively

- Symptoms and signs of 'impending eclampsia' (blurred vision, hyper-reflexia) are unreliable and expectant management is not recommended

- Immediate management of pregnant women or recently delivered woman:
  - complaining of severe headache or blurred vision
  - having Convulsion
  - found unconscious

- SHOUT FOR HELP
10.2 ASSESSMENT AND MANAGEMENT

- Protect the mother by lowering blood pressure and preventing or controlling convulsions.

- Magnesium sulfate is the preferred drug for preventing and treating convulsions.

- Use diazepam only if magnesium sulphate is not available.

- Never leave the woman alone.

- A convulsion is followed by aspiration of vomit may cause death of the woman and fetus.
10.3 DELIVERY

- Delivery should take place as soon as the woman’s condition has been 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.

- Get skilled anaesthetic help early; this will also aid the management of hypertensive crises and fits.
10.4 POSTPARTUM CARE

- Continue anticonvulsant therapy for 24 hours after delivery or last convulsion, whichever occurs last.
- Continue antihypertensive therapy as long as the diastolic pressure is 110 mmHg or more.
- Continue to monitor urine output.
• Watch carefully for the development of pulmonary oedema, which often occurs after delivery.

• Life threatening complications can still occur after delivery;

• Monitor carefully until the patient is clearly recovering.
10.4 POSTPARTUM CARE

Referral for tertiary level care

• Consider referral of women who have:
  
  – Oliguria (less than 400 ml urine output in 24 hours) that persists for 48 hours after delivery
  
  – Coagulation failure (e.g. coagulopathy or haemolysis, elevated liver enzymes and low platelets [HELLP] syndrome)
  
  – Persistent coma lasting more than 24 hours after convulsion.
10.5 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.
10.5 CHRONIC HYPERTENSION

- If the woman was on antihypertensive medication before pregnancy and the disease is well controlled, continue the same medication if acceptable in pregnancy.

- If diastolic blood pressure is 110 mmHg or more, or systolic blood pressure is 160 mmHg or more, treat with antihypertensive drugs: e.g. methyldopa.
10.5 CHRONIC HYPERTENSION

- If proteinuria or other signs and symptoms are present, consider superimposed pre-eclampsia and manage as pre-eclampsia

- Monitor fetal growth and condition

- If there are no complications, deliver at term

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

- If fetal growth restriction is severe and pregnancy dating is accurate, assess the cervix and consider delivery
10.5 CHRONIC HYPERTENSION

- If the cervix is favourable (soft, thin, partially dilated) rupture the membranes with an amniotic hook or a Kocher clamp and induce labour using oxytocin or prostaglandins.

- If the cervix is unfavourable (firm, thick, closed), ripen the cervix using prostaglandins or Foley catheter.

- Observe for complications including abruptio placentae and superimposed pre-eclampsia.
10.6 COMPLICATIONS

- Complications of hypertensive disorders in pregnancy may cause adverse perinatal and maternal outcomes.
- Complications are often difficult to treat so make every effort to prevent them by early diagnosis and proper management.
- Be aware that management can also lead to complications.
10.6 COMPLICATIONS
Management

• 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 ischaemia

• Provide supportive therapy

• If you suspect heart, kidney or liver failure, provide supportive therapy and observe
10.6 COMPLICATIONS

Management

• Suspect coagulopathy if:
  – A clotting test shows failure of a clot to form after 7 minutes or a soft clot that breaks down easily
  – Continued bleeding from venepuncture sites
10.6 COMPLICATIONS
Management

• A woman who has IV lines and catheters is prone to infection; use proper infection prevention techniques 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.
Management of slow progress of labour

Key Points
11.1 GENERAL PRINCIPLES

• Prolonged labour can lead to serious maternal problems including:
  1. Infection
  2. Uterine rupture
  3. Genital fistulas

• Problems for the baby include:
  1. Infection
  2. Asphyxial and traumatic injury to the baby
  3. Stillbirth
11.1 GENERAL PRINCIPLES

Labour

• Suspect or anticipate labour if a pregnant woman has:
  – Intermittent abdominal pain after 22 weeks gestation
  – Blood stained mucus discharge or “show”
  – Watery vaginal discharge or a sudden gush of water with or without pain.
11.1 GENERAL PRINCIPLES

- Prolonged labour may cause maternal and perinatal death and disability
- Ineffective uterine contractions are the most common reason for slow progress of labour in a primigravida
- Good management of labour may prevent problems associated with prolonged labour
- Recognize slow progress in labour with a partograph
- If labour is not obstructed, use oxytocin to augment ineffective uterine contractions.
11.1 GENERAL PRINCIPLES

Labour

• Confirm the onset of labour only if intermittent uterine contractions are associated with progressive changes in the cervix:

1. **Cervical effacement**: the progressive shortening and thinning of the cervix in labour; the length of the cervix at the end of normal pregnancy is variable (a few millimetres to 3 cm); with the onset of labour, the length of the cervix decreases steadily to a few millimetres when it is fully effaced

2. **Cervical dilatation**: the increase in diameter of the cervical opening, measured in centimetres
11.1 GENERAL PRINCIPLES

Labour

Progressive Cervical dilatation
11.1 GENERAL PRINCIPLES

Labour

- Diagnose labour only if there has been effacement and dilatation.

- An incorrect diagnosis of labour in this situation can lead to unnecessary anxiety and interventions.
11.1 GENERAL PRINCIPLES

Labour- Fetal descent

- Fetal descent may be assessed by abdominal palpation and vaginal examination

**Abdominal palpation**

- Fetal descent into the pelvis may be assessed in terms of fifths of head palpable above the symphysis pubis
  - 5/5 refers to a head that is entirely above the inlet of the pelvis
  - 0/5 refers to a head that is deep within the pelvis.
11.1 GENERAL PRINCIPLES

Labour

Abdominal palpation

Figure 11.2

Figure 11.3
11.1 GENERAL PRINCIPLES

Labour

Vaginal examination

• Fetal descent can also be quantified by relating the level of the fetal presenting part to a bony reference point in the maternal pelvis.

• Conventionally the ischial spines provide such a reference point (Figure 11.4: 0 = level of ischial spine).
11.2 SLOW PROGRESS OF LABOUR

- Slow progress of labour has three fundamental causes:
  1. Poor uterine contractions
  2. Malpresentations and malpositions
  3. Disproportion between the fetal size and pelvic size.

- Exclude malpresentations and poor contractions before making a diagnosis of disproportion.
11.2 SLOW PROGRESS OF LABOUR

Malpresentations and malpositions

- The most frequent and most favourable presentation is a well flexed head in the occipito-anterior position.
- In a malpresentation, there is usually a poor fit between the presenting part and the maternal pelvis.
- The presenting part is poorly applied to the cervix. Contractions are usually ineffective in achieving progress of labour.
11.2 SLOW PROGRESS OF LABOUR

- Disproportion occurs because:
  - The baby is too large
  - The pelvis is too small.

- You may be able to identify disproportion early in some cases:
  e.g. with a hydrocephalic head or a large baby in a woman with an abnormal pelvis because, for instance, of a history of malformation or trauma to the pelvis.

- The best test for an adequate pelvis is a trial of labour. Clinical pelvimetry is of limited value.
11.2 SLOW PROGRESS OF LABOUR

Assessment And Diagnosis

• When a woman presents with intermittent abdominal pains, ask the following questions:
  – Is this woman in labour?
  – If she is in labour, what is the phase of labour?
  – What is the presentation of the fetus?
  – Are the membranes ruptured? If so, how long ago?
11.2 SLOW PROGRESS OF LABOUR

Assessment And Diagnosis contd.

- Assess the woman’s general condition:
  - Is she in pain? Is she distressed?
  - Check pulse, blood pressure and hydration (tongue, urine output), temperature

- Does she have any medical problems?
11.2 SLOW PROGRESS OF LABOUR

- Diagnose labour only if there has been effacement and dilatation.

- An incorrect diagnosis of labour in this situation can lead to unnecessary anxiety and interventions.
11.3 PROGRESS OF LABOUR

Slow Progress Of Labour Associated With Prolonged Latent Phase

- The latent phase is prolonged when the cervical dilatation remains less than 4 cm after 8 hours.

- The diagnosis of a prolonged latent phase is made retrospectively:
  - When contractions cease, diagnose as false labour
  - When contractions become regular and dilatation progresses beyond 4 cm, diagnose as latent phase.

- Mistaking false labour for the latent phase leads to unnecessary induction and unnecessary caesarean section.
11.3 PROGRESS OF LABOUR

Slow Progress Of Labour Associated With
Prolonged Active Phase

- During active labour, dilatation usually progresses at least 1 cm per hour. Any rate of dilatation slower than this indicates a slow active phase.

- If the slow active phase is neglected, it can lead to a prolonged active phase.
11.3 PROGRESS OF LABOUR

Slow Progress Of Labour Associated With Prolonged Active Phase

- Slow progress of labour in the active phase of labour may be due to one or more of the following causes:
  - Inefficient uterine contractions
  - Malpresentations and malpositions: e.g. occipito-posterior
  - Disproportion between the size of the fetus and the pelvis.
Slow Progress Of Labour Associated With Prolonged Expulsive Phase

- Spontaneous maternal “pushing” should be permitted, but the practice of encouraging breath-holding and prolonged effort should be abandoned.

- If malpresentation and obvious obstruction have been excluded, failure of descent in the expulsive stage should also be treated by oxytocin infusion unless contraindicated.

- If there is no descent even after augmentation with oxytocin, consider assisted delivery.
11.3 PROGRESS OF LABOUR

• Assisted vaginal delivery by forceps or ventouse is indicated:
  – if the head is engaged (not more than 1/5 of the head is palpable above the pelvic brim) or
  – if the leading bony edge of the fetal head is at one cm or more below the level of the ischial spines by vaginal examination.

• Caesarean delivery is the preferred option if the head is at a higher level.
11.3 PROGRESS OF LABOUR

Slow progress of labour associated with malpositions and malpresentations

Brow presentation

• When the fetus is living: deliver by caesarean
• When the fetus is dead:
  – If dilatation is incomplete, deliver by caesarean section
  – If dilatation is complete, perform craniotomy or caesarean section.
• Do not deliver brow presentation by vacuum extraction, forceps or symphysiotomy.
11.3 PROGRESS OF LABOUR

Slow progress of labour associated with malpositions and malpresentations

Face presentation

- Prolonged labour is common with face presentation:
  - In the chin-anterior position, descent and delivery of the head by flexion may occur
  - In the chin-posterior position, the fully extended head is blocked by the sacrum from descent and arrest of labour occurs.
11.3 PROGRESS OF LABOUR

Slow progress of labour associated with malpositions and malpresentations

- Face presentation, chin anterior, can usually be delivered vaginally.

- Chin posterior can rarely be delivered vaginally.

- Do not perform vacuum extraction for face presentation.
11.3 PROGRESS OF LABOUR

• Breech presentation
  – Prolonged labour is an indication for urgent caesarean section in breech presentation.
  – Failure of labour to progress is a sign of possible disproportion.

• Transverse lie
  – Caesarean section is the management of choice, whether the fetus is alive or dead
11.3 PROGRESS OF LABOUR

Breech presentation

Transverse lie
Make the uterine incision big enough to deliver the head and body of the baby without tearing the uterine incision.
11.4 OPERATIVE PROCEDURES

Delivery of the fetus and placenta

Figure 11.12

Figure 11.13
11.4 OPERATIVE PROCEDURES

- Look carefully at the uterine incision before closing the abdomen.
- Make sure there is no bleeding and that the uterus is firm.
11.4 OPERATIVE PROCEDURES

What to do if problems occur

If bleeding is not controlled

1. Massage the uterus

2. If uterus is atonic, continue to infuse oxytocin and give ergometrine 0.2 mg and prostaglandins, if available

3. Transfuse as necessary

4. Have an assistant press fingers over the aorta to reduce the bleeding until the source of bleeding can be found and stopped

5. If bleeding is not controlled, perform uterine artery and utero-ovarian artery ligation or a hysterectomy.
11.4 OPERATIVE PROCEDURES

What to do if problems occur

• Ergometrine is easily destroyed by heat.

• If logistics are poor, you may need to give what appears to be a very large dose – but beware its use in eclamptic patients as it raises the blood pressure.
11.4 OPERATIVE PROCEDURES

Tubal sterilization at caesarean section
Induction 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 contraction pattern is established when there are three contractions in 10 minutes, each lasting more than 40 seconds.
11.4 OPERATIVE PROCEDURES

INDUCTION AND AUGMENTATION OF LABOUR

• The success of induction is related to the condition of the cervix at the start of induction:
  – Cervix is **favourable** if it is soft, short and partially dilated
  – Cervix is **unfavourable** if it is firm, long and closed: ripen it using prostaglandin or a Foley catheter before induction.

• Prostaglandin E2 is placed high in the posterior fornix of the vagina and may be repeated after 6 hours if required.

• If prostaglandin is not available, use a Foley catheter

• Do not insert the catheter if there is a history of bleeding or ruptured membranes or obvious vaginal infection.
11.4 OPERATIVE PROCEDURES

Artificial rupture of the membranes (ARM)

• If the membranes are intact, it is recommended practice in both induction and augmentation to first perform artificial rupture of membranes.

• In some cases, this is all that is needed.

• In areas of high HIV prevalence, leave the membranes intact for as long as possible to reduce the risk of perinatal transmission of HIV.
11.4 OPERATIVE PROCEDURES

Oxytocin stimulation

- 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.

- Women receiving oxytocin should never be left alone.
11.4 OPERATIVE PROCEDURES

Instrumental delivery

- The expulsive forces of labour can be augmented by traction applied to the fetal head.

- The methods used are:
  - Vacuum extraction
  - Forceps delivery.

- Any trial of instrumental delivery must be treated as a potential caesarean section in terms of preparing for anaesthesia (give ranitidine early) and blood transfusion.
11.4 OPERATIVE PROCEDURES

Vacuum extraction (Ventouse)
11.4 OPERATIVE PROCEDURES

Vacuum extraction (Ventouse)

Figure 11.20

Figure 11.21
Using the vacuum extractor

- 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, perform caesarean section.
11.4 OPERATIVE PROCEDURES

Forceps delivery
11.4 OPERATIVE PROCEDURES

Forceps delivery
12

Bleeding in pregnancy and childbirth

Key Points
12.1 BLEEDING

- Bleeding causes one in four maternal deaths worldwide
- Prevent anaemia, recognize and treat complications early
- Post partum bleeding is the most common cause of maternal death
- Practise active management of the third stage of labour in all cases to prevent postpartum haemorrhage.
12.1 BLEEDING

POSTPARTUM HAEMORRHAGE

- Postpartum haemorrhage (PPH) is vaginal bleeding in excess of 500 ml after childbirth.

- A woman with a normal haemoglobin level will tolerate blood loss that would be fatal for an anaemic woman.

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

POSTPARTUM HAEMORRHAGE contd.

• Risk assessment in the antenatal period does not effectively predict those women who will have PPH.

• Practise active management of the third stage of labour on all women in labour since it reduces the incidence of PPH due to uterine atony.

• Closely monitor all postpartum women to determine those that have PPH.
12.1 BLEEDING

Atonic uterus

- Bleeding occurs from the placental site after delivery.

- Blood vessels in the placental site are surrounded by uterine muscles, which normally contract after delivery and close off the vessels.

- Failure of the uterus to contract (atonic uterus) results in excessive bleeding. This is the commonest cause of bleeding after childbirth.
12.2 DIAGNOSIS AND INITIAL TREATMENT

• Active management of the third stage of labour includes:

  - Giving an oxytocic to the mother as soon as the baby is born

  - Delivery of the placenta by controlled cord traction

  - Uterine massage to ensure that the uterus is contracted.
12.3 SPECIFIC MANAGEMENT
ABRUPTIO PLACENTAE

- In every case of abruptio placentae, be prepared for postpartum haemorrhage:

1. Assess clotting status using a bedside clotting test. Failure of a clot to form after 7 minutes or a soft clot that breaks down easily suggests coagulopathy.
2. Transfuse as necessary.
3. If bleeding is heavy (evident or hidden), deliver as soon as possible.
4. If the cervix is fully dilated, deliver by vacuum extraction.
5. If vaginal delivery is not imminent, deliver by caesarean section.
12.3 SPECIFIC MANAGEMENT
ABRUPTIO PLACENTAE

• 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
  – If contractions are poor, augment labour with oxytocin
  – If the cervix is unfavourable (firm, thick, closed), perform a caesarean section
  – If the fetal heart rate is 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.
12.3 SPECIFIC MANAGEMENT
COAGULOPATHY (CLOTTING FAILURE)

- It can be triggered by many causes, including:
  - Abruption
  - Sepsis
  - Fetal death
  - Eclampsia
  - Amniotic fluid embolism.

- 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.

- 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.
If you suspect placenta previa, do not perform a vaginal examination unless preparations have been made for immediate caesarean section.
12.3 SPECIFIC 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.
  – Anticipate the need for blood early and transfuse as necessary.

• Do not give prostaglandins intravenously. They may be fatal.
12.3 SPECIFIC MANAGEMENT
ATONIC UTERUS

- If bleeding continues:
  - Check the placenta again for completeness
  - If there are signs of retained placental fragments (absence of a portion of maternal surface or torn membranes with vessels), remove remaining placental tissue
  - Assess clotting status using a bedside clotting test; failure of a clot to form after 7 minutes or a soft clot that breaks down easily suggests coagulopathy
12.3 SPECIFIC MANAGEMENT

ATONIC UTERUS

• If bleeding continues in spite of management above:
  Perform bimanual compression of the uterus and maintain compression until bleeding is controlled and the uterus contracts.
12.3 SPECIFIC MANAGEMENT
ATONIC UTERUS

Alternatively, compress the aorta.
12.3 SPECIFIC MANAGEMENT
ATONIC UTERUS

• If bleeding continues in spite of compression, perform uterine and utero-ovarian artery ligation;

• If life-threatening bleeding continues after ligation, perform subtotal hysterectomy.

• Packing the uterus is ineffective and wastes precious time
12.3 SPECIFIC MANAGEMENT
RETAINED PLACENTA

1. If you can see the placenta, ask the woman to push it out.

2. If you can feel the placenta in the vagina, remove it.

3. Ensure that the bladder is empty. Catheterize the bladder, if necessary.

4. If the placenta is not expelled, give oxytocin 10 units IM if not already done for active management of the third stage.

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

RETIRED PLACENTA contd.

• If the placenta is undelivered after 30 minutes of oxytocin stimulation and the uterus is contracted, attempt controlled cord traction.

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

• If controlled cord traction is unsuccessful, attempt manual removal of placenta. 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. Failure of a clot to form after 7 minutes or a soft clot that breaks down easily suggests coagulopathy.

If there are signs of infection (fever, foul-smelling vaginal discharge), give antibiotics as for metritis.
12.4 PROCEDURES
MANUAL VACUUM ASPIRATION

- 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 (usually 10–12 mm) that ensures adequate dilatation

- Take care not to tear the cervix or to create a false opening.
12.4 PROCEDURES

MANUAL VACUUM ASPIRATION

Begin with the smallest dilator and end with the largest dilator (usually 10–12 mm) that ensures adequate dilatation (Figure 12.5)
While gently applying traction to the cervix, insert the cannula through the cervix into the uterine cavity just past the internal os (Figure 12.6).

Rotating the cannula while gently applying pressure often helps the tip of the cannula pass through the cervical canal.
12.4 PROCEDURES
MANUAL VACUUM ASPIRATION

- 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 (Figure 12.7).
12.4 PROCEDURES

DILATATION AND CURETTAGE
12.4 PROCEDURES

Figure 12.10

CULDOCENTESIS
12.4 PROCEDURES

Figure 12.11

COLPOTOMY
12.4 PROCEDURES

SALPINGECTOMY FOR ECTOPIC PREGNANCY

Figure 12.12
12.4 PROCEDURES

MANUAL REMOVAL OF PLACENTA

Figure 12.13

Figure 12.14
12.4 PROCEDURES

REPAIR OF CERVICAL TEARS

Figure 12.15
12.4 PROCEDURES
REPAIR OF VAGINAL AND PERINEAL TEARS

Four degrees of tear can occur during delivery:

- **First degree**: Vaginal mucosa + connective tissue
- **Second degree**: Vaginal mucosa + connective tissue + muscles
- **Third degree**: Complete transection of the anal sphincter
- **Fourth degree**: Rectal mucosa also involved
Repair of first and second degree tears
12.4 PROCEDURES
Repair of third and fourth degree tears

Figure 12.20

Figure 12.21
12.4 PROCEDURES
UTERINE INVERSION

Figure 12.22
12.4 PROCEDURES
UTERINE AND UTERO-OVARIAN ARTERY LIGATION

Figure 12.23
2.4 PROCEDURE

Subtotal (supracervical) hysterectomy

Figure 12.24

Figure 12.25

Figure 12.26

Figure 12.27

Figure 12.28
Resuscitation and preparation for anaesthesia and surgery

Key Points
The emergency measures that are familiar to most of us are:

- **A** Airway
- **B** Breathing
- **C** Circulation

To manage a collapsed patient:

- Keep calm
- Use ABC principles for immediate treatment
- Think about and treat the underlying cause.
13.1 MANAGEMENT OF EMERGENCIES AND CARDIOPULMONARY RESUSCITATION

Cardiac Arrest And Inadequate Circulation

- In emergencies: look – feel – listen.

- In cardiac arrest, keep ventilating and continue ECM until there is a response or you decide to stop treatment.

- At this stage, you are temporarily averting the fatal consequences of cardiopulmonary arrest.

- The ABC routine is life saving, but only for a few minutes. Some other treatment must be given and normal circulation must be restored if the patient is to survive.

- Do not waste time during a cardiac arrest trying to make an ECG machine work.
13.1 MANAGEMENT OF EMERGENCIES AND CARDIOPULMONARY RESUSCITATION

Figure 13.1
When there is no ECG diagnosis

- Epinephrine (adrenaline) is life saving in many cases of cardiac arrest.

- Always use it once the diagnosis is made, even if you do not know the cause of the arrest.
13.1 MANAGEMENT OF EMERGENCIES AND CARDIOPULMONARY RESUSCITATION

Ventricular fibrillation

Figure 13.3
• Recognize shock by:
  – Tachycardia (may be the only sign in a child)
  – Thready pulse
  – Narrow pulse pressure: e.g. 110/70 becomes 95/75
  – Cold hands and feet
  – Sweating, anxious patient
  – Breathlessness and hyperventilation
  – Confusion leading to unconsciousness.

• There may be more than one cause of shock. In surgical patients, look for hypovolaemia and sepsis first.
Unconsciousness

Monitor the airway and await progress and diagnosis
13.2 OTHER CONDITIONS REQUIRING URGENT ATTENTION

ANAEMIA

• A critical haemoglobin concentration is 4 g/dl, below which significant reduction in oxygen consumption starts to occur.

• Blood transfusion is mandatory in all such cases.
13.3 INTRAVENOUS ACCESS

• Develop the attitude: ‘There is a vein in there. I must find it’

• There is almost no emergency case that can survive without a drip.

• How To Find A Vein
  – When access is difficult, make sure you have a good light and an assistant to help you.

  – Ideally, an intravenous cannula should be placed in a vein in the arm that is not over a joint and where fixation is easy, comfortable for the patient and convenient for drug administration and care of the IV site.

  – In shocked patients, such veins may be hard to find.
• Often the best veins to use in emergencies are:
  - Antecubital fossa
  - Femoral vein
  - Internal jugular vein.

• Do not attempt the subclavian vein as there is a high risk of pleural puncture.
13.3 INTRAVENOUS ACCESS

Femoral vein

- If you are right handed, it is easiest to stand on the patient’s right and use your left index and middle fingers to palpate the femoral artery.
- Use a 14, 16 or 18 G (20 G in a child) cannula mounted on a 5 ml syringe.
13.3 INTRAVENOUS ACCESS

Internal jugular vein

- Use of the internal jugular vein may be life saving, but serious complications can occur, including air embolism, damage to structures in neck and pneumothorax.

- Remove the IV line as soon as an alternative is available.

- Cannulation of a big central vein is useful for emergencies, but poses more hazards for the patient than a peripheral vein.
13.3 INTRAVENOUS ACCESS

- The internal jugular vein is the most popular vein to choose in severe shock and CPR as well as for elective major surgery.
- Two approaches are possible:

![Mid sternomastoid (upper)](image1)

![Sternomastoid triangle (lower)](image2)
13.3 INTRAVENOUS ACCESS
13.4 FLUIDS AND DRUGS

- Always try to calculate the volume and type of fluids lost
- Replace with fluids of a similar volume and composition
- Add the patient’s daily maintenance requirements to the fluid needed to replace losses to make the total daily requirement
- Watch carefully for a response to your fluid regime and modify it, if necessary.
13.4 FLUIDS AND DRUGS

- Every patient responds differently to fluid therapy.

- Look for the difference.

- Avoid fluids containing dextrose during resuscitation.

- Monitor the response by looking at the vital signs and urine output.

- Whole blood transfusion is the ultimate life saving treatment for haemorrhagic shock.
Paediatric Fluids

- In emergency paediatric resuscitation, it is customary to give a fluid bolus of normal saline (20 ml/kg body weight and repeat if needed) as initial therapy as soon as the drip is in place.

- Events happen quickly in babies. Monitor closely.
13.4 FLUIDS AND DRUGS

Speed Of Intravenous Fluid Therapy

- As with inadequate volumes of infusion, it is common that shocked patients receive their fluids too slowly.

- A slow running drip overnight is the commonest reason for a dead patient in the morning.
What Blood Pressure Should You Aim For?

- In severe haemorrhage, control of bleeding is the first priority, whatever the blood pressure or haemoglobin.
13.5 DRUGS IN RESUSCITATION

- Always give drugs intravenously during resuscitation

- Most drugs are only helpful once the cause of cardiac arrest has been diagnosed, but epinephrine is an exception and should always be given to patients with circulatory arrest.

- Epinephrine saves lives in cases of acute collapse.
13.6 PREOPERATIVE ASSESSMENT AND INVESTIGATIONS

- Always take a history – if the patient cannot tell you, someone else may be able to
- Make a rapid evaluation of a collapsed patient
- Follow this with a full and detailed examination to avoid missing out anything important.
13.6 PREOPERATIVE ASSESSMENT AND INVESTIGATIONS

Initial Assessment

• The events leading up to admission should be carefully considered: for example, following an accident:
  – When did it happen?
  – What happened?
  – Was the patient a passenger, driver or pedestrian?
  – Is there any blood loss?
  – How far away did it occur?
  – How did the victim get to hospital?
  – If unconscious now, was the patient conscious before?
13.6 PREOPERATIVE ASSESSMENT AND INVESTIGATIONS

- Before starting the clinical examination, make an “end-of-the-bed” examination of such signs as:
  - Breathing pattern (flail segment, asymmetrical or paradoxical movement, tachypnoea, dyspnoea)
  - Position of patient (sitting up or lying down)
  - Position of arms and legs (showing limb or pelvic fracture)
  - Restlessness, such as from pain, hypoxia or shock
  - Dehydration (skin turgor, sunken eyes)
  - Distended abdomen
  - Scars of recent surgery or dressings covering a wound that has not been inspected
  - Blood stained clothes.
13.6 PREOPERATIVE ASSESSMENT AND INVESTIGATIONS

• Before starting any case, ask yourself: “Have I missed anything out?”

• Ask: “Will the investigation be useful?”

• Talk to your surgical colleague to make sure you each know what the other will do.

• However strong the indications may seem for using a particular technique, the best anaesthetic technique, especially in an emergency, will normally be one with which you are experienced and confident.
13.7 ANAESTHETIC ISSUES IN THE EMERGENCY SITUATION

• Choose a suitable anaesthetic technique that fits in with the patient’s condition, the needs of the surgeon and your own experience and skill.

• Most cases in district hospitals are full-stomach emergencies, so general anaesthesia will normally require protection of the lungs with a tracheal tube.
13.7 ANAESTHETIC ISSUES IN THE EMERGENCY SITUATION

- It is a dangerous mistake to think that conduction anaesthesia is always safe.
- Never start a case if you are alone with the patient in the operating room.
- If in doubt about the regurgitation risk, apply **cricoid pressure** – it costs nothing and may save a life.
13.7 ANAESTHETIC ISSUES IN THE EMERGENCY SITUATION

Figure 13.12
13.7 ANAESTHETIC ISSUES IN THE EMERGENCY SITUATION

- Where facilities for anaesthesia are limited, ventilators often do not have alarms to warn about disconnection and trained, experienced anaesthetists are not available.

- Emergency surgery under general anaesthesia in these conditions is safer when performed with the patient breathing spontaneously.

- Use a rigid sucker for emergencies.
13.8 IMPORTANT MEDICAL CONDITIONS FOR THE ANAESTHETIST

- Pre-existing medical problems can have a profound influence on the course of anaesthesia and surgery.
- If the patient’s condition requires urgent surgery, use your skills to minimize the harmful effects of pre-existing conditions.
13.8 IMPORTANT MEDICAL CONDITIONS FOR THE ANAESTHETIST

• There is no absolute haemoglobin concentration below which a patient is “unfit for anaesthesia”.

• Look for medical complications in the diabetic patient.

• Low blood sugar is the main intra-operative risk from diabetes. Monitor blood sugar levels and treat, as necessary.
Practical anaesthesia

Key Points
14.1 GENERAL ANAESTHESIA

• Have a clear plan before starting anaesthesia

• Never use an unfamiliar anaesthetic technique in an emergency

• Always check your equipment

• Make sure you have an assistant before starting

• Ensure that you have the correct patient for the correct surgery on the correct side.
14.1 GENERAL ANAESTHESIA

- Always begin your anaesthetic with the patient lying on a table that can be rapidly tilted into a head down position in case of sudden hypotension or vomiting.

- Your choice of an anaesthetic technique, especially in an emergency, should be the one with which you are most experienced and confident.
14.1 GENERAL ANAESTHESIA

- General anaesthesia with intubation and controlled ventilation is effectively a universal technique.

- Although relatively time-consuming for short cases, there is almost no procedure for which it is unsuitable.

- Oxygen cylinders must be checked to see that they are full and connections fit the breathing system.
14.1 GENERAL ANAESTHESIA contd.

• Cricoid oesophageal compression should always be applied until the endotracheal tube is inflated

• Where there is no designated recovery room, make sure that the patient is awake, breathing and stable before leaving the operating room
14.1 GENERAL ANAESTHESIA
14.1 GENERAL ANAESTHESIA

- If you plan to intubate:
  - always have a backup plan in case of failure
  - do not persist with multiple attempts just to prove that you can do it
  - do not make your ability to intubate more important than the patient's life

- Give extra oxygen before and after the end of the anaesthetic.

- Continue to monitor the patient just as carefully after you have turned the anaesthetic off until the patient is fully awake

- A blocked tracheal tube = a dead patient
14.1 GENERAL ANAESTHESIA

Vomiting and regurgitation

- Seeing stomach contents in the unprotected airway of an unconscious patient is probably the worst thing that can happen in the practice of anaesthesia.

- Do not let this happen to you.
14.2 ANAESTHESIA DURING PREGNANCY AND FOR OPERATIVE DELIVERY

- If using general anaesthesia in an eclamptic patient, there may be a huge rise in blood pressure at intubation.
- Prevent this with a bolus of 2–3 G magnesium sulfate before intubation.
- If the mother and child are both critically ill, it is your clear duty to attend to the mother first.
14.2 ANAESTHESIA DURING PREGNANCY AND FOR OPERATIVE DELIVERY

- Place a pillow under one hip to tilt the uterus to avoid supine hypotension.
- Don’t be so concerned about the baby that you fail to give the mother a sufficient dose of anaesthetic.
- At the end of anaesthesia:
  - remember that the mother has a full stomach,
  - remove the endotracheal tube with her in the lateral position.
14.3 PEDIATRIC ANAESTHESIA

- For children under 15 kg, differences in anatomy and physiology mean you will have to significantly modify your anaesthetic technique.
- Pay special attention to fluid and heat losses in children.

![Diagram showing comparison between adult and child mucosa and lumen with labels for normal and oedema conditions.](image-url)
14.3 PEDIATRIC ANAESTHESIA

- As a rough guide for normally nourished children more than about 2 years old, use the following formula to calculate the internal diameter of the tube likely to be of the correct size:

\[
\text{Internal diameter of tube (mm)} = \frac{(\text{age in years} + 4.5)}{4}
\]
Rough indicators of the correct size of tube are:

- Diameter the same as the child’s little finger
- Most neonates will need a tube of 3 mm internal diameter
- For premature infants, a 2.5 mm tube may be necessary
- To estimate the length of tube needed, double the distance from the corner of the child’s mouth to the ear canal
- To check, look at the child’s head from the side while holding the upper end of the tube level with the mouth to give you an idea of how far into the chest the tube will go.
14.3 PEDIATRIC ANAESTHESIA

- Do not attempt to put up an intravenous infusion while the child is awake as this will cause deterioration especially in children with laryngo-tracheitis

- Do not send a child in respiratory distress to X-ray department, urgent management is needed
14.3 PEDIATRIC ANAESTHESIA

Paediatric Elective Anaesthesia

- Continuous monitoring of heart rate and respiration is essential in small children.
- A precordial or oesophageal stethoscope is invaluable for this.
Paediatric Emergency Anaesthesia

- Do not attempt to put up an intravenous infusion while the child is awake as this will cause deterioration especially in children with laryngotracheitis

- Do not send a child in respiratory distress to the X-ray department. Urgent management is needed.

- Ensure that the nurses understand the need to prevent the tube becoming blocked with dried secretions
14.4 CONDUCTION ANAESTHESIA

- All local anaesthetic drugs:
  - Are potentially toxic
  - May depress the central nervous system
  - May cause drowsiness, which may progress to unconsciousness with twitching and possibly convulsions
  - May cause hypotension related either to extensive sympathetic blockade, (e.g. after “high” spinal anaesthesia) or to direct depression of cardiac function from high blood levels of the drug.
Toxicity And Safety Of Local Anaesthetic Drugs

• Local anaesthetic drugs can be toxic – you must know the maximum safe dose

• If a severe toxic reaction occurs, prompt resuscitation is needed

• Avoid toxicity by using the most dilute solution that will do the job, e.g.
  - 1% lidocaine or 0.25% bupivacaine for most nerve blocks
  - 0.5% lidocaine or pilocaine for simple infiltration.
Toxicity And Safety Of Local Anaesthetic Drugs

- The rate of absorption of the drug can also be reduced by injecting it together with a vasoconstrictor drug, such as:
  - epinephrine, which is most often used in a dilution of 5 mg/ml (1:200 000); for infiltration, 2.5 mg/ml (1:400 000) is enough.

- Pre-mixed ampoules of local anaesthetic and epinephrine are often available but, if they are not, you can easily mix your own.

- To make a 1:200000 dilution of epinephrine (adrenaline):
  - add 0.1 ml of 1:1000 epinephrine to 20 ml of local anaesthetic solution.
Sedation during conduction anaesthesia

• Never give sedation to cover an inadequate nerve block

• Do not let sedation drift into unconsciousness with an uncontrolled airway. A sedated patient should still be able to talk to you
14.4 CONDUCTION ANAESTHESIA

SPINAL ANAESTHESIA

• Check all equipment and drugs as for general anaesthesia

• In a pregnant women at term, the block very easily goes high

• Always give oxygen to the mother during caesarean section

• Act immediately to treat the unresponsive patient, whether the cause is hypotension or high spinal

• A death or complication after spinal is usually due to neglect of vital signs
14.4 CONDUCTION ANAESTHESIA

SPINAL ANAESTHESIA

- Avoid spinal anaesthesia in:
  - patients in shock who are not fully resuscitated
  - infection at the site of the spinal needle placement
  - frank coagulopathy
  - patient refusal
  - convulsion, raised intracranial pressure due to brain tumour

- Use a thin 25 gauge spinal needle
14.5 SPECIMIN ANAESTHETIC TECHNIQUES

Ketamine Anaesthesia

- Ketamine is a full general anaesthetic; do not neglect routine precautions

- Contraindications to Ketamine: patients with
  - elevated blood pressure,
  - pre-eclampsia,
  - eclampsia,
  - heart disease
  - raised intracranial pressure
14.5 SPECIMIN ANAESTHETIC TECHNIQUES

General Anaesthesia With Intubation

- General anaesthesia with intubation and controlled ventilation is effectively a universal technique, although relatively time consuming for short cases, there is almost no procedure for which it is unsuitable.
14.6 MONITORING THE ANAESTHETIZED PATIENT

- The most important monitors are the eyes, ears, hands and brain of the anaesthetist
- Keep your attention focused on the patient first, then on the monitoring devices.
- Handle patients gently at all times, whether awake or unconscious
- It is fundamental rule in anaesthesia, that you must never leave your patient unattended

- It is the duty of the trained health staff to:
  - monitor vital functions and ensure patient safety during the critical period of unconscious due to injury, illness, influence of general anaesthetic drugs
14.6 MONITORING THE ANAESTHETIZED PATIENT

- Monitoring means *looking* at the patient.

- It is usually more important to look at the patient than the equipment but the alert anaesthetist pays constant attention to both.

- Observe the general operating room surroundings.

- Operating room chatter means not thinking about the patient.

- Observe the patient immediately before anaesthesia.

- If you cannot see the chest or abdomen, rearrange the drapes so that you can.
14.6 MONITORING THE ANAESTHETIZED PATIENT

• The commonest way to give a fatal overdose of anaesthetic is by mechanical ventilation (IPPV).

• No matter what ventilator you have, when connecting it to the patient for the first time, check that the inspiratory/expiration phases of the ventilator correspond to the rise and fall of the chest and abdomen.

• Never allow yourself to be denied access to monitoring of respiration, pulse and blood pressure.
14.6 MONITORING THE ANAESTHETIZED PATIENT

- Monitor your patient very closely immediately after giving a spinal anaesthetic. One of the best ways to monitor such a patient is to talk to them throughout anaesthesia.

- If a patient seems to be too ‘light’, check the ventilation first: the signs may be due to hypercarbia.

- If the pulse oximeter will not give a reading, it usually means that something is wrong with the circulation.
The three events that probably contribute most to mortality in the postoperative period are:

- Non-running drip
- Postoperative hypotension
- Respiratory failure.

If the patient is restless, something is wrong
14.7 POSTOPERATIVE MANAGEMENT PAIN MANAGEMENT AND TECHNIQUES

- Effective analgesia is an essential part of postoperative management.

- Opiate analgesics should be given cautiously if the age is less than 1 year. They are not recommended for babies aged less than 3 months unless very close monitoring in a neonatal intensive care unit is available.

- When using halothane as the sole anaesthetic in a fit patient, give an opiate analgesic with the induction agent.

- Prescribe regular analgesia. In practice, “On demand” often means “Not given”.
14.7 POSTOPERATIVE MANAGEMENT

Care of the infusion site

- Postoperative infusions are life saving.
- Loss of the drip and failure to correct hypotension is the commonest cause of death during the first postoperative night after major surgery.
14.7 POSTOPERATIVE MANAGEMENT

Postoperative ventilation

- Mechanical ventilation (IPPV) may be a planned part of postoperative management for a major operation or decided on at the end of surgery because circumstances demand it.

- IPPV should be continued postoperatively under the following circumstances:
  - Respiratory depression or oxygen saturation <80%
  - Deteriorating general condition
  - Severely distended abdomen
  - Severe chest trauma
  - Head injury or after intracranial surgery.
14.7 POSTOPERATIVE MANAGEMENT
Postoperative ventilation

- Avoid giving long acting muscle relaxants to facilitate IPPV.

- If the patient is “fighting” the ventilator, ask why?
  - Is he/she hypercarbic?
  - In pain?
  - Hypertensive?

- Treat these needs first before giving a relaxant.
Anaesthetic infrastructure and supplies

Key Points
15.1 EQUIPMENT AND SUPPLIES FOR DIFFERENT LEVEL HOSPITALS

• However well trained you are as an anaesthetist, your ability to provide safe anaesthesia is completely dependent on
  – the availability of the drugs,
  – oxygen supply and
  – equipment in your hospital.

• Drugs and oxygen must be correctly ordered and stored and equipment kept in safe working order by:
  – regular cleaning,
  – maintenance and
  – checks.

• Hospitals that do not follow these basic requirements will soon fail to provide safe anaesthesia.
15.1 EQUIPMENT AND SUPPLIES FOR DIFFERENT LEVEL HOSPITALS

1. Different levels of hospital require different personnel, equipment and drugs

2. Drugs must be correctly ordered and stored

3. A check list of essential emergency equipment for resuscitation should be in place

4. Ensure inventory of equipment and supplies

5. Best practice guidelines for emergency care should be in place

6. Hospitals with an intensive care unit may need additional equipment and supplies
15.1 EQUIPMENT AND SUPPLIES FOR DIFFERENT LEVEL HOSPITALS

The Intensive Care Unit (ICU)

- At the simplest level, the ICU is a ward that has a better standard of nursing and is better equipped than a general ward.

- While both medical and surgical cases will be admitted there, the ICU is particularly important for the postoperative care of major or complicated surgical cases and is usually located near the operating room.
15.1 EQUIPMENT AND SUPPLIES FOR DIFFERENT LEVEL HOSPITALS

Equipment for the ICU

- The ICU does not necessarily need to have ventilators or other expensive machines.

- An ICU might be a ward where:
  - Oxygen is available
  - Drips are kept running overnight

- At least hourly measurements and observations are made of:
  - Blood pressure
  - Pulse rate
  - Urine output
  - Oxygenation
  - Conscious level
  - Other general observations of the patient.
Equipment for the ICU contd.

• The pulse oximeter
  – The pulse oximeter is the most widely used physiological monitoring device.
  – It is especially useful in clinical anaesthesia and in the ICU and is simple to use.
  – The pulse oximeter should be the minimum standard of monitoring in every operating room where regular major surgery is carried out.
15.2 ANAESTHESIA AND OXYGEN

- A reliable oxygen supply is essential for anaesthesia and for any seriously ill patients.
- In many places, oxygen concentrators are the most suitable and economical way of providing oxygen, with a few backup cylinders in case of electricity failure.
- Whatever your source of oxygen, you need an effective system for maintenance and spares.
- Clinical staff need to be trained how to use oxygen safely, effectively and economically.
15.2 ANAESTHESIA AND OXYGEN

• Getting oxygen to patients requires more than simply having oxygen cylinders available

• You must have in place an entire functioning system, comprising of not only the apparatus for oxygen delivery, but also people who have been trained to:
  – operate it
  – system for maintenance and repair and supply of spare parts
15.2 ANAESTHESIA AND OXYGEN

• The ideal oxygen supply system is one based primarily on concentrators, but with a back-up supply from cylinders.

• Using oxygen from cylinders without a regulator is extremely dangerous.

• Oxygen cylinders are dangerous objects. If they fall over, they may injure or even kill.
15.2 ANAESTHESIA AND OXYGEN

Oxygen Cylinders

- A complete system for using oxygen in cylinders requires:
  - Reliable source
  - Transport to get to oxygen cylinders to the hospital
  - Procedures to ensure the hospital orders the appropriate amount of oxygen
  - Apparatus to deliver form cylinder to the patient
  - Clinical training to give the correct amount of oxygen, in the correct manner, to the patients who need it
  - Technical training to inspect, maintain and repair
  - Adequate budget to ensure the consistent availability of supply
• If ether is used on a compressed gas machine (Boyle’s machine), the gases are always explosive.

• To minimize the risk of explosion, never allow the simultaneous use of diathermy on a patient anaesthetized with ether. If one of these techniques must be used for the benefit of the patient, the other must not be allowed.

• No potential cause of combustion or source of sparking should be allowed within 30 cm of any expiratory valve through which a potentially flammable or explosive mixture is escaping.
15.4 CARE AND MAINTENANCE OF EQUIPMENT

• The important principles of care and maintenance are:
  
  – The anaesthetist working alone in a small hospital must understand and take responsibility for the upkeep of apparatus as well as for the care of patients
  
  – All equipment requires regular inspection, maintenance and repair to prevent it from rapidly deteriorating and becoming dangerous
15.4 CARE AND MAINTENANCE OF EQUIPMENT contd.

- Make a detailed list or inventory of the equipment you have to enable you to identify any extra items needed.

- List:
  - basic equipment,
  - spare parts, batteries and other consumables that will be needed and find out in advance how you can obtain them.

- Try to estimate when new parts will be required and order spares well in advance, before the machine breaks down and leaves you in difficulty.
15.4 CARE AND MAINTENANCE OF EQUIPMENT contd.

- Ensure that all types of apparatus are kept in a clean and dust-free environment, away from extremes of temperature and covered when not in use.

- Ensure that vaporizers are drained of anaesthetic if they are unlikely to be used for a week or more.

- Put a cork or spigot in the end of any gas port or tubing during storage to prevent the entry of insects.
Acute trauma management

Key Points
16.1 TRAUMA IN PERSPECTIVE

- Correct management within the first few hours after the injury is vital.

- Your hospital should have a trauma system, to ensure that life-threatening conditions can be quickly identified and treated.

- Hospital staff should be trained in acute trauma care, which requires effective teamwork.

- Trauma prevention is the most important aspect of trauma care management.
16.1 TRAUMA IN PERSPECTIVE contd.

- Medical and nursing teams are in a unique position to educate patients and health workers about effective ways of preventing injury.

- The prevention of trauma is far the least expensive and most effective way of reducing the injuries and deaths caused by trauma.

- However long since the injury, trauma care must start immediately the patient arrives.

- If you do this, you can save lives and prevent complications and disability.
16.1 TRAUMA IN PERSPECTIVE

TRAUMA CARE SYSTEMS AND TRAINING

- Preventive strategies include:
  - Improvements in road safety
  - Better driver training
  - Pedestrian and cyclist awareness
  - Wearing of seat belts in cars or helmets for motorcyclists
  - Preventing drivers from drinking alcohol
  - Limiting civil and urban unrest.
16.2 PRINCIPLES OF PRIMARY TRAUMA CARE MANAGEMENT

Aims In Managing The Injured Patient

1. Examine, diagnose and treat life-threatening complications of trauma as soon as the patient arrives in the hospital.

2. Use the simplest treatment possible to stabilize the patient’s condition.

3. Perform a complete, thorough examination of the patient to ensure that no other injuries are missed.

4. Constantly reassess the patient for response to treatment; if the patient’s condition deteriorates, reassess the patient.

5. Start definitive treatment only after the patient is stable.

6. When definitive treatment is not available locally, have a plan for the safe transfer of the patient to another centre.
16.3 SIX PHASES OF PRIMARY TRAUMA CARE MANAGEMENT

TRIAGE

- Triage
- Primary survey
- Resuscitation
- Secondary survey
- Stabilization
  - Transfer
- Definitive care

Figure 16.1
16.3 SIX PHASES OF PRIMARY TRAUMA CARE MANAGEMENT

- The successful management of severe trauma is dependent on the following six steps.

1. Triage
2. Primary survey
3. Secondary survey
4. Stabilization
5. Transfer
6. Definitive care.
16.3 SIX PHASES OF PRIMARY TRAUMA CARE MANAGEMENT

The importance of ABCDE

• ABCDE is a simple way of remembering the essentials of the primary survey.

• Immediately treat any life-threatening problems, such as bleeding, pneumothorax or obstructed airway, that you find during the ABCDE primary survey.

• Less urgent problems, such as an arm fracture, must wait until the patient is stable; they will be picked up in the secondary survey and should be treated appropriately in the definitive care phase.
16.4 PROCEDURES

INSERTION OF CHEST DRAIN AND UNDERWATER SEAL DRAINAGE

Figure 16.2
Figure 16.3
Figure 16.4
Figure 16.5
Figure 16.6
Figure 16.7
Figure 16.8
Figure 16.9
16.4 PROCEDURES

Tracheostomy

Figure 16.11

Figure 16.12

Figure 16.13

Figure 16.14

Figure 16.15
16.4 PROCEDURES
Tracheostomy
16.4 PROCEDURES

Aftercare

- Aspirate secretions from the tracheobronchial tree regularly, using a sterile catheter passed down through the tracheostomy tube.

- Avoid irritating the bronchi, which could stimulate coughing.

- The air around the patient should be kept warm and humid by means of a humidifier. When necessary, instil small amounts of sterile physiological saline into the bronchi to soften the mucus.

- Change the inner tracheostomy tube at regular intervals. If the outer tube becomes dislodged, reinsert it immediately and check its position both by clinical examination and chest radiography.

- Always have a spare tube available.

- Refer the patient for further treatment, if necessary.
16.4 PROCEDURES
Complications

- Complications include:
  - Early postoperative bleeding
  - Infection
  - Surgical emphysema
  - Atelectasis
  - Crust formation
  - Stenosis of the trachea is a possible late complication.
Orthopaedic Techniques

Key Points
17.1 TRACTION

- Use an appropriate method of traction to treat fractures of the extremities and cervical spine

- Apply extremity traction to the skin or to the skeleton using a pin inserted through the bone distal to the fracture

- Apply traction to the cervical spine using a head halter chin sling or skull tongs
• The weight applied through the traction system counteracts the muscle force pulling across the fracture, keeping the bone in proper alignment and length.

• Do not apply traction to skin with:
  – abrasions,
  – lacerations,
  – surgical wounds,
  – ulcers,
  – loss of sensation or
  – peripheral vascular disease.
17.1 TRACTION

Skin traction
17.1 TRACTION
Skeletal Traction
17.1 TRACTION

Sites of pin placement

Figure 17.9

Figure 17.10
17.1 TRACTION

Skull Traction
17.1 TRACTION

EXTREMITY TRACTION

Figure 17.15

Figure 17.16

Figure 17.17

Figure 17.18

Figure 17.19

Figure 17.20
17.2 CASTS AND SPLINTS

Plaster of Paris bandage

Figure 17.21
17.2 CASTS AND SPLINTS

- Casts and splints provide immobilization of the extremities or spine following injuries, or in cases of other abnormalities of bone or soft tissues.
- Use plaster or fibre glass to construct casts and splints.
- If necessary, wood and cardboard will serve as temporary splints.
- Casts are wrapped circumferentially around the extremity, providing more rigid fixation than splints.
- Use a splint for acute injuries to allow room for swelling.
17.2 CASTS AND SPLINTS

Figure 17.22

Figure 17.23

Figure 17.24

Figure 17.25
17.2 CASTS AND SPLINTS

SPLINT APPLICATION

Figure 17.26

Figure 17.27
Patient instructions

• Give oral and written instructions to the patient and/or to accompanying relatives or other attendants.

• Give the instructions in non-technical language that the patient can understand.
17.2 CASTS AND SPLINTS

Caring for a cast or splint

- Keep the cast or splint dry at all times
- Do not try to scratch your skin under the cast or splint with a sharp or blunt object
- Allow the cast to dry for 24 hours before putting weight on it or resting it on a hard surface
- For acute injuries, elevate the injured part for 24–48 hours and wiggle your fingers or toes frequently
- Return to the health clinic immediately if:
  - Your cast or splint gets wet or becomes soft or broken
  - You have increasing pain
  - You experience numbness or tingling, or have difficulty moving your fingers or toes
  - You see a change in skin colour of the extremity
  - Your cast or splint has a foul odour.
17.2 CASTS AND SPLINTS

Removing a cast
17.2 CASTS AND SPLINTS

Typical casts and splints

- Figure 17.39
- Figure 17.34
- Figure 17.36
- Figure 17.37
- Figure 17.38
- Figure 17.39
- Figure 17.40
17.3 APPLICATION OF EXTERNAL FIXATION

- External fixation is a technique for immobilizing fractures by placing pins into the bone above and below the fracture and connecting the pins to an external device.

- The fracture position is adjusted by making changes to the external components in an outpatient setting.

- Wounds are accessible for dressing changes, debridement and secondary closure or skin grafting.
17.3 APPLICATION OF EXTERNAL FIXATION

Materials

• Arrange the fixation frame to best accommodate the fracture pattern and the stability needed

• Partially threaded pins, 3–6 mm diameter, work best but smooth pins will work if threaded ones are not available.
17.3 APPLICATION OF EXTERNAL FIXATION

Half pins are threaded on the end

Transfixation pins are threaded in the middle
17.4 DIAGNOSTIC IMAGING

- Diagnostic imaging refers to a variety of graphic techniques:
  - routine X-ray images,
  - ultrasound,
  - nuclear bone scans,
  - MRI scans,
  - CT scans

- X-ray is the most common imaging technique available at the district hospital

- X-ray images are a useful additional aid for diagnosis and treatment, but practitioners must be able to provide care without them

- The most useful and common X-ray examinations include the chest, spine, pelvis and the extremities.
17.4 DIAGNOSTIC IMAGING

- Skull radiographs are often of limited value as they neither exclude nor confirm possible life threatening intracranial damage.
- In patients with acute abdominal disorders, including trauma injuries, ultrasound examination is the first method of choice, where available.
- When performed by well-trained operators, the sensitivity of ultrasound for detecting intraperitoneal bleeding is about 90% and the specificity is close to 100%.
• Physical therapy keeps the musculoskeletal system functional while the injured bone, muscle or ligament heals.

• Restoring movement early in the healing process helps to prevent venous thrombosis and pressure sores and enhances pulmonary function.
17.6 CRANIAL BURR HOLES

- Traumatic bleeding within the epidural and subdural spaces increases intracranial pressure and causes neurological impairment.

- Clinical features of extremely increased pressure include:
  - decreased consciousness,
  - slow pulse rate,
  - dilated pupils,
  - seizures and
  - hemiparesis

- Release of the pressure with cranial burr holes is an emergency and life-saving procedure.
17.6 CRANIAL BURR HOLES contd.

- Acute extradural and acute subdural haematomas are the only two conditions that may benefit from burr holes.

- A history of trauma and a clear clinical diagnosis are essential before undertaking the procedure.
17.6 CRANIAL BURR HOLES

Acute Extradural Haematoma

- The signs classically consist of:
  - Loss of consciousness following an lucid interval, with rapid deterioration
  - Middle meningeal artery bleeding with rapid raising of intracranial pressure
  - Development of hemiparesis on the opposite side with a dilating pupil on the same side as the impact area, with rapid deterioration.
17.6 CRANIAL BURR HOLES

Acute Subdural Haematoma

- Acute subdural haematoma, with clotted blood in the subdural space accompanied by severe contusion of the underlying brain, occurs from the tearing of bridging vein between the cortex and the dura.

- Management is surgical and every effort should be made to do burr-hole decompressions. The diagnosis can be made on history and examination.

- Creating burr holes through the skull to drain the haematoma is often an emergency and life-saving procedure.
17.6 CRANIAL BURR HOLES

Technique
Orthopaedic Trauma

Key Points
18.1 UPPER EXTREMITY INJURIES

Clavicle Fractures

- Diagnose fractures from the history and by physical examination
- Treat with a sling and early range of motion
- Fracture healing takes 4 weeks in children and 6–8 weeks in adults.
18.1 UPPER EXTREMITY INJURIES

CLAVICLE FRACTURES

Figure 18.1

Figure 18.2
18.1  UPPER EXTREMITY INJURIES

Figure 18.3
18.1 UPPER EXTREMITY INJURIES

Acromial-clavicular joint Separation

- Separation of the acromial-clavicular joint results from falls on the tip of the shoulder.
- Cases are classified by the amount of upward displacement of the clavicle (Figure 18.4).
18.1 UPPER EXTREMITY INJURIES

Acromial-clavicular joint Separation

- Make the diagnosis based on the history and a physical examination
- Treat with an arm sling
- When comfortable, begin a range of motion and active muscle strengthening in the shoulder.
18.1 UPPER EXTREMITY INJURIES

Shoulder Dislocation

Evaluation

Figure 18.5

Figure 18.6
18.1 UPPER EXTREMITY INJURIES

Shoulder Dislocation

• Make the diagnosis by physical examination

• Treat with closed manipulation

• X-rays help to evaluate the reduction and the presence of fractures

• Recurrent dislocations are common, especially in younger patients.
18.1 UPPER EXTREMITY INJURIES

Shoulder Dislocation
Treatment

Figure 18.7
Figure 18.8
Figure 18.9
18.1 UPPER EXTREMITY INJURIES

Proximal Humerus Fractures

Figure 18.10

Figure 18.11
18.1 UPPER EXTREMITY INJURIES

Proximal Humerus Fractures

- The anatomical location of the fracture defines the treatment
- X-rays are needed to evaluate the injury
- Treat displaced fractures with closed manipulation
- The major complication is shoulder stiffness.
18.1 UPPER EXTREMITY INJURIES

Humeral Shaft fractures

- Humeral shaft fractures result from direct trauma or rotation of the arm.
- Treat by closed means in a coaptation splint.
- The most significant complications are radial nerve injury and non-union.
18.1 UPPER EXTREMITY INJURIES

Humeral Shaft fractures

Treatment
18.1 UPPER EXTREMITY INJURIES

- Supracondylar fractures of the humerus are complex, unstable fractures

- Treat with closed reduction, followed by a cast or traction

- In cases of incomplete reduction in adults, consider open treatment

- Injury to nerves and arteries leads to significant complications.
SUPRACONDYLAR FRACTURES OF THE HUMERUS

Fracture patterns include:

- Supracondylar
- Intercondylar (Figure 18.16)
- Fractures of the medial and lateral epicondyles
- Isolated fractures of the capitellum and trochlea.
18.1 UPPER EXTREMITY INJURIES

Supracondylar Fractures Of The Humerus
Treatment
18.1 UPPER EXTREMITY INJURIES

Olecranon Fractures

Treatment

Suture of the torn triceps tendon

Placement of percutaneous pins with rubber bands
18.1 UPPER EXTREMITY INJURIES

Olecranon Fractures

Treatment

• Make the diagnosis by clinical examination and confirm by X-ray

• Treat non-displaced fractures with a long arm splint at 90 degrees

• Splint displaced fractures with the elbow extended or consider surgical stabilization.
18.1 UPPER EXTREMITY INJURIES

Olecranon Fractures

- Olecranon fractures result from a fall on the tip of the elbow.
- The triceps muscle pulls the fracture fragments apart (Figure 18.19).
18.1 UPPER EXTREMITY INJURIES

Fractures Of The Radial Head And Neck

•Fractures are classified by the articular involvement
18.1 UPPER EXTREMITY INJURIES

Fractures Of The Radial Head And Neck

**Treatment**

- In fractures with minimal displacement, treat with closed reduction and a posterior splint and begin motion as soon as comfortable.

- Treat displaced intra-articular fractures with early motion and consider surgical treatment, if available.
18.1  UPPER EXTREMITY INJURIES

Elbow Dislocation

• Injury occurs with a fall on the outstretched arm
• Treat with immediate closed reduction
• In children, the medial epicondyle may become entrapped in the joint and may require surgical removal.
18.1 UPPER EXTREMITY INJURIES

Elbow Dislocation

- Dislocations of the elbow occur with a fall on the outstretched arm.
- They may be in the posterior or posterior lateral direction (Figure 18.24).
Forearm Fractures

- Forearm fractures are complex fractures which, in adults, usually require surgical stabilization.
- They occur as three major types:
  - Midshaft fractures
  - Proximal (Monteggia) dislocations
  - Distal (Galeazzi) fracture dislocations
- The most common complication is loss of forearm rotation.
18.1 UPPER EXTREMITY INJURIES

Forearm Fractures
Evaluation

Figure 18.25

Figure 18.26
18.1 UPPER EXTREMITY INJURIES

Forearm Fractures
Treatment

Figure 18.27
18.1 UPPER EXTREMITY INJURIES

Distal Radius Fractures

- The distal radius is one of the most common upper extremity fractures
- Treatment is usually by closed reduction and application of a U-shaped splint coaptation
- The adequacy of the reduction can be judged by specific parameters visible on the post reduction X-ray
- The most common complication is malposition and loss of motion.
Distal Radius Fractures

- Fractures of the distal radius occur with a fall on the outstretched hand.
- The direction of the deformity depends on the position of the wrist at the time of impact (Figure 18.28).
18.1 UPPER EXTREMITY INJURIES

Distal Radius Fractures

- The goal of fracture treatment is to restore the normal anatomy of the following deformities:
  - Shortening of the radius relative to the ulna (Figure 18.29)
  - Loss of the volar tilt of the radial articular surface, seen in the lateral X-ray (Figure 18.30)
  - Disruption of the articular surface.
18.1 UPPER EXTREMITY INJURIES

Distal Radius Fractures

Treatment

Figure 18.31

Figure 18.32
18.1 UPPER EXTREMITY INJURIES

Carpal Fractures And Fracture Dislocations

- The injury results from a fall on the outstretched hand in hyperextension
- Diagnosis is difficult and is often overlooked
- Adequate X-rays are necessary for accurate diagnosis
- Closed reduction is the initial treatment, but surgical stabilization may be necessary.
18.1 UPPER EXTREMITY INJURIES

Carpal Fractures And Fracture Dislocations

Figure 18.33

Figure 18.34
18.2 THE HAND

Lacerations

- Treat lacerations promptly with
  - careful evaluation,
  - debridement and
  - lavage

- Close wounds only when clean, using suture, spontaneous healing or skin grafts

- After injury, elevate the hand to control swelling and begin motion early

- Nail bed injuries require special treatment.
18.2 THE HAND

Lacerations

Treatment
18.2 THE HAND

FRACTURES AND DISLOCATIONS

Fracture dislocation of the first carpometacarpal joint (Bennett’s fracture)
18.2 THE HAND
FRACTURES AND DISLOCATIONS

Figure 18.40

Figure 18.41

Phalanges
Mallet finger
Pelvic ring fractures

- Pelvic ring fractures result from high-energy trauma and are classified as:
  - stable or
  - unstable

- Unstable fractures are associated with significant blood loss and multiple system injury

- Treat initially with systemic resuscitation and temporary pelvic compression

- Complications include:
  - deep vein thrombosis,
  - sciatic nerve injury and
  - death from bleeding or
  - internal organ damage.
18.3 FRACTURES OF THE PELVIS AND HIP

Pelvic ring fractures

Figure 18.42

Figure 18.43
Pelvic ring fractures

Treatment
Unstable Fractures
Acetabular fractures

- Acetabular fractures result from high-energy pelvic injuries

- Treatment aims to restore the congruence of the femoral head with the acetabulum by traction or by surgery if available

- Complications include
  - deep venous thrombosis,
  - sciatic nerve injury and
  - late degenerative arthritis of the hip

- Do not send patient to another hospital unless you are certain that the complicated surgery is available there
18.3 FRACTURES OF THE PELVIS AND HIP

• Hip fractures are classified as
  - intra-capsular (femoral neck fractures) or
  - extra-capsular (inter-trochanteric and subtrochanteric fractures)

• Treat displaced intra-capsular fractures with
  - internal fixation,
  - prosthetic replacement or
  - early ambulation

• Treat extra-capsular fractures with traction or internal fixation

• Perkin’s traction works well and avoids the immobilization necessary with other techniques.
18.3 FRACTURES OF THE PELVIS AND HIP
Fractures Of The Proximal Femur (Hip Fractures)

Classify fractures by their anatomic location (Figure 18.46):

- Intra-capsular (femoral neck fractures)
- Extra-capsular: intertrochanteric
- Extra-capsular: subtrochanteric.
18.3 FRACTURES OF THE PELVIS AND HIP

Hip Dislocations

- Make the diagnosis from the:
  - history and
  - clinical findings;
  - use X-rays to confirm associated fractures

- To avoid the complications of vascular necrosis and loss of joint motion, reduce the dislocation as soon as possible.

- Closed reduction is usually successful if carried out promptly.
18.3 FRACTURES OF THE PELVIS AND HIP

Hip Dislocations

Figure 18.47

Figure 18.48
18.4 INJURIES OF THE LOWER EXTREMITY

- Femoral shaft fractures result from high-energy trauma and are often associated with other significant injuries.

- Debride and lavage open fractures under sterile conditions as soon as possible.

- Treat in traction and monitor the fracture position with or without X-rays.

- Fracture of the femoral neck is the most common associated skeletal injury and frequently overlooked.
18.4 INJURIES OF THE LOWER EXTREMITY

- **Distal femoral fractures** occur as supracondylar fractures or extend into the knee joint as intercondylar fractures.

- Treat non-displaced fractures in a cast.

- Treat displaced fractures in traction.

- Popliteal artery injuries require immediate surgical correction if the limb is to be saved.
18.4 INJURIES OF THE LOWER EXTREMITY

Distal femoral fractures
18.4 INJURIES OF THE LOWER EXTREMITY

Patella injuries

Figure 18.52
18.4 INJURIES OF THE LOWER EXTREMITY

- **Patella injuries** are caused by direct trauma to the anterior knee.

- Displaced fractures are associated with rupture of the quadriceps tendon complex; they need surgical repair to restore knee extensor function.

- Popliteal artery injuries require immediate surgical correction if the limb is to be saved.
18.4 INJURIES OF THE LOWER EXTREMITY

Tibial plateau fractures

Figure 18.53
18.4 INJURIES OF THE LOWER EXTREMITY

- **Tibial plateau fractures** are intra-articular injuries of the weight-bearing portion of the knee joint.

- Treat non-displaced fractures with a splint or cast.

- Treat displaced or unstable fractures with traction or surgical stabilization.

- Evaluate for injury to the popliteal vessels.
18.4 INJURIES OF THE LOWER EXTREMITY

Tibial shaft Fractures

Figure 18.54
18.4 INJURIES OF THE LOWER EXTREMITY

- Healing response and complication rate are related to the extent of soft tissue injury.
- Open fractures are common and require immediate debridement.
- Closed reduction and cast application is appropriate for most fractures.
- External fixation is useful for fractures associated with open wounds or severe comminution and instability.
- Complications include compartment syndrome, nonunion and infection.
Ankle fractures result from inversion, eversion/external rotation and vertical forces.

The anatomic structures involved include the tibia, fibula and talus and three sets of ligaments.

Isolated fibula fractures are stable.

Most other injuries involve two or more of the above structures and require closed reduction or surgical stabilization.

External fixation may be used in vertical load fractures.
18.4 INJURIES OF THE LOWER EXTREMITY

Ankle fractures

Figure 18.55
Figure 18.56
Figure 18.57
Figure 18.58
18.4 INJURIES OF THE LOWER EXTREMITY

Foot Injury

- Clinical examination suggests this fracture, but X-rays are needed to confirm the diagnosis and to guide treatment.

- Treat with closed reduction and immobilization.

- Fracture dislocations may require open reduction.
18.4 INJURIES OF THE LOWER EXTREMITY

Foot Injury

Figure 18.59
18.4 INJURIES OF THE LOWER EXTREMITY

- Calcaneal fractures occur:
  - either through the body of the calcaneous and into the subtalar joint, or
  - as avulsion fractures of the posterior portion of the tuberosity

- The mechanism of the injury is a vertical load which may also cause vertebral body compression fractures

- Treat with:
  - compression,
  - elevation,
  - splinting and
  - gradual resumption of weight bearing.
18.4 INJURIES OF THE LOWER EXTREMITY

Calcaneal fractures
18.4 INJURIES OF THE LOWER EXTREMITY

Fractures of the metatarsals and toes

Figure 18.62

Figure 18.63
18.4 INJURIES OF THE LOWER EXTREMITY

Fractures of the metatarsals and toes

• The injury results from forced plantar flexion of the forefoot

• Diagnosis is by X-ray showing fractures of the base of the metatarsal bones with subluxation or dislocation of the tarsal-metatarsal joints

• Treat with closed reduction and immobilization. Pin fixation may be necessary to secure the position

• Long-term mid-foot pain is common

• Fractures of the metatarsals and toes are common injuries resulting from minor trauma

• Treat fractures and dislocations in this area by closed reduction and immobilization.
18.5 SPINE INJURIES
18.5 SPINE INJURIES

- Evaluate the spine based on:
  - history of injury,
  - physical examination,
  - complete neurological examination and X-rays

- Spinal column injuries are stable or unstable, based on bone and ligament damage

- Neurological function may be normal, show incomplete injury or complete spinal cord disruption

- Base your treatment on the extent of injury.
18.6 FRACTURES IN CHILDREN

Figure 18.68

Figure 18.69

Figure 18.70

I  II  III  IV  V
18.6 FRACTURES IN CHILDREN

- Open growth plates and the thick periosteal membrane make fractures in children different from those in adults.

- Treat fractures by closed reduction; certain displaced epiphyseal fractures may need surgical reduction.

- Future growth will remodel some residual deformity in length, angulation and displacement but not in rotation.
18.6 FRACTURES IN CHILDREN

Specific Fracture types
18.7 AMPUTATIONS

Figure 18.75

Figure 18.76

Figure 18.77

Figure 18.78
18.7 AMPUTATIONS

- Limb amputation is a definitive procedure, which requires careful preoperative thought and consultation.

- Amputations are performed in emergency situations for severe limb trauma and in elective situations for infection or tumours.

- Amputations in children should, when possible, preserve the growth plates.

- Rehabilitation efforts are focused on the substitution of lost function.
18.8 COMPLICATIONS

Figure 18.79

Figure 18.80

Figure 18.81
18.8 COMPLICATIONS contd.
18.8 COMPLICATIONS

• Compartment syndrome is caused by swelling within closed fascial spaces; as the intra-compartmental pressure increases, blood supply to the muscles is lost.

• Treat with immediate surgical release of the skin and fascia over the involved compartment.
18.9 WAR-RELATED TRAUMA

• The severity of the gunshot wound is related to bullet size, shape and velocity

• Low velocity injuries cause minor wounds and are treated with:
  - superficial debridement,
  - antibiotics and
  - tetanus prophylaxis

• High velocity injuries cause extensive soft tissue and bone damage and are treated with careful debridement and lavage, as are all open fractures; do not close the wound initially

• Treat associated fractures with plaster, traction or external fixation.
18.9 WAR-RELATED TRAUMA

- Injury patterns are related to the type of landmine encountered

- Blast injuries occur from pressure sensitive mines, while trip-wire mines produce injury from multiple flying fragments

- Evaluate the entire patient for injury to multiple systems

- Treat extremity injuries with debridement and skin coverage

- Amputation is often necessary.
19

General Orthopaedics

Key Points
19.1 CONGENITAL AND DEVELOPMENTAL PROBLEMS

- There are four major hip disorders in children; each occurs within a specific age range and may cause severe hip deformity if not treated early.

- They include:
  - Developmental dysplasia of the hip
  - Septic arthritis
  - Avascular necrosis (Legg-Calve-Perthe’s Disease)
  - Slipped capital femoral epiphysis

- Diagnosis is made by clinical examination. X-rays are useful for follow-up care, but are not essential.
19.1 CONGENITAL AND DEVELOPMENTAL PROBLEMS

Hip disorders in Children

congenital dislocation of the hip

Slipping of the femoral epiphysis
19.1 CONGENITAL AND DEVELOPMENTAL PROBLEMS

TALPES EQUINOVARUS (CLUB FOOT)

Figure 19.3  Figure 19.4  Figure 19.5
19.1 CONGENITAL AND DEVELOPMENTAL PROBLEMS

• The heel and forefoot are inverted, with the ankle in plantar flexion; the deformity is not correctable with manipulation

• Begin treatment as early as possible with manipulation and repetitive casts

• Patients presenting after 6–12 months of age will need surgical correction.
Tumours in bone are either primary (originating in the bone) or metastatic (originating elsewhere and spreading to bone).

Differentiating between benign and malignant tumours requires X-rays and, usually, biopsy.

Treatment of malignant bone tumours requires special facilities, including chemotherapy, radiation therapy and surgery.
19.3 INFECTIONS

Septic arthritis
19.3 INFECTIONS

Septic Arthritis

- Joint infections arise from infections elsewhere in the body or from a direct wound into the joint.

- Suspect infection when there is swelling, pain, and loss of joint motion.

- Confirm diagnosis by aspiration of purulent fluid from the joint.

- Treat with needle or open joint drainage and antibiotics.
19.3 INFECTIONS

Pyogenic osteomyelitis

- Bone infections come from haematogenous spread from a distant site, from penetrating wounds and after surgery.

- Acute infections are treated with antibiotics; once an abscess forms, surgical drainage is necessary.

- Chronic osteomyelitis is the most common type; a draining sinus and sequestrum (dead bone fragment) are usually present.

- Removing the sequestrum is necessary to control the infection, but it should not be performed until the involucrum (new reactive bone) has fully formed.
19.3 INFECTIONS
Pyogenic osteomyelitis
19.4 DEGENERATIVE CONDITIONS

• Arthritis is an abnormality of joints arising from overuse or injury (degenerative arthritis) or inflammation (rheumatoid arthritis)

• Diagnosis is made from the history, physical examination and distinctive X-ray changes

• Non-surgical treatment consists of anti-inflammatory medication, injections, muscle strengthening and rest.
19.4 DEGENERATIVE CONDITIONS

- Bursitis and tendinitis result from an inflammatory response to overuse.
- Common locations for bursitis are the shoulder, elbow, hip, and knee.
19.4 DEGENERATIVE CONDITIONS

- Tendinitis is most common at the lateral elbow, radial side of the wrist, knee, Achilles tendon at the ankle, plantar surface of the foot.

- Treat with rest and anti-inflammatory medication.

- Corticosteroid injections into bursa are helpful, but they should not be used around large tendons.
19.4 DEGENERATIVE CONDITIONS

Tendinitis