DIPLOMA IN REGISTERED NURSING

eLearning Training Program

Course Title: Surgery and Surgical Nursing II

Course Code: SSN 022

ACKNOWLEDGEMENTS

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ABBREVIATIONS AND ACRONYMS

AIDS	Acquired immune deficiency syndrome
AK	Astidmatic keratotomy
BCVA	Best corrected visual acuity
CK	Conductive keratoplasty
CLARE	Contact lens acute red eye
CLE	Clear lens extraction
CPR	Cardiopulmonary resuscitation
CSSD	Central sterile supply department
dB	Decibel
EAC	External auditory canal
ENT	Ear, nose and throat
ETT	Endotracheal tube
FNH	Focal nodular hyperplasia
GERD	Gastroesophageal reflux disease
HIV	Human immune vilus
ICU	Intensive care unit
IEC	information, education and communication
IOL	intraocular lens implant
IOP	Intraocular pressure
ITP	Idiopathic thrombocytopaenic purpura
MIU	Mega international unit
NSAIDS	Non steroidal anti-inflammatory drugs
PDS	Polydioxanone
URI	Upper respiratory infection

COURSE OVERVIEW

Introduction

Welcome to the second part of our course on Surgery and Surgical Nursing. In the first part of this course you learnt about the principles and types of surgery, how the body reacts to injury, trauma and haemorrhage, and how to manage surgical conditions of the gastrointestinal tract, cardiovascular and respiratory systems.

In this second part we will discuss the management and complications of surgical disorders of the biliary and urinary system, disorders of the ear, nose and throat, and eyes. You will also learn about the basic principles of operating theatre nursing and effects of anaesthetic agents to patients. This course will provide you with theoretical training, but you will be expected to practice your skills in the clinical area with your clinical instructor.

Course Aim

The aim of this course is to equip you with knowledge and skills in surgery and surgical nursing of conditions of the biliary and urinary system, ear, nose and throat, and eyes; as well as principles of operating theatre nursing and effects of anaesthetic agents.

Course Objectives

By the end of this course you should be able to:

1 Apply surgical nursing skills in the management of clients with surgical conditions of the biliary and urinary systems
2 Apply the principles of operating theatre nursing in the management of clients undergoing surgery
3 Apply surgical nursing skills in the management of clients with surgical conditions of the ear, nose and throat
4 Apply surgical nursing skills in the management of clients with surgical conditions of the eye.

Course Content

This course is divided into the following four main units:

- Unit 1: Surgical Conditions of the Biliary and Urinary System
- Unit 2: Operating Theatre Nursing and Anaesthesia
- Unit 3: Disorders of Ear, Nose and Throat
- Unit 4: Opthalmology and Ophthalmic Nursing

Assessments

In this course you will be assessed through written assignments, tests and a final examination at the end of the year. You will also undergo practical skills assessments in order to find out if you know how to perform the necessary procedures. The breakdown of the assessments is as follows:

Theory **100%**

- Continous Assessment 20%
- Tests (2no) 20%
- Group assignment (2no) 20%
- Total 40%
- **Final Theory Examination 1 60%**

Practical **100%**

- Continous Assessment
- Clinical Assessment (2no) 40%
- **Final Practical Examination 1 60%**

Learning Tips

This course will take you a minimum of 66 hours to cover theory and 140 hours for practicals. Plan your work in such a way that you give yourself enough time to complete all of them**.**

Activities, Self-Help Questions and Case Studies

As you study the course, you will find activities, self-help questions and case studies. These will help you learn more effectively as you apply what you read. Make sure you take time to complete them in the order they appear in this course.

Readings

You will find a list of prescribed books readings at the end of this course. The references will help you to explore the topics further. You are encouraged to read as widely.

Prescribed Readings

1. Bloom, S. R. (1995) Toohey's Medicine. A Text book for students in Health Care, London Churchill, Livingstone

2. Ray, A. H. (1996) Medical Surgical Nursing. Philadelphia. Lippincott

3. Smeltzer S.C and Bare B.G. (2004). Brunner and Suddarths Textbook of Medical Surgical Nursing, 10th edition, Lippincott Williams and Wilkins, Philadelphia.

Recommended Readings

1. Black J.M. et al, (2001). *Medical-Surgical Nursing: Clinical Management for Positive Outcome*, 6th Ed, Saunders Company, London.

2. Lewis H. D. et al., (2004). *Medical - Surgical Nursing: Assessment and Management of Clinical Problems,* Mosby. New Mexico.

UNIT 1: SURGICAL CONDITIONS OF THE BILIARY AND URINARY SYSTEM

1.1 Introduction to the Unit

Welcome to Unit 1. In this unit you will get an opportunity to study the common surgical conditions affecting the appendicular organs of the digestive system and organs of the urinary system. You will also learn how to care for patients with these conditions and especially those who have undergone surgical procedures. Let us start with our objectives for this unit.

1.2 Unit Objectives

By the end of this unit you should be able to:

1. Explain the management of a client with disorders of the liver
2. Describe the management of a client with disorders of the gall bladder
3. Explain the management of a client with disorders of the spleen
4. Describe the management of a client with disorders of the pancreas
5. Explain the management of a client with disorders of the urinary system

1.3 Disorders of The Liver

The liver is an intra-abdominal accessory organ of the digestive system. It normally weighs about 1.5kg. However, when it is diseased it can weight up to 10kg.

Can you remember the functions of the liver from the anatomy and physiology course? Write them down in the following activity.

Activity 1

List down in your notebook 2 functions of the liver.

We hope your list contained the following functions of the liver, namely:

1. Metabolism and energy production
2. Bile production
3. Storage of iron, vitamins and trace elements
4. Detoxification
5. Conversion of waste products for excretion by the kidneys

Figure 1 shows an illustration of the biliary tree.

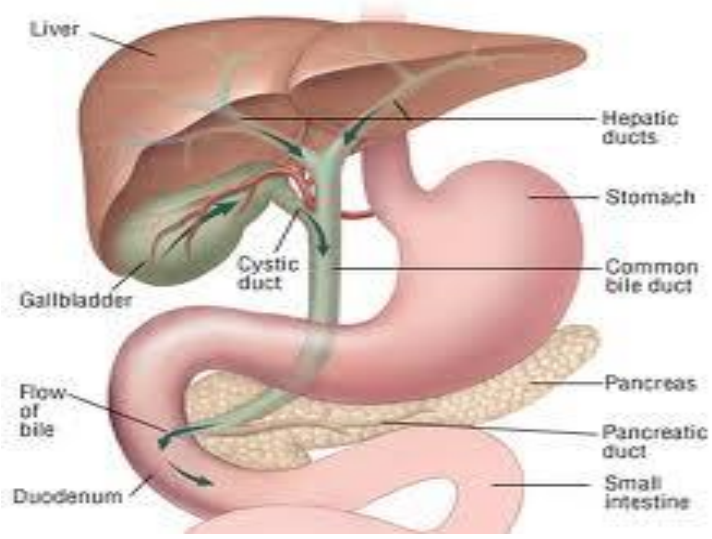

Figure 1: Diagram of the biliary tree

In this section we shall discuss the following surgical conditions of the liver:

- Liver abscess
- Polycystic liver disease
- Liver cirrhosis
- Neoplastic cyst
- Hydatid cyst
- Portal hypertension
- Oesophageal variceal haemorrhage
- Hepatic /liver tumours

1.3.1 LIVER ABSCESS

A liver abscess is a pus-filled mass inside the liver.

Causes

The common causes are abdominal infections such as appendicitis or diverticulitis due to haematogenous spread through the portal vein. There are three major forms of liver abscess, which are classified by aetiology:

1. Pyogenic liver abscess, which is the most common polymicrobial hepatic abscess
2. Amoebic liver abscess due to entamoeba histolytica
3. Fungal abscess, most often due to Candida species.

Predisposing Factors

The key predisposing factors are:

- Inflammatory bowel disease, particularly Crohn disease, due to loss of integrity of the mucosal barrier

- Liver cirrhosis,
- Hepatic transplant
- Hepatic artery embolization in hepatocellular carcinoma
- Institutionalization,
- Immunocompromise
- Older age, associated with biliary sepsis
- Malnutrition, malignancy, pregnancy, steroid use, and excessive alcohol intake predispose to liver abscess formation

Mode of Spread of Infection

The disease spreads through the:

1. Lymphatic system: intestinal infection can reach the liver through the lymphatic vessels.
2. Blood stream: infection can be carried from elsewhere in the body
3. Direct contact: through a penetrating or blunt wound and infection in the adjacent structures such as the gall bladder.

Pathophysiology

Cells die and disintegrate leaving spaces (cavities) where fluid and infected cells accumulate. White blood cells engulf the bacteria and die. The dead white blood cells accumulate as a creamy substance (pus) filling the whole area. These cells eventually grow around the abscess and wall it off.

Signs and Symptoms

The main signs and symptoms include:

- Nausea and vomiting
- Loss of appetite
- Fever

- Abdominal pain
  - Particularly in the right, upper part of the abdomen
  - Intense, continuous, or stabbing pain
- Chills
- Diarrhoea (in only one-third of patients)
- General discomfort, uneasiness, or ill feeling (malaise)
- Jaundice, joint pain, sweating, weight loss

Investigations

The following investigations are useful in the diagnosis of liver abscess:

- Computed tomography, Ultrasound scanning
- Complete blood count
- Liver abscess aspiration, to check for bacterial infection in the liver abscess
- Liver function tests
- Serology for amoebiasis
- Stool testing for amoebiasis

Management of Liver Abscess

The management involves:

- Abscess aspiration: a surgical procedure used to drain the abscess
- Administration of systemic antibiotics

Contraindications for Liver Abscess Aspiration

Liver abscess aspiration should not be done if the following conditions are suspected:

- Hydatid cyst: aspiration may lead to anaphylactic shock
- Haemangioma: may result in internal haemorrhage leading to shock.

- Liver aspiration should be avoided in patients with bleeding disorders.

Preoperative Care

The general preoperative nursing management includes:

1. Carrying out the investigations we mentioned above
2. Giving Vitamin K if there is jaundice or raised prothrombin time.

General Postoperative Care

- Care of insertion site needle to drain pus
- Psychological care
- Information, education and communication
- Care of the drainage tubes and the incision sites

Complications

The two main complications are:

- Secondary haemorrhage
- Secondary bacterial infection – disintegration of the lining wall of the cavity.

1.3.2 POLYCYSTIC LIVER DISEASE

Kidney cysts usually occur before liver cysts but polycystic liver disease rarely lead to hepatic and fibrotic liver failure. Polycystic liver disease is congenital associated with autosomal polycystic kidney with mutation of genes.

Presentation

The condition presents with the following:

- There may be abdominal pains.

- Palpable liver which maybe be due to hepatomegaly.
- Kidney cyst may also be present.

Medical Management

The aim of medical management is to:

- alleviate pain
- prevent complications

Investigations

The following investigations should be carried before a diagnosis is made:

- Kidney and renal functions test.
- Liver function test.
- Ultra sound or C.T scan which will show multiple liver cysts.

Treatment

If a diagnosis of polycystic liver disease is made, then the treatment includes de-roofing and liver resection. A liver trans plant may be done but this is rare.

1.3.3 NEOPLASTIC CYST

Cystadenomas and cystadenocarcimas are rare.

Signs and Symptoms

The possible signs and symptoms are:

- Asymptomatic.
- Nausea.
- Abdominal fullness.

- Abdominal pains.

Investigations

- Liver function test-which may be normal.
- Cyst fluid for carbohydrate antigen (CA) 19-9 level may be raised.

Treatment

The treatment of of neoplastic cyst is liver resection

1.3.4 HYDATID CYST

This is caused by a parasite *achinococcus granulosus*, which is a tape worm found in dogs. . The dogs pass the eggs in stool which are then ingested by man, sheep, cattle. The egg larva invade the intestinal truck to the mesenteric vessels via to the liver where it grows and a hybrid cyst develops producing daughter cyst. Human infection mainly occurs in people who raise sheep, cattle or are in contact with dogs.

Presenting signs and symptom

A hydatid cysts may be asymptomatic 10-20 years. The main signs and symptoms are:

- Pain or a mass in the right upper quadrant
- Jaundice may also appear.
- There may be anaphylactic shock if it raptures into the chest peritoneal cavity

Investigations

The following investigations are useful in the diagnosis of a hydatid cyst:

- Full Blood Count which will show raised esinophills

- Achinococcal anti body titter which will prove positive.
- A C.T Scan which will show the cyst.

Treatment

Treatment with Mebendazal / albendazole should be given. Surgery may also be necessary to resection or excise of the liver.

1.3.5 LIVER CIRRHOSIS

What is Liver Cirrhosis?

This is the chronic progressive disease of the liver characterized by extensive chronic degeneration and destruction of the liver parenchyma cells.

Cirrhosis of the liver occurs when the normal flow of blood, bile and hepatic metabolites are altered by fibrosis leading into changes on the hepatocites, bile ducts, vascular channels and reticular cells. In this condition, the liver cell attempts to regenerate but the regeneration process is disorganized resulting in abnormal blood vessels and bile duct relationships from the fibrosis.

Types of Liver Cirrhosis

The type of liver cirrhosis depends on the cause and includes:

- *Alcoholic cirrhosis/portal or nutritional cirrhosis*: this is usually associated with alcohol abuse.
- *Post necrotic cirrhosis*: this is a complication of viral toxic or idiopathic hepatitis
- *Biliary cirrhosis*: this is inflammation and eventually scarring and obstruction of the bile duct in the liver from prolonged biliary obstruction and infection. There is diffuse fibrosis of the liver with jaundice as a feature.

- *Cardiac cirrhosis*: results from long standing severe right side heart failure in patients with cor-pulmonale constrictive pericarditis.

Causes of Liver Cirrhosis

The following are the common causes of liver cirrhosis:

- Alcohol abuse.
- Use of certain drugs. e.g. T.B drugs like isoniazide.
- Exposure to certain drugs.
- Exposure to certain chemicals.
- Infection (including hepatitis B and C).
- Autoimmune disease (including auto immune chronic hepatitis).
- Bile duct obstruction.
- Persistent obstruction to outflow of blood from the liver.
- Heart and blood vessel disturbances.
- Malnutrition.
- Diabetes.

Pathophysiology

In liver cirrhosis there is cell necrosis and the destroyed liver cells are replaced by scar tissue. The normal lobular architecture becomes nodular. Eventually, irregular, disorganized regeneration, poor cellular nutrition, hypoxia caused by inadequate blood supply (blood flow), and scar tissue results in decreased functioning of the liver.

Among alcoholics, cirrhosis occurs with great frequency. A common problem in alcoholics is that protein malnutrition eventually causes nutritional cirrhosis. Extreme dieting or malnutrition can also cause it. It is believed that the combined impact of malnutrition and alcohol is especially damaging to hepatocytes. Alcohol has a direct hepato toxic effect. . It causes necrosis of cells and fatty infiltration.

Pathophysiology, Signs and Symptoms

When there is Liver injury the cells of the liver are damaged. This is called Hepatocyte damage and lead to the following:

Inflammation of the liver causing - pain and nauseas

⇩

Fever malaise

⇩

Anorexia and vomiting

⇩

Weight loss fatigue due to not eating

⇩

Alteration in blood and lymph flow this will lead to

Liver necrosis

⇩

Liver fibrosis and scaring

⇩

Portal hypertension

⇩

Portal hypertension - ascitis, splenomegaly, anaemia

Haemorrhoids,

⇩

Oedema

⇩

Oesophageal varies

⇩

Superficial abdominal varies

⇩

Leading to bleeding.

Clinical Manifestations

The onset of cirrhosis is usually insidious. But occasionally it can be abrupt. The following are some of the signs and symptoms:

- Anoxia.
- Palpable damaged liver due to macro nodular cirrhosis.
- Dyspepsia.
- Nausea and vomiting.
- Change in bowel habits - diarrhoea or constipation.
- Dull abdominal pains.
- Oesophageal and gastric varices.
- Hematemesis due to bleeding from varicose veins at the lower end of the oesophagus (oesophagus varices).

These symptoms occur as a result of the liver altered metabolism of carbohydrates, fats and proteins.

The dull abdominal pains described as a heavy feeling in the right upper quadrant or epigastrium may be due to swelling and stretching of the liver capsule, spasm of the biliary ducts and the intermittent vascular spasm.

Later signs and symptoms:

- *Jaundice:* this results from the functional derangement of liver cells and compression of bile ducts by connective tissue over growth. It occurs as a result of decreased ability to conjugate and excrete bilirubin (hepatocellular jaundice). May be accompanied by purities-due to accumulation of bile salts under the skin.

- *Skin lesions*: spider angiomas - spider nevi- small dilated blood vessels with a bright red centre point and spider-like branches. They occur on the navel, cheeks, upper trunk, neck and shoulder.
- *Haematological problems;*
- *Thrombocytopenia, leukopenia, anaemia* and coagulation disorders due to splenomegaly which is due to backup of blood from the portal vein into the spleen.
- *Anaemia*: due to inadequate red blood cell production, poor diet, bleeding from varies and poor absorption of folic acid.
- Resulting from endocrine disturbances: inadequate metabolism and activation of adrenal cortical hormones, oestrogen and testosterone occur and the following manifest:
  - Men: gynaecomastia, loss of axillary and pubic hair, testicular atrophy, impotence and loss of libido.
  - Due to accumulate of oestrogen:
    - young women have amenorrhoea.
    - older females have vaginal bleeding.

The enlarged blood vessels (varicose veins) result from high blood pressure in the veins that run from the intestine to the liver. This high blood pressure, also known as portal hypertension, coupled with poor liver function may lead to fluid accumulation in the abdomen - Ascitis.

Medical Management

The aims of medical management are:

- To remove or alleviate the underlying cause of cirrhosis,
- To prevent further liver damage.
- To restore the functions of the liver
- To prevent further complications

Investigation

The main investigations include:

- Liver biopsy: this is a definite test for cirrhosis; the biopsy detects hepatic tissue destruction and fibrosis and rules out cancer.
- Abdominal x-ray: the films show liver size and of gas within the biliary tract or liver calcification and massive ascites.
- Computed tomography and liver scans: the studies determine liver size, identify liver masses and visualize hepatic blood flow and obstruction.
- Esophagogastroduodenoscopy: this study reveals bleeding oesophageal varices, stomach irritation or ulceration or duodenal bleeding or irritation.
- Blood studies: liver enzyme test (amino transferase and aspartate amino transferase levels are elevated).
- Total serum bilirubin and indirect bilirubin levels are elevated.
- Total serum albumin and protein levels are decreased vitamin A, D, E, K are deficient.
- Liver scan using radioactive isotope shows the functioning areas and the scared areas of the liver.

Urine and stool studies:

- Urine levels of bilirubin and urobiliongen increase Fe.
- Faecal urobilinogen levels.
- Ultra sound scan to check if the duct is enlarged.
- Prothrombin time which shows the synthetic function of the liver
- Liver biochemistry
- Serum aspartate and alanine aminotrasparency which shows hepatic cellular damage.
- Serum alkaline phosphates: this may review cholecytitis due to intra hepatic or extra hepatic liver damage.
- Total proteins

- Endoscopy for diagnosis and treatment of varices as well as detection of portal hypertension.

Treatment

Non - pharmacological

- *Diet:*
  - Vitamin and nutritional supplements and improve the patients nutritional status.
  - Low salt diet-sodium consumption is usually restricted to 500mg/day to help manage ascites and oedema.
  - Stop alcohol ingestion if the patient takes alcohol.
  - Stop the toxin exposure if able to identify them.

- *Rest:* adequate rest is important.

Stop the cause:

- Stop drugs interacting with the liver e.g. Panadol.
- Stop drugs which cause pressure in the biliary tract such as morphine paradhyd because they increase pressure which can lead to obstruction in the bile flow.

Pharmacological

Diuretic therapy is an important part of management

- Spironolactone (aldactone) dose of 100 mg: It is a potassium-sparing drug.
- Modiuretic 100mg daily
- Furosemide (lasix)- this is a high potency loop diuretic. Dosage is 20-40mg daily.

- A paracentesis (needle puncture of the abdominal cavity) may be performed to remove ascitic fluid. It is a temporal measure though, since the fluids tend to accumulate.
- Anti acids-to reduce gastric distress and decrease the potential for gastrointestinal bleeding.
- Magnesium Trisilicate (MMT). Dosage is 200mg t.d.s. x 4/7(chewing). Its side effect is constipation.

Nursing Management

The aims of nursing management are similar to those of medical management which we have just covered. However, specific nursing management includes:

Psychological Care:

- Explain to the patient the disease process:
  - The possible cause of liver cirrhosis.
  - The pathological structure of the liver in cirrhosis.
  - The cause of ascitis.
  - The reason for strictness in monitoring sodium intake. So that even when he is alone can obey.
  - The nurse should be a supportive listener and be able to explain these phenomena to patients.

Rest and activity:

- The patient should be nursed in a semi fowler's position. To allow for maximum respiratory efficiency. This is because patients with ascites have dyspnoea.
- Use of pillows at the back of the patient may increase their comfort and ability to breath.
- Group the nursing care activities to lessen disturbances and allow for rest.

- The patient may not tolerate a lot of movement but encourage them to walk to the abruption.
- Provide diversional therapy to assist the patient cope with discomfort of itchiness and oedema.

Nutrition and fluid:

- Determine food preferences and provide it within the patients prescribed diet limitation.
- Offer small frequent meals.
- Anorexia, nausea and vomiting, pressure from ascites, and poor eating habits all create problems in maintaining an adequate intake of nutrients.
- Provide low protein or no proteins if so ordered, as ammonia, a product of protein is responsible for mental changes.
- Monitor salt intake: the patient should be put on a low salt diet.
- Restrict fluid intake as ordered.

Observation

- The patient should be observed for the following:
  - signs of fluid electrolyte imbalance especially hypokalaemia.
  - cardiac arrhythmias, hypotension, tachycardia and generalized muscle weakness.
  - bleeding gums, epistaxis and petechiae
  - signs of hepatic encephalopathy:
  - assess the patient's general behaviour, orientation to time and place.
  - monitor the ammonia level because the liver is unable to convert accumulated ammonia to urea for renal excretion;
  - blood pressure to rule out hypertension or hypotension;
  - temperature to rule out hyperthermia and hypothermia;
  - pulse to rule out tachycardia and bradycardia;
  - respiration to rule out dyspnoea and tachyapnoea;

- Closely monitor the patient during haemorrhagic episodes. Bleeding can occur with liver disease due to the impaired synthesis of clotting factors.
- Inspect stool for amount, colour and consistency. Test the stool and vomit for occult blood.

Hygiene

- Give the patient frequent skin care, bath him / her without soap and massage him with emollient lotion.
- Keep his nails short. Handle him gently, turn and reposition him often to keep the skin intact.
- There is high risk of impaired skin integrity related to oedema, ascites and purities as manifested by complaints of itching areas of excoriation caused by scratching.

Information education communication

- Teach the patients not to strain on defecation to minimize bleeding.
- Not to blow his or her nose vigorously to avoid epistaxis.
- Let patient use a soft toothbrush to avoid injury to gums.
- Advise the patient that rest and good nutrition conserve energy and decrease metabolic demands on the liver.
- Let him or her eat frequently small meals with low sodium intake.
- Teach patient to sit while bathing to conserve energy.
- The patient should avoid alcohol consumption, as it is one of the causes.

Prevent infection

- Reverse isolation
- Hand washing before and after toilet
- Aseptic techniques
- Restrict visitors

- Give antibiotics
- Use masks if heath worker has a cold/flu
- Provide an appropriate diet to help prevent secondary infection.

Complications

- *Portal hypertension*: caused by structural changes in the liver from the cirrhotic process. There is compression and destruction of the portal herpetic veins and sinusoids. These changes result in obstruction to the normal flow of blood through the system causing portal hypertension;
- *Oesophageal varices*: these occur as a complex of tortuous veins at the lower end of oesophagus, enlarged and swollen as a result of portal hypertension.
- *Ascitis:* due to accumulation of serous fluid in the peritoneal or abdominal cavity;
- *Oedema*: peripheral oedema- which results from decreased colloidal oncotic pressure from impaired liver synthesis of albumin and increased portalcarval pressure from portal hypertension;
- Jaundice
- Bleeding tendencies
- Hepatic coma
- Confusion
- Hepatic encephalopathy.

1.3.6 Portal Hypertension

Portal hypertension arises from liver cirrhosis. It occurs when there is a persistent increase in blood pressure in the portal venous system. It is caused by increased resistance to or obstruction of blood flow through the portal venous system into the liver.

Risk factors

The main risk factors are:

- Liver cirrhosis of all causes.
- It can be due to obstruction of the portal vein by a thrombus or it can also be caused by the tumours.

Types

There are three main types of portal hypertension, namely:

- *Pre hepatic*: due to blockage of the liver's portal vein leading to portal vein thrombosis.
- *Intra hepatic*: due to distortion of the liver's architecture due to cirrhosis and systosomiasis.
- *Post hepatic*: due to venous constrictive pericarditis, right heart failure and tumours.

Pathophysiology

The normal blood flow to and from the liver depends on normal functioning of the portal vein i.e. the inflow as well as outflow. The normal portal venous blood pressure is 5 – 10 mmHg. Portal hypertension occurs when pressure increases 5mmHg higher than that of the inferior vena cava. Collateral vessels develop in an effort to equalize pressure between the few venous systems; also the spleen and other organs that empty into the portal venous system begin to undergo the effects of congestion (gastro oesophageal junction, rectum).

Any disease process that damages the liver or alters blood flow leads to development of portal hypertension due to increased resistance of blood flow in the portal vein or increased resistant to flow within the portal venous system.

Clinical presentation

The main signs and symptoms include:

- Tortuous epigastric vessels
- Enlarged palpable spleen
- Internal haemorrhage
- Ascitis
- Raised venous portal pressure
- Malaena
- Encephalopathy.

Investigations

- Direct measurement of portal pressure which is done when liver is scanned
- Spleenoportalgraphy which shows enlarged spleen
- Abdominal angiography which shows the enlarged blood vessels
- Liver biopsy to rule out cancer
- Radiography
- Endoscopy to differentiate variceal haemorrhage from other types of GIT bleeding.

Managements

- Prevent active bleeding by giving the patient vitamin K
- Treat any respiratory infection
- Give fluids and high roughage diet to facilitate regular bowel opening and to prevent straining due to hard stool.

Complications

- Dilatation of superior oesophageal: these include abdominal wall veins and gastric veins.
- Swelling and distension of oesophageal veins leading to varices.

- Rupture of varices due to increased portal blood pressure caused by:
  - Coughing.
  - Straining at stool.
- Hepatic encephalopathy due to digestion of blood in the intestines. Following bleeding in the G.T.I. blood which is a protein increases ammonia in the blood stream.

1.3.7 OESOPHAGEAL VARICEAL HAEMORRHAGE

This is bleeding from the veins in the oesophagus. Bleeding is likely to occur with large varices (dilated veins). This can occur when, for instance, a person strains due to hard stool. This raises the pressure leading to rupture of oesophageal blood vessels.

Signs and symptoms of oesophageal bleeding

The main signs and symptoms include:

- Maleana.
- Hematemesis.
- Hypotensions less than 90/60 mmHg.
- Pulse rate more than 100b/m.
- Cold and clammy skin.
- Diminished orientations.
- Reduced ammonia.
- Restlessness.

Management

- Assess the general condition of the patient by checking the TPR-BP.
- The level of consciousness

- I.V line
- Oxygen therapy
- Positioning the patient in recovery position
- Suctioning patient if unconscious and has noisy breathing
- Collecting blood for investigation, such as, Hb, grouping and cross-matching and urea levels.
- Transfusion based on the results and giving plasma expanders.

Complications

The main complication is anaemia.

1.3.8 HEPATIC /LIVER TUMOURS

Liver or hepatic tumours are growths on or in the liver. Since the liver is made up of various cell types, there are several distinct types of tumours which can develop in the liver. These growths can be benign or malignant (cancerous). They may be discovered during medical imaging or may present in patients as an abdominal mass, hepatomegaly, abdominal pain, jaundice, or some other liver dysfunction.

Classification of Liver Tumours

As we mentioned earlier, the tumours can either be malignant or benign. Let us look at each in turn.

Malignant (Cancerous)

Most cases of liver tumours are **metastases** from other tumours. The most frequent malignant, primary liver cancer is **hepatocellular carcinoma.** The rare primary forms of liver cancer include cholangiocarcinoma, mixed tumours, tumours of mesenchymal tissue, sarcoma and hepatoblastomais a rare malignant tumour in children.

Benign

There are several types of benign liver tumours:

- *Haemangioma:* these are the most common type of benign liver tumour. They start in blood vessels. Most of these tumours do not cause symptoms and do not need treatment. Some may bleed and need to be removed if they are mild to severe.

- *Hepatic adenomas:*

  These benign epithelial liver tumours develop in the liver and are also an uncommon occurrence, found mainly in women using oestrogens as contraceptives, or in cases of steroid abuse. They are, in most cases, located in the right hepatic lobe and are frequently seen as solitary. The size of adenomas range from 1 to 30 cm. The symptoms associated with hepatic adenomas are associated with large lesions which can cause intense abdominal pain. The prognosis for these tumours is still not yet known.

- *Focal nodular hyperplasia (FNH):* is the second most common tumour of the liver. This tumour is caused by a congenital arteriovenous malformation hepatocyte response. The process is one in which all normal constituents of the liver are present, but the pattern by which they are presented is abnormal.

Other types include:

- Nodular regenerative hyperplasia and
- Haematoma.

Surgical Intervention

The most common operation performed on the liver is a resection (removal of a portion of the liver). The most typical indication for liver resection is a malignant tumour.

A single tumour or more than one tumour confined to either left or right side of the liver can be successfully resected. Liver resections performed on patients with extra hepatic disease may relieve the symptoms caused by the tumour, but offer little improvement in survival. Benign tumours of the liver (cyst, adenoma, haemangioma) can be successfully managed by liver resection as well. If the location of a benign tumour is superficial and small in size, the operation can be performed laparoscopically (by making small punctures in the abdomen while viewing through a video camera).

Liver Transplant

The contraindications for a liver transplant are:

- Sepsis.
- Malignancies outside the liver.
- Advanced hepatobiliary malignancy.
- Active substance abuse.
- Irreversible brain damage.
- Inability to comply with post-transplant immune suppression regimen.
- Preoperative care

The preparations for a live donor liver transplant include the following:

1. The donor participates in an extensive workup prior to the transplant.
2. Basic information is obtained and any questions answered by the coordinator.
3. The donor is seen in the outpatient clinic where they are interviewed by a transplant surgeon, coordinator and social worker

4. An informed consent is obtained,
5. A haematologist obtains a complete history and physical, blood profile.
6. An abdominal ultrasound is performed to assess the hepatic blood flow.
7. A psychological evaluation is performed in order to determine whether the donor is actually volunteering to do this and whether they completely understand the risks involved.
8. For women over 35 years old, a pap smear and mammogram is performed and for men over40 years old, a colonoscopy is performed.
9. If there are any idiosyncrasies up to this point or if the donor changes their mind, the evaluation process is stopped here.
10. Tests and studies for HIV, hepatitis, and immunology are done.
11. Urinalysis and a pregnancy test are performed on females
12. Liver volume is determined via abdominal CT scan and a chest x-ray, lung function tests, and echocardiogram are performed in preparation for the surgery.
13. Angiogram to determine the anatomy of the donor's liver and blood vessels is performed as well.
14. The anaesthesiologist meets with the donor to do a typical anaesthesia workup prior to surgery.
15. General pre operative care is given to the recipient.
16. All contraindications are ruled out.

Post-operatively, the patient has the following lines:

1. Two arterial lines.
2. Oxygen catheter and a second introducer.
3. Large bore line in arm
4. Peripheral IV (s)
5. A Quinton catheter if dialysis is required pre-op.

The patient also has the following drains/tubes:

1. T-tube (may also be called a Turcotte Tube, or bile drain)
2. Nasogastric tube

Patient is nursed in the intensive care unit (ICU). While there the following should be monitored:

1. Neurological status
2. Signs of haemorrhage
3. Prevention of pulmonary complication
4. Drainage
5. Urine output
6. Signs and symptoms of rejection and infection
7. Encourage coughing, breathing exercise
8. Measure and observe colour from drainage tubes
9. Offer emotional support
10. Give information, education and communication
11. Observe for side effects of immunosuppressants
12. Differentiate between infection and rejection: transplant patients may experience infection and rejection simultaneously.
13. Monitor the patient's response to changes in antibiotic and immunosuppression therapy. This guides medical decisions regarding the patient's care and ultimately impacts on the survival of the grafted liver.
14. Carefully and accurately transcribe and administer changes in medications;

The signs and symptoms of rejection mimic those of infection with a few variations. Both can cause hepatic dysfunction, yet their treatments are completely different. When rejection is suspected, it is important to rule out infection, as well as technical causes for the hepatic dysfunction.

Signs and symptoms of infection

These are:

- Fever
- Reduced quantity and quality of bile
- Increased liver function test
- Malaise
- Increased Ascites

Special investigations of the liver

1. Liver biopsy

This is a procedure in which a small needle is inserted into the liver to collect a tissue sample. This is taken for laboratory analysis in order to diagnosis a variety of liver disorders.

Indications

- Persistent abnormal liver blood test (liver enzymes).
- Unexplained jaundice.
- Liver abnormality found on ultra sounds or CT scan.
- An explained liver enlargement.

Preparation for liver biopsy

Find out if the patient is pregnant, has an allergy or bleeding problems. The patient should not be on medication such as aspirin or an inflammatory drugs. If the patient is on such drugs consult the doctor. Other preparations include:

- Laboratory investigations for HB grouping and X-match,
- Take a prothrombin count on the day of the procedure,
- Giving psychological care,
- Explaining the procedure and getting patient consent ,

- Giving the patient a hospital gown and letting the patient lie on the back near the edge of the bed. Make sure the patient does not fall to the ground.
- Keeping the patient still during the procedure with the elbow out to the side and hand under.
- Performing an ultrasound to mark the location of the liver or percussion
- Giving the patient a sedative or local anaesthesia such as lignocaine - 5mls.
- Asking the patient to hold their breath when the surgical blade and special needle is pushed in.

Putting the biopsy in formalin or sterile bottle for culture procedures. After biopsy the patient may be kept in recovery room for 4 -6 hours for observations like:

- Haemorrhage
- Pain
- Vital signs baseline.

If there is minor discomfort or dull pain give the patient pain killers like diclophenac.

Instructions after biopsy

- Do not drive or operate machinery at least 8 hours after biopsy
- No vigorous activities for 24 hours

Types of biopsy

- Laparoscopic when specific parts of the liver are required.
- Transvenous in patients with blood clotting problem or those who have fluids in their abdomen.

Complications of liver biopsy

- Haemorrhage
- Infection
- Fever
- Dyspnoea
- Chills
- Severe pain at the site of biopsy
- Tenderness fever, bleeding, chills: if these occur call the doctor and ask the patient to come to the hospital immediately especially if he or she has dyspnoea.

2. Cholecystography

This is a procedure in which an x-ray is used to visualize the gall bladder after administering by mouth, radio opaque's dye. The die is ingested with a high fat meal at noon one day before the test is carried out. The next day x-rays images of the gall bladder are taken.

Indications

- Diagnosis of gall bladder disease.
- Intolerance of fatty foods.
- diagnosis cystic duct obstruction.
- To rule out normal gall bladder contractility.
- To rule out gallbladder stones.
- To visualize the anatomy of the gall bladder in people with gallstones gall bladder disease and cystic duct disease.

Procedure

- A day before give a high fat meal at noon and fat free meal in the evening.
- Two to three hours after evening meal administer orally the radio opaque contrast media in tablet form.

- Restrict other foods fluids except water till test is finished. On the day of the test enema may be given.
- The patient should lie face done on a hard flat radiographic table when the x-ray film of the gall bladder is being taken. The patient may also lie on the side or stand erect
- Give the patient a high fat meal or synthetic fat containing agent to stimulate gall bladder empting.
- The X-rays should be taken 15 to 30 minutes following fat stimulus to visualize the bile duct and after 60 minutes if the gall bladder empties slowly.
- Normal food can be taken after test is complied.

Possible Complication

The possible complications include allergy to contrast media and the patient may require additional recovery time.

We have to the end of this section on surgical disorders of the liver. Next we shall look at disorders of the gall bladder.

1.4 DISORDERS OF THE GALL BLADDER

Several disorders affect the biliary system and interfere with normal drainage of bile into the duodenum. These disorders include inflammation of the biliary system and carcinoma that obstructs the biliary tree. Gallbladder disease with gallstone is the most common disorders of the biliary system.

Can you remember where the gall bladder is located? Think about it for two minutes and then complete the following activity.

Activity 2

Describe the location of the gall bladder and write down its main function in your notebook.

Compare your answers with what you read in the following section.

The gallbladder is a pear-shaped organ under the liver. It stores bile, a fluid made by the liver to digest fat. As the stomach and intestines digest food, the gallbladder releases bile through a tube called the common bile duct. The duct connects the gallbladder and liver to the small intestine. See Figure 1 for an illustration of the gall bladder.

Normal Physiology of the Gall bladder

Normally bile is formed in the liver and stored in the gall bladder. Bile contains bile salts, bilirubin, water, electrolytes, cholesterol, fatty acids and lecithin. In the gall bladder some of the water and electrolytes are absorbed, further concentrating the bile.

When food enters the intestines, it stimulates the gall bladder to contract and release bile through the common bile duct and sphincter of Oddi into the intestines. The bile salts in the bile increase the solubility and absorption of dietary fats.

Types of Gall Bladder Disorders

There are two types of gall bladder disorders, namely:

- *Cholecystitis:* that is the inflammation of the gall bladder.
- *Cholelithiasis:* which is formation of stones (calculi) within the gall bladder or biliary duct system.

CHOLELITHIASIS

Gallstones or cholelithiasis are crystalline substances or stones, formed within the body by acceleration or concentration of normal and abnormal bile components. Gall stones can occur anywhere within the biliary tree including the gall bladder and the common bile duct. Obstruction of the common bile duct is called choledocholithiasis. Obstruction of the biliary tree can cause jaundice.

Types of gall stones

- *Cholesterol stones*: they are usually green but sometimes they are small white or yellow in colour.
- *Pigment stones*: these are small dark stones made of bilirubin and calcium salts found in bile.
- *Mixed stones and pseudoliths or fake stones*: found in certain ethnic groups or from certain regions and they vary in size and types.

Size of the gallstones

They vary from the size of a grain of sand to that of a golf ball. They may be single or many smaller ones.

Risk factors for cholelithiasis

1. Age 65 and above.
2. Family history of gallstones.
3. Obesity, hyperlipidaemia.
4. Rapid weight loss.
5. Female gender due to use of oral contraceptives.
6. Biliary stasis, pregnancy, fasting, prolonged parenteral nutrition.
7. Diseases or conditions of the liver; liver cirrhosis, diseases or resection.
8. Sickle cell anaemia.

Pathophysiology

Gall stones form when several factors interact. These factors are abnormal bile composition, biliary stasis and inflammation of the gall bladder. Most gallstones (80%) consist primarily of cholesterol, while the rest (10%) contain a mixture of bile components. Excess cholesterol in bile is associated with obesity, a high cholesterol diet and drugs that lower serum cholesterol.

When bile is supersaturated with cholesterol it can form gallstones. Also biliary stasis or slow emptying of the gall bladder can contribute to Cholelithiasis. Stones do not form when the gall bladder empties completely in response to hormonal stimulation. Slow or incomplete emptying allows cholesterol to concentrate and increases the risk of stone formation. Inflammation of the gall bladder allows excess water and bile salts to be reabsorbed, which increases the risk of lithiasis (formation of stones). Most gallstones are formed in the gall bladder. They may then migrate into the ducts leading to inflammation of the duct known as cholangitis. Some people with Cholelithiasis are asymptomatic.

Clinical Manifestations

Gallstones may be silent producing no pain and only mild gastrointestinal symptoms. Such stones may be detected incidentally during surgery or diagnostic evaluation for non-related problems. The patient with gall bladder disease due to gall stones may develop two types of symptoms: those due to the disease of the gall bladder itself and those due to obstruction of bile passages by a gall stone.

Symptoms of gall bladder disease

The symptoms may be acute or chronic and include:

- Epigastric distress such as fullness, abdominal distension

- Vague pain in the right upper quadrant of the abdomen may occur following a meal high in fried or fatty foods.
- If a gallstone obstructs the cystic duct, the gall bladder becomes infected and distended.
- Patient develops a fever and may have a palpable abdominal mass.
- The patient experiences biliary colic with excruciating upper right abdominal
- pain that radiates to the back or right shoulder and is usually associated with nausea and vomiting.

These symptoms are more noticeable several hours after a heavy meal high in fats and carbohydrates. The patient is not able to find a comfortable position. Biliary colic caused by contraction of the gall bladder. Obstruction of the bile flow also interferes with absorption of the fat-soluble vitamins (ADEK). Therefore, the patient may exhibit deficiencies of these vitamins.

Medical Management

The aims of medical management are to:

- Relieve pain
- Educate the patient on the condition
- Prevent complications

Diagnostic assessment

These include:

- Abdominal x-ray
- Cholecystography
- Percutaneous transhepatic cholangiography
- Ultrasonography

Treatment

The treatment involves either dissolving the stones with visodeoxycholic acid or lithotripsy. The dissolving treatment should be given for a period of 2 years.

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Supportive and dietary management

About 80% of patients with gall bladder inflammation achieve a remission with rest, intravenous fluids, nasogastric tube suctioning, analgesia and antibiotics. Unless the patient's condition deteriorates, surgical intervention is delayed until the patient's acute symptoms subside and complete evaluation can be carried out. The diet immediately after an attack is usually limited to low fat diet. Supplements high in proteins and carbohydrates can be given.

Pharmacological Therapy

Chenodeoxycholic acid (Chenodiol or CDCA) has been effective in dissolving about 60% of radiolucent gallstones composed primarily of cholesterol. It inhibits the liver synthesis and secretion of cholesterol.

Surgical management

Surgical treatment of gall bladder disease and gallstones is necessary for the relief of long-term symptoms, removal of the cause of biliary colic, and for treatment of acute cholecystitis. Surgery may be elective when the patient's symptoms have subsided or may be performed as an emergency procedure if the patient's condition necessitates it.

Preoperative Management

The aim of preoperative management is to alleviate anxiety.

Preparation of a patient for the operation

In Surgery 1, we discussed how to prepare a patient for surgery and escort them to the theatre. You should apply the same procedures for this patient.

Patient's problems

The major nursing problems of the patient with gall bladder disease include pain related to obstruction of the biliary and inflammation and distension of the gall bladder and dietary intolerance related to inadequate bile secretion. After the surgery, the patient may experience problems related to abdominal surgery, including respiratory problems because of the high abdominal incision made for cholecystectomy and possible complications related to altered biliary drainage.

X-ray studies of the gall bladder and chest, including electrocardiogram and liver function tests should be done. Vitamin K may be administered if the patient's prothrombin level is low. If the level is unusually low, a fresh blood transfusion may be given before surgery is done to supply ingredients necessary for blood clotting.

Nutritional requirements are considered if the patient is not eating properly. It may be necessary to provide intravenous glucose with protein hydrolysate supplements. This will aid wound healing and help prevent liver damage.
Preparation for a gall bladder operation is the same as for any upper abdominal laparotomy. Instruction and explanation are given the day before surgery with regard to turning and deep breathing.

Because the abdominal incision is high on the abdominal (subcostal region) the patient is often reluctant to move and turn. Pneumonia and atelectasis are possible post-operative complications which can be avoided by breathing deeply and by turning. Since drainage tubes are required after the operation, the patient should be informed of this so that he or she knows what to expect. The patient

should also be informed about the likelihood of nasogastric suction during the immediate postoperative period.

Surgical intervention

Patients usually are placed on the operating table with the upper abdomen raised somewhat by an air pillow or sand bag to make the biliary area accessible.

The procedures may include the following:

1. *Cholecystectomy:* in this operation the gall bladder is removed after ligation of the cystic duct and artery. The operation is performed in most cases of acute and chronic cholecystis.
2. *Choledochostomy:* this is a surgical procedure in which an incision is made into the common bile duct for removal of stones. After the removal of stones, a tube is usually inserted into the duct for drainage. The same is performed in the gall bladder to remove stones.
3. *Cholecystostomy:* this is a surgical procedure in which an incision is made on the gall bladder to remove pus, stone or bile. This is followed by insertion and suturing of a tube in the opening for drainage. This operation is performed when the patient's condition prevents more extensive surgery or when an acute inflammatory reaction obscures the biliary system. As the patient returns to bed, the nurse should connect the tube to a drainage bottle placed at the side of the bed. Failure to do this may result in the leakage of bile around the tube and escape into the peritoneal cavity.

Postoperative Nursing Care

The aims of postoperative nursing care are to:

- Relieve pain
- Educate the patient on the condition

- Prevent complications

You should follow the procedures we discussed in Surgery I on how to collect and transfer a patient from the theatre to the ward.

As soon as the patient has recovered from anaesthesia, he or she should be placed in the low fowler's position. Fluids may be given by intravenous route and nasogastric suction may be instituted to relieve distension and ileus. Water and other fluids may be given after 24 hours and a soft diet started later, after bowel sounds return.

The location of the subcostal incision is likely to cause the patient to splint the operation site by inadvertently taking shallow breaths to prevent pain. Since full aeration of the lungs is necessary to prevent respiratory complications, you should give analgesics and encourage the patient to turn, cough and breath deeply at frequent intervals.

Drainage Management

In patients who have undergone a choledochostomy, the drainage tube must be connected immediately to a drainage receptacle. In addition, tubing should be fastened to the dressings or the bottom sheet, without dislodging it. Educate the patient on the importance of keeping the tube patent at all times.

Following a cholecystectomy, a drain (pen rose) is placed in the gall bladder bed and brought out through a stab wound (incision). Drainage from blood and serosanguineous (serum with blood) fluids is absorbed by dressing which is changed as required. Montgomery straps are helpful in maintaining a comfortable dressing.

After a cholecystectomy, a tube is placed in the gall bladder and fixed in position by a purse string suture. This is connected to a gravity drainage tube and a receptacle.

In a choledochostomy after the bile duct has been explored, dilated and relieved of stones, a T tube is positioned in the common bile duct to permit drainage of bile until oedema subsides. The tube is connected to gravity drainage tubing.
The patient is observed for indications of infection, leakage of bile into the peritoneal cavity and obstruction of bile drainage. If bile is not draining properly, an obstruction is probably causing bile to be forced back into the liver and blood stream. Since jaundice may result, the nurse should particularly be observant of the colour of the sclera.

The nurse should also note and report right upper quadrant abdominal pain, nausea and vomiting, bile drainage around the T tube, clay coloured stools and a change in vital signs. Bile may continue to drain from the drainage tract in considerable amounts for a time, necessitating frequent changes of the outer dressings and protection of the skin from irritation.

Skin pastes of zinc oxide, aluminium or petrolatum prevent the bile from literally digesting the skin. In order to prevent total loss of bile, the drainage tube or collecting receptacle may be elevated above the level of the apparatus. The bile collected should be measured and recorded every 24 hours and its colour and character documented. After several days of drainage, the tubes may be clamped for an hour before and after each meal in order to deliver bile into the duodenum to aid in digestion. Within 7 – 14 days, the drainage tubes should be removed from the gall bladder or common bile duct.

Observations

The stools should be observed daily and the colour recorded. Specimens of both urine and faeces may be sent to the laboratory for examination for bile

pigments. This assists you to determine whether the bile pigment is disappearing from the blood or whether it is draining again into the duodenum. You should maintain a record of the intake and output every 24 hours.

Nutritional needs

The diet of patients who undergo this procedure should be low in fats and high in carbohydrates and proteins. The patients themselves usually refuse to eat fatty foods because of the nausea that follows.

Preventing complications

These patients are especially prone to pulmonary complications as are all patients with upper abdominal incisions. Thus they should be taught to take deep breaths every hour to aerate the lungs fully. Other complications such as thrombophlebitis and pulmonary atelectasis may be avoided by promoting early ambulation as soon as permissible. Such complications are more likely to occur in the more obese patients. An abdominal binder may help to make the patient comfortable when he first gets out of bed since a drainage receptacle is attached when the patient is ambulating, the collecting bag may be placed in the bath robe pocket or fastened so that it is below the waist or common bile duct level.

Patient education

1. Encourage the patient to maintain a good nutritious diet and avoid excessive fats. Fats restriction is usually lifted after 4 – 6 weeks when biliary ducts dilate to accommodate the volume of bile once held by the gall bladder and when the ampulla of vata regain functions effectively.
2. Educate the patient on the medications they required (vitamins, anticholinergics or antispasmodics) and why they are given.

3. Teach the patient about the symptoms that they should report to the physician, namely: jaundice, dark urine, pale coloured stools, pruritus or signs of inflammation such as pain or fever etc.
4. Teach the patient about follow up visits (review dates)

Complications

The main complications of surgical procedures of the gall bladder are:

- Infection
- Hypostatic pneumonia
- Atelectasis
- Thrombophlebitis
- Jaundice
- Peritonitis
- Ileus
- Steatorrhoea

We have come to the end of our discussion on surgical disorders of the gall bladder. In the next section we shall discuss disorders of the spleen.

1.5 DISORDERS OF THE SPLEEN

The spleen is an organ in the upper left side of the abdomen, that filters the blood by removing old and damaged blood cells and platelets. It helps in the immune system by destroying bacteria by opsonization (a process by which opsonins render foreign organisms or particles more attractive to phagocytes), phagocytosis and producing antibodies. It also stores approximately 33% of all platelets in the body. The spleen is a useful organ but not essential to life it is sometimes removed (spleenectomy) in those who have blood disorder such as thalasaemia or haemolytic anaemia. If the spleen is removed a person must get certain immunizations to help prevent infections that the spleen normally fights.

Functions of the Spleen

In the introduction we have mentioned a function of the spleen. Do you know of any other functions? Take 2 minutes to think about it and then complete the following activity.

Activity 3
Write down in your notebook at least two functions of the spleen.

We hope your answer mentioned that the spleen helps our body to fight germs and infection and to filter blood. Its main functions are:

1. *Haemopoeisis:* The spleen is a source of red blood cells and granulocytes in foetal life.
2. *Filtration of blood cells:* normal blood cells pass through the spleen unchanged. Abnormal and ageing cells are trapped and destroyed in the spleen. It is the largest lymphatic tissue in the body.
3. Immunological *Function:* the spleen is an important site for affecting both cell mediated (T cells) and humoral (B cells) immunity. Particulate antigens are filtered off and immunoglobulins particularly IgM are produced in the spleen.
4. *Endocrine Effects:* on the bone marrow the spleen stimulates erythropoeisis and depresses white blood cell and platelet counts.

1.5.1 Abscess of the Spleen

Abscess of the spleen is usually caused by bacteraemia from a distant site such as from resistance endocarditis or pancreatitis. The likely pathogens are determined by the original focus as well as the other underlined risk factors.

Pathogens/Causative Organisms

- Gram negative bacilli, e.g., E. coli and salmonella species.
- Staphylococcus aereus.
- Streptococci and enterococci.
- Candida spices.
- Mycobacterium.

Take Note:
Neutropaenia, chronic corticosteroid use, as well as immune suppressed client are predisposed to candida spleenic abscess. Men from 6 months to 90 years old and other clients with sickle cell anaemia and diabetes are also pre disposed.

Signs and Symptoms

- Generalized abdominal pains.
- Fever.
- Tenderness.
- Enlarged spleen.
- Diaphragmatic irritation which may present as left shoulder pain.
- Anorexia.
- Malaise.

Investigations

- Plain radiography which may reveal an infusion (fluid in the tissue of the spleen).

- C.T scan which will show progressive increase in size as well as some gas and subcupsular extension with adjustment of fluid levels.
- Blood culture for possible pathogenic cause.
- Biopsy or aspiration of the abdominal fluid to exclude an infection and to make a diagnosis.

Treatment

- Antibiotic treatment according to culture and sensitivity
- Spleenectomy can be performed
- C.T guided percutaneous needle aspiration (potentially with drain placement for larger abscesses).

Complications

- Post spleenectomy sepsis
- Haemorrhage.

1.5.2 Spleenomegally (Hyperspleenism)

This is a syndrome marked by exaggerated spleenic activity and possibly spleenomegaly (spleen enlargement) that is greater than 12cm. In this disorder the spleen normal filtering and phagocytic functions are accelerated so much that it automatically removes abnormal and normal functioning cells. The spleen temporally destroys normal platelets and RBC.

Possible Causes

Idiopathic or it may be secondary to infectious disorders such as abscess sub acute bacteria endocarditis, chronic tuberculosis, malaria.

Types of spleenomegaly

Reactive splenomegaly: occurs in acute and chronic inflammatory conditions probably caused by phagocytosis of blood or bacteria and the release of chemicals form the inflammatory processes. It may be present in acute and chronic parasitic infections such as malaria, it may also be present in chronic immune inflammatory disorders such as in rheumatoid arthritis.

Congestive splenomegaly: results from chronic passive congestion of the spleen which leads to spleenomegaly and hyperspleenism such as; C.C.F resulting from right sided heart failure and portal hypertension due to cirrhosis. The spleen is moderately enlarged. Other causes are:

- Hyperplasic disorders caused by haemolytic anaemia
- Cysts and tumours: these maybe rare but they do occur e.g. leukaemia as well as lymphoma.

Signs And Symptoms

- Abdominal pains.
- Chest pains similar to pururitic pain when the stomach, bladder or bowels are full.
- Back pain.
- Signs of anaemia due to accompanying cytopaemia like pallor.
- Palpable left guardant abdominal mass.

Investigations

- Physical examination.
- Ultra sounds to confirm the diagnosis.

Treatment

If spleenomegaly underlies hyperspleenism, then a spleenectomy is indicated to correct hyperspleenism. However, after spleenectomy you should vaccinate the patient against hymophylus influenza, streptococcus pneumonia and

meningococcal. The patient should also be given long-term prophylactic antibiotics.

1.5.3 Rupture of the Spleen

Rupture of the capsule of the spleen or rupture of the spleen itself is a situation that requires immediate medical attention.

Causes

- Trauma from automobile accidents, knife wounds, severe blow to the spleen or gun shot.
- Accidental tearing of the spleenic capsule during surgery or neighbouring organs.
- Disease of the spleen that causes the spleen to be soft or that damage the spleen such as malaria.

Signs and symptoms

- Abdominal pains.
- Pain in the left shoulder.
- Signs of haemorrhage, such as, hypotension, tachycardia, cold and clammy skin.

Prognosis

Spleenic rupture permits large amounts of blood loss to lead into the abdominal cavity possibly resulting in shock and death. Patients typically require emergency surgery although it is becoming more common to monitor the patient to allow the bleeding to stop by itself and allows the spleen to heal.

Treatment

Emergency surgery or allowing the patient to recover and giving the required vaccine as well as long term antibiotics.

Preoperative Nursing Care

The aims of preoperative nursing care are:

- To treat the cause
- To prevent complications
- To prevent or control haemorrhage

Pre-operative assessment

If it's an emergency you should note the following

-
- Any loss of consciousness at site of accident.
- Any visible blood loss.

Management in case of shock

- Give intravenous fluids
- Oxygen administration
- Catheterization to monitor strict urine output
- Elevate the feet keeping the rest of the body flat to prevent respiratory embarrassment
- Keep the patient warm
- If sweating wipe the patient and change linen
- Observations:
  - vital signs (TPR and BP)
  - Observe extremities for cyanosis
  - Observe mental status: reduced consciousness
  - Monitor abnormal girth to rule out abdominal distension due to internal haemorrhage

- Nasogastric tube

Preoperative Health History

You should take the following history from the patient:

- Any previous surgery.
- Anaesthesia (do they fear about it).
- Prolonged nausea and vomiting.
- Any serious illness or trauma
- Allergy to medication, chemicals or late; give allergy drugs and record in the file.
- Bleeding tendencies or use of medication that cause clotting disorders like aspiration or no heparin.
- Corticosteroid or cortisone use because this will impair wound healing post operatively.
- Diabetes mellitus because it needs strictly control of sugar levels and it also delays wound healing.
- If the patient previously had an emboli as it may reoccur due to prolonged immobilisation post operatively.

Alcohol: get history of alcohol, recreation drugs or nicotine use. These results in potential problems with administration of anaesthesia and predictable reactions to anaesthesia and may need dosage alteration in anaesthesia and analgesia.

- *Smoking*: may be susceptible to thrombus (clot formation) due to high coagulability secondary to nicotine use.
- *Current discomfort*: clients on caffeine e.g. caffeinated beverages such as strong coffee may develop headaches related to nil per oral status.
- *Chronic illness*: such as arthritis of the neck or back my affect positioning of the patient on theatre table even on the will chair.

- *Life style habit*: sedentary life style can complicate the surgical course such as smoking, too much fat foods etc.

Pre-operative screen test or cardinal control tests

- ECG should be done on all males above 40 years and all females above 50 years to rule out cardiovascular diseases and hypertension.
- All clients over 60 years should get a chest x-ray before undergoing general anaesthesia in order to rule out respiratory diseases.
- Check blood for HB on all clients going for any operation, above 500mls for possible blood transfusion.
- Perform urinalysis procedure on all clients to rule out renal diseases, cardio vascular diseases, diabetes as well as hypertension.
- Perform coagulation tests on all clients.

1.5.4 Splenectomy

This is the surgical removal of the spleen. When is the removal of the spleen indicated? Think about it for 2 minutes and then complete the following activity.

Activity 4

When do you think the removal of spleen is indicated? Write the answer in your notebook.

Now compare your answers with the following indications for the removal of the spleen.

Indications For Splenectomy

1. Trauma

Injury to the spleen is an indication for splenectomy if the organ cannot be conserved. Spleens which are affected by conditions such as portal hypertension, polycythaemia and infective mononucleosis are prone to rupture on slight trauma. The classical clinical features of splenic rupture are pain, tenderness and guarding in the left upper quadrant of the abdomen. There is also pain in the left shoulder tip and signs of loss of blood.

2. Hereditary Spherocytosis

This congenital disease is transmitted as an autosomal dominant trait and affects the red blood cells which are spherical rather than biconcave. The cells are unduly fragile and unable to withstand the effects of passing through the splenic pulp. This results in excessive haemolysis, jaundice, anaemia and resultant splenic enlargement (splenomegaly).

3. Acquired Haemolytic Anaemias

Excess haemolysis may occur due to exposure to agents such as chemicals, drugs, infection or extensive burns or it may be an autoimmune phenomenon. Autoimmune anaemia predominantly affects middle aged women and causes severe haemolytic crises. . If steroids fail to control the disease, it can lead to excess sequestration of red blood cells. Splenectomy may be required.

4. The Purpuras

- *Idiopathic Thrombocytopaenic Purpura (ITP):* this disease of unknown aetiology is characterized by a low platelet count and short platelet life span despite the presence of many mega karyocytes in the bone marrow. Cyclical episodes of bleeding occur from the gastrointestinal tract and other sites associated with petechiae and ecchymosis, bleeding time is normal and capillary fragility is increased. Splenectomy is a treatment of choice for patients with chronic form of the disease and for severe ones that do not respond to corticosteroids.

- *Secondary Thrombocytopaenia*: if hypersplenism is associated with a known secondary thrombocytopaenia.

5. *Hypersplenism*

This syndrome consists of splenomegally and pancytopaenia (reduced blood cells) in the presence of an apparent normal bone marrow. There is sequestration and destruction of mainly white blood cells and platelets in the spleen.

Hypersplenism may complicate a number of inflammatory conditions, e.g. rheumatoid arthritis, malaria, myeloproliferative and lymphoproliferative disorders. In portal hypertension, splenic congestion frequently leads to splenomegally and hypersplenism. The effects of hypersplenism include expansion of total blood volume to fill the increased vascular spaces of the enlarged spleen and *splanchnic* beds. There is increased pooling of cells within the large spleen and excess destruction possibly induced by metabolic damage due to the cells being packed together in the enlarged spleen. In the peripheral blood, there is anaemia, leucopaenia and thrombocytopaenia.

6. *Proliferative Disorders*

- *Myelofibrosis:* this condition occurs when the bone marrow is replaced by scar tissue and is thus unable to make enough blood cells. As a result, the liver and spleen try to make these blood cells and this causes the organs to swell.
- *Lymphomas:* in both myelo and lympho proliferative conditions splenectomy may be indicated to reduce transfusion requirements when hypersplenism is a problem.

7. *Miscellaneous Conditions*

a. *Cysts of the spleen*: these may be congenital, degenerative or parasitic. Treatment consists of splenectomy as the cysts may be parasitic. Transabdominal needle aspiration is not advised.
b. *Splenic Artery aneurysm*: this is a relatively common complication of atherosclerosis in elderly patients. Bleeding can however occur and an operation is mandatory.

Preoperative Nursing Care

1. As the stomach is handled during splenectomy a nasal gastric tube should be always inserted.
2. The routine preoperative preparations are like for any abdominal operation, however, particular attention should be paid to the full blood count and coagulation status of the patient.
3. In the presence of any bleeding tendency, transfusion of blood platelets may be required for thrombocytopaenia. Platelets should be available to cover the operation and postoperative phase.
4. The degree of splenic enlargement should be known before an operation. If in doubt, the surgeon should request for a CT scan.

Emergency Preparation

The preparation is similar to that of acute abdomen.

Investigations

1. Blood for haemoglobin, grouping and cross matching, bleeding and clotting time
2. Chest and abdominal X rays
3. Urinalysis to rule out diabetes mellitus.

Management in case of shock

- Intravenous fluids

- Oxygen administration
- Catheterization to monitor strict urine output
- Elevate the feet keeping the rest of the body flat to prevent respiratory embarrassment
- Keep the patient warm
- If sweating wipe the patient and change linen
- Observations:
  - vital signs (TPR and BP)
  - Observe extremities for cyanosis
  - Observe mental status e.g., reduced consciousness
  - Monitor abnormal girth to rule out abdominal distension due to internal haemorrhage
- Nasogastric tube

Psychological care

Is the same as for acute abdomen.

Postoperative Nursing Care

The immediate postoperative care is similar to that of other surgical procedures and includes the following:

- Transportation of the patient from the theatre
- Observations
- Environment
- Airway maintenance/Position
- Pain relief
- Psychological care
- Nutrition/ Fluids and electrolytes
- Wound care

- Exercise
- Medication
- Elimination

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Complications of Splenectomy

The main complications of this procedure are:

1. *Pancreatitis:* occasionally follows splenectomy. This is due to handling and bruising of the tail of the pancreas during immobilization of the pancreas.
2. *Accessory spleens:* these occur around the splenic hilus, in its pedicle or in the omentum and may account for a relapse of the condition for which splenectomy was done.
3. *Local complications of splenectomy:* include lower lobe collapse and an abscess in the splenic bed.
4. *Transient increase in the platelet and white cell count:* these predispose to the risk of venous thrombosis. Low dose heparin is advised in all patients undergoing splenectomy.
5. *Loss of lymphoid tissue:* reduces immune activity and impairs the response to bacteraemia. The risk of serious infection is greatest in childhood. Most infections occur within three years of splenectomy. Some surgeons advise prophylactic penicillin for this period. Polyvalent antipneumococco vaccine may also be given before splenectomy.
6. *Bleeding from the pedicle and oozing from multiple adhesions:* this is also common and drainage is therefore advised. Any bleeding tendency, e.g. in patients with idiopathic thrombocytopaenic purpura, increase the likelihood of this complication. Hypotension and circulatory collapse within 48 hours of surgery indicate the need to explore the oedema.

We hope you now know how to care for patients with surgical conditions of the spleen. Next we shall discuss disorders of the pancreas.

1.6 Disorders of The Pancreas

The pancreas is a pale grey gland weighing about 60 grams. It is about 12 to 15 cm long and is situated in the epigastric and left hypochondriac region of the abdominal cavity (see Figure 2). It consists of a broad head, a body and a narrow tail.

Can you remember where the pancreas is located? Think about it for 2 minutes and then complete the following activity.

Activity 5

Write down in your notebook the location of the pancreas in the human body

Well done! Now compare your answer with the information in the following section.

The head lies in the curve of the duodenum, the body behind the stomach, and the tail lies in front of the left kidney and just reaches the spleen. The abdominal aorta and the inferior vena cava lie behind the gland. The pancreas is both an exocrine and endocrine. What does this mean? Continue reading for more information.

Figure 2: The pancreas

The exocrine pancreas

This consists of a large number of lobules made up of small alveoli, the walls of which consist of secretory cells. Each lobule is drained by a tiny duct and these unite eventually to form the pancreatic duct, which extends the whole length of the gland and opens into the duodenum. Just before entering the duodenum the pancreatic duct joins the common bile duct to form the hepatopancreatic ampulla. The duodenal opening of the ampulla is con-trolled by the hepatopancreatic sphincter (of Oddi). The function of the exocrine pancreas is to produce pancreatic juice containing enzymes that digest carbohydrates, proteins and fats.

The Endocrine Pancreas

Distributed throughout the gland are groups of specialised cells called the pancreatic islets (of Langerhans). The islets have no ducts but release hormones such as insulin directly into the blood.

In this section we shall discuss the following two conditions of the pancreas, namely:

- Rupture of the pancreas
- Pancreatic cancer

1.6.1 Rupture of The Pancreas

Rupture of the pancreas is difficult to diagnosis in most cases and is discovered only during surgical exploration.

Causes

- Trauma or localized blow to the mid abdomen caused by either motorcycle handlebars or steering wheel. Pancreases injury has high mortality. There are usually duodenal and biliary tract injuries.
- Penetrating abdominal injuries.

Signs and symptoms

- Vague upper and mid abdominal pain that radiates to the back
- Generalized peritoneal irritation leading to pancreatitis
- Signs of hypervolemia
- Epigastria pain
- Tenderness
- Progressive deterioration.

Diagnostic Tests

- C.T. scan.
- Abdominal Ultra sound
- X-Ray of the abdomen

Management

Conservation treatment is commenced depending on the degree of injury. Surgery is done to control haemorrhage, remove dead non-viable tissue, preserve viable tissue, and provide drainage of pancreatic secretions. The approach is similar to that for any laparatomy surgery.

Special Investigations: Pancreatic Scan

Reasons for the procedure

- A pancreas scan maybe performed to screen for primary or metastatic cancer of the pancreas.

- A pancreas scan maybe used to assess the response to therapy for pancreatic cancer and or to monitor the course of the cancer.

Risks of the procedure

- The amount of the radio peptide injected into a client's vein for the procedure is small enough and there may be no need for precautions. However, the injection of the radio peptide may cause some slight discomfort though allergic reactions to the radio peptide are rare.
- For some patients, having to lie still on the scanning table for the length of the procedure may cause some discomfort or pain.
- Patients who are allergic to or sensitive to medications contrast dyes or latex should notify their physician.
- If the patient is pregnant she should notify her physician due to the risk of the scan on the foetus. If she is lactating or breastfeeding she should notify her physician due to the risk of contaminating breast milk with the radio peptide.
- There may be other risks depending on the specific medical condition and the patient should discuss any concerns with the physician prior to the procedure.
- Certain factors or conditions may interfere with the accuracy of a pancreas scan. These factors include but are not limited to the following:
  - Presence of radionuclide in the body from a previous nuclear medicine procedure within a certain period of time.
  - Barium remaining in the gastro intestine (GI) tract from a recent barium procedure.

Before the procedure

- The physician explains the procedure to the patient and answers any questions the patient may have;

- The patient is asked to sign a consent form that gives the doctor permission to do the procedure. The form has to be read carefully and allow the patient to ask questions if something is not clear.
- Generally no prior preparation such as fasting or sedation is required prior to a pancreas scan.
- Notify the radiologist or technologist if the patient is allergic or sensitive to medications, local anaesthesia, contrast dyes, iodine, shellfish or latex.

Process of a Pancreas Scan

- The patient removes all clothing and jewellery or other objects that may interfere with the procedure and he is given a gown to wear.
- An intravenous (IV) line is started for injection of the radio peptide.
- The radio peptide is injected and allowed to concentrate in the pancreas tissue.
- The patient is asked to lie still on a scanning table as any movement may affect the quality of the scan.
- The scanner is placed over the abdomen in order to detect the gamma rays emitted by the radio peptide in the pancreas tissue;
- The patient may be repositioned during the scan in order to obtained views of all the surfaces of the pancreas.
- When the scan has been completed the I.V is removed.

While the pancreas scan itself causes no pain, having to lie still for the length of the procedure might cause some discomfort or pain particularly in the case of a recent injury or invasive procedure such as surgery.

1.6.2 Pancreatic Cancer

Pancreatic cancer is a malignant neoplasm (abnormal growth of tissue) originating from transformed cells in tissues forming the pancreas. The most

common type of pancreatic cancer is adenocarcinoma (tumours exhibiting glandular architecture on light microscopy) arising within the exocrine component of the pancreas. A minority of cases arise from islet cells, and are classified as neuroendocrine tumours.

The signs and symptoms that eventually lead to the diagnosis depend on the location, the size, and the tissue type of the tumour, and may include:

1. Abdominal pain, lower back pain, and
2. Jaundice (if the tumour compresses the bile duct).

Causes

The causes are unknown.

Risk factors

The risk factors for pancreatic cancer may include:

1. *Family history*: 5–10% of pancreatic cancer patients have a family history of pancreatic cancer.
2. *Age*: the risk of developing pancreatic cancer increases with age. Most cases occur after the age of 60 years, while cases before age 40 are uncommon.
3. *Smoking*: cigarette smoking
4. Diets low in vegetables and fruits.
5. *Diets high in red meat*: processed meat red consumption is positively associated with this type of cancer
6. *Diets high in sugar-sweetened drinks (soft drinks)*. In particular, the common soft drink sweetener fructose has been linked to growth of pancreatic cancer cells.
7. Obesity
8. Diabetes mellitus is a risk factor for pancreatic cancer

9. Chronic pancreatitis has been linked, but is not known to cause it. The risk of pancreatic cancer in individuals with familial pancreatitis is particularly high.
10. Helicobacter pylori infection
11. Gingivitis or periodontal disease
12. Partial gastrectomy

Signs and Symptoms

Early pancreatic cancer often does not cause symptoms and the later symptoms are usually nonspecific and varied. Common symptoms include:

- Pain in the upper abdomen that typically radiates to the back.
- Heartburn - acid stomach
- Poor appetite or nausea and vomiting
- Diarrhoea, loose stools.
- Significant weight loss (cachexia)
- Painless jaundice (sclera) or yellowish skin. There may be a combination with darkened urine when a cancer of the head of the pancreas obstructs the common bile duct as it runs through the pancreas.
- This may also cause pale-coloured stool and steatorrhea. The jaundice may be associated with itching as the salt from excess bile can cause skin irritation.
- Trousseau syndrome, in which blood clots form spontaneously in the portal blood vessels
- Pulmonary embolisms due to pancreatic cancers producing blood clotting chemicals

Exocrine Pancreatic Cancers

The tumour is an adenocarcinoma derived from a primary lesion in the body of the pancreas. Pancreatic carcinoma is thought to arise from progressive tissue changes.

Three types of precancerous lesions are recognised:

1. *Pancreaticintraepithelial neoplasia* – a microscopic lesion of the pancreas
2. *Intraductal papillarymucinous neoplasms* – are the second most common type of exocrine pancreas cancer. The prognosis is slightly better.
3. *Mucinous cysticneoplasms* both of which are macroscopic lesions. The cellular origin of these lesions is not known.

Other exocrine cancers include:

- adenosquamous carcinomas,
- signet ring cell carcinomas,
- hepatoid carcinomas,
- colloid carcinomas,
- undifferentiated carcinomas, and
- undifferentiated carcinomas with osteoclast-like giant cells

Investigations

- Take history including family history
- Ultrasound of the abdomen
- CT scan of the abdomen
- Full blood count
- MRI
- Endoscopic Ultra Sound
- Laparascopy

Treatment

Like any other cancer, the treatment options are chemotherapy, radiotherapy and surgery. Before any one of the above is undertaken the staging of the cancer is done. It helps the doctor to find the best treatment option.

Staging

Staging of the cancer helps to show:

- How much the tumour has grown.
- If the tumour has spread to the lymph nodes.
- Whether there is metastasis.

Primary Tumour

The following abbreviations are used to describe the extent of the primary tumour:

- TX- primary tumour can't be assessed.
- TO- no evidence of primary tumour.
- TI- tumour limited to the pancreas.
- TIA – tumour is 2cm or less.
- TIB – tumour is more than 2cm.
- T2 - tumour penetrates the duodenum, bile duct and peri pancreatic tissue.
- T3 – tumour peneratrate the stomach spleen colon and adjuscent large vessels.

Regional lymphnodes

The following abbreviations are used to express the involvement of regional lymphonodes:

- NO – regional lymphnodes can't be assessed.
- NX– no evidence of regional lymphnodes metastasis.

- N1 – regional lymphnodes metastasis.

Distant metastasis

The following abbreviations are used to describe the extent of metastasis of the tumour:

Mx - distant metastasis can't be assess.
Mo - no known distant metastasis.
Mi - distant metastasis.

Staging categories

All the three descriptions above are put together to decide the staging of the cancer as follows:

- Stage I – T1, No, Mo: T2, No, Mo.
- Stage II- T3, No, Mo.
- Stage III- Any T1, N1, Mo.
- Stage IV –T3, N1, Mi.

Treatment

The treatment includes the following:

- Chemotherapy: this is done when resection with curative surgery is not possible. Palliative chemotherapy may be used to improve the quality of life.
- Radiotherapy: can be considered in several situations. One situation is the addition of radiation therapy after curative surgery.
- Surgery: this is indicative only when:
  - The cancer is within the pancreas and it hasn't spread.
  - Chemotherapy has failed.
  - Radiotherapy has failed or is not indicated.
  - Cancer is localised and considered suitable for surgery.

- Surgery can also be performed for palliation, if the malignancy is invading or compressing the duodenum or colon.

Surgical Intervention

Procedures done

1. The Whipple procedure is the most common attempted curative surgical treatment for cancers involving the head of the pancreas. This procedure involves removing the pancreatic head and the curve of the duodenum together (*pancreato-duodenectomy)*, making a bypass for food from the stomach to the jejunum (*gastro – jejunostomy),* and attaching a loop of jejunum to the cystic duct to drain bile (*cholecysto – jejunostomy)***.** It can be performed only if the patient is likely to survive a major surgery and if the cancer is localized without invading local structures or metastasizing.
2. Cancers of the tail of the pancreas can also be resected using a procedure known as distal *pancreatectomy.*

Special Investigations

- C.T scan.
- Abdominal Ultra sound
- X-Ray of the abdomen

That brings us to the end of our discussion on disorders of the pancreas. Next let us look at the urinary system.

1.7 Disorders of The Urinary System

The urinary system consists of the kidneys, ureters, urinary bladder, and urethra. The kidneys form the urine and account for the other functions attributed to the urinary system. The ureters carry the urine away from kidneys to the urinary bladder, which is a temporary reservoir for the urine. The urethra

is a tubular structure that carries the urine from the urinary bladder to the outside.

In this section we shall discuss the following conditions of the urinary system:

- Renal tumours
- Trauma to the kidneys
- Renal stones
- Pyelonephrosis
- Hydronephrosis
- Epididymo-orchitis
- Varicocele
- Phimosis and Paraphimosis
- Benign Prostatic Hypertrophy
- Prostatitis
- Prostatectomy
- Prostrate cancer
- Tumours of the urinary bladder
- Urethral strictures
- Hypospadiasis
- Epispadiasis

Let us start with renal tumours.

1.7.1 RENAL TUMOURS

Renal tumours can either be benign or malignant.

Benign adenomas (non-cancerous tumours) are small and usually discovered unintentionally during other investigations. Haemangiomas are rare but may cause dramatic haematuria.

Malignant new growths are the nephroblastomas (Wilm's Tumours) which are seen in infants and the hypernephroma (carcinoma of the kidney) of adults. Both tumours are primary malignant tumours. Metastases from other tumour sites may occasionally be found in the kidney.

Nephroblastomas

These tumours usually occur in children under 4 years of age. They account for 10% of all childhood malignancies. They grow very rapidly and there is early local spread including invasion of the renal vein. Distant metastases most commonly appear in the lungs, liver and bones.

Signs and Symptoms

The cardinal sign is a large abdominal mass which is first noted when the baby is bathed. Sometimes fever and hypertension may also be present.

Investigations

- Intravenous urogram (IVU)
- Chest X ray to detect metastases

Treatment

- Transabdominal nephrectomy
- Radiotherapy
- Chemotherapy using a combination of Actinomycin D and Vincristin

Hypernephroma or Renal Carcinoma

This is the commonest malignant tumour of the kidney. The incidence in males is 3 times greater than in women and most patients are over 40 years of age. The tumour spreads into the renal pelvis causing haematuria.

Signs and Symptoms

- Pain
- Haematuria
- A mass may be palpable
- A remarkable range of systemic effect may occur. These include fever, raised ESR, etc.
- Polycythaemia
- Disorders of coagulation
- Abnormalities of plasma proteins and liver function test
- Pyrexia of unknown origin (PUO)
- Neuromyopathy

The systemic effects may also be due to the secretion of the tumour products such as renin, erythropoietine, parathormone and gonadothrophins.

Investigations

- Needle aspiration
- Ultrasonography to detect whether the mass is solid or cystic
- Computer tomography scan
- Arteriography
- Chest X-ray
- Isotope bone scan to detect metastases
- Skeletal X ray to detect metastases to bones

Treatment

- Radical nephrectomy
- Radiotherapy
- There is no effective chemotherapy for these tumours

1.7.2 TRAUMA TO THE KIDNEYS

Injuries to the kidneys may occur as a result of a fall, a kick or a road accident. The injury may be anything from a bruise to a severe rupture or damage to the renal vessels. If the peritoneum in front of the organ is torn, peritonitis may occur. Injuries may be open or closed.

Open injuries such as a gunshot or stab wound. Open lacerations of the parenchyma collecting system or pedicle are usually associated with other injuries within the abdomen.

Closed Injuries are of two main types:

- *Direct Blunt Injury:* this may be caused by a fall against the edge of the bathtub or a blow or a kick in the loin. These injuries are commonly associated with fractured ribs and if on the right side, with injury to the liver.
- *Major Renal Trauma:* this may occur as a result of rapid deceleration as occurs, for example, in aircrafts or road accidents. The pedicle is injured rather than the kidney. Deceleration injuries to the pedicle may cause Intimal tears, spasm or thrombosis of the vessels.

The late effects of renal trauma include perirenal collection of urine, urinoma or scarring of the kidney, and renal artery stenosis leading to hypertension. Hydronephrosis may be an early or late complication.

Signs and Symptoms

- History of injury to the loin followed by haematuria, usually the worse the haematuria the worse the renal damage.

- Loin pain and haematuria are present
- Severe injury which causes a mass (swelling) in the loin which increases in size;
- Signs of shock (tachycardia, low BP, pallor, sweating etc.) which may be a sign of injury to other organs.

Investigations

- Urgent excretory urography to determine the extent of renal damage
- Angiography to assess parenchymal and vascular damage
- Renal scan using Technetium 99^{m}

Treatment

- Bed rest in most cases helps the patient to heal
- In severe cases, exploration and partial nephrectomy
- All urine voided is kept and time of evacuation marked on the label so that the amount of blood in each specimen is compared with that of the previous specimen.

Prognosis

The outcome varies depending on the cause and extent of injury. The damage may be mild and reversible, it may be immediately life threatening, or it may be prolonged and result in complications.

Possible Complications

- Pain
- Renal hypertension (even if no other signs of renal failure)
- Infection of the urinary tract
- Infection of other areas (peritonitis, sepsis)
- Bleeding, minor

- Bleeding, severe (haemorrhage)
- Shock
- Acute renal failure, one or both kidneys
- Chronic renal failure, one or both kidneys
- Renal artery stenosis

Prevention

External damage may be prevented by using general safety precautions, for example, using safety equipment during work and play, wearing seat belts, and driving safely.

Toxic injury may be prevented by properly observing the directions for use of medications or other products. Follow the directions of the health care provider for use of all medications, including over-the-counter medications. Use cleaning products, solvents, and fuels as directed in a well-ventilated area because the fumes may also be toxic. Be aware of potential sources of lead poisoning, such as old paints, vapours from lead-coated metals, alcohol distilled in recycled car radiators, and similar sources.

1.7.3 RENAL STONES

Kidney stones also known as renal calculi are solid crystals aggregation formed in the kidneys from dietary minerals in the urine.

Classification of Renal Stones

Urinary stones are typically classified by their location depending on where they are found in the organs of the urinary system or what they are made of. Thus they may be termed as:

- Nephrolithiasis: those found in the kidneys,
- Ureterolithiasis: those found the ureters,

- Cystolithiasis: those found in the urinary bladder, or
- Chemical composition (calcium-containing, struvite, uric acid, or other compounds).

Figure 3: Cross section of the ureter with a stone

Types of Kidney stones

There are four main types of kidney stones:

1. *Calcium containing stones*: these make up a majority, nearly 75% of stones
2. *Uric acid stones*: these make up about 10% of stones
3. *Struvite (infected) stones*: these make up about 10% of stones and form after an infection in the urinary tract
4. *Cystine stones*: these are stones that form from the amino acid cysteine. They are not common

Formation of Kidney Stones

There are six major dietary factors in kidney stone formation as follows:

1. Hydration
2. Animal protein intake
3. Calcium
4. Oxalate
5. Sodium

6. Extreme diets

Let us examine each factor in turn.

Hydration

Urine is composed of water, salt, urea, oxalate, uric acid, potassium, magnesium, calcium, oxalate, creatinine, and other acids/waste products of metabolism. The composition of urine changes based on what we ingest. If we don't drink enough water, or eat excessive amounts of rich foods, the urine becomes more concentrated, which can increase the odds of stone formation. Concentrated urine can result from someone not drinking enough water, sweating a lot, or eating a rich diet (or a combination of all these factors).

Animal protein

Beyond hydration, a high animal protein intake is probably the most important factor influencing kidney stone development. Why? There are a few reasons:

- Animal protein contains purines (well, so do some plant foods, but it appears that purines from plants don't seem to have the same effects in the body). We break down purines into uric acid. Some of this in the body is fine, but too much can supersaturate the urine and lead to stones (both uric acid and calcium-containing types).
- Animal protein contains high amounts of glycine and methionine. Glycine is metabolized into oxalate, and methionine can increase urinary calcium.

Calcium

When we consume and absorb high levels of calcium our body gets rid of the excess. One way to excrete calcium is via urine. Higher levels of calcium in the urine can increase the chances of kidney stones for certain individuals (calcium is the most abundant mineral in kidney stones). While excessive calcium intake isn't a good idea, a low calcium diet might be even worse. First, not getting enough calcium can harm bone health. Second, eating calcium rich foods can help bind oxalates in the gut (see below for more on oxalates) and get rid of

them in the stool (before they're absorbed and travel to the kidneys). Finally, a low calcium intake leads to bone breakdown and higher levels of calcium in the urine.

Oxalates

Oxalic acid is a naturally occurring substance that can bind with minerals. Oxalates are kind of boring, until they crystallize with calcium to form kidney stones. When someone has a lot of oxalates in their urine, there are five potential sources of oxalates:

- Foods higher in oxalates include: spinach, cocoa
- Waste products of general metabolism
- Vitamin C supplements
- Animal protein
- Beverages

Excessive sugar consumption (from food or drink) may lead to increased oxalate, calcium, and uric acid in the urine.

Sodium

As we increase sodium in the diet, urinary calcium excretion increases, and this can influence stone formation. Limiting sodium to less than 2300 mg per day — simply by switching to unprocessed, whole foods — can greatly decrease the amount of oxalate and calcium in the urine, both of which are extremely helpful in preventing stones.

Extreme diets

Extreme diets are a great way to form gallstones, but risk for kidney stones also goes up. Large meals and over eating, especially at night before sleep, can lead to very concentrated urine. Further, with cyclic weight loss and weight gain (yo-yo dieting) we repeatedly break down stored body fat for energy, leading to metabolic by-products (including ketones) that must filter through the kidneys.

These by-products tend to make the urine more acidic, which can lead to stones.

Further, low carbohydrate and high fat/protein diets can increase urinary acidity, lower urinary citrate, and raise urinary calcium, thus increasing the chances of kidney stone form.

Other factors beyond control

Genetics: kidney stones tend to run in families. If one has a relative with kidney stones, the risk of having renal stones is 2-3 times higher.

Chronic diseases / health problems:

There are various medical conditions that can lead to kidney stone formation. These conditions include:

- Bowel disease
- Medullary sponge kidney
- Hyperparathyroidism
- Anatomic abnormalities with the kidney
- Paralysis
- Renal tubular acidosis
- Cystinuria
- Oxalosis

Medications used to treat kidney stones

- *Alkaline potassium salts*: used to raise urinary pH. You may need to dilute them with water if they cause stomach upset.
- *Alkaline sodium salts*: an alternative to potassium salts.
- *Thiazides*: diuretics used to decrease urinary calcium. You must control sodium intake when using them. They can deplete potassium levels in the body.

- *Allopurinol*: reduces production of uric acid in the body. Extremely serious side effects.

Signs and symptoms of kidney stones

Many stones are asymptomatic and are discovered during investigations for other conditions. The classical features of renal colic (or ureteric colic) are:

- *Sudden severe pain*. It is usually caused by stones in the kidney, renal pelvis or ureter, causing dilatation, stretching and spasm of the ureter. The pain starts in the loin about the level of the costovertebral angle (but sometimes lower) and moves to the groin, with tenderness of the loin or renal angle, sometimes with haematuria. If the stone is high and distends the renal capsule then pain will be in the flank but as it moves down pain will move anteriorly and down towards the groin. A stone that is moving is often more painful than a stone that is static. The pain radiates down to the testis, scrotum, labia or anterior thigh. Whereas the pain of biliary or intestinal colic is intermittent, the pain of renal colic is more constant but there are often periods of relief or just a dull ache before it returns. The pain may change as the stone moves. The patient is often able to point to the place of maximal pain and this has a good correlation with the current site of the stone.

Other symptoms which may be present include:

- Rigors and fever
- Dysuria
- Haematuria
- Urinary retention
- Nausea and vomiting

On examination:

- The patient with colic of any sort writhes around in agony. This is in contrast to the patient with peritoneal irritation who lies still
- The patient is apyrexial in uncomplicated renal colic
- Examination of the abdomen will usually reveal tenderness over the affected loin. Bowel sounds may be reduced. This is common with any severe pain
- There may be severe pain in the testis but the testis should not be tender
- Blood pressure may be low.

Diagnoses/Investigations

Basic analysis should include:

- Stick testing of urine for red blood cells (suggestive of urolithiasis), white cells and nitrites (both suggestive of infection) and pH (pH above 7 suggests urea-splitting organisms such as Proteus spp., whilst a pH below 5 suggests uric acid stones).
- Mid-stream specimen of urine for microscopy (pyuria suggests infection), culture and sensitivities.
- Blood for FBC, CRP, renal function, electrolytes, calcium, phosphate and urate, creatinine.
- Prothrombin time and international normalised ratio if intervention is planned.
- Non-enhanced CT scanning is now the imaging modality of choice and has replaced Intravenous pyelogram (IVP). Ultrasound scanning may be helpful to differentiate radio-opaque from radiolucent stones and in detecting evidence of obstruction.
- Plain X-rays of the kidney, ureter and bladder (KUB) are useful in watching the passage of radio-opaque stones (around 75% of stones are of calcium and so will be radio-opaque).

Management of a Patient With Renal Stones

Initial management can either be done as an inpatient or on an outpatient basis, usually depending on how easily the pain can be controlled.

Indications for hospital admission:

- Fever
- Solitary kidney
- Known non-functioning kidney
- Inadequate pain relief or persistent pain.
- Inability to take adequate fluids due to nausea and vomiting.
- Anuria.
- Pregnancy.
- Poor social support.
- Inability to arrange urgent outpatient department follow-up.

People over the age of 60 years should be admitted if there are concerns on clinical condition or diagnostic certainty (a leaking aortic aneurysm may present with identical symptoms).

Initial management of acute presentation

- Offer first-line Non-steroidal anti-inflammatory drugs (NSAIDs), usually in the form of diclofenac IM or PR for the relief of the severe pain of renal colic;
- Provide anti-emetics and rehydration therapy if needed;
- The majority of stones will pass spontaneously but may take 1-3 weeks; patients who have not passed a stone or who have continuing symptoms should have the progress of the stone monitored at a minimum of weekly intervals to assess the progression of the stone;
- Conservative management may be continued for up to three weeks unless the patient is unable to manage the pain, or if he or she develops signs of infection or obstruction;

- Medical expulsive therapy may be used to facilitate the passage of the stone. It is useful in cases where there is no obvious reason for immediate surgical removal. Calcium-channel blockers (e.g. nifedipine) or alpha-blockers (e.g. tamsulosin) are given. A corticosteroid such as prednisolone is occasionally added when an alpha-blocker is used but should not be given as monotherapy.

Surgical Intervention

Approximately 1 in 5 stones will not pass spontaneously and will require some form of surgical intervention. If the ureter is blocked or could potentially become blocked, e.g. when there is larger stone, a JJ stent is usually inserted using a cystoscope. It is a thin hollow tube with both ends coiled (pigtail). It is also used as a temporary holding measure, as it prevents the ureter from contracting and thus reduces pain, thus buying time until a more definitive measure can be undertaken.

Procedures to remove stones include:

- *Extracorporeal shock wave lithotripsy (ESWL)* - shock waves are directed at the stone to break it apart. The stone particles then pass spontaneously.
- *Percutaneous nephrolithotomy (PCNL)* - used for large stones (>2 cm), staghorn calculi and also cystine stones. Stones are removed at the time of the procedure using a nephroscope.
- *Ureteroscopy* - this involves the use of laser to break up the stone and has an excellent success rate in experienced hands.
- *Open surgery* - rarely necessary and usually reserved for complicated cases or for those in whom all of the above have failed, e.g. multiple stones.

Complications

- Complete blockage of the urinary flow from a kidney decreases glomerular filtration rate (GFR) and, if it persists for more than 48 hours, may cause irreversible renal damage;

- If ureteric stones cause symptoms after four weeks, there is a 20% risk of complications, including deterioration of renal function, sepsis and ureteric stricture;
- Infection can be life-threatening;
- Persistent obstruction predisposes to pyelonephritis.

Prevention of Renal Stones

Recurrence of renal stones is common and therefore patients who have had a renal stone should be advised to adapt several lifestyle measures which will help to prevent or delay recurrence by:

- Increasing fluid intake to maintain urine output at 2-3 litres per day;
- Reducing salt intake;
- Reducing the amount of meat and animal protein eaten;
- Reducing oxalate intake (foods rich in oxalate include chocolate, rhubarb, nuts) and urate-rich foods (e.g. offal and certain fish);
- Drinking regular cranberry juice: increases citrate excretion and reduces oxalate and phosphate excretion;
- Maintaining calcium intake at normal levels (lowering intake increases excretion of calcium oxalate).

Depending on the composition of the stone, medication to prevent further stone formation is sometimes given, e.g. thiazide diuretics (for calcium stones), allopurinol (for uric acid stones) and calcium citrate (for oxalate stones).

1.7.4 PYELONEPHROSIS

Pyelonephrosis is any disease of the kidney and its pelvis. While pyelonephritis is an infection of the renal pelvis and of the solid or parenchymatous portion of the kidney, often with small abscesses which destroy its substance. If acute pyelonephritis is not treated aggressively it may lead to chronic pyelonephritis.

Clinical features

- Pain in the loin and lower abdomen. The pain may resemble that of acute appendicitis.
- Frequency of micturition with scalding pain
- Pyrexia of over 39^{o} C, occasionally rigor may be the presenting symptom
- Vomiting
- Tenderness on the affected side in the region of the kidney
- The urine contains pus and organisms.
- Warm skin flushed or reddened skin, which is moist (diaphoresis)
- Fatigue and general ill feeling
- Blood in the urine
- Foul or strong urine odour
- Mental changes or confusion (mental changes or confusion may be the only signs of a urinary tract infection in adults some times)

Treatment

Chronic pyelonephritis is often slow to respond to treatment. Some children have neurological disturbances of the urinary bladder leading to urinary retention and infection, while others have congenital abnormalities of the renal tract and junction of the ureters with the bladder. This allows reflux to occur up the ureters when the bladder contracts. Reflux can be cured by plastic operations.

1.7.5 Hydronephrosis

Hydronephrosis also called pyelectasis is a condition in which the renal pelvis is distended due to partial obstruction usually at the pelvic ureteric junction. The parenchyma of the kidney becomes compressed. In extreme cases, it is no more than a thin sac and the number or functioning renal units may be small

indeed. If the primary cause is unilateral, one kidney is affected but if it is bilateral, both are affected.

Conditions causing unilateral hydronephrosis

- A stone in the ureter
- The pressure of tumours on the ureters
- Kinking of the ureter from bands or aberrant (extra) blood vessels to the kidneys in addition to normal renal ones.
- Neuromuscular incoordination at the junction of the renal pelvis with the ureter.

Conditions causing bilateral hydronephrosis

- Prostatic obstruction
- Urethral stricture and congenital urethral valves
- Phimosis
- Carcinorma of the cervix ureteri
- Bilateral renal or ureteric calculi
- Retroperitoneal fibrosis

Treatment

In severe unilateral cases a plastic operation of the pelvic uretric junction or nephrectomy may be necessary.

Complications

- Renal failure in bilateral cases
- Infection (pyonephrosis)

1.7.5 HYDROCELE

A hydrocele is a collection of serous fluid in the tunica vaginalis or sac surrounding the testicle. The condition may be secondary to the disease of the testicle but usually develops without any obvious cause.

Treatment

Aspiration by means of a needle and a syringe inserted into the hydrocele under local anaesthesia may be performed. Radical care is effected by excision of the sac or by turning the sac inside out. A drain is inserted in the scrotum for 48 hours and the scrotum is supported on strapping across the thighs for about 10 days after the operation. This is most important if a possible haematocele is to be avoided.

1.7.6 EPIDIDYMO-ORCHITIS

Epididymo-orchitis is the inflammation of the testes and epididymis. It can be described as acute or chronic.

Acute Epididymo orchitis

Causes

In adolescence it commonly occurs as a complication of mumps. In the adult, the commonest organism is the E coli while gonococcus is the second commonest cause of infection.

Signs and symptoms

The testicle is tender and swollen and the scrotal skin may be oedematous. In many cases the condition is associated with urinary infection and increased frequency and scalding of micturition may be present.

Treatment

- The patient should be confined to bed and the scrotum supported by a sling of broad strapping attached to the thighs

- Urinary antiseptics or antibiotics are prescribed e.g. nitrofurantoin 50mg 6 hourly orally with meals
- Urine should be taken for culture and sensitivity
- Complete resolution takes 2 – 3 months and recurrent attacks are not common
- Ligation of the vas deferens may be advisable for recurrent attacks.

Chronic Epididyoorchitis

Causes

The main causes are tuberculosis, Syphilis and Gonorrhea

Treatment

Tuberculus epididymitis may be part of tuberculus infection of the urinary system in which case antituberculus chemotherapy is the treatment. In refractory causes the epididymis may be excised. If it is caused by syphilis it should be treated with the treatment for syphilis.

1.7.7 VARICOCELE

A varicocele is a condition of varicocity of the veins in the spermatic cord and occurs almost invariably on the left side.

Symptoms

Some slight dragging pain

Treatment

The vast majority of cases require no treatment at all. A suspensory bandage is advised. If the patient complains of pain an operation may be undertaken and

consists of excising the dilated veins. This is necessary if the patient is sub fertile.

1.7.8 PHIMOSIS AND PARAPHIMOSIS

Phimosis

Phimosis is a condition in which the fore skin of the penis is constricted so that it can not be retracted over the glans penis.

Causes

It can occur congenitally or from inflammation and oedema. With the growing trend of non-circumcision of newborns, the child and adult require early instruction on cleaning the prepuce. In adults who do not clean the preputial area, normal secretions accumulate causing subsequent inflammation known as balanitis, which can lead to adhesions and finrosis.
The thickened secretions become encrusted with urinary salts and calcify forming calculi in the prepuce. In the elderly men, penile carcinorma may develop.

Treatment

The treatment of phimosis is by way of loosening and cutting the fore skin by circumcision.

Paraphimosis

Paraphimosis is a condition in which there is inflammation of the foreskin which then retracts behind the glans penis, causes narrowness and oedema.
This means it cannot be returned to its usual position (that is, covering the glans penis).

Causes

Paraphimosis can occur when the foreskin is pulled back during bathing, use of urinary catheters or intercourse and cannot be placed back in the forward position. This causes severe pain and constriction that if not relieved in severe cases, can lead to gangrene.

Treatment

Paraphimosis is treated by manual reduction, that is, firmly compressing the glans to reduce its size and then pushing it back while simultaneously moving the prepuce forward. Circumcision is usually the best form of treatment done after the inflammation and oedema has subsided.

1.7.9 BENIGN PROSTATIC HYPERTROPHY

When men reach their mid-40s, the prostate gland begins to enlarge. This condition, benign prostatic hyperplasia (BPH) is present in more than half of men in their 60s and as many as 90% of those over 90. Because the prostate surrounds the urethra, the enlarging prostate narrows this passage and makes urination difficult. The bladder does not empty completely each time a man urinates, and, as a result, he must urinate with greater frequency, night and day. In time, the bladder can overfill, and urine escapes from the urethra, resulting in incontinence. An operation called transurethral resection of the prostate (TURP) relieves symptoms of BPH by removing the prostate tissue that is blocking the urethra. No incision is needed. Instead a tube (retroscope) is passed through the penis to the level of the prostate, and tissue is either removed or destroyed, so that urine can freely pass from the body.

The prostate gland lies in the pelvic cavity in front of the rectum and behind the symphysis pubis, surrounding the first part of the urethra (prostatic urethra). See diagram of the prostrate gland below. It consists of an outer fibrous

covering and a layer of smooth muscle and glandular substance composed of columnar epithelia cells.

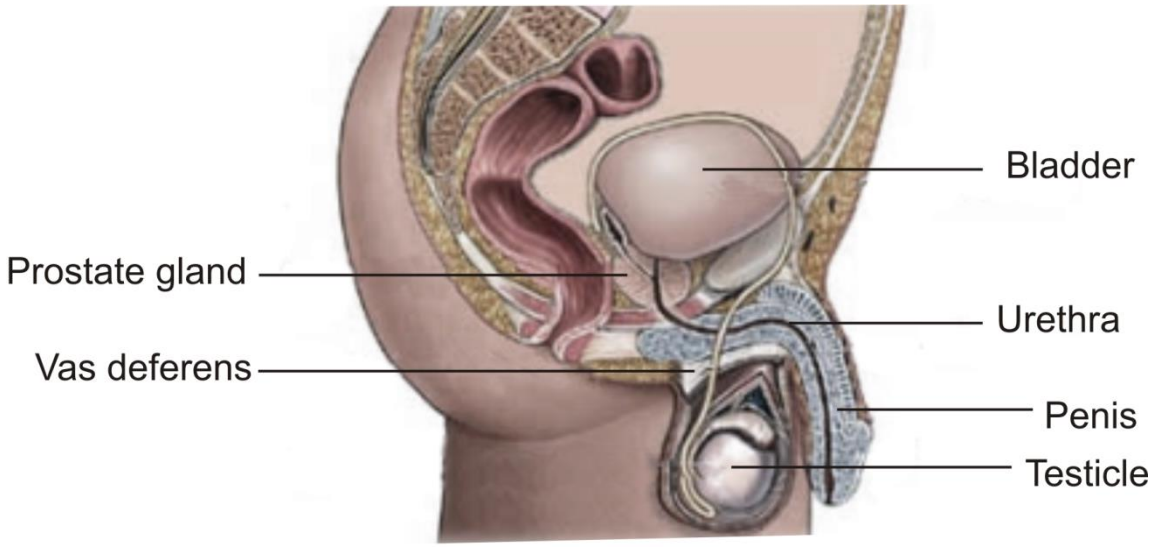

Figure 4: The prostrate gland

The prostate gland is an encapsulated gland weighing about 20 grams that encircles the urethra below the neck of the bladder. In the young adult male, the prostate gland is encased in a thin capsular membrane which is closely adherent to the underlying tissue. In benign prostrate hypertrophy, this tissue gradually begins to enlarge with new growths (hyperplasia) and the capsule of the prostate gland becomes thick and is loosely attached to the underlying tissue. This tissue can easily be stripped off leaving the thickened capsule intact. The enlarging prostate gland encroaches on the urethra and the base of the bladder producing certain obstructive symptoms.

What is the functions of the Prostate Gland?

Before you continue reading, complete the following activity.

Activity 6

Write down in your notebook any function of the prostrate gland that you know about.

Now compare your answer with the functions discussed in the following section. The prostate gland secretes a thin milky fluid that makes up about 30% of semen and gives it its milky appearance. It is slightly alkaline which provides a protective local environment for the spermatozoa arriving in the vagina. It contains a clotting enzyme which thickens the semen in the vagina increasing its likelihood of it being retained in the vicinity if the cervix.

Incidence

The causes of benign prostatic enlargement is unknown however, it is estimated that over 50% of men over 60 years show some sign of prostatic enlargement, of these 25% will require treatment. The direct cause is idiopathic, though some risk factors have been identified and they include the following:

1. Age above 45%
2. Race; more common in blacks
3. Family history of benign prostatic hypertrophy
4. Hormonal imbalance

Cause

Is uncertain but evidence suggest hormonal involvement.

Predisposing Factors

Risk factors for prostate gland enlargement include:

- ***Aging*.** Prostate gland enlargement rarely causes signs and symptoms in men younger than age 40. About one-third of men experience moderate to severe symptoms by age 60, and about half do so by age 80.
- ***Family history*.** Having a blood relative, such as a father or brother, with prostate problems means you're more likely to have problems.
- ***Ethnic background*.** Prostate enlargement is less common in Asian men than in white and black men. Black men might experience symptoms at a younger age than white men.
- ***Diabetes and heart disease*.** Studies show that diabetes, as well as heart disease and use of beta blockers, might increase the risk of BPH.
- ***Lifestyle.*** Obesity increases the risk of BPH, while exercise can lower your risk.

Pathophysiology

The effects of concern are as a result of the enlarging peri-urethral zone of the prostate. These enlarging adenomas lengthen and obstruct the prostate urethra, interfere with the sphincter mechanism of the internal meatus and lead to signs and symptoms of prostatic obstruction. Occasionally, the diverticuli may become quite large even larger than the urinary bladder. Urinary bladder diverticuli empty poorly and are liable to the three main complications of urinary stasis; infection, stones and tumours.

Signs and Symptoms

All the manifestations of benign prostatic hypertrophy are as a result of obstruction by the enlarged prostate gland. They include the following:

- Weak urinary flow of diminished force of urinary stream due to partial blockage of the prostatic urethra.
- Hesitancy in initiating voiding due to pain
- Post void dribbling usually of smelly urine
- Sensation of incomplete emptying of the urinary bladder

- Urinary retention in the bladder due to complete/partial blockage of the prostatic urethra
- Haematuria
- Dysuria due to partially blocked prostatic urethra
- Urgency due to incomplete emptying of the urinary bladder
- Nocturia

Management

The aims of management are to:

- alleviate the symptoms
- alley anxiety
- prepare the client for surgery

Investigations

1. Urinalysis to detect reduced amount and WBC which will increased
2. Urine for microscopy, culture and sensitivity
3. Serum creatinine levels to estimate renal function
4. Prostate specific antigen (PSA) – glycoprotein produced only in the cytoplasm of a benign and malignant prostate. Levels are obtained to rule out prostate cancer with the levels corresponding with both benign and malignant prostatic tissue.
5. Direct rectal examination (DRE) which examines the external surface of the prostate gland.
6. Residual urine may be measured using Ultrasonography or post voiding catheterisation (more than 100mls is considered high)
7. Uroflowmetry to measure the flow rate of urine; the normal being 4mls per second and a finding of less than 10mls per second indicates obstruction.

Treatment

Conservative therapy include:

- Prostatic massage.
- Sitz baths.
- Short term fluid restriction to prevent bladder distension.
- If infection develops give anti microbial.
- Regular sexual intercourse may help receive prostatic congestion.

For mild prostatic enlargement drugs may be used. Fenestrid (Proscar) an antiandrogenic agent that inhibits the conversion of testosterone and causes the enlarged prostate to shrink in size. Side effects include impotence and decreased libido and volume of ejaculation. Excessive muscle contraction in benign prostatic hypertrophy may be blocked with adrenergic antagonists such as:

- Terazosin (Hytrin)
- Doxazosin (Cardura)
- Tamsubsin (Flomax)

Possible Complications of BPH

1. Infections due to urinary retention
2. Hydronephrosis due to back flow urine into the uterus
3. Hydroureter due to the back flow of urine
4. Renal shut due down

Surgical Treatment

This is the only effective therapy for relief of acute urine retention, hydronephrosis, severe haematuria and recurrent U.T.I or for palliative relief of intolerable symptoms.

1.7.10 PROSTATITIS

Prostatitis is the inflammation of the prostate gland. It may be acute or chronic.

Cause

- *Bacteria*: such as E-coli, Klebsiella, Enterobacteria, Protease, Streptococcus and Diptheroid, Pseudomonas.
- *Non bacteria*: such as, urea, Trichomonas vaginalis, Chlamydia and some viruses.
- *Other causes*: such as urethra stricture and prostatic hyperplasia.

Types of Prostatis

Prostatitis may be classified as:

- Acute Prostatitis
- Chronic prostatitis
- Granulomatus
- Non bacterial
- Prostitodynia (painful prostate gland)

Let us examine the acute and chronic types in further detail.

1. Acute Prostatis

Acute prostatitis most commonly results from gram-negative bacteria and is easily recognized and treated.

Pathophysiology

Infections probably spreads to the prostatic gland by:

- haematogenous route and from ascending urethral infection,
- invasion of rectal bacterial by way of the lymphatic vessels,
- all or reflux infection of urinary bladder into prostate duct

- less commonly infection may result from urethra procedures performed with unsterile instruments e.g. catheterization, cystectomy, or from infrequent or excessive sexual intercourse.

Clinical Manifestations

- Bacterial prostatitis
- Patient may report:
  - Sudden fever and chills.
  - Malgia (painful muscles).
  - Athalgia (Painful joints).
  - Perineal fullness.
  - Frequent micturition.
  - Urgency in micturition.
  - Dysuria.
  - Lower back ache.
  - Nocturia.

2. Chronic Prostatitis

Chronic prostatitis is the most common cause of recurrent urinary tract infection in men. It is not easy to recognized. About 35% of all men over the age of 50 years have chronic prostatitis. The features of chronic bacteria prostatitis vary. Some patients are asymptomatic while others present with urinary symptoms similar to those of the acute form.

Prostadylar

This is manifested by:

- Painful voiding
- Painful ejaculation
- Perineal pain.

Signs and Symptoms

1. Acute prostatitis begins with fever, chills, low back pain, myalgia, perineal fullness and arhtralgia.
2. Urination is frequent and urgent.
3. Dysuria, nocturia and urinary obstruction may occur
4. Urine may appear cloudy, when palpated rectally; the prostate gland is tender undulated, swollen firm and warm.
5. Chronic bacterial prostatitis sometimes produces no symptoms. Other possible symptoms include painful ejaculation, haemospermia, persistent urethral discharge and sexual dysfunction.

Diagnostic tests

1. Urine cultures to identify the causative bacteria
2. In some patients swelling is palpable through the rectum

Treatment

A. Drug therapy

1. Cotrimoxazole 960mg 12 hourly for about 30 days
2. If sepsis is likely intravenous cotrimoxazole or intravenous gentamycin plus ampicillin can be given until sensitivity test results are known.
3. In chronic prostatitis due to E. coli cotrimoxazole cotrimoxazole is usually given for at least 6 weeks.

B. Supportive measures

- Bed rest
- Adequate hydration
- Analgesics
- Antipyretics
- Sitz baths
- Stool softeners
- Anticholinergics and analgesics may relieve non bacterial prostatitis

- Alpha adrenergic blockers and muscle relaxants may relieve prostatic pain.

C. Surgery

If drug therapy fails, treatment may include transurethral resection of the prostate. This procedure is usually not performed on young adults because it may cause retrograde ejaculation and sterility. Total prostatectomy is curative but may cause impotency and incontinence.

Preoperative

- Administer analgesics for pain as ordered.
- Ensure bed rest and adequate hydration.
- Provide stool softener and give sitz baths as ordered. Avoid rectal examination because it may precipitate bleeding.
- As necessary prepare to assist the supra public needle aspiration of the bladder or a supra pubic cystestomy.

Postoperative care

1. If trans-urethral resection of the prostate is performed, you should monitor the patient postoperatively for signs of hypocalcaemia (low blood pressure cold skin thread and rapid pulse).
2. Check the catheter every 15 minutes for the first 2 – 3 hours after surgery for patency, urine colour, consistency and excessive urethral miatus bleeding.
3. Watch for septic shock (which is the most common complication) severe chills, sudden fever tachycardia, hypotension)
4. Watch for pulmonary embolism, congestive failure, hypotension, and acute renal failure and continue monitoring vital signs and central venue pressure.
5. Administer belladonna and opium suppositories and other anti spasmodics, e.g., buscopan as ordered to relieve painful bladder spasms that commonly occur after transurethral resection.

Complications

These include:

- Secondary infertility.
- Infection (UTI).
- Hypovolaemic shock.
- Renal failure.
- Pulmonary embolism.
- Congestive cardiac failure

1.7.11 PROSTATECTOMY

Prostatectomy is the surgical removal of all or part of the prostate gland. Radical prostatectomy involves the removal of the prostate capsule, seminal vesicles and part of the neck of the bladder.

Indications for Prostatectomy

1. Cancer of the prostate
2. Benign prostatic hypertrophy
3. Chronic prostatitis
4. Abscess of the prostate gland

Approaches Used In Prostatectomy

There are two main approaches. These are open and closed approach..

Closed Prostatectomy

1. Tarnsurethral Resection of The Prostate – TURP

In this approach a cystoscope (fibre optic instrument with a cutting edge) is passed through the urethra to the prostate gland were the obstructive prostate tissue is removed, resected or excised using the wire loop of the resectoscope and electrocautery. There is no incision made and bleeding is minimal with few hospital days for the patient. It is commonly used for the milder cases of prostate enlargement.

The excised tissue is washed into the bladder, and then flushed out at the end of the operation. A catheter is left in the bladder for one to five days to drain urine and blood. Advanced laser technology enables surgeons to safely and effectively burn off excess prostate tissue that is blocking the bladder opening, with fewer early and late complications. This procedure can be performed on an outpatient basis, but urinary symptoms do not improve until swelling subsides several weeks after surgery.

2. Transurethral Incision of The Prostate – TUIP

In this approach a YAG is used to make a small incision in the smooth muscle where the prostate is attached to the urinary bladder. The gland is split to reduce pressure on the urethra and pain. No tissue is removed. This procedure is suitable for men with smaller prostate glands. It can be done on an outpatient basis and has an additional advantage of less risk of postoperative ejaculation.

Open prostatectomy.

1. Perineal Prostatectomy

In this approach the incision is made in the perineum mid way between the rectum and the scrotum, and the prostate is removed together with the capsule. This procedure is often preferred for elderly men or those with poor surgical risks. It requires less time and involves less bleeding as coagulation can easily be achieved.

2. Retropubic Prostatectomy

In this approach an incision is made on the lower abdomen and the prostate is removed by going behind the pubic bone. This procedure allows adequate control of bleeding, visualization of the prostate bed, and bladder neck and across to the pelvic lymph nodes.

3. Suprpubic or Transvesicle Prostatectomy

In this approach the surgical is through the abdomen and urinary bladder to reach the prostate gland. Control of bleeding is difficult due to the surgical approach through the urinary bladder.

Take Note

Transurethral resection or incision is the recommended procedure for prostatectomy. The other procedures so called open approaches are reserved for very large sized prostates, or those patients with associated pathologies such as prostatic calculi, urethral stricture and urinary bladder diverticuli.

Factors Influencing the Choice for Surgical Approach

1. The size of the prostate gland and the severity of obstruction
2. The age of the patient
3. The presence of associated diseases.

Preoperative Nursing Care

Prostatectomy is an elective procedure and preoperative nursing care objectives include:

1. To establish an optimal kidney function
2. To ensure optimal preoperative general condition of the patient
3. Teach the patient on the expectations before and after operation.

Psychological Care

Explain the diagnosis and the procedure to the client and family. Inform him that he will have a urinary catheter before he goes to and when he returns from theatre and he may have drains in his incision. This is meant to reduce anxiety and increase cooperation. Communicate willingness to address any concerns or anxiety concerning the outcome of potential long-term effects of the surgery on sexuality. The wife should be involved in the matters of sexuality. Explain to the patient that he will be put on intravenous fluids and that his valuables such as rings and watch will be removed to prevent intraoperative complications. The need for diagnostic tests such as urinalysis, blood test to rule out infections and kidney problems and for baseline data should also be explained to the patient.

Sedatives/hypnotic medications should be given to promote rest and sleep. The patient is made to sign a consent form after he has understood the procedure for legal purposes. Explain the postoperative routine and devices or equipment such as intravenous line, oxygen or humidifying mask, and dressing. Explain the plan for postoperative pain control by use of strong analgesics, e.g. pethidine.

Physical Preparation

Observations and Investigations

- Blood tests such as clotting time, haemoglobin count, blood sugar to rule out diabetes mellitus, urinalysis to rule out urinary tract infections.
- The skin should be shaved
- Vital signs for baseline data
- BP to check for hypertension if any
- ECG to rule out cardiac problems
- X-rays to check for chest problems

- Catheterisation and enema should be given the night before surgery.

Observe the patient closely as blood pressure fluctuates and renal function may decline for a few days after renal drainage is established. Carry out prescribed renal function tests to determine if there is renal impairment from prostatic back pressure and elevated renal reserve. Weigh the patient daily and monitor intake and output.

Exercises

Explain and teach the patient the need for exercises post operatively. These are taught to prevent postoperative pulmonary complications such as atelectasis and hypostatic pneumonia. Exercises such as diaphragmatic breathing and coughing are important. Other exercises include a range of motion exercises of limbs and early ambulation when the condition allows.

Nutrition and Fluids

Nutrition just as in other elective surgical procedures plays an important role in the recovery of the patient postoperatively. Patients who are poorly nourished tolerate surgery poorly. Maintain adequate bladder drainage via an indwelling catheter or where possible a suprapubic cyststomy. Renal function usually improves with the establishment of renal drainage. Maintenance of continuous bladder drainage is important if the patient has urine retention and if the urine is more than 75 – 100mls to prevent back pressure of urine into the upper urinary tract. Maintain hydration as the patient is frequently dehydrated from self limitation of fluids due to micturition frequency. Therefore, encourage fluid intake of 2500 – 3000mls daily if the cardiac reserve is adequate.

Immediate Preoperative Nursing Care

Assist the patient with bathing, gowning and changing into operating room gown. Ensure that the patient takes nothing by mouth from mid night or 6 hours before operation. Provide additional teaching and reinforce prior teaching.

Ensure that identification, blood and allergy bands are correct, legible and secure. Complete skin and bowel preparation as ordered. Remove any jewellery, dentures and contact lenses and store in a safe place.
Insert an indwelling catheter if possible and an intravenous line. Verify that the informed consent has been signed prior to the administration. Obtain and record vital signs. Document all preoperative care in the appropriate location and complete the checklist before the client is transferred to the operating theatre. Verify that all client information is documented which should be given to the operating theatre personnel in detail together with all the patient's documents. Transfer the patient to the operating theatre ensuring safety during transportation. Prepare a postoperative bed.

Post Operative Nursing Care

The nursing care objectives are directed towards assessing for shock, preventing complications, assessing for haemorrhage, establishing adequate of the urinary bladder relieving pain and discomfort, and monitoring for other possible post operative complications.

Immediate Postoperative Nursing Care

The immediate postoperative nursing care begins when the patient has been transferred from the operating room to the recovery room. It encompasses the following:

- Positioning the patient in recumbent position in bed
- Monitoring vital signs every 30minutes until they are stable
- Monitoring the incision site to detect significant changes
- Assessing the level of consciousness and mental status
- Giving emotional support as the patient is in a vulnerable and dependent position
- Assessing the hydration status by monitoring the intake and output to detect cardiovascular and renal complications early and manage them

- Assessing the patient's pain levels and careful administration of analgesics and providing comfort without compounding the potential side effects of anaesthesia.

Subsequent Care

Watch out for evidence of haemorrhage in the drainage bag and dressing at the incision site. Take blood pressure, pulse rate and respiratory rate as frequently as the condition indicates and compare with preoperative readings to assess the degree of hypotension present. Observe for cold, sweating, skin pallor, restlessness, a drop in blood, increase in pulse rate, etc. These are indicative of impending shock. If the patient is bleeding excessively or has a low haemoglobin count, they may require immediate blood transfusion.

Establishing Adequate Urinary Bladder Drainage

Use a sterile system of drainage such as the 3-way system catheter, which is useful in controlling bleeding. An irrigation system keeps clots from forming but does not correct bleeding. Watch the drainage for increasing signs of active bleeding. That is, if the blood is bright red then it is from arteries. Irrigate the urinary bladder as ordered to prevent clot formation as frequently as is determined by the amount of bleeding. This is to keep urine in a light pink straw colour free of clots and transparent in appearance. Irrigate the catheter gently if occluded by blood clots or tissue remnants from the bladder way. Irrigate the catheter with normal saline and apply gentle suction, as strong suction on a recently occluded vessel can cause bleeding. Avoid overextension (distension) of the bladder as this may cause bleeding by over stretching the coagulated vessels in the prostatic capsule. Maintain intake and output record including the amount used for irrigation. Tape the drainage tubing (not catheter) to the shaved thigh to avoid direct traction on the bladder. There may be leakage of urine around the wound several days after catheter removal.

Pain Relief and Promotion of Comfort

Keep the patient quiet and comfortable during the immediate postoperative period to prevent episodes of bleeding as when the patient experiences severe pain following prostatectomy. He may strain (from bladder irritability) which causes pelvic vein engorgement and promote venous clot formation. Proper positioning of the patient is important to assist in the alleviation of pain. It ensures that the catheter and drainage tubes are draining well to prevent bladder spasms due to over distension. Give prescribed tranquilisers, sedatives and antispasmodics and appropriate analgesics for pain comfort.

For a Client Who Has Undergone TURP

- Maintain patency of the three-way indwelling urinary catheter. Perform continuous urinary bladder irrigation with normal saline to maintain pink urine without clots. Urine should return to a clear yellow colour within 24 – 48 hours
- Maintain traction on the catheter for 24 hours to decrease postoperative bleeding.
- Increase the rate of continuous bladder irrigation on any sign of increasing bleeding or clots and monitor vital signs. Validate patency of the urinary system and notify the physician.
- Assess the patient for TUR syndrome. This is electrolyte imbalance caused by absorption of normal saline solution irrigation. This leads to bradycardia, hypertension, confusion, vomiting, headache, tremors, etc.
- Assess intake and output carefully to ensure that irrigation is draining from the bladder and urine output is adequate.
- Stop continuous urinary bladder irrigation after 24 hours and remove the catheter within 72 hours.
- Watch for Dysuria, which is common after catheter removal. Monitor the colour of urine carefully for onset of new bleeding and report the bleeding to the physician.

- Watch for bladder spasms, which are common and may be caused by obstruction of urinary flow by a clot. Belladonna and opium suppositories are helpful to treat spasms of the urinary bladder.
- Start pelvic floor exercises known as Kegel or Pubococcygeous exercises 48 hours to decrease postoperative dribbling. Instruct the patient to:
  - tighten the perineal muscles as if trying to stop urine flow for 6 – 10 seconds;
  - repeat exercise 4 – 6 time daily;
  - complete total exercise 3 – 4 times daily.

Specific Advice On Discharge

- Encourage increased intake of fluid at home of at least 2000 - 3000mls per day to continuously drain the urinary system and decrease risk of urinary tract infection
- Instruct the patient that after prostatectomy, he will have retrograde ejaculation which will decrease his fertility but not his penile erection and sexual satisfaction. Thus his urine may appear milky sooner after sexual intercourse because of the presence of semen in urine.
- Advise the patient and his sexual partner to resume sexual activity in 6 – 8 weeks to allow local area rest and ensure complete healing.
- Advise the patient about pelvic floor exercises called Kegel or Pubococcygeous exercises to eliminate dribbling or incontinence. These are important to quicken healing and eliminate the possible dribbling and incontinence.
- Advise the patient that small flecks of burgundy (dark red coloured) scabs or clots may be shed 7 – 10 days after catheter removal and should clear within 24 – 48 hours of onset. He should not therefore be perplexed and worried.
- Ensure local perineal area hygiene (if perineal prostatectomy was done) to prevent infection and promote complete healing of the incisional wound.

- The patient should avoid taking of anticholinergics and diuretics unless they are prescribed by the attending urologist. These may inhibit the complete drainage of the waste substances from the urinary bladder.

Postoperative Complications

1. General complications

This is an elderly group of patients in which cardiovascular and respiratory complications are not uncommon. These must be assessed for and treated appropriately. Deep vein thrombosis may also occur. These are not common in minimal invasive procedures as in TURP.

2. Haemorrhage

Excessive haemorrhage may occur from the prostatic bed. If encountered following TURP, treatment includes blood transfusion, antifibrinolysis, and in rare cases, cauterization of the problematic bleeders from the prostatic bed in the operating theatre under general or regional anaesthesia. Surgical packing of the prostatic bed may be required in patients that have undergone open prostatectomy. Secondary haemorrhage is an occasional complication occurring about 8 days postoperatively and requires urinary bladder wash out, free drainage and antibiotics. Massive bleeding may require immediate blood transfusion.

3. Clot Retention

The catheter may cease to drain because of a blood clot in the bladder (it may be big or small). The patient complains of bladder pain and the bladder is palpable. The irrigation should be stopped until drainage is restarted. Milking the catheter, bladder washout and on occasions, returning the patient to theatre to clear the bladder may be necessary.

4. Infections

Urinary infection may occur following prostatectomy. The urinary infection after manipulation or removal of the catheter infection is suspected because of fever or rigors and confirmed by urine or blood culture. Appropriate antibiotics should

be administered as prescribed. Epididymo-orchitis may occur usually a week or 2 after operation.

5. Suprapubic Leakage

This may occur after retropubic or transvesicle prostatectomy, from the prostatic capsule or bladder wound. The catheter must be left in or reinserted, and only removed when the fistula has been dry for 4 days.

6. Urinary Incontinency

Some patients have poor control of micturition after removal of the catheter. Treatment involves eradication of any infection, perineal exercise (stopping and starting the urinary stream), etc.

7. Late Complications

Urethral stricture, which is the narrowing of the urethra sometimes occurs. The stream becomes thin along with difficult in passing urine. It usually requires treatment by dilatation.

8. Dry/Retrograde Ejaculation

Dry or retrograde ejaculation is a sequel to prostatectomy and more likely to occur in open prostatectomy. It occurs because the urinary bladder neck can longer close. It requires no treatment except reassurance of the patient that all is well and sexual satisfaction will still be achieved.

1.7.12 PROSTATE CANCER

Cancer of the prostate gland is the second most common neoplasm in men over the age of 50. Adenocarcinoma is the most common form, while sarcoma occurs rarely. Most prostatic carcinomas originate in the posterior prostate gland. The rest originate near the urethra. When primary prostatic lesions metastasize, they typically invade the prostatic capsule and typically spread along the ejaculatory duct in the space between the seminal vesicles or perivesicular fascia.

Causes

The cause of prostate cancer is unknown'

Risk factors

Some studies have shown a relationship between high dietary fat intake and increased testosterone levels. When testosterone levels are lowered either by surgical removal of the testicles (castration, orchiectomy) or by medication, prostate cancer can slowly get better.

There is no known association with benign prostatic hyperplasia (BPH).

Incidence

Prostate cancer is the third most common cause of death from cancer in men of all ages, and especially men over 75 years old. Prostate cancer is rarely found in men younger than 40.

Men at higher risk include African-America men older than 60, farmers, tire plant workers, painters, and men exposed to cadmium. The lowest number of cases occurs in Japanese men and those who do not eat meat (vegetarians). Although androgens regulate prostatic growth and function, and may also spread tumour growth, no definite link between increased androgen levels and prostatic cancer has been found.

Signs and symptoms

Early stage

In early stage the cancer of the prostate is usually:

- Asymptomatic.
- Some nodules are felt within the substances of the gland.

In advanced stage

- The lesions are stone hard and fixed

- Obstructive symptoms occur late
- There is difficulty initiating a urinary stream
- Difficult and frequent micturition
- Urinary retention
- Increased size and force of urinary stream
- Metastasis to bone, lymph nodes, brain and lung.
- Dribbling
- Urine retention
- Unexplained cystitis
- Rarely haematuria
- On rectal examination, the examiner palpates a hard nodule.

Diagnosis

Diagnosis is made through the following tests and examinations:

1. Digital rectal examination may reveal a small hard mass or nodule
2. Biopsy
3. Magnetic resonance imaging
4. Computerized tomography scan
5. Urine for culture and sensitivity
6. Serum acid phosphatase levels is elevated in stage 3 and 4
7. Blood urea examination
8. Haemoglobin estimation, grouping and cross matching
9. Chest x ray

Treatment

The appropriate treatment of prostate cancer is often controversial. Treatment options vary based on the stage of the tumour. In the early stages, surgery and radiation therapy may be used to remove or kill the tumour. Prostate cancer that has spread may be treated with: drugs to reduce testosterone levels; surgery to remove the testes; or chemotherapy. Surgery, radiation therapy, and

hormonal therapy can interfere with sexual desire or performance on either a temporary or permanent basis. You should encourage the patient to discuss their concerns.

Surgery

Surgery is usually only recommended after thorough evaluation and discussion of all treatment options. A man considering surgery should be aware of the benefits and risks of the procedure.

Removal of prostate gland (radical prostatectomy) is often recommended for treatment of stage A and B prostate cancers. This is a lengthy procedure, usually done using general or spinal anaesthesia. Orchidectomy alters hormone production and may be recommended for metastatic cancer. There may be some bruising and swelling initially after surgery, but this gradually goes away. The loss of testosterone production may lead to problems with sexual function, osteoporosis (thinning of the bones), and loss of muscle mass.

Radiation Therapy

Radiation therapy is used primarily to treat prostate cancers classified as stages A, B, or C. Whether radiation is as good as prostate removal is a debatable topic, and the decision about which to choose can be difficult. In patients whose health makes the risk of surgery unacceptably high, radiation therapy is often the preferred alternative. Radiation therapy to the prostate gland is either external or internal:

- *External beam* radiation therapy is done in a radiation oncology center by specially trained radiation oncologists, usually on an outpatient basis. Prior to treatment, a therapist marks the part of the body that is to be treated with a special pen. The radiation is delivered to the prostate gland using a device that resembles a normal x-ray machine. The treatment itself is generally painless. Side effects may include loss of appetite,

fatigue, skin reactions such as redness and irritation, rectal burning or injury, diarrhoea, cystitis (inflamed bladder), and blood in urine. External beam radiation therapy is usually done 5 days a week for 6 - 8 weeks.

- *Internal radiation* therapy places radioactive seeds inside you, directly in or near the tumour. This is called brachytherapy. A surgeon makes a small cut in the area to inject the seeds. They are so small, you don't feel them. The seeds can be temporary or permanent. Because internal radiation therapy is directed to the prostate, it reduces damage to the tissues surrounding the prostate. Side effects may include pain, swelling or bruising in your penis or scrotum, red-brown urine or semen, impotence, incontinence, and diarrhoea.

Radiation is sometimes used for pain relief when cancer has spread to the bone.

Medications

Medicines can be used to adjust the levels of testosterone. This is called *hormonal manipulation.* Since prostate tumours require testosterone to grow, reducing the testosterone level often works very well in preventing further growth and spread of the cancer. Hormone manipulation is mainly used to relieve symptoms in men whose cancer has spread. Hormone manipulation may also be done by surgically removing the testes.

The drugs Lupron or Zoladex are also used to treat advanced prostate cancer. These medicines block the production of testosterone. The procedure is often called *chemical castration*, because it has the same result as surgical removal of the testes. However, it is reversible, unlike surgery. The drugs must be given by injection, usually every 3 months. Possible side effects include nausea and vomiting, hot flashes, anaemia, lethargy, osteoporosis, reduced sexual desire, and erectile dysfunction (impotence).

Other medications used for hormonal therapy include androgen-blocking agents (such as flutamide) which prevent testosterone from attaching to prostate cells.

Possible side effects include erectile dysfunction, loss of sexual desire, liver problems, diarrhoea, and enlarged breasts.

Chemotherapy is often used to treat prostate cancers that are resistant to hormonal treatments. An oncology specialist will usually recommend a single drug or a combination of drugs. Chemotherapy medications that are used to treat prostate cancer include:

1. Mitoxantrone
2. Prednisone
3. Paclitaxel
4. Docetaxel
5. Estramustine
6. Adriamycin

After the first round of chemotherapy, most men receive further doses on an outpatient basis at a clinic or physician's office. Side effects depend on the drug given and how often and how long the drug is taken. Some of the side effects for the most commonly used chemotherapy drugs for prostate cancer include:

1. Blood clots
2. Bruising
3. Dry skin
4. Fatigue
5. Fluid retention
6. Hair loss
7. Lowering of your white cells, red cells or platelets
8. Mouth sores
9. Nausea
10. Tingling or numbness in hands and feet
11. Upset stomach
12. Weight gain

Monitoring

The patient should be watched closely to make sure the cancer does not spread. This involves routine doctor's check ups. Monitoring includes:

- Serial PSA blood test (usually every 3 months to 1 year)
- Bone scan or CT scan to check for spreading of the cancers
- Complete blood count (CBC) to monitor for signs and symptoms of anaemia
- Monitoring for other signs and symptoms, such as fatigue, weight loss, increased pain, decreased bowel and bladder function, and weakness

Preoperative Care

The aim of preoperative care is to maintain blood urea levels within normal levels by:

- By giving enough fluids to reduce on the urea levels in the blood and catheterisation to maintain urinary flow.
- Supporting the scrotum to prevent epidydimorchitis
- Using a three way urinary catheter (Foley's catheter) with the full explanation to the patient
- Preparing and keeping at least 3 units of blood readily available before operation as the prostate gland bleeds a lot due to its rich blood supply
- Elevating the patient and letting him avoid tempering with drainage tubes
- Informing the patient about retrograde ejaculation which is very common after prostatectomy
- Maintaining an optimal nutritional level as it plays an important role in wound healing
- Other nursing measures will also apply

Postoperative Care

Start by preparing the postoperative bed with a drip stand, bed elevator, vital sign tray, oxygen concentrator, suction, vomitus bowl, emergency tray, etc. Then collect the patient from theatre and get a full handover from theatre staff on what has been done on the patient. Other postoperative nursing care interventions are as for nursing care of a patient who has under gone prostatectomy as discussed above.

Prevention

There is no known prevention. Following a vegetarian, low-fat diet or one similar to the traditional Japanese diet may lower risk. Early identification (as opposed to prevention) is now possible by yearly screening of men over 40 or 50 years old through digital rectal examination (DRE) and PSA blood test.

There is a debate, however, as to whether PSA testing should be done in all men. There are several potential downsides to PSA testing. The first is that a high PSA does not always mean a patient has prostate cancer. The second is that health care providers are detecting and treating some very early-stage prostate cancers that may never have caused the patient any harm. The decision about whether to pursue a PSA should be based on a discussion between a patient and the health care provider.

Complications

- Impotence is a potential complication after prostatectomy or radiation therapy. Recent improvements in surgical procedures have made this complication occur less often.
- Urinary incontinence is another possible complication.
- Medications can have side effects, including hot flashes and loss of sexual desire.

1.7.13 TUMOURS OF THE URINARY BLADDER

Tumours in the urinary bladder may develop at any age, however, they are more frequently after the age of 50 and are twice as common in males as in females. The majority arises from the transitional cell (epithelial lining) as papillomas and may be benign or malignant. Those that are benign and recur tend to become malignant eventually. Others appear as ulcers which are usually malignant and are more invasive of deeper tissue layers.

Risk Factors

- Prolonged occupational exposure to aniline dyes
- Smoking
- Analgesic abuse
- Schistosomiasis

Clinical features

- The first symptom that brings a person to the hospital is usually intermittent painless haematuria or cystitis,
- The lesion may encroach on the urethral orifice giving rise to hesitance and a decreased urinary stream
- Suprapubic pain and a palpable mass generally indicate that the condition is in an advanced stage.
- If the growth obstructs the ureteral orifice there may be hydronephrosis
- If the lesion ulcerates, it causes haematuria and readily becomes infected.
- If infection is severe, and anaemia has developed, the patient manifests with weakness and loss of weight.

Medical Management

The aims of medical management are to

- diagnose cancer
- alley anxiety

- alleviate pain

Diagnosis

The following tests are useful in making a diagnosis:

1. Cystoscopy and biopsy
2. Urine specimen for cytology midstream specimen for culture and sensitivity
3. Intravenous urogram to identify obstruction or defects of the urinary system
4. A CT scan to identify invasion of other organs by the tumour

Treatment

Chemotherapy

This is indicated for superficial bladder cancer and consists of intravesicle administration of anti cancer drugs such as thiotepal doxorubicin mistomyfern.

Radiation Therapy

Used for invasive tumours.

Investigation Therapies

- Immunotherapy or biotherapy: this experiment involves the use of immunological agents.
- The intravesical route to instil interferone and tumour necrosis factor. These agents are believed to stimulate the patient's immune system to produce natural substances that kill abnormal cells or delay the growth.
- The intra vesicle administration of attenuated Bacilli Chalmette Guerin (BCG) has proved successful in threatening superficial bladder cancer.

Neo adjuvant therapy

Patients with localized bladder tumours which are too expensive for surgical removal may benefit from an experimental combination of radiation therapy and

chemotherapy. This treatment shrinks the tumour so that surgery can be more effective.

Photo dynamic therapy

This treatment requires IV injection of a photo sensitivity agent called haematogrophrin derivative (HPD). Malignant tissue appears to have an affinity to HPD so superficial bladder cancer cells readily absorbs the drug.

A cystoscope is then used to introduce laser cancer energy into the bladder exposing the HPD impregnated tumour cells to light energy to deactivate them. However, HPD is sensitive not only tumour tissue but also urinal tissue so any patient who receives this therapy must avoid sunlight for about 30 days.

Precautions Involved:

- Wearing protective clothing, gloves and face masks.
- Drawing heavy curtains at home during the day.
- Conducting exercise outside or out door at night to promote circulation of blood, mobility and muscle activity. After 30 days the patient can gradually return to normal day light activities.

Other Treatments

1. *Cystoscopy and resection*: the specimen is taken for histology. This is definitive treatment for tumours amenable to local removal.
2. *Megavoltage radiotherapy*: more extensive lesions may be treated by radiotherapy either primarily or in addition to transurethral resection.
3. *Cystodiathermy*: is used for treatment of small recurrent tumours
4. *Total cystectomy with urinary diversion*. It is used when the cancer is situated in the lower part of the urinary bladder or is quite extensive.
5. *Partial cystectomy*: is used if only the cancer is in the upper part of the bladder well above the urethral orifice. At operation a tube or catheter is placed in the bladder and brought out through the incision and an indwelling

catheter is also introduced through the urethra. The urethral catheter usually remains in place for approximately 2 – 4 weeks. On its removal, frequent micturition becomes a problem for the patient because of the reduced bladder capacity. Thus may lead to discouragement and depression. You should guard against the tendency to cut down on fluid intake in order to reduce frequent micturition.

Bladder Surgery

The operative procedures used in the treatment of bladder diseases may be transurethral or open surgery:

- *Transurethral Operative Procedures:* these may be performed to obtain a biopsy, remove neoplasms or calculus or resect the prostate gland.
- *Open surgery:* on the bladder may be undertaken for repair of a perforation or laceration, the removal of a neoplasm, calculus or prostate or segment resection or removal of the bladder. The open operative procedures include:
  1. *Cystotomy:* in which an incision is made in the bladder and closure without a drainage tube;
  2. *Cystostmy*: in which an incision into the bladder is made and a drainage tube inserted which is brought to the abdominal surface;
  3. *Segmental Resection*: involves the surgical removal of a section of the bladder;
  4. *Total Cystectom*: this involves the removal of the bladder involving ureteral transplantation and urinary diversion.

A suprapubic approach is most commonly used in open bladder surgery with the bladder being opened below the perineum.

Nursing Care of a Patient Having Bladder Surgery

Preoperative Preparation

Psychological support

- Opportunities should be provided for the discussion of feelings and concerns and for the patient to ask questions
- The patient and family are advised as to what may be expected following the operation.
- If the bladder will have a partial cystectomy, explain to the patient that they will experience frequency of micturition once the tubes are removed, because of the reduced capacity of the bladder. When the assurance is given the seems becomes less troublesome.

Investigations

- Kidney function tests and blood for electrolytes, for example, urea, creatinine, potassium, sodium, chloride and calcium;
- Urine for microscopy and if infection is present a urinary antiseptic or antibiotic is prescribed; e.g. Nitrofurantoin and septrin;
- Haemoglobin and blood for grouping and cross matching.

Fluids and nutrition

- Encourage the patient to take 2500 – 3000mls of fluids daily unless a large amount is contraindicated by cardiac or renal insufficiency;
- Record and note the balance of fluid intake and output;

Pay attention to the patient's nutritional status. Many of these patients are elderly and the existing condition may have contributed to their lack of interest in food resulting in deficiencies. Dietary adjustments and supplements may be necessary to meet nutritional needs.

Elimination

During the preparatory period, an indwelling catheter may be used to provide adequate drainage and reduce the residue urine. Encourage the patient to remain ambulatory.

Immediate Preparation

The immediate preparation for open bladder surgery is similar to that of any abdominal surgery.

Post Operative Care

Preparation to receive the patient from operation includes assembling the following:

- sterile tubings and drainage receptacles ready for prompt connection to an indwelling urethral catheter;
- a cystostomy tube;
  a tray of sterile equipment, and
  a solution for irrigating the catheters in the event of obstruction by clots.

Maintenance of urinary elimination

The patient returns from the operating theatre with an indwelling urethral catheter which is secured to the upper thigh to prevent traction. It connects to a sterile drainage tubing leading to a closed sterile drainage receptacle. The length of the tube should allow the patient to turn and move without tension being exerted on the catheter.

If there is a cystostomy, a tube is anchored in the bladder by a suture at the time of operation. The cystostomy tube is attached to a sterile tube and receptacle.
Both drainage systems are checked frequently (at least hourly for the first 36 – 48 hours) for patency. The characteristics (consistency and content of sediments) of drainage are noted at the same time. The urine will be blood stained for the first 2–3 hours, gradually becoming lighter. The drainage is best

examined in the plastic connecting tube before it becomes mixed with what is already in the receptacle.

The cystostomy tube, urethral catheter or tubing may become obstructed by a blood clot. The drainage system is checked for patency. If blockage of the tubing is indicated, it may be milked or changed. If the obstruction is within the catheter tube in the bladder, an order may be given to irrigate the tube with sterile normal saline. 50 – 75mls of the fluid is introduced. If the initial fluid does not return, consult the surgeon and do not instill more fluid. Adequate postoperative drainage is very important to prevent bladder distension and pressure on the suture line.

There are bladder irrigation systems that prevent clots from blocking the catheter. Specially made sterile bags of sterile irrigation fluid may be run into the bladder under gravity and then allowed to drain.

The drainage from each system is measured and recorded every 4 hours. Care of the tubing and drainage bag varies. It may be replaced daily with a fresh sterile set or changed every second day or twice weekly.

The cystostomy tube usually remains in place from 4 – 7 days depending on the patient's healing. The urethral catheter is generally left for a few days longer or until the incision opening in the bladder heals. When the cystostomy tube is removed, some urine will escape on to the dressing for a few days until the fistula heals over.

Following the removal of the catheter, keep a close check on the patient's frequency of voiding and the volume of the daily output for several days. When a urethral catheter that has been in place for several days is removed, dribbling is a frequent problem because the bladder urethral sphincters have been dilated continuously for a period of time. Frequent perineal exercises which consist of

contracting the abdominal gluteal and perineal muscles while continuing to breathe normally may help the sphincters to recover their tone and control. Occasionally a patient may not be able to void and catheterisation may be performed if voiding has not occurred within 8 hours.

A permanent cystostomy is sometimes done as a palliative measure for a patient who has an operable obstruction of the urethra, e.g., advanced carcinoma of the urethra, bladder neck or prostate gland.

Observations

1. Note and record drainage systems, blood pressure, pulse rate colour and level of consciousness at frequent intervals. The intervals are gradually lengthened if the vital signs are satisfactory.
2. Haemorrhage and shock are possible complications following either transurethral resection or open bladder surgery. Bleeding may be evident in the drainage and so you should examine the dressing surrounding skin areas and groins.
3. The daily fluid intake and output are recorded for a longer period than with most surgical patients. Examine the ratio of the intake to the output so that you are alert to possible renal insufficiency or retention of urine.
4. Note the characteristics of urine for a period of 10 – 14 days. Report the appearance of sediments, blood, cloudiness or presence of unusual odour.

Skin care

Compared with other abdominal surgery the dressing is changed earlier and more frequently for patients who have had open bladder surgery. This is because there is always some leakage of urine through the incision and around the tube. Clean the skin of urine frequently and keep it as dry as possible to prevent excoriation. If excoriation occurs, the use of stoma or hydrocolloid dressing wafers may prevent further skin breakdown and encourage healing.

Examine the lower back, buttocks groin, inner thighs and perineum each time you change the dressing. If any areas are moist, with urine drainage, wash and dry them thoroughly dry to prevent excoriation. Change the beddings as often as necessary to ensure dryness and comfort.

Control of pain

Bladder trauma and irrigation cause bladder spasms which are very painful and the patient may also experience the desire to void frequently even if the bladder is emptied by tube drainage. An analgesic such as pethidine is usually necessary at regular intervals during the first 48 hours. If the pain and discomfort are not relieved, consult the surgeon who may adjust the bladder catheter or cystostomy tube to relieve the pressure of its tips on the bladder wall.

Fluid and nutrition

A daily fluid intake of at least 2500 – 3000mls is necessary to ensure adequate irrigation of the bladder as well as to maintain satisfactory hydration, intravenously during the first day or two. The patient is put on a soft diet, which is increased progressively to a regular diet as tolerated and depending on the return of bowel sounds.

Elimination

The patient may be given a mild laxative after 2 days or an enema. Constipation and straining when passing stool should be avoided since they increase the patient's pain.

Patient education

If cystostomy is permanent or a urethral catheter is to remain in place, you should give the patient and family members detailed instructions about the necessary care. Give verbal and written instructions on the necessary

equipment, its use and maintenance, how it may be acquired, and any precautions to be observed.

1.7.14 URETHRAL STRICTURE

This is a condition in which a section of the urethra is narrowed and the lumen is inadequate for the passage of urine and ejaculates. Urethral stricture is causes by fibrosis or inflammation of the urethral lumen.

Causes

1. Trauma
2. Urethritis particularly following gonococco infection
3. Iatrogenic following intervention
4. Congenital defects in the canalization of the urethra

Once the process of inflammation and fibrosis begin the lumen of the urethra narrows and its compliance (ability to close or open in response to bladder filling or micturition is compromised. Meatal stenosis or narrowing of the urethral opening is also common. A urethral stricture creates symptoms when it creates voiding dysfunction or bladder obstruction.

Signs and Symptoms

1. Diminished force of urinary stream, spraying or a split urine stream
2. The patient may also report feelings of incomplete bladder emptying with urinary frequency and nocturia
3. Moderate to severe obstruction of the bladder outlet may lead to acute urinary retention
4. The patient may report a history of urethritis

5. Difficult with placement with urinary catheter or trauma involving the penis or perineum.

Management

1. Dilatation: a metal instrument (urethral sound) may be played or a series of enlarging stents can be placed progressively into the urethra to expand its lumen in a stepwise fashion
2. Teaching the patient to repeatedly dilate the urethra by self catheterisation every few days to avoid recurrence
3. An endoscopic or open surgical procedure may be completed to provide a more durable solution to obstructing urethral stricture.

1.7.15 HYPOSPADIASIS

Hypospadiasis is a urologic abnormality in which the urethral meatus/opening is located on the ventral surface of the penis anywhere from the corona of the perineum.

Causes

Hormonal influences in utero, environmental factors and genetic factors are possible causes.

Treatment

Surgical repair may be necessary if associated with chordee (a painful down curvature of the penis during erection) or if it prevents intercourse or normal urination. Surgery may also be done for cosmetic reasons or emotional well-being.

1.7.16 EPISPADIASIS

Epispadiasis is an opening of the urethral meatus on the dorsal surface of the penis. It is a complex defect that is usually associated with other genito-urinary tract defects.

Treatment

Corrective surgery to place the urethra in the normal position in the penis is usually done in early childhood.

Special Investigations

- Intravenous Pyelogram
- X - Ray

Special Procedures

- Cystostomy
- Cystoscopy
- Urostomy care
- Catheterisation
- Prostate Vaporisation
- Urethral dilatation

Take Note

Revise The Above Procedures From Your Procedure Manuals

You have come to this unit. Let us now review what you have learnt.

1.8 UNIT SUMMARY

In this unit we have discussed surgical disorders of the biliary and urinary system. In particular we have discussed some surgical conditions of the liver, gall bladder, spleen, pancreas and urinary system. We have looked at their

definition, causes, signs and symptoms, treatment and complications, and the specific management of patients with these disorders.

In the next unit we shall discuss operating theatre nursing and anaesthesia.

ASSIGNMENT

Read and make short notes on the following:

1. Pyelonephritis and hydronephrosis
2. Hydrocele and Epidydimorchitis
3. Vericocele

1.9 SELT TEST

Q1.List five signs and symptoms of Benign Prostatic Hypertrophy?

Q2. List at least four surgical approaches that may be used in prostatectomy?

Q3.What is prostatitis?

Q4.How can one prevent renal stones?

ANSWERS

Q1. **Signs and Symptoms of benign prostatic hypertropy**

- Weak urinary stream
- Prolonged emptying of the bladder
- Abdominal straining
- Hesitancy
- Irregular need to urinate
- Incomplete bladder emptying
- Post-urination dribble
- Irritation during urination
- Frequent urination

- Nocturia (need to urinate during the night)
- Urgency
- Incontinence (involuntary leakage of urine)
- Bladder pain
- Dysuria (painful urination)
- Problems in ejaculation

Q2. Surgical approaches in prostatectomy?

- Trans - Urethral Resection of prostate(TURP)
- Radical Retropubic Prostatectomy
- Radical Perineal Prostatectomy
- Suprapubic
- Cryo-surgery

Q3. Meaning of Prostatitis

Prostatitis is the inflammation of the prostate gland. It may be acute or chronic.

Q4. Prevention of Renal Stones

1. Increase fluid intake to maintain urine output at 2-3 litres per day.
2. Reduce salt intake.
3. Reduce the amount of meat and animal protein eaten
4. Reduce oxalate intake (foods rich in oxalate include chocolate, rhubarb, nuts) and urate-rich foods (e.g. offal and certain fish).
5. Drink regular cranberry juice: increases citrate excretion and reduces oxalate and phosphate excretion.
6. Maintain calcium intake at normal levels (lowering intake increases excretion of calcium oxalate).
7. Depending on the composition of the stone, medication to prevent further stone formation is sometimes given, e.g., thiazide diuretics (for calcium

stones), allopurinol (for uric acid stones) and calcium citrate (for oxalate stones).

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UNIT 2: OPERATING THEATRE NURSING AND ANAESTHESIA

2.1 Unit Introduction

Welcome to our second unit on operating theatre nursing and anaesthesia. In the last unit we learnt about surgical conditions of the biliary and urinary system. In this unit you will learn about the theatre environment, supplies and equipments used in specific procedures, the theatre environment and management of operating theatre. In addition we shall look at positions used in the theatre, management of a client on anaesthesia and types of incisions commonly used in theatre. By the end of this unit you should be able to provide comprehensive nursing care and safety to patients in the operating theatre and recovery room and provide an environment in which surgery can be carried out.

2.2 Unit Objectives

By the end of this unit you should be able to:

- Define common terms used in operating theatre nursing
- Describe the theatre environment;
- Relate the supplies and equipment used in theatre to specific surgical procedures;
- Describe how to receive a client into the operating theatre
- Describe the management of the operating theatre activities
- Discuss the positions used in theatre
- Explain the management of a client on anaesthesia
- Recognise the types of incisions commonly used in surgery

2.3 Definition Of Common Terms Used In Operating Theatre Nursing

1. *Operating theatre*: this is a room or department of a hospital in which surgical operations and diagnostic procedures are carried out.
2. *Operating suite*: this comprises the operating room and the immediate ancillary accommodation.
3. *Operation*: this is an invasive modality of treatment, where an incision is made into the body tissue for the purpose of repair or removal or entrance into the body cavity.
4. *Perioperative*: this is the total surgical experience which include pre, intra, & postoperative phases of patient care.
6. *Surgery*: this is a branch of medicine that deals with pre, intra and postoperative care of the patient.
7. *Surgical intervention*: this is a therapeutic process to restore or maintain health.
8. *Team*: this is a group of two or more persons who share common objectives and coordinate their efforts to achieve them.
9. *Operating room nursing*: this is identification of the physical, psychological, social & spiritual needs of a patient and implementation of individualised programme of nursing care.

2.4 The Theatre Environment

In this section we shall look at the layout and facilities of the operating theatre.

Design and Construction

The design of an operating theatre should:

- preferably be on the first floor,
- not admit natural light,

- have good ventilation system,
- be separate from general traffic and air movement,
- be noise free, and
- be close to the surgical wards, intensive care unit (ICU), casualty, X-ray department, central sterile supply department (CSSD) and the laboratory.

The air flow should be from the operating room to the entrance and should not have any exchange of air between theatres or with other hospital areas. The surface must be washable, with curved off joints between walls and the ceiling. The floors should be curved or rounded off to facilitate cleaning. The walls and floor must be impervious to withstand cleaning and damage by heavy moving trolleys, i.e., they should be made of terrazzo or a cement-based finish. There should be no ceramic tiles and the buffers must be used to protect the walls.

The wall should have a semi matt wall surface because it reflects less light. It should also be painted in pale green or blue colour, as this is less tiring to the eyes. The floor should be made of anti-static floor materials and the sockets should be constructed at least 1m above the floor.

Other Considerations

1. There must be a disposal area for used items, destruction and recycling (dirty corridor).
2. Administration and teaching, catering, cleaning: the materials used in construction must allow for minimal maintenance.
3. Communication: there should be an effective communication system such as an intercom/phone.

Access Zones

There are 4 access zones in the operating theatre department and these include:

1. General access zone
2. Limited access zone
3. Restricted access zone
4. Operating zone

Types of Operating Rooms

- Single theatre suite
- Twin theatre suite

Maintenance of Adequate Lighting and Ventilation of the Operating Theatre Room

Lighting

The operating theatre must not admit natural light as this causes glaring and forms shadows. There is need for good general lighting which is mounted on the ceiling and arranged to provide even illumination. This light source must be dust proof and easy to clean.

Types of Operating Theatre Lighting

1. Multi Reflector Luminaire
    - Scialytic: this type of lighting has an optical lens with a single lamp of 100 - 150watts
    - Metallic reflector light fitting: has metal reflectors which are heavily polished.
2. Multi Lamp Luminaire: this type of lighting has 6 – 9 separate lamps each lamp with 40watts . They are placed in single housing unit.

Ventilation

1. The theatre should not admit free circulating air or have windows. Therefore there is need for a good ventilation system that minimises infection and provides comfort for both the staff and the patients.
2. The temperature inside the operating theatre should range from 20 – 22degrees
3. The humidity should be from 50-55%

Types of ventilation systems

1. Plenum ventilation system: this system is fitted on the roof of the building. It sucks air from the environment, purifies, humidifies, heats or cools the air and pushes it back at high pressure through its diffusers. The highest pressure is found in the operating room while the lowest is found in the dirty corridor.
2. Ultra cleaning ventilation system: this is an advanced system used in vascular and transplant surgery. It reduces postoperative infection by 0.6%. The system pushes air through its diffusers at high velocity covering an operating theatre area of 2.8 square meters. It is 90% efficient.

Theatre Hazards and Prevention

Theatres are full of hazards for both patients and caregivers. The primary dangers include fires, exposure to anaesthetic agents and direct exposure to biological materials. There is also potential for physical injury from electric shock, explosions and inhalation of toxic substances

Hazards In the Theatre

Faulty equipment or improper usage increases the risk. The staff should have knowledge of hazards associated with equipment use, causes of accidental injuries and sources of health risks. All individuals working in theatre have

personal responsibility to ensure safe working environment for themselves and others

Classification if Hazards

- Physical hazards: injuries, falls, noise, electricity, radiation and fire
- Chemical hazards: anaesthetic gases, toxic fumes from gases & liquids, disinfectants & cytotoxic drugs

Classification of Hazards

Biological hazards: patients as hosts of pathogens, infectious/clinical waste, cuts and needlestick injuries and latex sensitivity.

Prevention of Physical Hazards

Staff must use all electro-medical equipment according to manufacturer's instructions. For example, do not operate them with wet hands, do not put liquids on top of equipment to avoid spillage and short circuit

Prevention of Physical Hazards

- Staff must use proper body mechanics to avoid back pain, as they stand for long hours in awkward positions
- Proper shoes should be worn for comfort and safety
- Operating table heights should be adjusted appropriately

Prevention of Physical Hazards

Staff and patients must be protected from radiation during exposure, to minimize development of cancer, genetic mutations, spontaneous abortions and congenital abnormalities

Prevention of Physical Hazards

- Keep anaesthetic machines, gas cylinders and flammable liquid containers away from sources of heat and should not touch each other

- Do not grease or oil vials for gas cylinders or anaesthetic machines

Prevention of Physical Hazards

- All operating suites should have fire warning and safety systems
- All staff should be familiar with location and operation of fire alarms and fire extinguishers

Prevention of Chemical Hazards

- Theatres should have closed absorption technique (scavenging system) to absorb anaesthetic gases and restrict their circulation into the air
- All items sterilized with Ethelyn Oxide should be aerated for 24hrs to prevent dizziness, N/V, cancer

Prevention of Chemical Hazards

- Gloves, masks and goggles should be worn when using disinfectants such as Glutaraldehyde (Cidex) and should be diluted in proper concentrations to prevent irritating the eyes and skin
- Safety precautions should be observed when administering cytotoxic drugs

Prevention of Biological Hazards

- Treat all body fluids as infectious
- Supervisors should ensure that appropriate protective materials are available and staff should be encouraged to use them
- Clinical waste should be handled and disposed appropriately and separate from domestic waste

Prevention of Chemical Hazards

Standard precautions should be adequately communicated and reinforced to ensure compliance and protect staff from occupational injuries such as needle stick injuries.

Prevention of Infection

1. Cleaning of theatre by daily dump dusting, major and minor cleaning
2. Clean all articles before sterilising them
3. Have an efficient reliable sterilising system
4. Have acceptable preparation and packaging method that allows articles to be delivered in sterile manner
5. Ensure that wrapped articles meet packaging standards
6. Sterilise all articles during the operation
7. Sterile persons must touch only sterile areas
8. Avoid leaning over sterile fields
9. Do not touch areas below sterile field
10. Keep your hands within sight and above the waist level
11. Cover wet areas with sterile material to prevent strike through.
12. Persons with flu, cuts and skin infection should not be allowed to scrub
13. Change outside clothes to Operating Theatre gear
14. Use outside and inside knife
15. Change gloves when punctured
16. Wear face masks
17. Minimise talking
18. Cover operation site if there is any delay and the operating instruments.

Infection Preventive Measures

- Meticulous hand washing
- Decontamination & use of appropriate antiseptics
- Maintain aseptic technique
- Protective wearing
- Use of biohazard poly bags with right colouring system

- Use of sharp boxes

Refer to supplementary notes on infection prevention.

Control of Temperature

Ventilation

- Artificial ventilation is recommended in theatres
- An air conditioning plant should be installed in the operating suite to help maintain room temperature between 18.5-22^{o}C and humidity between 50-55%.

Types of ventilation systems

1. Plenum ventilation system
   - This system is fitted on the roof of the building
   - It sucks air from the environment, purifies, humidifies, heats or cools the air and pushes the air at high pressure through its diffusers;
   - The highest pressure is in the operating room and lowest is in the dirty corridor.
2. Ultra cleaning ventilation system:

   This is an advanced system used in vascular and transplant surgery . It reduces postoperative infection by 0.6%. It Pushes air through its diffusers at higher velocity and is 90% efficient.

Preparation of the Operating Theatre For Surgery

All staff entering OT must be dressed in acceptable OT attire. Before starting the list for the day, the equipment should be checked by OT Nurses who also select sterile packs, prepare instruments and any required special apparatus for sterilization.

- The operating table with its accessories is checked to ensure they are in good working condition order;
- Operating light and other light fittings are inspected for illumination and focus;
- All electro-medical equipment, e.g., diathermy and suction machines are switched on to ensure they are functioning;
- Oxygen supply is ascertained if available and adequate;
- Damp-dusting of equipment and surfaces is also done;
- Sequence of cleaning is the from the cleanest to the least clean and from the highest to the lowest point ;
- Floors are cleaned before sterile trolleys are set;
- After cleaning, equipment and supplies needed in the OT suite are brought or replenished.

2.5 Supplies, Equipment and Preparation for Operation

2.5.1 Supplies

The main theatre supplies include suturing materials, disinfectants and surgical supplies. Let us look at each in turn.

Suturing Materials

There are many types of sutures which can be classified as absorbable and non-absorbable sutures.

Absorbable sutures

- Natural absorbable: chromic catgut, plain catgut, collagen, living tissue (fascia lata)
- Synthetic absorbable: dexon maxon, polydioxanone (PDS), vicryl

Non-absorbable sutures

- Natural: silk (worm cut/thread), linen, cotton thread.
- Synthetic non-absorbable: nylon, dermalon, prolene
- Others: metallic sutures made of titanium as ligatures and sutures

Disinfectants

These include liquid and solid substances such as:

- Savlon
- Methylated spirit
- Iodine
- Pynol
- JIK
- Chlorine granules
- Anti septic soaps

Surgical supplies

These include latex gloves, sterile gloves, all tubing's, needles, syringes etc.

Equipment

The main types of equipment include the following:

1. Theatre table and it accessories
2. Drip stand
3. Diathermy machine
4. Ventilator
5. Cardiac monitor
6. Pulsoxymetre
7. Sphygmomanometer (BP machine)
8. Boyles machine
9. Suction machine (high vacuum rotary compressor and reciprocating pump)
10. Mayo table

11. Kick bucket
12. Swab rack
13. Stools
14. Suture rack
15. Trolleys

Handling of Equipment

1. All equipment must be handled with care and must be cleaned and maintained according to specifications, e.g. endoscopes.
2. Qualified personnel must attend to faulty equipment promptly.

Sterilisation

Sterilization is a process that renders articles free of microorganisms including spore-forming organisms.

Methods of sterilisation

1. Dry sterilisation
2. Autoclaving: both rapid displacement and high vacuum and high pressure autoclaving.
3. Cold sterilization using cidex or formalin

Sterilisation tests

1. Bowie Dick test
2. Vacuum leak test
3. Gravity test tubes
4. Microbiological test
5. Electrical thermometer test

Storage of sterile articles and equipment

Store sterile articles in moist free and cust free areas.

Scrubbing, Gowning and Gloving

Scrubbing

1. Prepare scrub up room, soap, sterile hand brushes, etc.
2. Adjust theatre gear
3. Adjust water to preferred pressure
4. Wet both hands to the elbow one after the other
5. Pick the soap and wet it
6. Rub the soap with your left hand and apply the soap lather from the palm to the elbow in circular motion. This should take a minute for each hand
7. Rinse the helping hand followed by the hand with soap lather, then repeat for other hand
8. Take the hand brush, apply soap and in circular motion scrub the left hand, between finger webs and the nails. Rinse the helping hand with brush and rinse scrubbed hand repeat the same for the other hand and the drop brush. This takes one minute for each hand
9. With soap scrub the palm of the left hand moving in circular motion to the middle of the arm. Rinse and repeat for the same for the other hand.
10. Apply soap to both hands, drop the soap in the sink, wash and rinse hands one at a time.
11. Close the tap with elbow

Refer to your procedure manual for how this procedure is done.

Gowning

- Dry your hands using a sterile hand towel, using two corners for each hand
- Collect gown from runner identify neck and bottom drop the bottom
- Identify sleeves and push your hands into the sleeves but do not let your fingers come out of the sleeve edge

Gloving

There are three methods of gloving, namely, the closed, open and plunging in methods.

1. *Closed method*

- Receive the correct size of gloves, pick the right glove and place it on your right palm with its open end on fingertips whilst the thumb part of the glove is placed on the side where the thumb is.
- With the helping hand hold the cuff of the glove and pull it over fingers whilst pushing the hand being gloved into the glove.
- Repeat the same for the other hand and adjust

2. Open method

- With the hands of the sleeves of the gown, pick the right glove with your left hand by the edge of the calf, push your right hand into the glove and pull the glove over the sleeve.
- For the left hand pick the glove with the right hand placing your fingers into the folded calf of the glove, push your left hand into the glove and pull over the calf of the glove over the sleeve of the gown.
- Adjust and you are ready to work.

3. Plunging in method

- This method is used to glove a member of the surgical team, e.g., a surgeon or assistant surgeon.
- With the corresponding thumb of the glove facing the hand to be gloved, hold the glove by its ream. Pull it out ward to create a large opening into the glove. The person to gloved pushes his or her hand into the glove while you pull the glove upward so that glove cuff is over the sleeve of the gown.
- Repeat the same for the other hand.

Sterile Field

Once a patient is on the table, the skin of the patient is washed with an antiseptic beginning with savlon then iodine and lastly methylated spirit. The patient is draped with sterile material. This begins with covering the lower limbs to the abdomen and then above the umbilicus, covering the chest, switching on the anaesthetic screen, and lastly fastening the covers on the sides with towel clips. The area around and between the surgical team is considered sterile.

2.6 Reception of Patient

It must be noted that for many the theatre environment is a strange place and causes anxiety. Therefore the way we receive our patients in the theatre is of importance. Thus the patient and the escorting nurse should be welcomed. Introduce yourself and receive detailed handover from the ward nurse on the following:

- Name, age & gender of the patient
- Diagnosis and operation to be performed
- Latest vital signs and observations
- Investigations done
- Check that the consent is signed

Countercheck

If the patient has been starved if it is an elective procedure
What premedication if any has been given
Preparation made on operation site
If patient has an identity label
The intravenous line and patency
That the patient is catheterised

Once you countercheck the information above, you should then carry out a physical examination from head to toe noting the following;

- Hair texture
- Cervical lymph nodes
- Pallor
- Jaundice
- Axilla lymph nodes
- Scars on his abdomen for any past operation
- On fingers if clubbing and cyanosis and any rings
- If catheterized
- If any pedal oedema present
- Shaved

We hope you now know how to receive a patient in the operating theatre. Next we shall discuss the management of theatre activities.

2.7 Managing Operating Theatre Activities

In this section we shall look at the responsibilities of the theatre team members, the purpose and principles of documentation in the operating theatre, and also the various theatre positions.

2.7.1 Duties of The Theatre Team

The theatre team is made up of the following members:
The anaesthetist
The runner
The surgeon
The scrub nurse
The theatre superintendent
The porter

Let us look at the responsibilities of each member of team.

1. ANAESTHETIST

- Guardian of the patient throughout the entire care period.
- He manages the patient's physiology using principles of aseptic technique
- Induces and maintains anaesthesia at the required level.
- Manages anaesthetic physiological reactions throughout the surgical procedure.
- Teacher and researcher
- Oversees post anaesthesia care units until each patient has gained control of vital functions.
- Participates in hospital's program of cardiopulmonary resuscitation as teachers and team members.
- Consultant and manager for problems of acute and chronic respiratory insufficiency that require respiratory therapy.
- Consultant and manager for patients with fluid, electrolyte and metabolic disturbances that require IV therapy.
- In the ICU or emergency department, he may provide advise regarding the total care of unconscious patients, critically ill or injured patients with acute circulatory disorder or neurological deficits.
- He is an integral staff member of pain management.

2. THE RUNNER

- Controls the physical and emotional atmosphere in the OR which allows other team members to concentrate on tasks without distraction
- Responds to any emergencies in the perioperative environment.
- Creates and maintains a safe and comfortable environment for the patient by implementing the principles of asepsis.

- Demonstrates a strong sense of surgical conscience. Any break in technique by any one in the room should be recognised and corrected instantly.
- Provides assistance to any member of the operating room team in any manner for which the circulator is qualified.
- Supplies team with supplies, equipment and instruments necessary
- Guards against any inadvertent hazards in their use and care.
- Should also be competent to direct scrub persons.
- Identifies any potential environmental dangers or stressful situations of the patient and other team members or both.
- Constantly flexible to meet the unexpected and to act in an efficient rational manner at all times as a communication link between, events and team members in the sterile field and persons who are not in the operating room. This includes patient's family or significant others plus other personnel.
- Directs activities of all learners. The circulator must have the supervisory capability and teaching skills necessary to ensure maintenance of a safe and therapeutic environment for the patient. Kindly given assistance builds up the learner's confidence. In this capacity she acts as an advisor, supervisor and teacher.

3. THE SURGEON

- The surgeon must have knowledge, skill and judgement required to successfully perform the intended surgical procedure and any deviations necessitated by unforeseen difficulties.
- He provides preoperative diagnosis and care, selection and performance of the surgical procedure and postoperative management and care.
- He assumes full responsibility for all medical acts of judgement and for the management of surgical patients.
- He uses his cognitive skills to intervene effectively in the patients' illness or injury.

4. THE SCRUB NURSE

The responsibilities of the scrub nurse include the following:

- Patient care member of the sterile team.
- Responsible for establishing and maintaining the integrity, safety and efficiency of the sterile field throughout the surgical procedure.
- By utilising the knowledge and experience in aseptic techniques, the scrub nurse prepares and arranges for instruments and sterile supplies.
- Facilitates the surgical procedure by providing the required instruments and supplies.
- Anticipates, plans for and responds to the needs of the surgeon and other team members
- Exhibits a stable temperament, an ability to work under pressure, a keen sense of responsibility, a concern for accuracy in performing all duties.
- Ensures that sterility is maintained throughout the procedure.
- h. Keeps her working area neat and dry and reinforces whenever necessary.
- Accounts for all the swabs and instruments being used on the sterile field.

5. THE THEATRE SUPERINTENDENT

The role of the theatre superintendent is programming and implementing policies formulated by senior nursing officer. His/her main functions are to:

- Control and coordinate the work of non-medical staff within the operating department, allocating staffing according to need.
- Report to Senior Nursing Officer on staffing problems and need
- Initiate and develop new ideas and controls the introduction of new methods in consultation with Senior Nursing Officer
- Participate in maintenance and updating of the procedure manual in consultation with teaching staff.

- Maintains responsibility for the custody and registration of all scheduled drugs used in the Operating Theatre Department. Supervises custody and stock levels within the department in cooperation with pharmacist.
- Exercises control of stock levels within the department and ordering new equipment in consultation with medical and administrative staff.
- Receives and records details about mishaps, complaints and defects in supplies and equipment, investigating the circumstances in collaboration with appropriate staff and reporting findings to the senior Nursing Officer.
- Ensures that policy relating to operating department record keeping is followed.
- h. Co-operates with medical and other staff in research procedures, including clinical trials and evaluation of equipment and supplies.
- Controls alterations to operation lists, informs all relevant personnel in the operating department, other hospital department and wards over the proposed changes.
- Ensures that ward and recovery room staff receives the necessary information on which to base nursing care and emergency situations reporting details of the patient's condition to appropriate hospital staff.
- Collaborates with senior nursing officer to provide operating dept. planning guidance for building project team.
- Ensures that agreed safety procedures are known and followed by theatre staff, especially measures concerning swab, instrument and needle counts, storage and administration of blood and drugs, ionising radiation static electricity/explosion hazards, fire, departmental cleaning.

6. PORTER

- Helps to collect patient from the ward and taking the patient to the ward in the company of a Nurse
- Cleans the OR after each procedure
- Collects waste and discards them appropriately
- Collects medical-surgical supplies from stores

- Takes specimen to the lab
- Sluices and takes linen to the laundry

2.7.2 Documentation and Record-Keeping In Operating Theatre

What is Documentation?

This is the act of recording something in order to produce a document.

Records

These are written accounts of something that is kept, can be looked at and used in the future.

Purpose of Documentation and Record-Keeping

- Useful for continuity of care and ensures effective communication among team members
- Provides an accurate account of nursing and surgical activities through out the perioperative phase and acts as legal records
- Allows for the recall of potentially defective prosthesis and as reference for removal
- Provides a comprehensive method to retrieve information for research, statistics, quality assurance and risk management
- Helps to monitor the outcome of patient's condition
- May be useful for planning, monitoring and evaluation

Principles of Record-Keeping

Confidentiality: Documentation related to patients and staff in the OT should remain secure and confidential, and may be manual or computed. The use of information, for any reason, should be justified

Permanence: All entries on the client's records are made in dark – coloured ink so that the record is permanent and changes can be identified. Dark coloured ink is generally required because it produces well on microfilm and in duplication process.

Signature: each recording is supposed to be signed by the compiler of record or health care provider.

Timing: It is very important to document or to report as soon as the information is gathered. This is to minimize omission or distortions of facts.

Accuracy:

It is important that notations on records be accurate and correct. Accurate notations consist of facts or interpretations of an observation. For example, it is more accurate to write that the client "refused medication" (fact) than to write the client was" un cooperative" (opinion)

Sequence

Events are documented or reported in the order in which they occur so that a clear picture of events is formulated. For example, in a clinical area where a nurse records Assessments, did the nursing interventions and then the clients response.

Completeness

Not all the data that is obtained about the client by a health service provide can be recorded. However, the information that is recorded needs to be complete and helpful to the client and Health Care Professionals.

Use of Standard Terminologies

The Health Personnel, for example nurses, doctors and pharmacists etc., need to use only commonly accepted abbreviations, symbols and terms that are specified by the Agency.

Types of Records Kept In the OT

The common types of records maintained in the OT are:

- Theatre Registers for patient's particulars and surgery done
- Patient's medical records
- Incident Records for unwanted events such as DOT, Incorrect swab count
- Staff Duty Rotas
- Staff Leave records; both long and short
- Drug Acquisition records: ordering and usage
- Inventory record for equipment and furniture
- Staff Performance Appraisal records
- Report Book
- Specimen Record book
- Department meetings records
- Borrowing book
- Emergency trolley checklist
- CDA Book
- Theatre Manual

We hope you now understand the management of operating theatre activities, including record keeping and the responsibilities of team members. Next we shall consider the positions used in theatre.

2.8 Positions Used in Theatre

The main positions used in theatre are:

1. Supine/dorsal
2. Trendelenburg

3. Gallbladder
4. Lateral
5. Lithotomy
6. Breast/axillary position
1. Neck
2. Prone cranial
3. Sitting cranial
4. Supine hip
5. Knee elbow/ rabbit
6. Jack knife
7. Endoscopic

NB: Refer to your procedure manuals for the details of these procedures.

2.9 Anaesthesia

What is anaesthesia?

Anaesthesia is the absence of feeling in a part or whole body. Analgesia is the absence of pain or without pain & is used to describe the state in which pain has been abolished without leading loss of consciousness in-patient.

Types of anaesthesia

There are basically two types of anaesthesia namely:

- local anaesthesia, and
- general anaesthesia.

Local Anaesthesia

This is a type of anaesthesia causes loss of sensation in a more or less discrete area of the body.

The following are ways through which local anaesthesia may be achieved;

1. Local infiltration
2. Ring block
3. Regional
4. Nerve block
5. Spinal anaesthesia

General Anaesthesia

This type of anaesthesia causes loss of consciousness in the patient and there are two ways through which general anaesthesia is achieved. These are:

- Inhalational anaesthesia e.g. Halothane, Nitrous oxide
- Intravenous anaesthesia e.g. Ketamine, thiopentone

Preparation of anaesthetic equipment

You will need the following

1. Laryngoscope & blade
2. Endotracheal tube (ETT)
3. Suction tubes of all sizes.
4. Needles & syringes of right sizes
5. Nasogastric tubes of various sizes
6. Working suction machine
7. Sphygmomanometer& stethoscope
8. Pulsoxymetre
9. Drip stand
10. Ventilator and cardiac monitor
11. Boyles machine for administration and regulation of anaesthestic
12. Magill's forceps

Stages and Planes of anaesthesia

Arthur Guede described the stages of General Anaesthesia, though there are no clear dividing lines between them.

These are:

Stage 1: Analgesia

- Termed “stage of voluntary movement”
- Time from initial drug administration to loss of consciousness
- Gradual decrease in response to stimuli
- May demonstrate ataxia, struggling, excitation, salivation, defecation and urination

Stage II: Delirium

- Termed “stage of delirium or involuntary movement”
- Loss of all voluntary control
- From loss of consciousness to onset of automatic regular respiratory pattern, there is breath holding or deep breath,
- External stimulation can cause exaggerated reflex responses
- Swallowing and vomiting may occur

Stage III: Surgical Anaesthesia

- Termed “stage of surgical anaesthesia ”
- From the onset of automatic breathing or respiration to respiratory paralysis
- Progressive reflex depression
- Ventilatory rate becomes slower and regular
- Loss of vomiting and swallowing reflexes
- Divided into 4 planes according to Guedel:
  - Plane 1: *Light Anaesthesia*: analgesia and muscle relaxation sufficient only for minor non-invasive procedures of short duration. Lasts until ocular movements cease.
  - Plane 2: *Medium anaesthesia*:
    Analgesia and muscle relaxation sufficient for most surgical procedures, it is a period during which the intercoastal muscles are increasingly depressed and breathing become diaphragmatic

- *Plane 3: Deep Anaesthesia*: paralysis of intercoastal muscles and abolishment of all reflexes, respiration solely diaphragmatic.
- *Plane 4: Over dose*: severe cardiopulmonary depression & Pupillary dilatation

Stage IV: Overdose

- Respiratory arrest and cardiovascular collapse
- Leads to death if untreated

Drugs Used in Anaesthesia

- Anaesthetics drugs, e.g., halothane, nitrous oxide, thiopentone, cyclopropane, lignocaine, bupvercaine, ketamine
- Muscle relaxants, e.g., pancuronium (long acting), suxomethionium (short acting).
- Antiemetics, e.g., promthazine, plasil
- Sedatives, e.g., diazepam
- Stimulants, e.g., adrenaline, epinephrine
- Analgesic, e.g., pethidine
- Intravenous fluids, e.g., normal saline, ringers lactate, 5% dextrose

Other Drugs

- Sodium bicarbonate
- Calcium gluconate
- Digioxin
- 5o% dextrose
- Neostigmine
- Oxygen

Intubation

The insertion of a tubular device into a canal, hollow organ, or cavity.

Types of Intubation

The main types of intubation are:

- Endotracheal intubation
- Nasogastric intubation
- Nasotracheal intubation- (blind)
- Orotracheal intubation
- Fibreoptic intubation-(awake)
- Tracheotomy intubation

Let us look at each type in further detail.

Endotracheal intubation

The passage of a endotracheal tube through the nose or mouth into the trachea for maintenance of the airway during anaesthesia or for maintenance of an imperilled airway.

This is considered a relatively temporary procedure. The type of intubation used depends on the patient's condition and on the purpose for intubation.

Nasogastric intubation

The insertion of an endotracheal tube through the nose and into the stomach to relieve excess air from the stomach or to instil nutrients or medications.

Nasotracheal intubation- (blind)

This is the insertion of an endotracheal tube through the nose and into the trachea. The tube is passed without using a laryngoscope to view the glottic opening. This technique may be used without hyperextension, therefore it is useful when a client or patient has cervical spinal trauma and with patients who have clenched teeth. The tubes are usually smaller than those used for oro-tracheal intubation. This can also be performed with direct visualization with a

laryngoscopic examination. Blind intubation is only used if there are indications that the larynx cannot be visualized. Bleeding is common after intubation.

Indications for this type include intraoral operative procedures, during which the endotracheal tube could easily be displaced or obscure the operative site.

Orotracheal intubation

The insertion of an endotracheal tube through the mouth and into the trachea. This type is performed much more frequently than Nasotracheal intubation.

Fibreoptic intubation-(awake)

A fibreoptic scope is used that has an eyepiece to visualize the larynx and a handle to control the tip. It is inserted in the patient's throat and guided to the larynx and glottic opening. The endotracheal tube is then slid over the fibreoptic scope into the trachea. This procedure is usually used when patients are unable to flex and extend their head for any reason. Usually the patient's throat is numbed with local anaesthetics.

Tracheotomy intubation

Placing a tube by incising the skin over the trachea and making a surgical wound in order to create an airway. For the best results it is performed over a previously placed endotracheal tube in an operating room. However this is performed as an urgent, life-saving procedure.

Alternatives to intubation

- Laryngeal mask airway (LMA)
- Oesophageal Tracheal Combitube
- Tracheostomy

Indications for Intubation

- Inability to oxygenate patient.
- Inability to ventilate patient (rising PaCO2, respiratory acidosis, mental status change).
- Patient unable to protect airway.
- Anticipated clinical deterioration.
- To provide an airway in the trachea.
- Control or pulmonary ventilation
- For anaesthesia (intracranial, intrathoracic, and most intraabdominal operations mandate)
- To relive excess air from the stomach or to instil nutrients or medications.
- After induction of general anaesthesia, to minimize the possibility of aspiration of gastric contents.
- For patients in respiratory distress.

Requirements

1. Laryngoscope
2. Magill's forceps
3. Syringe 10cc filled with air
4. Cuffed endotracheal tube (E.T.T)
5. Short acting muscle relaxant scoline
6. Suction machine

Procedure

- Prepare the requirements before the patient is anaesthetised
- Once the patient is anaesthetised give scoline
- Hyperextend the neck of the patient with application of cricoid pressure

- With laryngoscope insert into the mouth of patient with help a of Magill's forceps, place laryngoscope blade on right side of tongue lift and shift the tongue to left side so as to expose the trachea
- Insert E.T.T into the trachea guided with laryngoscope light. Preferably the E.T.T may need a stilate
- Connect E.T.T to ambu bag, deflate the ambu bag whilst auscultating the patients chest to check for bilateral air entry into the lungs
- Inflate the cuff of E.T.T with enough air not too much to avoid tightness to prevent ischemia of tracheal tissue.
- Suction when needed

Complications of intubation

The complications of intubation include trauma, right bronchus intubation, failed intubation, oesophagus intubation, cuff leak.

Artificial ventilation

This is aided respiration and is achieved by using:

- A ventilator which is set at preferred ventilatory pressure, number of respirations and respiratory frequency.
- An Ambu bag, the patients E.T.T is connected to the ambu bag and the anaesthetist deflates the bag at preferred pressure and frequency.

Resuscitation

- Be alert
- Ensure endotracheal tube is clear and suction if blocked
- Check anaesthetic flow is correct
- Give fluids, e.g., normal saline
- Give emergency drugs, e.g., 50%dextrose
- Check vital sign readings
- Do cardio pulmonary resuscitation (CPR)

Care of an anaesthetised patient

The care of an anaesthetized patient involves the maintaining of the patient on all forms of anaesthesia. Thus you should:

- Check if patient is breathing spontaneously or ambu bagging
- Auscultate the patient's chest if the patient is intubated
- Check pupils if reacting to light, if reacting know you are giving light anaesthesia
- Check for the colour of tongue and blood
- Monitor blood loss
- Monitor urine output
- Monitor heart rate
- Monitor oxygen supply
- Monitor his blood pressure and temperature

Recovery room nursing duties

The recovery room nursing duties include:

- Receive a detailed handover from the scrub nurse
- Check level of patient consciousness and vital signs
- Check the incision site for bleeding
- Change soiled linen
- Ensure patient safety
- Check and record intake and output
- Provide psychological care
- Check airway and IV line for patency
- Inform ward staff to collect the patient when well recovered
- Specimen sending to ward or lab

The following are seven things that you should check in the recovery room

1. Airway patency

2. Blood pressure
3. Pulse
4. Intake and output
5. Fluid loss through blood loss
6. Level of consciousness
7. Pain signified by restlessness

2.10 Types of Incisions Commonly Used in Surgery

The types of incisions commonly used in surgery include:

1. Midline can be upper or lower (middle)
2. Right/left paramedian (by the middle in parallel)
3. Kocher's/transverse (across)
4. Pffannestial/elliptical (lower diagonal)
5. Gridiron/McBurney's

Types of tissues encountered in surgery

To make any incision a surgeon must know the tissues he or she is going to cut through. These may be as follows in order of arrangement:

a) Skin
b) Subcutaneous
c) Fascia
d) Muscle
e) Peritoneum

Below are the reasons for making any incision:

1. Type of surgery
2. Maximum exposure

3. Speed of entry
4. Post-op wound strength
5. Possibility of extension
6. Post – operative discomfort
7. Cosmetic effect

That brings us to the end of our unit on operating theatre nursing and anaesthesia. Let us review what you have learnt.

2.11 Unit Summary

In this unit we started by discussing common terms used in operating theatre nursing and then moved on to the theatre environment. Next, we have looked at the supplies and equipment used in theatre. In addition, we have considered how you should receive a client in theatre, how to manage operating theatre activities and the different positions used in theatre. Lastly, we have discussed how to manage a patient with anaesthesia and the common types of incisions used in surgery.

In the next unit we shall discuss disorders of the ear, nose and throat.

UNIT 3: DISORDERS OF EAR, NOSE AND THROAT

3.1 Unit introduction

In the last unit you learnt about operating theatre nursing and anaesthesia. This unit will introduce you to common surgical conditions affecting the ear, nose and the throat. During your study, you will have an opportunity to visit an ENT clinic for your practice and proficiency. Let us start with our unit objectives.

3.2 Unit Objectives

Br the end of this unit you be able to:

1. Describe the anatomy and physiology of the ear, nose and throat
2. Describe the management of a client with common disorders of the ear
3. Explain the management of a client with deafness and hard of hearing
4. Describe the prevention of deafness
5. Describe the management of a client with common disorders of the nose
6. Describe the management of clients with disorders of the throat

3.3 Anatomy and Physiology of the Ear

The ear is a sensory organ that allows hearing and maintains balance (equilibrium). Audition is the scientific name for the sense of sound and sound is a form of energy that moves through air, water, and other matter, in waves of pressure. Sound is the means of auditory communication, including songs and spoken language.

Although the ear is the vertebrate sensory organ that recognizes sound, it is the brain and central nervous system that "hears". Sound waves are perceived by the brain through the firing of nerve cells in the auditory portion of the central nervous system. The ear changes sound pressure waves from the outside world into a signal of nerve impulses sent to the brain.

Review of Anatomy and physiology of the human ear

The ear consists of three main parts, namely:

1. The external ear
2. The middle ear
3. The inner ear

1. The external ear

The external ear comprises the skin covering the cartilaginous auricle and the auditory canal. The outer ear is the most external portion of the ear. It includes the pinna (also called auricle), the ear canal, and the very most superficial layer of the eardrum (also called the tympanic membrane).This portion of the ear is very vital for hearing as it directs the sound waves into the auditory canal and middle ear.

The sound pressure is amplified through the middle portion of the ear and passed from the medium of air into a liquid medium. The change from air to liquid occurs because air surrounds the head and is contained in the ear canal and middle ear, but not in the inner ear.

2. Middle ear

The middle ear is separated from the external ear at the proximal portion of the auditory canal by the tympanic membrane (eardrum), a structure made of layered skin, fibrous tissue and mucous membrane. It comprises of three small bones i.e. the malleus (hammer), incus (anvil) and the stapes (stirrup). These

bones together link (articulate with each other) to transmit sound. The middle ear is a small air filled cavity in the temporal bone. The Eustachian tube equalises the pressure between the inner and outer surfaces of the tympanic membrane.

3. The Inner Ear

The inner ear is a bonny and membranous labyrinth consisting of the vestibule, the cochlea (containing the organ of corti) and the semi circular canals. It is hollow embedded in the temporal bone, the densest bone of the body. The hollow channels of the inner ear are filled with liquid, and contain a sensory epithelium that is studded with hair cells. The microscopic "hairs" of these cells are structural protein filaments that project out into the fluid. The hair cells are mechanoreceptors that release a chemical neurotransmitter when stimulated. The part of the ear that is dedicated to sensing balance and position also sends impulses through the eighth cranial nerve, the 8th nerve's Vestibular Portion. Those impulses are sent to the vestibular portion of the central nervous system. The human ear can generally hear sounds with frequencies between 20 Hz and 20 kHz(the audio range)

Sound Conduction and Transmission

Sound enters the ear through the external auditory canal and there the waves strike the tympanic membrane which also vibrates. These vibrations move from the malleus to the incus to the stapes through the oval window as mechanical energy. This mechanical energy is then transmitted through fluid in the cochlea to the round window which opens into the inner ear, stimulating the air in cells in the organ of corti and subsequently converted into electrical energy (an impulse). The electrical energy travels via the vestibulocochlea nerve to the central nervous system (auditory portion of the cerebral cortex in the temporal lobe) where it is analysed and interpreted in its form as sound to derive meaning.

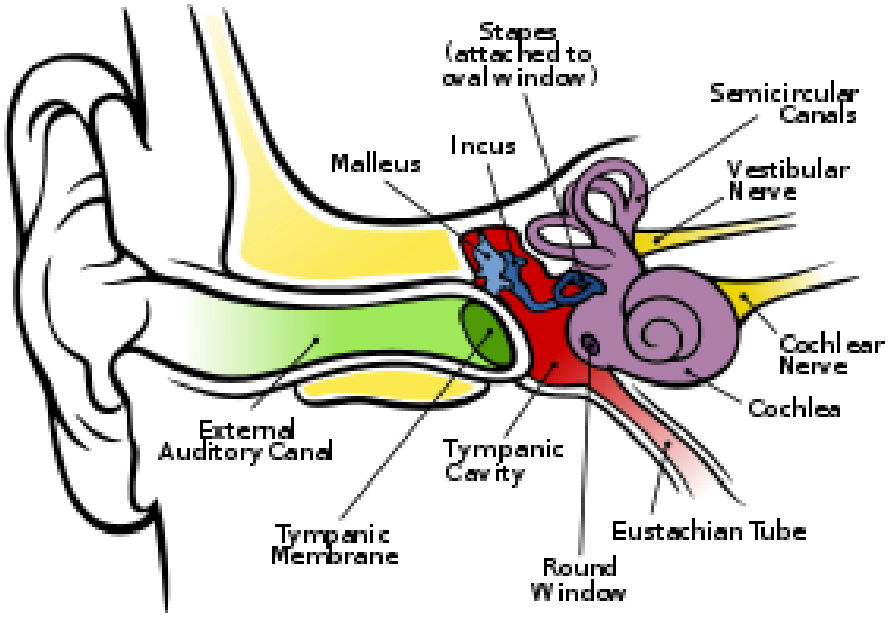

Figure 5: Parts of the ear

Investigations and Procedures

1. Inspection

The auricle and surrounding tissues should be inspected for discharges, deformities, nodules and lumps. Manipulation of the auricle does not usually elicit pain; if this manoeuvre is painful, acute otitis externa is suspected. Examine the ear colour and size. The ears should be similarly shaped, coloured the same as the face and sized in proportion to the head. Check the ear canal for discharge, foreign bodies and excessive cerumen (ear wax). Separate the external ear and the mastoid process (the bonny structure beneath and behind the ear) to assess for any areas of tenderness, swellings and nodules or lesions.

2. Autoscopic examination

This is done to examine the external auditory canal and the tympanic membrane. Any discharge, inflammation or foreign bodies in the external auditory canal is noted.

3. Evaluation of gross auditory acuity

A general examination of the patient's hearing can be made by assessing his/her hearing ability by:

- A whispered phrase or a ticking watch, etc, testing one ear at a time is used
- A Weber and Linne Tests may be used to distinguish conductive loss from sensory neural loss when hearing is impaired.

a. Whisper Test

Exclude one ear from testing, the examiner covers untested ear with the palm of the hand then whispers softly from a distance of 45 – 60cm from the uncovered ear and out of sight. The patient with normal acuity can correctly repeat what was whispered.

b. ***Weber Test (named after Friedrich Eugen Weber 1823 – 1891)*** *A* Gerontologist is a scientist who studies the effects of aging and age related diseases on humans.

The Weber Test uses the bone conduction to test lateralization of sound. A tuning fork is set in motion by grasping it firmly and tapping it in the examiner's hand or knee and then is set on the patient's head. The patient is asked to identify where the sound is heard i.e. the middle of the head, right or left ear. A person with normal hearing will hear the sound equally in both ears or describe the sound as central or on the middle of the head. In cases of conductive hearing loss, the sound is heard better in the affected ear. In cases of sensory neural hearing loss the sound localizes to the better hearing ear. The Weber test is used for detecting unilateral hearing loss.

c. Linne Test

In the Linne Test, the examiner shifts the step of the vibrating tuning fork between the two positions, 6cm from the opening of the ear canal (ear conduction) and against the mastoid bone (bone conduction), as the position changes, the patient is asked to indicate which tone is louder or if the tone is audible. Normally sound heard by air conduction is audible longer than that heard by bone conduction. The Linne test is useful for distinguishing between conductive and sensory neural hearing loss.

3.4 Common Disorders of The Ear

3.4.1 Conditions of The External Ear

Being covered by the skin, the external ear is liable to development of conditions just like those of any other part of the body covered by the skin. Disorders of the external ear include:

- otitis externa,
- otomycosis (fungal otitis externa), and
- eczematoid (psoriatic otitis externa).

Causes

Common predisposing causes are:

1. Swimming,
2. Forceful cleaning of the ear,
3. Trauma.

Let us examine each disorder in turn.

- *Otitis externa* is a dermatitis most often caused by a bacterial pathogen, commonly a pseudomonal or staphylococcal species. Pseudomonal infection produces green or yellow purulent otorrhoea or discharge.
    - *Otomycosis* is most commonly due to infection with an Aspergillus species. Aspergillus otomycosis appears as a fine white mat topped by black spheres.
    - *Eczematoid* presents differently in that it is not due to an infectious pathogen. This condition often manifests as a moist, white, granular otorrhoea on an erythematous base. It often responds to topical steroid drops but may be chronic or recurrent.

Clinical manifestations

The common clinical manifestations are:

- otorrhoea,
- erythema
- oedema.

In severe cases, soft tissue stenosis may be present. Extension of the infection from the external ear may manifest as cellulitic skin changes involving the concha of the auricle.

Management of external ear infection

1. External ear infections require otoscopic examination that must be performed in conjunction with an evaluation of related structures such as the external ear and the head and neck. For example, examine the auricle for swelling, deformity, and erythema; the face for evidence of facial nerve paresis or other cranial neuropathy; and the neck for masses.
2. Usually a history of preceding ear trauma in the form of forceful ear cleaning, use of cotton swabs, or water in the ear canal is important. Make sure that you take such history.

3. History of severe throbbing pain with ear discharge, this can lead to a hearing loss due to occlusion of the ear canal.

Diagnostic Tools

The otoscope consists of a head and a handle and is used to examine the external auditory canal (EAC), tympanic membrane, and middle ear.
A magnifying lens enhances the clinician's view. One or 2 heads for the otoscope may be used. A diagnostic head is fixed to the otoscope, which does not allow use of micro instruments through the scope, while a working or operating head has a magnifying lens that can slide to the side, enabling passage of microinstruments through the speculum into the external and middle ear.

Technique

To get the best view of the tympanic membrane in an adult, retract the auricle posteriorly and superiorly to straighten the EAC. In a child, pull the auricle posteriorly. Remove any debris or cerumen to allow for an adequate examination.

Examine the external canal for masses, skin changes, and otorrhoea. Then, examine all parts of the tympanic membrane. Ascertain the motion of the tympanic membrane by pneumatic otoscopy. Lastly, attempt a thorough examination of the middle ear contents through the tympanic membrane, although this examination may be limited by the opacity of the tympanic membrane itself.

Ear wax – Impacted wax

Ear wax, also known as *cerumen,* is produced by glands in the skin of the outer portion of the ear canal. The outer ear ends at the most superficial layer of the tympanic membrane. Cerumen impaction, or impacted ear wax, is a common phenomenon. It is the result of mixing skin cells of the outer ear canal with

glandular secretions that protects the ear against infections by cleaning and trapping dirt in the ear canal. Cerumen accumulation can occur if there is an overproduction of ear wax in response to infections or loud noises. The amount of ear wax produced varies by individual. Some individuals produce very little wax; others overproduce ear wax to the point that blockage may occur. Cerumen normally works itself out of the ear; however, there are situations when the wax begins to plug up the outer ear canal. When ear wax blocks the ear canal, it begins to cause problems, such as impacted earwax, or cerumen.

Signs and symptoms

Individuals who have impacted earwax often complain about symptoms of:

1. hearing loss,
2. pain in the ear,
3. a ringing in the ear (called tinnitus),
4. cough, vertigo, or
5. itching of the ear.

Management

Normally, earwax is removed by cleansing the ear. This is accomplished by wrapping a wet washcloth around the finger and washing around the outer ear. In the case of cerumen impaction, the excess ear wax may have to be softened using an oil-based agent (ear drops wax softener), such as baby oil or olive oil. Over the counter cerumen removing agents such as Debrox and Murine Ear Drops may also be used instead of oil-based agents to loosen the wax. Another low-cost method of removing ear wax involves using a 3% Hydrogen Peroxide. However, these ear drops may cause irritation to the ear and result in possible allergic reactions.

Information Education and Communication (IEC)

Excessive earwax can be very embarrassing, and can also cause many people to be a little hard of hearing. The following should be considered when giving I.E.C you should include the following advice:

1. Do not use cotton swabs to remove earwax. Cotton swabs and other small objects can cause earwax to be pushed farther back in the ear, creating more wax build up and possibly hearing problems.
2. People should not aim at getting rid of all the earwax.
3. Earwax is actually very healthy, it protects the ear from infections and other problems.
4. Visit the clinic for ear examination at every 6 – 12 months,
5. An ear drops prescription may help to loosen the wax
6. Ear syringing may be done at the clinic.

Foreign Bodies of The Ear

The vast majority of objects found in ears are placed there voluntarily usually by children. A caregiver should not threaten a child when asking about this possibility, because the child may deny having put something in the ear in order to avoid punishment. This denial could easily result in a delay discovering the object and therefore increase the risk of complications. Insects also crawl into the ear, usually when one is sleeping. Sleeping on the floor or outdoors increases the chance of this unpleasant experience. The ear canal, where most objects get stuck, is very sensitive.

Signs and symptoms

The symptoms of having a foreign body in the ear largely depend on the size, shape, and substance involved. Occasionally, a foreign body in the ear will go undetected and can cause an infection in the ear.

1. Pain is the most common symptom.
2. If the object is blocking most of the ear canal, the patient may experience a decrease in hearing on the affected ear.

3. Ear irritation to the ear canal, this may cause nausea and vomit.
4. Bleeding is also common, especially if the object is sharp.
5. One of the most distressing experiences with this problem is having a live insect in the ear. The insect's movement can cause a buzzing in the ear and may be quite uncomfortable.

Medical/Surgical Care

1. Where there is ear infection antibiotic ear drops can be administered.
2. Dripping mineral oil into the affected ear kills the insect. This is safe as long as there is no hole in the ear eardrum.
3. Urgent removal is also recommended for food or plant material (such as beans) because these may swell when moistened.
4. Urgent removal is indicated if the object is causing significant pain or discomfort.
5. Commonly used techniques include applying gentle suction to the object, small forceps, or instruments that have a loop or hook at the tip are used.
6. If the object is metallic, a long instrument may be magnetized to assist in gently pulling the object from the ear.
7. Another common technique involves irrigating the ear.
8. If the eardrum appears intact, warm water can be gently squirted past the object using a small catheter. The water will turn around at the end of the ear canal and often wash the object out.
9. A child with this problem may be sedated to allow calm and comfortable removal of the object.

3.4.2 Conditions of The Middle Ear

The following are common terms used in relation to conditions of the middle ear:

1. ***Myringotomy:*** this is a surgical perforation of the eardrum to remove fluid from the middle ear.
2. ***Tympanoplsty:*** this is a term used collectively to refer to a variety of reconstructive procedures performed on a deformed of diseased structure of the middle ear.
3. ***Otorrhoea:*** this is the discharge from the ear due to a perforated eardrum.
4. ***Cholesteatoma:*** this is a mass of debris of tissues that collects in the middle ear during chronic otitis media.
5. ***Chronic otitis media:*** this is a long-standing infection caused by the permanent perforation in the eardrum.

OTITIS MEDIA

Otitis media is the inflammation of the middle ear. It may be described as acute or chronic otitis media, thus identifying two types of the condition.

Predisposing factors

1. **Age:** otitis media is common in infants and children as they have a shorter and more horizontal Eustachian tube than adults. This predisposes them to frequent middle ear infections.
2. **Season:** otitis media is common in winter months due to non-bacterial respiratory tract infections, e.g. flu.
3. **Respiratory Tract Infections:** especially those affecting the nose and nasopharynx, such as, the common cold, influenza, measles, diphtheria, etc.
4. **Allergic Reactions:** allergy to food and non food substances has been associated with occurrence of otitis media.
5. **Sudden Pressure Changes:** occurrence of pressure differences between the aqueous contents of the middle ear clefts and the atmospheric environment of the client i.e. in deep sea diving.
6. **Pre-existing Perforation of the Eardrum:** infection may enter the middle ear from the external auditory meatus if there is a pre-existing perforation of

the eardrum. this is because the eardrum performs the function of providing a physical barrier.

7. **Trauma:** occasionally infection may enter from the external acoustic meatus if the eardrum is ruptured by trauma.

Causes of Otitis Media (Organisms)

1. Streptococcus pneumonae is the commonest cause as it accounts for 40% of cases of otitis media.
2. Haemophillus influenza
3. Moraxell catarrhalis
4. Staphylococcus aureus
5. Proteus mirabimis
6. Pseudomonas aeruginosa
7. E. coli

Pathophysiology

The common causative organism can be gram-positive cocci, such as, streptococcus species, or haemophilus influenza, or gram negative organisms such as pseudomonas. In the early stages of inflammation, the mucous membrane of the middle ear is reddened, then exudates serous fluid which collects in the cavity, exudates and oedema form in the line of the Eustachian tube and the middle ear resulting in decreased aeration, retraction of the tympanic membrane and serous exudation in the middle ear. The exudates can become purulent and cause bulging of the tympanic membrane as pus forms. At the same time the infection spreads to the mastoid hair cells and the tympanic membrane can rupture. Chronic infection with perforation can lead to the formation of cholesteastoma as the skin from the ear canal grows; debris and desquamation slowly collect inside the middle ear.

Signs and symptoms

1. The patient experiences slight deafness and popping sounds or noises in the affected ear. The deafness is due to the infection with secretions passing up the Eustachian tube from the nasal pharynx and this is usually caused by sinusitis, enlarged adenoids or common cold.
2. The patient complains of severe pain in the ear, which is usually brought about by ruptured tympanic membrane and accumulating pus causing pressure in the middle ear middle cavity.
3. There is a rise in temperature between 39.5°c and 40°c due to infection.
4. There may be tenderness over the mastoid process because the lining of the middle ear continues with that of mastoid antrum and cells.
5. On examination, the eardrum seems to be flushed with a network of dilated blood vessels.
6. Physical examination shows bulging of the tympanic membrane due to inflammation and accumulation of pus.
7. Pain leads to the patient experiencing insomnia and restlessness.
8. Otorrhoea may development due to rupture of the tympanic membrane.

Signs and symptoms of chronic otitis media

The main signs and symptoms of chronic otitis media are:

1. Perforation of the eardrum
2. Repeated infection of the ear
3. Painless discharge (otorrhoea) with or without odour
4. Conductive hearing loss which is greater when the ossicles are involved

Management

Investigations

1. History taking reveals progressive deafness or throbbing pain in the ear.

2. Examination of the ear with an auroscope will reveal a bulging tympanic membrane or red tympanic membrane. There may be pus discharge seen if the tympanic membrane is ruptured.
3. Pus for microscopy, culture and sensitivity
4. Oral examination may reveal tonsillitis

Medical treatment

1. Aspirin 600mg orally for 3 days, given to relieve pain and inflammation. In severe pain morphine may be given 15mg whenever necessary.
2. Amoxycillin 250 – 500mg 8hourly orally for 5 days
3. Diazepam 5 – 10mg given at night for sedation and to allow for rest and prevent insomnia

Nursing Care

The aims of nursing care are to:

1. To restore the Eustachian tube and middle ear function
2. To eliminate infection and inflammation
3. To control any allergies
4. To relieve pain
5. To prevent the develop of complications

Ear care

If the eardrum is ruptured a sterile dressing is kept over the ear and discharge is either mopped out or gently syringed away on a daily basis. In chronic otitis media, the external auditory meatus is dry daily and ear drops instilled. Various ear drops are instilled in the ear and these may include antibiotics and saline.

Pain relief

In the early stage of the disease when there is so much pain, apply a hot water bottled covered on the ear affected. Analgesics, mild and strong may be given depending on the degree of the pain to relieve the pain. Aspirin in mild cases or morphine in severe cases can be given. A myringotomy may be performed in cases where antibiotics are being administered and pus keeps on accumulating in the middle ear thus causing great pain.

Observations

Routine observations or vital signs such as temperature and respirations should be done. A raised temperature helps you to diagnose the severity of the disease and if there is any improvement of the patient after putting the patient on antibiotics. If high temperature persists for a longer period then you should suspect resistance to the drug and you may be need to change it before any complications arise. Observe the client for any sneezing as it may indicate an accompanying nasal infection which can be treated by steam inhalation. Observe for signs of any hearing loss and sleeping patterns at night.

Rest

The patient should be confined to bed to prevent injury as he may lose balance due to the condition. Activity should be restricted to bed activities such as sitting up, turning to change position gently and a bit of exercises especially in the acute phase of the condition.

Hygiene

Provide oral care to the patient after every meal as this promotes the appetite as well. Soiled linen and dirty bed clothes should be changed as soon as they are observed. The patient should be bathed daily in bed during the acute phase, and when stable they should be assisted in the tub. This allows the patient to feel refreshed, have a positive self image and above all ensure quick recovery.

Psychological care

Explain to the patient in simple terms the disease process. Allow the patient and his relatives to verbalise concerns and answer them if possible. Refer questions to the physician when not able to answer. Reassure the patient that the pain will subside soon with the help of antibiotics and analgesics ordered and given. Be with the patient in the most acute phase of the disease and explain to him or her why they are confined in bed. Patients are confined in bed because the may feel light headed, fall and sustain injury because of loss of balance. Seek permission and explain fully any procedure to be done on the patient so that they understand and feel cared for.

Nutrition and fluids

As the patient tends to be anorexic and feel nauseated, small frequent meals rich in proteins and vitamins should be provided to replace worn out tissues and for quick recovery. Meals should be soft to allow for easy chewing. A client receiving broad spectrum antibiotics should be given supplements of B vitamin as they may experience side effects such as diarrhoea or malabsorption. Encourage the patient to take enough fluids to replace the lost fluids and electrolytes by the way of diarrhoea and sweating due to fever.

Exercises

The patient may be allowed to do active exercises whilst remaining in bed. This is to prevent pressure sore formation, deep vein thrombosis and embolism.

Elimination

Observe the stool and amount that the client is passing. If there is diarrhoea as a result of prolonged use of broad spectrum antibiotics, a fluid replacement plan should be instituted. Constipation must be avoided at all costs. The patient should be offered a bed pan or urinal in the acute stage when he or she is confined in bed.

Information, education and communication

1. Advise the patient with acute otitis media to watch for and immediately report pain and fever which may indicate secondary infection.
2. Caution the patient to complete the prescribed course of antibiotic treatment and to report any side effects.
3. Advise the patient to notify the doctor or clinician if ear pain, fever, pus or ear discharge occurs.
4. Advise the patient on the importance of rest in the acute phase to prevent injury due to loss of balance.
5. Advise the client on the need to maintain a balanced diet in order to build their immunity, provide energy and quicken tissue repair and replacement.

Prevention of Recurrence

1. Teach the patient and people to recognise upper respiratory tract infections and to seek early medical treatment and advice.
2. Instruct the clients and especially mothers to feed infants in supine position and not to feed infants and small children with a bottle, in order to prevent reflux of nasopharyngeal flora.
3. Children and adults with recurrent ear infections should be cautioned against forceful blowing of the nose during the cold season as they may drive infected secretions into the middle ear.
4. Water entering the nose during swimming or diving should be allowed to run/drain out rather than being forcefully expelled.
5. Advise patients to complete prescribed medications to prevent recurrences
6. Advise the patient with ear discharge to use sterile cotton wool and to wash hands before inserting fingers into the ear.
7. Advise the patient to take a mixed diet rich in proteins and vitamins to promote quick healing.

Complications of Otitis Media

1. ***Deafness:*** In some cases complete loss of hearing accompanies chronic otitis media. Infections in the nose spread up to the pharyngotympanic tube and swollen mucous membrane blocks the tube. This means that the air in the middle ear cannot be removed and renewed and so it becomes absorbed by blood in the capillaries. Thus the pressure of air outside the tympanic membrane is not counterbalanced by air within. The membrane is then pulled tightly and cannot vibrate.
2. ***Mastoiditis:*** this comes about in the neglected cases of acute otitis media. There is intensification of symptoms and the patient's pain becomes severe, there is tenderness and usually redness and swelling occurs behind the ear. The amount of discharge usually decreases. Intensive treatment with treatment with antibiotics may check the infection in the early stage before breakdown of the bone and abscess formation have occurred. Treatment with Amoxyl 500mg in adults will arrest this condition.
3. ***Lateral sinus thrombosis*****:** venous infection with thrombosis occurs first in the tributary vein and spreads quickly into the lateral sinus, part of which projects into the mastoid process. The wall becomes easily infected and adherent to the bone. This may lead to formation of an abscess around the sinus.

Treatment

The treatment involves removal of the bone over the sinus , incision of the lateral sinus and removal of the clot.

4. ***Septicaemia*****:** Particles of septic clots may be broken off into the blood stream and produce pyaemia (pus in blood stream) or the patient may develop sepicaemia.

Treatment

Give broad spectrum antibiotics intravenously, e.g. Ampiclox 500mg 6 hourly for seven days.

5. ***Intracranial complications:*** infection of the middle ear can spread to the cranium via septic thrombi which is carried in the blood stream. It may also pass directly through the anatomic channel between the ear and the brain, e.g. through the labyrinth by the internal auditory meatus. This can lead to complications such as meningitis and intracranial abscess.

- *Meningitis:* the onset of meningitis comes with higher fever, restlessness and loss of appetite. Signs of meningeal irritation are first shown by discomfort on flexing the head forward and photophobia with generalized headache.

  Treatment:

  This is by lumbar puncture to get cerebral spinal fluid for microscopy, culture and sensitivity. When the causative organism is identified, appropriate antibiotics are given such as Crystalline Penicillin 2 – 4 mega units 6 hourly intravenously for 5 – 7days. Free drainage of the primary source is combined with repeated lumbar puncture.

- *Intracranial Abscess:*

  There are two forms of intracranial abscess:

  - Extradural abscess which is part of the mastoid infection and is rarely diagnosed before an operation. The dura mater is thickened and closed off. The infection may spread through the dura mater and other meninges causing first stage encephalitis and abscesses of brain tissue.
  - Cerebral Abscess in which the mode of spread is usually by septic thrombi and symptoms include headache, vomiting, giddiness and slowness of speech.

***6. Chronic otitis media*:** this is a long standing infection of the middle ear that does not go away. "Suppurative chronic otitis" is a phrase doctors use to describe an eardrum that keeps rupturing, draining, or swelling in the middle ear or mastoid area and does not go away. Pain is usually absent.

6. ***Labyrinthitis*:** this is occurs after erosion of the bone capsule of the labyrinth through vascular channels and by surgical injury to the lateral semicircular canal or the foot plate of the stapes in the course operation.

Treatment

Antibiotics are given intravenously and removal of a cholesteatoma is done.

7. ***Facial paralysis*:** the origin of this condition is otitis media. The facial nerve may be involved by an infection of the mastoid bone cells surrounding the facial canal or may be damaged during operation. As the facial nerves supplies the muscles of expression, complete paralysis is shown by marked asymmetry of the face, the affected being devoid of its natural folds and expression. Any attempt to smile causes the face to be drawn the opposite side. The patient cannot raise the eyebrows or close the eyes or show teeth on the paralysed side, he cannot whistle or pronounce the alphabetical consonants. Sometimes signs of facial ear paralysis appear early in the course of acute middle ear infection, but they usually disappear with antibiotics. To correct this condition, the patient may undergo an operation to decompress the nerve via the mastoid.

Prevention of otitis media

1. It is important to avoid overcrowding and to maintain good ventilation in all situations of work, sleep and meals. Avoid overcrowded places especially during outbreaks of respiratory tract infections as the incidence of carriers is greatly increased by overcrowding.

2. Early treatment of respiratory tract infections like influenza, measles, diphtheria, etc, which complicate into otitis media.
3. Avoid pricking the eardrum with sticks and dirty instruments that may perforate the eardrum or that carry pathogenic organisms.

MASTOIDITIS

The mastoid process is the thickened portion of the mastoid bone behind the ear. The mastoid bone contains air sinuses called the mastoid sinus which communicates with the middle ear.

Mastoiditis is an infection of the mastoid bone of the skull. It is a condition that almost always follows chronic otitis media. This means that the disease is preventable if otitis media is appropriately and treated early. The surgical operation done to correct the problem is termed ***mastoidectomy*** where the diseased mastoid cells are removed. It is therefore vital that appropriate pre and postoperative nursing care be given to the patient.

Causes

1. Streptococcus haemolyticus
2. Streptococcus mucosus
3. Trauma to the middle ear
4. A sequel of severe infections, fever as with influenza
5. Haemophilus influenza

Pathophysiology

Mastoiditis is commonly caused by bacterial infection which spreads to the mastoid bone from the tympanic membrane and mastoid antrum. Following the initial vascular engorgement, there is rapid swelling of the mucosa from oedema and filtration of pussy cells. With the degeneration of the cells and vascular thrombosis there is actual destruction of the underlying bone which is deprived of its blood supply, thus opening it to bacterial infection. In the wall of the

pneumonitised mastoid process, the infection spreads rapidly from the cells, the septa become thin with pus and debris, which may lead to formation of abscesses in various areas of the skull bone.

Signs and Symptoms

The main signs and symptoms are:

1. Pain: throbbing in character and frequently radiating from the mastoid process to the jaw;
2. Discharge due to ruptured tympanic membrane and when it is profuse it points to mastoid cells involvement;
3. Swelling: indicates an acute inflammatory process that has reached the periosteum over the mastoid characterized by redness, heat, etc.;
4. Raised temperature due to infection process;
5. Otoscopy reveals swelling and obstruction of the external ear;
6. Pulse rate: this is obtained by carefully observing the pulse rate; a slowly rising pulse rate is always a danger sign and on itself may constitute a sufficient level for operation. Sudden and unexpected fall in pulse rate without a corresponding fall of temperature should always call for suspicions of intracranial complications.
7. Deafness: due to the acute ear infection resulting from otitis media.
8. Tenderness: there is increasing tenderness over the mastoid area. This is most marked in front of the mastoid and behind the mastoid tip but may spread to the whole bone.
9. The eardrum (tympanic membrane) in most cases is perforated through which pus flows and pulsating.
10. General patient's appearance; with the rise of temperature, the patient appears flushed (reddish look) and has an anxious look.

Investigations

1. History: the patient will have history of ear infection such as otitis media.

2. Clinically the patient will present with signs and symptoms such as pain, ear discharge, deafness and fever.
3. CT scan will show that the air spaces in the mastoid process are filled with fluid.
4. X ray film shows clouding of the ear cells and decalcification of the bone cells.
5. Ear swab for microscopy, culture and sensitivity to determine the causative agent and treatment
6. Tuning fork Test to determine the state of hearing

Medical Treatment

1. If detected early, the patient is put on intravenous antibiotics such as Benzyl Penicillin 2 mega units 6 hourly for 5 – 7 days, Ampicillin 500mg 6 hourly for 5 – 7 days; Pain killers e.g. Paracetamol 500 – 1000mg 8 hourly for 3 days orally; Sedatives e.g. Diazepam 10mg whenever necessary
2. Surgery – Mastoidectomy or surgery to remove affected cells in the mastoid bone.

Indications For Surgery

1. Cases showing/manifesting with subperiosteal abscess formation or sagging of the roof of the external ear meatus.
2. Recurrence of pain and continuation of disturbances following apparent recovery after myringotomy or perforation. This is important when there cessation of discharge
3. Increase of profuse creamy ear discharge in association with rising pulse rate and increasing oedema over the mastoid area.
4. Persistent or increasing hearing loss with copious discharge.
5. Persistent throbbing pain and headache on the affected side.
6. Evidence of the extension of the disease beyond the limit of the mastoid and middle ear, e.g. rigors and giddiness.

7. Suspected masked mastoiditis, increasing hearing loss with radiological evidence of advancing bone disease.

Preoperative Nursing Care

The aims of preoperative nursing care are:

1. To prevent post operative pain
2. To relieve pain

Admission

The patient is admitted as an elective case a few days before surgery. This is to perform a full range of investigations. These tests can also be done on an outpatient basis and in this case the patient can be admitted a day before, or on the day of admission. In either cases, tests are necessary for pre and postoperative comparisons. The patient is admitted to the ENT or surgical ward. On admission, the patient is oriented to the ward and vital signs are taken to act as baseline data. Relatives are informed about the visiting time and also what the client will need to use e.g. tissue, toiletries, tooth paste etc. History is taken on whether the patient is on any drugs or has conditions like diabetes mellitus, hypertension, etc.. This helps the surgeon to know which drugs to use during anaesthesia.

Consent form signing

If the patient is above 18 years old, he or she should be asked to give consent permitting the operation. If younger or unconscious, the next of kin who is above 18 years old should give consent.

Observations and investigations

The following observations and investigations are performed:

- History of signs and symptoms.
- X ray to note mastoid pathology,

- Blood for haemoglobin, grouping and cross matching are done.
- Observation of vital signs to have some baseline information.
- Blood pressure to rule out hypertension,
- Temperature to rule out hyperpyrexia,
- Pulse rate to monitor cardiac function.
- Respirations are also a good indicator of respiratory and cardiovascular function.
- Weight is checked as some anaesthetics are given per kg body weight.

Patient teaching

The patient should be informed to take care of the drainage tubes near the incision site postoperatively. You should also educate the patient how to care for the packs, that is, to avoid touching or removing them with dirty hands to prevent wound contamination and secondary infection.

Physical preparation

Shaving: this will depend on the nature of the incision that will be done. For, a postural incision, a large area will be shaved, about 3-4cm around the ear and along hair folded with clips. For an endowall incision (incision through the ear canal) shaving may not be necessary. The rest of the hair may be washed with medicated shampoo to lessen the number of microorganisms that have the potential contaminate the incision. The scalp on the area where the incision is to be made should be cleaned with savlon 1:30 or any prescribed solution while taking care to prevent the solution from running into the ear.

Bowel preparation

This is necessary if general anaesthesia is to be used. The patient is starved for 6 – 8 hours before surgery to prevent aspiration of material from the stomach. Arrange for the anaesthetist to visit the patient the evening before surgery to assess whether he or she is fit for surgery.

Immediate Preoperative Care

On the day of surgery the following should be done:

- The patient should have an assisted bath to reduce microorganisms
- Jewellery like bungles, rings or any hearing aids should be removed to prevent effects of electrocution and any accidents in the theatre
- An identity band with the name of the patient, type of operation, date, age and diagnosis
- Catheterization
- Cannulation for intravenous fluids
- The patient should be gowned to prevent droughts and chills
- Organise all the patient's records which include X ray films, consent form and all other necessary items.

Psychological care

The relatives should be told of the period the operation is likely to take place and they should be reassured that the prognosis is good. Inform them that they will be allowed to visit and see the patient after the operation. If they wish to wait while the patient is in theatre, take them to the waiting room.

Other observations

1. Observe if the patient will be able to close the mouth and if the mouth is drooping, this will be indicated by his inability to whistle or show teeth or even smile.
2. Signs of increased intracranial pressure which may be due to a blood clot or blockage must be reported to the surgeon.
3. Observe the type of drainage i.e. odour, consistency and amount.
4. Talk to the patient at intervals to assess their hearing ability.

Premedication

- Diazepam 5 – 10mg

- Atropine sulphate 0.6mg intramuscularly to dry the secretions 30minutes before surgery.
- An ice pack to the diseased or affected area for the relief of pain.

Postoperative Nursing Care

The aims of postoperative nursing care are to:

- prevent complications
- relieve pain
- promote quick recovery

Environment

The patient should be nursed in the acute bay near the nurses' station for easy observations. The room should be well ventilated to prevent odours and cross infection. It should have adequate lighting for easy observation of the patient, bed elevators in order to elevate the foot of the bed in case the patient goes into shock. There should be a drip stand to hung intravenous fluids and a well functioning suctioning machine for secretions in case of airway obstruction. There should also be:

- a postoperative anaesthetic tray besides the bed which must contain artificial airway, mouth gag, tongue depressor, tongue holding forceps and sponge holding forceps;
- an observation tray with sphygmomanometer, stethoscope and thermometer for observations.
- an oxygen source in case of dyspnoea due to effects of anaesthesia and a noise free environment.

Position

The patient should be nursed in a semi prone position until he or she recovers from the effects of anaesthesia. This depends on the type of anaesthesia used. Thereafter the patient may take up any comfortable position, but the recumbent position is encouraged to prevent vertigo.

Observations

Vital signs of temperature, pulse rate, respiratory rate and blood pressure should be taken every quarter hourly for the first 2 hours then half hourly till the patient is stable, then 2 – 4 hourly to assess cardiovascular involvement. Temperature should be checked to rule out shock due to sudden haemorrhage and, subsequently to rule out infection, hypothermia may indicate shock and pyrexia the presence of infection. Observe the following:

- pulse rate to rule out shock indicated by rapid thread pulse;
- respiratory rate to rule out shock indicated by shallow respirations;
- blood pressure to assess cardiovascular functioning and determine hypovolaemic shock indicated by low blood pressure.
- blood stains on the dressing to check for bleeding. If present, inform the surgeon.
- oedema around the ear to assess if the dressing is too tight and if there is too much pressure from the internal pack.
- vertigo which may occur for several days after surgery, to counteract this, sit up the patient gradually with a pillow.
- Signs and symptoms of possible complications i.e. stiff neck, dizziness, headache and facial paralysis which may be due to the damage of the facial nerve,
- signs of facial palsy including, inability to control the affected side of the face, eye cannot close, mouth droops, inability to whistle, drink without dribbling from the mouth, asymmetry of the face due to weakness in the muscles. When trying show teeth or smile, the mouth pulls strongly to the good side.
- signs of increased intracranial pressure which may be due to blood blockage are headache, vomiting, slow pulse rate, low respiratory rate. These must be reported to the surgeon.
- Hearing status by talking to the patient at intervals to assess hearing ability,

- drainage tubes for patency to ensure continuous drainage, types of drainage in terms of colour, amount, consistency.
- drip and type of fluid; note the flow rate to, prevent circulatory overload, body extremities for cyanosis. If catheterized check if the catheter is in situ and that it draining urine; note the colour and amount to rule out renal failure.

Pain Relief

Allow the patient to get out of bed 24-48 hours after surgery. This is because of vertigo. Allow the patient to rest for a week without doing anything strenuous. Administer pethidine 1mg/kg body weight every 4-8 hours in the first 24-48 hours in the immediate postoperative period. Give sedatives in the subsequent postoperative period to reduce restlessness, such as, diazepam 5 - 10mg daily; administer analgesics, e.g., paracetamol 1g daily to counteract pain;, administer antiemetics, antihistamine, e.g., phenergan 25mg intramuscularly or intravenously to relieve vertigo, nausea and vomiting.

Psychological Care

Inform and reassure the patient that they are likely to hear noises in the ear, such as, crackling and popping sounds. Inform him or her that ear pocking reduces the level of hearing, in order to gain cooperation for subsequent care. Reassure the patient that they might see slight bleeding when the pack is removed. Explain that purpose of drains if any are present.

Wound care and infection prevention

The internal packing (dressing) which is greased with petroleum and antibiotic ointment with Neosporin and or teramycin is removed by the surgeon 3 – 5 days after surgery. You should do daily sterile dressing with prescribed solutions, and administer antibiotics such as Ampicillin 500mg, 6 hourly for 5 days to prevent infection. Disinfect drainage tubes if present with a disinfectant ,e.g., Jik 1:6. If there is need to remove sutures, these should be removed 5 days

postoperatively using aseptic techniques and sterile instruments to prevent introducing infection.

Hygiene

Give oral care to promote appetite as the patient may vomit frequently. Give assisted baths to promote the patient's comfort, put an incontinence sheet under the head to prevent soiling of linen due to discharge from the incision site. Change any soiled linen to promote the patient's comfort. Provide pressure area care if the patient is on total bed rest for a long time to prevent bed sores. Make the bed with clean bed linen every morning and whenever soiled to promote comfort.

Exercises

Encourage the patient to ambulate early especially after 24 – 48 hours to promote normal function of the cardiovascular and respiratory systems. Exercises of the face are also important because of the facial palsy.

Diet

The patient should eat any food but avoid food that is hard to chew, The diet should be rich in vitamins to promote tissue repair and boost the immunity.

Information, education and communication

1. Instruct the patient to avoid physical activity for a week after surgery. If the work they do is strenuous as him or her to return to work after 2 – 3 weeks when the vertigo has cleared.
2. Instruct the patient to blow the nose gently one side at a time for a week after surgery to prevent dislodging the grafts of the prosthesis
3. Encourage the patient to wear nose defenders or cotton with petroleum jelly and avoid loud noises because he will experience crackling or popping

noises after surgery. Advice the patient to stay away from loud noiseas it could worsen his condition.

4. Encourage the patient to take antibiotics and complete the course prescribed.
5. Advise the patient to check with the ear surgeon regarding instructions for flying if he wants to travel by plane for the patient who uses air transport.
6. Advise the patient to report any signs and symptoms worth reporting to the hospital.

Complications

1. Lateral sinus thrombosis

Infection with thrombosis occurs first in the tributary vein and spreads quickly into the lateral sinus part of which projects into the mastoid process . The walls easily become infected and adherent to the bone. This may lead to abscesses around the sinus (Perisinus abscess).

Treatment

This condition probably indicates the need for a mastoid operation. When this has been done the bone over the sinus is removed, the lateral sinus is incised and the clot removed. Bleeding is controlled by insertion of a gauze packing between the sinus and the bone. Antibiotics should be continued until signs and symptoms are no more.

2. Facial paralysis

This is facial nerve injury leading to weakness of the side of the face. It can occur due to direct trauma during operation or due to oedematous tissue compressing the nerve.

Treatment

If facial paralysis appears early in the course of acute middle ear infection, this will usually disappear with antibiotics. If damage of the nerve happens during an

operation, it is sutured immediately. It usually responds to physiotherapy but in certain cases the nerve may need to be decompressed to promote recovery.

3. Otosclerosis

This is a disease affecting the inner middle ear causing progressive conductive deafness. It usually commences in youth. The area around the oval window is mostly affected. It less frequently involves the round window but spreads slowly to the labyrinth.

Treatment

The treatment is usually surgical. The stapes are removed completely and replaced by a prosthesis. Hearing aids can be supplied if the patient is elderly, or doesn't wish to have an operation, or if there is too much internal damage.

4. Meningitis

In fulminating (occurring with great rapidity) cases labyrinthitis or chronic perilabyrinthitis infection has suddenly burst through the natural barriers of the defense mechanism will often be the first indication of the labyrinth disease.

Treatment

When the causative organism is found, the appropriate treatment is given. Sulphur drugs are given in full doses intravenously or intramuscularly. Free drainage of the primary source of the infection is combined with repeated lumbar puncture. Dehydration should be avoided by giving fluids intravenously.

5. Cradenigo's syndrome

This is due to thrombophlebitis of the inferior sinus and consists of signs of acute mastoiditis with paralysis of the 6th cranial nerve and deep seated ventral-orbital pain. The nerve becomes compressed by the distension of the sinus which contains blood clots.

Treatment

Ask for facial paralysis, antibiotics like crystalline penicillin 4 mega units 6 hourly for 5 days, and Aspirin 600mg orally 8 hourly for 3 days.

6. Brain abscess

This results from the extension of direct disease from the middle ear, usually in chronic cases of infection.

Treatment

Steroids e.g. prednisolone 10 – 20mg 12 hourly; antibiotics e.g. Ampicillin 500mg 6 hourly for 5 days; and crystalline penicillin 4 mega units intravenously 6 hourly are used.

Other complications

- *Labyrinthitis* as a result of pus being locked within the mastoid antrum seeking exit through the middle ear
- *Vertigo* as a result of interference with the vestibular apparatus
- Complete loss of balance
- Complete loss of hearing
- Loss of cerebral spinal fluid
- Septicaemia

Having looked at surgical conditions of the ear, let us now zero in on deafness and hearing impairment.

3.5 Deafness and Hearing Impairment

Hearing impairment is a broad term used to describe the loss of hearing in one or both ears. There are different levels of hearing impairment, namely:

1. Hearing impairment

This refers to partial or complete loss of the ability to hear from one or both ears. The level of impairment can be mild, moderate, severe or profound.

2. Deafness

This refers to the complete loss of the ability to hear from one or both ears.

There are two major types of hearing impairment defined according to where the problem occurs. These include the following:

- ***Conductive Hearing Impairment:*** is related to how the ear gathers sound. This involves a problem in the outer or middle ear. The hearing process is medically or surgically treatable.

- ***Sensorineural Hearing Impairment:*** is related to how the nervous system transmits sound to the brain. This is usually due to a problem with the cochlear and occasionally with the hearing nerve (vestibulocochlear nerve). This condition is usually permanent and requires rehabilitation with hearing aids. Common causes are excessive noise, birth injury, head trauma and ageing (presbycusis).

Other Types

i. ***Mixed Hearing Impairment:*** this refers to hearing impairment which results when the conductive hearing impairment is superimposed on sensorineural hearing impairment.

ii. ***Central Auditory Problem:*** this refers to hearing impairment/loss that has its underlying difficulty in the central nervous system. In this case the hearing difficult cannot be explained adequately on either conductive or sensorineural basis.

Causes of Deafness and Hearing Impairment/Loss

1. Hearing Impairment/Loss/Deafness can be inherited. If one or both parents or relatives are born deaf then their child could be born deaf.
2. Hearing impairment may also be caused before or during birth for several reasons and these may include: premature birth or low birth weight in which the baby lacks enough oxygen to breathe, rubella, syphilis or certain other infections in a woman during pregnancy. Also the use of ototoxic drugs or drugs, such as, aminoglycosides (gentamycin, streptomycin, aspirin) can cause damage to the inner ear if incorrectly given during pregnancy. Jaundice or hyperbilirubinaemia in a new born can also damage the 8th cranial nerve .
3. Infectious disease such as meningitis, measles, mumps, severe cerebral malaria and chronic ear infections in the young can cause deafness.
4. Loud noises such as gunfire or massive explosions, traffic sounds, noisy machinery, etc., can damage the middle ear and especially the inner ear and weaken hearing eventually.
5. Age: as people age, accumulated exposure to noise and other factors including general body tissue degeneration in the aged may lead to hearing impairment or deafness. This kind of hearing impairment occurs gradually as people grow older and begins in the 40s growing worse from there onwards..
6. Direct trauma to the head as happens in serious road traffic accidents.

Table ?: W.H.O. grades of hearing impairment/loss

GRADE OFHEARING IMPAIRMENT	CORRESPONDING AUDIOMETRIC ISO VALUE	PERFORMANCE	RECOMMEND ATIONS
0 – No Impairment	25 decibels (dB) in the better ear	No or very slight hearing problems (able to hear whispers)	None
1 – Slight Impairment	26 – 40 decibels in the better ear	Able to hear and repeat spoken words in a	Counselling, Hearing Aids

		normal voice at 1 metre.	where easily available
2 – Moderate Impairment	41 – 60 decibels in the better ear	Able to hear words and repeat spoken words in a raised voice at 1 metre	Hearing Aids usually recommended
3 – Severe Impairment	61 – 80 decibels in the better ear	Able to hear ***some***words when shouted into the better ear.	Hearing Aids are needed definitely, if not available Lip Reading and Sign Language should be taught.
4 – Profound Impairment including Deafness	81 or greater decibels in the better ear.	Unable to hear or understand even a shouted voice in the nearest ear.	Hearing aids may help, Rehabilitation is needed, and Lip Reading, signs and sign Language should be taught.

NB: Grades 2, 3 and 4 are classified as disabling hearing impairment.

Signs and symptoms of deafness and hearing impairment

The signs and symptoms include the following:

1. Asking to have things repeated frequently during conversations
2. Giving irrelevant answers to questions
3. Lack of attention and day dreaming
4. Spontaneous performance below level of apparent ability
5. Hearing much better when watching the speaker's face
6. Tendency to withdraw from activities necessitating conversations

7. Deviations in speech, especially sound articulation
8. Delayed speech and language development
9. Having more response to vibration and touch than speech and sound in the surrounding environment.
10. The person communicates more through the use of gestures, signs like vocalization and speech
11. There is behaviour suggestive of an emotional immaturity such as being demanding, fearful, having temper tantrums, etc.
12. Depression
13. Insecurity whenever they see others talking, the person things the people are talking about them (over suspicious).
14. “False pride” e.g. pretends as though they have heard when not.
15. Withdrawal from social contacts

Signs and symptoms in preschool children

1. Absence or little bubbling from the infant and failure of the child to produce certain words in which consonants are distinct e.g. gaga, mama, baba etc.
2. Delayed speech and language development
3. More response to vibration and touch than speech and sound in the surrounding environment and undue alertness e.g. a child needing to be touched before waking up;
4. The child makes easy wants known through the use of gestures and signs than vocalization and speech attempt
5. Behaviour suggestive of emotional immaturity such as being demanding, fearful, having temper tantrums, etc.
6. Difficulty in perceiving what is said regardless of the intensity of the speaker’s voice.

Assessment of hearing and investigations

Hearing tests are mainly concerned with two major things;

- Sensitivity, and
- speech discrimination.

Sensitivity has to do with one's ability to hear or respond to stimuli. While speech discrimination has to do with one's ability to clearly distinguish different speech sounds.

The basic instrument used for the measurement of hearing is called an Audiometer which is electrically calibrated with the ability to carefully control and test stimuli. To achieve this purpose, two different types of stimuli are presented i.e. pure tones and specifically selected words. However the initial investigation done is history taking and physical examination which involves examination of the pinna, especially in the hope of ruling out any surgical scars, tumours or warts which may affect hearing. Thereafter the level of hearing is tested with the voice, and it is very important to ensure that when one ear is being tested, the sound should not be heard in the other ear. The ear should be gently masked to prevent this from occurring. It is tested with a tuning fork.

Weber test

Where a tuning fork is placed on the forehead or above the head of the patient and the sound wave moves through the bone equally to both cochlear, the patient is then asked to which ear the sound is heard louder. In unilateral sensorineural deafness the sound will obviously be heard in the better ear with a normal cochlear. However, in unilateral conductive deafness, the sound is heard louder in the deaf ear which is masked from external sounds by conductive deafness and can therefore concentrate sound better on bony conducted sounds.

Medical Treatment

If the deafness or hearing impairment is caused by perforation of the eardrum, systemic antibiotics are given by mouth to prevent further infections.

1. Idiopathic (sudden) deafness is treated with a great variety of drugs including steroids and vasodilators. However, no treatment has proved valuable. Nevertheless, corticosteroids are usually prescribed and bed rest is usually advised.
2. Tinnitus is said to be caused by spasms of blood vessels supplying the inner ear and there is no likelihood that any therapy medical or surgical relieves it, Hence the patient is encouraged to wait for tinnitus to decrease altogether on its own.

Surgical Treatment

A sensorineural hearing loss of vertigo that persists for more than a few hours after an injury suggests something has penetrated the inner ear and in this case a surgical procedure called *tympanotomy* is usually performed to inspect the area and repair the damage. Furthermore, persistent hearing loss suggests a disruption of the ossicles which are repaired surgically through Tympanoplasty. However, when vertigo is disturbing and disabling and hearing loss deteriorates greatly, the cochlear and semicircular canals can be removed in a surgical procedure called *labyrinthectomy.* Small tumours are removed by microsurgery to avoid damaging the facial nerves; large tumours require extensive surgery though.

Prevention of Deafness

The following strategies are useful in preventing deafness:

1. Proper care of the healthy ear

Wax should not be cleaned out of the ear routinely as it acts as a protective mechanism. It lubricates the skin and traps foreign material that enters the ear canal. Applicators should be moistened with alcohol and inserted into the canal only the length of the cotton.

2. Early and adequate treatment of ear infections

Any disease of the ear that causes prolonged symptoms, such as, pain, swelling, drainage (plagued feeling) or decreased hearing should be promptly assessed and treated appropriately by the physician. Many chronic problems such as perforation and necrotic ossicles an be prevented with prompt and adequate medical attention.

3. Prevention of trauma to the ear

People should be taught to avoid inserting hard objects into the ear canal. Ear obstruction with any object, insertion of unclean articles or solutions in the ear, and swimming in water polluted with particles can lead to damage of the tympanic membrane or to ear infection. Adults often traumatize the ear by inserting hard articles into the outer in an attempt to remove cerumen or scratch the ear.

4. Early detection of hearing loss

Early detection of hearing loss is important so that the cause of the loss can be diagnosed and hopefully the problem can be corrected and arrested. The earlier the problem is diagnosed the easier it may be to treat.

5. Monitoring side effects of ototoxic drugs

Some drugs may affect the cochlear and vestibule of the ear or 8th cranial nerve. Persons taking ototoxic drugs need to know the side effects and signs and symptoms of these drugs to prevent the loss of hearing from developing. If these symptoms (dizziness, decreased hearing acuity, tinnitus etc.) occur, the next dose of the drug should be omitted and a physician consulted.

6. Monitoring noise pollution

The most common type of occupational hearing loss in our society is caused by loud noise. Exposure to noise levels of excess of 90 decibels over an eight hour period should be avoided. Exposure to levels greater than 85 – 90 decibels for

months or years can cause cochlear damage. Persons working in areas of high decibel noise must wear soundproof ear plugs.

7. Periodic ear examination

- Examination of the ear and hearing is recommended every 2-3 years because ageing frequently causes degenerative changes in the ear as well as in other body tissues.
- Many cases of sensorineural hearing impairment can be prevented through:
  - Immunizing children against childhood illnesses including meningitis and mumps
  - Immunizing women of child bearing age 915 – 45 years) against rubella before pregnancy.
  - Testing for and treating syphilis and certain other infections in pregnant women
  - Improving antenatal and perinatal care
  - Avoiding the unnecessary use of ototoxic drugs unless prescribed by a qualified health personnel and properly monitored for correct use.
  - Referring jaundiced babies for diagnosis and possible treatment.
  - Avoiding the effects of loud noise through reducing exposure by using personal protection in hearing and engineering control.
  - Increased availability of affordable properly fitting hearing aids and follow up services for many people with hearing impairment.
  - Avoiding getting married within families with history of deafness.

3.6 Rehabilitation of Deaf and Hard of Hearing Individuals

This is unusually directed at obtaining maximum use of any remaining hearing ability and teaching the client more effective use of the senses of vision and touch.

Rehabilitation is affected by the client's age and the severity of the impairment. It is more difficult to rehabilitate an old person with some visual reduction. Infant rehabilitation will require a specialist who can help them learn how to communicate. Habilitation is then the most appropriate word to use than rehabilitation.

Rehabilitation or habilitation problems are compounded for the deaf, blind and mentally retarded. However, if appropriate help is given the talents of these individuals can also be developed. Special education facilities are available for the deaf. Special instructors who are professionals are trained specifically to work with the deaf. These settings have equipment designed to enhance communication with the deaf like ear phones and microphones. Rehabilitation of an adult requires the client's acceptance of the problem that he doesn't hear well and the need for help. This is because most of the people affected by deafness conceal it.

A careful complete assessment of the client's ability and disability is the first step in rehabilitation and part of rehabilitation process is the administration of thorough audiometric studies including hearing and assessment of useful or suitable hearing aid is selected. All the medical and surgical treatments given to the patient are part of rehabilitation as they are aimed at improving the impairment or disability. A deaf individual and hard of hearing people must learn various compensatory techniques to offset the effects of their disability. These include:

1. Speech or lip reading

This is the ability to understand speech through observation of the lip and tongue movements, facial expression, gestures and body movements. This is the purpose of providing effective communication.

2. Sign language

This is the ability to make communication possible by means of hand signals. Various hand signals represent different letters of the alphabet and words which are taught by specialists.

Take Note

All people can learn this language so that they can communicate to their disabled member but it is also advisable for family members to use sign language in the presence of a deaf person when communicating.

3. Speech therapy

This is speech training that is done when the patient cannot hear his own voice or other people's voices. It is directed at people who are deaf with speech problems and also towards counselling. It prevents possible deterioration of speech skills related to impaired hearing.

4. Auditory training

Auditory training is another aspect of rehabilitation which emphasizes on speech discrimination and listening skills and use residual hearing.

5. Vocational training

The employable person with impaired hearing may require vocational training as part of rehabilitation. This is so because some deaf persons have the additional problems of poor balance due to damage to the inner's vestibular portion and unusual sensitivity to noise even though hearing is impaired. Consideration should be given to the presence of these problems in selecting appropriate rehabilitation for deaf individuals.

6. Hearing aids

These amplify sound so as to compensate the reduced hearing sensitivity. A hearing aid is any kind of mechanical or electrical device which improves

hearing. The otologist determines whether the patient's hearing can be improved surgically, mechanically or medically with a hearing aid. Hearing aids can maintain communication. While hearing aids may improve the person's hearing, they never restore hearing to normal level. They may amplify sound but not improve the ability to hear.

Hearing aids are usually helpful to the patient with middle ear problems. Patients with nerve damage on the other hand may be advised to rent a hearing aid for a month before purchasing one to be sure that it will be helpful. Amplification from hearing aids may be uncomfortable in the presence of sensorineural hearing loss, i.e., in nerve damage because with this disorder there is typically intolerance for loud sound.

Frequently older people have sensorineural hearing loss. With some type of hearing loss an ear trumpet actually provides the best type of amplification. A speech audiometer is used in prescribing an appropriate hearing aid. If the selected hearing aid is suitable for the patient's needs and is properly fitted, used and maintained, it may help and please him greatly. A cochlear implant is an auditory prosthesis needed for people with profound sensorineural hearing loss.

7. Hearing guide dogs

Specially trained dogs are available to assist a person with a hearing loss. People who live alone are eligible to apply for a trained dog. At home the dog reacts to a sound of telephone, a door bell, a small alarm or an intruder. The dog doesn't bark but alert its master by physical contact, and then runs to the source of noise. In public, the dog positions itself between the hearing impaired person and any potential hazard that the person can't hear such as an oncoming vehicle or a loud hostile person.

Our discussion on rehabilitation of the deaf brings us to the end of our discussion on surgical conditions of the ear. In the next section we shall discuss common disorders to the nose.

3.7 Common Disorders of The Nose

In this section we shall discuss the following common disorders of the nose:

- Epistaxis
- Neoplasms – nasal polyps
- Foreign bodies in the nose
- Sinusitis.

3.7.1 EPISTAXIS

Epistaxis simply means bleeding from the nose. Nose bleeding is a relatively common occurrence of haemorrhage from the nose. It is a condition characterized by bleeding and may be caused by trauma, infections which results in mucus membranes and vascular tissue breakage hence bleeding. This is bleeding from the nose which can be posterior or anterior.

There are two types of nose bleeding and these are:

- Anterior (the most common),
- Posterior (is less common) and more likely to require medical attention.

Sometimes in more severe cases, the blood can come up the nasolacrimal duct and out from the eye giving a likelihood of misdiagnosis.

Fresh blood and clotted blood can also flow down into the stomach and cause nausea and vomiting.

Cause of nose bleeding

The causes of nosebleeding can generally be divided into two categories:

- local factors, and
- systemic factors.

However, a significant number of nosebleeds occur with no obvious cause.

Local factors

1. Blunt trauma (usually a sharp blow to the face such as a punch, sometimes accompanying a nasal fracture)
2. Foreign bodies (such as fingers during nose-picking)
3. Inflammatory reaction (*e.g.* acute respiratory tract infections, chronic sinusitis, allergic rhinitis or environmental irritants)
4. Otic barotraumas, such as from descent in aircraft or ascent in s diving
5. Surgery (*e.g.* septoplasty and Functional Endoscopic Sinus Surgery)

Systemic factors

Most common systemic factors of nose bleeding include:

1. Infectious diseases (*e.g.* common cold)
2. Hypertension

Other possible factors

1. Drugs, such as Aspirin
2. Alcohol (due to vasodilatation of blood vessels)
3. Anaemia
4. Liver diseases - hepatic cirrhosis which causes deficiency of factor II, VII, IX,& X
5. Connective tissue disease
6. Heart failure (due to an increase in venous pressure)
6. Haematological malignancy

7. Idiopathic thrombocytopenic purpura
8. Pregnancy (rare, due to hypertension and hormonal changes)
9. Vascular disorders
10. Vitamin C and Vitamin K deficiency
11. Recurrent epistaxis is a feature of Hereditary Hemorrhagic Telangiectasia (Osler-Weber-Rendu syndrome)
12. Mediastinal compression by tumours (raised venous pressure in the nose).

Pathophysiology

Nosebleeds are due to the rupture of a blood vessel within the richly perfused nasal mucosa. Rupture may be spontaneous or initiated by trauma. An increase in blood pressure (e.g. due to general hypertension) tends to increase the duration of spontaneous epistaxis. Anticoagulant medication and disorders of blood clotting can promote and prolong bleeding.

Spontaneous epistaxis is more common in the elderly as the nasal mucosa (lining) becomes dry and thin and blood pressure tends to be higher. The elderly are also more prone to prolonged nose bleeds as their blood vessels are less able to constrict and control the bleeding. The vast majority of nosebleeds occur in the anterior (front) part of the nose from the nasal septum. This area is richly endowed with blood vessels (Kiesselbach's plexus). This region is also known as *Little's area*.

Bleeding farther back in the nose is known as a posterior bleed and is usually due to bleeding from Woodruff's plexus, a venous plexus situated in the posterior part of inferior meatus. Posterior bleeds are often prolonged and difficult to control. They can be associated with bleeding from both nostrils and with a greater flow of blood into the mouth.

Management of Epistaxis

The main objectives of management are to:

1. allay anxiety;
2. prevent complications such as cerebral hypoxia;
3. achieve haemostasis.

Investigations

1. History taking
2. Physical examination
3. Skull x-ray to rule out fractures
4. Hb estimation to rule out anaemia
5. Sickling test to rule out sickle cell anaemia
6. Full blood count (FBC)
7. Clotting time
8. Grouping and cross match

First aid management of epistaxis

- Ask the patient to sit up if he or she is capable
- Pinch the top of the nose for at least 5 minutes.
- Apply a cold compress on the forehead to constrict the bleeding vessels
- Tell the patient to breathe through the mouth
- Apply ice bags on the top of the nose to allow vasoconstriction of the nasal vessel.
- If there is no improvement with the above measures transfer the patient to a hospital

The flow of blood normally stops when the blood clots, which may be encouraged by direct pressure applied by pinching the soft fleshy part of the nose. This applies pressure to Little's area (Kiesselbach's area), the source of the majority of nose bleeds and promotes clotting. Pressure should be firm and should be applied for at least five minutes and up to 20 minutes. Tilting the head

forward helps to decrease the chance of nausea and airway obstruction. Swallowing excess blood can irritate the stomach and cause vomiting.

The local application of a vasoconstrictive agent has been shown to reduce the bleeding time in benign cases of epistaxis. The drugs oxymetazoline or phenylephrine are widely available and used as nasal sprays for the treatment of allergic rhinitis. If these simple measures do not work then medical/surgical intervention may be needed to stop bleeding.

In the first instance this can take the form of chemical cautery of any bleeding vessels or packing of the nose with ribbon gauze or an absorbent dressing (called anterior nasal packing). Such procedures are best carried out by a medical professional. Chemical cauterisation is most commonly performed using local application of silver nitrate compound to any visible bleeding vessel. This is a painful procedure and the nasal mucosa should be anaesthetised first, preferably with the addition of topical adrenaline to further reduce bleeding.
If bleeding is still uncontrolled or no focal bleeding point is visible then the nasal cavity should be packed with sterile dressings, which by applying pressure to the nasal mucosa will tamponade the bleeding point.

Ongoing bleeding despite good nasal packing is a *surgical emergency* and can be treated by endoscopic evaluation of the nasal cavity under general anaesthesia to identify an elusive bleeding point or to directly ligate (tie off) the bleeding vessels supplying the nose. These blood vessels include the *sphenopalatine, anterior*and posterior *ethmoidal arteries*.

Prevention of Epistaxis

The following measures are useful in the prevention of epistaxis:

1. Application of a topical antibiotic ointment to the nasal mucosa has been shown to be an effective treatment for recurrent epistaxis.
2. Avoiding forceful sneezing
3. Avoiding prolonged use of nasal sprays
4. Educating the patient on first aid procedures for epistaxis
5. Early treatment of upper respiratory tract infections
6. Educating the patient on the warning signs of epistaxis
7. Avoiding anticoagulant for analgesia
8. Avoiding trauma to the nose
9. Avoiding hot and dry environment
10. Reviewing date and when to return immediately
11. Avoiding picking of the nostrils

3.7.2 Neoplasms – Nasal Polyps

What are nasal polyps?

Nasal polyps are soft, painless, noncancerous growths on the lining of your nasal passages or sinuses. They hang down like teardrops or grapes. They result from chronic inflammation due to asthma, recurring infection, allergies, drug sensitivity or certain immune disorders.

Classification of Nasal Polyps

Nasal polyps are usually classified into two:

1. Antrochoanal polyps arise from the maxillary sinuses and are less common. These polyps are usually single and unilateral.

2. Ethmoidal polyps arise from the ethmoidal sinuses and are multiple and bilateral.

Causes/ Risk factors of Nasal Polyps

Nasal polyps can affect anyone, but they're more common in adults. People with the following conditions are more likely to also have nasal polyps:

1. Asthma
2. Cystic fibrosis
3. Hay fever (allergic rhinitis)
4. Chronic rhinosinusitis
5. Aspirin intolerance/salicylate sensitivity
6. Exposure to some forms of chromium can cause nasal polyps and associated diseases

Signs and symptoms

People with nasal polyps often complain about having a cold that has lasted for months or years. Symptoms of nasal polyps include:

- Nasal congestion, sinusitis,
- Anosmia (loss of smell), and secondary infection leading to headache.
- Small nasal polyps may not cause symptoms. Larger growths or groups of nasal polyps can block the nasal passages or lead to breathing problems such as:
- Breathing through the mouth
- Nose feeling blocked (nasal obstruction)
- Runny nose
- Headaches or pain , thought these are NOT common unless there is also a sinus infection.

Investigations

1. History to establish when the problem started
2. An examination of the nose which may show a greyish grape-like growth in the nasal cavity.
3. A CT scan of the sinuses which may show polyps as cloudy (opaque) spots.
4. Polyps that have been there for a long time may have broken down some of the bone inside the sinuses.

Treatments

Medications can often shrink or eliminate them, but surgery is sometimes needed to remove nasal polyps. Medications help relieve symptoms but rarely get rid of them. Even after successful treatment, nasal polyps often return. They are most often treated with steroids or topical medications. Antibiotics should only be taken by clients with nasal polyps if there is a bacterial sinus infection. Nasal polyps can also be treated with surgical methods. Sinus surgery requires a great amount of precision as this involves the risk of damage to the orbit matter. Some people may need surgery, such as functional endoscopic sinus surgery (FESS). Surgery can be done under general or local anaesthesia to remove polyps by way of endoscopic surgery. The surgical intervention may involve a procedure known as *polypectomy.*

Pre and post surgery sinus rinses with warm water mixed with a small amount (teaspoon) of salts (sodium chloride & sodium bicarbonate) can be very helpful to clear the sinuses.

Prognosis

Removing the polyps with surgery usually makes it easier to breathe through the nose. Nasal polyps often return. Reduced or lost sense of smell does not always improve following treatment with medicines or surgery.

Complications

The following are some of the common complications:

- Nose bleeding
- Serious infections such as meningitis
- Nasal polyps may come back

3.7.3 Foreign Bodies In The Nose

The nose is a deep space that extends directly back into the face. A relatively small portion of the nasal cavity is visible by looking into the tip of the nose. In the back of the nose, the space turns downward and connects to the back of the mouth.

Common objects found in the nose include food material, tissue paper, beads, toys, and rocks. Most of these cases of foreign bodies in the nose and nasal cavity are not serious and occur in toddlers and children from 1 – 8years of age. In addition, an object stuck in the nose has the potential to dislodge and travel into the mouth where there is the danger of swallowing it, or even worse, inhaling it into the lungs, which may block airflow.

Causes

1. The vast majority of foreign bodies are placed in the nose voluntarily for an endless variety of reasons.

2. Trauma is another common cause for items to get shoved inside the nose. When a person falls or gets struck in the face, it is important to consider the possibility that an object may be stuck in the nose and is completely out of view.

Signs and symptoms

1. Adults can tell that an object is in the nose.
2. Typically, foreign items in the nose result in complaints of pain or difficulty breathing through the side of the nose or nostril involved.
3. Nasal bleeding is also a common symptom of a foreign body in the nose because the tissues of the nose can be easily scratched.

Investigations

1. Take history and consider signs of a foreign body in the nose
2. Gather information in regard to what kind of foreign object.
3. Do an X- ray of the upper respiratory tract system including nasal cavities which will show the object.
4. CT scan may be considered.

Management or Self-care at Home

A person may complicate matters by pushing the object farther back into the throat and possibly causing the affected person to choke or injure the surrounding tissue. As such extra care should be observed. The following techniques can be tried to safely remove the object at home:

1. Blowing the nose will potentially dislodge the object and is more likely to succeed if the uninvolved nostril is closed during such attempts. Hold the unaffected nostril by pressing a finger against the side of the nose.

2. A sneeze will actually produce much more force and is an alternative way to push the object forward and out of the nose.

Medical Treatment

Treatment will largely depend on the location and identity of the object or objects involved. There are a variety of treatment options available at the clinic or health centre:

- If the object is metallic, a long magnetized instrument may be used to assist in gently pulling the object from the nose.
- Another technique involves gently passing a soft rubber catheter past the object. The catheters have an inflatable balloon at the tip, which can then be inflated and pulled back, along with the foreign body.
- Sedation may be considered for a child as an option to allow calm and comfort during removal of the object.

3.7.4 Sinusitis

What are Sinuses?

Sinuses are hollow cavities in the facial bones that play the function of reducing the weight of the bones and phonation. These sinuses are covered by a mucous membrane.

There are several paired paranasal sinuses, including the frontal, ethmoid, maxillary and sphenoid sinuses. These are:

1. The ethmoidsinuses are further subdivided into anterior and posterior ethmoid sinuses, the division of which is defined as the basal lamella of the middle turbinate.
2. Maxillary – can cause pain or pressure in the maxillary area (e.g., toothache, headache).

3. Frontal – can cause pain or pressure in the frontal sinus cavity (located above eyes), headache.
4. Ethmoid – can cause pain or pressure pain between/behind the eyes and headaches
5. Sphenoid– can cause pain or pressure behind the eyes, but often refers to the vertex, or top of the head.

What is Sinusitis

Sinusitis is the inflammation of the paranasal sinuses, which may be acute, chronic, hyperplastic or allegic. It results from colds or persistant infection and is characterized by nasal discharge, headache and fever.

Types of Sinusitis

There are two major types of sinusitis based on the immediacy of the presentation and occurrence of symptoms. These are acute and chronic sinusitis.

1. Acute

Acute sinusitis is usually precipitated by an earlier upper respiratory tract infection, generally of viral origin. It is caused by:

- Viral; rhinoviruses, coronaviruses, and influenza viruses etc.
- If the infection is of bacterial origin, the most common causative agents are streptococcus pneumoniae, haemophilus influenzae, and moraxella catarrhalis.

2. Chronic Sinusitis

Chronic sinusitis, by definition, lasts longer than three months and can be caused by many different diseases that share chronic inflammation of the

sinuses as a common symptom. Symptoms of chronic sinusitis may include any combination of the following:

- nasal congestion, facial pain, headache,
- night-time coughing, an increase in previously minor or controlled asthma symptoms,
- general malaise, thick green or yellow discharge,
- feeling of facial 'fullness' or 'tightness' that may worsen when bending over, dizziness, aching teeth, and/or halitosis

Other Types of Sinusitis

- Allergic sinusitis: this accompanies allergy rhinitis and is allergic in origin.
- Hyperplastic sinusitis: this results as a combination of purulent acute sinusitis and allergic sinusitis or rhinitis.

Causes

The common causes are as follows:

- Bacterial infection
- Haemophilus influenza
- Staphylococcus aureus
- Streptococcus pneumonae
- Streptococcus pyogenes
- Viruses (less frequent)

Predisposing Factors

1. Any condition that interferes with sinus drainage and ventilation, e.g., chronic nasal oedema, deviated septum, viscous mucus,
2. Tooth infection

3. Changes in altitude (flying or diving)
4. Continuous exposure to environmental hazards, e.g., paint, sawdust and chemicals
5. Swimming in contaminated water
6. Generalized debilitating conditions, such as, chemotherapy, malnutrition, diabetes mellitus, blood dyscrasias, long term use of steroids, immunodeficiency e.g. HIV/AIDS

Pathophysiology

Sinuses are air filled spaces in the skull that are lined with mucus membranes. Healthy sinuses contain no bacteria or any other microorganism and usually mucus drains out and air circulates freely. When the sinus opening becomes blocked and too much mucus builds up, bacteria and other micro-organisms grow more easily hence giving rise to congestion. Nasal congestion caused by inflammation, oedema and transudation of fluid leads to obstruction of the sinus cavities. This provides an excellent media for bacteria growth. Bacteria account for most cases of sinusitis. Sinusitis resolves as a result of unresolved bacterial or viral infection or an exacerbating allergic rhinitis

Signs and Symptoms

1. Stuffy nasal congestion preceded by a gradual build up of pressure in the affected sinus
2. Nasal discharge which later becomes purulent
3. Sore throat with a non-productive cough
4. Localized headache
5. General body malaise and fatigue
6. Pain on the affected sinus
7. Vague facial discomfort
8. Low grade fever
9. Swelling on the area of the affected sinus

10. Enlarged turbinates
11. Thickening of the mucosal lining and mucosal polyps

Investigations

- History and physical examination
- Nasal endoscope or sinoscopy
- Sinus x-ray in very serious cases reveals cloudiness in the affected sinus, air filled levels or thickened mucosal lining
- Ultrasonography
- CT scan if there is tenderness over the affected/infected sinus area
- HIV test
- Culture and sensitivity of discharge or pus from the sinus

Management

Basic management of a cold involves the following and aims at reducing the effects of the symptoms:

1. Apply a warm moist cloth to the face several times a day
2. Inhale steam 3 to 4 times a day, e.g., sitting in the bathroom with hot water running
3. Spray nasal saline several times a day and use humidifiers
4. Antibiotics
    - 1st line antibiotics – amoxicillin, erythromycin, co – trimoxazole.
    - 2nd line antibiotics – cepharosporines e.g. cefuroxime, ceftriaxone, cefalexin
5. Oral and topical decongestant agents decrease swelling of nasal mucosa and nasal polyps thereby improving drainage of sinuses.
6. Heated mist and saline irrigation to help opening blocked passages
7. Drink plenty of fluid to help loosen the mucus
8. Surgical intervention

9. Endoscopic surgery – to correct structural deformities that obstruct the opening (ostia) of the sinus
10. Excising and cauterizing nasal polyps
11. Correcting a deviated septum
12. Incision and drainage of the affected sinus, aerating the sinus and removal of tumours.

Information, Education & communication

1. Advice the patient to seek early medical treatment to prevent chronic sinusitis
2. Discourage swimming or diving while having upper respiratory tract infection
3. The patient should comply with medication
4. Teach the patient how to do nasal cavity irrigation with saline to remove clustered mucus near the nasal cavity.

Complications of Sinusitis

The following complications may develop if the patient is not well managed:

- Brain abscess
- Meningitis
- Osteomyelitis of facial bones
- Encephalitis
- Ischemic infarction
- Subperiosteal abscess
- Orbital cellulitis

This brings us to the end of our discussion on common surgical disorders of the nose. In the next section we shall discuss common disorders of the throat.

3.8 Common Disorders of The Throat

The throat extends from the nasal passages above and behind the mouth to the esophagus (tube that carries food to the stomach) in the neck. In this section we shall discuss the management of a client with the following disorders of the throat:

- Pharyngitis
- Tonsillitis
- Laryngitis
- Trauma and foreign bodies of the throat

We shall start with pharyngitis.

3.8.1 PHARYNGITIS

Pharyngitis is an inflammation of the throat or pharynx. In most cases it is painful and the initial infection can extend for a long period of time. It is often referred to as a sore throat. Pharyngitis occurs most commonly with a viral upper respiratory infection (URI).

Incidence And Prevalence

Approximately 40–60% of cases of pharyngitis are caused by a virus, while about 15% are associated with *Streptococcus* infection (strep throat). In the United States, children typically average five sore throats per year and *Streptococcus* infection every 4 years. Adults typically experience two sore throats per year and *Streptococcus* infection every 8 years. The incidence worldwide is higher, possibly because of resistance to antibiotics caused by over prescription. Sore throat is more prevalent in winter, when respiratory disease incidence is highest. The incidence of pharyngitis and strep throat is highest in

children between the ages of 5 and 18. Sore throat is rare in children younger than 3 years old.

Like many types of inflammation, pharyngitis can be acute or chronic. Acute pharyngitis is characterized by a rapid onset and typically a relatively short course. Let us look at acute pharyngitis in further detail.

Acute Pharyngitis

The pharynx is a common site of infection. After a person is directly exposed to the causative agent, such as viruses or bacteria, the latter will often settle in this part of the body. Acute pharyngitis can result in very large tonsils, which cause trouble during swallowing and breathing. Some cases are accompanied by a cough or fever. Most acute cases are caused by viral infections (40%–60%), with the remainder caused by bacterial infections, fungal infections, or irritants such as pollutants or chemical substances.

Other causes include:

1. Coughing
2. Inhaling pollutants (e.g., household cleaners, automobile exhaust, dust)
3. Other illnesses (e.g., diphtheria, mononeucleosis)
4. Seasonal allergies
5. Smoking and second-hand smoke
6. People with seasonal allergies to pollen often experience sore throat as a result of postnasal drip.

   Viral upper respiratory tract infection that produces postnasal drip, such as the common cold, and seasonal allergies are the most common causes of sore throat. Organisms such as *Streptococcus, Mycoplasma pneumoniae, Chlamydia pneumoniae*, and *Neisseria gonorrhoeae* cause bacterial pharyngitis. Infection is spread by person-to-person contact.

Types of Pharyngitis

There are two types of pharyngitis, viral and bacterial.

Viral Pharyngitis

These comprise about 40-60% of all infectious cases and can be a feature of many different types of viral infections, such as:

a. Adenovirus - the most common of the viral causes. Typically the degree of neck lymph node enlargement is modest and the throat often does not appear red, although it is very painful.
b. Orthomyxoviridae which causes influenza – it presents with rapid onset high temperature, headache and generalised ache. A sore throat may be associated.
c. Infectious mononucleosis ("glandular fever") caused by the Epstein-Barr virus. This may cause significant lymph gland swelling and an exudative tonsillitis with marked redness and swelling of the throat. The heterophile test can be used if this is suspected.
d. Herpes simplex virus can cause multiple mouth ulcers.
e. Measles
f. Common cold virus: rhinovirus, coronavirus, respiratory syncytial virus, parainfluenza virus can cause infection of the throat, ear, and lungs causing standard cold-like symptoms and often extreme pain.
g. Primary HIV

Bacterial pharyngitis

A number of different bacteria can infect the human throat. The most common bacterial agent is streptococcus, Group A being the most common. Unlike adenovirus, there tends to be greater generalized symptoms and more signs to find. However, others include:

- Corynebacterium diphtheriae

- Neisseria gonorrhoeae
- Chlamydophila pneumoniae
- Mycoplasma pneumonia
- Diphtheria, is a potentially life threatening upper respiratory infection caused by *Corynebacterium diphtheriae* which has been largely eradicated in developed nations since the introduction of childhood vaccination programs, but is still reported in the Third World and increasingly in some areas in Eastern Europe. Antibiotics are effective in the early stages, but recovery is generally slow.
    - *Fungal pharyngitis*
    - *Candida albicans* causing oral thrush

Signs And Symptoms

1. Swallowing may be difficult or painful and the throat may feel scratchy
2. The throat often appears red, swollen, or puffy, and may have white spots of purulent exudate (pus)
3. Fever and cough are also common
4. Examination may reveal swollen tonsils (near the base of the tongue), which may also be covered with white or gray exudate
5. The lymph nodes in the neck often become swollen and tender

Investigations

1. Diagnosis is made by examining the throat, observing its appearance, and feeling the neck for swollen lymph nodes
2. Because viral and bacterial pharyngitis can look the same, a throat culture is often used to determine if bacteria is present
3. The throat is swabbed with cotton and the sample is sent to a laboratory for culture and analysis. It takes more than 24 hours to obtain results. A rapid strep test may be performed and analysed in the physician's office. Results

are available in about 15 minutes. This test is not as reliable and negative results must be confirmed by culture.

Treatment

Treatment of viral causes are mainly symptomatic while bacterial or fungal causes may be amenable to antibiotics and anti-fungals, respectively. Sore throat related to viral URI usually resolves without medication. This treatment can be divided into symptomatic and remedial. Symptomatic treatments attempt to reduce pain and discomfort. Remedial treatments attempt to cure pharyngitis or prevent long-term complications such as rheumatic fever. Gargling with warm salt-water and taking acetaminophen (Tylenol) may relieve pain and reduce swelling. Analgesics such as NSAIDs and acetaminophen can help reduce the pain associated with a sore throat. Steroids (such as dexamethasone) have been found to be useful for severe pharyngitis. Viscous lidocaine relieves pain by numbing the mucus membranes of the throat.

- Remedial treatments are effective for bacterial infections and fungal infection. Bacterial pharyngitis is treated with antibiotics
- No specific treatment for viral infections have been found to be effective and most cases will settle within a few days.
- If the tonsils have been chronically infected, they may need to be removed surgically (tonsillectomy).

Complications of Pharyngitis

The main complications include the following:

1. Rheumatic fever (inflammation of connective tissue and joint pain),
2. Scarlet fever (fever with body rash),
3. Tonsil abscess,
4. Tonsillitis
5. Glomerulonephritis (kidney disease) can result from untreated streptococcal infection.

6. Severe pharyngitis associated with Corynebacterium diphtheriae and infectious mononucleosis can obstruct the airway.
7. Lower respiratory problems (e.g., pneumonia).
8. Longstanding infection of the tonsils (tonsillitis) can result in peritonsillar abscess, which affects the connective tissue of the tonsil.
9. Otitis media

3.8.2 TONSILITIS

A tonsil is a mass of lymphoid tissue comprised particularly of one or two small almond shaped bodies. It is situated one on each side of the pillar of the forchette fauces. It is covered by mucous membrane and its surfaces fitted with follicles. The term tonsil is used in its commonly accepted sense of indicating the faucial tonsils. The term adenoid is synonymous with hypertrophy of the pharyngeal tonsils. The tonsils and adenoids are part of the lymphoid tissues which arch the pharynx and are collectively known as *Waldeyer's Ring*. This consists of the lymphoid tissue on the base of the tongue (lingual tonsils) and the two faucial tonsils, the adenoids (pharyngeal tonsils) and the lymphoid tissue on the posterior pharyngeal wall. This tissue naturally serves as a defense against infection and when its defense mechanism is overcome, it may become a site of acute or chronic infection. The surgical removal of tonsils is known as Tonsilectomy.

Functions of Tonsils

1. They act as a barrier against infections
2. They are necessary for antibody production which fight bacteria in the body
3. Production of some blood cells

Types of Tonsillitis

Tonsillitis can be described as acute or chronic as follows:

1. *Acute tonsillitis*: is an abrupt or sudden inflammation of the palatine tonsils usually caused by streptococcus or less commonly a viral infection;
2. *Chronic tonsillitis:* is an inflammation of the tonsils which is recurrent between episodes of acute tonsillitis in which the throat remains uncomfortable.

Incidence

Tonsillitis is common in children between 5-7 years of age.

Predisposing factors

1. Overcrowding
2. Poor ventilation and housing
3. Upper respiratory tract infection (URTIs)
4. Seasons especially in winter and spring
5. Infectious like diphtheria
6. Age: young children are predisposed because their immunities are often low and are prone to infections
7. Lowered immunity in general.

Causes

1. Beta haemolytic streptococcus
2. Pneumococcus
3. Staphylococcus
4. Echo Virus (Enteric Cytopathogenic Human Orphan Virus) causes meningitis and respiratory infection
5. Adenovirus serotype viii
6. Influenza virus
7. Diphtheriae
8. Treponema pallidum

Signs and Symptoms

1. Enlarged lymph nodes due to the immune response as the defense mechanism tries to fight the infection.
2. Dysphagia: may be as a result of swollen tonsils and involvement of the trigeminal nerve
3. Fever as a result of circulating microorganisms and toxins in the blood.
4. Sore throat due to ulceration in the depth of crypts
5. Malaise due to the systemic infection in the body
6. Difficulties in opening the mouth (trismus) due to inflammation process
7. Excessive salivation due to pain and inflammation of tonsils
8. Hyperaemic tonsils with swelling due to the inflammatory process
9. Yellowish exudates draining from the crypts.

Management of Tonsillitis

Investigation and diagnostic tests

1. Clinical picture or presentation may reveal swollen tonsils and enlarged swollen lymph nodes
2. Throat culture may determine the infecting organism
3. White blood cell count usually reveals leucocytosis

Non pharmacological treatment

1. Bed rest especially in the acute stage is very important and advised
2. Advise the patient to take a lot of fluids by mouth
3. Advice the patient to take saline gaggles
4. An ice collar may be applied to the neck to relieve pain
5. A bland diet is highly recommended especially in the acute stage.

Medical treatment

1. Antibiotics such as oral penicillin, e.g. Pen V 500mg 6 hourly orally for 10 days; or Benzathine Penicillin 2.4mega units intramuscularly stat
2. Analgesics e.g. Aspirin for pain relief
3. Steroids e.g. Prednisolone to suppress the inflammatory process (not recommended for the immune compromised).

Surgical Treatment – Tonsilectomy

Indications

The indications of tonsillectomy are:

1. *Recurrent acute Tonsilitis:* if a patient gets more than 4 attacks of genuine acute tonsillitis every year, then they may benefit from tonsilectomy. It is of course important to be certain that the attacks described by the patient are tonsillitis and not just sore throat. Each attack should last for 5-7 days with fever, malaise severe enough to keep the child away from school or an adult from work.
2. *A Quinsy (Abscess):* if a patient has had quinsy, he is likely to get another one unless the tonsils are removed.
3. *For Histology:* if one tonsil is abnormally larger or harder than the other, or if it is ulcerated, it must be removed for histology as it may be a good site for Squamous cell carcinoma development.
4. *Rheumatic Fever and Acute Glomerulonephritis:* patients who have had one of these diseases will often be treated with long term penicillins to avoid further beta haemolytic streptococcal infection. However, patients may develop resistance to penicillin or allergy. In this case tonsilectomy may be performed on request by the physician or paediatrician.
5. *Size:* size alone is not a common indication. It is only considered if they are large enough to cause respiratory obstruction with evidence of right-sided

heart stain and even failure. Sleep apnoea is a significant symptom in this case and the tonsils and adenoids must be removed as a matter of urgency.

Complications of Tonsilitis

These include:

1. Peritonsilar abscess (Quinsy): this is situated near the tonsils and leads to septicaemia.
2. Chronic tonsillitis resulting from acute tonsillitis
3. Rheumatic heart disease which can eventually lead to heart failure
4. Recurrent otitis media
5. Acute nephritis

Preoperative Nursing Care

The aims of preoperative nursing care are to:

1. reassure and prepare the patient for surgery
2. prevent complications
3. achieve healing as rapidly as possible

Admission

Tonsilectomy is not an emergency and thus is admitted a day before surgery to allow the patient to adapt to the ward environment. This also allows orientation and explanation of the operation to be done.

Assessment and investigations

1. History of sore throat of 2-3 weeks with swollen tonsils
2. Heart and lung examination to ascertain cardiovascular function,
3. X-ray
4. Blood investigations: full blood, haemoglobin to check level
5. Bleeding and clotting time
6. Urinalysis to rule out diabetes mellitus

Psychological care

Educate the patient about the pre and postoperative requirements. For example, tell them that their normal diet will change to light meals, such as custard, after the operation. Allow them to ask questions and answer them clearly and refer the difficult ones to the doctor. This enhances a good relationship. Involve the significant others in the care. If the patient is a child, allow the mother or guardian to stay close as this reduces fears and anxieties. Allow the child to play with toys and to continue with the home environment he is used to. If necessary, you can invite a chaplain or any other religious leaders to offer spiritual care and allay anxiety. You should also tell the patient that they might lose their voice temporarily.

Nutrition

Provide the patient with a well balanced diet to correct the nutritional status. He or she is likely to be anorexic due to dysphagia. Provide L]light small frequent meals to promote appetite. The food should be rich in proteins and vitamins to repair worn out tissues and build the immunity.

Hygiene

If the patient has excessive solution, provide a sputum mug with a disinfectant to spit in. Oral toilet and mouth gaggles with saline help in refreshing the mouth and prevent mouth infections.

Immediate Preoperative Nursing Care

The patient is starved for 6 – 8 hours prior to the operation. He or she is given an early morning bath and a clean gown. Dentures if any are removed and kept safe with any jewellery. Premedication is given as ordered by the surgeon such as diazepam 10 mg, an hour before going to theatre to reduce anxiety. Atropine intramuscularly may also be given as ordered by the anaesthetist to reduce secretions in the mouth. Narcotics are given to reduce pain e.g. pethidine and if necessary an intravenous line is put. Ensure the patient has an identification

tag bearing the name, ward, sex, age, and details of the type of operation to be done. The patient is taken to theatre together with all the notes and a hand over given to theatre staff nurse.

Patient teaching

The patient is advised to do normal breathing or coughing exercises to attain full lung expansion and gaseous exchange. He or she is told to be swallowing saliva after operation to prevent infection which may be due to accumulation of secretions. The patient is also told to avoid excessive coughing and laughing which may lead to haemorrhage and avoid highly spiced foods.

Postoperative Nursing Care

The aims of postoperative nursing are to:

1. prevent haemorrhage
2. promote quick recovery
3. maintain a patent airway
4. prevent asphyxia from inhaled blood and secretions.

Environment

Put the patient in a clean room to prevent infection. The room should have: oxygen supply in case of an emergency; a trolley with resuscitative equipment and emergency drugs; and an emesis bowl for expectoration of mucus and blood.

Position

Put the patient in a lateral position with the head turned on one side to facilitate drainage of secretions from the mouth and pharynx. The head should lie on a dressed/covered mackintosh to prevent soiling of linen.

Observations

The patient needs constant observation for the first 12 hours. Ensure you take observations of pulse rate and blood pressure half hourly to detect early any bleeding. Observe for the swallowing reflex as frequent swallowing, even when the patient is sleeping, is a sign that he is bleeding and the doctor should be informed immediately. Observe the temperature in order to rule out infection. If the patient is vomiting observe the colour of the vomitus because he may be vomiting blood.

Hygiene

If the patient is vomiting, give them an emesis bowl to prevent vomiting on the floor. If there is excessive salivation, a clean dry cloth or swab can be used to wipe the mouth. Throat gaggling with antiseptic solution or normal saline for at least 10 days after meals should be encouraged.

Nutrition

When the patient is fully awake and the gag reflex has returned, allow him or her to drink water and later to take plenty of non-irritating foods. The patient should avoid milk products which coat the throat causing frequent throat cleaning and increasing risk of bleeding. Taking fluids prevents stiffness of muscles. In the morning after the operation a light diet should be provided and a normal diet thereafter. Most children eat a full diet after the second day but older ones will prefer soft foods. The acid of fruits and fruit juices causes considerable pain and so should be avoided.

Advice on discharge

Before discharge you should provide the patient or his parents with written instructions on home care. These should include the following:

1. Tell them to expect a white scab to form in the throat between the 3rd and 4th day postoperatively and to report bleeding or ear discomfort that lasts longer than 3 days.
2. To avoid spicy irritating foods and milk products as they coat the mucous membrane. The patient should have soft foods that are easy to chew and should avoid using straws or fork as these may cause injury.
3. Advise the patient to stay indoors for several days and to avoid strenuous exercise and sun bathing as this causes dilatation of blood vessels. Activities contraindicated because of the risk of bleeding include sneezing, coughing and vigorous nose blowing.
   Prevent anxiety by informing the patient what to expect after surgery.

Hygiene

Throat gaggles are encouraged to sooth the throat. Prevention of constipation and placement of electrolytes are important. Occasionally a mild laxative is necessary to help relieve constipation and also unpleasant mouth odour following surgery. Additionally, fluid intake helps compensate for the slight temperature elevation which may occur for a few days.

Review Dates

The patient should receive recommendations for rest and follow up appointments, as well as, instructions concerning pain relief and diet. Instruct the patient to notify the doctor if he or she develops ear discomfort or temperature elevation lasting longer than 3 days. Encourage to rest the voice and avoid aspirin as this precipitates bleeding. Emphasize the importance of completing the course of prescribed antibiotic therapy to promote compliance.

Complications of Tonsilectomy

The main complications are:

1. Haemorrhage

This may be reactionary occurring within 12 hours of the operation or secondary occurring 5-7 days afterwards. The later is duet o sepsis. An adult is usually aware of blood on swallowing and will indicate his concern to the nurse. A child may be too young to know and the nurse must watch for excessive swallowing. The patient should sit up in bed with the head and neck well supported by pillows. Examine the tonsil for signs of bleeding and record the blood pressure and pulse rate. Inform the surgeon of the patient's medical condition. If there are blood clots, the surgeon can remove them by means of Luc's forceps and then mops the fossa with cotton wool soaked in hydrogen peroxide. If this does not stop the bleeding, it may be necessary to take the patient back to ligate one or more blood vessels.

2. Atelectasis

This arises if a plug of mucus blocks one of the bronchiole tubes. The signs are elevation of temperature, rapid breathing, dyspnoea, coughing and cyanosis, dullness on the affected lung with absence of breath sounds on percussion and auscultation respectively. Radiologically, the affected lung is displaced towards the mediastinum and the diaphragm is raised.

Treatment

The treatment is to sit the patient up if possible and have him cough or lie on the good side. If the measures fail then aspirate the occluding plug of mucus bronchoscopically.

3. Pneumonia

This is evidenced by the same symptoms as those of atelectasis but the breath sounds on the affected side are increased rather than absent. A fluoroscopy show the diaphragm is symmetrical and the mediastinum is in the midline with lungs aerating well. Pneumonia can result if the patient inhales blood and this can be prevented by taking proper precautions during operation, e.g.,

hyperextension of the head and proper suctioning. Treatment includes giving benzyl penicillin 2MIU 6 hourly intravenously for 5 days.

4. Lung abscess

This is evidenced by fever, cough and expectoration of a mouthful of pus usually a week or two after surgery. It can be prevented by hyper extending the head during the operation. It prevents inhalation of any material such as blood and mucus.

5. Sepsis of the operation site

It can be prevented by encouraging the patient to swallow or gaggle 2-3 times a day. Encourage the patient to take plenty of oral fluids.

Treatment

Benzyl penicillin 2MIU 6 hourly intravenously for 5 days.

6. Acute otitis media

Infection may spread to the middle ear and cause acute otitis media indicated by a rise in temperature and earache.

3.8.3 LARYNGITIS

The larynx is the voice box that allows us to speak, shout, whisper, and sing. The larynx consists of a cartilage skeleton that houses the vocal cords, which are covered by a mucus lining. Muscles inside the larynx adjust the position, shape, and tension of the vocal cords, allowing us to make different sounds. Any change in the air flow (which is generated by the lungs) across the vocal cords will affect the voice and the quality of the sound. The larynx is located at the junction of the eosophagus and trachea and has a flap-like covering called the

epiglottis. The job of the epiglottis is to prevent *food* and *saliva* from entering the larynx during swallowing.

What is laryngitis?

Laryngitis is an inflammation of the voice box and larynx, caused by upper respiratory infections, vocal cord abuse, smoking or reflux oesophagitis. Oedema of the vocal cords, caused by the inflammation, restricts the normal movement, causing a hoarse or gravelly sounding voice or even an inability to speak.

What Causes laryngitis?

The common causes include the following:

1. Colds or flu: this is the most common cause
2. Acid reflux also known as gastroesophageal reflux disease (GERD) also called reflux laryngitis.
3. Overuse of voice
4. Irritation, such as from allergies or smoke
5. Diptheria
6. Alcohol and smoking
7. Tumours
8. Thyroid inflammation
9. *Vocal cord paresis or paralysis:* this is a result of inflammation or injury to the vagus nerve, most commonly the recurrent laryngeal nerve and less often the superior laryngeal nerve. Paresis or paralysis affects the velocity and amplitude of air flow through the cords, resulting in a leak of air through the vocal cords that gives a breathy quality to the voice.
10. *Spasmodic dysphonia:* this is a hyperfunctional neuromuscular disorder. The spastic quality of the voice is a result of the inability of the vocal cords to maintain uniform vibration.

11. *Presbylaryngeus:* this is the abnormal speech of older people. The aging process causes a loss of muscle tone, resulting in a weakened closure or bowing of the vocal cords.
12. *Vocal cord lesions:* these prevent the cords from touching and cause irregular vibrations such as:

- Vocal cord polyps: oedematous mucous membranes attached to the vocal cord. They can be caused by chronic voice abuse, allergies, heavy smoking, or acute infection.
- Vocal cord nodules: also known as “singer’s nodules” are benign growths caused by chronic voice abuse.

Take Note

Numbers 6, 7 and 8 cause irritation and compress nerves of the larynx.

Signs and Symptoms

The main signs and symptoms of laryngitis are:

1. Hoarseness and loss of voice is the primary symptom of laryngitis.
2. Dry cough (Huskiness)
3. Sore throat (Chronic throat clearing)
4. Fever
5. Swollen cervical lymph nodes
6. Pain with swallowing
7. Feeling of fullness in the throat or neck
8. Difficulty breathing (Dyspnea)
9. Complete loss of voice (Aphonia)
10. Aspiration on swallowing
11. History of upper respiratory tract infection with loss of voice
12. Examination of the ears, nose, and throat.

13. If any discharge throat swab.
14. Laryngoscopy to observe the vocal cords
15. Computed tomographic scan to rule out a tumour as the cause of vocal cord paresis or paralsis

Diagnosis of Laryngitis

1. History of upper respiratory tract infection with loss of voice
2. Examination of the ears, nose, and throat.
3. If any discharge a throat swab should be taken
4. Laryngoscopy to observe the vocal cords
5. Computed tomographic scan to rule out a tumour as the cause of vocal cord paresis or paralysis.

Non-Pharmacological Treatment

The goal of clinical management is to restore the voice to an acceptable quality. As with any other structure in the body that gets inflamed, rest is key to recovery. For laryngitis, that means limiting the amount of talking. If talking is required, one should avoid whispering and instead talk in a regular voice, regardless of how it sounds. Whispering requires the vocal cords to be stretched tightly and requires more work by the surrounding muscles.

The treatment for viral laryngitis is supportive and includes:

1. Taking plenty of fluids
2. Inhaling humidified air
3. Elevation of the head of the bed
4. Normal saline throat irrigations

Pharmacological Treatment

1. Antacids to neutralise gastric acid in gastroesophageal reflux.
2. Brufen for pain

3. Prednisolone or dexamethasone may be used to decrease inflammation and shorten the course of symptoms
4. Antibiotics for infection

Special Medical – Surgical Procedures

The main surgical procedures are:

1. Direct laryngoscopy with microlaryngoscopy to visualise the vocal cords
2. Excission of nodules or polyps.
3. Thyroplasty, which is the insertion of a stent to move the paralysed vocal cord into midline position.

3.8.4 Trauma and Foreign Bodies of The Throat

The common foreign bodies of the throat include:

1. Dentures
2. Fish bones
3. Metal pins
4. Small batteries
5. Seeds
6. Coins
7. Balloons
8. Pieces of deformable plastics
9. Food boluses

3.8.5 Trachoestomy

What is a tracheostomy? Think about it for 2 minutes and then complete the following activity.

Activity 7

Write down the meaning of tracheostomy in your notebook.

Compare your answer with the definitions given in the following discussion.

What is a tracheostomy?

1. A tracheostomy is a surgical incision into the trachea to the overlying skin for the purpose of creating an airway. (Lewis 2004)
2. A tracheotomy is a surgical incision into the trachea for the purpose of establishing an airway;
3. Tracheostomy is the stoma that results from the tracheotomy, and its when an indwelling tube is inserted into the trachea;
4. A tracheostomy is an artificial respiratory opening made in the anterior wall of the neck and trachea, made between the 2^{nd} and 3^{rd} or 3^{rd} and 4^{th} tracheal rings;
5. Tracheostomy is the creation of an artificial opening into the trachea through which breathing occurs.

Types of Tracheostomy

1. Emergency tracheostomy: this is when an operation is done immediately e.g. in foreign bodies.
2. Elective tracheostomy: this is when the patient is prepared in advance, e.g., in the case of cancer of the upper respiratory tract.
3. Temporal tracheostomy: this is a tracheotomy which is performed for a short period then closed.
4. Permanent tracheostomy: this is left for a life time.

Indications for a Tracheostomy

1. To bypass an upper airway obstruction.
2. To facilitate removal of secretions i.e. tracheaobronchial secretions
3. To permit long-term mechanical ventilation
4. To permit oral intake in cases of respiratory insufficiency in patients who require long-term mechanical ventilation
5. To reduce the work of breathing for a critically ill patient
6. To prevent aspiration of oral or gastric secretions in unconscious patients
7. In cases of paralysis of vocal cords and spasms of laryngeal muscles.
8. In tumours of the larynx, thyroid gland and cysts of the thyroid

Procedure

The surgical procedure is usually performed in the operating room or in an intensive care unit, where the patient's ventilation can be well controlled and optimal aseptic technique can be maintained. A surgical opening is made in the second and third tracheal rings. After the trachea is exposed, a cuffed tracheostomy tube of an appropriate size is inserted. The cuff is an inflatable attachment to the tracheostomy tube that is designed to occlude the space between the trachea walls and the tube to permit effective mechanical ventilation and to minimise the risk of aspiration.

The tracheostomy tube is held in place by tapes fastened around the patients' neck. Usually a square of sterile gauze is placed between the tube and the skin to absorb drainage and prevent infection.

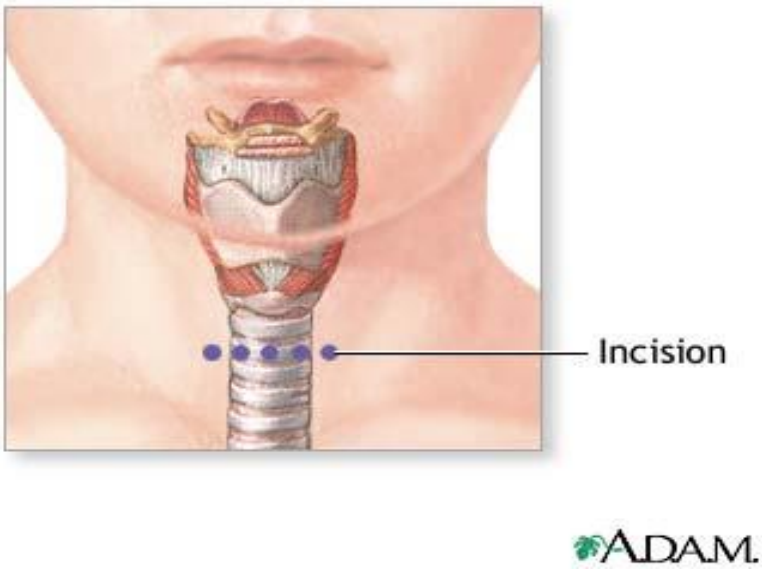

Figure 6: Diagram of a tracheostomy showing incision site

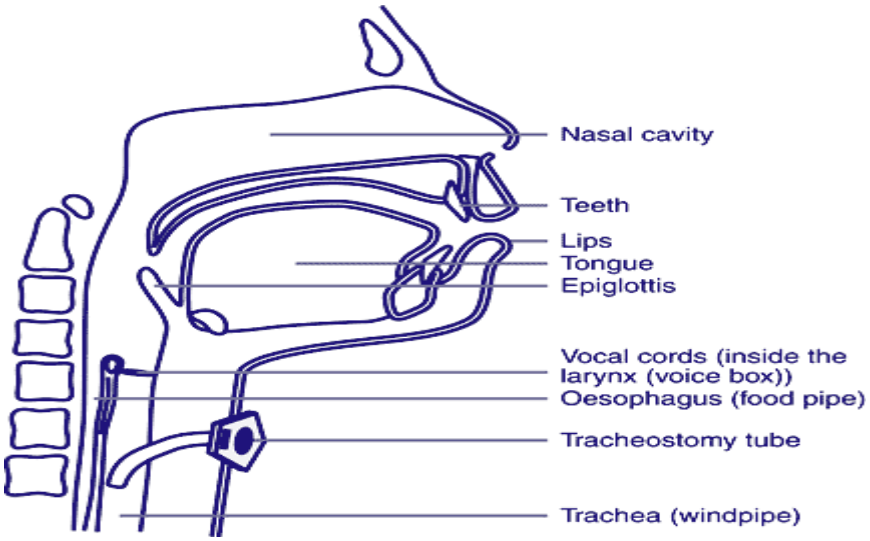

Figure 7: Diagram showing tracheostomy tube in place

Specific Preoperative Nursing Care

1. Explain the procedure to the client and family.
2. Inform the client and family that the client will be unable to speak while tube is in place, but once the tube is removed the client will resume speaking normally.
3. Establish a method of communication with the client, either written or non-verbal.
4. Assess whether the patient has loose, chipped, or capped teeth.
5. Remove dental prosthesis, or any foreign object or secretions if present.
6. Obtain the necessary equipment (a laryngoscope with straight and curved blades, magill forceps, and a swirl adapter, trachea tube, oropharyngeal airway or bite block, tape, inflating syringe, phenylephrine hydrochloride, lidocaine hydrochloride, ambu bag, suctioning equipment, oxygen, etc.).
7. Check function of equipment (such as cuffs for leaks or laryngoscope for batteries and bulbs).
8. Continue with general pre-operative nursing care.

Postoperative Nursing Care

1. Promote cleanliness

You should remove the inner cannula and clean it as often as possible. Various methods may be employed for cleaning. One method is to scrub the inside of the inner tube with a soft toothbrush while running cold water through it. If mucous material has become encrusted, the inner tube may be soaked in a basin of a specially prepared solution for several hours. While the inner tube is soaking, the outer tube should be suctioned to remove accumulated secretions. Before reinsertion, a careful inspection should be made to see that bristles have not adhered to the tube. This is because they may be aspirated into the respiratory passage.

2. Prevent drying and crusting of the mucosa.

Remove secretions as they accumulate and provide some form of moisture or humidification. Often some physicians may order 2 to 3 ml of sterile saline to be instilled directly into the tube before suctioning to aid in loosening secretions and to provide a stimulus for a cough reflex.

3. Maintaining a patent airway

Observe the tube for accumulation of excessive secretions and suction as often as needed. The tracheotomy acts as a foreign body to the respiratory passage, and the response is an increase in the amount of secretion.

Observe for signs of:

- air occlusion;
- change in vital signs such as, increased pulse rate, increased shallow respirations, decreased BP, and low grade fever;
- change in mental attitude-restlessness and anxiety;
- change in respiratory status –wheezing, whistling, and dyspnoea.
- air leaks around the trachea. To detect air leaks, palpate the exposed skin near the wound and listen for cracking sounds. If you detect any sounds, elevate the client to semi-fowler's position. This position facilitates more effective breathing and coughing. It also promotes drainage of accumulating fluids as well as prevents fluids from pressing on the airway.

Provide adequate hydration by using nebulizers and humidifiers. A wet gauze may be placed over the opening.

The rest of the care is general but do bear in mind that the major problem of these patients is their inability to speak.

Rehabilitation

For those with temporary tracheostomy

For clients who do not require continuous mechanical ventilation, weaning begins by plugging the tracheostomy tube's opening. At first the tube is plugged for a short time, e.g., 5 minutes. The time is gradually lengthened according to the client's respiratory status, condition and confidence. Eventually the tracheostomy tube can be removed. Naturally patients are anxious about weaning because they fear that they may not be able to breath, therefore you should explain weaning to the patient as well as to their significant other. Advice the patient to come back if they experience any difficulties in breathing and the importance of keeping the stoma area clean.

For those with permanent tracheostomy

You should start teaching the patient self care long before discharge. A team approach is usually important and so the speech therapist, and the respiratory therapist should be involved in the rehabilitation of this patient. Home visits are also important in the initial days of discharge to provide professional guidance to the patient.

Complications of Tracheostomy

The main complications of tracheostomy are:

1. Haemorrhage which could be primary or secondary because the tracheotomy area is very vascular.
2. Surgical emphysema (presence of air in the subcutaneous tissue) due to
3. excessive dissection of tissue.
4. Pneumothorax common in children due to an injury of the epiod pleural.
5. Displacement of the tube due to improper fitting of tracheotomy tubes.
6. Blockage of the tracheotomy tube leading to asphyxia.
6. Atelectasis
7. Tracheal ulceration and stenosis.

8. Difficulty in decannulation (removal of the tracheostomy tube).

That brings us to the end of this unit on conditions of the ear, nose and throat. Let us now review what you have learnt.

3.9 Unit Summary

In this unit we have learnt about various surgical disorders of the ear, nose and throat and discussed their pre and postoperative nursing and surgical management. We have seen that the common surgical disorders of the ear are otitis externa, otomycosis (fungal otitis externa), eczematoid (psoriatic otitis externa), and conditions of the middle ear such as mastoiditis. We have also considered the issue of the rehabilitation of deaf and hard of hearing. In addition, we have looked at common disorders of the nose such as, epistaxis, neoplasms or nasal polyps, foreign bodies in the nose and sinusitis, and lastly, common disorders of the throat, namely: pharyngitis, tonsillitis, laryngitis, and trauma and foreign bodies of the throat

In the next unit you will learn about ophthalmology and ophthalmic nursing.

UNIT 4: OPTHAMALMOLOGY AND OPHTHALMIC NURSING

4.1 Unit introduction

Welcome to the last unit in the second part of our surgery and surgical nursing course.. In the last unit we discussed surgical disorders of the ear, nose and throat. In this unit we shall study disorders of the eye and their management. This is a specialty course in which you may wish to specialise to become an ophthalmic nurse during your nursing career in the future. We hope by the end of this unit you will be able to apply the knowledge you have gained to manage clients with eye conditions. Let us start by reviewing the objectives of this unit.

4.2 Unit Objectives

By the end of this unit you should be able to:

- Define concepts and terms used in ophthalmic nursing
- Describe the structure of the eye
- Outline the principles of ophthalmic nursing
- Discuss the nursing management of clients with inflammatory conditions of the eyes
- Discuss the nursing management of clients with non-inflammatory conditions of the eyes
- Explain the different types of intraocular surgeries
- Describe the magnitude of blindness in the world and WHO's Vision 2020 initiative.

4.3 Definition of Terms Used In Ophthalmic Nursing

We will start by defining common terms used in ophthalmic nursing.

1. **Accommodation:** this is the ability of the eye to change its focus between distant objects and near objects.
2. **Visual Acuity:** this is the sharpness, acuteness, or keenness of vision.
3. **Adnexa:** these are accessory structures of the eye, including the eyelids, lacrimal apparatus, etc.
4. **Amblyopia***:* this is the dullness or obscurity of sight for no apparent organic reason. It is not correctable with glasses or surgery. It is sometimes called a lazy eye because one eye becomes dependent on the other one for focus. It usually develops in early childhood and is often associated with strabismus.
5. **Eye Angle***:* this a **d**rainage area of the eye formed between the cornea and the iris. It is named after its angular shape, which is why you will see the word "angle" in the different glaucoma names.
6. **Anisometropia***:* a **c**ondition of the eyes in which there is an unequal refractive power.
7. **Anterior Chamber***:* this is the **s**pace between the cornea and the crystalline lens which contains aqueous humor.
8. **Aphakia***:* This is **a**bsence of the lens of the eye.
9. **Aqueous Humor***:* this is the **t**ransparent fluid which occupies the anterior chamber and maintains eye pressure.
10. **Argon laser:** a device used to treat glaucoma (usually open angle) and diabetic retinopathy using a thermal beam.
11. **Astigmatic Keratotomy** *(AK):* treats astigmatism by flattening the cornea with arc-shaped incisions in its periphery.
12. **Astigmatism***:* structural defects of the eye in which the light rays from a viewed object do not meet in a single focal point. This results in blurred images being sent to the brain. An astigmatic cornea is not perfectly rounded like a basketball but has an irregular shape more like the side of a football. Astigmatism is most often combined with myopia or hyperopia.
13. **Axis***:* optical - a straight line through the center of both surfaces of a lens.

14. **Best corrected visual acuity (BCVA***):* this is the best possible vision a person can achieve with corrective lenses, measured in terms of Snellen lineson an eye chart.
15. **Bifocals***:* lenses containing two focal lengths, usually arranged with the focus for distance above and near focus below.
16. **Binocular vision***:* simultaneous use of the two eyes. Normal binocular vision yields a stereoscopic image and parallax-induced depth perception.
17. **Blepharitis***:* inflamation of the eyelids, a common problem which tends to be reoccurrent in nature.
18. **Blind spot***:* the area of the optic disk where the optic nerve fibres exit the eye and where there are no light-sensitive cells. This small area can be measured and in glaucoma, as the nerve fibres die, the blind spot tends to enlarge and elongate. This is one of the diagnostic hallmarks of glaucoma.
19. **Cataract:** gradual clouding of the crystalline lens resulting in reduced vision or eventual blindness, correctable by cataract surgery.
20. **Cataract surgery***:* removal of a cataract, replacing it with an intraocular lens implant.
21. **Closed angle glaucoma***:* glaucoma conditions occurring suddenly (acute).
22. **Clear Lens Extraction (CLE***):* this is a procedure in which the eye's natural clear crystalline lens is removed and replaced with an intraocular lens implant, using the same technique as cataract surgery.
23. **Colour blindness***:* inaccurate term for a lack of perceptual sensitivity to certain colours. Absolute colour blindness is almost unknown.
24. **Colour vision:** Ability to perceive differences in colour, including hue, saturation and brightness.
25. **Comprehensive eye exam:** Evaluation of the complete visual system.
26. **Conductive Keratoplasty (CK*)*:** procedure in which a radio frequency probe, rather than a laser, is used to reshape the cornea. It is approved for low to moderate hyperopiain patients over age 40. However it does not appear to have the precision of lasik.

27. **Cones:** one of the two types of light-sensitive cells, concentrated in the centre of the retina (also see rods). There are about 6.5 million cones in each eye (150,000 cones in every square millimetre) which are responsible for detailed visual acuity and the ability to see in colour.
28. **Contact lens:** small, thin removable plastic lens worn directly on the front of the eyeballs, usually used instead of ordinary eyeglasses for correction or protection of vision.
29. **Depth perception:** ability of the vision system to perceive the relative positions of objects in the visual field.
30. **Diplopia***:* condition in which a single object is perceived as two, also known as double vision.
31. **Exophoria:** position of the eyes in an over-diverged position compensated by the external eye muscles so that the eyes do not appear turned outward.
32. **Exotropia***:* position of the eyes in an over-diverged position so that non-fixating eye is turned outward. One eye looks straight ahead and one turns outward.
33. **Extracapsular cataract surgery:** surgery in which the cataract is removed in one piece through a larger incision, which usually requires several stitches.
34. **Eye chart:** technically called a Snellen chart, a printed visual acuity chart consisting of Snellen optotypes. These are specifically formed letters of the alphabet arranged in rows of decreasing letter size.
35. **Field of vision:** entire area which can be seen without shifting the gaze.
36. **Halos***:* rings around lights due to optical imperfections in, or in front of, the eye.
37. **Hyperopia***:* also called *farsightedness*, hyperopia is the inability to see near objects as clearly as distant objects, and the need for accommodation to see distant objects clearly. It is common term is farsightedness.
38. **Intracapsular cataract surgery:** cataract surgery in which both the lens and capsule are completely removed, a rarely used procedure.
39. **Intraocular lens implant (IOL):** permanent, artificial lens surgically inserted inside the eye to replace the crystalline lens following cataract surgery or clear lens extraction.

40. **Intraocular pressure(IOP***):* fluid pressure within the eye created by the continual production and drainage of aqueous fluid in the anterior chamber.
41. **Keratitis***:* inflammation of the cornea
42. **Keratotomy:** surgical incision (cut) of the cornea. .
43. **Keratoconous:** rare, serious, degenerative corneal disease, in which the cornea becomes thin and assumes the shape of a cone.
44. **Keratomileusis:** carving of the cornea to reshape it.
45. **Keratoplasty**: surgical reshaping of the cornea.
46. **Lazy eye**: amblyopia, an eye condition noted by reduced vision not correctable by glasses or contact lenses and is not due to any eye disease.
47. **Low vision:** condition occurring when ordinary eyeglasses or contact lenses are unable to bring a patient's sight up to normal sharpness.
48. **Miosis:** pupillary constriction.
49. **Monovision:** purposeful adjustment of one eye for near vision and the other eye for distance vision.
50. **Mydriasis***:* pupillary dilation.
51. **Myopia:** also called near-sightedness or short-sightedness, the inability to see distant objects as clearly as near objects.
52. **Normal vision:** occurs when light is focused directly on the retina rather than in front or behind it.
53. **Photophobia***:* sensitivity to light.
54. **Presbyopia***:* inability to maintain a clear image (focus) as objects are moved closer. Presbyopia is due to reduced elasticity of the lens with increasing age.
55. **Refractive errors:** the degree of visual distortion or limitation caused by inadequate bending of light rays, includes hyperopia, myopia, and astigmatism.
56. **Refractive power***:* ability of an object, such as the eye to bend light as light passes through it.
57. **Rods:** one of the two types of light-sensitive cells, located primarily in the side areas of the retina (also see cones). There are about 125 million rods, which are responsible for visual sensitivity to movement, shapes, light and dark (black and white) and the ability to see in dim light.

58. **Snellen eye chart:** most common chart used to test visual acuity with black letters of various sizes against a white background.
59. ***Snellen lines:*** snellen optotypes arranged in horizontal rows called "lines".
60. **Snellen optotypes:** specifically formed letters of the alphabet arranged in rows of decreasing letter size on the Snellen chart.
61. **Strabismus:** condition occurs when the muscles of the eye do not aligned properly and binocular vision is not present. Patients with a history of strabismus may develop double vision after refractive eye surgery.
62. **Twenty-twenty, 20/20 vision:** to have 20/20 vision means that when you stand 20 feet away from the Snellen eye chart you can see what the majority of people can see at that same distance.

4.4 Structure of the Eye

The eye is a paired organ of vision. It is made up of various components, which enable it to receive light stimuli from the environment and deliver these stimuli to the brain in the form of an electrical signal. Vision involves all components of the eye. The eye is contained within the bony orbit of the head which is a cavity comprising parts of the lacrimal bone (includes fossa for nasolacrimal duct) and the maxilla.

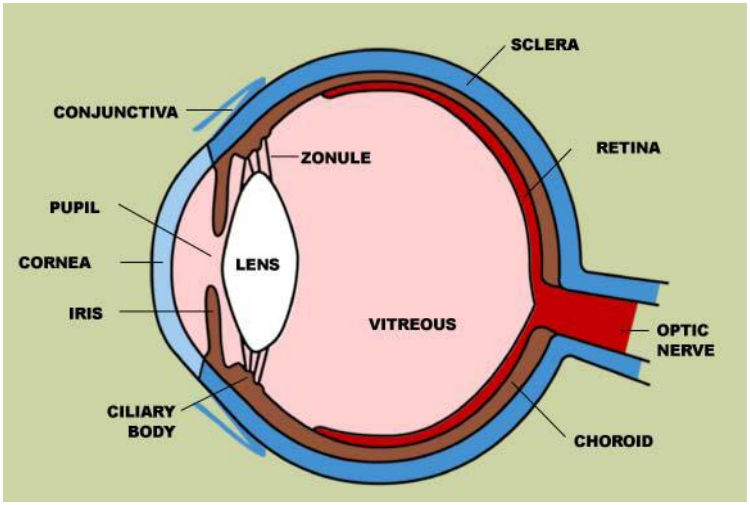

Figure 8: Structure of the eye

The main structures of the eye as shown in Figure 8 include the following:

1. **The Conjunctiva**: it is continuous with the skin of the eyelids. The palpebral conjunctiva is the part of the conjunctiva that covers the inner surface of the eyelid; the bulbar conjunctiva covers the surface of the eyeball. It is lined by stratified squamous epithelium and contains goblet cells, which secrete the deepest, mucus, layer of tear film, which adheres to the surface of the globe. It is highly vascular.

2. **The Cornea:** it is a transparent tissue that forms the front part of the eyeball, covering the iris and pupil. The cornea is the first part of the eye that bends (or refracts) the light and provides most of the focusing power.

3. **The Aqueous Humour**: this is a clear fluid that is produced by ciliary processes of the ciliary body. It provides nutrients for the lens and cornea. It also maintains intraocular pressure (25mm.Hg) and is replaced several times a day (2µl/min). An increase in intraocular pressure can cause *glaucoma.*

4. **The Lens**: this is a transparent derivative of the optic placode. The fibres of the lens are live cells, shaped in an onion structure. It is lined rostrally by cuboidal epithelium. It has a capsule, with rostral and caudal sutures, with a softer cortex and a firmer nucleus. The lens has no blood vessels or nerves, so nutrients are obtained from the aqueous humour by diffusion.

5. **The Vitreous Humour**: this is another clear fluid secreted by the ciliary body up to the time of maturity. It is gelatinous and so has very loose connective tissue: contains water, hyalouronic acid and collagen. Pressure from the vitreous humour prevents retinal detachment. It supports the lens anteriorly and the retina posteriorly. It contains a hyaloid canal, which is a remnant of blood vessels during development.

6. **The Retina**: is the inner layer of the eyeball and it develops from the optic vesicle, which is an outgrowth of the diencephalon. It remains connected to the diencephalon via the optic nerve.

7. **The Uveal Tract**: this is a three-part physiological and pathological unit, positioned between the sclera and the retina. It is made up of the following:

    - *The Choroid:* a pigmented, highly vascular layer, containing:
        - tapetum lucidum (inner layer, nearest retina).which is reflective and coloured and so increases sensitivity to poor light,
        - vascular layer: nutritive, black/connective layer (outer layer, nearest sclera).
    - *The Ciliary Body*: this is a portion of the eye that produces aqueous humour and vitreous humour. Its muscle fibres stretch the lens into a flatter shape, allowing distant vision
    - *The Iris*: this is a vascular, coloured and contractile circular tissue of the eye which determines the aperture or space (pupil) size.

8. **The Sclera**: this is continuous with the cornea at the point of the limbus (joint). It is similar to the cornea, except that it is vascular, and has dense, irregular, fibrous connective tissue. It has a white colour.

9. **Iridocorneal angle**: also called the filtration angle, this is the acute angle between the iris and the cornea, which is at the periphery of the anterior chamber of the eye. Its purpose is to drain the aqueous humour. A wider angle allows for better drainage.

What is Ophthalmology?

Ophthalmology is a branch of medicine that deals and specializes in the diagnosis and the treatment of eye diseases. In other words, Ophthalmology is the branch of medicine that deals with the anatomy, physiology and diseases of the eye.

4.5 Principles of Ophthalmic Nursing

1. Ophthalmic patients due to impaired vision need sympathetic handling to help them acquaint themselves to surroundings and strangers. This builds their confidence resulting in successful treatment
2. Psychological care must be provided to reduce apprehension. When approaching a patient with visual impairment or blindness, announce your presence softly
3. Direct patients as they walk by holding their hand or allowing them to hold your shoulder when their sight is impaired
4. Patients must be nursed in a quiet and less crowded room
5. Patients with photophobia must be nursed in dim but spacious rooms
6. Patients must be assisted to maximize use of other senses with a lot of patience
7. Always explain procedures to gain patient confidence and co-operation
8. The nurse must always be gentle and dexterous in carrying out procedures
9. When approaching a patient, the nurse must use a calm tone while making his/her presence known by the patient
10. Always inform the patient that you are leaving him/her
11. Provide light meals especially postoperatively to prevent gaping of sutures and to rest the eye
12. Always wash hands before and after caring for eyes
13. Eyes must be swabbed from inner canthus outwards with saline or sterile water
14. Pad the eye to lessen eye movements in injuries or pain
15. Eyes with purulent discharge should not be padded/covered
16. Eye drops/ointment must be checked thoroughly before instillation to prevent pharmaceutical disasters
17. Eye drops/ointment must be administered one per patient and not shared
18. Post-op patients must lie on the unaffected eye and personal belongings/locker kept near the unaffected eye to prevent pressure on affected eye
19. Operations to the eyes must be done one eye at a time, in order to prevent causing total blindness.

20. A firm bandage and pad is required in patients after excision of the eye contents to control bruising and control swelling
21. Use aseptic technique when handling or treating eyes
22. Always stand behind or in front of the patient when caring for the eyes
23. Always orient your patients to the ward.

4.6 Inflammatory Conditions of The Eye

The main inflammatory conditions of the eye are:

- Blepharitis
- Uveitis
- Keratitis
- Corneal ulceration
- Conjuctivitis

Let us discuss each in turn starting with blepharitis.

BLEPHARITIS

Blepharitis is an ocular disease characterized by inflammation of the eyelid margins. It is a very common cause of ocular discomfort and irritation. It can be subdivided into anterior and posterior blepharitis, although there is often considerable overlap in signs and symptoms.

Types of Blepharitis

1. *Anterior blepharitis:* affects the anterior margin (front) of the eyelid near the roots of the eyelashes. The causes are seborrheic dermatitis (similar to dandruff) and, more rarely, infection by Staphylococcus bacteria.

2. *Posterior blepharitis:* affects the posterior margin (back) of the eyelids, the part that makes contact with the eyes. This is caused by the oil glands present in this region and can be exacerbated by scalp dandruff. It is by far the most common type of blepharitis.

Signs and symptoms

Blepharitis is one of the most common disorders of the eye and usually presents with the following signs and symptoms:

1. Eye discomfort
2. Redness and tearing
3. Burning, itching
4. Light sensitivity
5. An irritating, sandy, gritty sensation that is worse upon awakening.

Management of a Patient with Blepharitis

Blepharitis is a chronic disease for which there is no cure. It requires long-term treatment to keep it under control. Treatment consists of 2 phases:

- *Acute phase:* treatment involves intensive therapy to rapidly bring the disease under control.
- Maintenance phase: the goal here is to indefinitely continue the minimum amount of therapy that is necessary to keep the disease quiet.

Other treatment methods which can help are:

1. Warm Compresses followed by Lid Scrubs: this is the most critical element of effective blepharitis control. This therapy involves applying a warm compress to loosen the crusts, and then scrubbing the eyelid with a detergent soap to reduce

bacteria load. This also helps to stabilize the tear film and release oily secretions from the meibomian glands, thus reducing tear evaporation and the dry eye symptoms.

2. A 4-step typical lid margin hygiene routine:

- ***Softening of lid margin debris and oils****:* Apply a warm wet compress to the lids, such as, a washcloth with hot water for about 2 minutes.
- ***Mechanical removal of lid margin debris***: At the end of a shower routine, wash your face with a washcloth. Using facial soap or non-burning baby shampoo (make sure to dilute the soap solution 1/10 with water first), gently and repeatedly rub along the lid margins with closed eyes.
- ***Antibiotic reduction of lid margin bacteria*** (at the discretion of the physician): After lid margin cleaning, spread small amount of prescription antibiotic ophthalmic ointment with fingertips along lid fissure while eyes closed. Use prior to bedtime as opposed to in the morning to avoid blurry vision.
- Avoid the use of eye make-up until symptoms subside

The following guide is very common but is more challenging to perform by visually disabled or frail patients as it requires good motor skills and a mirror. Compared to the 4-step method above it does not bear any advantages. The procedure is as follows:

- Apply a hot compress to both eyes for 5 minutes once to twice per day.
- After the hot compress, sit in front of a mirror, use a moist Q-tip soaked in a cup of water with a drop of baby shampoo. Rub along the lid margins while tilting the lid outward with the other hand.
- While still in front of mirror, place small drop of antibiotic ophthalmic ointment (e.g. erythromycin**)** in lower conjunctival sac while pulling lid away from eye with the other hand.
- This coupled with a mild massage mechanically empties glands located at the lid margin (Meibomian, Zeiss, and Moll glands).

3. **Antibiotic treatment.**

   The use of an ointment on the eyelid margin immediately after lid scrubbing helps to increase patient comfort. The choice here is usually Erythromycin eye ointment or Tobradex eye ointment (steroid-antibiotic combination). In addition, the antibiotics help to further reduce the bacterial load on the eyelids

4. **Oral tetracyclines** (doxycycline or minocycline): can be used for about 3 months in cases of recalcitrant Meibomian Gland Dysfunction (MGD) cases. Tetracycline antibiotics affect the meibomian gland secretions, inhibit bacterial lipases as well as reduce the eyelid bacterial load.

5. **Anti-inflammatory treatment**

   Castor oil has been used traditionally in folk medicine as an anti-inflammatory remedy for the treatment of blepharitis. The main ingredient in Castor oil is ricinoleic acid. Castor oil could either increase or decrease eyelid inflammation depending on whether it is used only once or for many days. Eyelid inflammation may increase initially after starting treatment but with repeated use over a week, the blepharitis inflammation will be reduced.

Patient Teaching

1. Encourage the patient to participate in eyelid care.
2. Show him how to use a cotton-tipped applicator or a clean washcloth to remove scales from his eyelids. Instruct him to do it daily.
3. Demonstrate how to apply warm compresses.

You now know the signs and symptoms of blepharitis. Let us look at another inflammatory condition known as uveitis.

UVEITIS

What is Uveitis?

Uveitis is an intraocular eye disorder. It involves all inflammatory processes of the middle layers of the eye, also called the uveal tract or uvea. The uvea includes the iris (coloured part of the eye), choroid (a thin membrane containing many blood vessels), and ciliary body (the part of the eye that joins these together).

The uvea is very important because its many veins and arteries transport blood to the parts of the eye that are critical for vision. Uveitis may occur as *anterior uveitis,* which affects the iris and the ciliary body*, or posterior uveitis* that affects the choroid and the retina.

Causes of Uveitis

In a large number of cases, the cause of uveitis are not well known, but it is often related to stress.

Uveitis has many potential causes, including infection with a virus, fungus, bacteria or parasite, inflammatory disease affecting other parts of the body, or injury to the eye.

Types of Uveitis

1. *Iritis* is the most common form of uveitis. It affects the iris and is often associated with autoimmune disorders such as rheumatoid arthritis. Iritis may develop suddenly and may last up to eight weeks, even with treatment.
2. *Cyclitis*is an inflammation of the middle portion of the eye and may affect the muscle that focuses the lens. This also may develop suddenly and last several months.
3. *Retinitis* affects the back of the eye. It may be rapidly progressive, making it difficult to treat. Retinitis may be caused by viruses such as shingles or herpes and bacterial infections such as syphilis or toxoplasmosis.
4. *Choroiditis* is an inflammation of the layer beneath the retina. It may also be caused by an infection such as tuberculosis.

Retinitis and choroiditis can each be caused by an autoimmune disease such as rheumatoid arthritis or lupus.

Clinical Presentation

1. The patient with anterior uveitis will complain of a dull ache in one eye, blurred vision, and sensitivity to light.
2. With posterior uveitis, the patient will report slight blurred vision or floating spots.

General signs and symptoms

These are:

1. Eye redness and irritation
2. Blurred vision
3. Eye pain
4. Increased sensitivity to light
5. Floating spots before the eyes

Diagnosis

The following tests are useful in the diagnosis of uveitis:

1. Slit-lamp examination findings in both anterior and posterior uveitis will reveal milkiness of the aqueous humor and inflammatory cells particles on the back of the cornea
2. Ophthalmoscopy will reveal active inflammatory fundal lesions involving the retina or choroid or both.
3. Serologic tests can detect toxoplamosis as the cause of posterior uveitis.

Treatment

Uveitis requires vigorous and prompt management, which includes treatment of any known underlying cause and application of a topical cycloplegic, such as 1% atropine sulfate. Additional therapy may involve applying topical and subconjunctival steroids. For severe uveitis, the patient may be given oral systemic corticosteroids

Nursing care

1. Encourage rest during the acute phase of uveitis
2. Administer prescribed drugs, including analgesics

Patient Education

1. Teach the patient how to instil eye drops
2. Explain the indication, dosage and adverse effects of prescribed drugs'
3. Instruct him to report adverse effects of systemic corticosteriods.
4. Recommend wearing of sunglasses to relieve photophobia
5. Urge the patient to seek follow-up care because of the strong likelihood of recurrence.

Complications

Untreated anterior uveitis progresses to posterior uveitis, which may lead to scarring cataracts, glaucoma and retinal detachment.

KERATITIS

What is Keratitis?

Keratitis is a condition in which the eye's cornea, the front part of the eye, becomes inflamed. The condition is often marked by moderate to intense pain and usually involves impaired eyesight.

Keratitis is also defined as an inflammation of the cornea — the clear, dome-shaped tissue on the front of your eye that covers the pupil and iris. Keratitis may or may not involve an infection. Non-infectious keratitis can be caused by a relatively minor injury, such as a fingernail scratch, or from wearing your contact lenses too long. Infectious keratitis can be caused by bacteria, viruses, fungi and parasites.

Types of Keratitis

1. Superficial keratitis involves the superficial layers of the cornea. After healing, this form of keratitis does not generally leave a scar.
2. Deep keratitis involves deeper layers of the cornea, and the natural course leaves a scar upon healing that impairs vision if on or near the visual axis. This can be reduced or avoided with the use of topical corticosteroid eye drops.

Causes of Keratitis

1. Keratitis has multiple causes, one of which is an infection of a present or previous herpes simplex virus secondary to an upper respiratory infection, involving cold sores.
2. *Amoebic keratitis:* amoebic infection of the cornea is the most serious corneal infection, usually affecting contact lens wearers. It is usually caused by Acanthamoeba.

Risk Factors

Factors that may increase the risk of keratitis include:

1. ***Contact lenses*:** wearing contact lenses increases ones risk of infectious and non infections keratitis. The risk typically stems from not disinfecting lenses properly, wearing contact lenses while swimming, wearing them longer than recommended, or using water or homemade solutions to store and clean lenses. Keratitis is more common in people who use extended-wear contacts, or wear contacts continuously, than in those who use daily wear contacts and take them out at night.
2. ***Reduced immunity*:** if the immune system is compromised due to disease or medications (diabetes is a common disease that decreases your body's resistance to infection), one is at higher risk of developing keratitis.
3. ***Warm climate*.** If one lives in a warm, humid climate, the risk of keratitis is increased, particularly if plant material gets into one of the eyes. Plant material can scratch the corneal epithelium and chemicals from the plant can cause an inflammation, which may then lead to an infection.

4. ***Corticosteroid:.*** use of corticosteroid eyedrops to treat an eye disorder can increase your risk of developing keratitis or worsen existing keratitis.
5. ***Eye injury:*** if one of your corneas has been damaged from an injury in the past, you may be more vulnerable to developing keratitis.

Responsible Pathogens

1. ***Bacterial keratitis*****.** this can come from an injury or from wearing contact lenses. The bacteriums usually involved are Staphylococcus aureus and for contact lens wearers Pseudomonas aeruginosa
2. ***Fungal keratitis:*** the fungus responsible for fungal keratitis is fusarium.
3. ***Viral keratitis***
   - *Herpes simplex keratitis*: viral infection of the cornea is often caused by the herpes simplex virus which frequently leaves what is called a 'dendritic ulcer'.
   - Herpes zoster keratitis
4. ***Onchocercal keratitis*****:** which follows O. volvulus infection by infected blackfly bite. The blackfly usually lives near fast-flowing African streams, so the disease is also called "river blindness“.

Other Causes of Keratitis

1. Exposure keratitis
2. Photokeratitis - keratitis due to intense ultraviolet radiation exposure (e.g. snow blindness or welder's arc eye.)
3. Ulcerative keratitis
4. Contact lens acute red eye (CLARE) - a non-ulcerative sterile keratitis associated with colonization of Gram-negative bacteria on contact lenses
5. Severe allergic response may lead to corneal inflammation and ulceration (i.e. vernal keratoconjunctivitis).
6. Feline eosinophilic keratitis - affecting cats and horses; possibly initiated by feline herpes virus 1 or other viral infection.

Signs and Symptoms of Keratitis

1. Eye redness
2. Eye pain
3. Excess tears or other discharge from your eye
4. Difficulty opening your eyelid because of pain or irritation
5. Blurred vision
6. Sensitivity to light (photophobia)
7. An itchy, burning or gritty feeling in your eye
8. Swelling around the eye
9. A feeling that something is in your eye

Diagnosis

Keratitis is sometimes mistaken for allergic conjunctivitis, and so it is important to make an effective diagnosis and provide the appropriate treatment. Diagnosis can be done through the following tests:

1. ***Eye examination:*** includes an effort to determine how well the client can see (visual acuity), usually using standard eye charts.
2. ***Slit-lamp examination:*** examines eyes with a special instrument called a *slit* l*amp* which provides a bright source of light and magnification. The instrument is called a slit lamp because it uses an intense line of light — a slit-like beam — to illuminate the cornea, iris, lens, and the space between the iris and cornea. The light allows the doctor to view these structures with high magnification to detect the character and extent of keratitis, as well as the effect it may have on other structures of the eye.
3. ***Laboratory analysis*****:** a sample of tears or some cells from the cornea are taken for laboratory analysis to determine the cause of keratitis and how best to treat it.

Treatment of Keratitis

Treatment depends on the cause of the keratitis. Infectious keratitis generally requires antibacterial, antifungal, or antiviral therapy to treat the infection. This treatment can involve prescription eye drops, pills, or even intravenous therapy. Over-the-counter eye drops are typically not helpful in treating infections. In addition, contact lens wearers are typically advised to discontinue contact lens wear and discard contaminated contact lenses and contact lens cases.

Antibacterial drugs may include common eye ointments such as chlorampenical, tetracycline, and other antibacterial solutions that can be bought commercially, such as i Quixin (levofloxacin), Zymar (gatifloxacin), Vigamox (moxifloxacin), Ocuflox (ofloxacin — available generically).

Steroid containing medications should not be used for bacterial infections, as they may exacerbate the disease and lead to severe corneal ulceration and corneal perforation. These include Maxitrol (neomycin+polymyxin+dexamethasone — available generically), as well as other steroid medications. One should consult an ophthalmologist or optometrist for treatment of an eye condition. Some infections may scar the cornea to limit vision. Others may result in perforation of the cornea, (an infection inside the eye), or even loss of the eye. With proper medical attention, infections can usually be successfully treated without long-term visual loss.

Treatment of Non-infectious keratitis

Treatment of non-infectious keratitis varies depending on the cause. However, for uncomplicated cases in which, for example, keratitis is caused by a scratch or prolonged wearing of contact lens, a 24-hour eye patch and topical eye medications often may be all that's necessary.

Treatment of Infectious keratitis

Treatment of infectious keratitis varies, depending on the cause of the infection:

a. *Bacterial keratitis*. For mild bacterial keratitis, antibacterial eyedrops may be all you need to effectively treat the infection. If the infection is moderate to severe, you may need to take oral antibiotics to get rid of the infection. It may also be necessary to use corticosteroid eyedrops to reduce the inflammation of bacterial keratitis.

b. *Fungal keratitis***:** keratitis caused by fungi typically requires antifungal eyedrops and oral antifungal medication.

c. *Viral keratitis*: if a virus is causing the infection, antiviral eyedrops and oral antiviral medications may be effective. But these medications may not be able to eliminate the virus completely, and viral keratitis may come back in the future.

d. *Acanthamoeba keratitis***:** Keratitis that is caused by the tiny parasite acanthamoeba can be difficult to treat. Antibiotic eye drops may be helpful, but some acanthamoeba infections are resistant to medication. Severe cases of acanthamoeba keratitis often require a corneal transplant (keratoplasty).

If keratitis doesn't respond to medication, or if it causes permanent damage to the cornea that significantly impairs vision, the doctor may recommend a corneal transplant.

Complications of Keratitis

Potential complications of keratitis include:

1. Chronic corneal inflammation
2. Chronic or recurrent viral infections of your cornea
3. Open sores on your cornea (corneal ulcers)
4. Corneal swelling and scarring
5. Temporary or permanent reduction in your vision
6. Blindness

You now know how to care for a client with keratitis. Let us now learn about corneal ulceration.

CORNEAL ULCERATION

The cornea was described in section 4.4 of this unit. Can you remember what it is? Write your description in the following activity.

Activity 8

Write a description of the cornea in your notebook and then compare it with the one given in the following discussion.

The Cornea is part of the outer protective layer of the eyeball. It is dome shaped, transparent structure fitting into the surrounding sclera. The Cornea is convex, a vascular and highly sensitive. The site where the cornea becomes continuous with the sclera is called the corneal limbus. Corneal ulcers produce scaring or perforation. They occur in the central or marginal area, varying in shape and size, and may be singular or multiple.

Aetiological factors

The causes include:

1. ***Bacterial infection*** such as Staphylococcus aureus Staphylococcus epidermis and Streptococcus pneumoniae
2. ***Viral infection,*** such as, Herpes Simplex type I and Varicella zoster
3. ***Fungi*** may also cause slow growing ulcers, especially Candida ulbicans and ephalosporium
4. The **protozoan** Acathamoeba
5. Vitamin A or protein deficiency
6. When the eyelids do not close properly to protect and moisten the cornea, corneal ulcers may develop from dryness and irritation, even without an infection.
7. Foreign body lodging in the eye may scratch the cornea

8. Chemical and mechanical injuries which may cause inflammation leading to infection.
9. The eye can be irritated by a contact lens.
10. Reaction to toxins and allergens
11. Traditional eye medicines are a major risk factor in the current epidemic of corneal ulceration in developing countries (Bulletin of the World Health Organization, 2001).

Pathophysiology of Corneal Ulceration

The corneal epithelium is normally an effective barrier against microorganisms.
Once it is compromised from disease or trauma, the underlying stroma/layer becomes an excellent culture medium for a variety of organisms. Ineffective closure of the eyelid will also predispose the eye to infection. The client's eyes will therefore tear more than usual because the cornea produces tears to reduce irritation. There will also be increased sensitivity to light due to irritated nerve endings on the cornea, and blurred vision due to inability of the cornea to provide the proper refractive surface.

Clinical Manifestations of Corneal Ulceration

The common clinical manifestations include:

1. Pain due to irritated nerve endings
2. Sensitivity to light
3. Increased tear production
4. The patient may complain of foreign body sensation due to irritation
5. There will be a red eye due to hyperaemia
6. There will be photophobia due irritated nerve endings
7. Blurred vision due to inability of the cornea to provide good refractive surface
8. Eventually, a whitish yellow spot of pus may appear in the cornea.
9. Ulcers may develop over the entire cornea and may penetrate deeply.
10. Additional pus may accumulate behind the cornea.

11. Serious lesions may rapture if the eye is rubbed

Management

The goal of management is to eradicate the cause, prevent further injury to the cornea and promote comfort and healing. The following should be done in management:

Health History of present illness:

1. Ask for any specific eye complaints.
2. Record any changes in vision that the client has observed.
3. If the client reports pain, ask exactly about its location and the nature, if it is stabbing, sharp or aching.
4. Document if they have any sensitivity to light like photophobia.
5. Record of any discharge and describe the nature, whether it is tears, purulent or crusting of the eyelids or eye lashes.
6. Note also if they feel dry and irritated.
7. Observe for redness or swelling of the lids, eyes or the periorbital area.

Past Medical History

1. Obtain a good history of past medical problems from the patient who reports with eye problems. Be alert for conditions like:
    - Diabetes Mellitus since elevated sugar levels can cause blurring of vision and permanent changes in the retina which can cause blindness.
    - Neurologic disorders like brain tumours, head injuries and strokes can impair vision.
    - Thyroid disease as in hyperthyroidism may cause exophthalmos (bulging eyes).
    - Hypertension can cause changes in the blood vessels of the eyes and may eventually lead to vision loss.
2. Note any eye injury or previously diagnosed eye disease including when they last received therapy.

3. Get a record of the current medication that is being used as some drugs may cause temporal or permanent changes in visual acuity or colour vision like digitalis, corticosteroids, indomethacin and sulfisoxazole.
4. Other medications can contribute to development of glaucoma or cataracts

Family History

Find out of any history of some conditions like diabetes in the client's family or any known eye diseases.

Functional Assessment

Get a record of the client's occupation, roles and usual activities and be alert of activities that may pose a risk to the eyes

Physical Assessment

1. Inspect for tilting of the head or squinting as this may symbolize difficulties with vision.
2. Assess for symmetry in the appearance of both eyes that is whether they are the same distance from the nose, the same size and of the same degree of prominence.
3. On inspection you may notice eye congestion. If the patient has a bacterial ulcer a purulent discharge may be observed.
4. Examination of the cornea may show sterile hypopyon which moves as the patient tilts the head
5. For corneal inspection, observe by directing a light at it from the side using several angles. The cornea normally, should be transparent, smooth, shiny and bright. Any cloudy areas or specks may be the result of accidents or injuries.
6. Assess for the blink reflex by, for example, moving an object or your finger towards the clients face. The client with vision will blink. This reflex can also be assessed by expelling a syringe of air toward the eye.

Investigations

Make sure that the following investigations are carried out:

- ***Measurement of vision***

Measure vision by testing each eye separately, then both eyes together. Visual acuity test measures both distant and near vision. The eye or snellen's chart is a simple tool to measure distant vision. For clients who cannot read or count, use hand motion acuity and they will tell the direction your hand is moving

- ***Laboratory investigations***
  i. Cultures and smears of corneal swabs help diagnose infections. A sample of the exudates is obtained before antibiotics or topical anaesthetics are instilled. Take swabs from any ulcerated or inflamed areas. Culture and sensitivity testing of the corneal scraping may help to identify the causative organism
  ii. Corneal Staining consists of placing fluorescein or other topical dye into the conjunctival sac. The dye outlines irregularities of the corneal surface that are not easily visible. Corneal staining is mainly used for corneal trauma, problems caused by a contact lens, or the presence of foreign bodies, abrasions, ulcers or other corneal disorders. The procedure is non-invasive and is performed under aseptic conditions. The dye is applied topically to the eye, and the eye is then viewed through a blue filter. The non-intact areas of the cornea stain a bright green colour
  iii. Slit light examination helps to assess the ulcers' depth.

Medical and Surgical Management

Corneal Ulceration is an emergency that should be treated immediately to preserve vision.

Eye irrigation

Irrigations are done to remove irritating chemicals from the eye. Sterile normal saline or plain water are the best solutions to use.

Chemotherapy

1. Sympathomimetics like epinephrine bitartrate (epitrate) helps to decrease corneal congestion.
2. Anesthetics used to block sensation in the external eye on removal of sutures after surgery or foreign bodies.
3. Cycloplegics prevent accommodation
4. Antifungals like natamycin which is effective against some fungal infections of eye. Antivirals like idoxuridine (herplex) for treatment of herpes simplex.
5. Anti inflammatory drugs like predinisolone acetate for prevention of redness and swelling because of inflammation.
6. Analgesics such as Panadol are administered for relief of pain
7. For infection related ulcers therapy call for systemic and topical broad-spectrum antibiotics.
8. Antibiotics like gentamycin ophthalmic are given for treatment or prevention of eye infection.
9. Chlorhexidine is used in the treatment of the eyes. It is prepared at the appropriate strength of 0.02% solution in water. It is an effective treatment for Acanthamoebainfection of the cornea. In two small clinical trials in India and Bangladesh, 0.2% chlorhexidine was superior to natamycin in treating a range of fungi causing keratitis (Journal of Community Eye Health, 1999).

Eye Surgery

1. Surgical intervention is done to aid the healing process. Tarsorrhaphy may be done. This is the suturing of the eyelid to decrease blinking and to promote healing.
2. When the cornea is injured by infection or trauma, scar tissue may form obstructing light from entering the eye. This causes varying degrees of vision impairment as the cornea becomes opaque. Treatment for corneal opacity is removal of the

scarred cornea and replacement with a healthy one. This procedure is called keratoplasty.

Nursing Care Using a Nursing Care Plan Format

In fundamentals of learning you learnt how to use the nursing care process. You will apply it in the nursing care of a patient with corneal ulceration..

Problem 1: Eye pain

Nursing diagnosis: Pain related to irritated corneal nerve endings from trauma or postoperatively, evidenced by verbalizations.

Nursing Goal: The patient will be relieved of pain in the next 6 hours.

Nursing intervention and rationale:

- ✓ Assess for pain, the nature, degree and location of pain
- ✓ Encourage her to use some non pharmacological techniques that could divert her attention from the pain if mild, like listening to soft soothing music, or tell her a story or explain to her about meditation.
- ✓ Ensure her room is not bright but dim as light can precipitate pain
- ✓ Advise patient to wear dark glasses for photophobia
- ✓ Advise the patient to keep the eyes closed to avoid blinking to precipitates pain
- ✓ If the pain is severe, notify the doctor for further management
- ✓ Administer analgesics as prescribed
- ✓ Provide analgesics

Evaluation: The patient states pain reduction or absence and is relaxed after 6 hours. This is expressed by a calm facial expression and verbalisation

Problem 2: Disturbed sensory perception

Nursing diagnosis: Disturbed sensory perception related to altered reception, transmission and interpretation of visual stimuli, trauma to the eye or patching.

Nursing Goal: The patient will be able to adapt to vision impairment.

Nursing intervention and rationale:

- ✓ Keep the patient in a low bed to allow for easy climbing in and out of bed
- ✓ Place the call button near her bed if available so that she is able to call attention in cases where she needs anything
- ✓ Remove all obstacles in the room that can cause him or her to fall
- ✓ Assist patient with activities of daily living

Evaluation: The patient has no falls or other traumatic injuries. The patient is able to use assistive devices and techniques to maintain as much independence as possible. The patient makes adjustments in lifestyle to accommodate visual change.

Problem 3: Risk of injury

Nursing diagnosis: Risk of injury related to trauma or irritation.

Nursing Goal: The patient will have decreased risk of injury.

Nursing intervention and rationale:

- ✓ Protect the eye with an eye patch if no blinking is noted to prevent light from damaging the eye
- ✓ Instil or administer prescribed artificial tear to moisturize the eyes.
- ✓ Instruct patient not to impose stress on the eye by rubbing, leaning forward, straining or lying on the affected side.
- ✓ Encourage patient to take stool softeners like lots of fluid and roughage diet to avoid straining on constipation.
- ✓ Instruct her to call for help if she needs anything or wants to go to the toilet or she should lean on walls and furniture when moving.
- ✓ Orientate the patient to the environment
- ✓ Place the call button near her bed if available so that she is able to call attention in cases where she needs anything
- ✓ Remove all obstacles in the room that can cause her to fall
- ✓ Assist her with her activities of daily living
- ✓ Provide an aid for mobilisation e.g. holding or walking stick

Evaluation: The patient avoids potentially harmful activities like rubbing the eyes, bending forward etc.

Problem 4: *Anxiety*

Nursing diagnosis: Anxiety related to threat to body image, uncertain outcome and lack of knowledge of the condition manifested by restlessness and lack of sleep.

Nursing Goal: The patient will have reduced anxiety within 24 hours.

Nursing intervention and rationale:

- ✓ Give psychological care to the patient to allay anxiety. Assure the patient that everything possible is being done to better the condition of the eye.
- ✓ Explain all the procedure being done on her and why to gain cooperation and allay anxiety. Provide a good clear explanation at every stage of management to help alleviate fear and anxiety
- ✓ Pay attention to all her grievances and try as much as possible to answer all her questions. Refer those you fail to answer to other members of the health care team.
- ✓ Acknowledge that it is normal for her to fear vision loss and respond promptly to her needs
- ✓ Explain to the patient the condition and disease prognosis
- ✓ Explain the importance of frequent drug instillation
- ✓ Speak to the patient before touching them

Evaluation: The patient states a reduction in anxiety and is relaxed within 24 hours as she verbalises less questions. The patient has the necessary knowledge about the condition.

***Problem 5*: Ineffective therapeutic regimen management**

Nursing diagnosis: Ineffective therapeutic regime management related to lack of understanding of self care measures and treatment of visual impairment.

Nursing Goal: The patient will be able to adhere to plan of care and have effective treatment regimen management.

Nursing intervention and rationale:

- If medication is indicated for the patient, review with her the procedure and have a family member present so that they help each other at home.
- Explain the importance of medication for her quick recovery
- Encourage her to observe review dates and to come back to hospital if she or he experiences difficulties at home..
- Supplement all the verbal instructions with written information.

Evaluation: The patient is demonstrating appropriate self-care by taking the prescribed plan of care and is managing appropriately. She carries out the plan of care and participates in rehabilitation programs.

Problem 6: Photophobia

Nursing diagnosis: Photophobia related to high sensitivity to light evidenced by constant closure of eyes and verbalisation

Nursing Goal: The patient will have reduced photophobia

Nursing intervention and rationale:

- Explain to the patient the reason for the photophobia
- Nurse the patient in a dark room to avoid eye irritation
- Advise the patient to wear sunny glasses

Evaluation: The patient verbalises reduction in photophobia

Complications of Corneal ulceration

The complications may include the following:

1. Corneal Ulcers may heal with treatment but leave a cloudy, fibrous material that causes scarring and impairs vision.
2. There may be deep-seated infection.
3. There may be perforation of the cornea.
4. Displacement of the iris, eye destruction, uveitis, Blindness

Psychosocial Care

1. Pace your interview to match the learning needs and style of the individual client.
2. Allow the client the opportunity to express fear or anxiety regarding any possible change in vision status.
3. Refer clients who are newly diagnosed with permanent vision impairment to local resources and support groups.
4. Explain all diagnostic procedures, restrictions and follow-up care to the client scheduled for tests.
5. Offer large print or auditory educational materials for the client with decreased visual acuity.
6. Ask the client about vision problems in any other members of the family because some vision problems have a genetic component.
7. Test the visual acuity of both eyes immediately in any person who experiences an eye injury.

Rehabilitation

Rehabilitation involves health promotion and maintenance as follows:

1. Teach the client not to rub their eyes.
2. Teach the client who has discharge from one eye to use a clean cloth to wipe away the drainage and wash it thoroughly. If using a tissue, they must discard it immediately after. They must use a clean tissue or cloth on the other eye.
3. Identify if the client is at risk of eye injury as a result of the work environment or leisure activities.

4. Encourage them to wear eye protection when performing yard work, working in a wood or metal shop, using chemicals, or in any environment where drops or particular matter are air borne.

That brings us to the end of our discussion on corneal ulceration. Let us now move on to another inflammatory condition of the eye, namely, conjunctivitis.

CONJUNCTIVITIS

Conjunctivitis is an inflammation or infection of the conjunctiva, the thin transparent layer of tissue that lines the inner surface of the eyelid and covers the white part of the eye. Conjunctivitis, often called “pink eye,” is a common eye disease, especially in children. It may affect one or both eyes. Some forms of conjunctivitis can be highly contagious and easily spread in schools and at home. While conjunctivitis is usually a minor eye infection, sometimes it can develop into a more serious problem.

Causes/Types of Conjunctivitis

The cause of conjunctivitis varies depending on the offending agent. It may be caused by a viral or bacterial infection. It can also occur due to an allergic reaction to irritants in the air like pollen and smoke, chlorine in swimming pools, and ingredients in cosmetics or other products that come in contact with the eyes. Sexually transmitted diseases like Chlamydia and Gonorrhoea are less common causes of conjunctivitis.

Signs and symptoms

People with conjunctivitis may experience the following symptoms:

1. A gritty feeling in one or both eyes
2. Itching or burning sensation in one or both eyes
3. Excessive tearing
4. Discharge coming from one or both eyes
5. Swollen eyelids

6. Pink discoloration to the whites of one or both eyes
7. Increased sensitivity to light

Types of Conjunctivitis

There are three main categories of conjunctivitis. These are:

- allergic,
- infectious, and
- chemical conjunctivitis.

Let us look at each in turn.

- ***Allergic Conjunctivitis***

Allergic conjunctivitis occurs more commonly among people who already have seasonal allergies. At some point they come into contact with a substance that triggers an allergic reaction in their eyes e.g., pollen, skin dander, spring flowering, etc.

- ***Bacterial Conjunctivitis***

Bacterial Conjunctivitis is an infection most often caused by *staphylococcal orstreptococcal bacteria* from the skin or *H. influenza* from the respiratory system. Infection can also occur by transmittal from insects, physical contact with other people, poor hygiene (touching the eye with unclean hands), or by use of contaminated eye makeup and facial lotions.

Ophthalmia Neonatorum is a severe form of bacterial conjunctivitis that occurs in newborn babies. This is a serious condition that could lead to permanent eye damage unless it is treated immediately. It occurs when an infant is exposed to Chlamydia or Gonorrhoea while passing through the birth canal.

- ***Chemical Conjunctivitis***

Chemical Conjunctivitis can be caused by irritants like air pollution, chlorine in swimming pools, and exposure to noxious chemicals, cosmetics, smoke, etc.

Diagnosis

Conjunctivitis can be diagnosed through a comprehensive eye examination. Testing, with special emphasis on evaluation of the conjunctiva and surrounding tissues, may include:

1. *Patient history:* to determine the symptoms the patient is experiencing, when they began, and the presence of any general health or environmental conditions that may be contributing to the problem.
2. *Visual acuity measurements:* to determine the extent to which vision may be affected.
3. *Evaluation of the conjunctiva and external eye tissue:* using bright light and magnification.
4. *Evaluation of the inner structures of the eye:* to ensure that no other tissues are affected by the condition.
5. *Supplemental testing:* may include taking cultures or smears of conjunctival tissue, particularly in cases of chronic conjunctivitis or when the condition is not responding to treatment.

Using the information obtained from these tests, the optometrist can determine if one has conjunctivitis and advise on the treatment options.

Treatment

The treatment of conjunctivitis is directed at three main goals:

- To increase patient comfort
- To reduce or lessen the course of the infection or inflammation
- To prevent the spread of the infection in contagious forms of conjunctivitis

The appropriate treatment for conjunctivitis depends on its cause:

1. ***Allergic conjunctivitis***: the first step should be to remove or avoid the irritant, if possible. Cool compresses and artificial tears sometimes relieve discomfort in mild cases. In more severe cases, non-steroidal anti-inflammatory medications and antihistamines may be prescribed. Cases of persistent allergic conjunctivitis may also require topical steroid eye drops.

2. ***Bacterial conjunctivitis***: this type of conjunctivitis is usually treated with antibiotic eye drops or ointments. Improvement can occur after three or four days of treatment, but the entire course of antibiotics needs to be used to prevent recurrence.

3. ***Viral Conjunctivitis*****:** there are no available drops or ointments to eradicate the virus for this type of conjunctivitis. Antibiotics will not cure a viral infection. Like a common cold, the virus just has to run its course, which may take up to two or three weeks in some cases. The symptoms can often be relieved with cool compresses and artificial tear solutions. For the worst cases, topical steroid drops may be prescribed to reduce the discomfort from inflammation, but do not shorten the course of the infection. Some doctors may perform an ophthalmic iodine eyewash in hope of shortening the course of the infection. This newer treatment has not been well studied yet; therefore no conclusive evidence of the success exists.

4. ***Chemical Conjunctivitis***: treatment for chemical conjunctivitis requires careful flushing of the eyes with saline and may require topical steroids. The more acute chemical injuries are medical emergencies, particularly alkali burns, which can lead to severe scarring, intraocular damage or even loss of the eye.

Patient Education on Self Care

1. Show the patient proper hand washing techniques. Because some forms of conjunctivitis are highly contagious, urge the patient and family members to avoid sharing wash clothes, towels and pillows.

2. Caution the patient against rubbing the infected eye. This can spread the infection to the other eye and other persons.
3. Warn the patient with “cold sores” to avoid kissing others on the eyelids to prevent the spread of the disease.
4. Demonstrate how to instil eyedrops and ointments correctly-without touching the eye or eyelashes with the bottle tip.
5. Explain the purpose, dosage and possible adverse effects of drug therapy and emphasise the importance of completing the prescribed course.
6. Stress the importance of wearing safety glasses if the patient works near chemical irritants.
7. If conjunctivitis results from a STI organism such as N. gonorrhoea, review the methods for preventing disease transmission.

Checkpoint questions

What is conjunctivitis?

Explain the common causes of conjunctivitis

Discuss the health education you will give to a patient with this condition.

You now know the causes and management of conjunctivitis. In the next section we shall discuss trachoma.

TRACHOMA

What is trachoma?

Have you ever heard of trachoma? What is it known for?

Trachoma is a specific type of infectious conjunctivitis caused by the Chlamydia trachomatis. It is known as the leading cause of the infectious blindness in the world.

Causes

Trachoma is caused by the bacterium Chlamydia trachomatis

Predisposing Factors

Blinding endemic trachoma occurs in areas with poor personal and family hygiene. Many factors are indirectly linked to the presence of trachoma including:

1. Lack of water, absence of latrines or toilets, poverty in general, flies, close proximity to cattle, crowding and so forth.
2. However, the final common pathway seems to be the presence of dirty faces in children that facilitate the frequent exchange of infected ocular discharge from one child's face to another.
3. Most transmission of trachoma occurs within the family especially in areas with inadequate water and poor hygiene states.

Transmission

1. *Primary transmission*: person-to-person transmission by ocular and respiratory secretions.
2. *Secondary transmission:* insect vectors such as houseflies.

W.H.O. Staging of Trachoma Infection

The World Health Organization recommends a simplified grading system for trachoma. The Simplified W.H.O. Grading System is as summarized below:

1. Trachomatous inflammation, follicular (TF) – Five or more follicles of >0.5 mm on the upper tarsal conjunctiva
2. Trachomatous inflammation, intense (TI) – Papillary hypertrophy and inflammatory thickening of the upper tarsal conjunctiva obscuring more than half the deep tarsal vessels
3. Trachomatous scarring (TS) - Presence of scarring in tarsal conjunctiva.
4. Trachomatous trichiasis (TT) – At least one ingrown eyelash touching the globe, or evidence of epilation (eyelash removal)

5. Corneal opacity (CO) – Corneal opacity blurring part of the pupil margin

Signs and Symptoms of Trachoma

- Eye discharge, swollen eyelids
- Turned-in eyelashes
- Swelling of lymph nodes in front of the ears
- Corneal scarring

Treatment

The World Health Organization (WHO, 2013) has set a goal of eliminating blinding trachoma as a public health concern by 2020. National governments in collaboration with numerous non-profit organizations implement trachoma control programs using the WHO recommended **SAFE** strategy, which includes:

- **S**urgery to correct advanced stages of the disease
- **A**ntibiotics to treat active infection, using Zithromax (azithromycin)
- **F**acial cleanliness to reduce disease transmission
- **E**nvironmental change to increase access to clean water and improved sanitation

Antibiotic Selection:

WHO recommends azithromycin (single oral dose of 20 mg/kg) or topical tetracycline (one percent eye ointment twice a day for six weeks). Azithrtomycin is preferred because it is used as a single oral dose. Although it is expensive, it is generally used as part of the international donation program organized by Pfizer through the International Trachoma Initiative (ITI). Azithromycin can be used in children from the age of six months and in pregnancy.

Prevention of Trachoma Infection

1. ***Antibiotic therapy:*** WHO Guidelines recommend that a region should receive community-based, mass antibiotic treatment when the prevalence of active trachoma is high among one to nine year-old children. Annual treatment should continue until the prevalence drops below five percent. At lower prevalence, antibiotic treatment should be family-based.
2. ***Facial cleanliness***: children with grossly visible nasal discharge, ocular discharge, or flies on their faces are at least twice as likely to have active trachoma as children with clean faces.
3. ***Intensive community-based health education*** **programs**: promoting face washing can significantly reduce the prevalence of active trachoma, especially intense trachoma (TI).
4. ***Environmental improvement***: modifications in water use, fly control, latrine use, health education and proximity to domesticated animals have all been proposed to reduce transmission of Chlamydia trachoma. Particular attention is required for environmental factors that limit clean faces.

Prognosis

With treatment, the prognosis is good, but if not treated properly with oral antibiotics, the symptoms may escalate and cause blindness, which is the result of ulceration and consequent scarring of the cornea.

- Untreated, repeated trachoma infections result in entropion, a painful form of permanent blindness when the eyelids turn inward, causing the eyelashes to scratch the cornea.
- Surgery may also be necessary to fix eyelid deformities

You now know the causes, transmission, signs and symptoms and treatment of trachoma. Let us move on to another disorder of the eye known as the stye.

STYE

Styes are quite common in our communities and it is possible that you have had one or seen somebody with one. How would you describe it? Write your answer in the following activity.

Activity 9

Write down in your notebook your description of a stye

Well done! Now compare your description with the one given in the following discussion.

A stye is a tender, painful red bump located at the base of an eyelash or under the inside of the eyelid. The medical term for a stye is a *hordeolum* (plural, *hordeola)*.

A stye results from an acute infection of the oil glands of the eyelid (meibomian glands). The infection occurs when these glands become clogged. The term external hordeolum is used to refer to a stye that develops at the base of an eyelash, involving a hair follicle of the eyelid. Whereas the term internal hordeolum refers to a stye arising due to an inflamed meibomian gland under the eyelid.

A stye is sometimes confused with a chalazion, which is a cyst or a specific type of scarring (due to chronic inflammation) arising in the meibomian glands of the eyelid. In contrast to a sty, a chalazion is usually painless.

Causes of a Stye

Styes are generally caused by a Staphylococcus aureus bacterial infection. Although they are particularly common in infants, styes are experienced by people of all ages but can also be triggered by stress or poor nutrition. Using the same razor to shave hair near the eyes and the moustache can also spread staphylococcus bacteria, potentially leading to styes or other eye infections. The bacteria is contagious, so care should be taken to avoid touching the eye or sharing cosmetics, towels, or washcloths. Styes will last up to 3 weeks without treatment or a week with treatment.

Susceptibility

1. Styes are very common and people of all ages can develop a stye, males and females are equally affected.
2. People with certain chronic conditions, such as, diabetes mellitus, chronic blepharitis (inflammation of the eyelid), seborrhoea, and chronic debilitating illnesses are more prone to develop styes than the general population.
3. In many susceptible people, stress seems to trigger the development of a stye.

Signs and Symptoms

1. The first signs of a stye are tenderness, pain, and redness in the affected area.
2. Later symptoms include itching, swelling, watering of the eye, sensitivity to light, and discomfort when blinking.
3. A yellowish bump sometimes develops at the centre of the swelling.

Treatment

1. Application of a warm compress or warm washcloth to the affected area for 10 minutes, four to six times a day, can speed rupture of the sty and aid in the relief of symptoms. A sty should not be pressed or squeezed to facilitate drainage.
2. If a sty persists for several days, a doctor may lance (drain) the infection under local anaesthesia.
3. Children who require surgical drainage of a sty may need a general anaesthetic.
4. Antibiotic ointments and/or steroid ointments sometimes are prescribed to treat a sty.
5. Systemic (oral) antibiotics may be recommended for persistent or multiple styes, but this is rare.
6. Pain medications may be used to alleviate pain and tenderness.
7. Contact lenses and eye makeup should never be worn during treatment for a stye.

Prognosis

1. A stye is harmless in the majority of cases.

2. In most cases, a sty ruptures on its own within a few days, leading to relief from symptoms.
3. Some people may require medical or surgical treatment of a sty, if it does not rupture.
4. A sty does not cause intraocular damage (damage to the eye). Styes often recur. Complications of styes are rare.

Complications

Complications of a stye are rare, but may include the following:

1. The infection may spread to other eyelash follicles, leading to multiple styes.
2. A chalazion (a form of scarring of the glands in the eyelid that may include the formation of cysts) is the most common complication that develops from a stye.
3. Other potential complications include a generalized infection (cellulitis) of the eyelid, and improper drainage of a sty may lead to deformity or disruption of eyelash growth.
4. Progression of a stye to a systemic infection (spreading throughout the body) is extremely rare, and only happens in a few instances

Prevention of a Stye

While it is impossible to completely prevent the development of a stye good hygienic practices, including proper hand washing, can help to prevent it. Other measures that can help prevent styes include:

- Never sharing cosmetics or cosmetic eye tools (such as lash curlers or eyelash combs) with others
- Keeping eye tools clean
- Discarding old or contaminated eye makeup
- Keeping all cosmetics clean
- Not touching the eye and surrounding areas.

Entropion

An entropion is a medical condition in which the eyelid folds inward. It is very uncomfortable, as the eyelashes constantly rub against the cornea and irritate it. This condition is most common in people over 60 years of age.

Risk Factors

1. Entropion is usually caused by genetic factors and very rarely it may be congenital when an extra fold of skin grows with the lower eyelid (epiblepharon). The upper or lower eyelid can be involved and one or both eyes may be affected. When entropion occurs in both eyes, this is known as bilateral entropion**.**
2. Trauma on the eye can lead to an entropion
3. Trachoma infection may cause scarring of the inner eyelid, which may cause entropion.

Symptoms

Symptoms of an entropion include the following:

1. Redness and pain around the eye
2. Sensitivity to light and wind
3. Sagging skin around the eye
4. Epiphora
5. Decreased vision, especially if the cornea is damaged

Treatment

Treatment is a relatively simple surgery in which excess skin of the outer lids is removed or tendons and muscles are shortened with one or two stitches. General anaesthesia is sometimes used before local anaesthetics are injected into the muscles around the eye. Prognosis is excellent if surgery is performed before the cornea is damaged.

CHALAZION

What is a chalazion?

A chalazion is also known as a meibomian gland lipogranuloma. It, is a cyst in the eyelid that is caused by inflammation of a blocked meibomian gland, usually on the upper eyelid. Chalazia differ from styes (hordeola) in that they are subacute and usually painless nodules. They may become acutely inflamed but, unlike a stye, they usually point inside the lid rather than on the lid margin. Figure 9 below shows a picture of a chalazion.

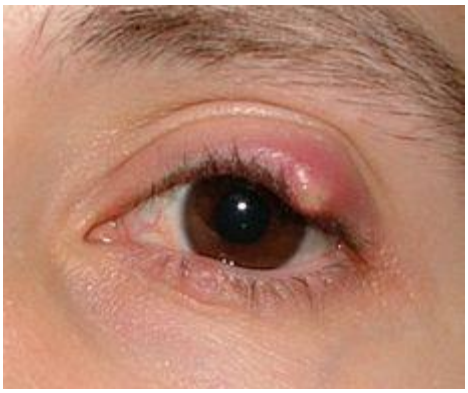

Figure 9: A Chalazion

Signs and Symptoms

The main signs and symptoms are:

1. Swelling on the eyelid
2. Eyelid tenderness
3. Sensitivity to light
4. Increased tearing
5. Heaviness of the eyelid

Treatment

The following measures can be used in the treatment of this condition:

- Topical antibiotic eye drops or ointment (e.g. chloramphenicol or fusidic acid) are sometimes used for the initial acute infection
- Corticosteroids may also be given to relieve inflammation
- Surgical to remove larger chalazia may be done.

Chalazion Surgery

Chalazion surgery is normally performed by an ophthalmologist at the hospital. This type of surgery is a simple procedure which is generally performed as a day operation and the patient does not need to remain in the hospital for further medical care. It is performed under local or general anaesthesia. The recovery process is easy and quite fast. Most patients experience some very minor discomfort in the eye which can be easily controlled by taking analgesia medication.

Postoperative Teaching

Teach the patient to:

1. Avoid getting water in the eye for up to 10 days after surgery. They may wash, bath or shower but they must be careful to keep the area dry and clean.
2. Avoid wearing makeup for at least one month after the operation.
3. Restrain from wearing contact lenses in the affected eye for at least eight weeks to prevent infections and potential complications
4. Administer eye drops to prevent infection and swellings in the eye, and to take pain medication to enable them cope with the pain and discomfort in the eyelid and eye.
5. Use a pad and protective plastic shield to apply pressure on the eye in order to prevent leakage of blood after the operation. This can be removed 6 to 8 hours after the procedure.

That marks the end of our discussion on chalazion and its management. You have one more short condition to consider before we come to the end of our topic on inflammatory conditions of the eye.

XEROPHTHALMIA

Xerophthalmia is a medical condition in which the eye fails to produce tears.
It is caused by a severe Vitamin A deficiency and is described as pathologic dryness of the conjunctiva and cornea. The conjunctiva becomes dry, thick and wrinkled. If untreated it can lead to corneal ulceration and ultimately to blindness as a result of corneal damage.

Other forms of dry eye are associated with aging, poor lid closure, scarring from previous injury, or autoimmune diseases such as rheumatoid arthritis and chronic conjunctivitis.

Treatment

Treatment can occur in two ways: treating symptoms and treating the deficiency:

- *Treatment of symptoms:* usually includes use of artificial tears in the form of eye drops, increasing the humidity of the environment with humidifiers, and wearing wrap around glasses when outdoors.
- *Treatment of the deficiency:* can be accomplished with a Vitamin A or multivitamin supplement or by eating foods rich in Vitamin A. Treatment with supplements and/or diet can only be successful if the disease has not progressed to corneal ulceration. If it has reached point only an extreme surgery can offer a chance of returning sight.

Prophylaxis of Xerophthalmia

Prophylaxis consists of periodic administration of Vitamin A supplements. WHO recommended schedule, which is universally recommended is as follows :

1. Infants 6–12 months old and any older children weighing less than 8 kg - 100,000 IU orally every 3–6 months
2. Children over 1 year and under 6 years of age - 200,000 IU orally every 6 months
3. Infants less than 6 months old, who are not being breastfed - 50,000 IU orally should be given before they attain the age of 6 months.

You have come to the end of our long topic on inflammatory conditions of the eye. In the next section we shall look at non-inflammatory conditions of the eye.

4.7 Non Inflammatory Conditions of The Eye

4.7.1 Eye Injury (Trauma)

The main types of eye injury are physical and chemical. Physical or chemical injuries can be a serious threat to vision if not treated appropriately and in a timely fashion. The most obvious presentation of ocular (eye) injuries is redness and pain of the affected eyes. However, this is not universally true, as tiny metallic projectiles may cause neither symptom. Tiny metallic projectiles should be suspected when a patient reports metal contact, such as, hammering a metal surface. Intraocular foreign bodies do not cause pain because there are no nerve endings in the vitreous humour and retina that can transmit pain sensations.

Causes of Eye Injuries

Some for the common causes are:

1. Flying pieces of wood, metal, glass, stone and other material are notorious for causing much of the eye trauma.
2. Sporting balls such as cricket ball, lawn tennis ball, squash ball), shuttle cock (from Badminton) and other high speed flying objects that can strike the eye.
3. Blunt trauma during, for example, a fistfight.

4. The games of young children such as bow-and-arrows can lead to eye trauma.
5. Road traffic accidents (RTAs) with head and facial trauma. The eye injuries are usually severe in nature with multiple lacerations, shards of glasses embedded in tissues, orbital fractures, severe hematoma, and penetrating open-globe injuries with prolapse of eye contents.

Effects of Eye Injury

1. **Closed globe injury or Non-penetrating trauma:** The eye globe is intact, but the seven rings of the eye are classically described as being affected by blunt trauma.
2. **Penetrating trauma:** The globe integrity is disrupted by a full-thickness entry wound and may be associated with prolapse of the internal contents of the eye.
3. **Perforating trauma:** The globe integrity is disrupted in two places due to an entrance and exit wound (through and through injury). This is a severe type of eye injury.
4. **Fracture of the orbit :** caused by blunt trauma, such as fist or ball injury, leading to fracture of the floor or medial wall of the orbit due to sudden increased pressure on the orbital contents.

Investigation

The goal of investigation is to assess the severity of the ocular injury so that you can implement a management plan as soon as possible. The usual eye examination should be attempted, and may require a topical anaesthetic in order to be tolerable.

The first step is to assess the external condition of the eye and orbit, and check for perforations, hyphema, uveal prolapse, or globe penetration. If the pupil is teardrop-shaped, and the anterior chamber is flat, then the paitent has a perforating injury of the cornea or limbal area.

Emergency Case

An emergency must be treated within minutes. This should include chemical burns of the conjunctiva and cornea.

Semi-urgent Cases

Semi-urgent cases must be managed within 1–2 days. They include orbital fractures and subconjunctival haemorrhages.

Management of Eye Injury

a) ***Irrigation of the eye***: the first line of management for chemical injuries is usually copious irrigation of the eye with isotonic saline or sterile water. In the case of chemical burns, one should not try to buffer the solution, but instead dilute it with copious flushing.
b) ***Patching*****:** depending on the type of ocular injury, either a pressure patch or shield patch should be applied. In most cases, such as those of corneal abrasion or the like, a pressure patch should be applied to ensure that some tension is applied to the eye, and that the patient cannot open the eye under the patch. In cases of globe penetration, pressure patches should never be applied, and instead a shield patch should be applied to protect the eye without applying any pressure. If a shield patch is applied to one eye, the other eye should be also be patched due to eye movement. This is because if the uninjured eye moves, the injured eye will also move involuntarily causing more damage.

c) ***Suturing****:* in cases of eyelid laceration, sutures may be a part of appropriate management by the primary care physician so long as the laceration does not threaten the canaliculi, is not deep, and does not affect the lid margins.

Complications

Multiple complications are known to occur following eye injury and the risk is higher with retinal tears, penetrating injuries and severe blunt trauma. Other possible complications are:

- Corneal scarring,
- hyphema,
- iridodialysis,
- post –traumatic glaucoma,
- uveitis,
- cataract,
- vitreous haemorrhage, and
- retinal detachment.

Common Conditions Associated With Eye Injury /Trauma

Common conditions associated with eye injury and trauma include:

1. Scratched Eye (Corneal Abrasion)

Getting poked in the eye or rubbing the eye when a foreign body is present are some of the common causes of abrasions to the eye's surface (corneal abrasions). Corneal abrasions are very uncomfortable and cause severe sensitivity to light. If you know something has scratched your eye, it's very important to seek treatment for your eye injury. Scratches also can make the eye susceptible to infection from bacteria or a fungus. Certain types of bacteria and fungi can enter the eye through a scratch and cause serious harm in as little as 24 hours. Even blindness can result. This is especially true if whatever scratched the eye is dirty or contaminated.

Remember also that infections from eye injuries such as scratches can originate from unexpected sources such as a baby's fingernails or tree branches. If you have a scratched eye, don't rub it. And don't patch your eye, either. Bacteria like dark, warm places to grow, and a patch might provide the ideal environment. Simply keep the eye closed or loosely tape a paper cup or eye shield over it. Then seek medical care as soon as possible to check out the type of eye injury.

2. Penetrating or Foreign Objects in the Eye

If a foreign object such as metal or a fishhook penetrates the eye, visit the health centre right away. Do not attempt to remove the object from the eye. This could cause even more injury to the eye. Metal foreign bodies can quickly form a rust ring and a significant scar. The eye care specialists should remove these foreign bodies as soon as possible.

3. Caustic Foreign Substance in the Eye (Chemical Burn)

Getting unexpectedly splashed or sprayed in the eye by substances other than clean, harmless water can be scary. Some substances burn or sting but are fairly harmless in the long run, while others can cause serious injury. The basic makeup of the chemical involved can make a lot of difference, such as:

- **Acid:** as a general rule, acids can cause considerable redness and burning but can be washed out fairly easily.
- **Alkali:** substances or chemicals that are basic (alkali) are much more serious but may not seem so because they don't cause as much immediate eye pain or redness as acids. Some examples of alkali substances are oven cleaners, toilet bowl cleaners and even chalk dust.

Chemical exposures and burns are usually caused by a splash of liquid getting in the eye, but they can be caused in other ways as well. For example, by rubbing the eyes and transferring a chemical from the hands to the eyes or by getting sprayed in the eye by hair spray or other aerosols. Advice clients who experience a splash in the eye to put their head under a steady stream of barely warm tap water for about 15 minutes. Let the water run into the eye and down the face. They should then seek medical care to see what is recommended for the eye injury. The patient should tell the health professional exactly what kind of substance got into the eye and what has been done about it. Depending on the substance, the effects of chemical exposures can cause eye injuries that range from minor irritation to serious eye damage and even blindness.

4. Eye Swelling

Eye swelling or puffiness can result from being struck in the eye by a baseball moving at a high speed. The best immediate treatment for this type of eye injury is an ice pack. The patient may have a simple black eye (bruising around the eye), an eye specialist should be seen to make sure there's no internal damage.

5. Subconjunctival Haemorrhages (Eye Bleeding)

This eye injury usually looks worse than it really is. A subconjunctival haemorrhage involves leakage of blood from one or more breaks in a blood vessel that lies between the white of the eye (sclera) and its clear covering (conjunctiva). Subconjunctival haemorrhages are quite common and can occur from even minor injury to the eye. It may be limited to a small sector of the eye, or it can extend over the entire eye, making the white sclera appear bright red. A subconjunctival haemorrhage is painless and does not cause temporary or permanent vision loss. No treatment is required. Over the course of several weeks, the blood will clear and the eye will return to a normal appearance.

6. Traumatic Iritis

Traumatic iritis is inflammation of the coloured part of the eye that surrounds the pupil (iris). It occurs after an eye injury. Traumatic iritis can be caused by a poke in the eye or a blow to the eye from a blunt object, such as a ball or hand. Traumatic iritis usually requires treatment. Even with medical treatment, there is a risk of permanent decreased vision.

7. Hyphemas and Orbital Blowout Fractures

A hyphema (high-FEE-mah) is bleeding in the anterior chamber of the eye, the space between the cornea and the iris. Orbital blowout fractures are cracks or breaks in the facial bones surrounding the eye. Hyphemas and blowout fractures are serious eye injuries and medical emergencies. They are caused by significant blunt force trauma to the eye and face, such as getting hit by a bat, baseball, hockey stick or getting kicked in the face.

Eye Foreign Body Symptoms

The main symptoms of a foreign body in the eye are:

1. Sharp pain in the eye followed by burning, irritation, tearing, and redness
2. Feeling that something is in the eye when moving the eye around while it is closed
3. Scratching sensation over the eye when blinking
4. Blurred vision or vision loss in the affected eye
5. Bleeding into the white part of the eye, which can be either a conjunctival haemorrhage or a subconjunctival haemorrhage (sometimes, this is associated with a penetrating injury.)
6. Blood layering in front of your iris, the coloured area of the eye, and behind the cornea, the clear dome on the front of your eye (This is called hyphema and is often a sign of significant injury).

Examinations and Tests

1. The first part of an eye examination is to evaluate vision with either a wall chart or a handheld chart.
2. The next portion of the examination, which is usually only performed by an ophthalmologist or eye specialised, is the slit lamp examination. During this test, the client sits on a chair with her chin on a support. The doctor shines a small slit of light into the eye and looks through a microscope. This helps to see the cornea, the iris, and the lens, as well as the fluid in the eye.
3. The ophthalmologist starts with a general examination of the visible portions of the eye. The eyelids, eyeball, and iris are examined.
4. During this part of the examination, the health professional looks to make sure that the pupil is symmetric and reacts properly to light, that there is no obvious injury to the eyeball, and that no visible foreign bodies are still in the eye.

5. During this first part of the examination, the eyelid may be inverted with a cotton swab to get a better view of the underside of it.
6. The eye may be numbed with pain medicine and a fluorescent dye may be applied.A blue light is then used to look for scratches on the cornea or evidence of leaking aqueous fluid (clear fluid that fills the front of the eyeball).
7. While the eye is numb, a tonometermay is used to check the pressure in the eye.
8. Depending on the severity of injury to the eye, the final portion of the examination involves dilating (enlarging) the pupil with eye drops.
9. Then, the inside of the eye and the retina is evaluated to ensure that there are no foreign bodies inside the eyeball itself or any damage to the retina.

Medical Treatment

1. For scratches on the cornea (called corneal abrasions), the usual treatment is an antibiotic ointment and/or antibiotic eyedrops and pain medicine. If the abrasion is large (greater than 50% of the corneal surface), then it may also be treated with a patch.
2. Any noted damage to the iris, the lens, or the retina requires immediate evaluation by an ophthalmologist and may or may not require surgery.
3. A ruptured eyeball requires surgery by an ophthalmologist.
4. If no other injury is noted, hyphema requires close follow-up care with an ophthalmologist.

Congratulations! You have come to the end of our discussion on common eye injuries. Now we are going to look at Glaucoma.

4.7.2 Glaucoma

What is glaucoma?

Glaucoma is an ocular disease characterised by raised Intraocular Pressure (IOP). If this pressure is not relieved, it may lead to damage of the optic nerve head and nerve bundles of the retina, eventually leading to vision loss.

Another definition of glaucoma describes it as a syndrome of progressive optic neuropathy, with a characterised appearance of damage of the optic nerve head and defects in retinal sensitivity leading to loss of visual function.

Pathophysiology

The major risk factor and focus of treatment for most glaucomas is the increased intraocular pressure. Intraocular pressure is a function of production of liquid aqueous humor by the ciliary body of the eye and its drainage through the trabecular meshwork. Aqueous humor flows from the ciliary bodies into the posterior chamber, bounded posteriorly by the lens and the zonule of Zinn and anteriorly by the iris. It then flows through the pupil of the iris into the anterior chamber, bounded posteriorly by the iris and anteriorly by the cornea. From here the trabecular meshwork drains aqueous humor via Schlemm's canal into scleral plexuses and general blood circulation. In open angle glaucoma there is reduced flow through the trabecular meshwork. In angle closure glaucoma, the iris is pushed forward against the trabecular meshwork, blocking fluid from escaping.

Types of Glaucoma

There are many different types of glaucoma. However , it can be classified as either **open angle glaucomas**, which are conditions of long duration (chronic), **or closed angle (angle closure)** glaucomas, which includes conditions occurring suddenly (acute).

i. Open angle Glaucoma

Chronic open-angle glaucoma (COAG) is the most common type of glaucoma. Its frequency increases greatly with age. This increase occurs because the drainage mechanism gradually becomes clogged with age. As a consequence, the aqueous fluid does not drain from the eye properly. The pressure within the eye, therefore, builds up painlessly and without symptoms. Furthermore, since the resulting loss of vision starts on the side (peripherally), people are usually not aware of the problem until the loss encroaches on their central visual area.

ii. Closed angle Glaucoma

Closed angle glaucoma is a relatively rare type of glaucoma. In this condition, the patient's intraocular pressure, which ordinarily is normal, can go up very suddenly (acutely). This sudden pressure increase occurs because the filtering angle becomes closed and blocks off the drainage channels. This type of glaucoma can occur when the pupil dilates (widens or enlarges). As a result, the peripheral edge of the iris can become bunched up against its corneal attachment, thereby causing the filtering angle to close. Thus, the problem in closed angle glaucoma is that the eye fluid is not able to access the drainage system (trabecular meshwork).

Risk Factors of Glaucoma

The major risk factors include:

1. Age over 45 years, family history of glaucoma
2. Black racial ancestry, diabetes
3. History of elevated intraocular pressure
4. Near-sightedness (high degree of myopia), which is the inability to see distant objects clearly
5. History of injury to the eye
6. Use of cortisone (steroids), either in the eye or systemically (orally or injected)

7. Farsightedness (hyperopia), which is seeing distant objects better than close ones (Farsighted people may have narrow filtering angles, which predispose them to acute (sudden) attacks of closed-angle glaucoma.)

Signs and Symptoms of Glaucoma

A sudden glaucoma attack may be associated with severe eye pain and headache,

- A red (inflamed) eye,
- Nausea, vomiting, and blurry vision.
- In addition, the high intraocular pressure may lead to corneal swelling (oedema), which causes the patient to see haloes around lights.

Diagnosis

1. *Tonometry:* which determines the pressure in the eye by measuring the tone or firmness of its surface.
2. *Ophthalmoscopy:* this procedure is done to examine the optic nerve at the back of the eye. Damage to the optic nerve, called cupping of the disc, can be detected in this way.
3. *Visual Field testing*: actually maps the visual fields to detect any early (or late) signs of glaucomatous damage to the optic nerve
4. *Gonioscopy*: the purpose of this test is to examine the filtering angle and drainage area of the eye
5. *Pachymetry*: determines the thickness of the cornea.

Treatment

1. Beta Blockers: these include timolol (Timoptic), levobunolol (Betagan), carteolol (Ocupress), and metipranolol (Optipranolol). Used once or twice daily, these drops are very effective.

2. Adrenergic agonists: they work in glaucoma by both reducing the production of fluid by the eye and increasing its outflow (drainage). The most popular adrenergic agonist is brimonidine (Alphagan).
3. Other members of this class of drops include epinephrine, dipivefrin (Propine), and apraclonidine (Iopidine). Carbonic anhydrase inhibitors work in glaucoma by reducing the production of fluid in the eye. Eye-drop forms of this type of medication include dorzolamide (Trusopt) and brinzolamide (Azopt). They are used two or three times daily.
4. Carbonic anhydrase inhibitors: are used as pills (systemically) to remove fluid from the body in patients with swelling (oedema) that is caused by fluid retention.
5. Oral forms of these medications used for glaucoma include acetazolomide (Diamox) and methazolamide (Neptazane).
6. Osmotic agents are an additional class of medications used to treat sudden (acute) forms of glaucoma where the eye pressure remains extremely high despite other treatments.
7. These medications include Isosorbide and Mannitol (given through the veins).

Surgical Intervention

1. *Trabeculectomy*: this is a delicate microsurgical procedure used to treat glaucoma. In this operation, a small piece of the clogged trabecular meshwork is removed to create an opening and a new filtering pathway is made for the fluid to exit the eye
2. *Iridectomy*: relieves pressure by excising part of the iris to re-establish the outflow of aqueous humor

Nursing Diagnoses

These are some of the points you need to consider in the nursing care:

1. Anxiety
2. Fear
3. High risk for injury
4. Knowledge deficit

5. Pain
6. Sensory or perceptual alteration

Nursing Interventions

1. For the patient with closed angle glaucoma, give medications as ordered and prepare him or her physically and psychologically for iridotomy.
2. After trabeculectomy, give medications as ordered to dilate the pupil
3. After surgery, protect the affected eye by applying an eye patch and shield. Position the patient on his back or on the unaffected side.
4. Administer pain medication as ordered
5. Encourage ambulation immediately after surgery
6. Encourage patient to express his concerns related to having a chronic condition.

Patient Education

1. Stress the importance of meticulous compliance with prescribed drug therapy to maintain low IOP and prevent optic disk changes that cause vision loss.
2. Explain all procedures and treatments, especially surgery, to help reduce the patient's anxiety.
3. Inform the patient that lost vision cannot be restored but that treatment can usually prevent further loss.
4. Instruct the family how to modify the patient's environment for safety.
5. Teach the patient the signs and symptoms that require immediate medical attention, such as sudden vision change or eye pain.

4.7.3 Cataract

What is a cataract?

A cataract is anopacity of the crystalline lens resulting in visual disturbance. It is also defined as lens opacity or cloudiness"(Smeltzer and Bare, 2004). Cataract extraction

is the surgical removal of the crystalline lens. Figure 10 below shows a picture of an eye cataract.

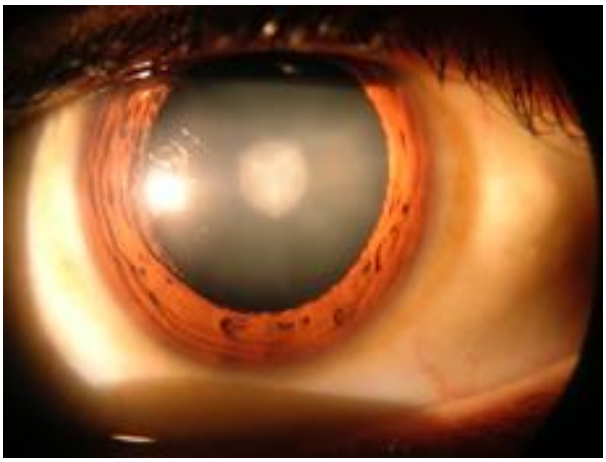

Figure 10: Eye cataract

Risk Factors of Cataract Formation

- Exposure to ultra light
- Heavy smoking and drinking
- Surgery of the eye
- Excessive exposure to ultra violet light
- Working in welding industry
- Health conditions such as Diabetes Mellitus
- Ocular conditions e.g. myopia, glaucoma, retinal detachment
- Drugs, such as, Thiazides, tetracycline, systemic corticosteroids or **long-term** topical corticosteroids and oral contraceptives.

Types of Cataracts

The following are the main types of cataracts:

1. Senile (most common)
2. Congenital

3. Familial
4. Traumatic
5. Toxic
6. Cataract secondary to existing conditions e.g. glaucoma, retinopathies.
7. Cataract associated with systemic conditions like, diabetes mellitus and malnutrition.
8. Cataracts can also be defined according to the type, location and degree.

Pathophysiology

Cataract development is mediated by a number of factors. In senile cataract formation, it appears that altered metabolic processes within the lens cause a reduction of water and alterations in the lens fibre structure. The lens is encapsulated and unable to shed dead cells. Over the life span, the lens becomes dense. Changes in the molecular structure of the cells cause whitish opacities to appear. Along with the increasing density and opacity of the lens, the ability of the lens to absorb the ultra violet light actually increases to protect the retina from light damage. When the lens absorbs ultra violet light there is a fluorescent reaction, which results in the yellowing of the lens. These changes affect the lens transparency causing vision changes. Cataract can develop in one or both eyes and visual impairment normally progresses at the same rate in both eyes over a period of many years or in a matter of months.

Clinical Manifestations

1. Increased glare in bright light resulting from irregular refraction of rays
2. Blurred or distorted images
3. Altered colour perception (the yellowing of the lens acts as alight filter).
4. Behavioural changes in children
5. Painless
6. Myopic shift
7. Monocular diplopia

8. Photophobia
9. Visible opacity of the lens on ophthalmoscopic examination
10. Reduced visual acuity
11. Leucorrhoea or ‘whitish pupil’ is seen only in advanced stages of cataract

Medical Management of A Patient With Cataract

The goal is to restore the vision. This can be achieved pharmacologically or through medical surgical procedures. Currently there is no available treatment to cure cataracts other than surgical removal.

Health History

Ask client about:

1. Family history
2. Recent trauma
3. Exposure to radioactive materials
4. Systemic diseases like diabetes mellitus, hyperthyroidism, downs syndrome, or atopic dermatitis
5. Nutrition: history of poor feeding e.g. in alcoholism may lead to malnutrition
6. Bad habits, e.g. excess alcohol and smocking
7. Occupation, e.g. Welders
8. Age above 50years
9. Past medical history of injury to the eye or intraocular diseases such as recurrent Uveitis
10. Drug use, e.g. corticosteroids for a long time

Physical Assessment

On general survey, the lens appears cloudy. You should ask the client to describe his or her vision. For example, ask the client to tell you what they can see well and what they have difficulty seeing.

Investigations

1. Ophthalmoscopy (direct or indirect)
    - May show immature cataract, red reflex occurs or
    - May show a mature cataract, no red reflex and visible fundus
2. Slit lamp bio microscopy: shows a degree of cataract formation and confirms the diagnosis.
3. Snellen visual acuity test: this will reveal decreased visual acuity
4. Blood test for sugar: blood sugar will be above normal (Normal level is between 3.3-4.4mmol/l

Surgical Management

Most cataracts are highly treatable. Cataract surgery is one of the most common surgeries performed in the United States with 95% of patients experiencing improved vision if there are no other eye conditions present. During surgery, the doctor removes the clouded lens, and, in most cases, replaces it with an artificial lens, called an intraocular lens (IOL). An IOL is a clear, plastic lens that requires no care and becomes a permanent part of your eye. After surgery, the patient may not need to wear thick eyeglass lenses because of the implanted lens. (AFB Senior Site, 2007)

The aim of cataract surgery is to rehabilitate blind of visually impaired people by restoring their sight to normal or as near to normal as possible. When palliative measures are not working, the patient is then due for surgery. The ophthalmologist decides the type of surgery. If both eyes are affected operations are done at different times to allow both the patient and doctor to evaluate the results of the first surgery. Basically there are there types of surgery that can be done. These are;

1. Phaco emulsification and aspiration: this type of surgery involves needling or lens aspiration where the cortex and nucleus of the lens are irrigated out through an incision in the anterior lens capsule, leaving the posterior capsule behind. The posterior capsule is left intact to support an intra ocular lens (10L) implant. The incision may be closed with 1-3 sutures or none at all.

2. Extra capsular cataract extraction

In extra capsular cataract extraction, the anterior lens capsule, the cortex and nucleus are removed leaving the posterior capsule lens in place. Following this type of surgery, the cortical matter may proliferate on the intact posterior capsule, a condition requiring capsulectomy. This type of surgery is performed when a posterior chamber intra-ocular lens is to be implanted. The lens sits in the posterior capsule to keep it in place. It is also done in patients aged less than 50 years.

3. Intracapsular lens extraction

The entire lens (i.e. nucleus, cortex and capsule) is removed from the eye by forceps or the cryoprobe. This type of surgery is performed when the patient is over 65 years of age, because the vitreous has lost its adherence to the lens and so there is less danger of the vitreous protruding through the pupil following lens extraction. This is the most frequently performed cataract extraction.

Nursing Management

Preoperative Care

Most of these cases are day cases but in special cases patients may be admitted to hospital. The preoperative care will include:

1. Giving psychological care and reinforce the need for cataract extraction
2. Allowing patient to sign consent for operation
3. Preparing the patient for general or local anaesthesia
4. Withholding aspirin for at least 5-7 days before surgery and any anticoagulation therapy.
5. A night before the operation, pupils are dilated with mydriatics every 10 minutes for 4 doses at least an hour before surgery e.g. Cyclopentolate or Atropine sulphate
6. No need to starve the patient
7. Keeping case notes ready
8. Checking the vital signs and record
9. Gowning the patient and taking them to the theatre.

Postoperative Care

1. If an Iris clip lens was used, the pupil must not be dilated, as it will cause the lens to move out of position.
2. If no intra-ocular lens has been implanted, or if there is an anterior chamber lens, the pupil may be dilated to rest the eye postoperatively
3. Give the patient temporary aphakic glasses if no intra-ocular lens has been implanted.
4. Instruct the patient on how to instil eye drops and the importance of resting the eye.
5. Give prescribed medications and read the discharge notes.

Complications of Cataracts and Surgery

The main complications include:

- Increased intraocular pressure
- Haemorrhage
- Without surgical intervention, blindness and glaucoma occurs.
- Postoperative posterior capsule pacification.
- Secondary glaucoma
- Post operative infection

Rehabilitation

Adaptation to restored normal vision is usually rapid. Adaptation to limited vision will require more time based on individual variations. There may be need to assist the client to adjust to a new job or new roles in the family.

Health Education

Teach the patient about the following:

1. Infection prevention

2. Danger signs which they should report immediately
3. To avoid strenuous exercises
4. To desist from sleeping on the affected eye until full recovery
5. To change lifestyle
6. To improve on diet with more vitamin intake.

4.7.4 Retinal Detachment

What is retinal detachment?

Retinal detachment is the separation of the retina from its attachments to the underlying tissue within the eye. Most retinal detachments are a result of a retinal break, hole or tear. It is also defined as a disorder of the eye in which the retina peels away from its underlying layer of support tissue.

The retina is the light-sensitive layer of tissue that lines the inside of the eye and sends visual messages through the optic nerve to the brain. When the retina detaches, it is lifted or pulled from its normal position. If not promptly treated, retinal detachment can cause permanent vision loss. In some cases there may be small areas of the retina that are torn. These areas, called retinal tears or retinal breaks, can lead to retinal detachment.

Pathophysiology

The retina is a thin layer of light-sensitive tissue on the back wall of the eye. The optical system of the eye focuses light on the retina. The retina translates that focused image into neural impulses and sends them to the brain via the optic nerve. Occasionally, posterior vitreous detachment, injury or trauma to the eye or head may cause a small tear in the retina. The tear allows vitreous fluid to seep through it under the retina, and peel it away like a bubble in wallpaper. Figure 11 below shows a diagram of the eye showing retinal detachment.

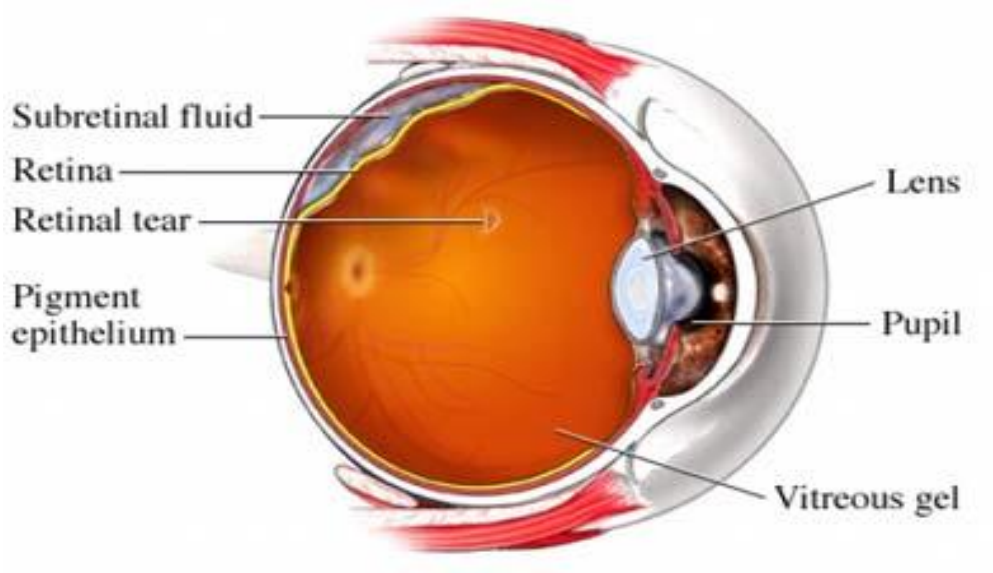

Figure 11: Retinal detachment

Types of Retinal Detachments

There are three types of retinal detachments, namely:

1. ***Rhegmatogenous retinal detachment***

occurs due to a break in the retina (called a *retinal tear*) that allows fluid to pass from the vitreous space into the sub retinal space between the sensory retina and the retinal pigment epithelium.

2. ***Exudative serous, or secondary retinal detachment***: occurs due to inflammation, injury or vascular abnormalities that results in fluid accumulating underneath the retina without the presence of a hole, tear, or break.

3. ***Tractional retinal detachment***: occurs when fibrous or fibrovascular tissue, caused by an injury, inflammation or neovascularization, pulls the sensory retina from the retinal pigment epithelium.

Risk Factors/Causes

1. Blunt trauma, as from a tennis ball or fist, or a penetrating injury by a sharp object to the eye can lead to a retinal detachment.
2. A family history of a detached retina that is non-traumatic in nature seems to indicate a genetic (inherited) tendency for developing retinal detachments.
3. Diabetes can lead to a type of retinal detachment that is caused by pulling on the retina (traction) alone, without a tear.
4. Cataract surgery, especially if the operation has complications, increases the risk of a retinal detachment.
5. Patients with chronic inflammation of the eye (uveitis) are at increased risk of developing retinal detachment.
6. High myopia (greater than 5 or 6 diopters of nearsightedness) increases the risk of a retinal detachment
7. Patients taking certain eye drops have an increased risk of developing a retinal detachment, such as, Pilocarpine (Salagen), which for many years has been a mainstay of therapy for glaucoma

Signs and Symptoms

A retinal detachment is commonly preceded by a posterior vitreous detachment which gives rise to these symptoms:

1. Flashes of light (photopsia): very brief in the extreme peripheral (outside of center) part of vision
2. Sudden dramatic increase in the number of floaters
3. Ring of floaters or hairs just to the temporal side of the central vision
4. Slight feeling of heaviness in the eye
5. As detachment progresses, the patient may report gradual, painless vision loss described as looking through a curtain or cobweb.

Management of a Patient With Retinal Detachment

Health history taking:

Past health history

1. Find out if they had a similar problem or it is the first time.
2. Find out if they had any cataract extraction.
3. Ask the patient if there is any history of trauma to the eyes.

Present health history

Find out the following from the patient:

1. Onset of the problem whether gradual or acute.
2. Whether client experiencing pain
3. Ask for any signs of black spots, flushing spots and shadow.
4. Any history of diabetes mellitus or hypertension.

Physical Assessment

1. Assess client's visual changes in both eyes such as visual field loss.
2. Check for pupil reaction (a fixed pupil may indicate previous trauma).
3. Examine the vitreous for signs of pigment or tobacco dust (i. e, Shafer sign), which is pathognomonic for a retinal tear in 70% of cases with no previous eye diseases or surgery.

Investigations

1. Direct Ophthalmoscopy: it is done after full pupil dilation. Direct ophthalmoscopy shows folds or discolouration in the usually transparent retina.
2. Indirect Ophthalmoscopy: this can detect retinal tears.
3. Ocular ultrasonography: this examination may be performed to examine the retina if the patient has an opaque lens.

Medical Management (Treatment)

1. Depending on the detachment's location and severity, treatment may include restricting eye movements to prevent further separation until surgery is done.

2. A sclera depressor may also be used externally on the lid or conjunctiva to assist in rotating the eyeball and to indent the retina for increased viewing ability.
3. A hole in the retina is treated with cryotherapy (use of a freezing probe) or laser therapy (photocoagulation is used to seal the hole if it has not progressed to detachment).
4. Both methods create inflammation around the area, which scars and seals the hole.
5. To reattach the retina, sclera buckling is performed. This procedure involves depressing the sclera from the outside by silastic sponges or silicone bands that are sutured in place permanently

Nursing Management

In your nursing care consider the following problems:

1. Altered vision
2. High risk of infection
3. Self care deficit
4. Anxiety
5. Diversionary activity deficit

Complications

1. Postoperative swelling of tissues and cells in the anterior chamber due to inflammatory process may result in increased intraocular pressure.
2. Postoperative infection
3. Severe vision impairment
4. Blindness

Rehabilitation

1. Family members should be encouraged to give support to the patient.

2. The home environment should be assessed for safety hazards such as stairs, poor lighting and electrical cords.

   You have now come to the end of this topic on cataracts. In the next topic we shall discuss disorders of the Lacrimal duct.

4.7.5 Congenital Lacrimal Duct Obstruction

Congenital nasolacrimal duct obstruction (CLDO) is a condition in which a tear duct fails to open at the time of birth.

Treatment

Most cases resolve spontaneously and antibiotics are only applied if conjunctivitis occurs. A lacrimal sac massage can be applied to stimulate the duct to open, though this is not always successful. The aim of the massage is to generate enough hydrostatic pressure (downward, toward the nose) to "pop" open any obstruction. Additional massage may then be performed up toward the lacrimal punctum, in order to express any infectious material out of the nasolacrimal sac. When discharge or crusting is present, the lids should be gently cleaned using cooled pre-boiled water or saline.

Referral to an ophthalmologist is indicated if symptoms are still present at 12 months, or if significant symptoms or recurrent infections occur sooner. Nasolacrimal duct probing may be performed in the office setting (usually from 4 to 8 months of age) or under general anaesthesia in an operating room for older patients. The success rate of probing is higher for younger children. A silastic tube or stent may be employed along with probing to maintain tear duct patency.

4.7.6 Retinoblastoma

What is retinoblastoma?

Retinoblastoma (Rb) is eye cancer that develops from the immature cells of a retina.

Causes of Retinoblastoma

In children with a heritable genetic form of retinoblastoma, there is a mutation on chromosome 13, called the RB1 gene. The genetic codes found in chromosomes control the way in which cells grow and develop within the body. If a portion of the code is missing or altered (mutation) a cancer may develop. The defective RB1 gene can be inherited from either parent. In some children, however, the mutation occurs in the early stages of foetal development (American Cancer Society 2003).

Classification

There are two forms of the disease, a **heritable form** and **non-heritable form**. All cancers are considered genetic in that mutation of the genome, however, this does not mean that they are heritable or transmitted to offspring.

Signs and Symptoms

The most common and obvious sign of retinoblastoma is an abnormal appearance of the pupil, leukocoria, also known as amaurotic cat's eye reflex. Other signs and symptoms include:

1. Deterioration of vision,
2. A red and irritated eye with glaucoma

Diagnosis

Screening for retinoblastoma should be part of a "well baby" screening for newborns during the first three months of life and should include:

1. *The red reflex*: checking for a normal reddish-orange reflection from the eye's retina with an ophthalmoscope or retinoscope from approximately 30 cm. This is usually done in a dimly lit or dark room.
2. *The corneal light reflex/Hirschberg test*: checking for symmetrical reflection of beam of light in the same spot on each eye when a light is shined into each cornea, to help determine whether the eyes are crossed.
3. *Eye examination:* checking for any structural abnormalities.

Differential diagnosis

1. *Persistent hyperplastic primary vitreous (PHPV):* a congenital developmental of the eye resulting from failure of the embryological, primary vitreous and hyaloid vasculature to regress, whereby the eye is shorter, develops a cataract, and may present with the whitening of the pupil.
2. *Coats disease:* a typically unilateral disease characterised by abnormal development of blood vessels behind the retina, leading to blood vessel abnormalities in the retina and retinal detachment to mimic retinoblastoma.
3. *Toxocara canis:* an infectious disease of the eye associated with exposure to infected puppies, which causes a retinal lesion leading to retinal detachment.
4. *Retinopathy of prematurity (ROP):* associated with low birth weight infants who receive supplemental oxygen in the period immediately after birth. It involves damage to the retinal tissue and may lead to retinal detachment.

Treatment

The various treatment modalities for Retinoblastoma includes:

1. *Enucleation of the eye*: most patients with unilateral disease present with advanced intraocular disease and therefore usually undergo enucleation, which results in a cure rate of 95%. In bilateral Rb, enucleation is usually reserved for eyes that have failed all known effective therapies or without useful vision.

2. *External beam radiotherapy (EBR)*: the most common indication for EBR is a child whose eye has active or recurrent bilateral retinoblastoma after completion of chemotherapy and local therapies. However, patients with hereditary disease who received EBR therapy are reported to have a 35% risk of second cancers.
3. *Brachytherapy*: brachytherapy involves the placement of a radioactive implant (plaque), usually on the sclera adjacent to the base of a tumour. It is used as the primary treatment, or more frequently in patients with small tumours, or in those who had failed initial therapy including previous EBR therapy.
4. *Thermotherapy:* thermotherapy involves the application of heat directly to the tumour, usually in the form of infrared radiation. It is also used for small tumours
5. *Laser photocoagulation*: laser photocoagulation is recommended only for small posterior tumours. An argon or diode laser or a xenon arc is used to coagulate all the blood supply to the tumour.
6. *Cryotherapy*: cryotherapy induces damage to the vascular endothelium with secondary thrombosis and infarction of the tumour tissue by rapidly freezing it. Cryotherapy may be used as primary therapy for small peripheral tumours or for small recurrent tumours previously treated with other methods.
7. *Systemic Chemotherapy*: systemic chemotherapy has become an important form of treatment in the past decade, to avoid the adverse effects of EBR therapy. The common indications for chemotherapy for intraocular retinoblastoma include tumours that are large and that cannot be treated with local therapies alone in children with bilateral tumours. It is also used in patients with unilateral disease when the tumours are small but cannot be controlled with local therapies alone.
8. *Intra-arterial chemotherapy*: chemotherapeutic drugs are administered locally via a thin catheter threaded through the groin, through the aorta and the neck, directly into the optic vessels),
9. *Nano-particulate chemotherapy:* to reduce the adverse effects of systemic therapy, subconjuctival (local) injection of nanoparticle carriers containing chemotherapeutic agents (carboplatin) has been developed which has shown promising results in the treatment of Rb in animal models without adverse effects (American Cancer Society 2003).

4.7.7 Conjunctival Squamous Cell Carcinoma (CSCC)

Conjunctival Squamous Cell Carcinoma and corneal intraepithelial neoplasia comprise what are called Ocular Surface Squamous Cell Neoplasias. It is the most common malignancy of the conjunctiva.

Risk Factors

The risk factors for the disease include:

1. Exposure to sun
2. Radiation and smoking,
3. Exposure to polycyclic hydrocarbons.

Signs And Symptoms

Conjunctival carcinoma is often asymptomatic at first, but it present with the following:

1. Growth, red eye,
2. Pain, itching, burning,
3. Tearing, sensitivity to light,
4. Double vision, and
5. Decreased vision.

Treatment

The treatment may include the following:

1. Surgical excision followed by cryotherapy;
2. Removal of the contents of the orbit, or exenteration;
3. Radiation treatment, topical Mitomycin C.
4. Close follow-up is required.

This was a short topic! Now let us move on to another condition known as macular degeneration.

4.7.8 Macular Degeneration

Macular degeneration (AMD) is a medical condition which usually affects older adults. It results in loss of vision in the center of the visual field because of damage to the retina. It occurs in dry and wet forms. It is a major cause of blindness and visual impairment in older adults. In the dry (nonexudative) form, cellular debris called drusen accumulates between the retina and the choroid,. This causes the retina to become detached. In the wet (exudative) form, which is more severe, blood vessels grow from the choroid behind the retina, thus causing the retina to become detached. It can be treated with laser coagulation and with medication that stops and sometimes reverses the growth of blood vessels.

Risk Factors of Macular Degeneration

1. *Family history*: the lifetime risk of developing late-stage macular degeneration is 50% for people who have a relative with macular degeneration
2. *Macular degeneration gene:* The genes for the complement system proteins factor H (CFH), factor B (CFB) and factor 3 (C3) are strongly associated with the risk of developing macular degeneration
3. *Mutation of the ATP synthase gene:* Retinitis Pigmentosa (RP) is a genetically linked dysfunction of the retina and is related to mutation of the adenosine triphosphate (ATP) synthase gene
4. *Stargardt's disease:* this is an autosomal recessive retinal disorder characterized by a juvenile-onset macular dystrophy, alterations of the peripheral retina, and subretinal deposition of lipofuscin-like material

5. *Hypertension* (high blood pressure) leading to excessive pressure exerted on the retina together with the macula.
6. *Cholesterol:* elevated cholesterol may increase the risk of AMD
7. *Obesity:* abdominal obesity is a risk factor, especially among men
8. *High Fat intake:* consuming high amounts of certain fats may contribute to AMD, while monounsaturated fats are potentially protective.
9. *Oxidative stress*: age-related accumulation of low-molecular-weight, phototoxic, pro-oxidant melanin oligomers within lysosomes in the retinal pigment epithelium may be partly responsible for decreasing the digestive rate of photoreceptor outer rod segments
10. *Fibulin-5 mutation:* rare forms of the disease are caused by genetic defects in fibulin-5, in an autosomal dominant manner.
11. *Race:* macular degeneration is more likely to be found in Caucasians than in people of African descent.
12. *Exposure to sunlight*: especially blue light. Evidence is conflicting as to whether exposure to sunlight contributes to the development of macular degeneration. A recent study on 446 subjects found it does not.
13. *Smoking:* cigarette smoking is likely to have toxic effects on the retina.

Signs and Symptoms

The signs and symptoms of macular degeneration include:

1. Pigmentary alterations
2. Exudative changes: haemorrhages in the eye, hard exudates, subretinal/sub-RPE/intraretinal fluid
3. Atrophy: incipient and geographic
4. Visual acuity drastically decreasing (two levels or more), e.g.: 20/20 to 20/80.
5. Preferential hyperacuity perimetry changes (for wet AMD)

6. Blurred vision: those with nonexudative macular degeneration may be asymptomatic or notice a gradual loss of central vision, whereas those with exudative macular degeneration often notice a rapid onset of vision loss.
7. Central scotomas (shadows or missing areas of vision)
8. Distorted vision in the form of metamorphopsia, in which a grid of straight lines appears wavy and parts of the grid may appear blank: Patients often first notice this when looking at miniblinds in their home.
9. Trouble discerning colours, specifically dark ones from dark ones and light ones from light ones
10. Slow recovery of visual function after exposure to bright light
11. A loss in contrast sensitivity

Management

Investigations

The following tests and procedures may be used:

1. *Physical exam and history**:*** an examination of the body to look for general signs of health, including checking for signs of disease, such as lumps or anything else that seems unusual. A history of the patient's health habits and past illnesses and treatments is taken. The doctor also asks if there is a family history of retinoblastoma.
2. *Eye exam with dilated pupil:* an exam of the eye in which the pupil is dilated (opened wider) with medicated eye drops to allow the doctor to look through the lens and pupil to the retina. The inside of the eye, including the retina and the optic nerve, is examined with a light. Depending on the age of the child, this examination may be done under anaesthesia.
3. *Ultrasound exam**:*** a procedure in which high-energy sound waves (ultrasound) are bounced off internal tissues or organs and make echoes. The echoes form a picture of body tissues called a sonogram.
4. *CT scan (CAT scan):* a procedure that makes a series of detailed pictures of areas inside the body, such as the eye, taken from different angles. The pictures are

made by a computer linked to an x-ray machine. A dye may be injected into a vein or swallowed to help the organs or tissues show up more clearly. This procedure is also called computed tomography, computerized tomography, or computerized axial tomography.

5. *MRI (magnetic resonance imaging):* a procedure that uses a magnet, radio waves, and a computer to make a series of detailed pictures of areas inside the body, such as the eye. This procedure is also called nuclear magnetic resonance imaging (NMRI).

Treatment

1. Drugs approved for some variety of macular degeneration include ranibizumab and aflibercept
2. Photodynamic therapy is also used.
3. The drug verteporfin is administered intravenously; light of the correct wavelength is then applied to the abnormal blood vessels. This activates the verteporfin and obliterates the vessels.

You now know about macular degeneration. Let us move on to another non-inflammatory condition of the eye known as Ptosis.

4.7.9 PTOSIS

What is Ptosis?

Ptosis is an abnormally low position (drooping) of the upper eyelid. The drooping may be worse after being awake longer, when the individual's muscles are tired. This condition is sometimes called "lazy eye", but that term normally refers to amblyopia. If severe enough and left untreated, the drooping eyelid can *cause* other conditions, like amblyopia or astigmatism. This is why it is especially important for this disorder to be treated in children at a young age, before it can interfere with vision development.

Causes of Ptosis

Ptosis occurs when the muscles that raise the eyelid (levator and Müller's muscles) are not strong enough to do so properly. It can affect one eye or both eyes and is more common in the elderly.

Ptosis may be caused by damage or trauma to the muscle which raises the eyelid, or damage to the nerve (3rd cranial nerve (oculomotor nerve) which controls this muscle. Such damage could be a sign or symptom of an underlying disease such as diabetes mellitus, a brain tumour, and diseases which may cause weakness in muscles or nerve damage, such as myasthenia gravis.

Classification of Ptosis

Depending upon the cause it can be classified into:

1. *Neurogenic ptosis*: which includes oculomotor nerve palsy, Horner's Syndrome, Marcus Gunn jaw winking syndrome, 3rd cranial nerve misdirection.
2. *Myogenic ptosis:* which includes myasthenia gravis, myotonic dystrophy, ocular myopathy, simple congenital ptosis, blepharophimosis syndrome
3. *Aponeurotic ptosis*: which may be involutional or post-operative
4. *Mechanical ptosis:* which occurs due to oedema or tumours of the upper lid
5. *Neurotoxic ptosis:* which is a classic symptom of envenomation by elapids such as cobras, or kraits. Bilateral ptosis is usually accompanied by diplopia, dysphagia and/or progressive muscular paralysis. Regardless, neurotoxic ptosis is a precursor to respiratory failure and eventual suffocation caused by complete paralysis of the thoracic diaphragm.

It is therefore a medical emergency and immediate treatment is required.

Treatment

1. Slight ptosis that doesn’t produce deformity or vision loss requires no treatment.

2. Severe ptosis that interferes with vision or disfigures appearance may require surgery to resection weak levator muscles.
3. To correct congenital ptosis, the patient may undergo surgery at the age 3 or earlier if ptosis is unilateral.
4. An option to surgery may be special eyeglasses with an attached suspended crutch on the frame to elevate the eyelid.
5. Effective management also includes treatment of the underlying cause.

Nursing Diagnosis

1. Altered health maintenance
2. High risk for infection
3. High risk for injury
4. Sensory or perceptual alterations (visual)

Nursing Interventions

1. Provide a safe environment by removing excess equipment and furniture from the patient's room.
2. Report postoperative bleeding immediately
3. Apply ointment to sutures as prescribed
4. Apply ice compresses to decrease swelling

Patient Teaching

1. After surgery, emphasize the need to protect the surgical site during healing. Explain that the injury at the suture line can precipitate recurrent ptosis. Review the signs of infection.
2. Provide oral and written instructions for using medications, including ophthalmic ointment.
3. If the patient is a young child, encourage his parents to review safety measures with him.

That brings us to the end of our discussion on non-inflammatory disorders of the eye. Now let us learn about surgeries within the eye.

4.8 Intraocular Surgeries

Eye surgery, also known as ocular surgery, is surgery performed on the eye or its adnexa, typically by an ophthalmologist. The eye is a fragile organ, and requires extreme care before, during, and after a surgical procedure. An expert eye surgeon is responsible for selecting the appropriate surgical procedure for the patient, and for taking the necessary safety precautions.

Orbital Surgery

The orbit is the bony socket in the skull that contains and houses the eye and all the associated structures that support the function of the eye like muscles, nerves and blood vessels. The eye and these other structures are surrounded by fat which acts as a cushion to protect the eye as we run around or if we inadvertently get hit in the eye. Unfortunately, a variety of problems can occur in the eye socket that effect the function of the eye. These processes range from inflammatory disease like thyroid associated orbitopathy as seen in patients with Graves' disease, to tumours, infections, and injuries from trauma. When these problems occur, patients often have double vision, loss of vision, pain and swelling. Evaluation with a trained specialist is important to appropriately evaluate and treat the underlying problem.

Enucleation, Evisceration and Exenteration

Enucleation, evisceration, and exenteration are all surgical interventions that involve the permanent removal of the patient's eye. Let us study each in turn.

Enucleation

An enucleation is the removal of the eye leaving the eye muscles and remaining

orbital contents intact.

Indications for enucleation

1. Endophthalmitis unresponsive to antibiotics
2. Improvement of cosmesis in a blind eye.
3. Painful eyes with no useful vision
4. Malignant intraocular tumours
5. In ocular trauma to avoid sympathetic Ophthalmia in the second eye.
6. In congenital anophthalmia or severe microphthalmia to enhance development of the bony orbit.
7. To reduce pain in a blind eye.
8. Cases of endophthalmitis unresponsive to antibiotics

Exenteration

An **exenteration** is the removal of the entire orbital contents, including the eye, extraocular muscles, fat, and connective tissues.

Indications for extenteration

1. Cutaneous tumours with orbital invasion
2. Lacrimal gland malignancies
3. Extensive conjunctival malignancies
4. Other orbital malignancies
5. Mucormycosis
6. Chronic orbital pain
7. Orbital deformities

Evisceration

Evisceration is the surgical technique that removes the entire intraocular contents of the eye while leaving the scleral shell and extraocular muscle attachments intact.

Evisceration surgery is a simpler procedure than enucleation surgery and offers better preservation of the orbital anatomy and natural motility of the anophthalmic socket tissues.

Preoperative Preparation

Psychological Preparation

1. A patient who is faced with the permanent loss of an eye requires the physician's reassurance, caring explanations, and psychological support, both before and after the surgery.
2. The patient (and family) should understand that evisceration and enucleation surgery involves the complete, permanent removal of the diseased or deformed eye.
3. The general nature of the anophthalmic socket should be explained to the patient, who must be informed that an ocular prosthesis will be fitted approximately 6 weeks following the surgery.

4. The indication for surgery, whether it is pain, poor visual prognosis, the risk of sympathetic ophthalmia, or the presence of an intraocular neoplasm, should be clearly explained.

5. The patient should be informed of the choices between enucleation and evisceration surgery and of the availability of a variety of orbital implants.

6. The patient should understand the risks and benefits of wrapping orbital implants with either autologous tissues or preserved donor tissue and that donor tissues may carry the risks of communicable diseases, such as syphilis, hepatitis, and human immunodeficiency virus.

7. A thorough explanation allows the patient and family to make a well-informed decision regarding surgery.

8. Although the specific decision for surgery is to be made by the patient and family, it is reasonable for the surgeon to make a best-judgment recommendation to help with the myriad of choices available, e.g., enucleation versus evisceration and the variety of types of orbital implants.

9. Following enucleation or evisceration, most patients undergo a grief reaction of varying degrees. The patient, therefore, requires psychological support from the physician and nurses.

8. A patient who undergoes exenteration should also be informed of the nature of the surgery and the radical amount of tissue to be resected.

9. Although the patient must be given a full and truthful explanation regarding exenteration surgery, the surgeon should avoid giving overly gruesome details so as not to deter the patient from receiving necessary treatment, such as, for a potentially life-threatening neoplasm.

Removal of The Wrong Eye

Removal of the wrong eye presents one of the greatest disasters that can occur to the ophthalmic surgeon and patient. Every ophthalmologist and surgeon must be aware of this possibility, no matter how remote. Preoperatively, the surgeon may mark the forehead or trim the lashes on the appropriate side. These methods, however, are not foolproof. In the operating room, the surgeon should thoroughly review the chart, including the operative permit and the examination notes. It is important, then, that the surgeon should prepare and drape the patient. Once a sterile operative field is set up, the surgeon must again verify that the correct eye is about to undergo enucleation. If the procedure is due to severe trauma, the correct eye should be externally deformed. However, in cases where the external appearance of both eyes

is normal, the surgeon must compulsively re-examine the fundus to verify the pathology.

Postoperative Management

The postoperative procedures for a patient who has undergone permanent eye removal are as follows:

1. The orbital pack and pressure dressing should remain in place for approximately 5–7 days.
2. Following removal of the dressing, the patient should use gentle hydrogen peroxide rinses to cleanse the socket.
3. Generally, these orbits heal best when left open to the air, so the patients should wear a patch only when going out in public.
4. There is often considerable swelling of the conjunctiva which may protrude between the eyelids.
5. This will settle after some days.
6. Antibiotic ointment is applied regularly and the patient can be discharged if feeling well.
7. Once the swelling and inflammation has settled an artificial eye can be inserted
8. The surgeon should remain vigilant to the possibility of infection of the skin graft, especially by Pseudomonas, Staphylococcus, or Streptococcus.
9. Systemic antibiotics may be necessary if these infections arise.
10. In some patients, the exenterated orbit retains chronic, moist, ulcerated areas intermixed with areas of healthy keratinizing epidermis.
11. A combined eyelid-ocular prosthesis can be made by an anaplastologist.
12. Many exenteration patients prefer simply to wear a black patch.

Complications

The main complications of Evisceration are:

1. *Postoperative infection* if performed in the setting of endophthalmitis or panophthalmitis. The use of broad-spectrum systemic antibiotics usually minimizes this risk, and the surgeon can generally use a primary orbital implant.
2. *Postoperative extrusion* of the orbital implant may be related to: postoperative scleral shell shrinkage; poor wound healing of the scleral edges; or to improper selection of the orbital implant size.
3. *Postoperative pain* is more common when the cornea is retained.

The main complications of enucleation are:

Orbital implant extrusion: this can be avoided by:

- paying meticulous attention to Tenon's fascia wound closure and proper selection of implant size;.
- Excluding risk of prior irradiation treatment of the eye and orbit, severe traumatic injuries to the eye and orbit, and severe eye and orbital infections.

Long-term complications of the anophthalmic socket are numerous and include:

1. Generalized volume deficiency of the anophthalmic socket.
2. Lower eyelid laxity with poor prosthesis support,
2. Orbital implant migration
3. Upper eyelid ptosis
4. Chronic conjunctivitis and mucoid discharge

The main complications of exenteration are:

- *Severe haemorrhage*: it is important preoperatively to discontinue aspirin and all other medicines that could adversely affect blood clotting.

- *Cerebrospinal fluid leakage*: this is through the orbital roof transgression of the dura and chronic sino-orbital fistulas through the region of ethmoid sinus air cells.

Infection

1. During the first few weeks of healing, free skin grafts are susceptible to infection.
2. Patients may require treatment with broad-spectrum systemic antibiotics for coverage of Staphylococcus, Streptococcus, Pseudomonas, and other bacteria.
3. The administration of systemic antibiotics is combined with maintenance of vigorous topical hygiene of the split-thickness skin graft using hydrogen peroxide rinses.

We hope you are now able to care for a client who has undergone intraocular surgery. One of the outcomes of these surgeries may be blindness. Let us study that next.

4.9 Blindness and Vision 2020

There is an estimated 9 million blind people in sub-Saharan Africa. This represents the highest regional burden of blindness ratio in the world. The number of blind in sub-Saharan Africa is going to increase to 15 million by 2020 unless measures are taken to counteract the problem. This could have significant socio-economic impact on communities and countries. The available resources to tackle the problem of blindness in sub-Saharan Africa are insufficient. There is marked shortage and misdistribution of human resources and eye care facilities. The current output of eye care services is grossly inadequate and far from addressing the need. Although VISION 2020 was launched in 1999 by WHO to eliminate avoidable blindness worldwide by the year 2020, the response of Member States in WHO/AFRO region in implementing VISION 2020 is still mostly inadequate. Therefore, there is a sense of urgency to scale up the implementation of VISION 2020 in sub-Saharan Africa. In June 2004, an expert on Community Eye Care worked with AFRO to articulate a proposal for the scaling up of Vision 2020.

4.9.1 VISION 2020

What is Vision 2020?

Vision 2020: The Right to Sight, is a global initiative to eliminate avoidable blindness. The programme is a partnership between the World Health Organization (WHO), and the International Agency for Prevention of Blindness (IAPB), a large umbrella organization for eye-care professional groups and nongovernmental organizations (NGOs) involved in eye-care

Aim of Vision 2020

The aim of Vision 2020 is to eliminate avoidable blindness by the year 2020. Attainment of this aim implies the development of a sustainable comprehensive health-care system to ensure the best possible vision for all people and thereby improve quality of life.

History of Vision 2020

In the mid1970s, the International Federation of Ophthalmological Societies (IFOS), the World Blind Union, and a group of international NGOs formed the IAPB. In 1978, WHO established the Prevention of Blindness programme (WHO/PBL). Throughout the 1980s, a close working relationship developed between WHO/PBL and the NGOs. One outcome of this was the unique partnership between WHO, Merck and Co. Inc., and NGOs involved in onchocerciasis control, which led to collaboration with the World Bank for the development of the African Programme for Onchocerciasis Control (APOC).

In 1994, based on the positive experience of this public-private partnership to control one specific blinding disease, WHO and the NGOs formed a joint task force to address the increasing problem of global blindness. With support from the NGOs, WHO convened consultations with experts in the field, which in 1997 resulted in the publication of The Global Initiative for the Elimination of Avoidable Blindness. That document explains the rationale, global strategy, and targets for the VISION 2020 programme.

In May 2003, the World Health Assembly unanimously passed resolution WHA 56.26, which urges Member States to commit themselves to supporting the Global Initiative for the Elimination of Avoidable Blindness by setting up, not later than 2005, a national Vision 2020 plan, in partnership with WHO and in collaboration with nongovernmental organizations and the private sector. This was to give a highly visible international impetus to the prevention of avoidable blindness.

Priorities for VISION 2020: The Right to Sight

The priorities for VISION 2020 are based on the facts that 75% of blindness and visual impairment occurs in the poor and very poor communities of the world, and that 75% of blindness and visual impairment is a result of five preventable or treatable conditions, namely:

- cataract,
- refractive errors and low vision,
- trachoma,
- onchocerciasis, and
- a specific group of causes of childhood blindness.

For each of these conditions a cost-effective intervention exists. If priority is given at the global level to improving eye-care services for neglected communities and to targeting these five diseases, it is calculated that instead of 76 million blind people in 2020, there will be 24 million. This is the prime mandate of VISION 2020.

Structure

The structure of the global partnership between WHO and IAPB to implement VISION 2020 is summarized in Figure 12 below.

Figure 12: Relationship between WHO, IAPB and Vision 2020 (Source: WHO & IAPB, 2004)

Programme strategy

The concept of VISION 2020:The Right to Sight, is built upon the foundation of community participation. The following three essential components of the VISION 2020 programme should be part of all existing and future VISION 2020 action plans:

1. cost-effective disease control interventions
2. human resource development (training and motivation)
3. infrastructure development (facilities, appropriate technology/consumables, funds).

This concept is schematically illustrated in Figure 13 below.

Figure 13: The concept of Vision 2020 (Source: WHO & IAPB, 2004)

That discussion on WHOs global initiative to fight blindness brings us to the end of this unit. Let us now review what you have learnt

4.10 Unit Summary

In this unit you have learnt about terms used in ophthalmic nursing and the structure of the eye. We have also discussed the principles of ophthalmic nursing and the management of inflammatory and non inflammatory conditions of the eye. In addition we have looked at types of intraocular surgeries and Vision 2020, WHO's global initiative to combat preventable blindness.

This unit marks the end of Part II of our course on surgery and surgical nursing. In this course we have discussed conditions affecting the liver, biliary system, the spleen, pancreas and urinary system. We have also looked at operating theatre nursing and anaesthesia, and conditions of the ear, nose and throat and eye diseases. You are required to practice some of the procedures we have discussed in order to gain proficiency. In the third part of this course you will learn about disorders of the endocrine system, orthopaedic and oncology nursing.

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