LECTURE NOTES

For Health Officers

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e.g.
- Hemorrhage
  - Loss of plasma due to burns
  - Loss of water and electrolytes in diarrhea
  - Third space loss (Internal fluid shift into inflammatory exudates in the peritoneum, such as in pancreatitis.)

Cardiogenic shock is present when there is severe reduction in oxygen delivery secondary to impaired cardiac function. Usually it is due to myocardial infarction or pericardial tamponade.

Septic Shock (vasogenic shock) develops as a result of the systemic effect of infection. It is the result of a septicemia with endotoxin and exotoxin release by gram-negative and gram-positive bacteria. Despite normal or increased cardiac output and oxygen delivery, cellular oxygen consumption is less than normal due to impaired extraction as a result of impaired metabolism.

Neurogenic shock

Summary: Clinical features of hypovolemic shock in adults with estimated volume loss.

Estimated blood loss	**750-1500ml**	**1500ml-2000ml**	**>2000 ml**
Blood pressure	Normal	Reduced	Severely Reduced
Pulse rate	>100/min	>120/m	>140/m very feeble
Capillary refill	Slow	Slow	Undetectable
Respiratory rate	20-30/m	30-40/m	>35/m
Urinary flow rate (Normal: 30-60 ml/hr or 0.5-1ml/kg/hr)	20-30/hr	10-20/hr	0-10/hr
Mental state(CNS)	Anxious	confused	Lethargic, comatose

MANAGEMENT OF SHOCK

Treatment is aimed at restoring oxygen delivery to the cells of vital organs as rapidly as possible. The management depends on the cause and type of shock.

General Management

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Septic Shock

- Initial management as above
- Appropriate antibiotics especially for gram-negative microorganisms
- Inotropic support such as adrenaline and dopamine
- Surgical eradication of the infection focus

Cardiogenic shock

- Initial management as above
- Inotropes
- Treat the causes
- Etc.

Neurogenic shock

- Initial management as above
- Pain relief
- Treat the causes, give supportive measures like inotropic support

COMPLICATIONS OF SHOCK

The main complications of severe shock include:

1. Shock lung (ARDS)
2. Acute renal failure
3. Gastrointestinal ulceration
4. Disseminated intravascular clotting
5. Multiorgan failure
6. Death

Therefore, a patient in shock requires immediate emergency treatment. Early diagnosis and immediate correction of shock prevents permanent organ damage and death.

CHAPTER TWO
FLUID AND ELECTOLYTES

Learning Objective

At the end of this chapter, the learner should know:

- The anatomy and physiology of body fluids and electrolytes
- The common fluid and electrolyte changes, their causes and management
- The common acid base imbalances and their treatment

Introduction

Knowledge about fluid electrolyte and acid base changes and their management is basic to the care of the surgical patient. Many disease processes result in changes that could result in rapid deterioration of the patient and death. Anyone caring for surgical patients should have a basic knowledge of fluid, electrolyte, acid and base disturbances, as well as their causes and their management**.**

DEFINITIONS

Moles or millimoles: number of particles present per unit volume

Equivalents or milliequivalents: number of electric charges per unit volume.

Osmoles or milliosmoles: number of osmotically active particles or ions per unit volume.

A mole of a substance is the molecular weight of that substance in grams. An equivalent of an ion is its atomic weight expressed in grams divided by the valence. In case of univalent ions, one milliequivalent (meq) is the same as one millimole. In case of divalent ions such as calcium or magnesium, one mole equals two meq. When the osmotic pressure of a solution is considered, it is more descriptive to use units of osmole or milliosmole.

These units refer to the actual number of osmotically active particles present in solution but they are not dependent on the chemical combining capacities of the substances. Thus, a millimole of sodium chloride which dissociated into sodium and chloride contributes 2 milliosmole.

NORMAL DISTRIBUTION OF BODY FLUIDS

Total body water

The total body water constitutes 50 – 85% of total body weight depending on age and lean body mass (muscle mass). In regard to this, 55% - 60% of body weight for a 70 Kg young

man is water. Females have lower body water (45 –60%) because of the high fat content of their body. The total body water in neonates is 80%-85%, which is higher than in adults.

Total body water is further divided into two:

1. Intracellular fluid, comprising 2/3 of total body water
2. Extra cellular fluid, comprising 1/3 of total body water. The extra cellular fluid is sub divided into *Intravascular* (plasma) comprising 2/3 of extra cellular fluid and *Interstitial* which comprises 1/3 of extra cellular fluid.

N.B. Physiologically all compartments of body water are interdependent.

CHEMICAL COMPOSITION OF BODY FLUID COMPARTMENTS

Commonly available replacement fluids

	Ions (millimol per liter)			Carbohydrate (gram per liter)	Used for replacement of
Fluid	Na^+	Cl	Ka^+		
Physiologic saline **(Normal saline)**	154	154	0	0	Blood/ extra cellular fluid loss
Hartmann's solution **(Ringer's lactate)** (Contains lactate and calcium)	131	112	5	0	Blood, intracellular fluid loss
5% glucose in water **(D/W)**	0	0	0	50	Maintenance and for medication

DISTURBANCES OF FLUID AND ELECTROLYTES

CLASSIFICATION

Disturbances in body fluids can be classified into three:

- Disturbance in fluid volume
- Disturbance in composition
- Disturbance in acid base balance

DISTURBANCE IN FLUID VOLUME

Volume deficit

Extra cellular fluid (ECF) volume deficit is the most common fluid volume disorder in the surgical patient. The lost fluid is not water alone, but water and electrolytes in approximately the same proportion as they exist in normal extra cellular fluid.

Causes

- Losses of gastro-intestinal fluids: e.g. vomiting, gastric tube, diarrhea and entero-cutaneous fistulas
- Sequestration or loss of fluid in soft tissue injuries and infections such as burns
- Intra-abdominal and retroperitoneal inflammatory processes such as peritonitis, intestinal obstruction, etc.

Sodium (Na^+)

- It is the most abundant caution of the extra cellular fluid
- After trauma and surgery, there is a period of shut down of sodium excretion for up to 48 hours. During this period, it may not be advisable to administer large quantities of isotonic saline.
- The concentration of serum sodium is not related to the volume status of extra-cellular fluid. A severe volume deficit may exist with a normal low or high serum level.
- Daily requirement of sodium is one millimol/kg. The excretion of sodium by the kidneys is under the control of aldosterone.

Sodium depletion (Hyponatremia): Na+ less than 130 milliequivalent/liter

Hyponatremia can be associated with

1. Volume depletion, sodium and water depletion. Most frequent cause of sodium and water depletion in surgery is small intestinal obstruction. Duodenal, Biliary, pancreatic and high intestinal fistula are also causes of hyponatremia.
2. Water intoxication with excess volume and edema, over-prescribing of intravenous 5% D/W and colorectal washouts with plain water

Clinical feature

It can present with signs and symptoms of either fluid excess or fluid overload depending on the primary cause.

Laboratory:

Serum sodium and other electrolytes, hematocrit drops

Treatment

Ringer's Lactate or Normal Saline In cases of volume depletion.

Fluid restriction and sodium sparing diuretics In case of fluid excess.

Sodium Excess (Hypernatremia): Na+ more than 145 mmol

Causes

- Excessive water loss in burns or sweating, insensible losses through the lungs.
- Excess amount of 0.9% saline solution is given IV during the early operative period where there is some degree of retention of sodium.

Clinical feature

Depending on the cause it can be of fluid excess or fluid deficit.

Treatment

5% D/W can be infused slowly

Potassium

Treatment

Measures to reduce K

Treatment

A serum level of calcium of 15 mg/dl or higher requires emergency treatment.

- Vigorous volume repletion with salt solutions.
- Oral or IV inorganic phosphate or mithramycin.

ACID – BASE BALABCE

Normally, the blood pH lies within the range of 7.36-7.44. The control of this tight balance is accomplished by:

- *Blood buffer:*- which includes the bicarbonate and carbonic acid, phosphates ,serum proteins and meth-hemoglobin(play a greatest role from the blood buffers)
- *The lung:*- excretes acid(CO_2)
- *Kidney :*- the ultimate organ to maintain imbalance to near normal by its capacity to excrete both acid and base.

Alkalosis (accumulation of Base or loss of acid)

Metabolic Alkalosis

Causes

- Loss of acid from the stomach by repeated vomiting or aspiration
- Excessive ingestion of absorbable alkali
- Hypokalemic alkalosis in patients with pyloric stenosis: potassium loss due to repeated vomiting.

Clinical Features

- Cheyne-stokes respiration with periods of apnea
- Tetany sometime occurs.

Treatment

- Repletion of volume + potassium (check urine output)
- Use of 0.1 N or 0.2 N HCl is also effective in treatment of resistant metabolic alkalosis.

Respiratory Alkalosis (PCO2 below the normal range of 31 – 42 mmHg)

Causes

Most common cause is excessive pulmonary ventilation by anesthetized patients in surgical practice. It can also be caused by hyperventilation due to severe pain, hyper pyrexia and high altitude.

Treatment

- Must focus on relieving the primary cause.
- Relieving airway obstruction, adequate analgesia, and draining pleural effusion are some of the definitive measures.
- Intubation and mechanical ventilation may be used in severe cases.

ACID BASE BALANCE SUMMARY

Type of Acid-Base Disorder	***Defect***	***Common Causes***	***Compensation***
Respiratory acidosis	Retention of CO2 (Decreased alveolar ventilation)	Respiratory center depression: morphine, CNS injury, Pulmonary disease: emphysema, pneumonia	Renal Retention of bicarbonate, excretion of acid salts, increased ammonia formation Chloride shift into red cells
Respiratory alkalosis	Excessive loss of CO2 (increased alveolar ventilation)	Hyperventilation: Emotional Severe pain Assisted ventilation Encephalitis	Renal Excretion of bicarbonate, decreased excretion of acid slats decreased ammonia formation
Metabolic acidosis	Retention of fixed acids or Loss of base bicarbonate	Diabetes, Azotemia, Lactic acid accumulation, Starvation. Diarrhea, Small-bowel fistula	Pulmonary (rapid) Increased rate and depth of breathing Renal (slow) As in respiratory acidosis
Metabolic alkalosis	Loss of fixed acids Gain of base bicarbonate Potassium depletion	Vomiting Gastric suction (pyloric obstruction) Excessive bicarbonate intake Diuretics	Pulmonary (rapid) Decrease rate and depth of breathing Renal (slow) As in respiratory alkalosis

Review Questions

1. What types of acids base balance and electrolyte changes will a patient with GOO have? Which kind of fluid will you use for resuscitation?

2. What is the role of the kidney in electrolyte and acid -base balance?

3. What are the buffer systems of the body? Which is the most rapid one?

4. Outline treatment of a patient with metabolic acidosis

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CHAPTER THREE

BLOOD TRANSFUSION

Learning objectives

After reading this chapter students should be able to:

Blood prepared after a full typing and cross match can be transfused safely in 99.95% cases. In some instances when fully cross- matched compatible blood is depleted or unavailable; type specific or O negative blood should be given. Type O Rh negative blood can be transfused without lysine the recipients blood.. Irregular recipient antibodies cannot

Clinical manifestation: Patient often experiences fever, chills and dyspnea.

Treatment

- Stop transfusion immediately
- Administration of fluids and diuresis with mannitol or frusemide
- Transfused blood with patients blood sample should be sent for analysis
- Sodium bicarbonate may prevent precipitation of hemoglobin in the renal tubules
- Steroids may ameliorate the immunologic consequences.

Transfusion reactions from mismatches involving the Rh system or minor antibodies usually induce extravascular hemolysis, since these reactions occur slowly, serious complications do not often develop.

Non-hemolytic transfusion reaction

References

1. Bailey and Loves: Short Practice of Surgery 22nd, ed.

2. Hardy's Textbook of Surgery

CHAPTER FOUR

PRE-OPERATIVE AND POS-TOPERATIVE CARE

Learning objectives

At the end of this chapter, students are expected to

- Be familiar with pre and post-operative care and complications
- Identify factors which make patients high risk for surgery
- Differentiate postoperative complications
- Manage common post operative complications

Introduction

In the management of patients with surgical procedures, the overall outcome of the operation mainly depends on the pre-operative diagnosis and the surgical procedure. But in addition to this, the patient's pre-operative situation should be well evaluated so as to make the patient able to withstand the stress of surgery. Factors which make the patient high risk for surgery should be controlled as much as possible. Also, the patients' postoperative course highly depends on the postoperative care given, and anticipation with early diagnosis and management of postoperative complications.

General consideration

Preoperative evaluation should include a general medical and surgical history, a complete physical examination and laboratory tests. The most important laboratory tests are:

- Complete blood count
- Blood typing and Rh-factor determination
- Urinalysis
- Chest x-ray

Further laboratory tests should be performed only when indicated by the patients' medical condition or by the type of surgery to be performed.

Assessment and Minimization of Surgical Risks

Cardiovascular System

Cardiac problems

The preoperative period is associated with significant cardiovascular stress. Patients with heart disease should be considered high-risk surgical candidates and must be fully evaluated.

- Patients with symptoms of previously undiagnosed heart disease (E.g. chest pain, dyspnea, pretibial edema or orthopnea)
- Recent history of congestive heart failure
- Recent myocardial infarction
- Severe hypertension
- Varicose vein and deep venous thrombosis

Such patients should be evaluated with the assistance of medical or cardiology consultation. The perioperative monitoring, induction, and maintenance techniques of anesthesia, and post – operative care can be tailored to the specific cardiovascular diseases.

Pulmonary system

The following respiratory tract problems make patients high risk for surgery;

- Upper airway infections
- Pulmonary infections
- Chronic obstructive pulmonary diseases: chronic bronchitis, emphysema, asthma

Elective surgery should be postponed if acute upper or lower respiratory tract infection is present. Pulmonary infections also predispose to postoperative bronchitis and pneumonia. If emergency surgery is necessary in the presence of respiratory tract infection, regional anesthesia should be used if possible and aggressive measures should be taken to avoid postoperative atelectasis or pneumonia.

Renal system

Renal function should be appraised

- If there is a history of kidney disease, diabetes mellitus and hypertension
- If the patient is over 60 years of age
- If the routine urinalysis reveals proteinuria, casts or red cells

It may be necessary to further evaluate renal function by measuring creatinine clearance, blood urea nitrogen and plasma electrolyte determination.

myocardial ischemia which may be silent. These patients should have an extended cardiac work up and receive metoclopromide as well as a non particulate antacid before surgery.

Thyroid disease

Elective surgery should be postponed when thyroid function is suspected of being either excessive or inadequate. In Hyperthyroidism, The patient should be rendered euthyroid before surgery if possible. This may take up to 2 months with anti-thyroid medications.

In hypothyroidism, thyroxin should be started before surgery if possible. In all cases, treatment should be started with a very low dose of thyroid replacement to avoid sudden and large workload on the myocardium. The usual tests of thyroid function include T3, T4, and TSH levels.

In addition to the above discussed factors, there are issues which might need special consideration in preoperative patients. The diagnosis of early pregnancy must be considered in the decision to do elective major surgery in reproductive age female.

History of serious reactions or sickness after injections, oral administration or other uses of substances like narcotics, anesthetics, analgesics, sedatives, antitoxins or antisera should be sought.

The patients' general hydration status should be assessed and made optimal. Nutritional status of the patient also needs evaluation and correction.

After all this, prior to the operation, it is important to have an empty stomach because full stomach can result in reflux of gastric contents and aspiration pneumonitis. In elective surgery, patients should not eat or drink anything after midnight on the day before surgery.

Post-operative care, complications and their Treatment

Post-operative care

Post-operative care is care given to patients after an operation in order to minimize post operative complications. Early detection and treatment of post operative complications is possible if there is optimal care. Some of the care is given to all post operative patients, while the rest are specific to the type of operation. Routine cares include:

Immediate care:

a. Vital sign checking
b. Chest auscultation
c. Input and output monitoring
d. Checking for bladder and abdominal distention
e. Potent analgesics for pain relief

On subsequent post-operative days*:*

a. Oral intake can be started

b. Patients encouraged to ambulate

In the following sessions, we will focus on common postoperative complications.

Cardiovascular complications

Shock

Postoperative efficiency of circulation depends on blood volume, cardiac function,

***Treatment** includes*

- Á Warm moist packs
- Á Elevation of the extremity
- Á Analgesics

Anticoagulants are rarely indicated when only superficial veins are involved.

Thrombophlebitis of the deep veins

Investigation

Chest X-ray- findings are pulmonary opacity in the periphery of the affected lung which is triangular in shape with the base on pleural surface, enlargement of pulmonary artery, small pleural effusion and elevated diaphragm. ECG may show characteristic changes.

Treatment

- Cardiopulmonary resuscitation measures
- Treatment of acid-base abnormality
- Treatment of shock. Immediate therapy with heparin is indicated even in the absence of a definitive diagnosis.

Pulmonary Complications

About 30% of deaths that occur within six weeks after operation are due to pulmonary complication. Atelectasis, pneumonia, pulmonary embolism and respiratory distress syndrome from aspiration or sepsis, fluid overload or infection are the most common pulmonary complications.

Atelectasis

Definition

Atelectasis is a pulmonary complication of early postoperative period. It is a condition characterized by areas of airway collapse distal to an occlusion.

Predisposing factors

Include chronic bronchitis, asthma, smoking and respiratory infection. Inadequate immediate postoperative deep breathing and delayed ambulation also increase the risk.

Clinical features

- Fever in the immediate post operative period
- Increased pulse and respiratory rate
- Cyanosis
- Shortness of breath
- Dull percussion note with absent breath sounds

Investigation

X-ray findings include patchy opacity and evidence of mediastinal shift towards the atelectatic lung.

Clinical features

- Abdominal distention
- Absent bowel sounds
- Generalized tympanicity on percussion

Investigation

- Plain x-ray-generalized dilatation and gaseous distention of the bowel loops

Treatment

- NGT decompression
- Fluid and electrolyte balance

Post operative intestinal obstruction

Causes

- Peritonitis
- Peritoneal irritation
- Fibrinous adhesion

Clinical features

- Manifests between the 5^{th} and 6^{th} postoperative day
- Significant and protracted vomiting
- Crampy abdominal pain
- Focal typmpanicity of the abdomen on percussion
- Exaggerated bowel sounds

Investigation

Plain film of the abdomen usually reveals distension of a portion of small bowel with air fluid levels.

Treatment

Vigorous hydration and careful electrolyte monitoring is needed. This often results in re-alignments of the bowel loops and relief of the obstruction. Patient should be kept NOP and NGT inserted for decompression. If the obstruction doesn't respond within 48-72 hours, re-operation is necessary.

urinary stream. The patient should be encouraged to get out of bed. Bladder drainage by means of a urethral catheter should be instituted.

Urinary tract infection

Predisposing factors

- Á Pre-existing contamination of the urinary tract
- Á Catheterization

Clinical presentation

- Fever
- Suprapubic or flank tenderness
- Nausea and vomiting

Investigation

-Urine analysis (pus or bacteria will be seen in the urinary sediments)

Treatment

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Treatment

- Sutures should be removed
- The wound should be explored and cultured
- Ample drainage should be established together with local wound care
- Appropriate antibiotics if systemic manifestations like fever are persistent.

Hematoma, Abscess and Seromas

These may occur either in the pelvis or under the fascia of abdominal rectus muscle. They are suspected during falling of hematocrite in association with low-grade fever. Small hematoma or seroma often resolve spontaneously, but some can become infected. Ultrasonography is an excellent adjunct to physical examination. Drainage of infected hematoma should be accomplished extraperitoneally.

Review Questions

1. What are the important components of preoperative patient evaluation?

2. List important laboratory investigations which need to be done in almost all pre-operative patients despite the specific diagnosis.

3. What are the risks of untreated respiratory tract infection in surgery?

4. Why is diabetes mellitus considered to be pre operative risk?

5. About post-operative shock
    a) List the causes, what is the commonest cause?
    b) What are the clinical manifestations?.
    c) What are the important measures to be taken to combat shock?

6. What is the most common cause of fever in the immediate postoperative period ?

7. Outline the care for an infected post-operative wound.

References

1. Bailey and Loves: Short practice of Surgery, 22nd ed.
2. Hardy's Textbook of Surgery
3. Current Textbook of Obstetrics and Gynecology, 8th ed.

CHAPTER FIVE
ASEPTIC AND ANTISEPIC TECHNIQUES

Learning Objectives

After reading this chapter, the student should know

1. The definition of the different terms used in asepsis and antisepsis
2. The properties of the most frequently used antiseptics and their use in surgical and traumatic wounds.
3. How choose the most suitable antiseptics for his/her institution

Introduction

The most serious outcome (important factor) of impaired wound healing is infection. Antiseptics and aseptic techniques are used in an attempt to prevent contamination to an acceptable level making the wound less receptive to bacterial growth. It should be noted, however, that the corner stones in decreasing wound infection are: gentle tissue handling, sharp dissection, good homeostasis, and accurate apposition of wound edge without tension. Proper wound debridement (wound excision) is vital in post traumatic wounds to prevent infection.

Therefore, knowledge of aseptic and antiseptic techniques is very important for the medical practitioner, be it in the ward, minor/major operation theaters or in the emergency out patient department: this knowledge can help prevent infection, unnecessary morbidity and some times mortality of patients.

DEFINITIONS

***Aseptic technique*:** the prevention of microbial contamination of tissues and sterile materials by excluding, removing or killing microorganisms

Disinfection: involves the killing or removal of sufficient microbes to render an inanimate object safe for its intended purpose

Antiseptics: Chemicals which can be applied to living tissues to kill or inhibit the growth of microbes.

Cross infection: the transfer of microbes in hospitalized patients to other patients.

Staff:-

Preventative Measures to be taken

- Skin disinfection between contact with patients by detergent (soap and water) in the wards or OPD and use of antiseptic in intensive care and neonatal units.
- Treatment for identified carriers and full blown cases e.g. boils
- Prophylactic antibiotics when indicated

Operating Theater

Most bacteria infecting surgical incisions are implanted during the operation. Therefore strict asepsis has to be maintained.

Staff

- Wear clean clothes, shoes or covers, mask and cap or hood beyond the green line
- Scrubbing up of all operating team before each operation for at least 5 minutes with an antiseptic soap or detergent. To prevent skin damage, brushes should be used only to clean under the nails. Finally, dry with sterile towel and apply 70% alcohol or Povidone iodine if available.
- Put on sterile gloves and gowns in an aseptic manner

Patient

- Shave hair immediately before surgery
- Clean the operation field with antiseptic containing:
  - Chlorohexidin and 2.5% Iodine for adults
  - 70% alcohol for children
  - Podovine Iodine for all ages if available
- Finally, cover with sterile drapes.

Operating Room

There are few bacteria in the air of an empty theatre but every individual liberates about 10,000 organisms per minute into the air. Therefore, to decrease airborne infections, keep the number of personnel reduced to a minimum. Unnecessary movement should also be discouraged.

There should be adequate ventilation for most procedures. If there is no system to provide this, windows should be open to allow ingress of fresh outside air and escape of anesthetic gases.

Keep all doors closed except as needed for passage of equipment and personnel.

Clean operating rooms between operations. At regular intervals, conduct a more thorough cleaning by mopping the floor and washing the walls with detergents.

Instruments

All instruments and garments to be used in surgical procedures must be sterile and this is attained by sterilization.

Sterilization: - is a process by which inanimate objects are made free of all microorganisms. Widely used methods of sterilization in a hospital are.

Autoclaving: - This is the preferred method of sterilization. It uses steam at a pressure of 750 mmHg above atmospheric pressure and temperature of 120^0 C for 15-30 minutes. The steam is helpful for penetration even into spores. Appropriate indicators must be used each time to show that the sterilization is accomplished.

Dry heat:-

This is a poor alternative but suitable for metal instruments. It uses a temperature of 170^0C for two hours.

N.B. Boiling is an unreliable means of sterilization and it is not recommended.

APPENDIX: properties of commonly used antiseptics

Alcohols (e.g. ethyl, isopropyl): -

Broad spectrum, rapid action, moderately expensive, most active against bacteria at 70% concentration

Chlorhexidine:-

Good activity against staphylococci and streptococci, moderate activity against gram-negative bacteria, persistent action, moderately expensive, non-toxic, unpleasant taste

Iodine (lugols solution):-

Broad spectrum, cheap, stains, hypersensitive

Povidone iodine:-

Broad spectrum, moderately expensive, some hypersensitivity, rapid inactivation by blood

Hexachlorophane:-

Slow, but cumulative action against staphylococci and streptococci, systemic toxicity for neonates, moderately expensive

Triclosan:-

Similar activity but less toxic than hexachlorophene

Chlorine (chlorinated lime and Boric acid (Easol):-

Broad spectrum, locally toxic, expensive

Dilute sodium hypochlorite solution:-

Broad spectrum, cheap, locally toxic

Quaternary ammonium compounds :-(e.g. cetrimide in benzalkonium chloride)

Poor gram-negative activity, readily contaminated, detergent, cheap, non-toxic.

Noxythiolin:-

Releases formaldehyde in contact with tissues, broad spectrum, expensive, weak and slowly bactericidal

Alcohol plus chlorhexidne
Alcohol plus povidon iodine } useful mixtures
Chlorhexidine plus cetrimide

Review Questions

1. Using your knowledge of the properties of the different antiseptics which one would you choose for your heath center?

2. Which antiseptics do you recommend for preoperative skin preparation for adults? What about for children?

3. What is the most important measure you would take for a patient who comes to the emergency room with a contaminated wound?

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1. General Surgery at the District hospital: WHO 1998.

2. Mark Farrington, Infection and the Surgery, Surgery, The medicine group (UK) ltd, 1988

CHAPTER SIX

SUTURE MATERIALS AND SUTURING

Definition

Suture is a thread like material used to close surgical wounds and unite two edges of cut tissue.

Types of Suture Materials

Suture materials can generally be classified as absorbable and non absorbable.

Absorbable:

This is a type of suture material that gets absorbed by the tissue.

E.g. *Catgut* (natural or biologic type)

Vicryl (Synthetic)

Non absorbable:

This is a type of suture material that remains unabsorbed by the tissue.

E.g. *Silk* (natural or biologic type)

Nylon (Synthetic)

SELECTION OF SUTURE MATERIALS

Different surgical stitches are used in various types of tissues for different purposes. Important factors considered when selecting suture material for surgery include:

N OF SUTURE MAT11

- Type and site of the operation
- Healing characteristics of the tissue involved
- Properties of the suture and needle
- Security of knots
- Behavior of the material in presence of infection
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SUTURING TECHNIQUES

The basic principles of suturing technique include:

1. Inserting the needle at right angle and gently advance through the tissue
2. Avoiding tension
3. Size and interval between bites are dependent on the tissue thickness and type of tissue to be sutured

FORMS OF SUTURING TECHNIQUES

Important types of suturing techniques commonly used include:

- Simple interrupted
- Continuous simple
- Vertical and horizontal mattress
- Subcuticular stitches

Figure 1: Simple Interrupted Sutures

Figure 1a

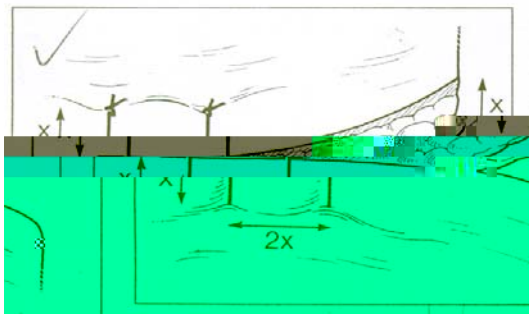


Figure 1b

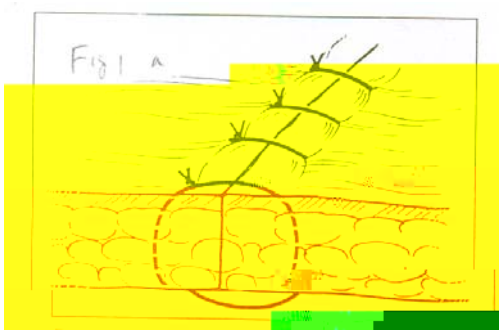


Figure 1c

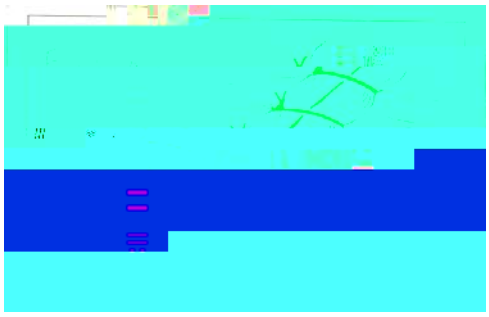
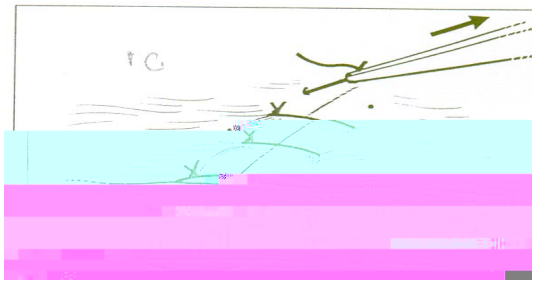


Figure 1d



Useful Tips:

- Insert the needle carefully at right angles to the tissue edges. Advance through, gently avoiding shearing force.

- For long wounds being closed with interrupted sutures, it is advisable to start in the middle and to keep on halving the wound.
- Tie a careful reef knot and lay to one side of the wound.
- Cut suture end about 0.5cm long to allow length for grasping during removal.
- When removing sutures, cut flush with the tissue surface so that the exposed length of the suture, which is potentially infected, does not have to pass through the tissues.

Figure 2: Continuous Sutures

Useful Tips:

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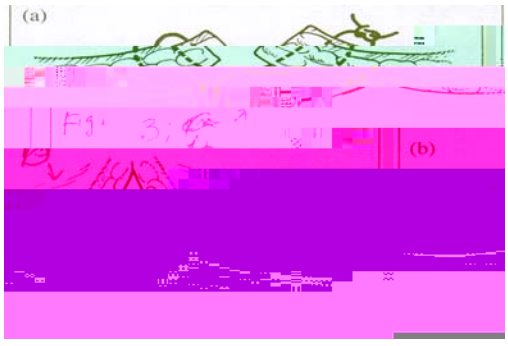

Figure 4: Subcuticular Sutures

This technique may be used with absorbable or non-absorbable sutures. For non-absorbable sutures, the ends may be secured by means of beads etc. For absorbable sutures, the ends may be secured by means of buried knots.

Small bites of the subcuticular tissues on alternate sides of the wound are taken and then pulled carefully together.

CHAPTER SEVEN

WOUNDS-WOUND HEALING AND CARE

Learning Objectivmt

Phases of healing

1-Coagulation phase:

This is the first phase of healing which is induced immediately following injury. It is characterized by vaso-constriction, clot formation and release of platelets and other substances necessary for healing and help as a bridge between the two edges.

2- Inflammatory phase:

This phase takes place from time of wounding up to three days. It is characterized by classical inflammatory response, vasodilatation and pouring out of fluids, migration of inflammatory cells and leukocytes and rapid epithelial growth.

3- Proliferate Phase:

This phase, also known as phase of fibroplasia, starts around the 3rd day of injury and stays for about three weeks. This is a phase during which important events occur for healing of the wound. It is characterized by fibroblast, epithelial and endothelial proliferation, Collagen synthesis, and ground substance and blood vessel production.

4- M

healing

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Factors affecting healing

Healing of a wound can be affected by various conditions. The following are examples of factors which down grade a healing process.

Local factors

- Ischemia and decreased oxygen tension
- Presence of foreign bodies
- Closure under tension
- Infection
- Irradiation…

Systemic factors

- Systemic diseases like diabetes, cirrhosis, renal failure, malignancy…
- Poor nutritional State (hypo proteinemia vitamin and mineral deficiency)
- Decreased resistance due to immune suppression, chronic infection
- Drug therapy like steroids, cytotoxic agents

WOUND ASSESSMENT AN

Classification of wounds

Once wound is carefully assessed, it is necessary to classify into a specific type in order to plan a proper management scheme. There are many approaches of classifying wounds. However, wounds can generally be grouped into two categories.

Closed wounds: These are wound types, which have an intact epithelial surface, and skin cover not completely breeched.

Example: Contusion, Bruise, Hematoma

Open wounds: These are wounds caused by injury which leads to a complete breakt of the epithelial protective surface.

Example: Abrasion, Laceration, Puncture, Missile injuries, Bites…

The following method is the traditional surgical wound classification scheme that was

Therefore, the patient requires thorough examination before instituting wound management. The following priority has to be set and followed.

- Stabilize the patient and correct all life threatening conditions, like airway obstruction and bleeding.
- Take quick general history on the incident.
- Do gross physical examination to assess associated injuries.
- Assess the wound or soft tissue injury in detail.
- Plan and institute treatment according to the goal and specific wound type.
- Follow up, re-inspect the wound and assess the outcome of your management after a day or two.

Treatment of the wound begins following initial assessment. The initial care of all wounds is generally governed by several principles. However, the goal in all cases is to establish a good environment to assist wound healing and prevent infection. Proper wound care includes the following measures:

- Adequate hemostasis locally to stop bleeding.
- Adequate irrigation to reduce bacterial load and foreign particles.
- Careful debridement to remove all dead tissues and non-vascularized fragments.
- Careful decision on whether to close or leave the wound open for later closure.
- Supplementing with antibiotics and tetanus prophylaxis as required.
- Improving host response by correcting systemic diseases.

Regarding primary wound closure, each condition must be individualized. However, general guidelines that can be followed are:

- Clean wounds should be closed primarily
- Clean-contaminated wounds can be primarily closed if they can be converted, into clean wounds
- Untidy, contaminated wounds which cannot be converted to tidy wounds should not be closed primarily
- All missile wounds, animal and human bites should never be primarily closed unless strongly indicated

Delayed primary closure

Is done for traumatic or contaminated wounds to avoid the risk of wound sepsis. It is done within 3 days of initial treatment.

Secondary closure

This is usually done in 3-7 days of initial treatment. It is effected in contaminated or traumatic wounds. It provides a reliable drainage and opportunity for repeated inspection and debridement as necessary.

SPECIFIC WOUND MANAGEMENT

As mentioned earlier, the management of specific wound types should be individualized. This is mainly governed by local wound factors. The common wound types and their specific management is listed below.

Bruises

These wounds are very superficial. There is no specific management needed except local compress and analgesics if pain is severe.

Hematoma

This is a collection of extravasated blood in the soft tissues.

Management:

- It usually gets absorbed spontaneously and should be left
- Local compress to alleviate pain
- Aseptic evacuation or aspiration only if very large (expanding) or over a cosmetic area or leading to compression of vital structures.

Abrasion

An abrasion is rubbing or scraping of skin or mucous membrane. It may affect only a part or full layer of skin. Dirt particles can be imbedded into the skin defect.

Management:

- Cleanse using scrubbing brushes
- Use antiseptic or lean tap water and soap
- Analgesic

Punctures

These may be compound wounds which involve deeper structures. They require careful management.

Management:

- Evaluate the depth of damage
- Remove pricking or other foreign bodies
- Excise damaged tissue
- Cover with antibiotics
- Tetanus prophylaxis

Lacerations

These are open wounds caused by an object moving across the skin, commonly by sharp and thin objects which slice with minimal energy, like a knife, or glass, but can also be due to high-energy impact. Their management should be as follows.

Management:

- Careful inspection
- Adequate cleansing
- Closure, if feasible, under appropriate anesthesia
- Proper wound debridement if needed
- Appropriate antibiotic prophylaxis
- Tetanus Prophylaxis
- Analgesics as needed

Crush and avulsion wounds

These are compound complicated wounds. They are usually associated with systemic involvement and have more extensive damage than may appear. Manage these conditions as follows.

Management:

- Correct associated life threatening conditions
- Proper wound debridement
- Early skin cover if possible or late graft, wound left open if contaminated
- Appropriate antibiotics
- Tetanus Prophylaxis
- Analgesics as needed

Missile injuries

These are type of wounds which are compound and complicated. There is excessive tissue damage and high degree of contamination. They usually present with severe life threatening conditions and should be carefully managed.

Management:

- Correct life threatening conditions to stabilize the patient's vital functions
- Careful wound inspection
- Careful wound debridement
- Adequate effective antibiotics
- Tetanus Prophylaxis and analgesics as needed
- Avoid primary closure of the wound

BITES

Bites can be caused by humans or other animals. The wounds can be puncture or laceration and are contaminated. Management of common bites is discussed below.

Human bites

These are relatively rare but more heavily contaminated than those of most animalss due to polymicrobial nature including anaerobic organisms as a normal oral flora. Management should include the following aspects.

- Careful wound inspection
- Take culture from wound site
- Thorough scrubbing and liberal irrigation with saline or plain water
- Adequate debridement
- Leave wound open except early face and head wounds
- Do not suture severed tendons and nerves primarily
- Broad-spectrum antibiotics, later to be changed to specific antibiotics according to culture result
- Tetanus Prophylaxis
- Wound observation

Dog bites

Peculiar to dog bites is that infected animals can transmit the rabies virus from the saliva which leads to rabies, a deadly disease. To avoid this complication the animal must be kept for observation for at least 10 days. These wounds should be urgently and carefully managed as follows.

Local management:

- Vigorous irrigation and repeated swabbing and flushing with soap and water or antiseptics
- Local anti-rabies serum infiltration under the wound if available
- Leave wound open

Systemic management:

- Post exposure anti rabies prophylaxis (1ml, IM) on the 1st, 3rd, 7th, 14th and 28th day of bite.
- Tetanus prophylaxis
- Antibiotics

Snake Bites

Poisonous snakes cause severe local and systemic effects due to highly active substances in their venom. Immediate aggressive measures should be taken to limit the affects. Management should include:

First aid measures:

- Local wound irrigation
- Apply pressure bandage proximally to avoid or reduce venom spread with caution on the blood supply
- Immobilize the limb to minimize venom absorption
- Transport patient immediately to nearby hospital

Hospital Measures:

- Identify the species
- Conduct necessary laboratory investigations like hemoglobin, renal function...
- Anti-venom injection, if available
- Supportive care for severe conditions
- Rest
- IV-infusions to combat shock
- Antibiotics
- Blood transfusion
- Tetanus Prophylaxis
- Surgery, if local complications
- Wound excision
- Fasciotomy for compartment syndrome

WOUND COMPLICATIONS

Handled and managed improperly, wounds can result in variants from normal healing and become complicated, causing local systemic complications.

Local:

- Infection
- Dehiscence
- Granuloma formation
- Scar formation
- Contracture leading to loss of joint function etc

Systemic:

- Death may occur if un controlled sepsis or hemorrhage
- Systemic manifestations of hemorrhagic shock due to massive bleeding
- Bacteremia and sepsis from a source of locally infected wound

Review Questions

1. Which of the following is important in assessing a wound to manage it properly?

    A) Duration of injury

    B) The circumstance of wounding

    C) The mechanism of injury

    D) Local appearance of the wound

    E) All of the above

2. Which of the following wounds can be categorized as “clean”?

    A) Bullet wound of one hour duration

    B) Human bite of 30 minutes duration

    C) Glass laceration of five hours duration

    D) Crush injury of the leg following car accident

    E) None of the above

3. A proper wound care includes all measures except

    A) Removing all devitalized tissue

    B) Removing foreign bodies impregnatell ui5.3(n)-.1nration

6. In a contaminated wound left open to heal without closure, healing is effected by

A) First intention

B) Second intention

C) Third intention

D) Purely by epithelialization

E) All of the above

7. Which of the following factors is unlikely to affect the healing of a wound?

A) Presence of foreign body

B) Systemic illness

C) Sex of the patient

D) Poor patient nutritional state

E) Presence of infection

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CHAPTER EIGHT
SURGICAL INFECTIONS

Learning Objectives

At the end of this chapter, each student will be able to:

- Define a surgical infection clearly
- Have a clear understanding on the pathogenesis of surgical infections
- Understand and define the common types of surgical infections
- Understand the management of surgical infection according to its type
- Identify types of surgical infections that require emergency procedure

Introduction

Surgical infection encompasses a wide pathologic aspect. It can be defined broadly as an infection related to or complicating a surgical therapy and requiring surgical management.

Many infections occupy a non-vascularized space of tissue, thus are likely to respond to non-surgical treatments. These types of infection therefore definitely require surgery as a primary or definitive therapeutic approach.

Examples of such infections, which definitely need surgery, can be:

- Gas gangrene
- Abscess
- Appendicitis...

On the other hand, any infection that is related to surgical therapy but that may not definitely require surgery is also categorized as a surgical infection.

Examples:

- Urinary tract infections after catheterization for surgical purpose
- Pulmonary complications following intubation for surgery
- Tracheotomy site infection

All wounds that follow operative procedure or incision are also grouped as surgical infections.

Example:

Post-operative wound infection

CLASSIFICATION

Surgical infections can be classified in relation to specific conditions. According to temporal relation to surgery, surgical infections are grouped into three types.

Ante/pre operative infections:

These infections happen before a surgical procedure. The time of initial infection may or may not be known.

Example:

- Accidents
- Appendicitis
- Boils
- Carbuncle
- Pyomyositis…

Operative infections:

These are types of surgical infections that happen during a surgical procedure. It can occur either due to contamination of the site or poor tissue handling technique.

Postoperative infections:

These infections occur after a surgical procedure. The contamination is usually from the patient's source.

Example:

- Surgical wound infections
- Urinary and respiratory tract infections

PATHOGENESIS

There are certain elements or factors present for a surgical infection to occur. These include:

- An infectious agent
- A susceptible host
- Favorable external factors or local condition with closed, less or non-per fused space.

An infection becomes overt only when the equilibrium between the bacterial and host factors becomes disturbed.

Infectious agents:

Surgical infections are caused by various types of microorganisms either separately or in combination (poly microbial). The common organisms in decreasing order are:-

1- Aerobic bacteria

- Staphylococcus aureus
- Streptococci
- Klebsiella
- E. coli…

2- Anaerobic bacteria

- Bacteroids
- Peptostreptococci
- Clostridia…

3- Fungi

- Histoplasma
- Candida
- Nocardia and actinomycetes…

4- Parasites

- Entameba hystolytica causing amebic liver abscess
- Echinococcus causing hydatid cyst…

The organisms get access through skin breaks, operative wounds, tubes, and catheters…They lead to overt infection by various mechanisms, which commonly include tissue invasion, local damage and toxin production. Later, the organisms or their toxins impose more danger by systemic spread.

Host Susceptibility:

Reduced immune host defense predisposes to surgical infections. Conditions affecting the specific and non-specific immunity and systemic diseases that suppress the immune response, like diabetes mellitus, TB and AIDS can reduce the body's immune defense, thus increasing the susceptibility to infection.

Local and external factors:

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- Presence of foreign bodies
- Closure under tension etc.

External factors like a break in the sterility technique also contribute to the development of surgical infection.

DIAGNOSIS

Once an infection develops, it can be diagnosed by the clinical manifestation and supportive laboratory investigation:-

Clinical manifestation: Patients with overt surgical infection may present with the following symptoms and signs:

Symptoms and signs of local inflammation such as hotness, redness, edema/swelling, local pain and loss of function

Clinical findings:

The infection usually becomes evident on the 5^{th}-7^{th} postoperative day. The following clinical features may accompany the infection.

- Fever
- Wound pain
- Wound edema and induration
- Local hotness and tenderness
- Wound/stitch abscess
- Serous discharge
- Crepitation occasionally

Management:

- Remove stitches to allow drainage
- Local wound care
- Antibiotics only if systemic manifestations or signs of local spread accompany.

Abscess

An abscess is a localized collection of pus. It contains necrotic tissue and suppuration from damage by the bacteria, and white blood cells. It is surrounded by area of inflamed tissue due to the body's response to limit the infection.

Etiology:

Pyogenic organisms, predominantly staphylococci are the leading causes. These organisms lead to tissue necrosis and pus formation.

Clinical features:

Patients with an abscess anywhere in the body may present with the following findings.

- Clinical features of inflammation when superficial (Heat, pain, edema, redness and loss of function)
- Local fluctuation if superficially located.
- Spontaneous discharge and sinus formation
- Systemic manifestations like fever, sweating, tachycardia
- Chronicity especially in granulomatous infection like mycobacteria,

Treatment:

- Primary treatment is drainage of the abscess by making incision
- Debridement and curettage to break all septations and loculations
- Delayed primary or secondary closure is preferred
- Antibiotics should not be given until systemic symptoms or signs of spread occur

Cellulitis

Cellulitis is an inflammation of the subcutaneous tissue characterized by invasion without definite localization. Thin exudate spreads through the cleavage planes of tissue spaces. It usually involves the extremities and identifiable portal of entry is detectable.

Etiology: The most common etiologic organisms are

- Beta hemolytic streptococci
- Staphylococci
- Clostridium perfringens

Clinical Features: There is usually an identifiable portal of entry which can be a surgical wound, puncture site, skin ulcer or dermatitis. Other features include:

- Local signs of inflammation, which may be very intense
- Poorly defined brown-red edema
- Blebs and bullae in severe cases; tissue destruction and ulceration may follow
- Central necrosis and suppuration may occur late in some complicated cases
- Systemic signs of bacteremia and toxemia due to spread and toxin release

Management:

- Rest to limit spread of infection and pain
- Elevation of the involved limb
- Hot, wet pack
- High dose broad spectrum antibiotics IV

Impetigo

This is a skin infection characterized by a series of intraepithelial abscesses which present as multiple small pustules coalescing together. Later these pustules form lesions with erosion and crust formation. The disease is contagious in nature.

Etiology: The causative agents are streptococci and staphylococci.

Clinical Pictures:

- Series of small intra epithelial abscesses , multiple
- Bullous lesions
- Skin erosion and
- Crust formation.

Management:

- Local care
- Careful washing with antiseptic soap
- Local antibiotic ointments like neomycin if available
- Systemic antibiotics like cloxacilline only in resistant cases

Furuncle (Boil)

Furuncle is an acute infection of hair follicles with Para follicular inflammation. It commonly occurs over the axillae, back of the neck and buttocks. Poor hygiene, immune suppressive diseases and irritation are known contributing factors.

Etiology:

The causative agents are staphylococci aureus.

Clinical feature:

- There is an intense local irritation of acute onset
- Painful firm, reddish, round swelling initially, which later becomes fluctuant
- Suppuration and central necrosis occurs later
- The condition subsides and is self-limited to recur in multiple lesions (chronicity)

Treatment:

- It may subside spontaneously without suppuration (Blind boil)
- Incision /Excision if complicated
- Antibiotics

Carbuncle

Carbuncle is an infective gangrene of subcutaneous tissue which commonly occurs in patients with diabetes and other immune suppressive conditions. It is commonly found over the nape of the neck.

Etiology: It is caused by staphylococcus aureus.

Treatment:

- Adequate systemic antibiotics in early stages
- Aggressive debridement
- Local wound care
- Detect and treat predisposing factors like diabetes mellitus

Pyomyositis

Pyomyositis is an acute bacterial infection of skeletal muscles with accumulation of pus in the intra-muscular area. It usually occurs in the lower limbs and trunk spontaneously or following penetrating wounds, vascular insufficiency, trauma or injection. Poor nutrition, immune deficiency, hot climate and intense muscle activity are highly associated factors.

Etiology: The most common causative agent is Staphylococcus aureus. Streptococci can also be detected in acute form.

Clinical Features: It usually has sub-acute onset and can present with

- Localized muscle pain and swelling, late tenderness
- Induration, erythema and heat
- Muscle necrosis due to pressure
- Fever and other systemic manifestations later after some days

Treatment:

- Immediate intravenous antibiotics before surgery
- Surgical drainage of all abscess
- Excision of all necrotic muscles
- Supportive care

Madura Foot

This is a chronic granulomatous disease commonly affecting the foot with extensive granulation tissue formation and bone destruction. The disease is common in the tropics and occurs through a prick in barefoot walkers in 90% of cases.

Etiology: The causative microorganisms for this infection are various fungi or actinomycetes found in road dust.

Clinical Manifestation:

- Firm, painless, pale nodule appears initially followed by others
- Vesicles surrounding the nodules which later burst and form sinuses
- Watery discharge, which may contain granules appearing yellow, red or black color
- Flattening of the convexity of inner foot
- Deep spread to bones subcutaneous plane leading to secondary infection.

Treatment:

- Sulphonamides and Dapson (prolonged course)
- Broad spectrum antibiotics for secondary infection
- Amputation if severe and disfiguring infection

Necrotizing fasciitis

This is an acute invasive infection of the subcutaneous tissue and fascia characterized by vascular thrombosis, which leads to tissue necrosis. The skin is secondarily affected. It is idiopathic in origin but minor wounds, ulcers and surgical wounds are believed to be initiating factors. The condition is described as "Meleney's synergistic gangrene" if it occurs over the abdominal wall and "Fournier's gangrene "if in the scrotum and perineal area.

Bacteriology:

Mixed pathogens of the following microorganisms are usually cultured.

- Streptococci
- Staphylococci
- Gram negative bacteria
- Anaerobes and
- Clostridia

Clinical Features:

- Sudden onset of localized pain
- Rapidly spreading inflammation
- Spread along chemic fascial planes
- Hemorrhagic bulla and edema
- Skin devascularization
- +/- Crepitations
- +/- Muscle necrosis
- Systemic signs of toxemia

Treatment:

- Meticulous surgical excision of the wound regardless of immunization state to eliminate the bacterial infection and the dead contaminated tissue
- Isolation, quietness and comfort
- Sedation with chlorpromazine up to 200mg IM/day barbiturates or diazepam 50mgIV under close followup and observation for central signs of drug over dose
- Antibiotics: crystalline penicillin is the drug of choice for parenteral medication. Tetracycline can be an alternative antibiotic for oral therapy.
- Intensive nursing care
- Naso-gastric tube for feeding to maintain protein balance
- Immunization
- Respiratory support and consider tracheostomy if spasms becomes frequent leading to cyanosis
- Human antitetanus globulin if available to neutralize circulating toxin
- Active immunization with 0.5 ml of tetanus toxoid if the patient is not immunized or the wound is tetanus prone

Prevention:

Prevention of clinical tetanus depends on adequate immunization of the population and careful surgical management of all traumatic wounds, even those which appear to be minor. Patients with grossly contaminated wounds and no or unclear history of immunization should receive an intramuscular antitoxin therapy. Active immunization with tetanus toxoid should also be started.

Gas Gangrene

Gas gangrene is another clostridia associated with soft tissue infection (Clostridial myonecrosis). It is a rare but devastating infection characterized by muscle necrosis and systemic toxicity due to the elaboration and release of toxins. It usually follows wounding

Clinical features:

It is characterized by fulminant local and systemic manifestations. Patients may appear normal at early state. Clinical features include:

- Sudden and persistent severe pain at wound site.
- Localized tense edema, pallor and tenderness
- Gas noted on palpation or radiographs
- Progressive brownish discoloration of skin and hemorrhagic bullae formation
- Dirty brown discharge with offensive, sweetish odor
- Severe systemic manifestations including fever, tachycardia, hemolytic anemia, hypotension, renal failure and finally death
- Gram's stain from the discharge can be diagnostic

Management:

- Surgery is most important component
- Extensive, wide excision of involved muscles
- Amputation of an extremity may be needed.
- Antibiotics: high dose penicillin is the preferred drug
- Supportive measures including
  - Intravenous infusions
  - Blood transfusions
  - Close monitoring and follow up

Review Questions

1. Which of the following is not categorized as “surgical infection”?
    A) Urinary tract infection after catheterization for Prostatectomy
    B) Abscess formation following injection on the thigh
    C) Wound abscess following excision of big lipoma on the back
    D) Lung atelectasis following intubation for laparotomy
    E) None of the above

2. Which of the following is a requirement for a surgical infection to occur?
    A) Virulent microorganism
    B) A tissue of decreased or no blood supply
    C) A decrease in the immune response of a patient
    D) All of the above
    E) None of the above

3. Which of the following are the most common microorganisms of surgical infection?
    A) Viruses
    B) Staphylococcus species
    C) Clostridia
    D) Candida
    E) Entoameba

4. Which of these clinical states may indicate a presence of surgical infection?
    A) Fever
    B) Loss of function of body part
    C) Local hyperemia
    D) Tachycardia
    E) All of the above

5. Which investigation can be helpful for diagnosing a surgical infection?
    A) Gram’s stain from a discharge if there is any
    B) Blood culture
    C) WBC count
    D) Tissue biopsy
    E) All of the above

6. The correct way of managing a patient with an abscess is

A) Start with effective antibiotics and send home

B) Drainage and no antibiotics if no systemic signs

C) Apply local ointments for aiding the abscess to burst

D) Give effective antibiotics and analgesics

E) All except B

7. In a patient with gas gangrene

A) Little circulatory support is needed

B) Surgical removal of gangrenous tissue is the primary management

C) Penicillin is the preferred antibiotic

D) B and C are correct

E) Systemic signs are not commonly seen

Key to the Review Questions

1. E
2. D
3. B
4. E
5. E
6. B
7. D

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CHAPTER NINE

TRAUMA

Learning Objectives

After reading this chapter, the student should be able to:

- Identify the various types of trauma; understand their epidemiology, predisposing factors and methods of their prevention.
- Learn the general approach and treatment priorities of a trauma victim.
- Learn the specific management of missile injuries and burn.

Introduction

Trauma is one of the leading causes of mortality, morbidity and disability worldwide. In developing countries, the magnitude of the problem has been increasing consuming more and more of the meager health resources of these nations. Moreover, trauma mostly affects people in their productive years of life, hence the high economic and social burden to society.

The causes of trauma are various and their relative incidence varies in different populations. Deaths due to trauma tend to occur in three patterns:

1. Immediate death (50%)

- Occur in the first few minutes after the accident
- Are due to extensive and lethal injuries to the brain, heart & major blood vessels

2. Early deaths (30%)

- Occur in the first few hours
- Are due to the collections and bleedings in the chest and abdomen, extensive fractures and increased intracranial pressure
-

DEFINITION

Trauma is tissue damage, which occurs due to transfer of different forms of energy either intentionally or unintentionally.

Types of Trauma: Trauma can be classified according to the:

I- Cause: Homicidal injuries

Road traffic accident and falls

Industrial accidents, burn, etc.

II- Mechanism: A/ *Blunt Injury: C*aused by acceleration, deceleration, rotational or shearing force

B/ *Penetrating Injury: C*aused by a direct breach by penetrating object

E.g. Bullet injury, stab injury

TREATMENT PRIORITIES

Management of trauma requires adherence to an established order of priorities like the advanced trauma life support (ATLS) protocol developed by the American College of Surgeons. The ATLS generally consists of a primary survey and resuscitation followed by a secondary survey and definitive management.

I- The primary survey and resuscitation

This part of management comprises a quick evaluation of the patient to detect immediately life threatening situations and institution of measures to correct them. It has the following components:

A- Air way: Assess the patency of air way. In a trauma victim, it may be compromised by the back fallen tongue, broken tooth, vomitus, blood etc. If the air way is compromised, use suctioning, jaw trust, positioning, oropharyngeal tube or endotracheal tube to open it, taking care of the cervical spine.

B- *Breathing:* Assess adequacy of breathing. It may be compromised by pneumothorax, hemothorax or multiple rib fractures causing flail chest.

C- *Circulation:* Assess the circulatory volume. Look for external hemorrhage and arrest it by pressure, bandaging or tourniquet if the other methods fail. Tachycardia, hypotension, pallor may mean bleeding into the body cavities or from an obvious external wound. Open a wide bore

IV line, take blood sample for cross match and start resuscitation with Normal saline or Ringer's lactate.

D- Do a quick neurologic examination to assess consciousness. Use the Glasgow coma scale (GCS) to determine the level. Look for any Neurological deficit or lateralizing sign.

E- Expose (undress) the patient fully for examination not to miss serious injuries.

II- Secondary survey and definitive management

This is done after the life threatening conditions have been evaluated and resuscitative measures are instituted. It includes the following aspects:

A- Take History: The informant may be the injured patient, relatives, police or ambulance personnel. The history should include:

- Time of injury,
- Mechanism of injury,
- Amount of bleeding,
- Loss of consciousness,
- Any intervention performed or drugs given should be asked for.

B- Do a proper and *systematic examination* of all body systems.

C- Make necessary investigations such as hematocrite, cross-match, urinalysis, X-ray, ultrasound, etc. However, **never** send a patient with unstable vital signs for investigation or referral before resuscitation.

D- Institute the appropriate *specific treatment* like laparotomy for possible abdominal organ injury, POP cast for tibio-fibular fracture.

ROAD TRAFFIC ACCIDENTS (RTA)

Road traffic accident is the leading cause of trauma deaths in industrialized nations and many developing countries. Several factors contribute to the high magnitude. These include poor condition and design of roads, traffic mix (sharing of road by vehicles of different speeds and pedestrians), poor condition of the vehicles and poor traffic rule enforcement.

The incidence of this serious problem can be reduced by improving the public awareness and the quality of training given to the drivers and strict enforcement of traffic rules. Moreover, improving the design and quality of the roads and regular checkup of vehicle fitness would help alleviate the problem.

Injuries are caused by sudden acceleration e.g. a pedestrian hit by car or decelerations causing the passenger to collide with the interior of car, other passengers or be ejected out of the car. There are certain patterns of injury in RTA .The presence of one of the following injuries should alert to the possible presence of the other:

- Á Head and cervical spine injury
- Á Lower rib fractures and spleen or liver injuries
- Á Pelvic fracture and urinary tract injury etc

Certain factors indicate that a RTA victim has a high risk of serious and multiple injuries. These include:

- Presence of flail chest
- Roll over
- Death of another person in the car

FIREARM INJURIES

In civilian practice, these injuries are mostly due to homicidal violence, although accidental injuries also occur. In many developing countries like Ethiopia, the magnitude of the problem is big due to high distribution of firearms among civilians who have little or no knowledge on safe handling and usage. It is made worse by the presence of large number of land mines, which are remnants of repeated wars and conflicts in these poor nations.

Generally, missile injuries may be caused by bullets from pistols, rifles, machine guns or fragments from exploded grenades and mines. The degree of injury sustained depends on the amount of energy transferred from the missile to the patient as formulated below.

$E=½mv^2$ (E = energy transferred, m = mass of the missile, v = velocity of the missile)

Thus, the speed and weight of the missile are the determinant factors. The extensive tissue injury with the high degree of contamination creates a perfect medium for life threatening infection to occur.

Missile injuries are classified into:

I- *Low- velocity missile injuries*

- Comprise missiles fired from hand guns (<400m/s)
- Injury is limited to the path of the bullet.

II- *High velocity missile injuries*

- Comprise bullets fired from rifles, machine guns and blast fragments ($\geq$1000m/s)
- Cause a small entrance and a larger exit wounds

- Tissue damage occurs in the surrounding tissue as well, due to the temporary cavitation effect
- Foreign bodies, dirt and clothing materials are sucked deep in the wound due to the vacuum effect

Management of missile injuries

The most important factor in the management of missile injuries and prevention of serious infection is appropriate wound debridement. Wound debridement consists of:

- Excision of all dead tissue, e.g., dead muscle
- Removal of all dirt, foreign bodies and free bone fragments
- Thorough irrigation of wound with copious amount of saline
- The debrided wound should be left open for closure later

N.B: Never close missile wounds primarily, not even the very trivial looking ones!

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3- Third degree (full thickness) burn: Involves complete burn of the dermis. The burned skin looks charred, white or grayish and the surface is pain free.

The extent or percentage of burn is determined by the “rule of nine” in which the body surface is divided into eleven parts each constituting 9% of the total (fig.). In children, the size of the hand may be used to estimate the burn surface, which is approximately 1%.

Management of a burn victim

General management:

Like all trauma patients, adhere to ATLS system.

- Airway obstruction may occur rapidly after inhalation injury or delayed for 24-48 hours. Endotracheal intubation or tracheotomy may be needed in patients with burns involving the air way.
- Major burn (> 20% body surface area) needs fluid resuscitation. Open IV line with wide bore cannula and infuse saline containing IV fluid (Ringer’s lactate if available)
  - The amount of IV fluid needed for the first 24 hours is calculated as a product of percent of the burned surface area and the body weight in kilograms added to the daily maintenance (%BSA X Wt.) + daily maintenance. *Half* of the calculated volume is given in the *first 8 hours* and the remaining half over the *next 16 hours from the time of burn*.
  - Volume and rate of fluid administration should be valid according to the vital signs and urine output, hence the need to catheterize the patient. The optimal urine output is 30-50ml /hr in adults and 1ml/kg/hr in children

Criteria for admission

- Adults $\geq$ 20% BSA burn
- Children $\geq$ 10% BSA burn
- Burns involving the face, hands, feet and genitalia
- Suspicion of inhalation injury
- Chemical and electrical burns

Burn wound management: There are several methods of managing a burn wound. The choice depends on the degree, size and site of the burn, and availability of facilities and expertise.

1- The *exposure method*: The burn wound is cleaned by antiseptic agents and left exposed to air. It is used for burns of the face and burns of large surface area.

2- The *occlusive method*: A thick dressing after cleaning with antiseptics covers the burn wound. It is used mostly for outpatient treatment of small burns.

3- The *plastic bag method*: The burned part is wrapped in a transparent plastic bag. It is used for burns of hands and feet.

4- The *saline method*: The burn wound is intermittently irrigated with half strength saline solution. This is used for large surface deep burns.

5- Early *excision and skin grafting*: This needs skill of grafting and transfusion facilities. It is used for deep burns.

Emergency escharotomy and fasciotomy should be done for deep circumferential burns of limbs, neck or trunk.

Analgesia: Most burn patients are in severe pain. Therefore, analgesic doses of IV narcotics regularly to control the pain should be stressed as part of the management.

Prevention of Infection: Burn patients have impaired resistance against infection. Most deaths occur due to pneumonia and wound sepsis. Prophylactic antibiotics (penicillin) are given for severe burns but, routine administration has no value. Topical antimicrobials e.g. 1% silver sulfadiazine are helpful for deep 2^{nd} and 3^{rd} degree burns.

Nutrition: Naso-gastric tube should be inserted after admission for patients with more than 25% burn and those who have nausea and vomiting. Enteral feeding should be resumed as

Review Questions

1- A 20 year old man was brought in unconscious after car accident. Describe how you would proceed managing him.

2- What are the predisposing factors for road traffic accidents and describe the methods of prevention.

3- What does wound debridement mean?

4- How would you manage a 24 year-old housewife who was brought in eight hours after sustaining a 30% flame burn to her chest, arms, and face?

Reference

1. Schwatz Text Book of Surgery, 1999.

2. Baily and Love's Short Practice of Surgery, 22nd edition.

HEAD AND SPINAL INJURIES

Learning objectives

At the end of this chapter students are expected to:

- Identity types of head injuries
- List the effects of head injury
- Outline assessment of patients with head or spinal injury
- Plan for management of patients with head injury
- Outline evaluation and management of spinal injuries

Fracture of the base of skull

Basal skull fractures can occur at different sites (anterior, middle or posterior fossa)

They often result in CSF leak. Anterior fossa fractures present with subconjuctival hematoma, anosmia, epistaxis and CSF rhinorrhoea. Middle fossa fracture presents with CSF rhinorrhea or otorrhea, heamotympanum and bruising behind the ear.

Brain injuries

Mechanisms of brain injury

Abrupt deceleration of a moving head results in minor injury at site of impact (coup injury) or contusion of the brain opposite the point of impact (contra coup injury). From clinical point of view, brain injuries could be primary (occurring at the time of impact) or secondary (develops subsequently).

Primary brain injury

Cerebral concussion

This is a clinical diagnosis characterized by temporary dysfunction. It is most severe immediately after injury and resolves after variable period of time. It is often accompanied by loss of consciousness and amnesia for the moment is common. Post-concussion syndrome which consists of headache, irritability, depression and lassitude may be seen as late manifestations.

Cerebral contusion and Laceration

Pia and arachnoid tearing and intracerebral bleeding characterize these conditions. It usually produces focal neurologic deficits that persist for more than 24 hours. Blood brain barrier defects and cerebral edema are common. Contusions may resolve spontaneously or persist.

Secondary brain injuries

Secondary brain injuries are effects which develop secondary to subsequent anatomical and physiological derangements. The role of the health worker is to early detect and manage these.

Intracranial hematomas

A. *Extradural hematoma:* This condition usually follows temporal bone fracture with tearing of middle meningeal artery leading to hematoma collection. Patients may present in coma after a lucid interval. Urgent evacuation of the hematoma is required.

B. *Acute Sudbural* hematoma: This state is the most common intracranial mass lesion following head injury. Mostly, it results from tearing of bridging veins. The lesion is rapidly evolving and early evacuation is mandatory.

C. *Chronic subdural* hematoma: This is most common in infants and adults over 60 years of age. Patients usually present with progressive neurological deficit more than 2 weeks after the trauma.

D. *Intracerebral hematoma:* Intracerebral hematoma results from areas of contusion coalescing into contusion hematoma.

Cerebral swelling (Brain edema)

This results from vascular engorgement, due to loss of auto regulation and increased extra and intracellular fluid. If not corrected early, it results in cerebral ischemia.

Infections

Compound depressed fractures or basal skull fractures can lead to meningitis or cerebral abscess.

Patient assessment

In unconscious head injury patient, *primary survey* followed by resuscitation, if any impairment, should be the initial approach. Air way, breathing and circulation should be secured. This has to be followed by *secondary survey* and definitive management.

History

Points to determine in the history are:

- Period of loss of consciousness
- Period of post traumatic amnesia
- Cause and circumstance of the injury
- Presence of headache and vomiting.
- Presence of seizures.

Physical examination

Then Patients will be examined for evidences of injury

- Assess level of consciousness (Glasgow coma scale)
- Pupillary response
- Complete neurologic examination, look for lateralizing signs.
- Look for evidences of basal skull fracture

Intracranial hypertension must also be controlled in postoperative period. Post-operative

Investigation

After complete physical examination, x-rays should be taken. In conscious patients biplanar x-rays of the symptomatic part of spine are adequate. In cervical spines, unstable injuries are easily overlooked in lateral and A-P films. One option is to have real-time flexion and extension x- rays.

Treatment

- IV resuscitation should be started in patients with spinal shock.
- Majority of simple compression fractures heal without consequences. It is treated symptomatically initially with rest, then with splinting and mobilization as necessary.
- Adequate immobilization is mandatory in unstable cervical injuries. Further neurologic damage is prevented by suitable immobilization.
- If there is deterioration of neurological function after initial assessment, surgery should be considered to stabilize the spine and to decompress the spinal cord and nerve roots. Careful transfer to appropriate centers is therefore important.
- High dose steroids may improve recovery after spinal cord injuries.
- Bladder care.
- Bed sore prevention by bed care and frequent position changes.

Review Questions

1. Discuss the basic mechanisms of brain injury in head injury patients

2. List the secondary brain injuries following head injury

3. A patient comes to you after sustaining a road traffic accident. On physical examination, there are no evidences of external injury. When you assess his level of consciousness, he opens his eyes when pinched, withdraws from pain and he is confused.

    a) What is his Glasgow coma scale?

    b) What further history and physical examination do you require?

    c) List the investigation you order

    d) Suggest your management plan

References

1. Bailey and Loves, Short Practice of Surgery.22nd edition

2. Hardy's Textbook of Surgery

4. Primary Surgery, Trauma.

CHAPTER TEN

ORTHOPEDIC SURGERY

Learning Objective

After reading this chapter, the students should be able to:

- Understand the etiology, pathology and clinical presentation of bone and joint infections.
- Learn the mechanism, classification and healing of fractures and dislocations.
- Learn the general steps and the various modalities of fracture treatment and their complications.
- Learn about amputations, their indications and complications.

Introduction

Orthopedics deals with disorders of the musculoskeletal system. Although the

Diagnosis

- History of
  - Pain, which is gradually increasing in severity
  - Fever, Toxicity
  - Failure to use the involved limb
- Physical Examination
  - Localized bony tenderness (most important)
  - Adjacent joint may contain effusion
- Lab. Investigation
  - Leucocytosis and raised ESR
  - Positive blood culture
  - X-ray changes of bone: late to develop (10-15 days) and is thus not helpful for diagnosis of acute osteomyelitis.

Treatment

Antibiotics

- IV antibiotic should be started empirically after taking blood sample for culture
- Choice of antibiotics depends on the age:
  - Neonates:- Penicillinase resistant penicillins + Aminoglycosides
    E.g. Cloxacillin + Gentamycine
  - Children under 5 years:- Penicillinase resistant penicillins + Anti H.influenzae
    E.g. Cloxacillin + Chloramphenicol
  - Patients above 5 years:- Penicllinase resistant penicillin
    E.g. Cloxacillin

The duration of antibiotic treatment is 6 weeks. IV route is changed to oral after fever and leucocytosis have disappeared (about 7-14 days).

Surgery: Surgery to drain abscess is recommended if fever and pain fail to subside after 48 hours of IV antibiotic treatment or if there is evidence of pus collection.

Analgesics and splinting: Analgesics and splinting of the limb in functional position using POP casts or skin traction reduces pain in the acute phase.

CHRONIC OSTEOMYELITIS

Chronic osteomyelitis usually follows a delay or inappropriate treatment of an acute stage osteomyelitis. It may also follow direct infection of bone in compound fracture.

Pathology: The dead bone (sequester) lies in an abscess cavity surrounded by a newly formed bone (Involcrum) under the elevated periosteum.

Diagnosis: The usual presentation is periods of quiescence and acute exacerbation of persistently discharging sinus. There may be skin hyper pigmentation around the sinus and palpable bone thickening. X-ray may show sequester, abscess cavity, involucrum or diffuse sclerosis.

Treatment

***Antibiotics*:** Used for acute exacerbation and perioperate for about six weeks.

Surgery: Surgery is done to remove a dead bone (sequesterectomy) or to eliminate an abscess cavity (saucerization). Conservative treatment is considered in a patient with minimal discharge and no obvious sequestrum or bone cavity. Amputation may be considered for extensive bone involvement and heavy discharge or frequent flare-ups which incapacitate the patient.

SEPTIC ARTHRITIS

***Definition*:** Septic arthritis is an acute bacterial infection of joints.

***Etiology*:** It varies in different age groups and is similar to that of acute osteomyelitis. Neisseria gonorrhea should be considered in the sexually active age group.

Pathology: The hip and knee joints are the commonly affected joints. Bacteria may reach the joint via the blood, local extension of osteomyelitis or directly in penetrating wounds of the joint. The pus formed in the joint is chondrolytic and destroys the joint cartilage if not evacuated.

Diagnosis:

History: The usual presenting symptoms are joint pain, swelling and fever.

Physical examination: The joint becomes swollen with effusion, tender and warm. The range of active and passive movement also gets severely limited.

Lab: Joint fluid analysis reveals opaque yellow to green fluid with

- High cell count (mostly>100,000/mm^3, with >90% PMN).
- Decreased glucose level (50 mg/dl lower than blood)
- Culture is often positive.

Treatment

Start with *IV antibiotics*. Do joint *aspiration* repeatedly under aseptic condition. If frank pus is found, drain it by making *arthrotomy*. *Immobilize* the affected joint in functional position until inflammation subsides and physiotherapy to prevent joint stiffness.

Complications

Early: Destruction of articular cartilage, dislocation, epiphyseal necrosis.

Late: Secondary osteomyelitis, joint stiffness and ankylosis

TUBERCULOUS ARTHRITIS

Tuberculosis of bones and joints is mostly due to hematogenous spread from a pulmonary focus. The intervertebral discs, the hip and knee joints are the most frequently affected.

Pathology

- Necrosis and granulation tissue formation in the synovium
- Destruction of sub chondral bone and articular cartilage
- Fibrous fusion (ankylosis) of the joint

- Á Presence and type of displacement which can be lateral shift, angulation, rotation, overlap, distraction
- Á Quality of bone: check for:
  - Osteoporosis
  - Pathological fracture, etc

Management of a patient with fracture

A) GENERAL TREATMENT

- Like any trauma patient, follow the ATLS system. Associated life threatening injuries may be missed if evaluation of the patient is not systematic.
- Always assess the status of distal circulation and neurological function.

Methods of Immobilization

1- Plaster of Paris (POP) cast

- Is the safest and cheapest method of immobilization
- Immobilization should always include the two adjacent joints
- Joints should be immobilized in a functional position
- Complications include joint stiffness and compartment syndrome.

2- Traction

A) Using gravity: e.g. U-slab for humeral shaft fracture

B) Skin traction: A method of applying traction using bandage, usually used in children and temporarily in adults. The maximum weight that can be applied is 2kg.

C) Skeletal traction: Traction applied via a pin inserted into the bone distal to0 >>BD0sta93

Compound (open) fractures

Open (compound) fracture

- This is a fracture in which the fracture hematoma communicates with skin or mucous membrane.
- Infection is the most feared complication of compound fractures and may cause delayed healing, non union, sepsis or even death.
- It is a surgical emergency

Principles of management*:*

- Early wound debridement and thorough irrigation with saline
- Antibiotics: Broad spectrum e.g. Penicillin + Aminoglycoside should be given IV at least for 48 hrs.
- Tetanus prophylaxis
- Rigid immobilization with access to the wound e.g. extcr'te compoun TDDer000lgourge!P

III- Infection

- Usually complicates open fractures
- Chronic osteomyelitis may be the result.
- Adequate debridement is the most critical factor in preventing infection.

IV- Bone healing abnormalities

1- Delayed Union

- Failure of a fracture to heal in the expected time period.

2- Non union

- Total failure of the fracture to heal with formation of a false joint between the fractured ends (pseudoarthrosis)

3- Malunion

- Healing occurs with deformity

4- Avascular necrosis

- Necrosis of part of the fractured bone occurs due to disruption of its vascular supply. E.g. Femoral head.

V- Joint complications

- Joint stiffness
- Secondary Hemarthrosis
- osteoarthritis

VI- Systemic complications

- Usually follow polytrauma and major long bone fracture
- Include ARDS and fat embolism syndrome

DISLOCATIONS

A dislocation is a total disruption of joint with no remaining contact between the articular surfaces.

A subluxation is partial joint disruption with partial remaining but abnormal contact of articular surfaces.

Types of Dislocation

1- Traumatic dislocations

- This is a type of dislocation caused by trauma. A force strong enough to disrupt the joint capsule and other supporting ligamentous structures dislocates a previously normal joint.

2- Deadly limb

- Life threatening infection (e.g. Gas gangrene) or malignancies which can't be controlled by other local measures

3- Dead loss

- Severe soft tissue injury especially associated with major nerve injury, which may occur in compound fractures.

Level of amputation

The choice for the level of amputation depends on:

- Age
- The nature and extent of the pathology e.g. Neoplasm, trauma
- The vascularity of tissues
- Presence of infection
- Status of the joints
- Access to the various types of prostheses

Generally, the most distal level that will heal and still provide a functional stump is selected.

- In the upper limb, attempt should be made to conserve every possible inch.
- In the lower limb, the most important factor is to try and conserve the knee joint whenever possible.

Amputations performed in the face of infection should be left open for a later closure.

Complications of amputation

- Edema
- Hematoma
- Secondary and reactionary hemorrhage
- Infection
- Ischemic necrosis
- Flexion contracture
- Chronic pain-psychogenic, neuromas, etc.

Review Questions

1. Describe the pathogenesis of acute osteomyelitis.
2. A 25 year old man presents with severe pain and swelling of his right knee joint of two days duration. Discuss his management.
3. Describe the management of a patient with compound fracture.
4. What is compartment syndrome? Describe its clinical manifestation and management.
5. List the indications for amputation.
6. What are the factors considered in deciding the level of an amputation?

Reference

1. Review of orthopedics. Mark D. Miller, 1992.

2. Sabiston Text Book of Surgery, 1997.

3. Schwartz Text Book of Surgery,1999

4. Bailey and Love’s Short Practice of Surgery.

CHAPTER ELEVEN

ANESTHESIA

Learning Objective

After reading this chapter, the student should be able to:

- Á Get basic information and understanding about the proper pre-anesthetic preparation of a patient before surgery,
- Á Get basic knowledge on different types of anesthesia with their characteristics.
- Á Get basic knowledge about the steps in the assessment and management of a patient with cardio-respiratory arrest, needing cardiopulmonary resuscitation.

PRE-ANESTHETIC PATIENT EVALUATION AND PREPARATION

INTRODUCTION

The purpose of pre anesthetic assessment is to present the patient for surgery in the best possible condition. Pre anesthetic assessment and preparation should include:

- o Medical History
- o Relevant physical examination
- o Checking the results of tests or investigation
- o Correct or improve any medical conditions before surgery
- o Prescribing any drugs for pre-medication (if needed)
- o Explaining to the patient the procedure of anesthesia

History

- o Diagnosis and planned surgery
- o Actual medical and surgical history

Respiratory system: Ask if there is history of shortness of breath, cough, sputum production and wheezing

Cardiovascular system: Check if there is history of:

- o Angina/previous myocardial infarction, current orthopnea, ankle swelling

Past medical history: Such as bleeding disorders, hypertension, asthma, seizures, psychiatric disorders, previous anesthesia and any problem related to anesthesia

Drug therapy: History of intake of drugs like:

- Anti-diabetics
- Anticoagulants
- Steroids
- Anti-hypertensive

Additional history on:

- Excessive alcohol intake, smoking and allergies to drugs
- Pregnancy
- Dental status (loose teeth)
- Fasting

Physical Examination

Respiratory System

Check for cyanosis, finger clubbing, pattern and frequency of breathing, position of trachea, presence of added sounds on auscultation and their localization.

Cardiovascular system

Ease of venous cannulation: Finally, check for the ease of venous access

Investigations: There are routine investigations prior to any surgery which requires anesthesia. This depends on the facilities and the condition of patient and type of surgery. Special investigations should be ordered according to the condition of the patient.

District Hospital: (Where the facilities are restricted)

- Hemoglobin
- Urine analysis

Referral Hospital:

- Hemoglobin and full blood count
- Urine analysis
- Blood Urea Nitrogen/Creatinine
- Serum electrolytes
- Electrocardiogram (age over 40 years)

In case of emergency surgery: Patients presenting for emergency surgery face additional problems to those with elective surgery. These include full stomach with high risk of aspiration and hypovolemia due to blood or fluid loss which has to be replaced as fast as possible. Measures which should be taken in case of full stomach include:

- Postpone surgery for at least 4 hours.
- Empty the stomach using Naso-Gastric Tube of largest possible size.
- Magnesium tricilicate to reduce the pH of the gastric content.
- Especial "Crash induction" can be employed in the case of general anesthesia.

Crash induction:

This is a procedure used to prevent aspiration when full stomach is suspected.

- ü First preoxygenate the patient and give induction agent to make sleep.
- ü An assistant apply pressure on the cricoids just below the thyroid cartilage to occlude the esophagus.
- ü Then, muscle relaxant given
- ü The pressure will be removed when the endotracheal tube is in the trachea and the balloon is inflated

N.B.: In case of a life-threatening emergency, there is no contraindication for general anesthesia!

Measures before leaving the ward to the theater

- Food and drink with held for 6 hours
- Lipstick removed, nails cleaned, etc.
- Dentures, artificial limbs and eyes removed
- Bladder emptied
- Premedication given

Premedication

Definition: Premedication is administration of drugs before surgery.

Purposes:

- To alleviate anxiety and fear with sedatives (Diazepam)
- To reduce secretions especially salivary and bronchial (Atropine)
- To prevent undesirable reflexes, e.g. bradycardia (Atropine)
- To facilitate induction and reduce the dose of anesthetic used

Commonly used drugs:

- ü Diazepam 10 mg
- ü Atropine 0.01 mg/kg IV / 0.02 mg/kg IM (ideally 30 min prior surgery)

Route of administration:

- Oral with small amount of water
- Intramuscular (for children)
  - Intravenous injection:
- Pre medication has not been given earlier in the ward
  - In patients who have already intravenous infusion running
  - In shocked patients
  - In a patient who has a bleeding tendency

CARDIOPULMONARY RESUSCITATION (CPR)

Definition: Cardiopulmonary resuscitation is the attempt to restor the vital functions of the body, which are the respiration and the circulation.

ABC of Cardiopulmonary Resuscitation
A = Assessment and Airway
B = Breathing
C = Circulation
D = Drugs

A. Assessment: Assess the patient for response by

- Á gently shaking the shoulders
- Á shouting, “are you all right?”

If the patient responds by moving or answering, leave him/her in the position in which they were found (assuming there is no further danger) and look for any obvious injuries or causes for collapse (Diabetic, intoxication, etc).

If there is any suspicion of a neck injury, protect the cervical spine by manual immobilization. Provide first aid for any injuries present and carefully reassess the patient at the regular interval.

If the patient does not respond, shout for help.

Fig. 1: Opening the Airway

By tilting the head back, open the airway by lifting the tongue off the fall by lifting the chin. Inspect the posterior pharyngeal wall. Remove any obvious obstruction from the mouth including loose denture.

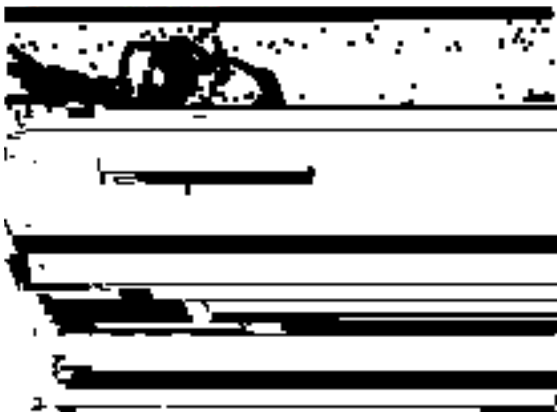


Fig. 1: Opening the airway. Top: Airway obstruction produced by tongue and epiglottis
Bottom: Relief by head tilt –chin lift

B. Breathing:

- ü Look, listen and feel for breathing (Fig. 2).
- ü Look for chest movement.
- ü Listen at the mouth for breathing sounds.
- ü Feel for expired air with your cheek.
- ü Look, listen and feel for up to 10 seconds before deciding whether breathing is present or absent.

Fig. 2: Determining breathlessness

If the patient is breathing:

- ü Turn the person into the recovery position (lateral position) unless you would aggravate any injuries (cervical spine injuries).
- ü Observe him/her closely checking that uninterrupted breathing continues and pulse is present.

If the patient is not breathing:

- ü Turn the patient into supine position and give two breaths of expired air ventilation (mouth to mouth breathing) (Fig. 3) then check the circulation.
- ü Expired air ventilation provides oxygen concentration of 16%, which is adequate to oxygenate the collapsed patient in the initial phase.

Fig. 3: Rescue breathing: Mouth to mouth breathing

C. Circulation (Fig. 4)

- ü Check the carotid pulse just lateral to the laryngeal prominence. Major pulses like the carotid or femoral pulses are more reliable in an emergency than peripheral pulses.
- ü Feel up to 10 seconds before deciding about the presence or absence of pulse.
- ü Look for any other signs of circulation (movement, swallowing, etc).

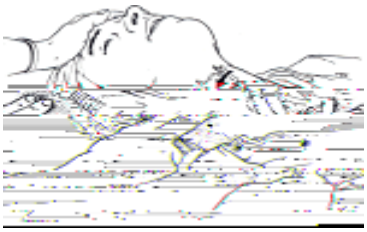


Fig. 4: Determining pulselessness. Locate the larynx while maintaining the head-tilt position (left). Slide the fingers into the groove between the trachea and the muscles at the side of the neck where the carotid pulse can be felt (right).

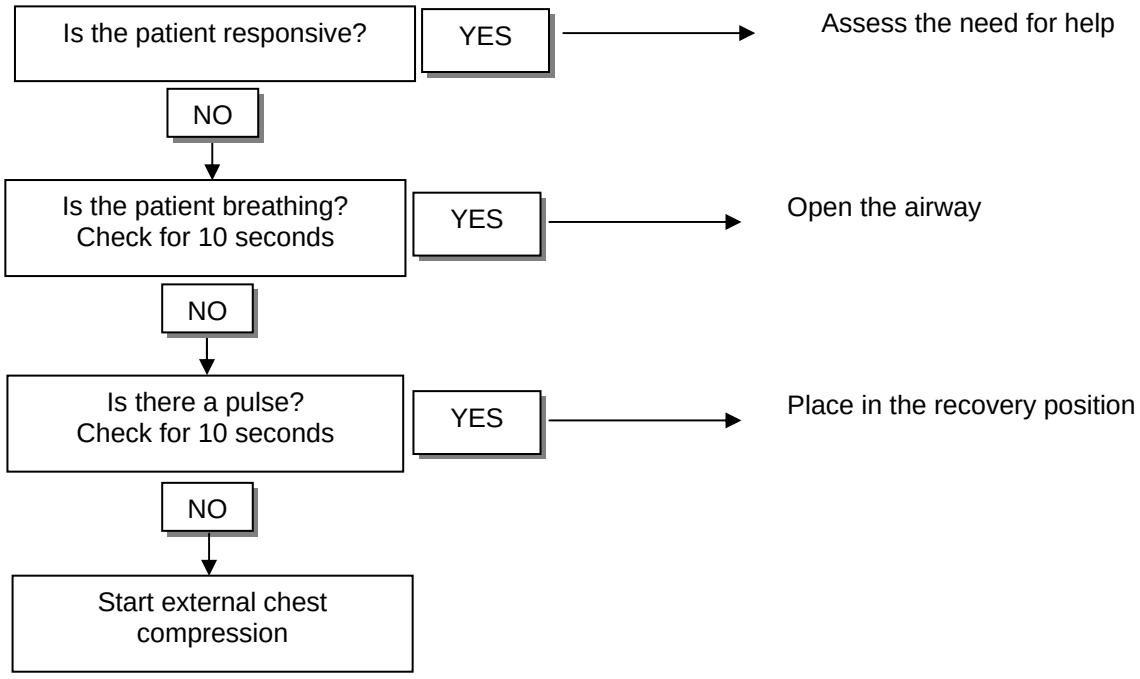
If pulse is present:

- ü Continue ventilation giving 10 breaths per minute.
- ü Reassess for signs of continuing circulation every minute, taking no more than 10 seconds to do so on each occasion.
- ü If signs of a spontaneous respiratory effort appear, stop and reassess ABC again.

If there are no signs of circulation, this is a ***cardiac arrest.***

- ü Start external chest compression (Fig. 5).
- ü Give 15 chest compressions.
- ü Reopen the airway and give a further 2 breathes of expired air ventilation.
- ü External chest compression provides only 20% of normal cardiac out put.

SUMMARY: ABC OF LIFE SUPPORT



D. Drugs:

Open the intravenous line and start with resuscitation fluid and at the same time one of the assistants can prepare adrenaline and give 1 mg every 3 minutes. In the meantime continue with breathing and external cardiac compression. Check for pupilary reaction as well. After 20-30 minute if there is no sign of heart beat and pupilary reaction one can stop resuscitation.

SYSTEMIC (GENERAL) ANESTHESIA

Definition: Several different types of drugs with different properties can produce the state of anesthesia.

General Anesthesia: the method of making the patient pain free and unaware about what is going on during the surgery.

***Regional anesthesia*:** a method of blocking of nerve impulses before they reach the central nervous system using local acting drugs in order to induce analgesia and /or relaxation.

Advantages of General Anesthesia

- It can be given quickly
- It makes the patient's whole body insensitive to pain
- It makes the patient unconscious

A general anesthesia may cause both respiratory and cardio-vascular complications, which will require intervention. To fight against the complications, one should:

ü Keep a vein open before anesthesia

ü Have to prepare equipments for securing air way and possible ventilation.

Steps of general anesthesia

ü Premedication

ü Induction

ü Maintenance

ü Recovery

Premedication

Premedication can be started in the ward and /or in the OR before surgery.

Induction of Anesthesia

Induction of anesthesia is to make the patient unconscious. Before giving the drugs to make the patient sleep you should let him/her breathe 100% oxygen, which will be used as a reserve during the time of intubation. Induction can be performed:

- With intravenous anesthetic agents: Ketamine + Atropine or Thiopentone
- With inhalation agent (e.g. Halothane)

After the patient is induced, the anesthesia can be continued with intubation or with out (mask ventilation or spontaneous breathing).

Endo tracheal intubation:

It is a technique of passing an endotracheal tube into the trachea of the patient for securing the airway, and to make easier ventilation. For Intubation the patient should be adequately relaxed with inhalation agent or muscle relaxant. The relaxant used for intubation is Suxamethonium, which has fast onset of action and short effect.

Equipment necessary for intubation and resuscitation:

- Face mask
- Self inflating bag (Ambo)
- Oropharyngeal air way (different sizes)
- Suction machine with suction tip
- Laryngoscope with different blade sizes
- Endotracheal tubes

Maintenance of Anesthesia: The anesthesia can be maintained with:

- inhalation agent (halothane or ether ± muscle relaxant
- inhalation agent + ketamine ± muscle relaxant
- intermittent Ketamine or Ketamine drip ± muscle relaxant
- Muscle relaxants for maintenance which usually are long-acting ones (e.g. Pancuronium, Vecuronium).

Monitoring: During anesthesia it is important to do strict monitoring of heart beat, blood pressure, respiration, temperature, fluid balance and urine output.

The carrier gas for volatile anesthetic agent can be atmospheric air or oxygen from compressed source depending on the type of Anesthesia machine in use.

Recovery and Extubation:

During recovery phase the patient recovers from:

- Inhalation agents by exhalation and/or metabolism
- Ketamine by excretion and metabolism
- Muscle relaxants by excretion and/or metabolism and/or reversal with neostigmine

Before extubation

- Be sure that the patient is breathing adequately (reversed from relaxant)
- Suck oropharyngeal secretion
- Deflate the cuff (which is used for adults) and remove the endotracheal tube

Transportation and immediate postoperative care:

- Transport in the recovery position
- Check and observe closely the pulse rate, blood pressure, respiratory rate, urine output hourly, any abnormal and continuing blood loss and presence of pain.

Lidocaine (Xylocaine) 1%, 2% or 5% with or without Adrenaline in dose of:

With Adrenaline: 7 mg/kg

Without Adrenaline: 3 mg/kg

- **Bupivacaine** (Carbosthesin, Marcain) 0.25%, 0.5%, 0.75% without Adrenaline
  Maximum dose: 2 mg/kg

Adding Adrenaline to Lidocaine has two useful effects:

- Allows larger dose of Lidocaine without toxic effect, by causing vasoconstriction which reduces the rate of absorption of the drug.
- As the rate of absorption of local anesthetic drug is slow, the duration of anesthesia increases.
- Never use local anesthetic drugs with adrenaline in areas supplied with end arteries
  e.g.
  - For finger block
  - At the ear lobe
  - For circumcision (on penis)

Contraindications to conduction anesthesia

- True allergy to local anesthetic drugs
- Infection at the intended site of injection
- Systemic treatment of the patient with anti coagulant drugs

Types of conduction blocks

A) Spinal Anesthesia

Definition: Spinal anesthesia is a conduction block of nerve roots achieved by injecting a small volume of concentrated local anesthetic solution into the subarachnoidal space through the lumbar puncture. The level of lumbar puncture is at the interspaces between the 3rd and 4th lumbar vertebrae. The procedure should be performed with strict aseptic technique.

Drugs used

- Heavy or isobaric 0.5% Bupivacaine, duration of anesthesia 2-3 hours
- Heavy 5% Lidocaine, duration of anesthesia 90 minutes

Indications

Spinal anesthesia is appropriate for procedures involving below the level of umbilicus like in the lower extremities, hip, perineum, lower abdomen, lumbar spine.

Contraindications:

Complications for spinal anesthesia include:

- Patient refusal
- Patient with uncorrected hypovolemia
- Local infection
- Bleeding tendency
- Raised intracranial pressure

Procedure of spinal anesthesia

- Choose the lumbar interspace below the 2nd lumbar vertebrae (usually the 3rd or the 4th interspace) (Fig. 6 + 7).
- Clean and drape.
- Do the lumbar puncture (Fig. 8 top left).
- When the cerebro-spinal fluid starts to drip on removal of the stylet from the

Fig. 6: Lateral positioning of the patient and selecting the lumbar interspace

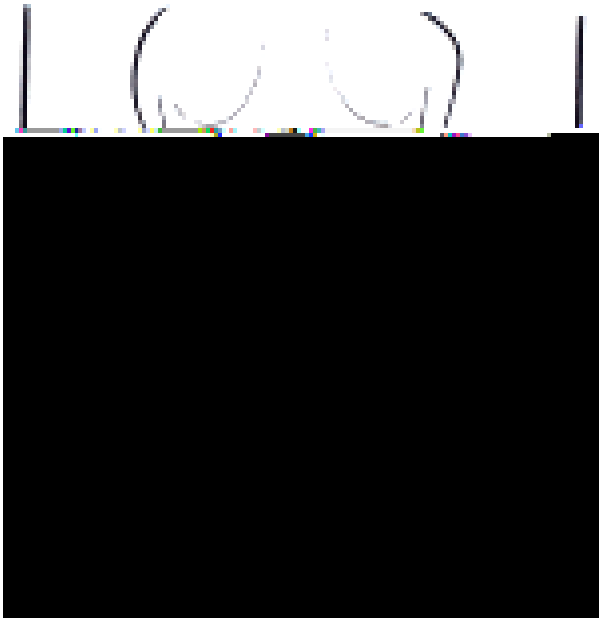


Fig. 7: Sitting position of the patient and selecting the lumbar interspace

Fig. 8: Technique of Spinal Anesthesia

B) Nerve block

Definition:

C) Field block

Field block is injection of local analgesic so as to create a zone of analgesia around the operative field. It can be used for:

- Repair of an inguinal hernia
- Caesarean section
- Circumcision

D) Infiltration

Infiltration is direct injection of drugs into the area to be incised and between bone ends in fractures. Lidocaine 0.5% is adequate for simple infiltration.

E) Topical anesthesia

This can be performed simply by applying 4% lidocaine to the mucus membrane, for minor surgery and instrumentation of:

- Nose
- Mouth
- Eye
- Pharynx and larynx
- Urethral procedures

Review Questions

1. A 60 year old male patient presents to Emergency OPD with persistent vomiting, abdominal distension and failure to pass flatus and feces. After evaluation by the surgeon, it is decided to take him to the operating theater.
   What preoperative preparation should be performed before surgery?

2. 35 year old man with wt of 60 kg comes for inguinal herniorrhaphy which is planned to be done under local anesthesia.
   a) What is the maximum volume of 1% Lidocaine (with Adrenaline) you can give?
   b) Immediately after injection of Lidocaine, the patient tries to say something to you, subsequently he fails to communicate and the pulse is getting weak. What are your immediate measures?

3. A 17 year old girl is brought to the Emergency department with polytrauma after a car accident. At arrival her BP is not recordable, she is unconscious and cyanotic. How do you manage this patient?

4. You receive a patient from the OR, who had major surgery. How do you follow this patient in the immediate post-operative period?

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Simple Goiter

Patho-physiology:

- Carcinoma: malignant changes of the follicular layer might develop in simple goiter.

Prevention and treatment

Prevention

In endemic areas the incidence of goiter can be significantly reduced by the introduction of iodized salt. In early stages, a hyper-plastic goiter may regress if thyroxin is given in a dose of 0.1mg daily for few months. The nodular stages of simple goiter are irreversible. But most of the patients are asymptomatic and do not require operation.

Operation might be indicated

- On cosmetic grounds
- Tracheal compression and
- When malignancy cannot be excluded

The options of surgical treatment are

- Near total thyroidectomy
- Subtotal thyroidectomy

Toxic goiters

Thyrotoxicosis - is a condition in which there is increased metabolic rate due to high level of circulating thyroid hormone. It is about eight times more commonly seen in females than males.

Clinical features

The most significant symptoms are

- Loss of weight in spite of good appetite,
- A recent preference of cold
- Palpitation.
- Tiredness
- Emotional liability.

The most important clinical signs of thyrotoxicosis commonly seen are

- excitability of the patient,
- the presence of goiter,
- hot and moist palms,
- exophthalmus in primary type
- tachycardia with cardiac arrhythmia

- Weakness of the proximal limb muscles
- The goiter in primary thyrotoxicosis (Grave's disease) is diffuse and vascular, it may be large or small, firm or soft and bruit may be present. Whereas in secondary thyrotoxicosis the goiter is nodular.

***Diffuse toxic goiter*:** Primary toxic goiter or Grave's disease is a diffuse vascular goiter appearing at the same time as symptoms of hyperthyroidism. It usually occurs in younger women and frequently associated with eye signs. The hypertrophy and hyperplasia are due to abnormal thyroid stimulating antibodies

Toxic nodular goiter: A simple nodular goiter is present for a long time before the hyperthyroidism, and hence termed secondary thyrotoxicosis. It is usually seen in middle aged or elderly people and less frequently associated with eye signs. In many cases of toxic nodular goiter, the nodules are inactive and it is the intermediate thyroid tissue that is involved in hyper secretion.

Toxic nodule: This is a solitary hyperactive nodule which may be part of a generalized nodularity or a true toxic adenoma. It is autonomous and its hypertrophy and hyperplasia are not due to thyroid stimulating antibodies. Because TSH secretion is suppressed by the high level of circulating thyroid hormones, the normal thyroid tissue surrounding the nodule is suppressed and inactive.

Diagnosis of thyrotoxicosis

- Most cases are easily diagnosed by the clinical picture.
- The thyroid functional status can be determined by estimation of serum thyroxin hormones and TSH.
- Isotope scanning is used to investigate discrete thyroid swelling. This helps to determine the functional activity relative to the surrounding gland according to isotope uptake.

Treatment of thyrotoxicosis

Treatment of thyrotoxicosis includes specific and non-specific measures. The specific measures are

- the use of antithyroid drugs
- surgery
- radioiodine

The nonspecific measures which include rest and sedation are not commonly recommended.

Anti thyroid Drugs:

Antithyroid drugs are used to resume the patient to a euthyroid state and to maintain this for a prolonged period. But it should be clear that antithyroid drugs cannot cure a toxic nodule since the overactive thyroid tissue is autonomous and recurrence of the hyperthyroidism is certain when the drug is discontinued.

Surgery:

Surgery cures thyrotoxicosis by reducing the mass of overactive tissue below critical mass. Preoperatively, the patient must be prepared with antithyroid drugs so that the patient becomes euthyroid. The preferred procedure is subtotal thyroidectomy.

Post-operative complications

- Hemorrhage - a tension hematoma may develop deep to the cervical fascia – which is potentially life threatening
- Respiratory obstruction - can occur due to laryngeal edema or secondary to tension hematoma.
- Recurrent laryngeal nerve paralysis may be unilateral or bilateral and could be transient or permanent.
- Thyroid insufficiency**.** This is insidious and usually occurs after 2 years.
- Parathyroid insufficiency - is due to removal of parathyroid gland and usually seen in immediate post operative period.
- Thyrotoxic crisis (storm) - is an acute exacerbation of hyperthyroidism. It occurs if a thyrotoxic patient has been inadequately prepared for thyroidectomy.
- Wound infection - a subcutaneous or deep cervical abscess may occur rarely and necessitates drainage.

Neoplasms of the thyroid

Classification of thyroid neoplasm

Review Questions

1. Discuss stages of simple goiter.
2. List the most important clinical signs of thyrotoxicosis.
3. What is the most common presenting symptom of thyroid malignancies?
4. Compare and contrast papillary and follicular thyroid carcinoma with respect to root of metastasis, overall mortality and location of recurrence?
5. What is the most important investigation in solitary thyroid nodule?

1. Bailey and Loves, 50 Ed. 2. Hardy Text Book of Surgery

CHAPTER TWO

THE BREAST

Learning objectives

After reading this chapter, the student is expected to:

- È Identify the common causes of lumps in the breast
- È Mention the possible methods of investigating breast lumps
- È Understand clinical presentation and treatment of benign breast lumps
- È Understand the staging evaluation of breast carcinoma
- È Outline the management principle of carcinoma in the breast
- È Diagnose and manage infectious diseases of the breast

Introduction

The breast is a modified sweat gland that produces milk under hormonal influences. Breast carcinoma is the most common cause of death in the developed world. In underdeveloped countries patients present usually with late stage of disease. This is due to lack of screening facilities, low index of suspicion among health professionals, poverty and lack of knowledge. Benign conditions of the breast are important because of the discomfort they produce and frequent confusion with neoplastic disease.

Anatomy

- The protuberant part of the human breast is generally described as overlying the 2^{nd} to 6^{th} ribs,
- It extends from the lateral border of the sternum to the anterior axillary line, between clavicle and to the 7^{th} and 8^{th} ribs below.
- The ligaments of cooper are hollow conical projections of fibrous tissue filled with breast tissue the apices of cones being attached firmly to the superficial fascia and thereby to the skin overlying the breast.
- The areola contains involuntary muscles arranged in concentric rings as well as radially in the subcutaneous tissue.
- The nipple is covered by thick skin with corrugations. Near its apex lie the orifices of the lactiferous ducts. The nipple contains smooth muscle fibers arranged concentrically and longitudinally.
- Lymphatics of the breast drain predominantly into the axillary lymph nodes on the ipsilateral side.

Breast lumps

Among all the problems women develop in their breasts, breast lumps are the most common. These could be secondary to either benign disease conditions, or fatal carcinomas. Hence, it is essential to identify different types of breast lumps. Students should be familiar with some of differentiating mechanisms between malignant and benign breast lumps.

Breast cysts

This is a rare condition which may occur in the last decade of reproductive life due to a non-integrated involution of stroma and epithelium. They are often multiple and may be bilateral. Diagnosis can be confirmed by aspiration and/or ultrasound.

Treatment – solitary or small cysts are aspirated. If there is residual lump after aspiration, if fluid is blood stained, or if cyst recurs, local excision for histological diagnosis is advisable. .

Fibroadenoma

Usually occurs during 15-25 years of age and arises from hyperplasia of a single lobule. It can usually grow up to 2-3 cm in size surrounded by well-marked capsule. It is smooth, solitary, usually painless and moves freely in the breast. Most fibroadenomas can be excised through periareolar incision with good cosmetic result.

Phyllodes Tumor

- Are benign tumors
- Usually occur in women over 40 years but can appear in younger woman.
- Present as large, massive tumor with unevenly lobulated surface and occasionally with ulceration of overlying skin.
-

Clinical presentation

- Nipple discharge of any color,
- a subareolar mass,
- Abscess,
- Mammary duct fistula and/or nipple retraction.

Treatment:

- Excision of all major ducts.
- In case of nipple retraction, carcinoma must be excluded by mammography and histology.

When the diagnosis of carcinoma is in doubt

There are cases where one cannot be sure whether the particular lump in the breast is area of mammary dysplasia, benign tumor or an early carcinoma. If there is doubt on clinical, cytological or radiological examination, it is essential to obtain a tissue diagnosis. Table '1' gives an algorism for investigating a breast lump

Table "1" Investigation of a breast lump

Lump in the breast				
Cystic		Solid		
FNA		Clinically benign		Clinically malignant
		FNA		FNA
Cytology	Cytology	Cytology	Cytology	Cytology
Benign, breast lump disappears	Malignant, lump persists or bloody	Benign	Malignant	Benign
Follow-up	Urgent biopsy	Follow-up or excise	Treat cancer	Urgent biopsy

Acute mastitis

Definition

This is acute inflammation of the breast. Bacterial mastitis is the commonest variety of mastitis and nearly always commences acutely. It is associated with lactation in the majority of cases

Cause

Most cases are caused by staphylococcus aureus.

Clinical presentation

- Pain
- Swelling
- Redness
- Tenderness and hotness of the affected side.
- Later on, abscess may develop.

Treatment

- Initiation of appropriate antibiotics (e.g.- cloxacilline)
- Affected breast rested with breast-feeding on the opposite side only.
- Support of breast
- Local heat and analgesics for reduction of the pain.

Complication: - *breast abscess*

If acute infection of breast doesn't resolve with in 48 hours, or if after emptied of milk there is an area of tense induration, the inflammation has resulted in an abscess. Unlike majority of localized infections; fluctuation is a late sign so incisis .layed. W(ofl1(.l t28tT*0011 Tc-.0003 Tw[ )-90exis

- Age - it is extremely rare below the age of 20, but the incidence thereafter steadily rises so that by the age of 90 nearly 20% of women are affected.
- Genetic - it occurs more commonly in women with a family history of breast cancer.
- Diet- since it is more common in “developed” world, dietary factor may play role, a high intake of dietary fat is associated with an increased risk.
- Endocrine - common in nulliparous women, having the first child at early age especially if associated with late menarche. Early menopause is protective.
- Obesity.

Pathology: Breast cancer may arise from the epithelium of the duct system starting from the nipple to the end of lactiferous ducts which is in the lobule. It may be entirely in situ (with out breaching basement membrane) or may be invasive. The degree of differentiation of a tumor is usually described by three grades well differentiated, moderately or poorly differentiated. *Ductal carcinoma is the most common variant*. Lobular carcinoma occurs in up to 10 percent of cases.

Spread of breast cancer

1. *Local spread:* Tumor increases in size and invades other parts of the breast. It tends to involve the skin and to penetrate the pectoral muscles, and even the chest wall.
2. *Lymphatic spread:* Occurs primary to the axillary lymph nodes. Involvement of lymph nodes is not necessarily a chronological event in the evolution of the carcinoma, but rather a marker of the metastatic potential of that tumor. In advanced diseases there may be involvement of supraclavicular nodes and of any contra lateral lymph nodes.
3. *Spread by the blood stream:* (hematological spread). It is by this route that skeletal metastasis occurs in decreasing frequency to the lumbar vertebra, femur, thoracic vertebra, rib and skull. They are generally osteolytic. Metastasis can also occur to the liver, lungs and brain and occasionally to the adrenal glands and ovaries.

Clinical presentation

While any portion of the breast may be involved, breast cancer commences most frequently in the upper outer quadrant.

Local findings

- Hard, irregular lump.
- In drawing of the nipple (nipple retraction).
- Skin involvement with peau d’ orange (orange peel) appearance.
- Frank ulceration and fixation to the chest wall.

Signs of metastasis

- depends on the part of the body involved
- Lymph node enlargement
- Bone pain
- cough

These patients must undergo a staging evaluation which includes careful clinical examination, chest x-ray, serum alkaline phosphates and liver ultrasound.

Prognosis of breast cancer:

Review Questions

1. What are the differential diagnoses of a lump in the breast?

2. A-20 year old female patient presents with a solitary painless lump in the breast. Examination reveals a freely mobile 3cm lump. The most likely diagnosis is

   A. Fat necrosis
   B. Fibroadenoma
   C. Breast cancer
   D. Phylloides tumor

3. What is the peculiar feature of breast abscess as compared to other abscesses? How can the diagnosis be confirmed?

4. Discuss the spread of breast cancer.

5. What are the mainstays of treatment of early breast cancer?

6. A thirty-five year-old nulliparous woman comes with history of swelling in the breast of 2-months duration. The swelling is reported to be painful and persistent. In association with this, the patient has moderate fever, decreased appetite and weight loss.

   A. What is the most likely diagnosis?
   B. What further History and physical examination do you need to reach a diagnosis?
   C. List the most important laboratory investigations which help you confirm the diagnosis.

   On Physical examination, the tumor measured 4cm, its non-mobile and rough surfaced. There is freely mobile axillary lymphadenopathy on the same side.

   D. What is the stage of the disease?
   E. Out line the management approach.

References

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2. Hardy's Text Book of Surgery

CHAPTER THREE

THE CHEST

Learning Objectives

After reading this chapter, the student should be able to:

- Recognize upper airway obstruction, identify causes and suggest appropriate management.
- Identify life threatening thoracic injuries, which need immediate lifesaving measures
- Highlight the most commonly encountered thoracic injuries and their management.

Congenital

- Laryngomalacia
- Laryngeal or tracheal web and stenosis
- Subglottic tumour (haemangioma, polyp)
- Aberrant vessels
- Adenoids

CLINICAL FEATURES

In most case, clear history suggesting foreign body aspiration, infection or trauma can be elicited. It is usually characterized by *stridor* (noisy breathing); suprasternal *retraction*; *tachycardia* and *cyanosis* develop as obstruction becomes complete.

TREATMENT

Every effort should be made short of tracheostomy to save life or treat a cause. If a foreign body aspiration is suspected, *tilt* the patient's head down *and slap* the patient sharply across the back. Then, *explore* the pharynx and mouth by finger and if possible, urgent *laryngoscopy* should be done.

If indicated, *intubate* the airway immediately, otherwise do emergency *cricothyroidotomy* (insert wide bore needle to the cricothyroid membrane) and give 100% oxygen until intubation or proper tracheostomy is done. *Tracheostomy* is indicated if long-term airway management is considered.

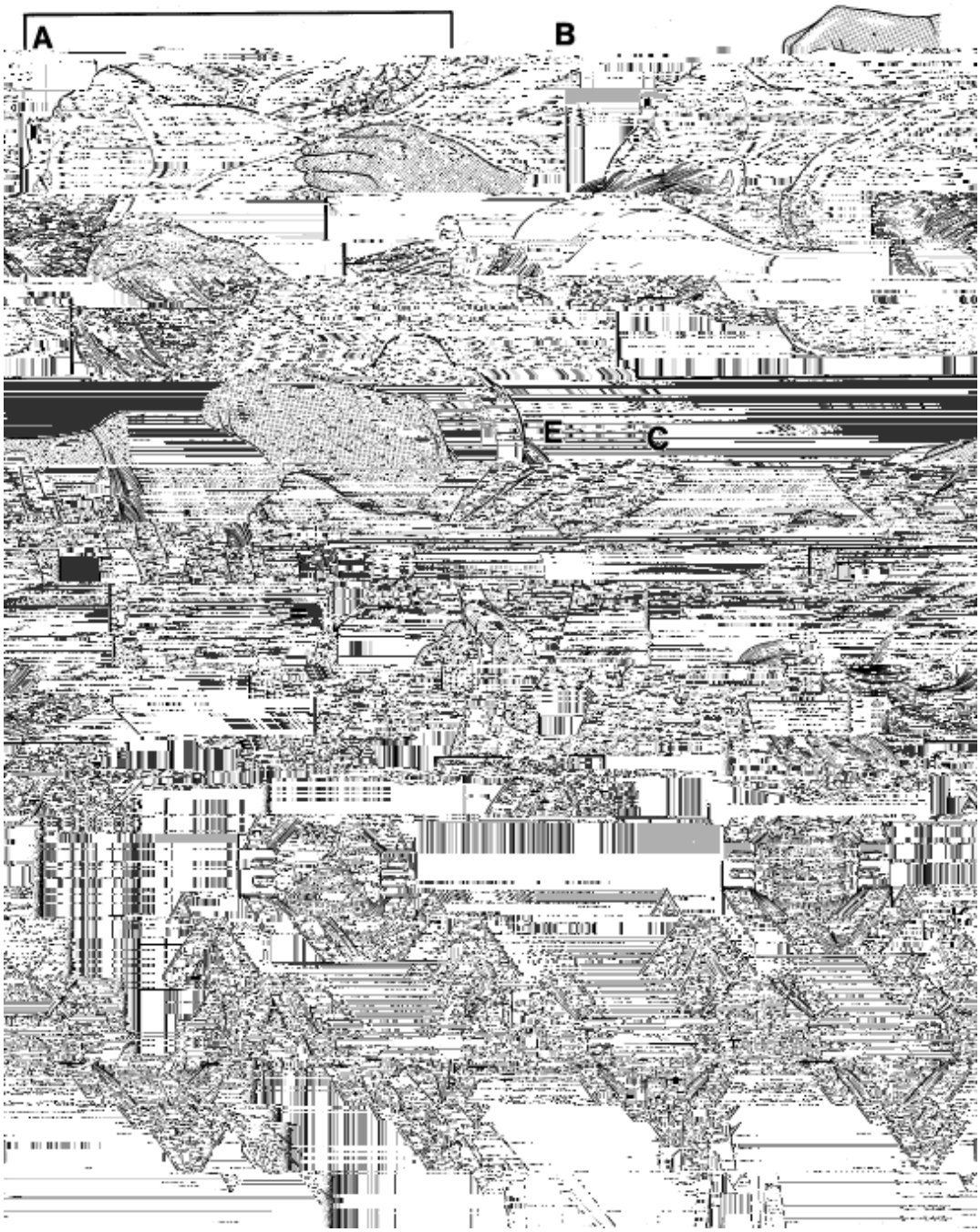
TRACHEOSTOMY

DEFINITION

Tracheostomy is provision of an artificial airway by opening the trachea. It is indicated to by-pass upper airway obstruction, for drainage of the respiratory tract and to provide assisted ventilatory support.

PROCEDURE *(see figures for illustration):*

1. Tracheostomy should be performed in operating room under general anaesthesia with intubation, if possible, especially in case of children. But if very urgent situation is encountered, do cricothyroidotomy while preparing for tracheostomy.
2. Fully extend the head by putting pillows under patient's shoulder
3. Palpate and count the tracheal rings. Make incision over fourth tracheal ring transversely or vertically in case of emergency.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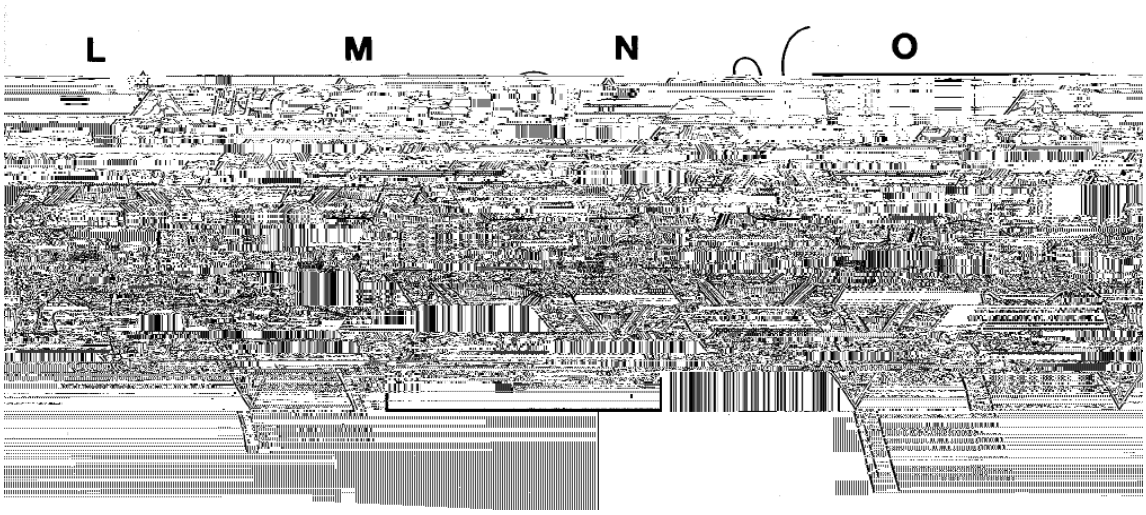
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in nearly all cases. It should be considered as thoracoabdominal if penetration is below fourth intercostal space.

PATHOPHYSIOLOGY

Inadequate delivery of oxygen to tissue results from

1. Ventilation-perfusion mismatch i.e. perfusion of non ventilated lung mostly as a result of lung contusion
2. Decreased tidal volume due to pain or other cause
3. Hypovolemia from bleeding
4. Mechanical obstruction due to tension pneumothorax and cardiac tamponade

PNEUMOTHORAX

DEFINITION: Pneumothorax is a presence of air in pleural cavity.

TYPE: Open: This is associated with chest wall wound which communicate with the external environment.

Tension: This is a surgical emergency associated with development of pressure which compromise breathing as well as circulation.

Simple: This is collection which is not associated with compromised breathing and no breach of chest wall

CAUSE

Blunt and penetrating injuries

MECHANISM

- *Fractured rib penetrating the lung*
- Deceleration and crush disrupting the alveoli
- Sucking effect of negative intrapleural pressure

N.B: In most cases of traumatic pneumothorax, there will be associated bleeding which may not be apparent.

CLINICAL FEATURE

Presume pneumothorax in any chest injury until proved otherwise since pain and splinting make physical examination difficult. Look for decreased chest expansion, tracheal shift, hyper resonant percussion note and decreased air entry. If patient's condition is stable, confirm by erect chest x-ray.

TREATMENT

The principal objective is to remove trapped air through tube thoracostomy (chest tube). In case of tension pneumothorax, insertion of needle at second intercostal space over the mid clavicular line of the same side relives the tension until chest tube insertion.

HEMOTHORAX

DEFINITION

Hemothorax is collection of blood in the pleural cavity. Bleeding usually occurs from intercostal or internal mammary arteries. Bleeding from parenchymal injury is nearly always self-limiting. ***Massive Hemothorax*** is a bleeding of more than 1500ml in to pleural cavity and rarely occurs in blunt trauma.

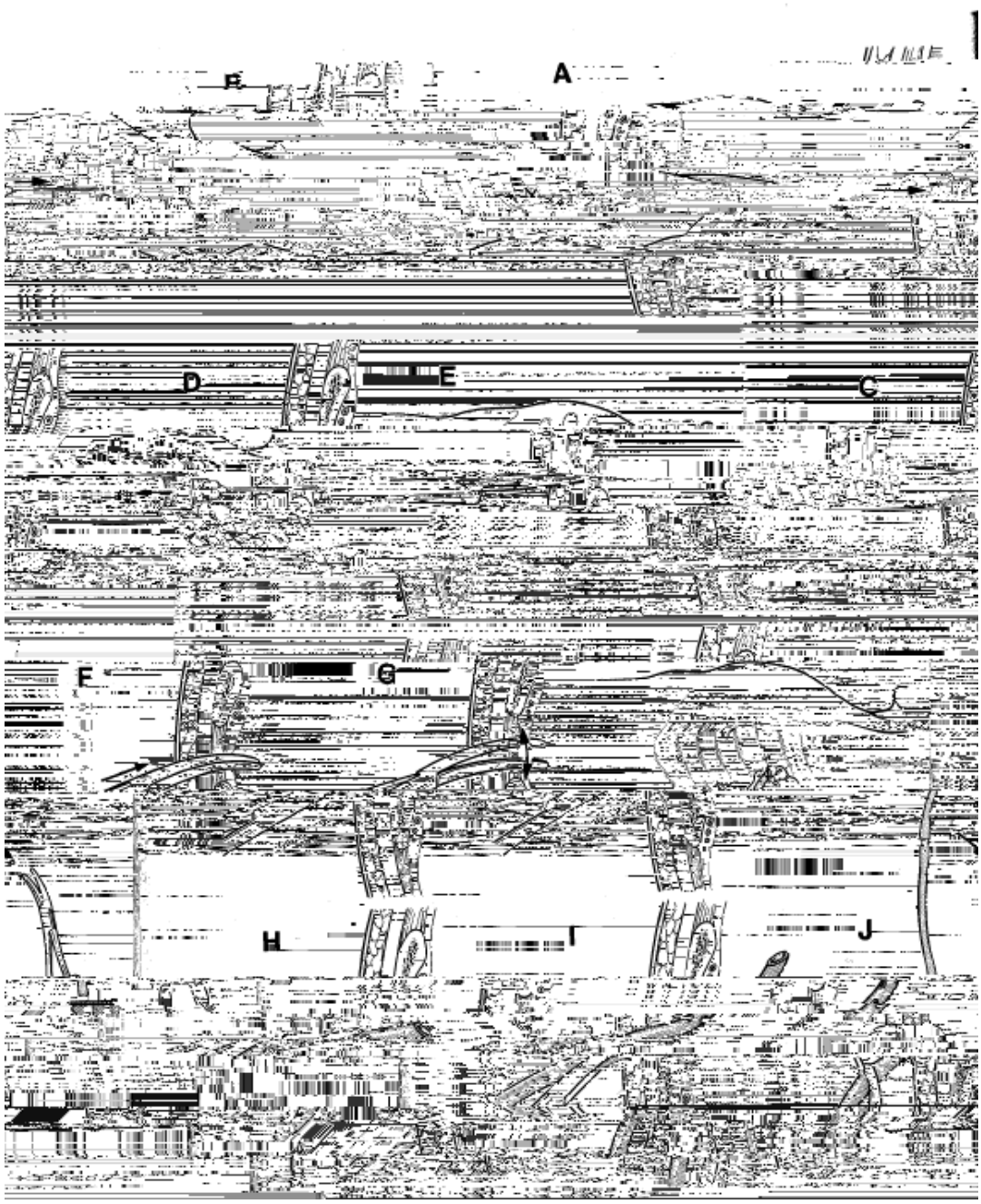

Figure 2: Procedure for Chest Tube Insertion

CARE OF THE TUBE

INDICATION FOR REMOVAL

Generally, a tube should be removed as soon as it finishes its purpose, i.e. when there is:

- Clinical evidence of complete lung expansion
- No more air leak and
- Less than 50 - 100ml of drainage in 24 hours
- Radiological evidence of complete expansion of the lung

N.B: Remove the chest tube while patient is in full inspiration and tightly close the insertion site by gauze soaked with a lubricant.

EMPYEMA AND LUNG ABSCESS

EMPYEMA THORACIS

DEFINITION

Empyema is a collection of purulent fluid in the pleural space.

AETIOLOGY

- Pulmonary *Infection* (unresolved pneumonia most common cause - 50%)
- *Trauma*: penetrating injury, thoracic surgery, esophageal perforation etc.
- *Aspiration* of pleural effusion of any source
- Extra pulmonary *spread*: from subphrenic abscess, retropharyngeal infection, mediastinal infection, etc.
- *Bone infection*

- Failure of early intervention
- Presence of foreign body
- Failure to detect underlying lung pathology

MICROBIAL PATHOGENS

In adults: Usually monomicrobial. Staphylococcus aureus, Streptococcus pneumonia and Streptococcus pyogens most common causes in healthy adult. Immunocompromised patients are prone to Aerobic gram negative bacilli and fungal infection.

Children: less than 6 month of age: Staphylococcus aureus most common pathogen

6 month-2 years of age: Staphylococcus aureus, Streptococci pneumonia and H.influenza are common pathogens.

2 years- 5 years of age: H. influenza is the commonest pathogenic agent.

Fungal or tuberculous foci may be reactivated in patient with malignancy, transplant recipient and AIDS to cause empyema.

DIAGNOSIS

History and Physical Examination:

History of predisposing factors, fever, pleuritic chest pain.

Signs of pleural effusion and signs of chronicity (chachexia, finger clubbing and discharging sinus) can be detected.

Investigation:

1. Routine: haemoglobin, WBC, ESR
2. Chest film: shows fluid level, meniscus sign and underlying lung pathology
3. Needle aspiration and analysis:
    a) Cloudy or purulent fluid suggestive of pus.
    b) Gram stain and culture.
    c) Acid Fast Staining if tuberculosis is suspected. Yield is less than 25%.
4. Ultrasonography: detects loculation and septation.

TREATMENT

The treatment depends on the stage, nature of primary infection and source of contamination. The principle of treatment includes control of infection by appropriate *antimicrobials* and *drainage* of pus to achieve full lung expansion.

The following procedures are options for drainage:

1. ***Thoracentesis:*** This is aspiration of fluid from the pleural cavity by a surgical puncture.

Review Questions

1. Outline the management of a two-year old male child who presented to emergency OPD with a sudden onset of high-grade fever, cough and inspiratory stridor.

2. A 45-year old male patient involved in a motor vehicle accident presents with severe respiratory distress. On examination, he is found to have tachypnea, hypotension and distended neck veins. What possible causes do you consider? Brief their management.

3. A 30-year old lady who was on antibiotic therapy for severe pneumonia started to shoot fever on the third day. She was found to be in respiratory distress and examination revealed evidence of fluid in left hemi thorax. Outline the management of this patient.

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UPPER GASTROINTESTINAL BLEEDING

(Asrat Sime, M.D)

Etiology

The causes of upper GI bleeding include:

- **Peptic ulcer**. Peptic ulceration is the commonest cause of upper GI bleeding with duodenal ulcer (DU) bleeding four times more common than gastric ulcer (GU) which correlates to higher incidence of duodenal ulcer.
- **Varices**. Bleeding from esophageal or gastric varices is another common cause of upper GI bleeding in patients with cirrhosis and portal hypertension
- **Gastritis.** Acute gastritis (acute mucosal erosions) causes frequent and possibly massive bleeding and is usually associated with ingestion of substances such as NSAID, alcohol, corticosteroids, anticoagulants etc.
- **Gastric Neoplasms.** Carcinoma of the stomach is the commonest neoplastic cause of bleeding. Other less common neoplasms include: Adenoma, Angioma, and Lymphoma etc.
- **Stress ulcer**- refers to acute gastro duodenal lesions that arise in association with (risk factors): Multiple system trauma, Hypotension/shock, sepsis, Major burns, etc.
- **Mallory-Weiss tears** are longitudinal mucosal tears extending across the esophagogastric junction and follow prolonged violent vomiting, often after a binge of alcohol. Bleeding may be profuse, but in over 90 % of cases, it stops spontaneously without specific therapy and responds to conservative measures such as sedation and volume replacement.
- **Others:** Esophagitis, Vascular malformations, Systemic diseases leading to bleeding and coagulation abnormalities, etc.

- Sweating
- Anxiety, restlessness
- Large amount of bloody vomitus
- Hematochezia/melena

Inquiries should also include about

- Scoiodemagraphic variables (e.g. Age)
- PUD history- past or present
- Ingestion of drugs implicated as causes of GI bleeding
- Liver diseases (past, present, complications)
- Co-morbid diseases
- Symptoms of bleeding diathesis, etc.

Urgent examination aims to pick up signs suggestive of seriously depleted blood volume and probably continuing blood loss which include:

- Rising pulse rate and respiratory rate
- Decreasing blood pressure and pulse pressure
- Restlessness
- Increasing pallor
- Cold nose and extremities
- Sweating (beads of sweat on the forehead)
- Decreased urine output

Also look for:

- palpable glands, e.g. left supraclavicular lymph nodes (Virchow's nodes)
- Signs of co-morbid and systemic diseases
- Signs of chronic liver disease and portal hypertension

Management

Resuscitation

For patients in need of immediate resuscitation and hospitalization:

ü Insert large bore intravenous cannula (preferably two)

- Restoration of blood volume is the initial priority which is started with rapid crystalloid infusion until blood is available (refer to the treatment of shock)
- Blood is taken at this time for necessary investigations including blood count, blood grouping and cross matching, blood chemistry, etc. (but resuscitation is started and continued without waiting for results which can be reviewed later).

- ü Monitor response to resuscitation measures with:
  - Clinical monitoring (frequent evaluation), e.g. vital signs, urine output, etc.
- ü Alleviate anxiety and pain, e.g. diazepam, analgesics
- ü Place nasogastric tube in all patients with significant GI bleeding to monitor rate of bleeding and for saline lavage.
- ü Once the patient is stabilized review pertinent laboratory data and decide on further treatment in conjunction with the clinical setup of the patient

  e.g. need for transfusion
- ü Monitoring needs to be continued (e.g. frequent vital signs) for at least 3 days after apparent cessation of hemorrhage.

Diagnostic evaluation and further management

- ü Once the patient with suspected upper GI bleeding is stabilized, the diagnostic evaluation, in a hospital setup, in addition to more detailed history and physical examination, involves investigations like:
  - Emergency esophago-gastro-duodenoscopy
  - Other studies performed based on the findings on endoscopy and availability of facilities
- ü After establishing the cause, further management is undertaken depending on the underlying cause. (Refer to the appropriate sections for diagnostic studies and treatment modalities on the specific causes of GI bleeding).
  - Medical therapy
  - Endoscopic therapy
  - Surgical (operative) - the primary goal in acute significant hemorrhage is to control the bleeding.

LOWER GI BLEEDING

Lower gastrointestinal bleeding (LGIB) can be:

- Small intestinal bleeding
- Colorectal bleeding
- Anorectal bleeding

Small intestinal bleeding: Is uncommon, rarely is massive, difficult to diagnose and usually a diagnosis of exclusion after other sources of bleeding have been ruled out.

Colonic bleeding: Can be acute and massive or chronic presenting with occult blood positive stool and anemia. The causes include:

- Neoplasms and polyps
- Diverticulosis/ diverticulitis
- Vascular malformations
- Inflammatory causes e.g. intestinal tuberculosis, inflammatory bowel diseases

Anorectal bleeding: Causes include:

- Hemorrhoids
- Anal fissure
- Tumors /polyps
- Proctitis

Clinical evaluation

This depends mainly on the history and physical examination. Assess for the homodynamic status of the patient and clinical diagnosis of the possible underlying cause and site of bleeding.

History -Note that:

ü LGIB is usually suspected when patient presents with Hematochezia

ü Although usually helpful, the distinction based on stool color is not absolute.

Bright red blood per rectum can be seen with massive UGIB and bleeding from the right colon.

ü Chronic bleeding may present with
- Unexplained anemia
- Orthostatic hypotension
- Fatigue and weight loss

ü Though visible bleeding is the most alarming symptom it is commonly associated with symptoms such as:
- Pain
- Change in bowel habits: - Stool frequency
  - Stool consistency
- Excessive mucus discharge per rectum - Mixed with stool/blood in proximal lesions, covering the stool (with blood)/sloughs in distal lesion
- Tenesmus
- Sense of incomplete defecation

- Pruritus - ani common with local lesions

Also inquire for

Symptoms related to causes of UGIB

Symptoms related to manifestation of associated diseases e.g.-STI, AIDS

Physical examination: Vital signs and other indices of tissue perfusion and signs of chronic blood loss should be looked for. Do complete abdominal examination including digital rectal examination, and pelvic examination in female patients

Treatment: Patients who are low risk (e.g. - a young, otherwise healthy patient with self-limited rectal bleeding secondary to hemorrhoid) may be evaluated as an outpatient.

Resuscitation: Resuscitation is the first priority initiated while the patient is being assessed and its progress should be monitored closely (refer to the management of hypovolemic shock).

Diagnostic evaluation: With further clinical assessment and investigations performed after the patient is hemodynamically stable .Based on the patient's clinical setting and availability investigations could be performed which include:

- NG tube lavage to exclude UGIB
- CBC (WBC, HCT/Hb, platelet count…)
- Emergency esophago-gastro-duodenoscopy (EGD) may be needed
- Blood chemistry
- Coagulation profile
- Stool examination for- parasites, blood cells, Occult blood in chronic occult cases
- Lower GI Endoscopy: procto-sigmoidoscopy: Valuable for visualization biopsy taking and endoscopic treatment.
- Contrast studies- useful in chronic GI bleeding

Specific treatment:

The treatment depends on the underlying cause. It can be medical, operative or endoscopic.

Follow up of management:

Correction of anemia and malnutrition

Pain management

COLORECTAL TUMORS

Learning Objectives

At the end of this unit the student is expected to:

- Understand the importance of early diagnosis and treatment of colorectal tumors.
- Discuss the clinical features of colorectal carcinoma in relation to pathologic types, site and extent of spread.
- List the differential diagnoses of carcinoma of the colon.
-

Predisposing factors

- pre-existing polyps
- Familial adenomatous polyposis
- Ulcerative colitis

Spread

- Generally the growth is comparatively slow
- Local spread-
- Lymphatic spread- to the regional lymph nodes
- Blood stream spread- to the liver and then to the lungs, skin, bone.
- Trans-coelomic spread -malignant deposits throughout the peritoneal cavity and to non-adjacent organs.

Clinical features: The local effects of the tumor depend on the site and macroscopic variety of the primary tumor.

Tumors in the right colon commonly present with:

- Anemia
- Loss of appetite, weight and generalized body weakness
- Palpable lump on abdominal, rectal or bimanual palpation
  e.g. in the RLQ of the abdomen, cecal carcinoma, carcinoma of the ascending colon
- Features of appendiceal mass

Tumors in the left colon usually present with:

- Change in bowel habit: constipation, diarrhea, or alternating
- Passage of mucus
- Tenesmus and sense of incomplete defecation (rectosigmoid tumors)
- Rectal bleeding (bright, mixed or occult)
- Features of intestinal obstruction (acute, chronic or acute on chronic)
- Pain usually a late manifestation
- Bladder symptoms (urinary symptoms): due to pressure /invasion

Investigations: These are based on mode of presentation and availability and include:

Diagnostic investigations:

- Stool examination - parasites, WBC, occult blood, culture
- Sigmoidoscopy, colonoscopy
- Barium enema
- Biopsy under endoscopic guide

Staging investigations:

Ultrasonography, Chest x-ray, Liver function tests etc.

Management: The management depends on mode of presentation, stage of the disease, the site of the primary lesion and presence or absence of multiple lesions. Modalities include:

- ***Surgery*** (curative or palliative)
  - *Emergency* laparotomy- for acute significant bleeding and/or acute abdomen with the primary aim of treating the acute complication followed by elective surgery.
  - *Elective* surgery
    - After pre-operative colon preparation
    - Resection for resectable tumors (curative)
- ***Palliative:*** palliative surgery, Cytotoxic chemo therapy, Radiotherapy for advanced malignancy.

COMMON PERIANAL CONDITIONS

Learning Objectives

At the end of this unit, the student is expected to:

- Perform clinical evaluation for early diagnosis of a patient with an Anorectal abscess and identification of underlying/associated diseases
- Discuss the management of a patient with Anorectal abscess
-

ANORECTAL ABSCESSES

Patients with anorectal abscesses need a thorough evaluation and early and adequate surgical management. Because, an abscess:

- Á May be the presenting manifestation of an underlying systemic or local diseases (e.g. - AIDS, Diabetes mellitus, rectal tumors, inflammatory bowel diseases…)
- Á May be found in association with other diseases
- Á Leads to complication such as fistula in ano, sepsis (perianal sepsis), etc unless treated early and adequately.

Pathogenesis

In many cases the infection is caused by mixed micro organisms. Infection of anal gland is the initiating factor in the majority of cases, which spreads along tissue planes. An abscess can also develop following infection of a Perianal hematoma, infection following Perianal injuries, extension from cutaneous boils etc.

Classification

Based on their anatomical location, anorectal abscesses are classified into four main varieties:

Perianal(subcutaneous) abscess:-

This is the commonest type and can affect people of all age groups.

Ischiorectal abscess:-

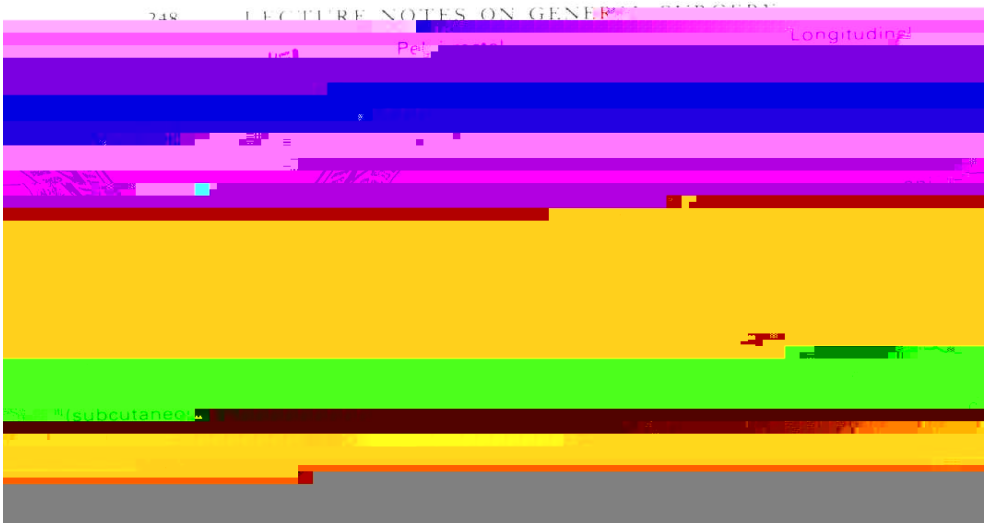
Is also common and is located in the ischiorectal fossa

Sub mucous abscess:-

This an abscess located under the mucous membrane

Pelvirectal abscess:-

This is an abscess located above levator ani and follows spread from pelvic abscess



Clinical features: Patient complaints include pain (usually severe), fever, constitutional symptoms such as sweating and anorexia, features of proctitis and constipation

Physical findings (rectal examination) include

PERIANAL FISTULAS (FISTULA IN ANO)

Definition: A fistula in ano is a track, lined by granulation tissue, which connects the anal canal or rectum internally with the skin around the anus externally.

Causes (risk factors) - It results from:

-

ANAL FISSURE (FISSURE IN ANO)

Definition: Anal fissure is an elongated tear (ulcer) in the lower anal canal, which lies along the long axis of the canal. The upper end stops at the dentate line. It is located commonly in the posterior midline, occasionally along the anterior midline and rarely at multiple sites.

Etiology: The cause of anal fissure is not completely understood. Passage of hard fecal mass precipitates and aggravates the condition.

Classification: Anal fissure can be classified as acute or chronic based on its pathologic features.

- *Acute fissure:* is a deep skin tear at the anal margin extending in to the anal canal with edges showing little inflammatory indurations or edema .It is accompanied with spasm of the anal sphincter muscle.
- *Chronic fissure:* is characterized by Inflamed and indurated margins as a result of inflammatory fibrosis and contracture of the internal sphincter in long standing cases

NB: specific causes are much more common with a chronic fissure (e.g. syphilis, tuberculosis, Crohn's disease, and carcinoma.

Clinical features: A patient with anal fissure presents with:

- Pain is the commonest feature
-

Management

Conservative management: This is recommended especially for a small acute and superficial fissure, which may heal spontaneously. It includes:

- A high fiber diet and high fluid intake with a mild laxative, such as liquid paraffin, to encourage passing of soft, bulky stools
- Administration of a local anesthetic ointment or suppository

***Surgical Measures*:**

Surgical measures are needed when the above measures fail, in chronic fissures with fibrosis, a skin tag or a mucous polyp or recurrent anal fissures. Procedures include:

- Lateral anal sphincterotomy
- fissurectomy and
- sphincterotomy

This procedure can be used for cases with a chronic fissure. It needs an experienced operator to reduce complications, which include hematoma formation, incontinence and mucosal prolapse.

After care: This consists of bowel care, daily bath and softening the stool till wound healing.

HEMORRHOIDS (PILES)

Definition: Hemorrhoids are dilated sub mucosal veins in the anus. They may be classified into:

- Internal hemorrhoids (Internal to the anal orifice)
- External hemorrhoids (External to the anal orifice)
- Interoexternal hemorrhoids (Prolapsing internal hemorrhoids)

INTERNAL HEMORRHOIDS

Internal hemorrhoids refer to dilatation of the sub mucosal internal venous plexus and draining superior hemorrhoidal veins. They develop within areas of enlarged anal lining (anal cushions') as they slide downwards during straining. Since the internal and external (subcutaneous perianal) venous plexus communicate (Porto-systemic anastomosis) engorgement of the internal plexus is likely to lead to involvement of the latter.

With the patient in the lithotomy position, internal hemorrhoids are frequently arranged in three groups at 3, 7 and 11 o'clock positions. This arrangement corresponds to the distribution of the superior hemorrhoidal vessels (2 on the right, one on the left) but there can be smaller hemorrhoids in between the three groups.

Investigations

Proctoscopy- to visualize internal hemorrhoids and exclude other lesions

Complications: Complications of hemorrhoids include profuse hematochezia, strangulation

Management:

Á

-
- Hydrophilic creams or suppositories
-

Á , hemorrhoidectomy indicated for:

-
-
- Fibrosed hemorrhoids
- **Treatment of complications**

  Strangulation, thrombosis and gangrene
  - ü Immediate surgery under adequate antibiotic cover or
  - ü adequate pain relief,
  - ü bed rest, frequent hot sitz bath,
  - ü
  - ü

- ü Severe hemorrhage
  - o Resuscitation with IV fluids
  - o Local compression with adrenaline solution
  - o Pain relief when present
  - o Blood transfusion when needed

  All these are followed by definitive therapy

EXTERNAL HEMORRHOIDS

A thrombosed external hemorrhoid (perianal hematoma), is usually associated with considerable pain. It appears as an inflamed tense tender and easily visible on inspection of the anal verge.

Treatment

Relieving pain by local or oral analgesics and avoid constipation. Surgical evacuation of the clot can be done under local anesthesia.

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ACUTE ABDOMEN

DEFINITION: The term acute abdomen denotes any sudden condition with chief manifestation of pain of recent onset in the abdominal area which may require urgent surgical intervention.

CLASSIFICATION: The pathologic cause for acute abdomen can be grouped into

Surgical causes

A. Inflammation: e.g. Acute appendicitis, cholecystitis
B. Obstruction: e.g. Acute intestinal obstruction
C. Infarction: e.g. Mesenteric ischemia
D. Strangulation: e.g. volvulus
E. Perforation: e.g. perforated peptic ulcer

DIAGNOSIS

Clinical: History and physical examination

Laboratory: Complete blood count, cross match, urine analysis, serum amylase and electrolytes

Radiology: Ultrasound and plain film of abdomen

MANAGEMENT

A. Preoperative preparation
- Resuscitation with IV fluids
- Antibiotics, if indicated
- Catheterization and NGT insertion
- Analgesics after confirming the diagnosis

B. Surgery: Definitive laparotomy according to the cause

C. Patient monitoring and Post operative follow up

INTESTINAL OBSTRUCTION

DEFINITION

Intestinal obstruction is partial or complete blockage of the intestine producing symptoms of vomiting, constipation, distension and abdominal pain.

CLASSIFICATION

- Mechanical (dynamic): due to physical barrier blocks
- Paralytic ileus (adynamic): due to disordered propulsive motility
- High Intestinal obstruction (small bowel)
- Low intestinal obstruction (Large bowel)
- Simple: has adequate blood supply
- Strangulated: Mesenteric vessels occluded

- Constipation (partial or absolute)

Signs: The commonest signs (physical findings) are:

- Abdominal distension with visible bowel loops
- High pitched and tinkling bowel sounds
- Abdominal tenderness and guarding
- Signs of dehydration and hypotension
- Empty rectum on digital rectal examination (Large bowel obstruction)

DIAGNOSIS

- *Clinical:* history and physical examination
- *Laboratory:* complete blood count, electrolytes, etc
- *Plain film* of the abdomen:
    - Gaseous distension of the bowel with fluid level (general)
    - Central located distended loops with multiple air fluid level (small bowel)
    - Peripherally located distended bowel with haustral marks (Large bowel)
    -

The twisted loop distends grossly and passes up under the right side of the diaphragm. Unless the situation is relieved, perforation may occur due to either pressure necrosis at the base of the twist or to avascular necrosis at the apex.

DIAGNOSIS

CLINICAL

- Abdominal cramp and distension
- Constipation (early) and vomiting (late)
- Empty rectum on digital rectal examination

RADIOLOGIC FINDINGS

- Two long fluid levels in the lower quadrant
- Inverted U shape of the sigmoid lumen
- “Coffee bean” appearance or the ‘Omega sign”

MANAGEMENT

Conservative:

The uncomplicated, simple volvulus without signs of peritonitis can be deflated with a well greased large bore rectal tube under the guide of a sigmoidoscope if available. If the deflation fails, laparotomy and derotation of the loop has to be done followed by elective resection to prevent recurrent attacks.

Intravenous fluid should be given to rehydrate the patient if there is a sign of dehydration.

Emergency Surgery:

In case of complicated volvulus with signs of peritonitis, the patient has to be prepared following resuscitative measures and giving antibiotics. Resection of the gangrenous segment with Hartman’s colostomy is done which has to be closed at a later stage.

APPENDICITIS

Appendicitis is an inflammation of the appendix that results from bacterial invasion usually distal to an obstruction of the lumen.

PATHOPHYSILOLGY

Appendicitis begins with obstruction of the narrow lumen by lymphoid hyperplasia, fecal material (fecolith), foreign body (seeds or worms) etc. Following obstruction of the lumen, a continued secretion of mucus produces distension of the distal end. The distension results in

- Á Appropriate antibiotics (combination for coverage of gram positive, gram negative and anaerobes)
- Á Correct all deficits (dehydration)

SURGERY

- Á Surgical removal of the appendix is the definitive treatment.

N.B: Close follow up of surgical patient is very important post operatively to identify complications as early as possible and correct in time.

COMPLICATIONS

Complications of acute appendicitis include perforation with local or generalized peritonitis, appendiceal mass and abscess formation. Delayed diagnosis and treatment may lead to complications and death.

PERITONITIS

DEFINITION: Peritonitis is an inflammation of the peritoneum. It is an acute life threatening condition caused by bacterial or chemical contamination of the peritoneal cavity. The major causes of peritonitis include:

- Perforated appendix
- Perforated peptic ulcer disease
- Anastomotic leak following surgery
- Strangulated bowel
- Pancreatitis
- Cholecystitis
- Intra abdominal abscess
- Haematogenous spread of infective agent such as typhoid or tuberculosis
- Typhoid perforation
- Ascending infection (e.g. salpingitis) etc.

CLASSIFICATION

Primary peritonitis: caused by bacterial spread via the blood stream.

Secondary peritonitis: caused during perforation or rupture of abdominal organ allowing access of bacteria and irritant digestive Juices to the peritoneum.

Acute peritonitis: rapid onset or brief duration with several symptoms

Chronic peritonitis: long duration since the onset involving very slow changes.

Localized peritonitis: peritonitis confined to a limited space e.g. pelvis.

Generalized peritonitis: the whole peritoneal cavity involved.

ROUTES OF BACTERIAL INVASION

1. Direct: contamination via perforation, a penetrating wound or during surgery

2. Local Extension: contamination by migration from an infected organ

e.g. -through gut wall, via the fallopian tubes

3. Blood stream: via the blood as consequence of general septicemia.

Bacteria or other pathogenic agents can gain access to the peritoneum by the above mentioned routes. The infection can remain limited to a local area of the peritoneum or become generalized. Factors which favor localization of the infection include:

- Anatomical factors (e.g. subphrenic spaces)
- Pathological factors (e.g. adhesions)

- Á Surgical factors (e.g. drains) Etc.

ETIOLOGY: The commonest bacterial invaders in peritonitis are :-

Escherichia coli

Streptococci

Bacteroids

Etc.

CLINICAL FEATURES: Commonest manifestations (presentation) of peritonitis are:

- Á Sharp pain which is worse on movement
- Á Fever and tachycardia
- Á Abdominal distension
- Á Tenderness and guarding
- Á Diminished or absent bowel sounds
- Á Shoulder pain due to referred pain from diaphragmatic irritation
- Á Tenderness on rectal examination (pelvic peritonitis)
- Á Abdominal distension and vomiting, etc.

DIAGNOSIS

The diagnosis of acute peritonitis is mainly made by the clinical findings i.e. suggestive history and physical examination. Base line laboratory investigations like WBC count may be indicative. Plain film of the abdomen can also be diagnostic with findings related to underlying pathology e.g. air under the diaphragm in perforated viscus. Ultrasound is also useful to detect abscess collection.

MANAGEMENT

The management of patients with peritonitis should be started immediately. It includes various aspects of approaching the patient. Attention should be given to the following conditions:

- Resuscitation: general patient care with intravenous fluids
- Analgesia
- Naso-gastric tube insertion (NGT)
- Triple antibiotics (ampicilline , gentamycin and metornidazole or chloramphenicol)
- Monitoring in put and out put by catheterization
-

4. *RBC production* and destruction of the old RBC,s
5. *Conjugation* of circulating billirubin
6. *Detoxification* of drugs and certain toxic substances

Function of Kupffer cells

Phagocytosis - defense against infections

AMOEBIC LIVER ABSCESS

Amebic liver abscess is a complication of amoebic dysentery.

Incidence

The disease occurs approximately in 3% of patients with intestinal amoebiasis. It is more common in middle aged male (M:F = 9:1)

Etiology

E. hystolytica - intestinal protozoal parasite

Pathology and pathogenesis

Amoeba reaches the liver by way of the portal vein from the focus of ulceration in the bowel wall. Hepatic lesion usually occurs in the right lobe and has the following characters:

- Is large, single abscess
- Contains characteristic liquid material which is reddish brown *anchovy paste* fluid
- Has thin wall with little or no fibrosis

Clinical manifestation

History:

Chief complaints are fever, chills, right upper quadrant pain which may radiate to right shoulder area. There could also be a history of:

- Cough, pleuritic chest pain or dyspnea
- Painful epigastric swelling if left lobe is involved
- History of antecedent diarrhea
- Weight loss

Physical examination:

Physical examination can reveal the following findings:

- Tender hepatomegaly : almost constant feature
- Tenderness over lower intercostal spaces with /without swelling and skin edema.
- Abnormal finding over the base of the lung

Investigations

Stool examination: cysts or trophozoites of E. hystolytica

WBC: leukocytosis

Hemoglobin: anemia in prolonged illness

CXR: elevated right diaphragm, right side pleural effusion, obliteration of costophrenic or cardio phrenic angle

Ultrasound: localizes the abscess

Aspiration:- anchovy paste aspirate is considered pathognomonic

- amoebic trophozoit can be seen from the aspirated fluid

Complications

1. Secondary infection – the most common complication

   ⇒ pyogenic abscess

2. Rupture: direction of rupture can be into plural cavity, lung, pericardium or peritoneum.

3. Shock (due to rupture)

Treatment: Can be medical or surgical

1. *Medical (main modality of treatment)*
   - Oral metronidazol 750mg TID for 10 days is effective in more than 90%
   - Analgesics (paracetamol)
   - Rehydration and nutritional support
   - Correct anemia
2. *Surgical drainage*
   - When there are complications like rupture or sign of imminent rupture
   - When there is no response to medical treatment with in 48 to 72 hrs

HYDATID CYST OF THE LIVER

This is a parasitic disease caused by infestation with the Echinococcus granulosus.

Incidence

It occurs wherever a large number of sheep are raised.

4. *Penetration* (stomach, colon, pancreas, kidney)
5. Broncho-pleural and hepato-bronchial *fistulas*

Investigations

- U/S of the abdomen :- cyst and daughter cysts
- Casoni skin test: if reagents are available.
- Chest X-ray - to rule out concomitant lung infection or pulmonary complication.

Treatment

Expectant: small/dead calcified cyst

Medical: Albendazol/mebendazol for 2- 4 weeks for multilocular disease or patients unfit for surgery.

Surgical: Definitive treatment

Differential diagnosis

- Amoebic liver abscess
- Non parasitic liver cysts
- Tumor
- Pyogenic liver abscess

DISEASES OF GALL BLADDER AND BILIARY TREE

Anatomy and physiology

Gall bladder

The gall bladder is a pear shaped organ of 7.5 – 12.5 cm length and capacity of 50cc. It has three parts: *fundus, body and neck.*

The cystic duct (the duct which joins the GB with common hepatic duct together to form CBD (common bile duct)

Functions of Gall bladder: The main functions of the gall bladder is to serve as

- Reservoir for bile
- Organ for concentrating the bile
- Secretion of the mucus

GALL STONE DISEASE (cholelithiasis)

Gall stone disease is the most common pathology of the biliary tract.

Classification

1. Cholesterol stone (6%): usually solitary
2. Mixed stone (90%): cholesterol is the major component with others like calcium bilirubinate. These type of stones are multiple, faceted and usually associated with infection.
3. Pigment stone: mainly composed of calcium bilirubinate. They are usually small, multiple and black. Commonly associated with hemolytic disease.

Incidence

Female sex and old age are the common risk factors. But the condition can occur in both sexes and at any age.

Pathogenesis: Three important factors implicated in pathogenesis of cholelithiasis are:

1. Metabolic: cholesterol is soluble in bile salt and phospholipids. When bile salt is deficient or when the cholesterol level is in excess in relation to the bile salt, the bile formed is supersaturated or lithogenic

2. Infection: causes increased mucus plug formation and scarring which form a nidus for stone formation. Also many bacteria deconjugate billirubin which will combine with calcium to form insoluble calcium bilirubinate.

3. Stasis: important for growth of stone. Progesterone in multiparous women is believed to be contributory.

Clinical Presentation

Most (90%) patients with gall stone diseases are asymptomatic. Symptomatic patients present with:

History:

- Right upper quadrant colicky pain (biliary colicky)
- Dyspepsia, fatty food intolerance, flatulence, abnormal post prandial bloating
- Symptoms of acute cholecystitis or other complications

Physical examination:

- right upper quadrant tenderness
- Risk factors can be identified

Complications of Gall bladder stone

1. ***In the gall bladder:***
    - chronic cholecystitis
    - acute cholecystitis
    - gangrene
    - perforation
    - empyema
    - mucocele
    - carcinoma
2. ***In the bile duct:***
    - obstructive jaundice
    - cholangitis
    - acute pancreatitis
3. ***in intestine:***
    - acute intestinal obstruction (Gall stone ileus)

Diagnostic workup

Ultrasound: detects stone in the gall bladder

Plain abdominal film: Only 10% of stones are radio opaque and visible on X-ray

Differential diagnosis

1. PUD
2. Hiatal Hernia
3. Carcinoma of stomach
4. Diverticular disease
5. Angina pectoris

Treatment

Surgery: Open or Laparoscopic

1) cholecystectomy. The main stay of treatment
2) cholecystostomy for bad risk patients with severe infection
   (Severe Acute cholecystitis or gall bladder empyema)

Acute Cholecystitis

Definition

Acute cholecystitis is an acute inflammation of gall bladder due to obstruction of neck of gall bladder or cystic duct stone. Another rare form of acute cholecystitis which occurs in absence of stone is called acalculous cholecystitis.

Pathogenesis

Direct pressure of calculus on the mucosa results in ischemia, necrosis, and ulceration with swelling edema and impairment of venous return. This process increases and extends the extent of inflammation and favors bacterial multiplication. The end result may be:-

- Pericholecystic abscess
- Fistula formation between gall bladder and bowel
- Gall bladder empyema/mucocele
-

- Hepatitis
- Pleurisy
- Appendicitis
- Myocardial ischemia or infarction.

Investigation:

WBC: Leucocytosis

Plain Chest or abdominal X-ray: to check for pneumonia or radio opaque stone

Ultrasound: detects calculi, gall bladder wall thickening and pericholecystic fluid

Treatment

1. *conservative*
    - Admit the patient
    - keep the patient NPO
    - Start on IV fluid
    - Insert NGT
    - Analgesics
    - Antibiotics to cover common causative bacteria: usually ampicillin and gentamycin are used.

Biochemical features of different types of jaundice.

Type of the test	Pre hepatic	hepatic	Post hepatic
Serum billirubin:- Total	+	+++	+++
Direct	N	++	+++
Indirect	+++	++	N
Serum Alkaline phos	N	+	+++
Liver Enzymes	N	+++	+
Urine : billirubin	0	N	+++
urobilinogen	+++	N	0

Causes of extra hepatic biliary obstruction

Obstruction in the

- Urine and stool (clay color) color change is indicative of obstruction
- RUQ abdominal pain
- Loss of appetite, weight loss
- History of abdominal trauma, surgery

Physical examination:

- General appearance: obesity, emaciation.
- Depth of jaundice/pallor
- Hepatomegaly, splenomegaly
- Ascitis
- Palpable gall bladder
- Liver mass.
- Skin scratch marks

Note the following distinctions of various causes of jaundice

ü Surgical jaundice is characterized by
  - Á Yellow green icterus
  - Á Pruritus of the skin more during night time
  - Á Clay colored stool due to absent bile
  - Á Dark brown urine due to conjugated billirubin in the urine

ü Jaundice due to choledocholithiasis is characterized by
  - Á history of chronic colicky right upper quadrant pain
  - Á Intermittent jaundice
  - Á Risk factors for gall bladder stone formation or
  - Á History of gall bladder stone (Diagnosed)
  - Á Usually impalpable gall bladder

ü Jaundice of Neoplastic cause is characterized by
  - Á Progressively deepening jaundice
  - Á Anorexia, weight loss, and pallor
  - Á Palpable gall bladder with mild or no pain

Investigations

- Hemoglobin: anemia suggests malignancy
- Urinalysis: billirubin/urobilinogen
- Serum billirubin: total and direct
- Serum alkaline phosphatase
- Ultrasound: gall stone, choledochal cyst, dilated bile duct, Neoplasm
- Liver function test
- Prothrombin time

Treatment

Surgical: The patient should be sent to a hospital for surgery.

Review Questions

1. Correct statement regarding Amoebic Liver Abscess is/are:
   A. It is more common in males.
   B. Right lobe is more commonly affected
   C. Hepatic lesion is usually solitary.
   D. ‘Anchovy Paste’ aspirate is pathognomonic
   E. All of the above

2. Complications of hydatid diseases of the liver do not include
   A. Rapture
   B. Suppuration
   C. Hypovolemic shock
   D. Penetration
   E. None

3. The commonest type gall bladder stone is
   A. Cholesterol
   B. Oxalate
   C. Mixed
   D. Pigment
   E. None

4. The most important diagnostic work up in cholelithisis is
   A. ultrasound
   B. plain abdominal X-Ray

This canal runs in antero inferior direction from internal to external ring. The internal ring lies 2cm above and 2cm medial to mid inguinal ligament. The external ring lies just above the pubic crest and tubercle

Contents of inguinal canal

In male: Spermatic vessels, Vas deference, Ileo inguinal nerve, Genito femoral nerve

***In female*:** Round ligament

Anatomy of femoral canal

Is a narrow rigid space bounded by:

- Inguinal ligament, superiorly
- Pectineal part of inguinal ligament posterior
- Lacunar part of inguinal ligament medially, femoral vein laterally
- The narrow rigid space makes this types of hernia more prone to obstruction and strangulation.

Inguinal hernia

- accounts for 80% of all external abdominal wall hernia
- commonest is all ages and sexes
- 20 x more common is males than women
- more common on right side

Classification

1. Indirect type: passes through internal inguinal ring along the inguinal canal. May extend down to the scrotum.
2. Direct type : Bulges through the post wall of inguinal canal

Indirect inguinal hernia

- 60% on right, 40% Lt side and 20% bilateral
- Due to congenital defect or potential defect which is the remnant of processes vaginalis
- 20 times more common in men

Direct inguinal hernia

- due to wear and tear associated with advanced age and increased intra abdominal pressure

Femoral Hernia

- acquired downward protrusion of intestinal contents into the femoral canal
- 4 times more common in females (middle-aged multiparous)
- rare in children

Clinical features

History

- Elderly or middle aged woman with thin body build
- lump on anterior and upper thigh
- may present with complaints associated with int. obstruction or strangulation

Physical examination

- Small lump on lower groin, lateral and below pubic tubercle
- Reducible/irreducibility
- Bowel sound/cough impulse – usually absent

Management

- surgical repair without delay

Umbilical (Para umbilical) Hernia

Umbilicus is one of the weak sites of the abdomen. A hernia can occur at this potential site.

Risk factors

- ü Female sex
- ü Multiple parities
- ü Obesity
- ü Ascites

Complications

- Á Obstruction
- Á Strangulation
- Á Rupture

Treatment

Expectant: - Spontaneous closure is expected in 80% cases of umbilical hernia in under five children.

Surgery: - Beyond five years

Incisional Hernia

Risk Factors

- ü Wound infection
- ü Poor surgical technique (improper facial repair)
- ü Chronic cough or straining
- ü Obesity

Clinical features

- Risk of obstruction and strangulation is very rare.
- Local discomfort
- Cosmetic problems
- Difficulties with micturation and bowel movement when very large

Treatment

Review Questions

1. False statement regarding abdominal wall hernia is/are
   A. Indirect inguinal hernia is the commonest type
   B. Femoral hernia is the commonest type in females
   C. Strangulation can occur without obstruction
   D. Direct inguinal hernia is common in old age
   E. A & D

2. Conservative management is indicated in Obstructed hernia in
   A. Obstructed inguinal hernia in infant
   B. Femora hernia
   C. Strangulated hernia
   D. Umblical hernia in under five children
   E. None

3. Incidence of obstruction is higher in which one of the following hernial type?
   A. Femoral
   B. Direct inguinal
   C. Paraumbilical I adult
   D. Incisional
   E. A and C

4. Options of management of abdominal well hernia
   A. Herniotomy
   B. Herniorrhaphy
   C. Expectant
   D. All
   E. None

References

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2. Bailey and Love's Short Practice of Surgery, 22nd edition

3. Handbook of General Surgery, Peter G.Bevan, 1992

4. Concise Surgery, Kevin Lafferty and John Rennie, 1998

STOMACH AND DUODENUM

Learning Objective

The student should be able to:

- ü enumerate the associated risk factors for Peptic ulcer disease (PUD) and gastric cancer
- ü describe the clinical features and investigation modalities pertinent to PUD and gastric cancer
- ü discuss the complications of peptic ulcer disease
- ü describe the treatment of peptic ulcer disease and gastric cancer

Introduction

Peptic ulcer disease is a common problem all over the world including Ethiopia. It had been one of the intersecting points for the discipline of internal medicine and surgery. The recent finding suggesting infection with Helicobacter pylori (H. pylori) as an important associated risk factor is shifting the treatment of peptic ulcer disease from surgery to medical modalities.

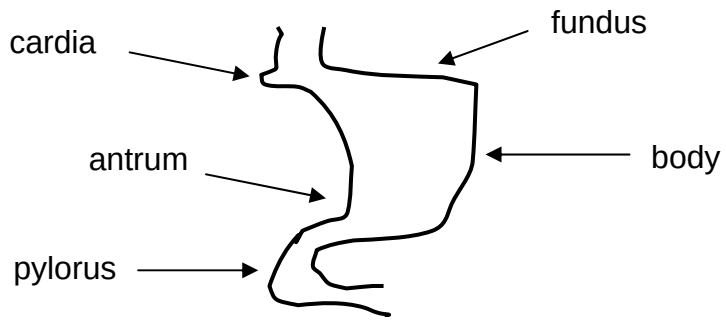
Gastric cancer is one of the top five cancers in frequency, however, it is one of the disease entities with the worst prognosis because of the difficulty to diagnose it early. Therefore one has to have a high index of suspicion to diagnose the disease early for the outcome of treatment heavily depends on the stage of the disease at the time of diagnosis.

Peptic ulcer disease

Anatomy and physiology of the stomach and duodenum

The stomach is an asymmetric dilation of the proximal gastro intestinal tract. The adult capacity is 1.5 to 2.0 liters. Anatomically, it is divided into the following parts:

Cardia, Fundus, Body, Antrum and *Pylorus*



The pyloric sphincter regulates gastric emptying and prevents reflux of duodenal content.

The wall of the stomach has four layers mucosa, submucosa, muscularis and serosa.

Region	Mucosa cells	Secretion
Cardia	goblet cell	mucus
fundus and body	parietal cells	acid
	chief cells	pepsinogen
Antrum and pylorus	goblet cells	mucus
	G. cells	gastrin

Table: Types of cells in the stomach and their secretion.

The stomach performs two interrelated functions in the initial phase of digestion

a. Food breakdown to form chyme through
    - mechanical digestion and
    - acid and pepsin action

b. Reservoir through receptive relaxation, i.e. the stomach increases its size as the amount of food in it increases.

Phases of gastric secretion

There are three phases of gastric secretion

Cephalic - mediated by acetylcholin secreted by the vagus nerve.

Gastric - mediated by the hormone gastrin (by G cells)

Intestinal - mainly inhibitory through peptides like secretin

Pathogenesis

The pathogenesis of peptic ulcer is an imbalance in the aggressive activity of acid and pepsin and the defensive mechanisms that resist mucosal digestion.

Factors contributing to the pathogenesis of peptic ulcer include:

1. Helicobacter pylori
2. Non steroidal anti-inflammatory drugs (e.g. aspirin)
3. Acid hypersecretion (e.g. Zollinger Ellison syndrome)
4. Rapid gastric emptying
5. Impaired duodenal acid disposal
6. Impaired gastric mucosal defense
7. Duodenogastric reflux

The most convincing evidence for H. pylori infection as a cause is that eradication of H.pylori infection is associated with a near elimination of recurrence of peptic ulcer following treatment. However, only a minority (10% over a life time) of people harboring H.pylori develop ulcers.

Classification

Acid peptic disease of the stomach and duodenum includes

Erosive gastritis (inflammation confined to the mucosa of the stomach)

Acute gastritis - occur after major trauma, shock, sepsis, head Injury and ingestion of aspirin and alcohol. It is generally classified as “Stress erosion”.

Chronic gastritis

Peptic ulcers - extend through the mucosa into the submucosa and muscularis. Chronic gastric and duodenal ulcers are distinguished by the presence of an established inflammatory reaction. Duodenal ulcer usually occurs in the proximal duodenum with in 1 to 2 cm of the pylorus, the portion of intestine first exposed to gastric secretion. In duodenal ulcer there is acid hyper secretion while in gastric ulcer acid secretion is either normal or decreased.

Clinical manifestation

The clinical presentation is non-specific and the following features may not always be found.

Table 1: *Summary of clinical features of gastric and duodenal ulcers*

	Gastric ulcer	**Duodenal ulcer**
Periodicity	present	Well marked
Pain	Soon after eating but not when lying down	Two hours after food Night pain
Vomiting	Considerable vomiting	No vomiting
Hemorrhage	Hematemesis more frequent than melena	Melena more frequent than hematemesis
Appetite	Afraid to eat	Good
Diet	Lives on milk and fish	Eats almost anything
Weight	Loses weight	No loss in weight

On examination it is not unusual to find localized deep tenderness in the right hypo chondrium.

Investigations

a. Gastroduodenoscopy and biopsy
b. Barium meal
c. Blood studies ↓ hemoglobin (Hgb) shows chronic blood loss
d. H.pylori test

Treatment

Medical treatment

ü Acid reduction

- H_2 – receptor antagonists– cimetidine 800 mg/night for six weeks
- Proton pump inhibitor – omeprazole 20 mg/d
- Irritants should be avoided
- Anti H. pylori treatment is given in the g20 7.0rD0 TTD0 Tc0 Tw(-).

Gastric Outlet Obstruction (G.O.O)

This is a state that results from cicatrisation and fibrosis due to long standing duodenal or juxtapyloric ulcer.

Clinical feature

- Patient presents with pain, fullness, vomiting of large foul smelling vomit and on examination a peristaltic wave from left to right and succession splash can be elicited. There could also be signs of electrolyte disturbance and metabolic alkalosis
- Barium meal shows large stomach full of food residue with delay in evacuation

Treatment

Surgery – truncal vagotomy and bypass operation after preliminary gastric lavage with saline for 4-5 days and Correction of fluid and electrolytes using crystalloid fluids

Gastric Cancer

Epidemiology

- Age 40-60 years
- Sex M:F 3:1

More common in Far East – Japan

Etiology

Premalignant conditions and risk factors:

- Á Gastric distention
- Á Dysphagia or fullness, belching and vomiting
- Á Other signs
  - Virchow’s nodes on the neck, Krukenberg tumor in the pelvis, etc.
  - Abdominal mass
  - Ascites

Investigations

- Gastroscopy and biopsy
- Hgb
- Barium meal shows filling defect
- Laparotomy (diagnostic)

Treatment

- Gastrectomy when possible
- Palliative bypass surgery

Pro.278 gis

Review Questions

1. What are the three phases of gastric secretion?
2. Compare and contrast the clinical presentation of gastric and duodenal ulcers.
3. Mention the treatment of uncomplicated chronic duodenal ulcer.
4. Enumerate the complications of peptic ulcer disease.
5. How would you manage a perforated peptic ulcer disease?
6. Mention the premalignant conditions for gastric cancer.
7. What are the clinical features of gastric cancer and how do you reach the diagnosis?
8. What is the overall five year survival rate of gastric cancer?

Examination: Usually less revealing - weight loss, emaciation, chest findings due to aspiration pneumonia

Investigations

Barium swallow radiography

Esophagoscopy

Endoscopic ultrasound

Manometry

Common surgical causes of Dysphagia

Achalasia of the esophagus (cardiospasm)

Etiology - motility disorder of the esophagus due to loss of ganglion cells in auerbach's plexus.

Pathophysiology - Incomplete relaxation of lower oesophageal sphinictor (LES)
- Stasis esophageal dilatation (functional obstruction)
- Risk for cancer (Ca), in long standing cases

clinical feature - Age 20-40 years
- Progressive dysphagia (insidious onset) regurgitation
- Retrosternal discomfort, fetid flatulence and aspiration pneumonitis

Diagnosis – Barium swallow: rat tail tapering, dilated esophagus, no gas in stomach
- Esophagoscopy
- manometry

Treatment: Disruption of the lower circular muscles- Heller's cardiomyotomy.

Carcinoma of the esophagus

Epidemiology

> 60 years M > F

5% of all cancers

Predisposing factors

Ingestion of hot meal, smoking, alcohol intake, etc

Pathology

Microscopic: squamous cell carcinoma, Adeno carcinoma

Macroscopically: Annular stenosing, ulcer, fungating, cauli flower like

Spread

Direct, lymphatic and blood stream to liver and bone

Clinical feature

Dysphagia, regurgitation, anorexia, weight loss

Diagnosis

Clinical features

Pain, heart burn, dysphagia, occult blood, secondary anemia

Diagnosis - Barium swallow, esophagoscopy

Treatment - treat the cause, H_2 blockers, omeprazole – reflux (peptic)

- surgery for sliding hernia

Caustic strictures

Treatment - acute inflammatory stage - NPO, antibiotics and cortisone

- stricture – dilation, esophageal replacement

Review Questions

1. Classify dysphagia according to the cause and site and give examples for each.
2. What are the investigations which are important in the differential diagnosis of dysphagia?
3. Compare and contrast a patient with achalasia with another patient having esophageal cancer (clinical presentation, diagnosis, treatment and prognosis).

References

1. Bailey and loves, short practice of surgery, 1995, 22

CHAPTER FIVE

UROLOGY

Learning Objectives

C. **Frequency:** it is an increased number of voiding urine; it is due to incomplete emptying and/or irritability of the bladder.

D. **Dysuria** (painful micturation)

E. **Dribbling:** drops of urine continues to flow even after micturation

F. **Urgency:** the feeling to void is very high urging the patient to void now and then

G. **Hesitancy**. Patient hesitates void, when he reaches to toilet though he had great feeling to void.

Investigations

Urinalysis:

- *Presence of protein, blood, glucose, ketones and PH in urine can all be determined.*
- *Electrolytes and chemical in the urine are measured e.g. billirubin bacteria*

Bacteriology

- *Urine culture and their susceptibility pattern from urine culture.*

Renal function Test:

- Estimates the capacity of the kidneys to excrete waste products and capacity of concentrating the urine.
- It is measured by assessing Blood Urea nitrogen (BUN) (normal value 20-40) and creatinine level (normal value 0.5-1.5) in the blood.

Radiology

Plain film (KUB) is the initial film that should be taken in cases suspected to have presence of stones along the urinary tract projections.

Intravenous Urogram (IVU, IVP):- patient is given a contrast material intravenously. Anatomy and physiology of the Kidneys, ureters and bladder are demonstrated.

Other investigations modalities are listed below

Modality	Advantages
Ultrasonography	- Shows the size of renal parenchyma - Hydronephrosis and stone, mass lesions
Cystoscopy	- Visualizes the bladder for tumor, and the prostate for enlargement
Urethrocystogram	- Delineates the location and length of urethral stricture
Retrograde Ureteropyelography	- Displays the ureter and pelvis e.g.- PUJ obstruction

Acute Renal Failure (Anuria/Oliguria)

Acute renal failure is said to happen when

- Oliguria (<400 ml of urine in 24 hours) or
- Anuria (no urine excretion at all). Kidneys fail to produce adequate urine out put to wash out all harmful toxic products such as nitrogen products.
- Hyperkalemia

Causes

The following table illustrates the common causes of acute renal failure

Level	**Common condition**
Pre renal ARF	- Dehydration - Shock
Renal (intrinsic renal diseases)	- Glomeluronephritis - Drugs, poisons - Myoglobinuria - Incompatible blood transfusion
Post renal (obstructive)	- Calculi, pelvic malignancy - Iatrogenic, retroperitoneal fibrosis - Bilharzias , BPH ,etc

Management of acute renal failure

Treatment of acute renal failure depends on the causes.

1. Treat the cause

- If hypotension, administer fluids and correct hypotension, then most of the cases could be reversed, urine out put is monitored hourly.
- Adequate urine out put is 0.5 –1.5ml/Kg/hr.
- Diuretic challenge
- In established cases: fluid restriction, and fluid administration based on replacement of the ongoing losses.

2. Renal *supportive methods*, such as dialysis (peritoneal and hemodialysis) performed to remove toxic chemicals and decrease the potassium level (k+) level in the blood to normal.
3. If the cause is post renal obstruction, e.g. ureteric stone, BOO, remove or bypass obstruction by the following means:

    Catheterization

    Open Surgery

Disorder of the kidneys and ureters

Hydronephrosis

Definition:

Hydronephrosis is defined as an aseptic dilatation of the pelvicalyceal system as a consequence of a partial or complete obstruction. It can be unilateral or bilateral based on the level of obstruction. The following table lists some causes of hydronephrosis.

Congenital	Acquired
- Congenital stricture of external urethral meatus, phymosis - Congenital valves of the posterior male urethra - Idiopathic pelvi-ureteric junction obstruction	- Benign prostatic enlargement - Urethral stricture - Post- circumcision phymosis - Stone diseases

Pathophysiology

When obstruction of urine flow is not relieved the following conditions happen:

The pelvis will be dilated, and more and more urine is collected.

Then calyces and pelvis become dilated, and pressure develops in the pelvicalyceal system

Then renal parenchyma undergoes pressure atrophy and even chronic renal failure could

Classification of Kidney infections

- Acute pyelonephritis
- Chronic pyelonephritis
- Pyonephrosis
- Renal abscess
- Perinephric abscess

Acute pyelonephritis:

It commonly occurs in females, in reproductive age group, childhood and pregnancy. The reason behind the increased prevalence of acu3(a)-1.726s(2.639394ra3(a)t:.0872 Tyi in0gS incre to highc

Diagnosis

- U/A - white cells are seen in great number
- Culture may grow E.coli, proteus species or any other organism listed above
- Ultrasonography**:-** may show scarred small kidney in late cases.

Treatment

- Remove the predisposing element e.g. Vesico-ureteric reflux
- Repeated courses of antibiotic treatment may be necessary

Perinephric abscess

Definition

Perinephric abscess is an infection of the perinephric fat resulting in pus collection. The source unlike pyelonephritis can be from extension of cortical abscess. It could also result from a distant source such as from appendix abscess.

Clinical feature

- Swinging high grade fever
- Abdominal and loin tenderness
- Flank mass

Diagnosis

Elevated WBC count,

Low or no pus cells or bacteria in urine

Ultrasound is usually diagnostic. KUB may help

Treatment

Drainage of abscess, intravenous antibiotics and fluid administration

Renal tuberculosis

Renal tuberculosis is not an uncommon condition. It is hematogenous in origin.

Pathogenesis

- The infection, once established in the kidney, tuberculous granuloma is formed.
- The granulomas are changed to ulcers and several ulcers coalesce to from an abscess.
- Healing of the inflammatory processes lead to extensive fibrosis and then to Tb pyonephroses.
- The ultimate result is calcified or cement kidney.

Clinical feature

- painful micturition
- Minimal flank pain

- Bloody urine
- urinary frequency

Investigation

- Á Sterile urine (routine culture is negative)
- Á Plain film of the abdomen shows calcified lesion (pseudo calculi)
- Á IVU shows loss of outline of renal papilla, hydronephrosis , and abscess
- Á Chest X-ray may show lung lesions

Treatment

Anti-Tb chemotherapy administration

Reconstructive surgery

Renal Stone Disease (Nephrolithiasis)

Renal stone disease is common in areas where the temperature is hot, and people are likely to be dehydrated. Etiology of stone formation in the urinary tract is not very clear. Proposed etiologies include:-

- Á Urinary stasis
- Á Infections
- Á Lack of inhibitors

Types of renal calculi

Calcium oxalate	Triple phosphate	Urate stone	Cystine stone
- They are irregular with sharp projection - Radio opaque - Cause bleeding (hematuria)	- Formed by ammonium magnesium and calcium phosphate (struvite) - Grows in infected alkaline urine - Tends to be very large (stag horn) - Dirty, radio opaque	- Multiple - hard, smooth - Radiolucent	- congenital error of metabolism - cystinuria - Contain sulfur - Radio-opaque

Clinical feature

- Symptoms are variable
- Silent calculi, may cause no symptoms but progressive destruction of the renal parenchyma
- Bilateral stones may cause uremia before dilatation
- Pain(75%) located in the renal angle

- Stone in the ureter manifests with severe pain radiating from loin to groin, attacks may not last longer than 8 hours
- Hematuria
- No tenderness, rebound tenderness or guarding
- Pyuria if complicated with infection
- Septicemia and urosepsis

- Á Symptoms of metastatic disease occur more frequently such as varicolele and
- Á Hypertension

Diagnosis

- Ultrasonography shows space occupying lesion
- IVU shows space occupying lesion with destroyed and deformed pelvi-calyceal system
- computer tomography

Treatment

The treatment depends entirely on surgical excision. It is not sensitive to radiotherapy and chemotherapy.

Renal injuries

Renal injuries are relatively uncommon injuries partly due to the inaccessible location of the kidneys in the retroperitoneum. Injuries to ureters are extremely rare in traumas; however ureteric injuries are fairly common in endoscopic ureteric procedures.

Renal injuries can be divided as mild, moderate severe or first, second and third degree renal injuries respectively.

First degree renal injury is an injury limited to the kidney parenchyma resulting in only subcapsular hematoma, hematuria may not be there.

Second-degree renal injury is said to happen when the injury involved the pelvicalyceal system but not the renal major vessels, hematuria is evident

Third degree renal injury is characterized by renal artery or renal vein involvement

Clinical features

Hematuria: - the most important symptom in renal injuries, extent and duration of hematuria determines the severity

Pain in the flank area and hypochondrium

Fullness, tenderness and *bruises* in the flanks may be detected

Hypotension and *shock* in third degree injuries are seen

Treatment

Conservative: - first degree and some second degree renal injuries replacement of fluid and blood transfusion if needed catheterization and follow up

Surgery: - severe forms of renal injury

Urinary Bladder

Bladder Injuries

The bladder is one of the visceral organs that are commonly involved in either blunt or penetrating injuries. Bladder rupture can be either intra peritoneal where urine peritonitis occurs and needs laparotomy and closure , While extra peritoneal rupture can be managed conservatively by passing an indwelling catheter.

Bladder outlet obstruction

This is the commonest presentation of all urologic problems and quite diverse disorders produce bladder outlet obstruction. The following table describes some of the long list of causes.

Males	Females
-BPH -Urethral stricture -Prostatitis - Rupture of Urethra - Meatal ulcer - Phimosis - Neurogenic bladder	- Retroverted gravid uterus - Multiple sclerosis - Hysteria - Neurogenic bladder - Certain drugs

Treatment

Acute urinary retention in most cases is relieved by passing a fine urethral catheter. If the cause is urethral stricture, suprapubic cystostomy is done to relieve the acute retention.

Bladder Stones

Stones are also formed in the bladder, and if stone is formed without any predisposing factor it is called primary vesical calculus. Whereas, a stone formed in the presence of distal obstruction or foreign body acting as a nidus, is called secondary vesical calculus.

Clinical Feature

- Males are more effected than females
- Pain characteristically occurs at the end of micturition
- The pain is referred at the end of the penis or labia majora
- In young boys, screaming and pulling of the penis with hand at the end of micturition
- Interruption of urinary stream and changing of body position to resume micturition.

Diagnosis

Radio opaque stone or filling defect in X-ray film

Treatment

Cystolithotomy (Open surgical removal)

Bladder Cancer

Bladder tumor is common in people exposed to chemical carcinogens. Occupational exposure to chemicals such as dye factory workers and cigarette smoking are considered to be strongly associated with bladder cancer. More than 80% of bladder cancer is transitional cell origin and only 25% of the tumors are muscle invasive.

Superficial bladder cancers are typically exophytic growth or papillary tumors. They account for 70% of the cases. Treatment is endoscopic resection and recurrence afterwards is common. Cystoscopic check up is necessary at regular intervals.

Muscle invasive transitional cell Carcinoma is solid tumor, large based and possesses potential of distant metastasis to the lungs, bones and liver.

Clinical feature

- Urinary retention from blood clot
- Pain, deep in the pelvis, indicating spread out of bladder territory
- Painless hematuria
- Recurrent UTI

Investigation

- Urine for white cell and RBC
- Blood BUN, Creatinine
- IVU shows filling defect, irregular out line of the bladder wall and hydronephrosis
- Cystoscopy

Treatment

Non- invasive tumors are treated with transurethral resection and followed with check cystoscopies.

- Intravesical chemotherapy and
- BCG is also effective in prevention of recurrence.
- Invasive tumors are very aggressive. Possible treatment is radical surgery, removing the bladder and lymph nodes around it, then urinary diversion.

Benign prostatic Hyperplasia (BPH)

Surgical Anatomy

These are three zones in the prostate gland

- Peripheral zone: mainly the posterior aspect of the gland

- Central zone: the gland posterior to urethral lumen above the ejaculation duct.
- Periurethral zone: this part is on which most of benign enlargement of the prostate arises.

Benign prostatic Hyperplasia starts in the periurethral zone and as it increases in size it compresses the outer peripheral zone. This zone finally becomes the false capsule. The gland is acted upon by testosterone, male hormone, incriminated to cause the enlargement.

Clinical Feature

- acute urinary obstruction
- Symptoms of prostatism (frequency , dysuria, urgency, dribbling, hesitancy)
- Chronic retention, overflow incontinence, and renal insufficiency.

Investigation and assessments

- Digital rectal examination
- Serum PSA(Prostatic specific antigen)
- Ultrasonography and IVU
- Cystoscopy
- Transrectal Ultrasonography

Management of BPH:-

- If associated with BOO → Pass a catheter and allow drainage, then prostatectomy.
- In cases only with symptoms of prostatism, other conservative measures can be tried.

Prostatic carcinoma

Prostatic cancer is most common malignant tumor in men over the age of 65 years.

Clinical Feature

Advanced disease gives rise to symptoms including

- Bladder out let obstruction
- Pelvic pain and hematuria
- Bone pain , renal failure

Diagnosis and assessment

- Rectal examination – stony hard gland with obliteration of the median sulcus.
- Blood tests- Hgb, PSA level, Liver function test, BUN and creatinine.
- PSA level> 10nl is suggestive > 30nl is diagnostic

N.B: PSA level is not specific. It can be affected by other conditions as BPH, UTI, etc.

Treatment

Based on the stages of the disease and the life expectancy of the patient, treatment is selected. The modalities available are:

- Surgery
- Radiotherapy
- Hormonal therapy, e.g. Bilateral orchidectomy

The urethra and penis

The urethra

Congenital abnormalities

Meatal stenosis

This is a condition which usually follows fibrosis after circumcision and if left untreated leads to chronic retention then chronic renal failure

Clinical Feature

Spraying and dribbling in lesser degree of stenosis

Urinary retention

Treatment

Meatotomy/meatoplasty (Plastic reconstruction of the meatus)

Congenital valves of the posterior urethra

This is a condition with presence of symmetrical of valves. It can cause obstruction to the urethra of boys and is not visualized on urethroscope. Voiding urethrocystogram (VCUG) is diagnostic

Treatment

Treatment is by initial decompression by catheterization followed by transurethral resection of the valves.

Hypospadias

This is the most common congenital malformation where meatus open onto the under side of the penis, perineum or prepuce. It has associated deformity called chordee (fibrous cord deforms the penis).

Treatment

Surgical repair

Urethral Injuries

There are two types

- Rupture of the membranous urethra

- Rupture of the bulbar urethra: blow to the perineum is the mechanism of injury

Clinical Features

- Retention of urine
- Perineal hematoma
- Bleeding from the external meatus

Treatment

- No attempts to catheterize should be made before urethroscopy or urethrography
- Suprapubic catheter insertion then surgery (urethroplasty) after 3 months.

Rupture of the membranous urethra: most commonly due to pelvic fracture or can also be due to penetrating injuries.

- Road traffic accidents, severe crush injuries and falls all can cause this injury
- Pain, bruising and dullness to percussion above the umbilicus

Treatment

Initial suprapubic catheter can be put to relieve urinary obstruction followed by urethroplasty

Complication

- Urethral stricture
- Urinary incontinence

Urethral Stricture

Causes

- Traumatic ⟶ Road traffic accident, falls, penetrating injuries
- Inflammatory ⟶ Gonococcus, Mycobacterium tuberculosis
- Latrogenic ⟶ Catheterization, instrumentation

Clinical Features

Bladder outlet obstruction, younger age than the prostate Patients

Diagnosis

Urethroscopy

Urethrography

Treatment

- Dilation with elastic or metallic boogie
- Urethrotomy , internal visual incision of stricture
- Urethroplasty, Excision and end to end anastomosis, patch urethroplasty

The Penis

Phymosis: Is an adhesion of the foreskin. It can be congenital or post-circumcision and results in urinary retention.

Treatment: is circumcision

Paraphymosis: Is a condition in which tight foreskin is retracted and causes constriction to the penis.

Treatment is dorsal incision over the constricting ring.

The Testis and Scrotum

The Testis

Incomplete Descent

This is a condition in which the testis is arrested in some part of its path to the scrotum.

Ectopic testis

Is abnormally placed outside its path, e.g. perineum. The testis located out of the scrotum is usually atrophic, grossly immature. If not treated early irreversible destruction will occur.

Clinical Features

- Right side in 50% of the cases
- Left 30%,
- bilateral in 20%

The position of the undescended testis is intra abdominal or inguinal canal or in the superficial inguinal pouch.

Hazards

The risks of incomplete descent of the testes include

- Sterility in bilateral cases
- Pain due to trauma
- Associated inguinal hernia
- Torsion
- Epididymo-orchitis
- Atrophy
- Increased liability to malignant diseases

Treatment: Orchidopexy

Testicular Torsion

Torsion of the spermatic cord may cause ischemia and necrosis of the testis

Predisposing conditions

- Inversion of the testis (rotated testes, upside down, or transverse lie)
- High investment of the tunica vaginalis (clapper-bell deformity)
- Separation of epididymis from the body of testis

Clinical Features

Most common between 10-25 years of age. It presents with sudden agonizing pain in the groin and the lower abdomen. Vomiting is also common

Treatment

- emergency exploration is mandatory
- orchidectomy if necrotic testis is found, orchidopexy if viable
- orchiopexy is advised on the unaffected side

Hydrocele

Hydrocele is an abnormal collection of serous fluid in the tunica. Types include:-

- Primary
- Secondary

Etiology: - excessive production and defective absorption

Treatment: - Hydrocelectomy

Malignant tumors of the Testis

1-2% of all malignant tumors are Testicular Carcinoma. Malignant tumors of the testis are common in young male adults. Mal descent predisposes to malignancy.

Classification

Tumors are classified based on Histologic predominant cells

- Seminoma (40%)
- Teratoma (32%)
- Combined seminoma and teratoma (14%)
- Lymphoma (7%)
- Other (7%)

Seminoma

- Occurs in age range between 35-45 years
- Extremely rare in children before puberty
- Tumor compresses the neighboring structure as it grows
- In rapidly growing tumors there may be areas of necrosis
- Spread is via the lymphatics, blood born is rare.

Teratomas

Teratomas arise from Totipotent cells, contain variety of cell types. They occur in relatively younger patients compared to seminomas.

Clinical features: - Testicular tumors may be asymptomatic for several months except lump in the testis

- Sensation of heaviness
- Pain in one - third of the cases
- On examination, the testis is enlarged, smooth, firm, and heavy.
- Testicular sensation is lost.
- Secondary Hydrocele in 10%

Diagnosis

- Blood for tumor markers such as HCG, Alpha FP
- CXR for secondary deposit

Treatment

Orchidectomy: removes primary tumor

Seminoma: - *Radiotherapy* after orchidectomy

Chemotherapy

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Review Questions

1. Outline the important steps of investigating a patient with right flank mass and hematuria.
2. Discuss the management of a 13 year-old patient with intermittent urinary retention and initial hematuria.
3. Outline common causes of acute urinary retention and indicate the recommended treatment.
4. Describe the clinical feature and treatment of benign hyperplasia.
5. List common problems associated with painful, sudden swelling of the scrotum.
6. A 40 year-old male presented with difficulty in urination of 1 year duration. How do you work him up? (Start from clinical evaluation)

References

1. General Surgery at the district hospital WHO 1998.

2. Bailey and Loves, short practice of surgery, 1995, 22nd edition