Course Title: Surgery and Surgical Nursing III

Course Code: SSN 034

Acknowledgements

Writer(s): MAULAO STEPHEN MBUZI

SR. GLADYS LUNGU

Reviewer(s): IKATANGA IMENDA & BUBALA MULONGO

Table of Contents

COURSE OVERVIEW

INTRODUCTION

Welcome to Surgery and Surgical Nursing III of the Registered Nursing Diploma. This course involves the study of surgical conditions and their treatments. This is a full course done inthat coversing disorders of the endocrine system Orthopaedics and Orthopaedic Nursing and Oncology and Oncology Nursing.. It will equip you with the knowledge and skills in Surgery and the management of clients with surgical conditions. You will be required to do Theory and Practical aspects.practical

COURSE AIM

The aim of this course is to equip you withknowledge and skills in surgery and surgical nursing and the management of clients with surgical conditions.

COURSE OBJECTIVES

At the end of the course, you should be able to:

1. Describe the management of clients with conditions of the endocrine and nervous systems.
2. Describe the management of clients with orthopaedic conditions.
3. Describe the management of clients with tumour

ASSESSMENTS

In this course you will be assessed by writing assignments, tests and final examination at the end of the year. You will also be assessed in practical to find out if you have acquired the skill in the procedures needed. The breakdown of the assessments is as follows;

ASSESSEMENT

Theory		**100%**	
Continuous Assessment		20%	
Test	2	20%	
Group assignment	2	20%	
Total		40%	
Final Theory Examination	**1**		**60%**
Practical		**100%**	
Continuous Assessment			
Clinical Assessment	2		40%
Final Practical Examination	**1**	**60%**	

LEARNING TIPS

This course will take you a minimum of 66 hours to cover the theory and 140 hours practical. You should spend these hours studying the course, doing the activities and self-help questions and completing the assessment tasks. Plan your work in such a way that you give yourself time to complete all of them.

ACTIVITIES, SELF-HELP QUESTIONS AND CASE STUDIES

As you study this course, you will find activities, self-help questions and case studiesin. These are intended to help your learning to be more effective as you apply what you read. The activities will help you to employ new ideas. Make sure you take time to complete them in the order they are in this course. Write full answers to the activities and discuss them fully.

READINGS

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

UNIT 1: DISORDERS OF THE ENDOCRINE SYSTEM

1.1 Unit Introduction

Welcome to unit one ofour course on surgery and surgical nursing Part III. In this unit we shall discuss the various conditions affecting the endocrine system**.**

The multiple activities of the cells, tissues and organs of the body are coordinated by different types of chemical messengers controlled by endocrine, hormones which are released by glands or specialized cells into the circulating blood and influence the functions of cells at another location in the body. The endocrine system is an integrated chemical communication and coordination system that enables reproduction, growth and development and regulation of energy. With the nervous and immune system, the endocrine system maintains the internal homeostasis of the body and coordinate responses to external and internal environmental changes.

The concentration of hormones required to control most metabolic and endocrine functions areare incredibly small. The rates of secretion of various hormones are extremely small, usually measured in milligram (mg) or microgram (mcg).

1.2 Unit Objectives

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

1. Describe the management of a client with tumours of the endocrine system

2. Describe the management of a client with disorders of the nervous system

1.3 Tumours of the Endocrine System

1.3.1 Tumours Oof The Thyroid Gland

Before we discuss the tumours, let us review the anatomy and physiology of the thyroid gland.

Review of the Anatomy and Physiology

The thyroid gland consists of the right and left (lateral) lobes, connected in the middle by a narrow isthmus, see Figure 1 below. Often the isthmus exhibits a conical lobe also the pyramidal lobe that may ascend as high as the hyoid bone. Normally the lateral lobes of the thyroid gland are conical in shape.

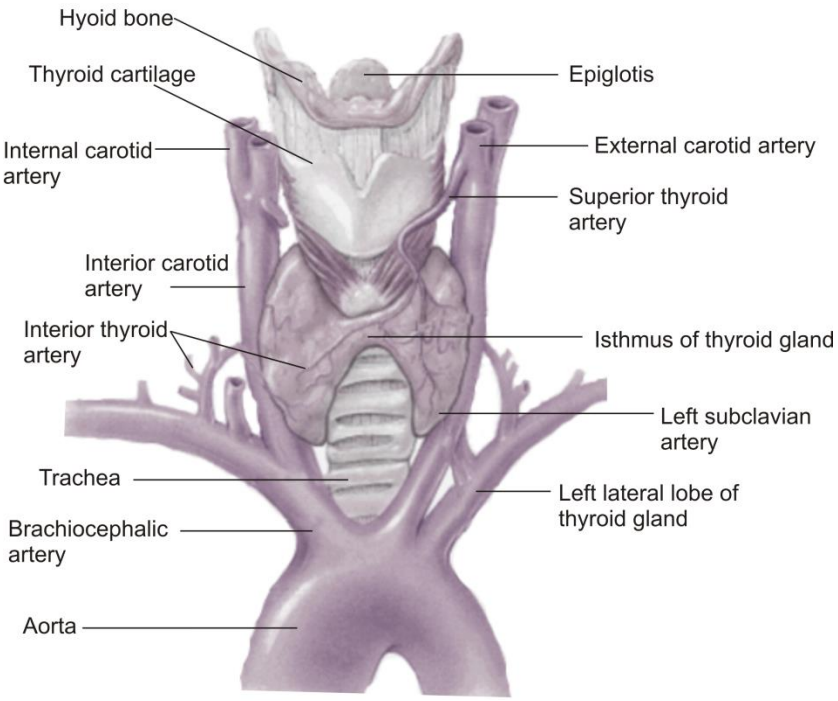

Figure 1: Diagram of the thyroid gland

Blood Supply: The thyroid gland has an extremely rich supply. In fact, it has one of the richest supply in the body considering its size. It is supplied by four main arteries, pair superior and inferior thyroid arteries. The superior thyroid artery lies close to the external branch of the superior laryngeal nerve as they both descend into the neck. Because of the arteries close association with these nerves, clamping of the superior thyroid artery may damage the nerve if the later is not first recognized.

Laryngeal Nerves: The vagus nerves course inferiorly from their exit at the jugular foramen towards the mediastinum and pass inferiorly through the neck in the carotid sheath along with the common carotid artery and the internal jugular vein. The external branch innervates the small cricothyroid muscle and may also send a small branch of its own to the inferior pharyngeal constrictor muscle. The cricothyroid muscles are important inn that they help to maintain the tone of the true vocal cords. Damage to the external branch of the superior laryngeal nerve may compromise this function. The recurrent laryngeal nerves innervate all the muscles of the larynx except the cricothyroid, which is innervated by the external branch of the laryngeal nerve. The recurrent laryngeal nerves are also sensory to the mucosa of the larynx below the level of the vocal cords. Importantly the only abductors of the vocal cords are the posterior cricoaretynoid muscles, and dinnervation of these muscles or trauma to the recurrent laryngeal nerves that innervate these muscles may compromise the function of these abductors. Under normal circumstances the airway remains open but inspiratory stridor may occur. The compromised producing hoarseness of the voice, dyspnoea may also occur.

Damage to the external branch of the laryngeal nerve and consequent dinnervation of the cricothyroid muscle may be especially traumatic for patients who rely heavily on their voice such as public speakers or singers. when damaged, the voice is lost, tires easily, it is less resonant and high-pitched sounds are especially difficult to make.

Figure 2: Double goitre

Thyroid hormones and Their Functions

The primary function of the thyroid gland is the synthesis and secretion of thyroxin (T4) although it does secrete small amounts of the thyroid hormone Tri – idothyronin (T3) as well. An intact *hypothalamic – pituitary – thyroid axis* and a ready source of iodine are required for the normal production of T3 and T4 by the thyroid gland. Any interruption in this axis or deficiency in the availability of iodine compromises the synthesis ability of the gland.

Iodine metabolism

Approximately 100 – 150 mcg of inorganic iodine is needed per day for the normal thyroid hormone biosynthesis. The main source of iodine is the diet found in the iodination of salt, milk, bread and other foodstuffs. Deficiency of iodine causes goitre and hypothyroidism.

Functions of thyroid hormones

The major function of the thyroid gland is to control the metabolic rate. Removal of the thyroid causes the basal metabolic rate to drop 30 – 40% below normal. The thyroid

hormones are also an important factor in growth. Inadequate secretion during formative years results in stunted growth.

SIMPLE GOITRE Simple Goiter

What is simple goiter?

This is thyroid enlargement unaccompanied by constitutional effects, hypo-or hyperthyroidism, commonly caused by inadequate dietary intake of iodine.

The causes of simple goiter or nontoxic multinodular goiter are:

- *Sporadic goiter*: usually seen in teen / young women it caused by goitrogens, hereditary or unknown . Usually euthyroid
- *Drug induced goiter*: sulfonamides and phenylbutazone inhibit organification of iodine. Iodine containing drugs such as amiodarone interfere with thyroglobulin proteolysis Iodine or lithium interfere with thyroglobulin breakdown and release of T3 / T4
- *Goitrogens:* cassava, cabbage, cauliflower, Brussels sprouts and turnips interfere with T3 / T4 synthesis. Cassava contains a thiocyanate which inhibits iodide transport within the thyroid
- *Hereditary*: see dyshormonogenetic goiter
- *Plummer syndrome*: hyper functioning thyroid nodule within a goiter, without ophthalmopathy or dermopathy of Graves disease

Signs and Symptoms

The patient may have a history of low iodine intake or over ingestion of food goitrogens, but these phenomena are rare in North America. In the early stages, the goiter is typically soft, symmetric, and smooth. Later, multiple nodules and cysts may develop.

Diagnosis

- Thyroidal radioactive iodine uptake
- Thyroid scan
- Thyroxine (T4), triiodothyronine (T3), and TSH levels

In the early stages, thyroidal radioactive iodine uptake may be normal or high with normal thyroid scans. Thyroid function tests are usually normal. Thyroid antibodies are measured to rule out Hashimoto's thyroiditis.

In endemic goiter, serum TSH may be slightly elevated, and serum T4 may be normal or slightly low, but serum T3 is usually normal or slightly elevated.

Treatment

Depends on causdependentIn iodine-deficient areas, iodine supplementation of salt; oral or IM administration of iodized oil yearly; and iodination of water, crops, or animal fodder eliminates iodine-deficiency goiter. Goitrogens being ingested should be stopped.

In other instances, suppression of the hypothalamic-pituitary axis with thyroid hormone blocks TSH production (and hence stimulation of the thyroid). Full TSH-suppressive doses of l-thyroxine (100 to 150 mcg/day po depending on the serum TSH) are useful in younger patients. l-Thyroxine is contraindicated in older patients with nontoxic nodular goiter, because these goitres rarely shrink and may harbour areas of autonomy so that l-thyroxine therapy can result in hyperthyroidism. Large goiters occasionally require surgery or 131I to shrink the gland enough to prevent interference with respiration or swallowing or to correct cosmetic problems.

BENIGN THYROID ENLARGEMENT (NON-TOXIC MULTINODULAR GOITER)

As we discovered that goiter is an enlargement of the thyroid gland. The gland can be generally enlarged or have multiple growths (nodules) leading to enlargement of the whole thyroid gland. The latter is termed multinodular goiter (MNG). There are two forms of multinodular goiter:

1) nontoxic MNG and
2) toxic MNG.

Explanation:

If the goiter makes normal amounts of thyroid hormone, it is known as a nontoxic MNG. If the goiter makes higher than normal amounts of thyroid hormone leading to a suppressed TSH, it is known as a toxic MNG.

Signs and symptoms

If the goiter is very slow growing and long-standing, the patient may not notice the slow increase in size. However, some patients may complain of a feeling of fullness in the neck, a choking sensation,difficulty swallowing large pills or chunky foods, a sense of pressure on the neck, or worsening snoring, especially with MNG that grow beneath the breastbone (i.e. substernal goiter).

Treatment

Please note that the use of thyroid hormone to attempt to "suppress" and shrink MNG is not indicated and puts patients at risk of hyperthyroidism. **Surgery for MNG**, when:

- a dominant nodule is suspicious for malignancy,
- the goiter is growing rapidly,
- orthere are compressive symptoms due to the size of the goiter.
- In patients who have normal thyroid function, with compressive symptoms due to a single nodule, with a benign biopsy.

MALIGNANT (HYPERTHYROIDISM OR THYROTOXICOSIS)

What is Hyperthyroidism?

Hyperthyroidism is a condition in which there is increased activity of the thyroid gland resulting into excessive secretion of thyroid hormones, characterized by increased metabolic rate. Hyperthyroidism is also called *thyrotoxicosis* and is a condition that results when thyroid tissues are stimulated by excessive thyroid hormones. It is

sustained thyroid hyperfunction accompanied by an increased radioactive iodine uptake.

Incidence

Thyrotoxicosis is more common in females than males and affects women five times more frequently than men. It commonly occurs at the age of 30 – 40 years.

Causes

The cause of hyperfunction of the thyroid gland is idiopathic but it is thought to be due to abnormal stimulation of the gland by circulating immunoglobulins (long acting thyroid stimulators). However, some factors have been thought to lead to a hyperfunction thyroid gland such as;

1. *Toxic diffuse Goitre* (Grave's disease): which is a disorder characterized by one or more of the following, diffuse goitre, hyperthyroidism and infiltrative ophthalmopathy.
2. *Toxic Nodular/Multinodular Goitre*: which is a disorder characterized by the presence of many thyroid nodules and a milder form of hyperthyroidism.
3. *Toxic adenoma*
4. *Thyroiditis*: increased amounts of thyroxin and triiodothyronine released during acute inflammatory process.
5. *Pituitary adenomas* may secrete excessive thyroid stimulating hormone.
6. Ingestion of exogenous thyroid extracts.
7. *Struma ovarii:* ovarian demoidtumour made up of thyroid tissue that secretes thyroid hormone.

Signs and symptoms clinical manifestations

The main signs and symptoms include:

1. Nervousness characterized by emotionally hyper-excitable, irritable behaviour and apprehension i.e. they cannot sit quite –, over active and have tremors of the hands.

2. Increased appetite or eating due to increased metabolism.
3. Marked loss of weight due to failure match between food intake and metabolic rate.
4. Weakness and easy fatigability due to excess use of available energy reserves
5. Heat intolerance and due to increased heat production resulting from hyperactivity and increased metabolic rate which leads to a warm skin and excessive perspiration.
6. Rapid pulse rate ranging between 90 and 160 beats per minute and wide pulse pressure (resulting from increased systolic and decreased diastolic blood pressure).
7. Enlargement of the thyroid gland of various sizes though not always the case.
8. There may be diarrhoea or increased defecation due to increased peristalsis.
9. Exophthalmos producing a startled facial expression due to excessive fat collection behind the eyeball.

Management

Investigations

1. History taking and physical examination; the history and physical examination can be of central importance in establishing the cause of the patient's hyperthyroidism. Important features include the duration of symptoms, presence of a diffuse or focal enlargement of the thyroid gland and anterior neck pains though not always.
2. Blood for circulating thyroxin (T4) and triiodothyronine (T3) which will be elevated
3. Thyroid scan may detect abnormalities of the thyroid tissue
4. Iodine uptake test
5. Thyroid suppression test to determine whether the pituitary controls the thyroid gland. Thyroid hormone therapy is commenced which will suppress the gland to produce its hormones. Measurements after thyroid hormone therapy suppression will indicate hyperthyroidism.

Medical Treatment

As yet no treatment for hyperthyroidism has been discovered that combats the cause. However, control can be instilled to relieve the symptoms which may cause complications. Thus, three forms of treatment to control excessive thyroid activity are:

- pharmacotherapy,
- irradiation with isotope, and
- surgery.

Let us look at each in further detail.

Drug therapy

The objective of treatment is to inhibit stages in hormone synthesis or release and to reduce the amount of thyroid tissue thereby reducing hormone production.

1. Antithyroid Drugs: (Thiocarbamides, Thiomides): these block the utilization of iodine by interfering with the iodination of tyrosine and coupling of iodotyrosine in the synthesis of thyroid hormones. Commonly used drugs include:

a. Propylthioracil (Propacil, PTU)

Dose: 100mg orally 8houlry up to 300mg 8hourly in severe cases. Continued until the patient is 'euthyroid' then maintenance dose of 100mg 8hourly daily.

Side Effects: Agranulocytosis, headache, drowsiness, visual disturbances, diarrhoea, nausea, vomiting jaundice, urticaria, skin discoloration etc.

b. **Methimazole (Tapazole)**

Dose: 5mg orally 8hourly if mild, 10 – 15mg orally 8hourly if moderately severe and 20mg orally 8hourly if severe. Continue until the patient is "euthyroid", and then start maintenance dose of 5mg 8hourly daily to a maximum dose of 15mg daily.

Side Effects: Same as for Propacil

Nursing Implications

- A patient on antithyroid drugs is instructed not to use decongestants for nasal stuffiness because they are poorly tolerated.
- These drugs are contraindicated in pregnancy as they may produce goitre and cretinism in the foetus.

- Thyroid hormones may be given occasionally with these antithyroid drugs to put the gland at rest.

2 Iodine or Iodine Compounds like Potassium Iodide or Lugols Solution (a strong iodine solution).

Action: these decrease the release of thyroid hormones from the thyroid gland. They act by reducing the vascularity and size of the gland by shrinking with the resultant improvement in the patient's condition. They are used in combination with antithyroid agents and are commonly used as the patient awaits surgery.
Dose: 0.1mls – 0.3mls 8hourly a day or 5 drops in water or milk 8hourly a day after meals for 14 days as an immediate preoperative measure.

3.Other Supportive Drugs

a) *Beta Adrenergic Blockers:* beta adrenergic blockers have been shown to control peripheral manifestations of hyperthyroidism in pregnant women and neonates. Thyroid storm in both adults and children has been managed with propranolol in conjunction in conjunction with antithyroid therapy. Oral propranolol 80mg 8hourly combined with potassium iodide 60mg 8hourly is effective in attenuating cardiovascular manifestation of hyperthyroidism and reducing plasma concentration of T3 and T4.
b) *Alpha Methyldopa (Aldomet):* slows the heart rate but does not alter the cardiac output.
c) *Calcium Channel Blockers:* e.g. Verapamil orally 80 – 120mg 8hourly
d) *Corticosteroids:* corticosteroid therapy has been recommended for a week before surgery. These diminish thyroid function by suppressing secretion of thyroid stimulating hormone (TSH). These may include Prednisolone 25mg; Dexamethasone 4mg or Hydrocortisone 100mg may be used. In addition 200mg hydrocortisone administered intravenously during operation.
e) *Muscle Relaxants*: such as Diazepam for relieving apprehension

f) *Narcotics* to decrease the metabolic rate.

g) *Neuroleptics* such as Chlorpromazine as a tranquiliser.

Radioactive Iodine

The objective of treatment is to destroy the over active thyroid cells. Radioactive isotope of iodine is concentrated in the thyroid gland where it destroys thyroid cells thus reducing the cells producing excessive thyroid hormones.

Surgery –THYROIDECTOMY

A portion of the over active and or enlarged thyroid gland is removed surgically to reduce thyroid hormone secreting cells.

Indications for thyroidectomy

1. Large goiters that are compressing adjacent structures
2. A patient with hyperthyroidism that is not treatable with radioactive iodine therapy because of the patient's characteristics (pregnancy, child and patient's preference) or that it is not well controlled by antithyroid drugs.
3. Capillary and follicular thyroid carcinoma.
4. For cosmetic reasons.
5. Pregnancy when hyperthyroidism is not controllable by antithyroid drugs

Types of Thyroidectomy

The main types of thyroidectomy are :

1. *Total Thyroidectomy:*this is the total removal of the thyroid glandular tissue especially in situations where the whole thyroid gland is cancerous

2. *Subtotal Thyroidectomy:*this procedure involves the removal of half the thyroid glandular tissue.
3. *Thyroid Lobectomy:*this surgery involves only removal of a quarter the thyroid glandular tissue. This is less commonly done for thyroid cancer as the cancerous cells must be small and non aggressive.
4. **Hemithyroidectomy**- the entire isthmus is removed along with one lobe affected by carcinoma.
5. **Partial Thyroidectomy or Lobectomy-** surgical removal of part of the thyroid gland such as the right or left side (lobe) affected by the tumour. It is done in nontoxic multinodular goiter.
6. **Near total thyroidectomy**- both lobes are removed except for a small amount of thyroid tissue (on one or both sides) in the vicinity of the recurrent laryngeal nerve entry point and the superior parathyroid gland. Done in papillary thyroid carcinoma.
7. **Hartley Dunhill Operation:** removal of one entire lateral lobe with isthmus and partial/subtotal removal of opposite lateral lobe. Done in nontoxic MNG (multinodular goiter)

Preoperative Nursing Care

The patient who is to have surgery of the thyroid requires a non stressful environment (tranquil quiet room and calm, relaxed staff). General measures such as a consistent nurse and schedules should be involved in the patient's care.

Patient teaching

1. The surgical strategy and the nature of the procedure should be fully explained to the patient.
2. The patient should be told that the recurrent laryngeal and superior laryngeal nerves are at high risk with thyroid procedures. If the recurrent laryngeal nerves are damaged, the disability may range from changes in the voice such as hoarseness

and weakness to airway distress. If the superior nerves are damaged, there may be a change in the pitch of the voice.

3. The parathyroid glands are also at risk in thyroid surgery. The patient should be told that the glands need repositioned during the thyroid procedures and that it may sustain damage during the process. However, if parathyroid function should fail despite all the precautions that are taken to conserve it, the patient will require calcium and vitamin D supplements temporarily or permanently.
4. Advice the patient that there is a small risk of postoperativehaemorrhage. If a haematoma results, reopening of the wound may be necessary and the patient and the patient may also require a blood replacement.
5. If a malignant thyroid tumour is diagnosed, the patient should be advised to remain off antithyroid therapy for 4-6 weeksso that the whole body radioisotope can be done to assess for metastastic diseases. If total thyroidectomy is performed the patient, the patient will require thyroid replacement for physiological purposes.
6. The patient should how to cough and to move the head and neck post operatively without causing stain on the suture line, thus the patient should also be taught preoperatively to support the neck by placing both hands behind the neck when the head or when coughing and range of motion exercises of the neck should be practiced.
7. The nurse should explain routine postoperative care such as intravenous infusion
8. The patient should be told that talking is likely to be difficult for short time after surgery.

Informed Consent Signing

After the standard preparation, ask the patient is he/she requires any further explanation or has any questions. If he/she does understand the inherent risks as well as the potential benefit to be achieved, obtain their consent for thyroidectomy.

Investigations and preoperative drug therapy

Ensure that all preoperative investigations and medications are done andgiven. Investigations should be done to rule out any abnormalities and create a baseline data. Institute drug therapy to let the patient be brough as close as possible to a euthyroid condition prior to the operation as we have discussed above. This is also done to avoid perioperative thyroid storm (thyroid crisis).

Take Note

Only patients in a life or death emergency situation should be taken for surgery without the benefit of being rendered euthyroid.

Other njursing interventions on the preparation of a patient who is to undergo surgery of the thyroid gland are as the preparation involved in other patients prior to surgery.

Postoperative Nursing Care

Preparation to receive the patient after operation

Special equipment should be assembled and for use when preparing to receive the patient following thyroidectomy. These include:

1. Sand bags or small firm pillows to immobilise the head.
2. Suction equipment and catheters for clearing mucus from the throat.
3. Sterile clip removers or stitch cutters in case of a haematoma at the site of surgery obstructing the trachea by compression.
4. A humidifier to relieve tracheal or laryngeal irritation and facilitate the removal of secretions.
5. Intravenous infusion equipment
6. A sterile emergency intubation and trachestomy tray in the event of respiratory obstruction.
7. Equipment for obtaining blood specimen quickly for blood calcium determination.
8. Ampoules of calcium chloride calcium gluconate with the necessary equipment for intravenous administration in the event of complication of tetany (hypocalcaemia).

Environment (specific)

The patient should be nursed near the nurses' duty room for constant and close observations. This is because the patient may be usually apprehensive or develop serious complications.

Position and airway maintenance

If general anaesthesia has been administered, the patient is laid in lateral position until recovery takes place and then is soon propped up as soon as possible supported by a back rest. Suctioning of the oral pharynx is carried out if the accumulation of secretions is severe. Encourage deep breathing and coughing several times each hour.

Observations

Record the blood pressure, pulse rate and respiratory rate every 15 minutes, and reduce the frequency gradually if the patient remains stable. Record the body temperature every 4 hours. Note the degree of restlessness and apprehension and if not relieved by the prescribed sedation, is brought to the attention of the surgeon. Pay particular attention to the patient's respiration any complaints or signs of respiratory distress and cyanosis, since they may indicate laryngeal paralysis or compression of the trachea by accumulating blood. Some hoarseness is common and is due to irritation of the larynx by the surgery and endotracheal tube used in maintaining airway during surgery. The surgeon is advised if the hoarseness and weakness of the voice persist beyond 3 – 4 days. The dressing should be watched for signs of haemorrhage. Since blood may drain back under the patient's neck and shoulders each time the nurse observes the patient to be certain that any bleeding will be detected early. Any choking sensation, difficulties in coughing and swallowing or tightening of the dressing are signs that there is bleeding into the surrounding tissues causing pressure on the trachea and epiglottis. If symptoms occur, the dressing should be loosened at once and the doctor notified. If loosening the dressing does not relieve the respiratory difficult, the surgeon

may instruct the nurse to remove the clips or sutures form the wound to relieve pressure on trachea when the surgeon arrives, an emergency tracheotomy may be necessary.

Tetany may develop due to accidental removal of one or more of the parathyroid glands. It may cause symptoms of calcium deficiency (tetany) such as muscle twitching , convulsions (painful muscular spasms) especially of the feet and hands.

During the first 2 postoperative days, serum calcium levels should be checked and exogenous calcium and thyroid hormone administered. Indirect laryngoscopy should be performed to document recurrent laryngeal nerve function.

Pain relief

Pethidine or morphine may be ordered and given to keep the patient comfortable and less apprehensive during the first 48 hours. Analgesics should be administered regularly and consistently to control pain. Respirations are assessed for evidence of a decrease in rate or depth.

Care related to the incision

As soon as the patient has recovered from anaesthesia, she/he is placed on her/his back and head of bed is moderately elevated to facilitate breathing. The head and neck are supported by a pillow and are positioned in good alignment, prevent flexion and hyperextension. The position prevents strain on the suture line and avoids sensation that the neck is falling off. When the patient's position is changed, you lifts and supports the head preserving good body alignment. Teach the patient to lift and support the head by placing the hands at the back of the head when wishing to move.

The patient returns from the operating theatre with surgical drains inserted. These should be checked at regular intervals to ensure free drainage and that the mechanism is functioning. While large accumulation of blood behind the wound site can cause respiratory obstruction, a smaller haematoma can increase vulnerability to infection and delayed healing.

If vital signs are stabilized and normal, the patient is assisted out of bed on the first postoperative day. Following removal of the drains usually on the first or second post operative day, the sutures or skin clips after one week and firm healing of the incision; head exercises, which include flexion (forward and lateral), hyperextension and turning, are gradually introduced with the surgeon's approval. To prevent contraction of the scar, the patient may be told to massage the neck gently twice daily using lanolin cold cream or an oily lotion.

Nutrition

Some difficult in swallowing is usually experienced for a day or two, but the patient should swallow a little fluids as soon as possible and as it serves to clean the mouth. The patient should take a little fluid high in carbohydrates and a soft diet if tolerated. Since the throat usually is sore for several days following surgery, the patient may have some difficulty taking nourishment. Analgesics and throat lozenges or narcotics may be ordered whenever necessary to relieve the discomfort which may be severe and prevent the patient from raising secretions. The time of administration of should be planned so that a dose can be given about half an hour before meals, to make swallowing easier. Benzoin or plain steam inhalation may be used in the room to soothen the mucous membrane or the throat and trachea and this relieves discomfort.

Psychological care

The patient and family should know that she/he patient will have a hoarse voice and some difficult in swallowing after operation due to irritation caused by the endotracheal tube through which the anaesthesia was given. This condition is temporally and will subside after local irritation and oedema disappear. Some patients may be aphonic because of neck pain, surgical manipulation and endotracheal intubation in the early postoperative period. These symptoms are not alarming and the surgeon should reassure the patient and her/his family. However, if there is excessive breathlessness or weakness of the voice and cough, recurrent nerve damage or endolaryngeal trauma such as submucosal haematoma or cricoaretynoid joint damage must be considered.

Complications Of Thyroidectomy

1. Haemorrhage

Signs of haemorrhage include: rapid pulse rate, fall in blood pressure and evident bleeding. You can see the bleeding if you frequently check the dressing and slide your hands under the shoulders and the neck. Blood may collect quickly within the tissues and cause pressure on the trachea. The patient may complain of choking congestion and shortness of breath, cyanosis, dyspnoea and asphyxia may occur.

Management

- Notify the surgeon immediately at the earliest time of change.
- Loosen the dressing to promote outward drainage.
- Prepare instruments for removing clips or sutures and an emergency tracheostomy tray in case the surgeon considers an immediate tracheostomy necessary. The skin clips may be removed to allow the escape of blood.
- The patient will be probably returned to the operating theatre to bring the bleeding under control. Blood replacement may be necessary.

2. Injury to one or both recurrent laryngeal nerves

These nerves control laryngeal muscles, opening of the glottis and voice production. Injury to one nerve produces hoarseness and weakness of the voice but no serious respiratory disturbance. Bilateral nerve injury causes paralysis of the muscles on both sides of the larynx resulting in closure of the glottis and respiratory obstruction. The patient is unable to speak and stridor occurs, cyanosis and loss of consciousness ensues unless respirations are quickly re established.

Management

Prompt endotracheal intubation or emergency tracheostomy is done and oxygen is administered.

3. Hypocalcaemia and tetany

During surgery interference with blood supply to the parathyroid glands or injury or removal of parathyroid tissue may depress the secretion by the gland. Decreased parathyroid hormone concentration leads to hypocalcaemia, resulting in increased neuromuscular irritability and a condition known as Tetany. Early signs of this complication include complaints of numbness and tingling in the hands of feet, muscle twitching and spasms and gastrointestinal cramps. A change may be evident in the voice, which may become high pitched.

Management

- A blood specimen is obtained for serum calcium determination with the appearance of early symptoms.
- Calcium gluconate 10% may be slowly administered intravenously, then oral preparation given till normal parathyroid function resumes.
- The patient is encouraged to take milk and calcium containing foods.

4. Scar Complications

Some patients develop a hypertrophic scar or kelloids particularly when the wound has been placed too low in the neck. Excision of the scar with steroid infiltration of the new wound during healing may improve the result but recurrence is common.

5. Thyroid Malfunction

I. Thyrotoxicosis/Crisis/Storm

If thyroidectomy is done to treat a very over active gland (Thyrotoxicosis), there may be a surge of thyroid hormone into the blood or may occur if hyperthyroidism of the patient has not been brought to euthyroid state prior to

surgery. The diagnosis should be suspected in patients with hyperpyrexia and marked tachycardia. This can be managed by iodide and beta blockers with tepid sponging.

II. ***Hypothyroidism***

This depends on the nature of the disease and the extent of thyroid removal. The patient may develop hypothermia and electrolyte deficiencies. Careful administration of small doses of triiodothyronine is supplemented by hydrocortisone.

Discharge Teaching

Discharge teaching of a patient following a thyroidectomy should include information regarding signs and symptoms of potential complications. It is also important to include information about how and when to contact the physician and written and verbal information regarding medications, wound care, nutrition and follow up visits with the physician. The nurse must be sure that the patient demonstrates an understanding of all aspects of home care. The family and significant other should be included in discharge teaching.

You have come to the end of our discussion on tumours of the thyroid gland. Next we shall discuss the female breast.

3.2The Female Breast

The breasts or mammary glands of mammals are important for the survival of the new born and thus of species. They are associated functionally with the reproductive system as organs for milk production in the postpartum woman. The female sex hormones influence the development of breasts and the production of milk. Breasts are also associated with feelings of sexuality and are an integral component of sexual behaviour. The breasts especially the nipples which are erectile tissue, are erogenous areas in sexual activity. Figure 3 below shows the structure of the breast.

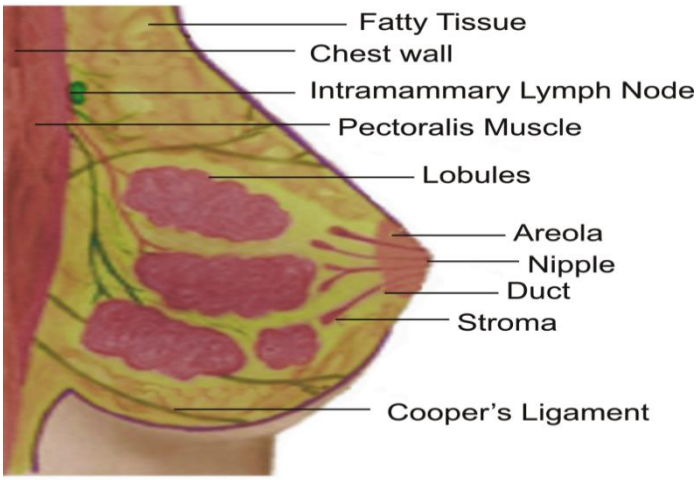

Figure 3: The female breast

The breast is composed largely of glandular tissue, but also of some fat tissue and is covered with skin. The glandular tissue is divided into about eighteen lobes which are completely separated by bands of fibrous tissue. Each lobe is a self contained working unit and is composed of the following structures:

- ***Alveoli:*** containing the milk secreting cells. Each alveolus is lined by milk secreting cells, the *Acini* which extract from the mammary blood supply, the factors essential for milk formation. Around each alveolus lie myoepithelial cells sometimes called basket or spider cells. When these cells are stimulated by oxytocin they contract, releasing milk into the lactiferous duct.
- ***Lactiferous tubules:*** small ducts which connect the alveoli.
- ***Lactiferous duct:*** a central duct into which tubules run.
- ***Ampulla:*** the widened out portion of the duct where milk is stored. The ampullae lie under the areola.
- ***Blood supply:*** the internal mammary artery, the external mammary artery and the upper intercostal arteries. Venus drainage is through corresponding vessels into the internal mammary and axillary veins.

- ***Lymphatic drainage:*** the axillary glands, with some drainage into the portal fissure of the liner and mediastinal glands. The lymphatic vessels of each breast communicate with one another.
- ***Nerve supply:*** the function of the breast is largely controlled by hormone activity but the skin is supplied by branches of the thoracic nerves. There is also some sympathetic nerve supply, especially around the areola and nipple.

BREAST TUMOUR (CARCINOMA OF THE BREAST)

Breast cancer is the commonest malignant disease of women worldwide. It is estimated that 1 in 17 of all female children born will develop the disease during their lifetime.

Women between 45 and 55 years are the most frequent victims, but many factors are known to influence its frequency. While all portions of the breast may be involved, the disease commences in the upper outer quadrant. That is why you should encourage women to self examine their breasts frequently and report to their doctors as soon as they detect a lump in the breast.

Contributing/Predisposing Factors

The main predisposing factors are:

a. ***Geographical***: it occurs commonly in the western world, England and Wales having a high incidence.
b. ***Genetic***: it occurs more commonly in women with a family history of breast cancer than in the general population.
c. ***Endocrine***: it is common in nulliparous women than in women who have borne many children and have breastfed. It is also less common in women who have their first child at an early age especially if associated with late menarche and early menopause.
d. ***Milk Factor***: an infective agent in milk has been shown to transmit breast cancer, though not much evidence to support this phenomenon exists.

Spread Of Mammary Carcinoma

Mammary carcinoma spreads in three ways:

a. ***Local Spread:*** the tumour increases in size and invades other portions of the breast. It tends to involve the skin and to penetrate the pectoral muscle and even the chest wall.
b. ***Lymphatic Spread:*** tOccurs in two ways; one by emboli composed of carcinoma cells, being swept along the lymphatic vessels by the lymph stream and second by permeation, that is actual growth of cancer cells along the lumen of the lymphatic channels. The axillary lymph nodes and the internal mammary lymph nodes are involved comparatively. Later the supraclavicular lymph nodes, the opposite breast and the mediastinum are possible resting places for carcinoma cells.
c. ***Spread By Blood Stream:*** it is by this route that skeletal metastasis occurs in the lumbar vertebrae, femur thoracic vertebrae and the skull. they areGenerally osteolytic pathological fractures occuring most often in a rib or a vertebra. In most instances, it is by way of the bloodstream that metastases arrive in the liver, lung fields or brain from the breast. However, secondary deposits may also be carried to the liver via the lymphatics within the rectus sheath and the falciform ligament.

Clinical Types Of Breast Cancer

1. ***Scirrhous Carcinoma***: the commonest form, in middle aged or elderly women. Owing to many fibrous tissues the lump feels very hard, while its contour tends to be irregular. As the tumour advances, it may cause indrawing of the nipple, the overlying and tethering to the pectoral fascia deeply. In the late cases there may be peau d'orange, ulceration of the skin and fixation to the chest wall.
2. ***Atrophic Scirrhous Carcinoma*** is an uncommon variant and is seen principally in aged, thin women with small breasts. The disease runs a very chronic course, taking about ten or more years to ulcerate through the skin.
3. ***Duct Carcinoma***: this presents with blood stained discharge from the nipple. It is not seen below the age of 40.

4. ***Medullary Carcinoma***: tAccounts for 5% of all breast cancer cases and affects a somewhat earlier age group than the average. The primary tumour is soft and circumscribed, and may attain a large size.
5. ***Inflammatory Carcinoma*** (Mastitis Carcinoma): tA very rare and highly aggressive cancer seen usually during pregnancy and lactation. The diseased breast is often painful, a symptom occurring in some 10% of breast cancers. The reddened skin feels abnormally warm and cutaneous oedema, which indicates blockage of the subdermal lymphatics with carcinoma cells, usually extends over a considerable. There may be retraction of the nipple.
6. ***Paget's Disease of the Nipple***: tIs a superficial manifestation of an underlying breast carcinoma. It presents as an eczema like condition of the nipple and areola which persists in spite of local treatment. The nipple is eroded slowly and eventually disappears.
7. ***Lipomatous carcinoma***: tIs a true lipoma of the breast is extremely rare. A Scirrhous ca may sometimes contract a covering of soft breast and subcutaneous tissue around itself to mimic a lipoma.

Clinical Staging Of Breast Cancer

The International Union Against Cancer (IUAC) has recommended a staging system known as TNM (Tumour, Nodes, and Metastases). The Manchester system remains in wide use and is described as follows:

a. **Stage I:** growth confined to the breast. An area of adherence to or ulceration of the skin smaller than the periphery of the tumour does not affect staging. The tumour must not be adherent to the pectoral muscles or the chest wall.
b. **Stage II:** same as stage I but these are affected mobile lymph nodes in the axilla of the same side.
c. **Stage III:** skin involved or peau d'orange larger than the tumour but still limited to the breast. tumour fixed to pectoral muscle but not to chest wall. Homolateral axillary

lymph nodes matted together or fixed to chest wall, or homolateral supraclavicular nodes mobile or fixed, or oedema of arm.

d. **Stage IV:** skin involvement wide if the breast and including cancer encuirasse, complete fixation of tumour to chest wall, distant metastases either blood borne or lymph borne; this include involvement of the opposite breast or axilla and deposits in bones and viscera such as l.

Events Resulting From Lymphatic Obstruction In Late Mammary Carcinoma

1. ***Peau d'orange****;* tis due to cutaneous lymphatic oedema where the infiltrated skin is tethered by the sweat ducts if cannot swell.
2. ***Late oedema of the arm***: elephantiasis chirurgensis a troublesome complication of radical mastectomy, especially when postoperative radiotherapy is given. Theoccurrence swelling appears at a time varying from several months to many years after operation.
3. ***Brawny arm*****:** tcan result from advanced neoplastic infiltration or not removed or incompletely removed axillary or supra clavicular lymph nodesare are . The oedema which is persistent and brawny (it does not pit) is due to lymphatic blockage but in some cases venous obstruction is a contributing factor.
4. ***Cancer-en-cuirasses*****:** this is accompanied by a brawny arm, the chest wall is studded with carcinomatous nodules and the skin is so infiltrated that it has been likened to a coat armour.

Manifestations Of Breast Cancer

1. Breast mass or thickening
2. Unusual lump in the under arm or above the collar bone
3. Persistent skin rash near the nipple
4. Flaking or eruption near the nipple
5. Dimpling, pulling or retraction in an area of the breast

6. Nipple discharge
7. Change in nipple position
8. Burning, stinging, or prickling sensation

Management Of A Client Undergoing Mastectomy

Operable Breast Cancer (Stage I And Ii)

Some authorities advocate for surgical operations of varying magnitude, some irradiation and others a combination of surgery and irradiation.

Aims Of Treatment

The aim of treatment is to:

1. Ensure long term control of disease in the breast (local) and lymph nodes (regional) area;
2. As far as is consistent with I Conserve (or restore) local and function., a;
3. Prevent, if possible, the evolution of those occult metastases known to be present in a proportion of patients, no matter how thorough the staging.

Indications For Mastectomy

1. Carcinoma of the breast
2. Cosmetic reasons

Diagnostic Tests

1. Clinical breast examination (CBE) inspection and palpation of the breasts and axillae performed by a trained health professional
2. Mammogram: a low grade dose X-ray study of the breast used to detect breast lesions
3. Percutaneous needle biopsy

4. Streotactic needle biopsy to obtain cells for histological evaluation

Treatment

The choice of systemic treatment depends on the woman's age, stage of cancer, and other individual factors. Breast cancer tends to be more aggressive in pre-menopausal women, probably because of hormonal factors. Thus treatment regimes for pre-menopausal women are also more aggressive.

Chemotherapy or Hormonal therapy

Tamoxifen Citrate (Nolvadex) is an oral medication that interferes with oestrogen activity. It is used to treat advanced breast cancer. It prevents recurrence of oestrogen positive breast cancer in postmenopausal women. It inhibits tumour growth by blocking the oestrogen receptor sites of cancer cells.

Radiation Therapy

Radiation therapy is typically used following breast cancer surgery to destroy any remaining cancer cells that could cause recurrence or metastasis. Radiation therapy is administered by means of external beam or tissue implants.

Surgery - Mastectomy

Surgery nowadays is toward conservative combined with chemotherapy, hormone therapy, or radiation, depending on the stage of the tumour and the age of the woman.

Mastectomy

There are various types of mastectomy procedures for breast cancer:

1. ***Radical Mastectomy*** is the removal of the entire affected breast, the underlying chest muscles and the lymph nodes under the arm of the affected side.
2. ***Simple Mastectomy*** is the removal of the complete breast only.

3. ***Segmental Mastectomy*** or *Lumpectomy* is the removal of the tumour and the surrounding margins of the affected breast tissue.
4. ***Modified Radical Mastectomy*** is the removal of the affected breast tissue and lymph nodes under the arm (axillary node dissection).

Pre – Operative Nursing Care

Psychological Preparation

Although each woman has individual needs, nursing diagnoses prior to surgery are concerned with anxiety, decisional conflicts, knowledge deficit and grief over the impending loss of a breast.

Dealing With Anxiety

A woman with breast cancer is often anxious about the diagnoses, the surgery, the outcome of the surgery if nodal involvement is found, and the possible changes in sexual and family relationships. The spouse is equally psychologically affected.

- Provide the opportunity to express thoughts and feelings. In this process, the woman can state her fears. Once the fears are stated, you should simply listen, educate or dispel fears that stem from lack of understanding.
- Discuss with the woman her knowledge of breast cancer. Assessing the woman's knowledge of breast cancer helps the nurse plan more effective teaching.
- Encourage discussion relating to immediate concerns about resuming her life and duties at home and the changes she has to make. Anticipatory guidance can help plan for and cope with changes in her life and relationships.
- Explain the surgical procedure, including information about preoperative medications, anaesthesia and recovery.
- Explain that it is normal to have decreased sensation in the surgical area. Severed or damaged nerves can reduce sensation.

Dealing With Decisional Conflict

The woman with breast cancer must make life changing decisions about treatment within a relatively brief and highly stressful time. Her age, menopausal status, and stage of cancer are only some of the factors that affect her decisions. Culture, values, life style, socioeconomic status, and self esteem are also considered.

1. Provide an opportunity for the woman to ask questions, answer questions as simply and directly as possible. Make eye contact and pay attention to body language.
2. Focus on immediate concerns, and provide up-to-date written material for woman to review.
3. Listen to the woman in a non-judgmental manner during her decision making process.
4. If the woman wishes, provide opportunities for her to meet with other women who have had successful breast cancer surgery.
5. Facilitate a team approach with the surgeon, anaesthetist, oncologist, plastic surgeon and other health professionals.

Dealing With Grief

Breast surgery, even lumpectomy, alters the appearance of the breast.

1. Listen attentively to the expressions of grief and watch for non-verbal cues.
2. Allow time to interact and do not rash interactions.
3. Explain that it is normal to have periods of depression, anger and denial after breast surgery.
4. If the woman wishes to do so, involve the partner in helping the woman to cope with her grief.
5. Ensure that the woman or family members sign an informed consent form.

Physical Preparation

Physical preparation is meant to ensure that the patient is made fit for surgery and recovers without many problems.

Observations, Assessment and Investigations

Take the vital signs to establish baseline data as for any other patient undergoing surgery. Hypertension should be identified if any and managed so together with cardiac problems.

Blood tests such as bleeding time, haemoglobin levels, cross matching, blood sugar tests to rule out diabetes mellitus, urinalysis to rule out urinary tract infections, should be done. ECG should be done to rule out cardiac disease. Chest X ray as well to rule out chest infections should be done.

Nutrition Assessment

Good nutrition and nutrition status assessment play a major role in the patient's recovery.

Immediate Preoperative Care

Assist the patient with bathing, gowning and changing into operating room gown. Ensure that the patient takes nothing by mouth six hours before operation or from midnight. Provide addition 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 them in a safe place. Hair should be well secured and nail polish removed.

Insert an indwelling catheter if possible and intravenous line. Verify that the consent form has been signed prior to the administration of pre operative medications. Verify that the height and weight of the patient are recorded in the chart for dosage calculation of anaesthesia. Have the patient empty the bladder immediately before the pre operative medications are administered unless an indwelling catheter is in situ.

Administer pre operative medications as ordered. Ensure the safety of the patient once the preoperative medications have been administered. Obtain and record vital signs and provide an on going care to the client and her family.

Document all preoperative care in the appropriate location and complete the checklist before the client is transferred to the operating theatre. Verify with the surgical team the client's identity and ensure that the entire client's information is documented appropriately. Help the surgical team transfer the client from the clean side to the sterile of the room of the operating department. Prepare the client's room back on the ward for postoperative care, including making the surgical bed and ensuring that anticipated supplies and equipment are in the room.

Post Operative Nursing Care (Specific)

Immediate Care

Immediate postoperative care begins when the patient has been transferred from the operating room to the recovery room.

1. Monitor vital signs every 30 minutes until they are stable
2. Monitor the surgical site to detect significant changes
3. Assess the mental status and level of consciousness
4. Orient the patient to time, place and persons repeatedly
5. Give emotional support because the client is a vulnerable and in a dependable position.
6. Assess the hydration status by monitoring intake and output to detect cardiovascular or renal complications.
7. Assess the patient's pain levels, carefu administration of analgesics and provide comfort without compounding the potential side effects of anaesthesia.

Care After Stabilisation

1. Assess the surgical for bleeding, drainage, colour and odour every 4hours for 24 hours and document your findings. Circle any visible bleeding and drainage on the dressing as baseline for subsequent assessment. Excessive bleeding or drainage signals postoperative complications that may require emergency attention.
2. Observe the incision and intravenous sites for pain, redness, swelling and drainage. Assess the drainage system for patency and adequate suction; note the colour and amount of drainage. Careful observation for signs of infection is essential because the woman's immune system is compromised. Intravenous catheters should be placed on the uninvolved side only.
3. Change dressings and intravenous tubing using aseptic technique. Moist dressings and intravenous tubing provide sites for bacterial growth and entry. Routine dressing and intravenous tubing thus should be changed using aseptic technique to reduce risk for infection.
4. Give and encourage a protein rich diet. Discuss the woman's nutritional status with the dietician and request consultation for the woman. Adequate nutrition boosts the immune system and promotes healing.
5. Clean the site, empty the device, and record the amount, colour and type of drainage. If the woman is discharged with a drainage system in place, teach her and her family how to care for the drainage system.
6. When obtaining blood pressure and starting intravenous lines, use the non-surgical side. This is because compression of the arm on the surgical side may cause lymphoedema.
7. Elevate the affected arm on a pillow higher than the shoulder, but do not abduct it; the hand should be higher than the elbow. Elevating the arm permits drainage, prevents swelling, and promotes circulation.
8. Encourage a range of motion exercises in the affected arm. Exercise helps develop collateral drainage.
9. Explain that lymphoedema massage and an elastic compression bandage may help control the swelling after she has recovered from surgery.

Psychological Care In Relation Tto Body Image Disturbance

Breast surgery can change the woman's body image. The surgical changes may be compounded by weight gain and other side effects of chemotherapy or hormone therapy. Self esteem also affects adjustment to a changed body image.

Postoperatively, you should:

1. Assess how the woman views her body. Discuss with the woman what she had prior to surgery. Self image is related to self esteem. Discuss whether herself image has changed.
2. Explain that redness and swelling in the scar will subside with time. The knowledge that the scar will subside may give the woman a more realistic view of the changes.
3. Include the partner and family if possible to discuss and plan for care and activities of daily living. Discuss with the partner and the family to facilitate the woman's emotional healing process.
4. Offer pamphlets and suggest books and videos that might increase knowledge about what lies ahead. Knowing what to expect can help the woman cope.
5. Encourage the woman to look at her incision when she feels ready; often the reality is not as frightening as the woman had imagined. Explain that it is normal to be afraid to look.
6. It the woman is interested in breast reconstruction, provide written material and encourage her to talk with a plastic surgeon and with women who have had successful reconstruction. It is important that the woman is fully informed about available options to make an informed decision.

Home Care/Teaching At Discharge

1. At discharge, teach the woman to watch for and report to her health care provider the. manifestation of infection; sfever, redness or hardness at the surgical site or purulent drainage. Any of these manifestations should be reported to

physician/surgeon. Knowing signs and symptoms of infection prepares the woman to seek prompt treatment if infection occurs.

2. Explain that she may experience scaling, flaking, dryness, itching rash or dry desquamation of the skin, particularly after radiation therapy. Impaired skin integrity increases the risk of infection.
3. Tell the woman to avoid deodorants and talcum powder on the affected side until the incision is completely healed. These substances may irritate the skin and impede healing.
4. The woman with breast cancer and her family have much to learn to provide health care at home. Therefore you should teach them the following:
    - Manifestations of infection and the need to report any that occur to her health care provider.
    - The importance of activities of daily living, such as eating, combing her hair and washing face.
    - Post mastectomy exercises as discussed with the physician and physiotherapist.
    - The need for adequate rest and emotional support.
    - Participation in a breast cancer support group and on-line information services and bulletin boards for sources of education and support.
    - About orosthesis management, if this option is chosen, a temporally light weight prosthesis may be worn immediately after the drains and sutures have been removed from the surgical site. A permanent one should be purchased until the wound has completely healed.

Recommended Exercises After Mastectomy

1. ***Wall climbing:*** stand facing the wall with toes 6–12 inches from the wall. Bend elbows and place palms against the wall at shoulder level. Gradually move both arms up the wall parallel to each other incisional pulling or pain occurs.

2. ***Overhead pulley***: using operated arm; toss over 6 foot rope over shower curtain rod. Grasp one end of the rope in each hand. Slowly raise operated arm as far as comfortably by pulling down on the rope on opposite side.
3. ***Rope turning***: tie the rope to the door handle. Hold the rope in hand of the operated side. Back way from door until the arm is extended away from the body, parallel to the floor.
4. ***Arm swings***: stand with feet 8 inches apart. Bend forward from the waist, allowing arms to hang towards the floor. Swing both arms up to the sides.

Complications Following Mastectomy

1. Infection
2. Fibrous tissue formation or kelloids
3. Emphysema
4. Lymphoedema
5. Haemorrage

Self Test Question1.44 Disorders Of The Nervous System

In this section we shall discuss the following disorders of the nervous system:

- Head injury
- Spinal injury
- Spinal tumours
- Brain tumours

We will start with head injury

4HEAD INJURY

Traumatic brain injury (TBI) continues to be an enormous public health problem even with modern medicine in the 21st century. Most patients with traumatic brain injury (about 75 – 80%) have mild head injuries, the remaining injuries are divided between moderate and severe categories. Head injuries are one of the most common causes of death and disability with sufficiently severe to warrant admission occurring in 200 persons per 10,000 population each year. About 6% of these are serious injuries producing coma. Road traffic accidents account for half of all head injuries; conversely two thirds of all road traffic accidents victims have head injuries. The cost to society of traumatic brain injury is staggering from both the economic and emotional stand point. Almost 100% of persons with severe head injury and as many as two thirds of those with moderate head injury, will be permanently disabled and in some fashion will never return to their pre morbid level of function.

Brain Anatomy

The brain essentially floats within the cerebral spinal fluid as a result the brain can undergo significant translation when the head is subjected to significant forces. In deceleration injury in which the head impacts a stationary object such as the windshield of a car, the skull stops moving almost instantly. However, the brain continues to move within the skull towards the direction of the impact for a very brief period after the head has stopped moving. This results in significant forces acting on the brain a it undergoes both translation and deformation.

In acceleration injury, as in a direct blow to the head, the force applied to the skull causes the skull to move away from the applied force. The brain does not move with the skull and the skull impacts the brain causing translation and deformation of the brain.
The forces that result from either deceleration or acceleration can cause injury by direct mechanical effects on the various cellular components of brain or by shear type forces on axis. In addition to the translational force, the brain can experience significant rotational forces which can also lead to shear injuries.

The intracranial compartment is divided into three components by two major dural structures: the falxicerebri and the tentorium cerebelli. The tentorium cerebelli divides the posterior fossa or infratentorial compartment (the cerebellum and the brain stem) from the supratentorial compartment (cerebral hemispheres), while the falxicerebri divides the supratentorial compartment into two halves and separates the left and right hemispheres of the brain. Both the falxi and the tentorium have central openings and prominent edges at the borders of each of these openings. When a significant increase in intracranial pressure occurs due toa large mass lesion or significant cerebral oedema, the brain can slide through these openings within the falxi or tentorium a phenomenon known as ***herniation***. As the brain slides over the free dural edges of the tentorium or the falxi, it is frequently injured by the dural edge.

Causes Of Head Injury

Let us start with your thoughts on this. Take a minute to think about the causes of head injury and then complete the following activity.

Activity 1

List at least 3 causes of head injury in your notebook and then compare your answers with the information given below.

The common causes of head injury are:

1. Road traffic accidents
2. Industrial accidents
3. Falling off from a height
4. Diving or swimming
5. Fighting
6. Military accidents e.g. gun shots
7. Trauma from any cause involving the head e.g. domestic violence, spots, etc.

Classification Of Head Injury

Classification of head injury depends on the damage of the tissue of the head. Thus they may involve the scalp, fractures of the skull bone, tearing of blood vessels within the skull (causing bleeding) and or involving the brain tissue.

1. Scalp Injury

Injuries to the scalp are usually termed as minor head injuries because they do not involve the brain tissue. Because of a lot of blood vessels to this part of the head and failure by these vessels to constrict efficiently soon after an injury, bleeding is usually so profuse. Types of scalp injuries may be lacerations, contusions, avulsions leading to haematomas, abrasions or scrapping off of the skin portion only, tec.

Management Of Scalp Injuries

Diagnosis is based on physical examination, inspection and palpation to determine the extent of scalp damage.

These injuries heal fast due to their having good supply. Haematomas of the scalp may not require any medical intervention as they are allowed to heal on their own when blood is absorbed. For lacerations, inject 1% or 2% lignocaine around the wound to anaesthetize the area. This allows and helps during the cleaning of the wound thoroughly. The area is irrigated with normal saline to remove any foreign materials and minimize chances of infection before the laceration is closed. Shaving of the scalp around the laceration is also done to remove hair which harbours microorganisms. Suturing is done is done to close the wound. Tetanus toxoid 0.5mls is given intramuscularly immediately.

2. *Skull Injuries*

Bones forming the skull are classified into two groups; cranial and facial bones. These injuries are fractures are fractures like those of other body bones. These can be classified as:

- *Simple Fractures:* these involve cracking or a narrow slit which does not necessarily extend through to the other surface of the flat bone. These fractures are not usually serious though this also depends on the amount of theforce involved.
- *Depressed Fractures:* these are fractures in which a piece of a broken skull bone is driven inwards. It can be simple or compound. These are called ***Pond Fractures.*** The seriousness of these fractures is dependent on the force involved as this can lead to injury to underlying tissues including the brain.
- *Comminuted/Compound Fractures:* these are fractures in which there is more than one line of broken bone resulting into several bone fragments. These may be a danger as they may go deep into the brain tissue causing serious brain damage.

Management

Non-depressed skull fractures may not require surgery. Close supervision and observation of the patient is essential instead. For depressed skull fractures, surgery is indicated. The scalp is shaved and cleaned and the fracture exposed. The fragments are elevated and the area is debrided by the surgeon in the operating theatre. The patient is also put on antibiotics for prophylaxis.

3. *Injury To Blood Vessels In The Brain –* ***Intracranial Haemorrhage***

Intracranial rupture or tearing of blood vessels can occur without any brain or scalp damage leading to bleeding within the skull. The seriousness or severity of intracranial haemorrhage depends on the blood vessels torn and the subsequent amount of bleeding. Thus it can be mild, moderate or severe.

Lesions can be extra axial occurring within the skull but outside the brain or intra axial occurring within the brain. The bleeding may be generalized, defuse or confined to a specific area.

Types of Intracranial Haemorrhage

a. *Epidural (Extra Dural) Haemorrhage/Haematoma*

In this type of bleeding haemorrhage occurs between the dura mater and the skull. It is commonly due to rupture of the meningeal artery which runs beneath and is closer to the temporal bone of the skull. There being no much space between the bone and brain, the brain tissue is compressed and this leads to increased intracranial pressure. The whole brain shifts and this can be seen on an x - ray film. If the patient presents with lethargy or unconsciousness after initially gaining consciousness following the injury, an epidural haematoma should be suspected.

b. Subdural Haemorrhage/Haematoma

This is bleeding below the dura mater (i.e. between the dura mater and arachnoid mater – subdural space). The bleeding is usually venous in nature and mostly involves the cerebral vein. This implies the slow development of the haematoma. However, after a period of time, the bleeding eventually causes increased intracranial pressure and leads to symptoms similar to those seen in an epidural haematoma.

c. Subarachnoid haemorrhage/Haematoma

This is bleeding of cerebral vessels into the space beneath the arachnoid mater. This is rarely seen in trauma and is more likely to be due to cerebral aneurysms. It may occur in combination with other types of bleeding stated above. Bleeding is usually associated with spillage of cerebral spinal fluid as this space connects with the spinal canal and hence even pressure does not commonly occur. Signs and symptoms may include intense headache and vomiting.

d. Intracerebral Haemorrhage/Haematoma

Intracerebral haemorrhage occurs within the brain tissue itself. The bleeding may be small but like bruising in any other part of the body, swelling or oedema may occur over a period of time causing progressive decrease in the level of consciousness and other symptoms of head injury in the patient.

Treatment

Emergency surgery to remove clots is done. ***A burr hole*** which is a hole drilled in the skull bone is made to allow access to the cranial cavity and remove the haematoma. This relieves the intracranial pressure as well.

4. *Brain Injuries*

Traumatic brain injury also called intracranial injury occurs an external force traumatically injures the brain tissue. Three types of brain injury exist and they include:

- cerebral concussion,
- cerebral contusion and
- cerebral laceration.

Let us discuss each in turn.

a. Cerebral Concussion

This is a type of brain injury resulting from severe shaking of the brain mater. It causes temporal loss of neurological function without organic structural damage. There is transient loss of consciousness lasting for seconds or minutes followed by complete recovery. The patient feels dizzy or sees spots before the eyes (i.e. seeing stars/flashes of light) or even completely loses consciousness for a long period of time. They portray the following signs and symptoms depending on the degree or amount of force.

- Obvious loss of consciousness
- Signs of shock; low rapid, feeble and weak pulse, subnormal temperature
- They may present signs of cerebral irritation such as irritation,, may be conscious but disoriented of place, time, personnel, high sensitivity to light and noise, marked nausea and vomiting and headache, lying curved up in bed their back to light, vital signs returning to normal, pupils reacting to light sluggishly and are equal, restless especially when opening bowels.

Take Note

If the irritation is not resolved, cerebral compression or increased intracranial pressure follows or develops due to oedema, haemorrhage, disturbances in brain substance etc.

b. Cerebral Contusion

This is a more severe form of brain injury in which the brain is bruised and or depressed downwards with possible surface haemorrhage. There is organic damage and rupture of blood vessels and nerves especially on the surface of the brain. Thus there will be loss of consciousness for a prolonged period of time and the patient may lie motionless for a period of time , a feeble pulse, shallow respirations, cold temperature (i.e. giving a shock picture).

c. Cerebral laceration

This is the most severe form of damage of the brain tissue which may end up with blood in the cerebral spinal fluid. The patient will present with progressive loss of consciousness, headache, progressing to drowsiness, slowing responses, nausea and vomiting. There will be increasing depth of unconsciousness detected by failure of the patient to respond to stimuli in the following order:

- Failure to respond to verbal commands;
- Failure to respond to mild skin stimulation like tickling or passing a swab over the eyebrow skin;
- Failure to respond to painful stimuli e.g. applying pressure on the supraorbital margin;
- Vital signs will be: slowing pulse pressure rate, increased blood pressure, snoring and slowing respiratory activity, widening pulse pressure,. pupil reaction at first will depend and which side of the brain has been damaged.; there will be pupil

constriction on the affected side part of the brain but as the pressure on the nerve continues the optic nerve fatigues to light.

- Muscle twitching which may become generalized as pressure increases and the patient may start fitting and lastly he may become paralysed as the nerves become fatigued with continued compression.

Pathophysiology Of Head Injury

Because the brain is housed within the inelastic container, only small increases in the volume within the intracranial compartment can be tolerated before pressure within the compartment rises dramatically. In the typical adult, the intracranial volume is approximately 1500mls (i.e. with normal ICP of 0 – 15mmHg) of which the brain accounts for 85 - 90%. Intravascular cerebral blood volume accounts for 10% and the cerebral spinal fluid accounts for the remainder less than 3%. When a significant head injury occurs cerebral oedema often develops, which increases the relative volume of the brain. Because the intracranial volume is fixed, the pressure within this compartment rises unless compensatory action occurs. In the non injured brain individuals without long standing hypertension, cerebral blood flow is constant with ain the range of mean arterial pressure (MAp) of 50–150mmHg. This is due to auto regulation by the arterioles which constrict or dilate within the specific range of blood pressure to maintain a constant amount to the brain. When the Map is less than 50mmHg or greater than 150mmHg, the arterioles are able to auto regulate and blood flow becomes entirely dependent on the blood pressure. Thus when the Map falls below 50mmHg, the brain is at risk of ischaemia due to insufficient blood flow, while a MAp greater than 160mmHg causes excess cerebral blood flow (CBF) that may result in increased intracranial pressure (ICP).

Traumatic brain injury (TBI) may be divided into two categories; primary and secondary brain injury.

a. ***Primary Brain Injury*** is the initial injury to the brain resulting from direct trauma to the brain.
b. ***Secondary Brain Injury*** is any subsequent injury to the brain after the initial injury. Secondary brain injury can result from systemic hypotension, elevated intracranial pressure, or as the biochemical result of a series of physiologic changes initiated by the original trauma.

MANAGEMENT

Medical Management

Investigations/diagnosis

1. History from the patient and examination; the head injured patient may be fully alert and oriented or may range from drowsiness to being deeply unconscious. Neurological defects can usually be found , e.g., altered level of consciousness
2. Skull entogenography (x – ray) for visualization of the bone fractures and fragments.
3. Computed Tomography scan may indicate subdural, subarachnoid haematoma, intracerebral haematoma or shift or distortion of the cerebral ventricles
4. Cerebral angiography may indicate ruptured blood vessels.
5. Intracranial pressure monitoring
6. Neurological assessment can be performed to evaluate the long term cognitive sequels.

Medical treatment

Treatment of head injury focuses primarily on the interventions to reduce increased intracranial pressure and treating other injuries.

1. Treating raised ICP:

- Tilting the patient's bed and straightening the head to promote blood flow through the veins of the neck and venous drainage from the head;

- Hypertonic saline can improve ICP by reducing the amount of cerebral oedema;
- An intravenous infusion of 100mls of 20% mannitol (an osmotic diuretic) over 15 minutes OR 0.25mg/kg body weight 4–6 hourly;
- Diuretics: to increase urinary output and reduce excessive fluid in the system: Lasix a loop diuretic 20 – 40mg intravenously 6–8 hourly.

2. ***Anticonvulsants:*** to be given with caution as they may depress the respiratory centre and make it difficult for the patient to breathe and lower the blood pressure.
    i. Phenytoin 15mg/kg body weight then 5mg as maintenance dose
    ii. Phenobarbital 30 – 120mg/day
    iii. Carbamazepine (Tegretol) 200mg twice daily initially but can be increased gradually to 800mg – 1200mg/day.
3. ***Corticosteroids:*** to control cerebral oedema; Dexamethasone 4 – 10mg intravenously every 6hourly.
4. ***Analgesics:*** avoid narcotics like morphine sulphate because of medullary depressant effect.
5. ***Stool softeners:*** to prevent straining as it may lead to increased ICP; Colice 100mg orally 8hourly.
6. ***Muscle Relaxants and Paralysers:*** to prevent coughing and straining while on a ventilator; Diazepam 5 – 10mg
7. ***Broad spectrum antibiotics:*** to prevent or control infection.
8. ***Ensuring Proper Oxygen Supply:*** endotracheal intubation and mechanicall may be used to ensure proper oxygen supply and provide a secure airway.

c. *Surgical Treatment*

1. *Craniotomy* in which part of the skull is removed. This may be needed to remove pieces of fractured skull or objects or done to expose the brain or meninges for inspection or biopsy.

2. *Skull trephine (Burr Hole*)**:** a circular hole drilled through the skull to relieve intra cranial tension (due to blood, pus or CSF or to facilitate such pressure as needle aspiration or biopsy.
3. *Ventriculostomy***:** an opening of the skull bone to introduce a hollow needle (cannular) into the ventricles (cavities) of the brain to relieve intracranial pressure or to obtain CSF for examination or to introduce antibiotics or contrast media for skull X– ray.

Nursing Care Of A Patient With Head Injury

The aims of nursing care of a patient with a head injury are:

1. To maintain a clear airway
2. To observe the patient critically
3. To prevent complications
4. To maintain the nutritional status

Environment

The room should be quiet. Preferably intensive care unit (ICU) or acute bay for easier observations as well as for easy access to resuscitative equipment in case of an emergency. Control noise and stimulation from environment; Separate stimuli by staggering tasks.

Maintenance of a Clear Airway

If the patient is conscious and has a good coughing reflex, he can remain in any position that he finds comfortable. But if he is unconscious, he should be nursed in semi prone position so that secretions and vomitus will drain out of the patient's mouth and the tongue does not fall back. If the airway is obstructed, the tongue should be pulled forward and the larynx cleared of debris and saliva. An airway can be inserted to hold the tongue forward. If the patient is deeply unconscious, intubation of the trachea may be necessary. Should apnoea occur, artificial respiration is commenced immediately

either by mouth to mouth resuscitation or ventilation through an airway or endotracheal tube. If the patency of the airway cannot be maintained because of severe facial injuries, tracheostomy should be done since prolonged intubation encourages erosion or stenosis of the trachea. Suctioning should be the last intervention to be done as it may irritate the airway and cause coughing in the patient which can lead to further increase in the intracranial pressure.

Promoting Adequate Respiration

One of the most complications of head injury is respiratory failure. Cerebral anoxia which is sequel of respiratory failure is a leading cause of death in these patients. The patient who has respiratory failure may have hypoxia, hypercarbia (higher conc. of carbon dioxide in blood) hypotension and dyspnoea. Usually, these patients are intubated and receive respiratory assistance with mechanical respirators. Arterial blood gas levels and pH are checked frequently to determine whether respiratory exchange is adequate. The patient must be suctioned as necessary with caution to maintain a patent airway.

Position

In subsequent care nurse the patient in supine position with the head tilted on the side until the patient is fully conscious. Regular turning of the patient should be done slowly and gently by 'log-rolling' technique. This can preferably be done 2 hourly to prevent complications like bedsores, hypostatic pneumonia, etc.

When the patient gains consciousness, he may be nursed in semi fowler's position to reduce intracranial pressure unless contraindicated. He should lie flat in bed unless contraindicated by increased intracranial pressure, then elevate the head of the bed to between 15^{o} and 30^{o}(except for dural tear) to maintain venous outflow from the brain and remove or loosen tight clothing.

Depending on the condition, the patient should not specifically be nursed in a supine position. The head should be positioned midline because rotation of the head or flexion of the neck can increase intracranial pressure. A neck splint can be applied. pillow under the head.

Observations

Initially blood pressure and, pulse rate and respiratory rate are taken and recorded every 15 minutes until they are stabilized and remain within safe limits. The patient should be left with blood pressure cuff on the arm to help to prevent disturbing the patient unduly when the pressure must be taken often. The eyes are observed for inequality of the pupils and the lips and fingernails for cyanosis. A sudden sharp rise in temperature which may goup to 42 degrees Celsius or higher and a sudden drop in blood pressure indicate that the regulatory mechanisms have lost control and the prognosis is poor. When the temperature is high tepid sponging, using ice bags to the groin and axillae and reduction of room temperature by the use of the fan. The patient's ears and nose are observed carefully for signs of blood and serous drainage which may indicate that the meninges have been torn (common in basal skull fracture and the spinal fluid is escaping. No attempt should be made to clean out the orifices. Loose sterile cotton may be placed in the outer openings only. This procedure should be done with caution so that cotton does not in any way act as a plug to interfere with free flow of fluid. The cotton should be changed as soon as it becomes moistened. Sometimes it is difficult to determine whether drainage from the nose is mucus or CSF. A TES TAPE will give a positive sugar reaction to spinal fluid and negative reaction to mucus. Observe the type and frequency of convulsions if any. This gives the picture of whether the patient's condition is worsening or improving.

1. *Monitoring Level of Consciousness*

Repeated monitoring of level of consciousness is essential to assess the patient's progress, e.g. rapid deterioration in the patient's condition. The nurse should alert the physician/surgeon to the possibility of a space occupying lesion which may have

resulted in herniation of the brain through the tentorium, thus placing the patient's life at grave risk. The Glasgow Coma Scale (GCS) is now officially accepted as the international standard for assessing the level of consciousness and is used in many accident emergency departments. Table 1 below shows the Glasgow coma scale.

Table 1: The Glasgow coma scale

RESPONSE	**CATEGORY OF RESPONSE**	**SCORE**
	EYES OPEN	
1. Spontaneously		**4**
2. On command		**3**
3. To pain		**2**
4. Incomprehensible		**1**
		FINDINGS _____
	BEST VERBAL RESPONSE	
1. Alert and oriented		**5**
2. Confused		**4**
3. Inappropriate		**3**
4. Incomprehensible		**2**
5. No response		**1**

		FINDINGS: _____
	BEST MOTOR RESPONSE	
1. Follows directions		**6**
2. Localizes pain		**5**
3. Withdraws from pain		**4**
4. Decorticate posturing		**3**
5. Decerebale posturing		**2**
6. No response		**1**
		FINDINGS: _____
	TOTAL SCORE	_____

Minimum score is 3 and maximum score is 15

1. *Mild Head Injury* a score of 11 – 15
2. *Moderate Head Injury* a score of 7 – 10
3. *Severe Head Injury* a score of 3 – 6

Take Note

Read through the procedure manual and practice on how to do the Glasgow Scale Procedure on a patient.

2. ***Control of Convulsions***

Administer anticonvulsants as prescribed following the right dose, time, route, and drug and observe the action and side effects of the drugs. Phenytoin is the drug of choice for prevention of seizure activity in patients with increased ICP. Sodium Pentothal is given to place the head injured patient in a barbiturate coma using so as to decrease ICP. Penthotal is an old treatment that has come back into current use. This drug works by decreasing the metabolic demands of the brain and cerebral blood flow. The patient is kept unresponsive. However, this makes it difficult to recognize neurological changes that may be occurring. It is usually given slowly by IV infusion only with normal saline. Do not add it to a running intravenous.

3. ***Fluid and Nutrition***

The Head injured patient will have decreased level of consciousness ; he may be unable to eat because of the condition he may be in. Feeding can be done via nasogastric tube, intravenous line, or gastrostomy.

4. ***Rest and Exercises***

The patient may need passive exercises. If permitted, move the limbs of the patient slowly and gently through their range of motion to preserve joint movements. It is important to promote rest, as head injury patients are usually restless.

The room must be kept as quite as possible by restricting traffic and visitors. Do constant observations quietly and in blocks to encourage rest. Avoid sudden noise, flashes of light and noise from equipment, which can increase patient's restlessness. Relieve restlessness by slight change in position or relaxation of limbs or emptying of the bladder. Alternate rest with activity to prevent complications associated with rest.

5. ***Psychological support***

Explain all procedures to the patient even if he is not fully conscious. Explain the condition and procedure done to the family members to allay anxiety. When the patient is fully awake allow him to verbalize then give appropriate feedback. The family of a critically head injured patient deserve and indeed demand the nurse's attention.

Reliable, honest and up-to-date information should be regularly provided to the patient's family by the nursing staff and reinforced by the medical staff. The family of a critically head injured patient deserve and indeed demand the nurse's attention.
Reliable, honest and up-to-date information should be regularly provided to the patient's family by the nursing staff and reinforced by the medical staff.

6. Maintenance of Good Hygienic Status

Provide daily personal care that the patient would normally carry out unaided, such as bathing, oral toilet/care, pressure area care, hair care, etc. This patient may be incontinent, therefore change linen appropeately. Keep the beddings dry cleanand free of wrinkles as well as the environment clean and free of bad odour.

If the eye reflexes are absent, irrigate the eyes with sterile normal saline. If one or both eyes remain open, apply a protective shield.

7. *Elimination*

The patient may be catheterized so as to keep the bed dry and monitor urine output. (a condom type of catheter is preferable to minimize the risk of infection that may set in)

The fluid intake and output should be monitored to to determine the level of hydration.

The patient is discouraged from straining when defecating, since the effort involved raises ICP. Stool softeners may be givento avoid or reduce the occurrence of this complication.

Provide bedpan and urinal to the patient whenever there is need. Observe elimination pattern and take note of abnormalities such as diarrhoea. Encourage fluids intake to prevent constipation.

1. *Information, Education and Communication*

i. Teach the family/patient how to take the medication as prescribed and how to manage the common side effects.
ii. Instruct the patient not to drive or perform any dangerous tasks while taking narcotic pain medications
iii. Avoid giving the person sedatives, sleeping pills or alcoholic beverages.
iv. The patient should not be allowed to engage in strenuous activity.
v. Instruct the caregiver to observe the eye. Pupils should be equal in size and react equally to light. Eyes should move together. If pupils are not equal or eyes act independently, notify your doctor.
vi. Observe patient for changes in behaviour, eating or walking habits.
vii. When driving the patient should wear seat belts s
viii. Never drink and drive.
ix. Playgrounds must be made safer.
x. Slides should have side rails on both sides of the top. Climbing equipment should be as easy to climb down as climb up.
xi. Swings should be made of rubber, plastic, or canvas, have rounded edges and a smooth finish
xii. It is important to wear a properly fitted bicycle helmet when cycling. Helmets reduce the risk of brain injury by almost 90%.
xiii. Bicycle riders must follow the same traffic laws as motor vehicles. One out of five bike collisions is caused by riding counter to traffic laws.
xiv. He should also avoid riding during twilight and evening hours.

Complications Of Head Injury

1. Posttraumatic hydrocephalus
2. Posttraumatic epilepsy (Seizure activity)
3. Meningitis
4. Brain abscess
5. Cerebral vascular accidents due to thrombi

6. Personality changes
7. Emotional instability
8. Intellectual deficits
9. Cranial nerve injuries
10. Visual deficits
11. Motor deficits (hemiplegia, hemiparesis)
12. Wound infection
13. Chronic headache
14. Irreversible brain damage

You now know how to care for a patient with a head injury. Let us now turn to clients with spinal injuries.

4SPINAL INJURIES /SPINAL CORD INJURY

Spinal cord injury refers to any injury to the spinal cord that is caused by trauma instead of disease. Depending on where the spinal cord and nerve roots are damaged, the symptoms can vary widely, from pain to paralysis, to incontinence. The treatment of spinal cord injuries starts with restraining the spine and controlling inflammation to prevent further damage. The actual treatment can vary widely depending on the location and extent of the injury. In many cases, spinal cord injuries require substantial physical therapy and rehabilitation, especially if the patient's injury interferes with activities of daily life.

In spinal injuries the vertebrae most frequently involved in SCI are the 5th , 6th , and 7th cervical (neck), the 12th thoracic, and the 1st Lumber vertebrae. The vertebrae are the most susceptible because there is a great range of mobility in the vertebral column in these areas.

Causes

Spinal cord injuries have many causes, but are typically associated with:

1. Major trauma from motor vehicle accidents, falls, sports injuries, and violence.
2. The most traumatic Spinal cord injuries are caused by lateral bending, dislocation, rotation, axial loading, and hyperflexion or hyperextension of the cord or caudaequina.

Classification

Classifications of spinal injuries is based on neurological responses, touch and pinprick sensations tested in each dermatome, and strength of ten key muscles on each side of the body, including hip flexion (L2), shoulder shrug (C4), elbow flexion (C5), wrist extension (C6), and elbow extension (C7).

Traumatic spinal cord injury is classified into five categories on the ASIA Impairment Scale:

1. A –indicatesa "complete" spinal cord injury where no motor or sensory function is preserved in the sacral segments S4-S5.
2. B–indicatesan "incomplete" spinal cord injury where sensory but not motor function is preserved below the neurological level and includes the sacral segments S4-S5.
3. C –indicatesan "incomplete" spinal cord injury where motor function is preserved below the neurological level and more than half of key muscles below the neurological level have a muscle grade of less than 3, which indicates active movement with full range of motion against gravity.
4. D –indicatesan "incomplete" spinal cord injury where motor function is preserved below the neurological level and at least half of the key muscles below the neurological level have a muscle grade of 3 or more.
5. E –indicates "normal" where motor and sensory scores are normal.

Take Note

It is possible to have spinal cord injury and neurological deficits with completely normal

motor and sensory scores.

Signs and Symptoms

Signs and symptoms experienced by a patient depend on where the spine is injured and the extent of the injury.

1. The muscles may contract uncontrollably, become weak, or be completely unresponsive;
2. The loss of muscle function can have additional effects if the muscle is not used, including atrophy of the muscle and bone degeneration;
3. A severe injury may also cause problems in parts of the spine below the injured area. In a "complete" spinal injury, all function below the injured area are lost;
4. In an "incomplete" injury, some or all of the functions below the injured area may be unaffected. If the patient has the ability to contract the anal sphincter voluntarily or to feel a pinprick or touch around the anus, the injury is considered to be incomplete.

Cervical injuries

Cervical (neck) injuries usually result in full or partial tetraplegia (Quadriplegia). However, depending on the specific location and severity of trauma, limited function may be retained.

1. Injuries at the C-1/C-2 levels will often result in loss of breathing, necessitating mechanical ventilators or phrenic nerve pacing.
2. Injury at C3 vertebrae and above : Typically results in loss of diaphragm function, necessitating the use of a ventilator for breathing.
3. At C4: Results in significant loss of function at the biceps and shoulders.
4. At C5: Results in potential loss of function at the shoulders and biceps, and complete loss of function at the wrists and hands.

5. At C6: Results in limited wrist control, and complete loss of hand function.
6. At C7 and T1: Results in lack of dexterity in the hands and fingers, but allows for limited use of arms.
7. Patients with complete injuries above C7 typically cannot handle activities of daily living and cannot function independently.

Additional signs and symptoms of cervical injuries include:

1. Inability or reduced ability to regulate heart rate, blood pressure, sweating and hence high body temperature.
2. Autonomic dysreflexia or abnormal increases in blood pressure, sweating, and other autonomic responses to pain or sensory disturbances.

Thoracic Injuries

Complete injuries at or below the thoracic spinal levels result in paraplegia.

1. At functions of the hands, arms, neck, and breathing are usually not affected.
2. At T1 to T8: Results in the inability to control the abdominal muscles.
3. Trunk stability is also affected. The lower the level of injury, the less severe the effects.
4. At T9 to T12: Results in partial loss of trunk and abdominal muscle control.
5. Typically lesions above the T6 spinal cord level can result in Autonomic Dysreflexia.

Lumbosacral Injuries

1. The effects of injuries to the lumbar or sacral regions of the spinal cord are decreased control of the legs and hips, urinary system, and anus.
2. Bowel and bladder function is regulated by the sacral region of the spine. In that regard, it is very common to experience dysfunction of the bowel and bladder, including infections of the bladder and anal incontinence, after traumatic injury.

3. Sexual function is also associated with the sacral spinal segments, and is often affected after injury.
4. During a psychogenic sexual experience, signals from the brain are sent to the sacral parasympathetic cell bodies at spinal levels S2-S4 and in case of men, are then relayed to the penis where they trigger an erection. A spinal cord lesion of descending fibres to levels S2-S4 could, therefore, potentially result in the loss of psychogenic erection.

Diagnosis/investigations

1. A radiographic evaluation using an X–ray to identify fractured vertebra bones
2. MRI or CT scan to determine if there is any damage to the spinal cord and where it is located.
3. A neurologic evaluation incorporating sensory testing and reflex testing can help determine the motor function.

Management

1. Modern trauma care includes a step called clearing the cervical spine, where a person with a suspected injury is treated as if they have a spinal injury until that injury is ruled out.
2. The objective is to prevent any further spinal cord damage.
3. The person is immobilised at the scene of the injury until it is clear that there is no damage to the highest portions of the spine.
4. This is traditionally done using a device called a long spine board and hard collar.
5. Once at a hospital and immediate life threatening injuries have been addressed, the person should be evaluated for spinal injury, typically by x-ray or CT scan.

Surgical Intervention

1. Surgery may be necessary to remove any bone fragments from the spinal canal and stabilize the spine. Different procedures can be performed.

2. Inflammation can cause further damage to the spinal cord, and patients are sometimes treated with a corticosteroid drug such as methylprednisolone to reduce swelling. The drug is used within 8 hours of the injury.

Drugs

The two main types of drugs are steroids and antibiotics.

- *Steroids:* high dose methylprednisolone may improve outcomes if given within 6 hours of injury. However, it should be given with care for it increases the risk of serious infection or sepsis due to the immunosuppressive effects it has on the body.

- *Antibiotics:* the patient is usually covered on antibiotic cover to prevent infection

Nursing Care

The nursing *management* is similar to that o*f head injury and or unconsciousness*

Rehabilitation of a client recovering from Spinal Injuries

1. When treating a patient with spinal cord injuries, repairing the damage created by injury is the ultimate goal.
2. By using a variety of treatments, greater improvements are achieved, and, therefore, treatment should not be limited to one method.
3. Furthermore, increasing activity will increase his/her chances of recovery.
4. The rehabilitation process following a spinal cord injury typically begins in the acute care setting. Physical therapists, occupational therapists, social workers, psychologists and other health care professionals typically work as a team under the coordination of a physiatrist to decide on goals with the patient and develop a plan of discharge that is appropriate for the patient's condition.

5. In the acute phase physical therapists focus on the patient's respiratory status, prevention of indirect complications (such as pressure sores), maintaining range of motion, and keeping available musculature active.
6. There is great emphasis also on airway clearance during this stage of recovery.
7. Following a spinal cord injury, the individual's respiratory muscles become weak and, in turn, the patient is unable to cough.
8. This results in an accumulation of secretions within the lungs.
9. Physical therapy treatment for airway clearance may include manual percussions and vibrations, postural drainage, respiratory muscle training, and assisted cough techniques.
10. With regards to cough techniques, patients are taught to increase their intra-abdominal pressure by leaning forward to induce cough and clear mild secretions.
11. The quad cough technique is done with the patient lying on their back and the therapist applies pressure on their abdomen in the rhythm of the cough to maximize expiratory flow and mobilize secretions.
12. Manual abdominal compression is another effective technique used to increase expiratory flow which later improves cough. Other techniques used to manage respiratory dysfunction following spinal cord injury include respiratory muscle pacing, abdominal binder, ventilator- assisted speech, and mechanical ventilation.
13. Depending on the Neurological Level of Impairment (NLI), the muscles responsible for expanding the thorax, which facilitate inhalation, may be affected.
14. If the NLI is such that it affects some of the ventilatory muscles, more emphasis will then be placed on the muscles with intact function.
15. For example, the intercostal muscles receive their innervations from T1 - T11, and if any are damaged, more emphasis will need to be placed on the unaffected muscles which are innervated from higher levels of the CNS.

Complications of Spinal Injuries

1. Neurogenic shock

2. Respiratory failure
3. Pulmonary oedema
16. Pneumonia
17. Pulmonary emboli
18. Deep venous thrombosis.

That was spinal injuries, we hope you now understand their classification, signs and symptoms and nursing management. Next we shall look at spinal and brain tumours.

4*SPINAL TUMO*URS

Introduction

Tumours of the spine are easily classified as extradural, intradural/extramedullary, and intramedullary. Regarding spinal tumours in general, extradural lesions occur most commonly and most are metastatic. Of the intradural lesions (which are rare), 84% are extramedullary, the majority being nerve sheath tumours or meningiomas. Approximately 16% of intradural tumours are intramedullary, the most common being ependymoma followed by astrocytoma. A primary spinal tumour means it comes from cells within or near the spine. They can involve the spinal cord, nerve roots, and/or the vertebrae (bones of the spine) and pelvis. They can be benign (non-cancerous) or malignant (cancerous). In general, benign tumours do not invade other tissues. Malignant tumours may invade other tissues and organs in the body. Although primary spinal tumours often contain a number of abnormal genes their cause remains unknown. In some cases the tumours run in families.

4BRAIN TUMORS

A ***brain tumour*** is an intracranial solid neoplasm, a tumour within the brain or the central spinal canal. Brain tumours include all tumours inside the cranium or in the central spinal canal. They are created by an abnormal and uncontrolled cell division, usually in the brain itself, but also in lymphatic tissue, in blood vessels, in the cranial

nerves, the brain envelopes the meninges, skull, pituitary gland, or pineal gland. Within the brain itself, the involved cells may be neurons or glial cells which include astrocytes, oligodendrocytes, and ependymal cells. Brain tumours may also spread from cancers primarily located in other organs (metastatic tumours).

Figure: Structure of the brain

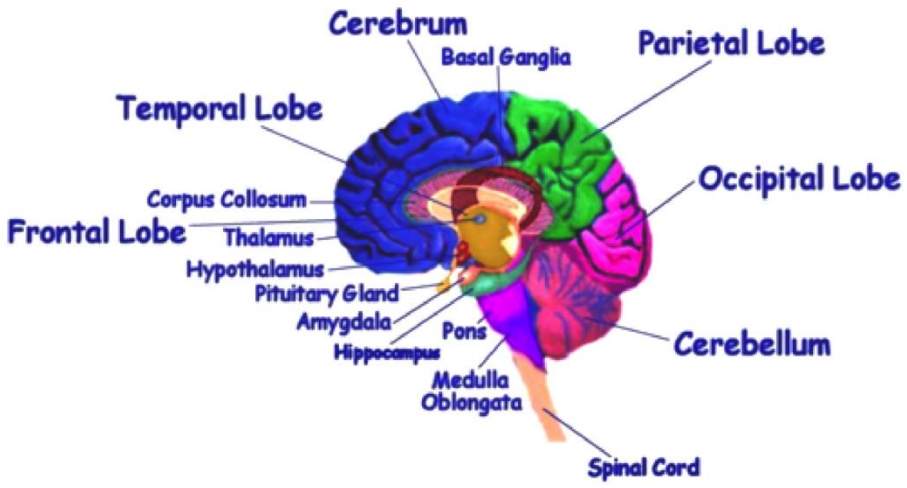

Figure 4: The Structure of the brain

Activity 2

Review anatomy and physiology of the brain

Risk Factors For Brain Tumours

A risk factor is something that may increase the chance of getting a disease. Some of the risk factors of brain tumours are:

1. ***Ionizing radiation:*** ionizing radiation from high dose x-rays (such as radiation therapy from a large machine aimed at the head) and other sources can cause cell damage that leads to a tumour. People exposed to ionizing radiation may have an increased risk of a brain tumour, such as meningioma or glioma.

2. ***Family history:*** it is rare for brain tumours to run in a family. Only a very small number of families have several members with brain tumours.

Types Of Brain Tumours

Primary brain tumours can be benign or malignant:

a. ***Benign brain tumours*** do not contain cancer cells:

1. Usually, benign tumours can be removed, and they seldom grow back.
2. Benign brain tumors usually have an obvious border or edge. Cells from benign tumours rarely invade tissues around them. They don't spread to other parts of the body. However, benign tumours can press on sensitive areas of the brain and cause serious health problems.
3. Unlike benign tumours in most other parts of the body, benign brain tumours are sometimes life threatening.
4. Benign brain tumours may become malignant.

b. ***Malignant brain tumours*** also called brain cancer contain cancer cells:

- Malignant brain tumours are generally more serious and often are a threat to life.
- They are likely to grow rapidly and crowd or invade the nearby healthy brain tissue.
- Cancer cells may break away from malignant brain tumours and spread to other parts of the brain or to the spinal cord. They rarely spread to other parts of the body.

Tumour Grading

Physicians group brain tumours using a grading system. The grade of a tumour refers to the way the cells look under a microscope and these include the following:

1. ***Grade I:*** The tissue is benign. The cells look nearly like normal brain cells, and they grow slowly.

2. ***Grade II*:** The tissue is malignant. The cells look less like normal cells than do the cells in a Grade I tumour.
3. ***Grade III:*** The malignant tissue has cells that look very different from normal cells. The abnormal cells are actively growing (anaplastic).
4. ***Grade IV:*** The malignant tissue has cells that look most abnormal and tend to grow quickly.

Cells from low-grade tumours (grades I and II) look more normal and generally grow more slowly than cells from high-grade tumours (grades III and IV). Over time, a low-grade tumour may become a high-grade tumour. However, the change to a high-grade tumour happens more often among adults than children.

Among adults, the most common types are:

1. ***Astrocytomas:*** the tumour arises from star–shapedglial cells called astrocytes. It can be any grade. In adults, an astrocytoma most often arises in the cerebrum.
   - ***Grade I or II astrocytoma*:** It may be called a *low-grade glioma*.
   - ***Grade III astrocytoma:*** It's sometimes called a *high-grade* or an *anaplasticastrocytoma.*
   - ***Grade IV astrocytoma:*** It may be called a *glioblastoma* or *malignant astrocytic glioma.*
2. ***Meningioma:*** the tumour arises in the meninges. It can be Grade I, II, or III. It is usually benign (grade I) and grows slowly.
3. ***Oligodendroglioma:*** the tumour arises from cells that make the fatty substance that covers and protects nerves. It usually occurs in the cerebrum. It's most common in middle–agedadults. It can be Grade II or III.

Among children, the most common types of brain tumours include the following:

1. ***Medulloblastoma:*** the tumour usually arises in the cerebellum. It's sometimes called a primitive neuroectodermal tumour. It is grade IV.
2. ***Grade I or II astrocytoma:*** in children, this low-gradetumour occurs anywhere in the brain. The most common astrocytoma among children is juvenile pilocytic astrocytoma. It's grade I.
3. ***Ependymoma:*** the tumour arises from cells that line the ventricles or the central canal of the spinal cord. It's most commonly found in children and young adults. It can be grade I, II, or III.
4. ***Brain stem glioma:*** the tumour occurs in the lowest part of the brain. It can be a low-grade or high-grade tumour. The most common type is diffuse intrinsic pontine glioma.

Symptoms Of Brain Tumours

The most common symptoms of brain tumours include:

1. Headaches (usually worse in the morning)
2. Nausea and vomiting
3. Changes in speech, vision, or hearing
4. Problems balancing or walking
5. Changes in mood, personality, or ability to concentrate
6. Problems with memory
7. Muscle jerking or twitching (seizures or convulsions)
8. Numbness or tingling in the arms or legs

Most often, these symptoms are not due to a brain tumour. Another health problem could cause them**.**

Diagnosis

One or more of the following tests can be done to diagnose a brain tumour:

1. *Neurologic exam:* tinvolves checking of vision, hearing, alertness, muscle strength, coordination, and reflexes. The physician also checks for eye swelling caused by a tumour pressing on the nerve that connects the eye and the brain.
2. *MRI:* a large machine with a strong magnet linked to a computer is used to make detailed pictures of areas inside the head. Sometimes a special dye (contrast material) is injected into a blood vessel in the arm or hand to help show differences in the tissues of the brain. The pictures can show abnormal areas, such as a tumour.
3. *CT scan:* an x-ray machine linked to a computer takes a series of detailed pictures of the head.
4. *Angiogram:*dye injected into the bloodstream makes blood vessels in the brain show up on an x-ray. If a tumour is present, the x-ray may show the tumour or blood vessels that are feeding into the tumour.
5. *Spinal tap:* tthe physician may remove a sample of cerebrospinal fluid (the fluid that fills the spaces in and around the brain and spinal cord). This procedure is performed with local anaesthesia. The physician uses a long, thin needle to remove fluid from the lower part of the spinal column.
6. *Biopsy:*the removal of tissue to look for tumour cells is called a biopsy. A pathologist looks at the cells under a microscope to check for abnormal cells. A biopsy can show cancer, tissue changes that may lead to cancer, and other conditions. A biopsy is the only sure way to diagnose a brain tumour.

Brain Tumour Treatment

People with brain tumours have several treatment options. The options may involve:

1. ***Surgery***, complete or partial resection of the tumour with the objective of removing as many tumour cells as possible
2. ***Radiation therapy***, this is the most commonly used treatment for brain tumours. The tumour is irradiated with beta, x-rays or gamma rays.
3. ***Chemotherapy*** is a treatment option for cancer,. However it is seldom used to treat brain tumours as the blood and brain barrier prevents the drugs from reaching the

cancerous cells. Chemotherapy can be thought of as a poison that prevents the growth and division of all cells in the body including cancerous cells.

Many clients get a combination of treatments. The choice of treatment depends mainly on the following:

1. The type and grade of a brain tumour
2. Its location in the brain
3. Its size
4. The patient's age and general health

Rehabilitation

Rehabilitation of a tumour patient after treatment may involve several types of therapists. These may include:

1. ***Physical therapists*****:** the treatment of brain tumours may cause paralysis. They may also cause weakness and problems with balance. Physical therapists help these patients regain strength and balance.
2. ***Speech therapists*****:** speech therapists help patients who have trouble speaking, expressing thoughts, or swallowing.
3. ***Occupational therapists*****:** occupational therapists help patients learn to manage activities of daily living, such as eating, using the toilet, bathing, and dressing.
4. ***Physical medicine specialists*****:** medical personnel with special training help patients with brain tumours stay as active as possible. They can help them recover lost abilities and return to daily activities.

Follow–up care after brain tumour treatment

The patient needs regular check-ups after treatment for a brain tumour. For example, for certain types of brain tumours, check-ups may be every 3 months. Check-ups help to ensure that any changes in patient's health are noted and treated if needed.

Special Investigations

Under the disorders of the nervous system, there are special investigations that we need to take the patient to/ for. Some of them are:

- X-ray
- Scanning
- Ventriculography
- Carotid angiography.

Activity 3

Please revise on these investigations. You can even get to Surgery I and read more on the investigations.

You have come to the end of our unit on disorders of the endocrine system. Let us review what you have learnt.

1.5 Unit Summary

In this unit you have learnt about the tumours of the endocrine system and disorders of the nervous system. In the tumours of the endocrine system we discussed the management of disorders of the thyroid gland and the breasts. In the nervous system we discussed the management of head injury, spinal injury, spinal tumours and brain tumours.

In the next unit we shall discuss conditions that affect bones, that is orthopaedics and orthopaedic nursing.

UNIT 2: ORTHOPAEDICS AND ORTHOPAEDIC NURSING

2.1 Unit Introduction

In this unit you will discuss conditions affecting bones and how to care for clients with orthopaedic conditions. Orthopaedics is a science which a specialized branch of surgery that involves the study and treatment of the diseases of the bones. It encompasses a number of conditions affecting the musculoskeletal system such as fractures, amputation, rheumatoid arthritis, septic arthritis, osteomyelitis, dislocations, sprains, etc.

“Ortho” means straighten while ‘paed’ means child in Latin, literally meaning straightening a child (whose bones are soft).

2.2 Unit Objectives

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

1. Define key terminologies used in orthopaedics
2. Discuss the principles of orthopaedic nursing and treatment
3. Describe the application and use of orthopaedic devices
4. Discuss the role of the nurse in orthopaedic procedures
5. Discuss the management of patients with the following orthopaedic conditions:
    - Abnormalities of the bones and joints
    - Traumatic conditions of the musculoskeletal system
    - Infections of the bones and joints
    - Infected wounds
    - Poliomyelitis
    - Bone tumours

- Amputation of a limb

2.3 Terminologies used in Orthopaedics:

1. *Cast:*a protective shell of plaster and bandage moulded to protect a broken or fractured limb as it heals.
2. *Arthroplasty:*reconstructive surgery of a joint or joints to restore motion because of ankylosis or trauma or to prevent excessive motion.
3. *Arthrogram:* an x-ray to view bone structures following an injection of a contrast fluid into a joint area. When the fluid leaks into an area that has a disease or injury, it provides evidence of a tear, opening, or blockage.
4. *Cartilage:*firm, rubbery tissue that cushions bones at joints
5. *Dislocation:* displacement of one or more bones at a joint.
6. *Active Motion:* joint motion carried out by the patient.
7. *Ankylosing spondylitis:*a type of arthritis that causes chronic inflammation of the spine and the sacroiliac joints. Chronic inflammation in these areas causes pain and stiffness in and around the spine. Over time, chronic spinal inflammation (spondylitis) can lead to a complete cementing together (fusion) of the vertebrae, a process called ankylosis. Ankylosis causes total loss of mobility of the spine.
8. *Arthritis:*inflammation of a joint. When joints are inflamed they can develop stiffness, warmth, swelling, redness and pain. There are over 100 types of arthritis.
9. *Atrophy:*wasting away or diminution. Muscle atrophy is decrease in muscle mass.
10. *Avulsion:*tearing away. A nerve can be avulsed by an injury, as can part of a bone.
11. *CT scan (Computed tomography scan):*Pictures of structures within the body created by a computer that takes the data from multiple X-ray images and turns them into pictures on a screen. The CT scan can reveal some soft-tissue and other structures that cannot even be seen in conventional X-rays.
12. *Chondromalacia:* abnormal softening or degeneration of cartilage.
13. *Comminuted Fracture:* Is aa fracture in which bone is broken, splintered or crushed into a number of pieces.

14. *Compound Fracture: Is aa* fracture in which the bone is sticking through the skin. Also called an open fracture.
15. *Contusion:*another name for a bruise. *What is a bruise?* A bruise, or contusion, is caused when blood vessels are damaged or broken as the result of a blow to the skin, (be it bumping against something or hitting yourself with a hammer). The raised area of a bump or bruise results from blood leaking from these injured blood vessels into the tissues as well as from the body's response to the injury. A purplish, flat bruise that occurs when blood leaks out into the top layers of skin is referred to as an ecchymosis.
16. *Crepitation:* a grating or crackling sound or sensation, as that produced by the fractured ends of a bone moving against each other.
17. *Internal fixation:*a surgical procedure that stabilizes and joins the ends of fractured (broken) bones by mechanical devices such as metal plates, pins, rods, wires or screws.
18. *Kyphosis:* outward curvature of the spine, causing a humped back.
19. *Ligaments:* a ligament is a tough band of connective tissue that connects the bones and keeps joints stable.
20. *Malunion:*State of healing of the bone in which bone unites but in abnormal position and/or alignment.t
21. *Nonunion:* state of healing of the bone in which there is no healing.
22. *Orthopaedic surgeon(or orthopaedist*): The physician who diagnoses, treats, manages the rehabilitation process, and provides prevention protocols for patients who suffer from injury or disease in any of the components of the musculoskeletal system.
23. *Orthopaedic surgery(or orthopaedics):* the medical specialty devoted to the diagnosis, treatment, rehabilitation, and prevention of injuries and diseases of the body's musculoskeletal system.
24. *Orthotics:* a support, brace, or splint used to support, align, prevent, or correct the function of movable parts of the body.

25. $Osteoporosis:$ thinning of the bones with reduction in bone mass due to depletion of calcium and bone protein.
26. $Synovectomy:$ the removal of the synovium or tissues lining the joints.
27. $Synovium:$ the lining of a joint.
28. $Traction:$the use of a system of weights and pulleys to gradually change the position of a bone. It may be used in cases of bone injury or congenital defect, to prevent scar tissue from building up in ways to limit movement, and to prevent contractures in disorders such as cerebral palsy or arthritis.

2.4 Principles of Orthopaedic Nursing and Treatment

1. The first priority in the management of a fracture is considering the client's airway, his breathing and ensuring blood circulation (ABCs) but do not let the obvious fractures deter you from the ABCs.
2. Hypovolaemic shock may be possible after sustenance of fractures. The shock may result from blood loss and body fluids as well as from severe pain. Hence reassess the client's blood, fluid and pain threshold to prevent and or treat shock.
3. Always immobilize the joint proximal and distaly by plaster splinting
4. Circumferential casting is rarely done in the ED for an acute fracture evolving oedema may lead to compartment syndrome
4. Always apply Ice and elevate for 48 hours post injury
5. Healing occurs over 4 – 10weeks if properly immobilized
6. For joint injuries: immobilize the affected part or joint only. Immobilization helps further soft tissue injury and continued pain
7. Reassess the patient's neurovascular status after immobilization or manipulation
8. Always consider analgesia and/or sedatives prior to attempting reduction

2.5 Application And Use Of Orthopaedic Devices

In this section you will learn the application and use of the following orthopedic devices :

- Splints
- Plaster of Paris (POP)
- Traction
- ***The orthopaedic bed***

We shall start by looking at Splints.

2.5.1 Splints

What is a Splint?

This is a device or an appliance which is applied to the body to protect and/ or immobilise a body part restrict movement.

Uses of Splints

1. To relieve pain
2. To diminish muscle spasms
3. To prevent undesirable movement e.g. stretching of weak muscles
4. To hold fractured bone ends in position until the fracture is united.
5. To maintain the position after reduction of a dislocation until the joint capsule has healed.

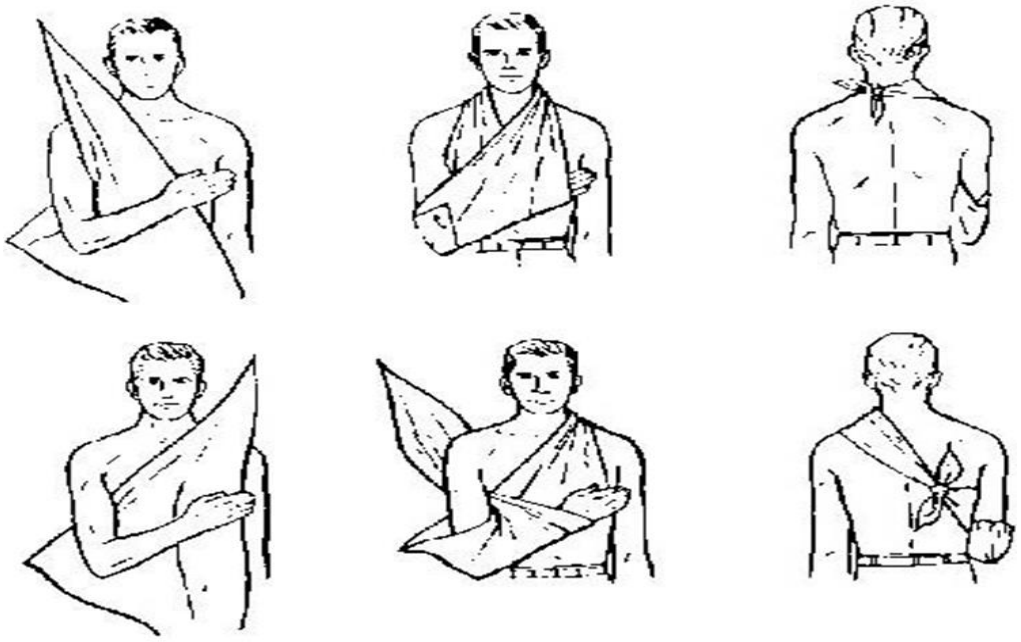

Figure 5: Examples of bandaging

2.5.2 Plaster of Paris (Pop)

What is plaster of Paris?

A POP cast is a device used forimmobilization. Cast materials include plaster of Paris, fiberglass, and plastic. All POPs come in rolls that can be applied in a manner similar to using an Ace bandage. Plaster casts are heavy, dry slowly, and lose strength and integrity if they become wet. Plaster of Paris Casts are usually applied by a trained orthopaedic specialist under the supervision and direction of a physician`

Uses of Plaster of Paris Casts

A Plaster of Paris cast is used to:

1. Immobilize fractures and hold bone fragments in reduction, placement for healing.
2. Prevent movement in soft tissue injuries.
3. Maintain proper alignment and correct deformities.
4. Permit early mobilization

Types of casts

- Short leg cast: extendsfrom below the knee to the base of the toes.
- Long leg cast: extendsfrom the upper or middle thigh to the base of the toes.
- Short arm cast: extendsfrom below the elbow to the palm.
- Thumb spica or gauntlet cast: extendsfrom below the elbow to the palm and includes the thumb.
- Long arm cast: extendsfrom axilla to palm, with the elbow normally immobilized at aright angle
- Walking cast: a short or long leg cast with a rubber or metal walking device attached to the foot.

- Body cast: encases the trunk.
- Shoulder spica cast: a body cast that encases the trunk, shoulder, and elbow.
- Hip spica cast: a body cast that encases the trunk and one or both lower extremities.

Care of a patient with a newly applied cast

1. Expose a newly applied cast to air circulation. It should never be covered, because the cover will restrict the escape of moisture and heat. This is essential, as a drying cast generates heat within the plaster as the moisture evaporates and the cast hardens.
2. Handle a wet cast carefully. A newly applied cast is set and firm when the patient leaves the cast room, but it is still damp and easily damaged. It takes 24-48 hours for a cast to become dry and hard. Handle the cast by lifting and supporting it on a pillow with the palms of the hands. Never use fingers as they will leave indentations, which cause pressure areas within the cast.
3. Provide plastic-covered pillows to support the cast along its entire length. Never permit the wet cast to rest directly on a flat or firm surface as this will flatten the contours of the cast and cause pressure within the cast.
4. Review the patient's clinical record for the type of cast and the reason the cast has been applied. Interview the patient to determine his knowledge of the cast purpose and whether he has had a cast before. Instruct the patient on care of the cast that is wet and after it is dry.
5. After a cast has cooled and begins to harden, elevate the casted extremity to reduce swelling which often occurs after application of a cast. When a newly applied cast is elevated, it should be supported along its entire length, on an inclined plane, with the distal joints higher than the proximal joints. For example, hand higher than elbow, elbow higher than shoulder.
6. Observe all edges of the cast for any areas that cut or put pressure on the skin.

7. Observe the extremity encased in plaster for circulatory impairment by comparing fingers or toes of the casted extremity with the uninvolved extremity. The primary concern following new cast application is to prevent complications. Circulation should be checked hourly during the first 24 to 48 hours, then every 4 hours. Thus you should:

- Check the skin temperature of the injured extremity. It should not be colder than theunaffected limb.
- Check and compare the pulses. They should be equal.
- Check for complaints of numbness, tingling, burning, swelling, pain, pressure, or inability to move the fingers or toes.
- Report presence of the above signs and symptoms IMMEDIATELY to avoid possibletissue necrosis. These findings indicate possible ischemia.

8. Perform the blanching (capillary refill) test. The nail beds of the fingers or toes are compressed lightly and released to check how quickly the colour returns.
9. With pressure applied, the nail bed should turn pale (blanch). When pressure is released, the colour should return within the time it takes to say "capillary refill," indicating return of capillary action.
10. Failure to blanch, or a blue tinge, indicates impaired venous circulation and congestion of tissues.
11. Failure of colour to return, or cold, pale fingers or toes suggests impaired arterial circulation.
12. In either case, report findings *immediately*. Do not wait . Permanent damage can result from impaired circulation caused by cast pressure.

General nursing management of a patient with a cast

Although a patient with an arm or leg cast is much more self-reliant than a patient in a body or spice cast, it is a nursing responsibility to monitor all patients and assist as

needed. Nursing management includes the following actions to assess the effectiveness of the cast.

1. Check the edges of the cast and all skin areas where the cast edges may cause pressure. If there are signs of edema or circulatory impairment, notify the charge nurse or physician immediately.
2. Slip your fingers under the cast edges to detect any plaster crumbs or other foreign material. Move the skin back and forth gently to stimulate circulation.
3. Lean down and smell the cast to detect odours indicating tissue damage. A musty or mouldy odour at the surface of the cast may be the first indication that necrosis from pressure has developed underneath.
4. Check the integrity of the cast by looking for cracks, breaks, and soft spots.

5. The casted body part must be examined and assessed frequently in order to prevent complications. Assess the casted part by checking the following:
    - Circulation by performing the blanching test and comparing the skin temperature and blanching reaction of the affected limb to that of the unaffected limb;
    - Presence of sensation in the affected limb by touching exposed areas of skin and instructing the patient to describe what he felt;
    - Motor ability of the affected limb by having the patient wiggle his fingers or toes.

Patient education will do much to prevent complications. Instruct the patient to do the following;

- Avoid resting cast on hard surfaces or sharp edges that may dent the cast and cause pressure areas.
- Never use a coat hanger or other foreign object to "scratch" inside the cast. This may cause skin damage and infection.

- Report any danger signs to the nursing staff immediately. Danger signs include pale, cold fingers or toes, tingling, numbness, increased pain, pressure spots, odor, or feeling that the cast has become too tight.
- Report any damage to the cast such as cracks, breaks, or soft spots.
- Never attempt to remove or alter the cast.

2.5.3 TRACTION

What is Traction?

Traction refers to a set of mechanisms for straightening broken bones or relieving pressure on the spine and skeletal system.

Types of Traction

There are two types of traction, namely:

- Skin traction
- Skeletal Traction

Let us look at each in turn starting with skin traction.

1. ***Skin Traction:*** This is a type of traction where the pull is applied indirectly to the bone through the skin i.e. skin, muscle and bone. In skin traction, the weight applied is between 2 – 3 kg and no more than that. The amount of weight applied in skin traction must not exceed the tolerance of the skin, or else the skin can be torn or weight drop.

   ### *Dangers And Complications Of Skin Traction*

   The main dangers and complications of skin traction include:

   1. Itching beneath the skin extensions

2. Unpleasant prickling sensation when hairs begin to grow on shaved skin.
3. Localised sores where bandages or extension material causes pressure.
4. Oedema, this indicates interference with circulation and may be caused by tight bandages or tight bands in extension strapping.
5. Foot drop caused by pressure on the lateral popliteal nerve.
6. Muscle wasting due to inactivity
7. Joint stiffness due to inactivity
8. Insufficient traction force

Take Note

Application of skin traction is contraindicated in the presence of skin conditions such as eczema or psoriasis, where there are varicose veins or where there is loss of normal skin sensation or indeed any neurovascular deficit.

2. ***Skeletal Traction:*** This is applied to the bone. This method of traction is used most frequently in the treatment of fracture of the femur, humerus, tibia and the cervical spine. The traction is applied directly to the bone by use of a metal pin or wire known as ***Kirshner Wire or Steinmann'sPin***, which is inserted through the bone distal to the fracture. The weights that are applied are between 7 – 15kg (5 – 10% of body weight).

Dangers and complications of skeletal traction

The main dangers and complications of skin traction include:

a. Infection at the site of insertion of the skeletal pin
b. Cutting out of a skeletal pin from the bone with a displacement at the fracture site
c. Over traction at the fracture site leading to delay, non union or malunion
d. Deformity which may be joint stiffness of muscle wasting as in skin traction

e. Disturbance bone growth especially in children
f. Necrosis of bone adjacent to the pin due to reduced blood supply.

Figure 6 below illustrates the various types of tractions.

Table 2: Comparison between skeletal and skin traction

Skeletal Traction	**Skin Traction**
It is more comfortable than skin traction	It is suitable for short periods of immobilization
It is more effective for long periods of immobilization	It is suitable for long periods of immobilization in children, in that spasms of powerful muscles which exist and must be overcome are not so well developed in a child.
It is less liable to disturbance	

Tractions may also be called either:

- *Fixed Traction*: this is a type of pull exerted on a limb between two fixed points by means of skin traction and Thomas splint.
- *Balanced Traction*: this is a type of pull exerted by weights applied to a limb or limbs with the body providing counter traction.

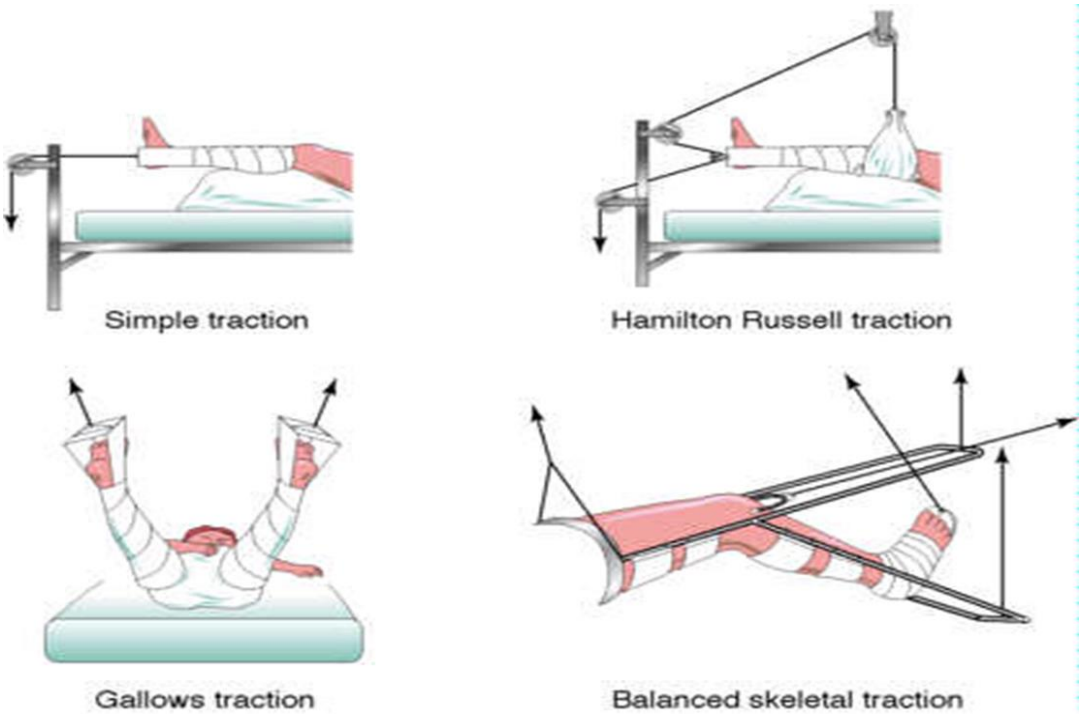

Figure 6: Types of Traction

Purpose of traction

The purpose of traction is to:

1. Regain normal length and alignment of involved bone
2. Reduce and immobilise a fractured bone
3. R or eliminate muscle spasms
4. Relieve pressure on nerves especially spinal
5. Prevent or reduce deformities or muscle contractures

You now know the types of traction and how they are used in orthopaedic treatment. Next let us learn about the orthopaedic bed.

2.5.4 The *O*rthopaedic *B*ed

The basic orthopaedic bed is a standard hospital bed with a firm mattress. A slatted orthopaedic bedboard may often be placed under the mattress for extra support. The basic orthopaedic bed often requires an over bed frame to accommodate any traction or suspension system that may be required. The framework is inserted into or clamped to the corners or ends of the hospital bed. The frame allows the utilization of adjustable pulleys, slings, harnesses, clamps, and other attachments. The Balkan frame, illustrated in Figure 1-27, is one example of an over bed frame. The Balkan frame is a standard equipment used in US Army patient care facilities, but other types of equipment are used as well.

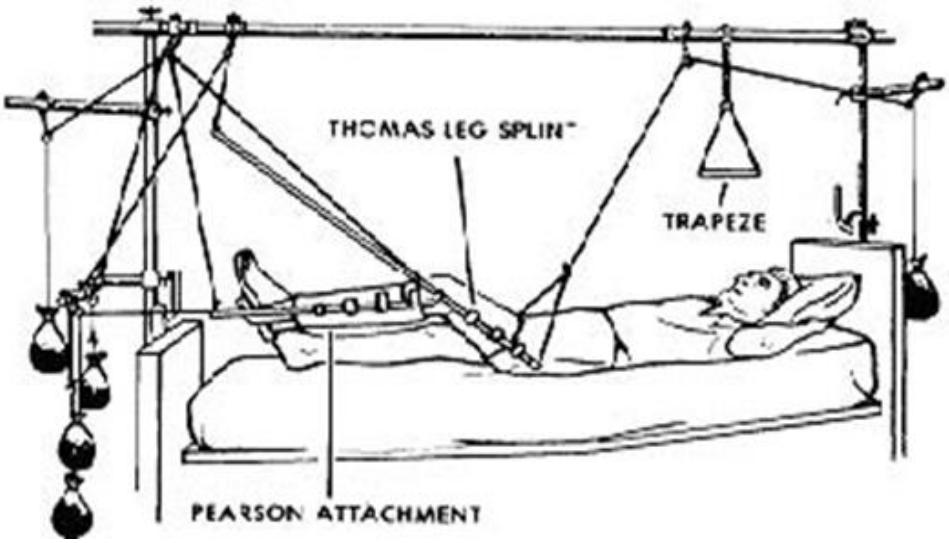

Figure 7: Orthopaedic bed with its gadgets

Special Orthopaedic Beds - *Turning* Frames

Turning frames are devices used to provide immobilization and to facilitate nursing care for the patient who, while immobilized, requires frequent repositioning from supine to prone. In addition to its orthopaedic applications, a turning frame is used in the treatment of patients with such conditions as spinal cord injuries and severe burns.

The major advantage in the use of turning frames is the prevention of the complications given below.

- Prevention of pressure sores. With relief of pressure from body weight on bony prominence and pressure areas, blood supply is improved. Additionally, large body areas may be exposed for skin care.
- Prevention of respiratory congestion. Rotation of the patient from face-up to face-down aids in loosening and ridding the lungs of fluid accumulation. The patient can cough and expectorate more effectively in the prone position.
- Prevention kidney and bladder complications. Rotation of the patient aids in elimination of urine sediments that are potential causes of kidney stones.

The nursing management of a patient in a turning frame is the same as for any other immobilized patient. The nature of the care required depends upon the reason for immobilization (casts, traction, paralysis, and so forth).

2.6 Role of the nurse in orthopedic procedures

An orthopedic nurse should:

- Have a good basic understanding of the anatomy and physiology of the loco-motor system;
- Have a sound knowledge of the principles of orthopaedic treatment;
- Have an expert knowledge of patient's condition and know how to prevent complications;
- Have ability to recognize patient's particular needs and know how to meet those needs;
- Have the ability to observe and report abnormalities;

- Have an acute awareness of correct body postures and mechanics to notice which may interfere with patient's condition;
- Be strong and healthy with a balance and stable outlook.

2.7 Management Of A Patient With Orthopaedic Conditions

In this section we shall focus on the management of patients with abnormalities of the bones and joints, traumatic conditions, infections of the bones and joints, poliomyelitis, infected wounds, bone tumours and amputations.

2.7.1 Abnormalities of The Bones And Joints

The abnormalities of the bones and joints can be divided into two:

- Congenital abnormalities
- Acquired abnormalities

Let us discuss each type in detail starting with congenital abnormalities.

A.CONGENITAL ABNORMALITIES

One of the common congenital abnormalities of bones and joints is the club foot.

What is a Clubfoot?

This is also known as **talipes,** clubfoot is the most common congenital disorder of lower extremities. The affected leg has a deformed talus and shortened Achilles tendon, which combine to give the foot a characteristic club-like appearance.

Clubfoot is a condition of ***adduction*** of the forefoot, ***inversion*** (varus) of the foot, and ***downward pointing*** of the foot and toes.

True clubfoot has all three of the components mentioned above. If the condition is unilateral, the affected foot is smaller, as are the calf tissues on that side. Joint tissues in the ankle and foot are contracted and thickened, inhibiting their function.

Pathophysiology

The cause of clubfoot is a matter of controversy. Theories include:

- genetic and chromosomal variations with some hereditary correlations,
- intra-uterine position or compression of developing tissues,
- interruption of development during the first trimester, and
- drugs containing curare.

The mechanism of genetic transmission remains unknown, but researchers are convinced that such a mechanism exists. The sibling of a child born with clubfoot has a 1 in 35 chance of being affected. The child of a parent with clubfoot has a 1 in 10 chance of inheriting the disorder.

Among children who have no family history of clubfoot , the anomaly may be linked to arrested development during the 10^{th} to 12^{th} week of gestation, when the feet form. Researchers also suspect muscle abnormalities, which lead to variations in tendon length and insertion points as possible causes.

Clubfoot may arise in older children secondary to paralysis, poliomyelitis, or cerebral palsy.

Types

Clubfoot may have various names, depending on the orientation of the deformity:

- ***Talipes equinus***: in which there is downward pointing of the foot and toes. i,e, the foot is in plantar flexion.
- ***Talipes varus*****:** in which there is inversion of the foot. i.e. the sole of the foot turned towards the midline of the body(inwards)

- ***Talipes valgus*:** in which the sole of the foot is turned outwards. i.e. away from the midline of the body (abduction, eversion)
- ***Talipes calcaneus*:** in which there is upwards pointing of the foot and toes. i.e. the foot is in dorsiflexion
- ***Talipes cavus*** (hollow): in which the foot has an abnormally high longitudinal arch.
- ***Talipes equinovarus*:** in which there is combination of downward pointing (plantar flexion) and inversion of the foot.
- ***Talipes equinovalgus*:** in which there is combination of plantar flexion (downwards pointing) and eversion/abduction of the foot.
- ***Talipes calcaneovarus*:** in which there is combination of dorsi-flexion and inversion of the foot.
- ***Talipes calcaneovalgus*:** in which there is combination of dorsi-flexion and eversion of the foot

Management

Investigation

X-rays of the foot will show talus superimposed on the calcareous and metatarsals having a ladder-like appearance.

Corrective treatment

Correction of clubfoot requires three stages : -correcting the deformity – maintaining the correction until the foot regains normal muscle balance – and observing the foot closely for several years to prevent the deformity from recurring.

- *Casting correction*

The ideal time to begin correction is in the first few weeks after birth when the foot is most malleable. Deformities are usually corrected sequentially as follows:

-
- First forefoot adduction
- Then various or inversion
- then equines or plantar flexion.

Trying to correct all three deformities at once creates a badly shaped, rocket bottomed foot. Correction begins by manipulating the foot appropriately and casting it in that position. The procedure is repeated several times until the foot assumes a normal or nearly normal shape, usually in about 3 months.

- *Surgical correction*

  Indications:

  The surgical correction of clubfoot is done if:

  – 3 months of casting has not corrected the condition.
  – The forefoot dorsi flexes and the hind foot remained in equinus.

  Surgical correction may involve:

  – Tenotomy, tendon transfer, stripping of the plantar fascia and capsulotomy
  – Wedge resection, osteotomy, or astragalectomy (excision of the talus) in case of severe deformity that persists into later life.

  The patient must wear a cast to preserve the correction. After corrective treatment, proper alignment must be maintained actively through exercise, splints, and orthopaedic shoes.

- *Nursing care*

  The aims of nursing care are to:

- Alleviate pain.
- Care for the skin under cast.

The nursing care of this patient is similar to that of a patient with a Plaster of Paris Cast.

- *Post-cast application care:*

  - Elevate the child's foot with pillow.
  - Check the toes every 1 to 2 hours for temperature, colour, sensation, motion, and capillary refill time; watch for edema.
  - Care for the skin under the cast edges every 4 hours
  - After washing and drying the skin, rub it with alcohol . Don't use oils or powders because they tend to macerate the skin.

- ***Post-operative care***

  - Elevate the child's feet with the pillows to decrease swelling and pain.
  - Report signs of discomfort or pain immediately .
  - Try to locate the source of pain which may result from cast rather than the incision.
  - Observe the cast for bleeding, if bleeding report it to the doctor.
  - Perform range of motion (ROM) exercises at least once every shift, unless contraindicated, to prevent contractures and muscle atrophy.
  - Encourage the patient, if old enough and /or his family to express their concerns about his disorder and his appearance. Answer their questions, and offer reassurance and support when necessary.

3) ***Patient teaching***

- Explain the disorder to the patient if old enough, and/or to his family. Make sure they understand that clubfoot demand immediate therapy and orthopedic supervision throughout the growth process.
- Before the child in a clubfoot cast leaves the hospital, teach his parents to recognize circulatory impairment. Be sure that they know how to care for the cast.
- Stress to parents that correcting this defect takes time and patient. Teach them exercises that they can do at home to help maintain the correction.
- Urge parents to apply corrective shoes and splints when the child takes naps and goes to bed at night.
- If appropriate, explain to an older child and his family that surgery may improve the clubfoot enough to ensure adequate function. However the affected calf muscles will remain slightly underdeveloped.

1.1.2 ACQUIRED ABNORMALITIES

The main acquired abnormalities are:

1. Deformities of the spine
2. Herniated disc
3. Torticollis

Let us discuss each in turn starting with deformities of the spine.

1. Deformities Oof The Spine

ANormal vertebral column has four curvatures which are responsible for a variety of functions. Two of these curves are described primary and two others are secondary.

- ***Primary curves***: wwhen the foetus is in the uterus, it lies curled up with the vertebral column bent so that the head and knees are more or less touching. This

position shows the primary curvature of the column which is concave anteriorly. On a normal vertebral column the primary curves are thoracic and sacral curves.

- ***Secondary curves*:** aafter birth, the first curve is maintained until at about three months old when the child can control the movement of his head. The control of the head causes the development of the first secondary curve, the cervical curve. At the age of about 12 to 18 months the child begins to walk thus forming the second secondary curve, the lumbar curve. Both cervical curve and lumbar curve are convex anteriorly.

  The cervical curve holds the head vertically up right. The thoracic curve increases volumes of the thoracic cavity. It forms part of the thoracic cage. The lumbar curve assists the positioning of the centre of gravity of the body over its base, the feet. The sacral curve increases the volume of the pelvic cavity. Together, the curves enable the body to be maintained in the erect posture with minimal muscular effort. A normal spine is capable of four main movements: forward flexion, extension, lateral flexion and rotation.

Causes of spinal deformities:

- ***F***ailure of growth.
- Muscle imbalance.
- Destruction of bones or joints by infection, injuries or tumours.

Effects of spinal deformities:

- risk of pressure on the spinal cord and nerves leading to pain and/or paralysis
- pain from cause of deformity
- interference with other organs e.g. heart, lungs
- serious cosmetic matter
- secondary effect on limbs may induce impairment of motion

Types of spinal deformities:

- increased forward angulation or posterior convexity known as **kyphosis.**
- increased backward angulation or posterior concavity known as **Lordosis.**
- lateral flexion and lateral rotation these two are usually combined and are called **scoliosis.**

Let us look at each type in further detail.

KYPHOSIS

kyphosis is an accentuation of the normal posterior curvature of the thoracic vertebrae.

Types and causes

Adolescent kyphosis also known as Scheuerman's disease, juvenile kyphosis, or vertebral epiphysitis.

Most of the cases are of unknown cause, some are due to growth retardation or vascular disturbance in the vertebral epiphysis during rapid growth periods. Some otherscauses are dueto infection, inflammation, aseptic necrosis of the vertebrae.

Adult kyphosis is also called adult round back. It can be caused by:

- Aging and associated inter-vertebral disk degeneration, atrophy and vertebral collapse from osteoporosis.
- Endocrine disorders (hyperparathyroidism and Cushing's disease) or prolonged steroidal therapy e.g. in case of osteoporosis treatment.
- Arthritis, Paget's disease/osteitis deformans), poliomyelitis, compression fracture of the thoracic vertebrae, metastatic tumour, plasma cell myeloma , or tuberculosis are additional possible causes.
-

Take Note

in both adolescent and adult kyphosis may result from poor posture.

Management

Investigation

- ***H***istory taking
- X-rays studies

Treatment

- ***M***edical treatment of the cause if known.
- **S**urgical treatment /operation to correct deformities:
  - Mild kyphosis may often be corrected before the skeletal frame has completed its growth.
  - Congenital kyphosis cannot be cured because embryological in origin, only a certain amount of the deformity can be minimized by surgery and local manipulations.
  - Kyphosis caused by spinal disease is also slightly amenable to surgery and local treatment.
  - Traction, pads and plaster-jacket supports are used in manipulative treatment, and electrical stimulation is also being used.

Preoperative care is that of an elective case:

Post***operative care:*** This is the same for any other postop care with the following additions.

Specific Aspects of Care only

Check the patient's neurovascular status every 2 to 4 hours for the first 48 hours, and report any changes immediately. Offer pain medication every 3 or 4 hours for the first 48 hrs. If the patient requires a brace, check its condition daily. Look for worn or malfunctioning parts. Carefully assess how the brace fits the patient. Keep in mind that weigh changes may alter proper fit.

Give meticulous skin care. Check the skin at the cast edges several times daily. Use heel and elbow protectors to prevent skin breakdown. Assist during suture removal and new cast application (usually about 10 days after surgery). Encourage gradual ambulation. arrange for follow up care with a social worker and home health nurse.

Patient teaching

If the patient has the cast:

- provide detailed, written cast care instructions at discharge,
- tell him to immediately report pain, burning, skin breakdown, loss of feeling, tingling, numbness or cast odour,
- urge him to drink plenty of liquid to avoid constipation and to report any illness (abdominal pain or vomiting) immediately,
- show him how to use proper body mechanics to minimize stain on the spine. warn him to lie on his stomach or on his back with his leg flat.

If the patient has a brace:

- explain its purpose and tell him how and when to wear it.
- make sure he understands how to check it daily for proper fit and function.
- teach him to perform proper skin care.
- advise against using lotion, ointments, or powders that can irritate the skin where it comes in contact with the brace.
- warn that only the doctor or orthopaedist should adjust the brace

Complications

The main complications include:

- Pulmonary complications such as:
  - contorted ribs
  - compression and/or displacement of lungs
- Neurologic damages: spastic paraparesis secondary to spinal compression.
- Skeletal complications: deformation of hips and other parts of the body in its effort to maintain balance.

You now know the types, causes and management of yphosis. Let us move on to Lordosis and scoliosis.

LORDOSIS

Lordosis is the abnormal increased in concavity (anterior curvature) of the lumbar spine. It is rare and usually occurs as congenital lesion due to failure of development of the posterior vertebral elements.

It can also be associated with paralysis of abdominal muscles and flexion deformity of the hips(compensatory lordosis) or it can be complicated with scoliosis (lordoscoliosis).

SCOLIOSIS

scoliosis is a lateral curvature of the vertebral column.

Types:

- *Non structural scoliosis*:- the spinal curve appears flexible, straightening temporarily when the patient leans sideway.
- *Structural scoliosis*:- a fixed deformity that doesn't correct itself when the patient leans sideway.

- *Infantile scoliosis*: -most common in boys aged 1 to 3. It may resolve spontaneously, or it may progress and require treatment.
- *Juvenile scoliosis*:- affects boys and girls aged 3 to10 about equally. This type of disorder usually requires long-term follow up and treatment during the peak growing years.
- *Adolescent scoliosis*:- occurs after age 10 and during adolescence.

Causes:

Non-structural scoliosis is commonly related to:

(1) leg-length discrepancies

(2) poor posture

(3) para-spinal inflammation

(4) acute disc disease.

Structural scoliosis has no known cause but it may stem from acongenital or a neuromuscular problems. Also diseases that affect the spinal (rickets) or that weaken the supportive muscles of the vertebral column (poliomyelitis) can bring about scoliosis. **S**ome cases are caused by any of several diseases or conditions that affect bone structure ,muscles or nerves.

Clinical features:

Scoliosis rarely produces symptoms until it is well established then symptoms include:

- Backache
- Fatigue
- Dyspnoea

Inspection may reveal signs of scoliosis:

- Unequal distance between the arms and the body,
- Uneven shoulder height and shoulder blade prominence.
- Asymmetrical waistline.
- Uneven hip height and asymmetrical thoracic spine.

Management

a) ***Investigations:***

- spinal X-rays studies including anterior, posterior and lateral views taken with the patient standing upward and bending.
- bone growth studies, though not diagnostic, may help determine skeletal maturity.
- patient history may reveal family history of scoliosis
- community or school scoliosis screening program.

b) ***Treatment***

the severity of the deformity and potential spine growth determine appropriate treatment which may include : Close observation- exercises- brace- surgery or combination of these.

For a mild curve of less than 20°:

- It is monitored by X-rays and examined every three months
- If the curve progresses between 5° and 10° and if the patient is still growing, the doctor may recommend a brace
- An exercise program that includes spine hyperextension , push-up, and breathing exercises may strengthen the torso muscles.

For a** curve of **20 to 40°** the following is required **:

- Management with spinal exercises and brace to prevent the curve from progressing;
- Lateral electrical surface stimulation to stimulate the spinal muscles.

a ***curve of 40° or more*** requires surgery because such a lateral curve continues to progress at the rate of 1° a year even after the patient reaches skeletal maturity: Surgery corrects lateral curvature by posterior spinal fusion and internal stabilization with various rods and spinal hard wire. After spinal fusion, the patient may need to wear a brace until the spine heals and stabiliszes. Period follow-up examinations are needed for several months.

b. ***Nursing care***

Using the nursing care plan you should provide interventions for the following problems:

Patient's Problems:

- **A**nxiety,
- Body image disturbance.
- Impaired physical mobility.
- Knowledge deficit
- Fear, pain, high risk for injury

ii. ***Nursing interventions and rational*****:**

- If the patient needs a brace enlist the help of a physical-therapist, a social worker and orthotist
- If the patient needs a body cast, provide pre, intra and post procedure care (see care of the cast)

Post-operative care (after corrective surgery):

- Provide the patient with pain killers as ordered and assess the patient's response to them.
- Check sensation, movement, colour, and blood supply in all extremities every 2 to 4 hours for the first 48 hours, then several times a day to detect neurovascular deficit
- Promote active ROM to help maintain muscle strength
- Encourage deep breathing exercises to avoid pulmonary complications

iii. ***Patient teaching***:

If patient needs a brace:

- Explain what it does and how to care for it;
- Suggest loose-fitting, oversized clothes for greater comfort
- Instruct patient to wear the brace 23 hours a day and to remove it only for bathing and exercise;
- To prevent skin breakdown, advise the patient not to use lotion and ointments, powder on areas where the brace contacts the skin. Instead suggest rubbing alcohol or tincture of benzoin to toughen the skin. Tell him/her to keep the skin dry and clean and to wear a snug T shirt under the brace;
- Advise the patient to increase activities gradually and to avoid vigorous sports;
- Instruct the patient to turn his whole body instead of just his head when looking to the side.

If the patient has the cast:

- Make him and his family understand proper cast care

- Explain cast syndrome(nausea, abdominal pressure, and vague abdominal pain) which may result from hyperextension of the spine
- Warn the patient not to insert or let anything get under the cast and to immediately report crocks in the cast, pain, burning, skin breakdown, numbness ,odor…

If the patient is having surgery:

- Explain pre and post operative procedures
- Makes sure the patient knows how to recognize the post-operative complications and measures to prevent them.

Before discharge :

- Check with the surgeon about activity limitations and make sure the patient understand them.
- Discuss all prescribed medication with the patient and any adverse reactions.

Complications

The main complications include the following:

- Debilitating back pain.
- Severe deformity.
- Decreased pulmonary function.
- Cor-pulmonale in middle age.

We have come to the end of our section on abnormalities of the bones and joints. In the next section you will learn about conditions of the musculoskeletal system.

2Traumatic Conditions Oof The Musculoskeletal System

In this section we shall discuss two traumatic conditions of the musculoskeletal system, namely:

- Sprains and dislocations

Fractures **SPRAINS AND DISLOCATIONS**

What is a sprain?

What is a Dislocation?

What is the difference between a sprain and dislocation? Think about it for 2 minutes and then complete the following activity.

Activity 4

Write down in your notebook the main difference between a sprain and a dislocation.

Now compare your answer with the information in the following discussion.

A sprain is an injury to the soft tissue, or ligaments, around a joint. This sometimes happens when someone moves the wrong way and “twists” something.

A d$islocation$ is when the bone becomes separated from the joint it meets, or it pops out of its socket. This sometimes happens when the bone and joint are overstressed. They can also be caused by contact sports, rheumatoid arthritis, inborn joint defects, and sudden jerking the arm or hand of a small child. A dislocation is most common in the shoulders, but fingers, hips, ankles, elbows, jaws, and even the spine are also prone to dislocation.

Both of these injuries are commonly confused with fractures (broken bones) because they all exhibit many of the same symptoms.

These symptoms include:

1. Pain

2. Swelling
3. Andan inability to move and bear weight
4. A misshapen appearance
5. Skin discoloration

Treatments and warnings:

Because of this, the basic first aid care can be used for all of these injuries (sprain, dislocation or fracture). The following are some key principles of first aid:

1. If you suspect a dislocation do not try to put the bone back into its socket, you may only make the injury worse.
2. If you suspect a dislocation in the neck or spine be very careful and do not try to move the client yourself unless absolutely necessary, as damage may have been done to the spinal cord (which may paralyze parts of the body below the injury site) Also, if you suspect an injury this serious call for help as soon as possible as you make arrangements to take the casualty to the hospital.
3. If the site of injury is bleeding then treat the wounds and cutsaccordingly, but do not try to reset/reshape the bone or joint. Also look for signs of ***shock***.
4. If the pulse is weak below the affected area call 911 and loosen all restrictive clothing.
5. If the person is in severe pain, or the injury is to the neck, spine, hips, or thigh bone, call for help.
6. If the joint or bone needs to be repositioned, do not give the person anything to eat or drink as it will put off medical treatment.
7. Remove any articles of clothing or jewellery covering the affected area, or restricting Blood flow to it.
8. You may give over the counter pain medications such as acetaminophen and ibuprofen as directed by the doctor. If there is bleeding do not give aspirin because aspirin is a mild blood thinner and will delay clotting.

9. Use the PRICE technique this stands for:
    - *Protect* the area and if possible make a splint to help immobilize the affected area. This will help prevent further damage to the limb. Do not try to reposition the bone/joint while making the splint.
    - *Rest* the area: avoid movement of the injured area and avoid participation in activities where you may be at risk to re-injure yourself until after the wound had had plenty of time to heal.
    - *Ice:* use ice to minimize swelling. If no ice is available, a bag of frozen veggies is a good substitute.
    - *Compression:* An elastic or fabric bandage may help decrease swelling and ease the pain. Ask a doctor before using one and make sure the bandage is not wrapped to tightly, which would hinder circulation.
    - *Elevation*: if possible raise the injured limb up above the heart. Support the elevated limb in a sling or under a pillow or folded blanket.

That's the management of sprains and dislocations. Next let us look at the management of fractures.

FRACTURES

What is a fracture?

A fracture is a break in the continuity of a bone. A bone may separate into two or more pieces or may not necessarily separate. The soft tissues in the area, surrounding the fracture may be injured. Fractures may occur when the bone is subjected to stress that is greater than it can absorb it. While the bone is the part most directly affected, other structures may also be involved resulting in soft tissue injury, oedema, haemorrhage into the muscles and joints, joint dislocation, rupture of tendons, severed nerves and damaged blood vessels. A fracture may occur due to a direct blow, crushing force, sudden twisting motion and even extreme muscle contraction.

Causes of fractures

Lets start with your thoughts on this. Complete the following activity.

Activity 5

List in your notebook at least 3 causes of fractures.

Well done! We hope your answers included the following causes of fractures:

1. Gunshot
2. Blows
3. Road traffic accidents
4. Falls
5. Infections like osteomyelitis
6. Extreme muscle contraction
7. Sudden twisting motions

Types of fractures

Fractures can be classified as follows:

1. *Incomplete Fracture:* this is a fracture in which the break of a bone occurs through only a part of the cross of a bone. E.g. green stick fracture
2. *Complete Fracture:* this is a fracture that involves the break across the entire section of the bone and frequently displaced from its normal position.
3. *Comminuted/Compound Fracture:* this is a fracture in which more than one line of broken bone resulting into several bone fragments.
4. *Open Fracture:* this is a fracture in which the skin or mucous membrane are pierced by the broken pieces of the bone.
5. *Closed Fracture:* this is a fracture in which the broken pieces of the bone do not protrude through the skin or mucous membrane.

6. *Complicated Fracture:* this is a fracture in which the extensively broken bone pieces cause damage to surrounding soft tissues.
7. *Green Stick Fracture:* this is a type of fracture in which one side of the bone is broken while the other is bent (commonly seen in children).
8. *Depressed Fracture:* this is a type of fracture in which broken pieces of a bone are driven inwards (common in skull or facial bones).
9. *Oblique Fracture:* this is a fracture in which the brake of a bone occurs at an angle across the bone.
10. *Transverse Fracture:* this is a fracture in which the brake of a bone (fracture line) occurs at a complete right angle across the bone.
11. *Spiral Fracture:* this isa fracture in twisting around and along the shaft of a bone.
12. *Avulsion Fracture:* this is a fracture which results in the pulling away of the fragments of a broken bone commonly by ligaments, tendons or its attachments.
13. *Compressed Fracture:* this is a fracture in which the fractured bone has been compressed by another bone as seen in fractures of the vertebral column.
14. *Pathological Fracture:* this is a fracture that occurs in an area of a diseased bone tissue, such as occurs in osteosarcoma, can also occur in elderly people especially post menopausal women etc.

Clinical manifestation of fractures

1. Continuous pain which increases in severity due to tissue damage
2. Loss of function (disuse syndrome) due to excessive pain
3. Deformity due to altered anatomy of the bone
4. Shortening of the limb with a broken bone due to muscle contraction
5. Crepitus and grating sensation felt due to rubbing against each other of broken bone fragments
6. Localized swelling and dark reddish discoloration due to the inflammatory process
7. Tenderness related to the inflammatory process

Physiology of bone healing

When a bone is injured, the healing process results in the restoration of the bone as it was prior to injury. There are several stages in fracture healing and they include:

1. Inflammation Stage

With a fracture the body's response is similar to that of injury elsewhere in the body. There is bleeding, extravasation of blood and fracture haematoma formation. The area exhibits oedema, swelling and pain. The clot undergoes organization and fibrin strands form within the clot. The fracture fragment ends of bone are devitalized because of the interrupted blood supply. Within a few days, tissue repair and healing will progress from adjacent viable tissue. The injured area is invaded by macrophages which debride the area. The inflammatory response is characterized by a decrease in swelling and pain.

2. Cellular Proliferation

Within 48 – 72 hours following a fracture, adjacent tissue cells modify and invade the area. Fibroblasts and osteoblasts produce collagen and proteoglycan for a collagen mixture at the fracture. Cartilage and fibrous connective tissue develop. Callus starts developing at the periosteum. Capillaries develop in the proliferating tissue and provide nourishment to the forming tissue.

3. Callus Formation

Tissue growth continues and cartilage collar from each bone fragment grows towards each other until the fracture gap is bridged. The fracture fragments are joined. An internal callus also develops and invades the remaining blood clot. The stage of the callus and the volume of tissue required to bridge the defect are directly proportional to the amount of bone damage and displacement. It takes 3 – 4 weeks for the fracture fragments to be united by cartilage or fibrous tissue.

4. Ossification Stage

Ossification of the developed callus begins within 2 – 3 weeks post fracture. This repair cartilage is replaced the process of endochondrial ossification. The mineral deposition continues and produces a firmly reunited bone. The callus surface continues to be electro negative in major adult long bone fractures. Full ossification takes place within 3 – 4 months.

5. Consolidation and Remodeling

The final stage of fracture consists of removal of any devitalized tissue and reorganization of new bone into former structural arrangement. Compact and cancellous bone develops according to the functional stress subjected to the healing bone. Depending on the extent of bone modification needed, remodelling may take months to years. When remodelling is complete, the fractured surface charge is no longer negative but becomes positive.

Management Of A Fracture

Principles of fracture management

The main principles are:

1. Resuscitation
2. Restoring the fracture fragments to their normal anatomical position (reduction)
3. Maintaining reduction in place until healing occurs (immobilisation)
4. Regaining normal functional strength of the affected part (rehabilitation)

Emergency care

Immediately after injury, it is very important to immobilise the body part before the patient is moved. Adequate splinting including joints adjacent to soft tissue should be ensured. In an open fracture, the wound is covered with a clean dressing to prevent contamination. Haemorrhage should be immediately arrested. Ensure the patient is appropriately positioned to maintain blood circulation and an open airway.

Methods Used To Obtain Fracture Reduction

There are three methods used to obtain fracture reduction. These are:

1. *Closed reduction*
2. *Open reduction*
3. *Traction*

Let us discuss each in further detail.

1. *Fracture reduction*

Reduction of a fracture refers to restoration of the fragment into anatomical rotation and alignment as nearly as possible. This is accomplished by closed or open manipulation. Before fracture reduction the patient should be prepared for the procedure. Medication for pain and relief are administered. The extremity that is to be manipulated should be handled gently to avoid additional damage, elevated to minimize swelling, and gently cleaned before being dressed in a cast or splint.

2. *Closed reduction*

This is where no operation is performed but the bone is pulled and immobilised. In most instances closed reduction is accomplished by bringing the bone fragments into apposition (ends in contact) by manipulation and manual traction. Following the manipulation, X-rays are taken to determine that the bone fragments are in correct alignment. A cast is usually applied to immobilise the extremity and maintains the reduction. A second person may maintain traction on the affected extremity while it is being encased in a plaster. Anaesthesia may be given to relax the muscles and relieve pain, e.g., scoline (suxamehtomium).

3. *Traction*

We discussed traction in section 2.5.3 of this unit. Can you remember when it is used? Write your thoughts in the following activity.

Activity 6

List down in your notebook the reasons why we use traction in orthopaedic treatment

We hope your list included the following reasons:

I. To minimize muscle spasms
II. To reduce
III. To align and immobilise the fracture
IV. To lessen deformity
V. To increase the space between opposing surfaces within a joint

Traction must be applied in the desired direction and magnitude to obtain the therapeutic effects.

Take Note

Application of skin traction is contraindicated in the presence of skin conditions such eczema, psoriasis, where there are varicose veins or loss of normal skin sensation or neuromuscular deficit or sores.

Preoperative Assessment

Application of traction can be a frightening experience. The equipment looks threatening. Prior to the application of any traction, the patient needs to be informed about the procedure, its purpose and its implication for him. Talking to the patient about what is being done and why helps alley anxiety.

Since the patient will be immobilised in bed, the mattress needs to be firm and supported with a bed board. If devices to minimize the development of pressure sores are to be used, they should be place on the bed before the application of traction.

The patient's skin should be examined for evidence of pressure or friction over bonny prominences or sores.

Specific nursing care

1. The patient's skin should be continuously examined for evidence of pressure or friction over bonny prominences.
2. During traction therapy, the patient's needs to exercise none immobilised muscles and joints to diminish the deterioration due to immobilisation.
3. Active motion of all unaffected joints is encouraged
4. The area over the traction tapes should be palpated daily.
5. The area over the Achilles tendon should be inspected several times daily since pressure in the region may occur when skin traction is applied to the leg. Care must be taken to avoid pressure on the peroneal nerve at the point at which it passes around the neck of the fibula just below the knee. Pressure at this point can cause foot drop.
6. Check peripheral pulses and the colour and temperature of fingers and toes.
7. Assess for altered sensation, weakness or dorsi flexion or foot movement, and inversion of the foot, which might indicate pressure on the common peroneal nerve. Any complaint or burning sensation under the traction bandage is investigated immediately.
8. Encourage active foot exercises hourly
9. Encourage the patient to take a lot of fluids to avoid constipation
10. Give foods rich in roughage
11. Bed pans should be given as demanded by the patient
12. Use aseptic technique when dressing the wound in open fractures.
13. When traction frames are used, a trapeze may be suspended overhead within easy reach of the patient. This apparatus is of great help in assisting the patient to move about in bed and on and off bed pans. It is also helpful to the nurse in caring for these patients when a patient is not permitted to turn, on one side or the abdomen.

The nurse must make special efforts to provide good back care and to keep the bed dry and free of cramps and wrinkles.

Pain control

After the use of skeletal traction, the pin site wound may heal with a depressed scar due to fibrous tissue contraction. This may be prevented by pinching the pin site tissue at the time of pin removal and thereby breaking the fibrous tissue that has formed at the pin site between the skin and the periosteum.

Patient teaching

1. Avoid stress on the affected site for at least 3 – 4 moths.
2. When discharged with a cast, the patient should not make it wet.

4. Plaster Of Paris (P.O.P.)

As we saw earlier in section 2.5.2, the purpose of POP is to:

- Immobilise a part of the body
- Correct deformity

Types of plaster

There are three types of plasters, namely:

1. *Unpadded Plaster:* this is used for treatment of conditions where swelling does not occur and also for treatment of fractures or when other injuries have subsided.
2. *Padded Plaster:* tthis is used for recent injuries e.g. fractures and also after operation or manipulation
3. *Plaster Slabs:* these are used in the following situations:
   - Strengthening plasters e.g. on joints

- Provide a sole piece in leg plasters
- In the initial treatment of the arms, wrists and fingers
- In cases where it is desirable to immobilise the limb intermittently e.g. night splints
- In injuries where gross oedema is present
- I conditions where a dressing has to be done daily

Nursing Measures After Application Of Plaster Of Paris

1. There should be no movement of the limb or joint immobilised or the plaster will crack and be ineffective.
2. Frequent inspection of extremities to note any interference with circulation i.e. on pressure the finger or toe nail becomes white and on release quickly becomes pink. Thus also:

i. Note any swelling
ii. Observe for loss of sensation
iii. Observe for loss of movement
iv. Observe for pain
v. Encourage movement of toes and fingers
vi. Observe for staining of P.O.P. if applied over a sutured wound.

Causes of plaster sores

The main causes of plaster sores are:

1. Pressure due to carelessness in moulding, handling, drying or insufficient protection to bonny prominences.
2. Friction from too loose a plaster cast which rubs against prominences
3. Foreign bodies inside the plaster casts such as stones and coins
4. Delay in preparing plaster cast so that the rough edges chaff the skin.

That brings us to the end of our discussion on traumatic conditions of the musculoskeletal system. In the next section we shall look at conditions caused by infections of the musculoskeletal system.

3Infections of OThe Bones and Joints

In this section we shall discuss the following infections of the bones and joints:

Osteomyelitis
Rheumatoid arthritis
Septic arthritis – infectious arthritisWhat is Septic Arthritis?

Tuberculosis of bone
We shall start our discussion with osteomyelitis.

OSTEOMYELITIS

What is osteomyelitis?

Osteomyelitis is an acute or chronic infection of the bone tissue caused by bacteria characterized by pain, fever, swelling and loss of function of the affected part.

Routes of infection

Bones which are usually protected from infection can become infected through three ways namely;

1. Haematogenous, e.g. infected tonsils, boils, infected teeth, urinary tract infection, etc.
2. Direct invasion, e.g. in open fractures, gunshot wounds, bone surgery etc.
3. Erosion of adjacent soft tissue infection (cellulitis)

Acute osteomyelitis is due to haematogenous spread and is seen more frequently in children than in adults. Chronic osteomyelitis is seen more frequently in adults than in children.

Causes (Organisms)

The main causative organisms are:

1. Staphylococcus aureus; is the commonest
2. Pseudomonas aerugenosa
3. Colon bacilli (e.g. E. coli)
4. Salmonella
5. Streptococcus
6. Haemophilus influenza
7. Pneumococcus
8. Klebsiella

Pathophysiology of osteomyelitis

Osteomyelitis due to haematogenous spread occurs in a bone area where there is lowered resistance, possibly due to subclinical trauma. It often develops in the long bones of children and vertebrae of adults. Regardless of the source of infective microbe, the initial response is one of inflammation, increased vascularity and oedema. After 2 – 3 days, there is a thrombosis of the blood vessels in the area and a resultant ischaemia with bone necrosis due to increasing tissue and medullary pressure. The infection extends into the medullary cavity and under the periosteum. Infective pus may spread the infection into the adjacent soft tissues and joints. Unless the infective process is controlled early, bone abscess forms.

In the natural course of events, the abscess may point and drain, but more often incision and drainage are done. The resulting abscess cavity has its walls and areas of dead tissue, as in any abscess cavity, however, in this case, the dead tissue is bone which cannot liquefy easily and be discharged as pus. The dead bone is called a *sequestrum.* Healing in a bone abscess is very difficult than healingin an abscess of soft tissueabscess because the cavity cannot collapse and heal.

New bone, the *involucrum* forms as the body attempts to repair. Often it grows so as to surround the sequestrum. Thus even though healing appears to take place, a

chronically infected sequestrum remains that is prone to produce recurring abscesses throughout the life of an individual. This is so called chronic type of osteomyelitis.

Clinical Manifestations

A. *Acute osteomyelitis*

The clinical manifestations of acute osteomyelitis are:

1. The onset is sudden
2. Chills
3. High fever
4. Rapid pulse
5. General body malaise
6. Painful extremity which is swollen and tender

B. *Chronic osteomyelitis*

The clinical manifestations of chronic osteomyelitis are:

1. Continuously draining sinus with recurrent periods of pain not so pronounced
2. Swelling
3. Low grade infection that thrives in the scar tissue with its reduced blood supply
4. On X – ray large irregular cavities are seen
5. Sequestrae

Management Of Osteomyelitis

The major goals of management of a patient with acute osteomyelitis include the following:

1. Absence of bone infection
2. Absence of pain
3. Improved body resistance to infection
4. Adherence to therapeutic regimes.

Diagnostic evaluation

The following tests are use din the diagnosis of osteomyelitis:

1. Early X – ray will show only soft tissue swelling
2. Blood studies will show elevated leucocytes (leucocytosis) and ESR
3. Blood cultures and cultures of abscesses are needed for proper antibiotic therapy.

Treatment

The initial objective of therapy is to control and arrest the infective process. Blood cultures and abscess fluid smear are done to identify the organism responsible and select the best antibiotic. Antibiotic therapy is begun immediately assuming a staphylococcus infection is present that is sensitive to semi synthetic penicillin. Cloxacillin is a drug of choice given parenterally. A sustained high therapeutic blood level of the antibiotic is important. 1000 – 2000 mg 6 hourly intravenously for 14 days is given. When the infection appears to be controlled the antibiotic can be administered orally and so continued for 3 – 4 weeks after the patient is afebrile.

Suspected regions of pus may be evacuated by needle aspiration. If the patient does not respond to treatment, surgery is carried out whereby the involved bone is exposed. The purulent and necrotic material is removed and the area irrigated directly with sterile physiologic saline solution.

In chronic osteomyelitis, all dead infected bone and cartilage must be removed before permanent healing takes place. This procedure which is called ***Sequestraectomy*** consists of the removal of enough Involucrum to enable the surgeon to remove sequestrum. The wound is either closed tightly to obliterate the dead space or may be packed to be closed later by granulation or possibly by grafting.

Specific nursing care

Nursing Diagnosis

Based on the clinical manifestations and other data, the patient's major nursing problems include:

1. Infection related to the osteomyelitis process
2. Pain related to infective debris
3. Decreased body resistance related to the infective process
4. Possible non adherence to therapeutic regimen related to a lack of understanding
5. Fever related to inflammation

1. If there is a draining wound, the patient should be isolated and secretion precaution or wound and skin precautions taken depending on the extent of infection. Careful hand is essential because of the possibility of cross infection.
2. Osteomyelitis is a disease that demands careful nursing management. The wounds themselves frequently are very painful and handled with great care andbelow the affected part should be supported and the extremity moved in a smooth manner. The affected part maybe immobilised with a splint until the wound has healed. Immobilisation decreases pain and muscle spasms. Give prescribed analgesics.
3. The patient should be monitored carefully for the development of additional painful areas or sudden rises in temperature. They may indicate the extension of the infection or secondary infection.
4. During the acute and convalescent period, the general health and nutrition of the patient needs to be monitored and enhanced. Fluids and a balanced diet high in proteins, vitamin C and D are provided. Electrolyte homeostasis and positive nitrogen balance promote health.
5. When the patient leaves with acute care setting, adherence to therapeutic regimens are stressed. Adequate treatment requires appropriate antibiotic therapy and an environment that will enhance bone healing.

Information, Education and Communication

1. Teach the patient to complete prescribed antibiotic therapy regimen
2. He should report any signs of fever, purulent drainage, pain, tenderness on area of previous infection, any discomfort with movement.
3. Instruct the patient to resume activities gradually and to keep follow up clinic or physician appointments.
4. Teach the patient to avoid colds and other infections.

Complications of osteomyelitis

The possible complications are:

1. Skeletal deformities
2. Joint deformities
3. Disturbed bone growth
4. Differing leg lengths
5. Impaired mobility
6. Chronic infection
7. Septic shock
8. Gangrene
9. Septicaemia
10. Septic arthritis

You have come to the end of our discussion on osteomyelitis. Let us now turn to rheumatoid arthritis.

RHEUMATOID ARTHRITIS

This is a chronic systemic progressive disease of unknown aetiology characterized primarily by inflammation of the synovial joints.

Incidence

Rheumatoid arthritis affects people of any age, but most often begins in women with a ratio of 3:1 over men. It begins between the ages of 25 – 35 years.

Pathophysiology

Rheumatoid arthritis is thought to be due to an auto immunologic response that centred in synovial joints. The pathologic changes are seen first as inflammation occurring in the synovial tissue or synovitits. Each of the synovial joints may be the site of inflammation, with swelling and pain, oedema and infiltration and lymphocytes and plasma cells begin to form rheumatoid factors that react with antigens to form immune complexes. This generates inflammatory response or reaction. There is an increase of phagocytic cells to remove the debris. Phagocytic cells produce enzymes that create more destructions, hyperaemia, oedema, swelling and thickening of the synovial lining continue. Granulation tissue covers the articular cartilage (panus), gradually replacing it with fibrous connective tissue. As the process spreads, the joint is destroyed as articular cartilage becomes eroded, exposing the bone in the joint.

Clinical manifestations

Rheumatoid arthritis presents with the following signs and symptoms:

1. Disease usually begins with unusual fatigue, generalized weakness and anorexia
2. Signs of joint inflammation (redness, swelling, warmth, pain etc.) begin most commonly in the fingers; particularly involving the proximal inter phalangeal joints (PIPs) and the metacarhalangeal joints (MCPs) bilaterally and symmetrically.
3. Additional joints such as the wrist, elbows, shoulders, knees and hips are involved and mobility is impaired.
4. Morning stiffness (lasting longer than 30 minutes after rising) which subsides with activity
5. Fixed deformities of the hands and feet are common in rheumatoid arthritis.

Other problems in the late or severe stages of rheumatoid arthritis include:

- Severe weight loss
- Fever
- Anaemia
- Muscle atrophy
- Osteoporosis
- Sjogreus Syndrome (less body fluids)

Management

Investigation/Diagnostic Tests/Radiological Examinations

The following investigations are useful in making a diagnosis:

1. Patient history taking
2. General appearance through physical assessment
3. X – ray
4. Bone scan
5. Rheumatoid factor (abnormal antibodies)
6. Raised ESR
7. Aspiration of synovial fluid

Non pharmacological treatment

1. *Pain Relief and Discomfort*

Hot and cold application or compresses are often helpful in relieving pain, stiffness, and inflammation and muscle spasms. If the inflammation process is acute, cold application may be tried in the form of moist packs or an ice bag.

2. *Rest*

Conserves energy, allows healing and alleviates pain.

Pharmacotherapy

Drug therapy is used to relieve inflammation and pain and arrest the progress of the disease:

a. Salicylates

Aspirin is the corner stone of treatment especially in early phases of disease such as rheumatoid arthritis. It has anti inflammatory, antipyretic and analgesic effects.

b. Non Steroidal Anti inflammatory

- Ibuprofen (Motrin) has an anti-inflammatory action particularly in joints
- Naproxen
- Sulindac

Other anti-inflammatory drugs

- Indomethacin (Indocid)
- Butazolidin

c. Gold therapy

Gold sodium theomalate (water based) may be used when rheumatoid arthritis cannot be controlled by non steroidal therapy.

d. Corticosteroids

- Prednisolone or Prednisone intra-articular corticosteroid injections.

e. Immunosuppressive Drugs

Cyclophosphamide: suppresses autoimmune mechanism in advanced rheumatoid arthritis.

Nursing Care

The aims of nursing care are to"

1. Relieve pain and promote comfort
2. Increase mobility and muscle strength

3. Promote optimal independence in activities of daily living
4. Develop a positive self concept of the patient
5. Attain and maintain the patient's optimal nutrition
6. Promote participation in an ongoing educational programme

Take Note

The patient should be *admitted in the general ward preferably in a side room for optimal rest*.

Relief Of Pain And Promoting Comfort

Apply hot compresses to relieve pain, stiffness, and inflammation and muscle spasms. Superficial heat may be applied in the form of warmth, tub bath and warm moist compresses. Therapeutic exercises can be carried out more comfortably and effectively after heat has been applied. However, in some patients, heat may actually increase pain, muscle spasms and synovial fluid volume. If the inflammatory process is acute, cold application may be tried in the form of moist packs or an ice bag. Both heat and cold are analgesics to nerve pain receptors, and relax muscle spasms.

Promotion of Rest

Rest also helps to relieve pain. Since rheumatoid arthritis is a systemic disease, the whole patient not merely the joints must be treated. The amount of rest required is indicated by the amount of inflammatory involvement and the feeling of the patient. When in bed, the patient should be flat on a firm mattress with only one pillow under the head because of the risk of dorsal kyphosis. The pillow should not be placed under the knees, as this promotes flexion contractures of those joints involved. Frequent period of bed rest during the day, take the weight of the joints and relieve fatigue. If joint inflammation is severe, the patient may be placed on complete bed rest for a brief period. At bed rest, the patient should be flat with feet propped against the footboard. All joints should be supported in a position of optimum functioning.

Positioning and Movement

The patient should lie on the abdomen several times daily to prevent flexion deformities. As the joints stiffness and tenderness diminish and function improves, the patient is encouraged to perform more out of bed activities. Pain can be anticipated in the knees and hips when rising from a chair. The nurse should select a straight back chair with a seat that is high enough to permit the patient to keep the feet flat on the floor, while the hips and shoulders are resting against the back of the chair. Toilet seats can be raised by attaching built up seats to standard toilets fixtures.

A cervical collar to prevent cervical motion may help if the patient has a painful neck. Stretch may control hand and finger pain by providing a mild splinting action, and reducing joint swelling and stasis of blood.

Foot wear when the foot is involved, pain is due to synovial proliferation, distension of the capsule and lack of supporting ligaments which contribute to mechanical deformities. Pain around metatarsal areas of the forefoot may be relieved by placing a metatarsal bar proximal to the point of impact on the metatarsal heads in order to relieve weight bearing. Pads may be placed in strategic places to relieve stress and irritation. These may be fitted to standard shoes by expert shoe makers. The patient is advised that the foot may continue to change shape and that modifications will need to be made on the shoes.

Administration of Medications

Administer anti inflammatory agents and analgesics to arrest progress of the disease. Salicylates (aspirin) when used in full dosage have an anti inflammatory as well as analgesic and antipyretic action. If aspirin is not successful in relieving pain and inflammation, other anti inflammatory drugs are used with salicylates therapy. Non steroidalanti inflammatory drugs (NSAIDs) e.g. Naproxen, ibuprofen, indomethacin.

Increasing ***Mobility And Muscle Strength***

Inflammation, scarring or other structural damage to joint structure results in pain and disability. If acutely inflamed, these joints should be rested by applying splints or other mechanical devices that will maintain them in functional positions. Simple splints provide rest; support the joint in optimal position to relieve pain and spasm and help prevent deformity. Provide systematic range of motion and specific muscle strengthening exercises. If activity is painful, help the patient to perform required motions. Emphasis must be placed on the need to carry out a regular exercise routiney on a daily basis in order to increase muscle strength. Isometric muscle exercises especially valuable as the joint is kept at rest during exercises.

Promoting Independence In Activities Of Daily Living

In order for the patient to become independent, he must be instructed and supervised by the nurse and others of the rehabilitation team in activities of daily living. It is important that the nurse the nurse works with the patient to achieve the goals of self-care and independence. Often the patient has the greatest difficult with fine delicate movements, such as those required for fastening items of clothing and opening small packages. Work together with the occupational therapist or physiotherapist to teach the patient ways to perform those difficult tasks. There are many self-help devices available to assist with dressing, bathing, grooming and eating when the patient cannot perform those himself. When there is difficult in ambulation, a walker may be prescribed as an assistive device to reduce the amount of weight bearing on the joints of the lower extremities. Well-fitted supportive shoes should be worn when walking to protect joints and prevent falls. When physical mobility is severely impaired and relieving of pain by conventional drug therapy fails, reconstructive joint surgery may be done to restore some function and reduce pain.

Psychological Care Aimed At Making The Patient Develop A Positive Self Concept

Patients with arthritis show the same fundamental psychological responses to their disease as persons with other chronic diseases, such as, fear, anxiety, depression, anger and loss. All aspects of the patient's life, including work role, social life, sexual functioning and financial status may be altered. Body image changes may cause social isolation and depression. It is better for the patient to express hostility or depression than suppress it, and to ultimately stop trying to communicate with the health care team. The nurse and the family should try to understand the patient's personality and his emotional reactions to the disease. Social workers, psychiatrists, liaison nurses, sex counsellors and the clergy may serve as valuable resources for reassurance and promotion of the patient's positive self-concept.

Nutrition

The patient frequently experiences anorexia, weight loss and anaemia. A dietary history should be taken on each patient to determine usual eating habits and preferences. The patient should be instructed on how to select food to include in the daily requirements from the basic four food groups with emphasis on foods on foods high in vitamins, proteins, and iron for tissue building and repair.

Health education

The nurse should assess the patient's knowledge regarding his disease, signs of exacerbations, treatment plan and drug therapy. If knowledge deficit exists, the nurse teaches the patient and his family and reinforces the teaching as necessary.

That's it for rheumatoid arthritis. Next we shall study septic arthritis.

SEPTIC ARTHRITIS OR INFECTIOUS ARTHRITIS

What is Septic Arthritis?

Septic arthritis is the invasion of a joint by an infectious agent which produces arthritis. The bacteria are carried by the blood stream from an infectious focus elsewhere, introduced by a skin lesion that penetrates the joints or by extension from adjacent tissues (e.g. bone). Normally, the joint is lubricated with a small amount of fluid that is referred to as synovial fluid or joint fluid. The normal joint fluid is sterile and if removed and cultured in the laboratory, no microbes are found.

Risk Factors

The main risk factors are:

1. Taking medications that suppress the immune system
2. Intravenous drug abuse
3. Past joint disease
4. Joint injury or surgery
5. Diabetes mellitus
6. Alcoholism
7. Human immunodeficiency virus infection
8. Sickle cell disease
9. Rheumatoid disease

Aetiology

Microorganisms must reach the synovial membrane of a joint. This can happen in any of the following five ways:

1. Dissemination of pathogens via blood from abscesses or wound infections
2. Dissemination from an acute osteomyelitis focus

3. Dissemination from adjacent soft tissue infection
4. Entry via penetrating trauma
5. Entry via iatrogenic means

Common bacteria include:

1. Staphylococcus aureus; is the most common cause in adults
2. Haemophylus influenza; is the most common cause in children
3. Nesseria Gonorrhoeae in young adults
4. E. coli in the elderly, intravenous drug users and seriously ill
5. Mycobacterium tuberculosis, salmonella cause septic spinal arthritis

Indications for concern

Septic arthritis is suspected when one joint (mono arthritis) is affected and the patient is febrile. Several joints can be affected simultaneously especially when the infection is caused by staphylococcus or gonococcus.

Signs and Symptoms

The main signs and symptoms are:

1. Fever
2. Chills
3. Joint pains
4. Swelling
5. Redness
6. Joint stiffness
7. Warmth

Joints commonly involved are large joints such as knees, ankles, hips and elbow

Diagnosis

1. Sepsis is diagnosis by identifying infected joint fluid (synovial fluid aspiration for culture and sensitivity)
2. Blood for culture, sedimentation rate and clostridium reactive protein

Treatment

The patient is treated with antibiotics and aspiration/drainage of infected joints as follows:

- Broad spectrum antibiotics are given immediately according to laboratory results.
- Intravenous antibiotics can be required for 4 – 6 weeks
- Drainage is essential for rapid clearing of infection
- Arthroscopy can be used to irrigate the joint and remove infected joint lining tissue
- Open joint surgery is used to drain the joint; drains are left in left in place to drain excess fluid that can accumulate after the procedure.

Nursing care

Nursing care basically focuses on the same specifically the following:

- Environment
- Relief of pain
- Observations
- Psychological care
- Rest/exercises
- Nutrition/fluids
- Hygiene
- Medication
- Elimination
- I.E.C.

Complications of septic arthritis

Possible complications include:

- Joint destruction
- Endocarditis
- Kidney failure

TUBERCULOSIS OF BONE

Cause: Tubercule Bacili (TB)

Types of TB of the Bone

The two main types are::

- Bovine Tuberculosis
- Human Tuberculosis

Incidence:

Tuberculosis of bone is high among people living in overcrowded area with low standard of nutrition. Children are more prone than adults. Clinical features : -depend on body resistance to infection. It is usually asymptomatic in healthy persons.

General manifestations

The patient may present with the following signs and symptoms:

- Anorexia
- Loss of weight
- Fatigue
- Rise in temperature by 1^0 C or 2^0 C .
- Restlessness .
- Night sweats

Local manifestations

- Aching pain which is worse after exercises and is relieved by rest.
- A lump, fist symptom of lesions of the low limb and spine.
- Muscle atrophy of the affected limb.
- Deformity due to pull of strong muscles in spasms or bone destruction.
- Swelling and tenderness.

Management

***Investigation*:**

The diagnosis is based on local and general clinical manifestations

***Radiological tests*:**

- X-rays of the joint involved will show loss of joint space, decalcification and irregularity
- X-rays of chest

***Laboratory tests*:**

- Mantoux skin test
- Aspiration of abscess for microscopic analysis to isolate the bacilli
- Biopsy of lymph glands and synovial membrane
- Blood for ESR (Erythrocytes Sedimentation Rate)
- Sputum and urine for alcohol acid fact bacilli (AAFB)

***Medical treatment*:**

Chemotherapy as in case of pulmonary tuberculosis

Nursing care:

The nursing care is similar to that of Osteomyelitis

You now know the common infections of the bones and joints. In the next section we shall discuss infected wounds.

2.5.4. 4Infected Wound

Types of infected wounds

There are two main types of infected wounds. These are superficial and deep infected wounds. Let us examine each in turn.

a. *Superficial infected wounds*:

Include:

- an open infected wound is one that is localized at the site of traumatic penetration or a surgical incision.
- n abscess is a localized collection of purulent material that may be in or near the skin surface , such as in a surgical wound; an abscess also may develop in visceral tissue, as in case of a sub-diaphragmatic or pelvic abscess

- a carbuncle is a localized abscess around a hair follicle or sweat gland.
- a cellulitis is an inflammation of the interstitial cells around an open area, usually as a result of direct inoculations through the skin opening. Cellulitis may be only an inflammatory condition, or the inflamed tissues may become infected, as in gas gangrene.

b. *Deep infected wounds*:

- may be the result of surgical exposure or secondary to undiagnosed , occult infection, such as, a sore throat, infected sinuses or tooth, pneumonia, or urinary tract infection.

Causes

- The most common infecting organism is staphylococcus aureus.
- Others pathogens associated with wound infection are: streptococcus pyogenis - pseudomonas aeruginosa - escherishia coli clostridium perfringens salmonella typhy - neisseria gonorrhoea - mycobacterium tuberculosis, - staphylococcus epidermidis - treponema pallidum – coccidioides immitis

Predisposing factors

- Diabetes
- Arteriosclerosis
- Non aseptic technique

Clinical features

- Red oedematous wound
- Drainage from the wound that may be serous or purulent
- Elevated temperature at the site and systematically
- Pain at rest, aggravated by ambulation
- Elevated WBCs count
- Wound drainage culture may or not reveal the offending organisms

Management

The aims of management are to:

- Investigate the cause
- Treat the cause
- Educate the patient on the disease and its prevention.

***Investigation*:**

- Clinical manifestations
- WBCs count
- Wound discharge culture and sensitivity
- In deep wound: sinogram and injection of radiopaque dye to look for presence of purulent material.

Treatment

***Superficial wound*:**

- Warm compresses or warm soaks.

- Incision and drainage of purulent material.
- Irrigation and packing of wound.
- Oral antibiotics may or not be given depending on the extent of infection.

Deep wound:

The treatment is similar to that of osteomyelitis with the following differences:

- A cephalosporin antibiotic will be given instead of penicillin. It is given initially in IV and then orally for 6 to 9 days.
- Joint or wound internal fixation or implant devices are removed, since they are foreign bodies that resist antibiotic therapy.
- After infection has cleared up –wound culture test negative- replacement surgery may be performed.

Nursing Management

- Clean all wound with soap and water and remove foreign matter and dead tissue.
- Give tetanus toxoid 0.5 ml to all patients
- Give anti-tetanus serum to all non-immunized patients
- Do not suture stab or duty wounds
- Give antibiotics and clean with antiseptic solution regularly.

Next we shall study a highly contagious condition of the bones known as poliomyelitis

5POLIOMYELITIS

What is poliomyelitis

This is an acute highly contagious disease of man caused by one of the three related polioviruses belonging to the enteric viruses of the piconavirus group. In its severe form it attacks the CNS, however, in mild form it produces non-specific syndrome without apparent disease.

Aetiology

The RNA virus of the picorna group is pathogenic to man and other primates.

There are 3 genotypes

- Type 1 – brunhilde
- Type 2 – lansing
- Type 3 - leon

There is no cross-immunity between the 3 groups.

Virus capable of remaining viable in water and sewage for as long as 4 mths. It is resistant to ether, ethyl alcohol, 2% tincture of iodine and even to a 10 minute exposure to a chlorine concentration of 0.05 ppm. It is not unusual to isolate large quantities of virus in sewage drained from areas of epidemics.

Epidemiology

It is found world-wide. Though it is now limited to small numbers of areas. Its transmission is favoured by dry-hot seasons

Pathogenesis

- Humans provide the sole reservoir.
- Virus enters via alimentary canal (faecal-oral route).
- Asymptomatic carriers most important transmitters.
- It is rarely associated with direct contact except where faecal contamination is concerned.
- Sequence of events: tVirus enters via the mouth and multiplies in oropharynx and gut.

1. Minor illness

– virus enters the blood stream.

- - Antibody production starts after which viraemia disappears.

2. Invasion of CNS

Postulation has it that virus enters the nervous system via the area postulemia of the medulla oblongata and at many points of the nervous network from proximal capillaries, spreading along nerve fibres.

Serum antibody is the important determinant of human susceptibility. Infants below 6mts rarely get polio due to passive maternal immunity. However, babies born of mothers with acute illness may develop disease soon after birth. In children males are more prone than girls. In adults the opposite is the case.

Predisposing Factors

- Pregnancy
- Multiparas more at risk than primiparas.
- Common occurrence in second trimester.
- Absence of tonsils
- Physical exertion
- Ovulation and menstruation

Clinical Manifestation

Incubation period 3 to 35 days with 80% occurring 7 to 14 days post contact.

Infection assumes one of the following forms:

- In apparent infection
- Minor illness
- Non-paralytic disease
- Paralytic disease

Let us look at each form in further detail starting with in apparent infection.

In Apparent Infection

95% fall into this category. The infection is asymptomatic but the virus is present in the pharynx and gut. It may also be in the blood. Antibodies develop.

Minor Illness

This has no clinical or laboratory evidence of cns invasion. The following t***hree Types Observed*****:**

- Upper respiratory manifestations
- Gastrointestinal disturbances
- Grippelike disease

Non-Paralytic Polio

- Meningeal Irritation
- Pathologies In CSF
- Initial neutrophilia, however, mononuclear cells soon predominate
- CSF, sugar, and protein levels are normal
- leucocyte count high in early stages (15000), but soon reverts.
- Very benigne course
- No change in muscle and nerve function

Paralytic Polio

- Involvement of **motor** nerve cells leading to paresis and even paralysis of various muscles.
- The commonest predromal symptoms are generalised muscle and bone discomfort
- May be subdivided into:

- Spinal
- Cervical
- Thoracic
- Lumbar
- Or May Occur In Any Combination Of Above

There are three types of paralytic polio: spinal polio (affects the spine), bulbar polio (affects the brainstem), and bulbospinal polio (affects the spine and brainstem).

- ***Bulbar*** *Polio*

Affects the brainstem and upper cranial nerves iii to viii or lower cranial nerves ix to xii. It also has involvement of cardiorespiratory centres.

Bulbo-Spinal

This one affects the spine and the brainstem. Its diagnosis is made mainly on clinical grounds (rapidly developing lower motor neuron dysfunction leading to flaccid weakness with hypo- or areflexia Other signs and symptoms are:

- Lack of upper motor neuron signs;
- Isolation of virus in stool or pharyngeal secretions;
- Rising levels of neutrolising antibody

Immunity

Life long, but normally specific

Treatment

The treatment of the Non paralytic form is:

- Rest and support.
- Avoid frequent examinations.
- Give analgesics.

The treatment of the Paralytic form is:

- Attention and action to /against life threatening conditions, managing pain and emotional care
- Physiotherapy
- Surgery

Prognosis

- 5% mortality.
- Total recovery for abortive and non-paralytics.
- 2 to 5% and 15 to 30% of children and adults respectively with paralysing disease die.
- Mortality at 25% and 75% in bulbospinal involvement.
- Most victims make full recovery.
- The more life-threatening the disease in acute stage, the more frequent is complete functional recovery.

Prevention

- Common isolation of poliomyelitis is of little public health value.
- Avoid careless contact with patients.
- Special care for pregnant women.
- Tonsillectomy to be avoided during epidemics.
- Similarly, avoid physical activity and chilling for individuals with minor illness, until after symptoms abate.

- Immediate notification & surveillance of acute flaccid paralysis
- Immunise against paralytic polio.
- Formalin inactivated strains (salk)
- Attenuated strains of poliovirus (sabin).
- NIDS - National Immunisation and Disease Surveillance

Acute flaccid paralysis Surveillance

The aims of AFP surveillance are to:

- Identify remaining infected areas
- Provide appropriate supplementary immunisation (Target strategy)
- Monitor progress towards eradication
- Ensure that all (at least 80%) AFP cases in children >15 yrs. are reported & investigated and 2 stool specimens submitted to WHO accredited laboratory

Eradication

- It can be eradicatited
- Man is only host
- Cheap, easy to administer oral vaccine of live attenuated virus is available
    - Oral administration mimics natural infection
    - Mass immunisation for children below 3yrs is superior to routine especially for communities in poor settings. Booster dose at 12 to 18 months is recommended

Take Note

The best way to prevent polio is vaccination. You should therefore ensure all children who come to the health facility have received polio vaccination.

6BONE TUMOURS

Bone tumors develop when cells in the bone divide without control, forming a mass of tissue. Most bone tumors are benign, which means they are not cancer and cannot spread. However, they may still weaken bone and lead to fractures or cause other problems. Bone cancer destroys normal bone tissue and may spread to other parts of the body (metastasis).

A bone tumor is a neoplastic growth of tissue in bone. Abnormal growths found in the bone can be either benign (noncancerous) or malignant (cancerous).

Bone tumors may be classified as "primary tumors", which originate in bone or from bone – derivedcells and tissues, and "secondary tumors" which originate in other sites and spread (metastasize) to the skeleton.

Carcinomas of the prostate, breasts, lungs, thyroid & kidneys are the primary carcinomas that most commonly metastasize to the bone. Secondary malignant bone tumors are estimated to be 50 to 100 times as common as primary bone cancers.

A. Primary bone tumors

Primary tumors of bone can be divided into benign tumors and cancers. Common benign bone tumors may be neoplastic, developmental, traumatic, infectious, or inflammatory in aetiology. Some benign tumors are not true neoplasms, but rather, represent hematomas, namely the osteochondroma. The most common locations for many primary tumors, both benign and malignant include the distal femur and proximal tibia.Examples of benign bone tumors include osteoma, osteoid osteoma, osteochondroma, osteoblastoma, enchondroma, giant cell tumor of bone, aneurysmal bone cyst, and fibrous dysplasia of bone.

Malignant primary bone tumors include osteosarcoma, chondrosarcoma, Ewing's sarcoma, fibrosarcoma, and other types.

While malignant fibrous histiocytoma (MFH) - now generally called "pleomorphic undifferentiated sarcoma" is known to occur occasionally. Current paradigms tend to consider MFH a "wastebasket" diagnosis, and the current trend is toward using specialized studies (i.e. genetic and immunohistochemical tests) to classify these undifferentiated tumors into other tumour classes. Multiple myeloma is a hematologic cancer, originating in the bone marrow, which also frequently presents as one or more bone lesions.

Germ cell tumors, including teratoma, often present and originate in the midline of the sacrum, coccyx, or both. These sacrococcyge alteratomas are often relatively amenable to treatment.

A. Secondary bone tumours

Since, by definition, benign bone tumors do not metastasize, all secondary bone tumors are metastatic lesions which have spread from other organs, most commonly carcinomas of the breast, lung, and prostate.

Reliable and valid statistics on the incidence, prevalence, and mortality of malignant bone tumors are difficult to come by, particularly in the oldest (those over 75 years of age), because carcinomas that are widely metastatic to bone are rarely ever curable, biopsies to determine the origin of the tumor in cases like this are rarely done.

General Symptoms of bone tumours

1. The most common symptom of bone tumors is pain, which will gradually increase over time. A person may go weeks, months, and sometimes years before seeking help; the pain increases with the growth of the tumor.

2. Additional symptoms may include fatigue, fever, weight loss, anaemia, and/or unexplained bone fractures.
3. Some bone tumors may weaken the structure of the bone, causing pathologic fractures

Chemotherapy and radiotherapy

Chemotherapy and radiotherapy are effective in some tumors (such as Ewing's sarcoma) but less so in others (such as chondrosarcoma). There are a variety of chemotherapy treatment protocols for bone tumors. The protocol with the best reported survival in children and adults is an intra-arterial protocol where tumor response is tracked by serial arteriogram. When tumor response has reached >90% necrosis surgical intervention is planned.

Medication

One of the major concerns is bone density and bone loss. Non-hormonal bisphosphonates increase bone strength and are available as once-a-week prescription pills. Metastron also known as strontium-89 chloride is an intravenous medication given to help with the pain and can be given in three month intervals. Generic Strontium Chloride Sr-89 Injection UPS, manufactured by Bio – NucleonicsInc., it is the generic version of Metastron. Astra zantec is currently under review as to the benefits in bone cancer.

Surgical treatment

Amputation

Treatment for some bone cancers may involve surgery, such as limb amputation, or limb sparing surgery (often in combination with chemotherapy and radiation therapy). Limb sparing surgery, or limb salvage surgery, means the limb is spared from

amputation. Instead of amputation the affected bone is removed and is done in two ways namely;

a. Bone graft, in which a bone from elsewhere from the body is taken.
b. Artificial bone is put in. In upper leg surgeries, limb salvage prostheses are available.

The other surgery is called van-nessrotation or rotationplasty which is a form of amputation, in which the patient's foot is turned upwards in a 180 degree turn and the upturned foot, is used as a knee.

Benign Bone Tumours

Most bone tumors are benign, and unlikely to spread. They can occur in any bone, but they usually are found in the biggest ones. These include the thighbone (femur), shinbone (tibia), upper arm bone (humerus) and pelvis. Some types are more common in specific places such as the spine or near the growth plates of the largest bones.

There are many specific types of tumors within the category of benign bone tumours. The most common ones are endochondromas, osteochondromas, nonossifying fibromas, chondroblastomas, osteoid osteomas, osteoblastomas, periosteal chondromas, giant cell tumours and chondromyxoid fibromas. Some conditions such as aneurysmal bone cyst, unicameral bone cyst and fibrous dysplasia are grouped with benign bone tumours. They often are treated in a similar way, although they aren't truly tumours.

Causes and Risk Factors of Benign Bone Tumors

These tumours are often strongly affected by the hormones that cause growth. Many benign tumours stop growing once a child's bones stop growing. This usually is between the ages 14 to 16 in girls and 16 to 19 in boys.

Symptoms of Benign Bone Tumors

A lump or swelling can be the first sign of a benign tumor. Another is ongoing or increasing aching or pain in the region of the tumor. Sometimes tumours are found only after a fracture occurs where the bone has been weakened by the growing tumor.
Benign bone tumors occur most often in children whose skeletons

Treatment Of Benign Bone Tumours

The type of tumour, its size, its location and how old the individual is all affect treatment decisions. Some tumours will heal after a fracture. Others may stop growing if the patient is near maturity when the tumour is discovered. Still other tumours are only discovered when an X-rayis taken for another reason. These may only to be watched to make sure they aren't growing or becoming aggressive.

Surgical Treatment
Benign Tumors

Certain benign tumours can spread or become cancerous (metastasize). Sometimes the doctor may recommend removing the tumour (excision) or some other treatment techniques to reduce the risk of fracture and disability. Some tumors may come back, even repeatedly, after appropriate treatment.

However, surgery is needed to remove diseased bones. Surgery removes the tumour and rebuilds new, healthy bone where the tumour was removed. invasive techniques are used to protect the surrounding healthy tissue. This gives young patients the greatest chance of returning to full and unlimited activities.

Metastatic sources of Bone Cancer

When people have cancer in the bones, often it is cancer that has spread there from elsewhere in the body. This is metastatic cancer. Even though it spreads to bone, it is not considered bone cancer because the tumour cells are from the primary cancer. For

example, a person with lung cancer that has spread to the bone is considered to have lung cancer with metastasis to the bone and not lung cancer and bone cancer.

Cancers that commonly spread to bone include:

1. Breast cancer
2. Prostate cancer
3. Lung cancer

Types of malignant bone tumors

1. *Osteosarcoma:* this is the most common type of cancer that originates in the bone. Although it most often occurs in those between ages 10 and 30, about 10% of cases develop in people in their 60s and 70s from secondary bone abnormalities. These tumors develop most often in the bones of the arms, legs, and pelvis and are more common among men than women.
2. *Chondrosarcoma:* this is a cancer of the cartilage cells, and is the second most common form of malignant bone tumor. It is uncommon in people younger than 20 and those older than 75. Although the cancer usually occurs in the bones of the arms, legs, and pelvis, the ribs and some other bones are occasionally affected. Although this cancer usually develops from normal cartilage, it may also form within prior benign tumors of cartilage and bone called osteochondromas.
3. *Ewing's Sarcoma:* this cancer most often arises in the middle portion of the long bones of the legs and arms but also may develop in the pelvis and other bones. Ewing's Sarcomas form in the cavity of the bone. This cancer usually appears in children and adolescents and is uncommon among adults older than 30.

   Fortunately, in over 90% of patients in whom a malignant tumour is discovered there is no visible evidence that the tumour has spread. Furthermore, in the past 15 years, dramatic improvements have been made in the treatment of malignant bone tumours. In the case of the most common malignant bone tumour, high grade

osteosarcoma, these improvements have resulted in a 5- to 10-fold increase in the likelihood of cure (now approaching 80%). In addition, the combination of improved techniques for surgical removal of these tumours and improved methods for functional reconstruction now allows 90-95% of patients with these aggressive tumours to be treated without the need for amputation.

Symptoms of a malignant bone tumor

Symptoms of a malignant bone tumour include:

1. Bone pain
2. Stiffness
3. Bone tenderness

Treatment Of Malignant Bone Disease

Malignant tumours may require the attention of several cancer specialists. Treatment depends on the stage of cancer. Cancer cells confined to the bone tumour and surrounding area are at a localized stage. Bone cancers that spread to other areas of the body are at a metastatic stage. These are more serious and a cure is more difficult. Cancers of the bone are most often removed with surgery. Treatment depends upon various factors, including the stage of the cancer (whether the cancer has spread):

1. ***Localized Stage*****:** cancer cells are contained to the tumour and surrounding area.
2. ***Metastatic Stage*****:** cancer has spread elsewhere in the body. Tumours at this stage are more serious and harder to cure.

These are common types of treatment for bone cancer and these may include:

1. Limb salvage surgerythat removes the part of the bone with cancer. Nearby muscles, tendons, and other tissues are not removed. A metallic implant (prosthesis) replaces the portion of bone that was removed. If possible, the surgeon will take out

the tumour and a margin of healthy tissue around it. The excised bone is replaced with a metallic implant (prosthesis) or bone transplant.

2. Amputation that removes all or part of an arm or leg when the tumour is large and/or nerves and blood vessels are involved. It may be needed if a tumour is large or extends to nerves and blood vessels. A prosthetic limb can aid function after amputation.

Recovery

When treatment for a bone tumour is finished, the doctor may take more x-rays and other imaging studies. These can confirm that the tumour is actually gone. Regular doctor visits and tests every few months may be needed. When the tumour disappears, it is important to monitor your body for signs that is may have returned (relapse).
Nursing care will be according to the procedure done. E.g. Amputation,

Radiation therapy

kills cancer cells and shrinks tumours with high-dose X-rays. It is often used in combination with surgery and may be used before or after surgery.

Systemic Treatment (Chemotherapy)

This treatment is often used to kill tumour cells when they have spread into the blood stream but cannot yet be detected on tests and scans. Chemotherapy is generally used when cancerous tumors have a very high chance of spreading.
Generally, malignant tumours are removed using surgery. Often, radiation therapy and chemotherapy are used in combination with surgery, before during and after surgery.

You now know the two types of bone tumours, their symptoms and management. In the next section we shall look at amputation of a limb.

7AMPUTATION OF A LIMB

What is Amputation?

Amputation of a limb is the surgical removal of an extremity. It is performed to relieve symptoms, improve function and quality of the patient's life. The main objective of surgery is to improve and conserve as much viable extremity as possible. Amputation of an extremity is frequently necessary as a result of:

1. Progressive peripheral vascular disease as occurs in sequel of diabetes mellitus
2. Trauma (i.e. leading to crushing injuries)
3. Severe burns of a limb
4. Congenital limb deformities
5. Malignant tumours of a limb
6. Fulminating gas gangrene
7. Chronic osteomyelitis

Levels of amputation

Amputation is performed at the most distal part that will heal successfully. The site of amputation is determined by two factors i.e. circulation in the part and functional usefulness.

Types of amputation

There are 5 types of amputations, namely:

1. Below knee amputation: usually preferred to below knee amputation because of the importance of the knee joint and the energy requirements for walking.
2. Above knee amputation
3. Below elbow amputation
4. Above elbow amputation
5. Modified ankle disarticulation (Synes amputation)

Classification of amputations

Amputations are classified as open or closed.

- ***Open Amputation or Quillone Amputation:*** this is the amputation whereby the surgeon does not close the stump with the skin flap immediately but it is left open allowing the wound to drain freely. The major indication for open amputation is infection and antibiotics are used. Once the infection is completely eradicated, the client undergoes another operation for stump closure.
- ***Closed or Flap Amputation:*** this is the amputation in which the stump is immediately closed by a flap of skin deliberately left for this purpose. It is commonly done in amputations without imminent or potential signs of contamination and possible infection.

Preoperative Nursing Care/Preparation

a. ***Psychological preparation***

Clients who are about to undergo amputation fear it because it destroys a familiar image, imposes physical and social limitation temporally upsets personal lifestyle. Knowing what to expect helps to reduce anxiety. Optimism and motivation can be fostered by helping the patient realize that amputation is the first step in the patient's rehabilitation and will make it possible to carry out activities of daily living and be functionally independent. With a traumatic amputation there is little opportunity to prepare the patient psychologically. A realistic, supportive approach that actively includes the patient in his care and rehabilitation activities helps the patient to accept his loss. Amputation forces anyone to make a major adjustment as it produces a permanent handicap that certainly thwarts (disarrange) some physiological, psychological and social needs. Physicians, nurses, prosthetists and physiotherapists share the task of helping the amputee make necessary changes in the pattern of living, with minimal interference in life activities. Let other amputees share their feelings with him. After the client has understood the purpose of surgery, he hasare to sign the informed consent.

b. ***Physical preparation***

Assessment

Before surgery the circulatory status of the extremity must be assessed by physical assessment for colour, temperature, pulse rate, responses to positioning and arteriography. If infection of gangrene exists, it should be cultured and efforts directed towards controlling it. Blood for full blood count should be taken to evaluate important parameters such as haemoglobin, cross matching, bleeding etc. Blood sample for glucose to rule out diabetes mellitus should be collected. If the patient has concomitant health problems such as dehydration, anaemia, cardiac insufficiency, diabetes mellitus, etc., these are treated so that the patient is in the best possible condition to withstand the trauma of surgery. The patient's nutritional status should be evaluated and a plan for nutrition care made when necessary.

Other immediate preoperative preparation

The patient is catheterized eight hours before surgery and made not to eat (starve) anything. Intravenous fluids are administered for hydration purposes and possible administration of medication. Premedications are also given and other routine immediate interventions are carried out.

Postoperative Care

The aims of postoperative care are to:

- Prevent post operative bleeding
- Reduce pain
- Prepare the patient for prosthesis use

Collection of the patient from theatre

Carry a postoperative tray when collecting the patient from theatre. The tray should contain a thermometer, sphygmomanometer, stethoscope, oral airway etc. ensure a

clear airway and that the tongue is not obstructing the airway. Put the patient in the recovery position. If spinal anaesthesia is used put the patient in supine position to prevent post spinal anaesthesia headache.

Environment

The patient may be brought in either conscious or unconscious depending on the anaesthesia used and how long he has stayed in the recovery room. If unconsciousl (left or right lateral) for easy draining of secretions. The bed should have a mackintosh and a draw sheet to protect the linen underneath from any drainage that may come from the stump. To prevent swelling or oedema that may cause tension on the suture line, the stump is placed on a pillow to provide elevation. A divided bed is idea for easy observation of the stump. The other bed accessory that may be of use is a sand bag to immobilise the stump. The room should be quiet so that the patient can have enough rest. A large tourniquet should be in plain sight of the patient's bedside in case haemorrhage is anticipated. A fracture board to prevent sagging of the bed should be availed and used.

Pain management

Immediate pain from surgical incision is managed with analgesics such as pethidine 50 – 100mg intramuscularly or morphine 10 – 15mg orally. Surgical pain is located at the incision and can readily be controlled. Amputees also experience phantom pain in which the patient describes pain in the part that has been amputated. These pains are real and need to be accepted by the patient and the nurse. This feeling will eventually disappear but if it lasts, can have a disquieting effect on the patient. Keep the patient active to decrease the occurrence of phantom limb pain. Phantom limb pain may occur 2 – 3 months after amputation and is seen more frequentlyin patients with above knee amputation.

Observations

Following any surgery, you should be concerned with reestablishment of homeostasis and preventing problems related to anaesthesia and immobility. Assessment of the respiratory function and encouragement of coughing and deep breathing are appropriate. Fluids and balanced nutrition need to be given. Monitor the elimination pattern. Observe the vital signs frequently. If the temperature is raising that may indicate the presence of infection. If the patient presents with low blood pressure, that may indicate hypovolaemic shock. Observe the stump for any bleeding and presents of pus. Assess the level of pain using the pain rating scale so as to establish how much analgesia to give.

Psychological care

The loss of an extremity comes as a shock even though the patient was prepared preoperatively. The patient's behaviour expressed will portray how he is coping with the loss and working through the grieving process. You should acknowledge the loss by listening and providing support. Many clients may cry easily, eat little, sleep poorly or more or avoid interaction with others. You should create an accepting and supportive atmosphere in which the patient and family are encouraged to express and share their feeling and work through the grieving process. Encourage support from the family and friends as this promotes acceptation from loss.

Management of the stump – Wound care

Amputation may be treated with a soft compression dressing or a rigid dressing. Let us study each in further detail.

a. Soft Compression Dressing Approach

The residual limb is wrapped with soft dressing immediately following surgery. The most threatening problem is massive haemorrhage due to loosened ligatures. According to the surgeon's preference, the residual limb may be placed in an extended position or elevated for a brief period following surgery. If it is to be elevated, the foot of the bed should be raised. The residual limb must not be placed on a pillow as a flexion

contracture of the hip may result. A contracture of the next joint is a frequent complication.

b. Rigid Compression Dressing Approach

Immediately following surgery, a rigid plaster is applied and is equipped to attach a prosthetic extension (Pylon) and an artificial foot. Following amputation a sterilized residual limb sock is applied to the residual limb. Felt pads are placed over pressure sensitive, starting from the distal end; the residual limb is wrapped with elastic plastic of Paris bandages while firm, even pressure is maintained. Care is taken not to constrict circulation. This rigid dressing technique is used as a means for creating a socket for immediate postoperative prosthetic fitting. It controls oedema, minimizes pain on movement and results in improved wound healing and maturation of the residual limb. As soon as the rigid dressing has dried, the prosthetic unit consisting of a prosthetic extension and foot can be applied.

*Rehabilitation of a patient with o**Orthopaedic** conditions*

The complete the rehabilitation of an amputee requires the concerted effort of the entire rehabilitation team. The orthopaedic surgeon, nurse, physiotherapist, prosthetists, and occupational therapist all unite their efforts to condition and train the patient to make a satisfactory adjustment to the prosthesis.

Complications of Amputation

The main complications of limb amputation include:*of a limb*

- Phantom pain
- Infection
- Gaping of the wound
- Haemorrhage
- Hip contracture
- Oedema

- Hypovolaemic shock

That topic on amputation brings us to the end of this unit on orthopaedic conditions. Let us now review what you have learnt.

Unit Summary

In this unit we have looked at the management of orthopaedic conditions. You started by learning the common terminologies use in orthopaedics and principles of orthopaedic nursing and treatment. Then we discussed the application and uses of orthopaedic devices such as Plaster of Paris and traction. Next we looked at your role as a nurse in orthopaedic procedures. Lastly we have had a long discussion on the management of patients with orthopaedic conditions. Here we looked at management of abnormalities of the bones and joints, traumatic conditions of the musculoskeletal system, infections of the bones and joints such as osteomyelitis, infected wounds, poliomyelitis, bone tumours and amputation of the limb

In the next unit we shall discuss oncology and oncology nursing.

Assignment

Read and make notes on the following;

1. Methods used in rehabilitation of a client with orthopaedic conditions
2. Your role as a nurse in the rehabilitation process
3. Community resources for the rehabilitation

Unit References

1. Burkitt H.G, Clive R.G.Q and Reed J.B; (2007). Essential Surgery: Problems and Diagnosis and Management, 4th edit, Churchill Livingstone Elsevier,Toronto.

2. Ignatavicius, D.D and Workman, M.L., (2006). Medical Surgical Nursing, 5th Edition, Elsevier Saunders, London.

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

4. Linton, A.D. and Maebius, N.K., (2003). Introduction to Medical-Surgical Nursing, 3rd Edition, Elsevier, USA.

5. Mosby Elsevier (2006). Mosby`s Dictionary of Medicine, Nursing and health Professions, 7th edit, Mosby Elsevier, St Louis.

UNIT 3:ONCOLOGY AND ONCOLOGY NURSING

3.1 UNIT Introduction

Unit three provides you an opportunity to study tumours and here are In the last unit you learnt about orthopaedic disorders. In this unit wdiscussed definition of tumours, their causes/origin, pathophysiology classification and characteristics and the management of patients with tumours. You will also learn about the various treatment modalities used in oncology, such as, chemotherapy, surgery and use of radiotherapy (radioisotopes).

Being a non-communicable chronic disease, cancer is a terminal disease but with prompt detection and treatment it can be cured and the patient rendered free of the disease. Therefore preventive measures, such as, health education and prompt detection by use of modern diagnostic methods are very important in reducing the effects and occurrence of cancer in the community.

3.2 Unit Objectives

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

1. Define common term used in oncology
2. State the aetiology of tumours
3. Outline the pathophysiology of tumours
4. List the classifications and characteristics of tumours
5. Explain the management of clients with tumours

3.3 Definition of terms

- *Oncology:* this is a branch of medicine dealing with the study of tumours.
- *Metastasis:* this is the dissemination of malignant cells from the primary tumour to distant sites, by direct spread of tumour cells to cavities or through lymphatic and haematogenous circulation.

- *Neoplasm* – this another term referring to cancer.

- **Hyperplasia:** this is an increase in the number of cells of a tissue. It is a common proliferation process during periods of rapid growth (e.g. foetal and adolescent growth) and during epithelial and bone marrow regeneration. This is a normal cellular response when a physiological demand exists and an abnormal response when growth exceeds the physiological demand. This usually leads to an increase in the size of a tissue or organ.
- **Metaplasia:** this occurs when one type of mature cells is converted to another type by means of an outside stimulus that affects the parent stem cell. Metaplastic changes may be reversible or may progress to dysplasia.
- **Dysplasia:** this is a bizarre cell growth resulting in cells that differ in size, shape or arrangement from other cells of the same type of tissue. It can occur from chemicals, radiation, or chronic inflammation or irritation. It can be reversible or can proceed to an irreversible neoplastic change.
- **Neoplasia:** this is uncontrolled cell growth that follows no physiological demand and can be benign or malignant (cancerous).
- **Anaplasia:** this is a ***lower***degree of differentiation of dysplastic cells (differentiation is the extent to which cells differ from their cells of origin and their maturity). Anaplastic cells lack normal cellular characteristics and are nearly always malignant.

a. *Pleomorphism:* this is the acquiring of the large irregular shapes of nuclei of cancer cells.

b. *Carcinogens:* these are substances that have been associated with the causation of cancer.

c. *Carcinogenesis:* This is the process of transformation of normal tissue into a cancerous tissue.

d. *Oncological Nursing*: This is nursing patterning to the care of patients suffering from the effects of tumours.

Now that we have looked at the definition of certain common terms lets go into details.

What is a tumour?

A *tumour* is also called a *neoplasm,* which is a mass of new tissue which develops from normal tissue of the body. A Tumour does not perform any useful function in the body. It may develop in any part of the body and consists of any type of tissue, e.g. muscle, fibrous, glandular tissues etc. It tends to increase in size or at least to persist throughout life, although it may disappear spontaneously, e.g. a papilloma of the skin (wart or papilloma of the larynx). If the tumour grows very fast, the tissue is liable to change in character so that it has no longer bears strict resemblance to the original tissue where it originated.

During life span various body tissues normally experience periods of rapid proliferation or growth that may be malignant (cancerous) or benign (non cancerous)

Activity 7

List in your notebook at least 3 factors that can predispose to cancer

Compare your answers with the information given in the following section.

3.4 Aetiology or Origin of Cancer

The obvious direct cause of cancer is not yet known, but that certain categories of agents (carcinogens) or factors have been implicated or associated in the carcinogenic process. These include the following:

1. Viruses

Viral causation in human cancers is very difficult to ascertain because the isolation of viruses is difficult. Viruses are thought to incorporate themselves in the genetic structure of cells. For example, the Herpes Stein Bar Virus (HBV) is highly suspect in causing Burkitt's lymphoma and nasopharyngeal cancers. Herpes Simplex Type 2 virus, Cytomegalovirus and papilloma viruses have been associated with dysplasia and malignancy of the cervix. Hepatitis B Virus has been associated with hepatocellular carcinoma, and HIV with Kaposi's sarcoma etc.

2. Physical Agents

Factors that are physical and associated with carcinogenesis include persistent exposure to sunlight or radiation of the sun and chronic irritation or inflammation. These agents are thought to interfere with the cellular mitotic stages over time.

3. Chemical Agents

Many chemical agents found in workplaces have proven to be carcinogenic or co – carcinogens in the cancer development process. The liver and kidneys are the organs most often affected chemical related cancers presumably because of their roles in the detoxification of chemicals.

4. Genetic and Familial Factors

Some adult and childhood cancers display familial predisposition. These tend to occur at an early age and at multiple sites in one organ or one pair of organs.

5. Dietary Factors

Dietary factors are thought to be related to 40 – 60% of all environmental cancers. Dietary substances can either be protective or carcinogenic. The risk of cancer increases over long term ingestion of carcinogenic or co-carcinogenic substances or the chronic absence of protective substances in the diet one ingests.

6. Hormonal Factors

Tumour growth may be promoted or encouraged by the disturbance in the hormonal balance by either the body's own hormone production (endogenous) or by administration of exogenous substances. Thus cancers of the breast, prostate and uterus are considered to be dependent on endogenous hormonal levels of growth. Administration of oral contraceptive diethylstilbestrol (DES) has been associated with hepatocellular carcinomas and vaginal carcinomas respectively.

Let us now look at how cancer develops.

3.5 The Pathophysiology of Cancer

The mechanism of change that causes cancer is not well understood. However, cancer begins when abnormal cells arise from normal body cells. As the disease progresses, these abnormal cells proliferate still within a local area. However, a stage is reached in which the cells acquire invasive characteristics and changes occur in the surrounding tissues or areas as well. Although the disease process can be described in general terms, cancer is not a single disease with a single cause; rather it is a group of distinct diseases with different causes, manifestations and prognoses.

3.6 Classifications and characteristics

To detrermine the type of tumor, dBenign and malignant types manifest different characteristics as shown in Table 3.

Table 3: Characteristics of benign and malignant tumours

#	CHARACTER	BENIGN	MALIGNANT
1	Cell characteristics	Cells resemble normal cells of the tissue from which the tumour originated	Cells often bare little or no resemblance to normal cells of the tissue from which they arose. There is both anaplasia and pleomorphism.

2	Mode of Growth	Tumour grows by expansion and does not infiltrate the surrounding tissues i.e. they are encapsulated	Tumour grows at the periphery and sends out processes that infiltrate and destroy the surrounding tissues.
3	Rate of Growth	Growth is usually slow	Grows usually relatively rapid and is dependent on the level of differentiation; the anaplastic the tumour the more rapid the rate growth.
4	Metastasis	Does not spread by metastasis	Gains access to the blood and lymph channels and metastasizes to other areas of the body.
5	Recurrence	Does not recur when removed.	Tends to recur when removed.
5	General Effects	Is usually a localized phenomenon that does not cause generalized effects unless by location it interferes with vital physiological functions.	Often causes generalized effects such as anaemia, weakness and weight loss (cachexia).
6	Tissue Destruction	Does not usually cause tissue destruction unless location interferes with blood circulation.	Often causes extensive tissue damage as the tumour out grows its own blood supply or it encroaches on blood flow to the area may also produce substances that cause cell damage (cytotoxic).

7	Ability to Cause Death	Does not usually cause death unless its location interferes with blood circulation.	Will always cause death unless its growth can be controlled early.

Cancer staging and grading

Cancer staging and grading plays an important role in the management of cancer.

Two main types of staging systems are used byhealth care team. The TNM system and *number systems*. Some cancers have their own staging systems, such as *Dukes' staging for bowel cancer*.

What is staging

Staging is a way of describing the size of a cancer and how far it has grown. When doctors first diagnose a cancer, they carry out tests to investigate the extent of the cancer locally and to see whether it has spread to another part of the body. This is different to the grade of cancer, which describes how similar a cancer cell is to a normal cell.

Why staging is important

Staging is important because it usually tells the specialist which treatments a patient needs. If a cancer is just in one place, then a local treatment such as surgery or radiotherapy could be enough to get rid of it completely. A local treatment treats only one area of the body.

If a cancer has spread, then local treatment alone will not be enough. A systemic treatment will be needed as well. Systemic means treating the whole body. Chemotherapy, hormone therapy and other drug treatments are systemic treatments because they circulate throughout the body in the bloodstream.

Sometimes doctors aren't sure if a cancer has spread to another part of the body or not. They look at the lymph nodes near to the cancer. If there are cancer cells in these nodes, it is a sign that the cancer has begun to spread. Cancer doctors call this having positive lymph nodes. The cells have broken away from the original cancer and got trapped in the lymph nodes. But we can't always tell if they have gone anywhere else. In this situation, doctors usually suggest adjuvant treatment. This means treatment alongside the treatment for the main primary tumour (for example, chemotherapy after surgery). The aim is to kill any cancer cells that may have broken away from the primary tumour.

a. *The 'TNM' staging system*

'TNM' stands for **T**umour, **N**ode, **M**etastasis. This system can describe the size of a primary tumour, whether the cancer has spread to the lymph nodes and whether the cancer has spread to a different part of the body (metastasised). The system uses numbers to describe the cancer.

- **'T'** refers to the size of the cancer and how far it has spread into nearby tissue. It can be 1, 2, 3 or 4, with 1 being small and 4 large
- **'N'** refers to whether the cancer has spread to the lymph nodes. It can be between 0 (no lymph nodes containing cancer cells) and 3 (lots of lymph nodes containing cancer cells)
- **'M'** refers to whether the cancer has spread to another part of the body. It can either be 0 (the cancer hasn't spread) or 1 (the cancer has spread)

Sometimes the letters a, b or c are used to further divide the categories. For example:

- stage M1a lung cancer (the cancer has spread to the other lung) and
- stage M1b lung cancer (the cancer has spread to other parts of the body).

As well as T1 - T4, you can get Tis. This means carcinoma *in situ*, which is a very small and very early stage of cancer. It is such an early stage that it is sometimes called pre-cancer.

P is sometimes used before the letters TNM. This stands for pathological stage. It means that the stage is based on examining cancer cells in the lab after surgery to remove a cancer.

C is sometimes used before the letters TNM. This stands for clinical stage. It means the stage is based on what the doctor knows about the cancer before surgery. The stage is based on clinical information from examining the patient and looking at his test results.

So for example, a small cancer that has spread to the lymph nodes but not anywhere else in the body may be T2N1M0. Or a more advanced cancer that has spread may be T4N3M1.

The Number system

These usually have a scale of 1 to 4. Less often, the scale is A to D. '1' typically means a small tumour that has not spread and there is no cancer in the lymph nodes. While '4' would mean that the cancer has spread to other major organs in the body.

Sometimes clinicians use the letters A,B or C to further divide the number categories: for example, stage 3B cervical cancer.

Overall Stage Grouping

This is also referred to as *Roman Numeral*Staging. This system uses numerals I, II, III, and IV (plus the 0) to describe the progression of cancer.

- **Stage 0**: *carcinoma in situ*.
- **Stage I**: cancers are localized to one part of the body. Stage I cancer can be surgically removed if small enough.

- **Stage II**: cancers are locally advanced. Stage II cancer can be treated by chemo, radiation, or surgery.
- **Stage III**: cancers are also locally advanced. Whether a cancer is designated as Stage II or Stage III can depend on the specific type of cancer; for example, in *Hodgkin's Disease*, Stage II indicates affected lymph nodes on only one side of the diaphragm, whereas Stage III indicates affected lymph nodes above and below the diaphragm. The specific criteria for Stages II and III therefore differ according to diagnosis. Stage III can be treated by chemo, radiation, or surgery.
- **Stage IV**: cancers have often metastasized, or spread to other organs or throughout the body. Stage IV cancer can be treated by chemotherapy, radiation, and surgery.

Manifestations and effects of cancer

These depend on the location and whether they are in the secondary stage e.g. haemorrhage ulceration etc. Most neoplasms are space occupying, they may compress blood vessels, neighbouring tissues or exert pressure on the regional nerves causing pain or even paralysis or produce malfunctioning by invasion and replacement of normal tissue.

Seven important early warning signs and symptoms of cancer

1. Unusual bleeding or discharge from anybody orifice
2. A lamp or thickening in the breast or elsewhere
3. A sore that does not heal
4. A persistent change in bowel or urinary bladder habits
5. A persistent cough or hoarse voice
6. Persistent indigestion or difficult in swallowing
7. A change in a wart or mole.

3.7 Management of apatient with cancer/tumours

A. Medical investigations

a. Patient's Health History

i. Get the patient's signs and symptoms as mentioned under early warning signs and symptoms

ii. Examine the patient's medical history for clues e.g. allergies, chemotherapy, ionizing radiation etc.

iii. Ask the patient about family history

iv. Review the patient's life style for behaviours that predispose him to cancer development

v. Obtain biographical information i.e. to inform you about his exposure to possible carcinogens.

b. Physical Assessment

i. Take vital signs noting the range of temperature as fever is common in cancer cases

ii. Inspect the face for signs of paralysis, anaemia, jaundice and ears for discharge

iii. Observe the breast symmetry; dimpling, flattening, oedema, ulceration etc. palpate the breasts for lumps

iv. Inspect the patient's chest for respiratory sounds; weak or absence of sounds suggests fluid, a mass or obstruction of the pleural space

v. Inspect the abdomen considering the shape, tone and symmetry by palpating to reveal abnormal masses and lymph nodes for any lymphadenopathy that may indicate spreading cancer (metastasis)

vi. Inspect the extremities to note any signs of immobility or fractures which indicate bone metastasis

vii. Inspect the genitalia for discharge and ulcers or lesions and inflammation

viii. Perform a neurologic assessment with the sitting upright as cancer patients commonly experience various neurological problems such as spinal cord compression and peripheral neuropathies.

c. Diagnostic tests

Useful tests for detecting cancerous lesions include:

- Tissue biopsyt is the single most important tool for diagnosing cancer
- X ray
- Lymphangiography
- Mammography
- Endoscopy
- Barium studies
- Isotopes
- Computed tomography
- Magnetic resonance imaging scan

Treatment modalities (general treatment of cancer)

There are three forms of cancer treatment available. In each patient treatment depends on a number of situations that include: the cancer type, its stage, location and localization, patient's responsiveness and his limitations. The three types of treatment of cancer are:

- of surgery,
- chemotherapy (drugs), and
- radiation.

These may be used independently or in combination depending on the extent and objective of treatment. Let us further look at each type of treatment.

1. Surgery

The surgical treatment of cancer involves removal of the tumour involved as much as possible the surrounding normal tissues. This form of treatment is mainly effective in

localized and small tumours. The ability of tumour cells to move from the original (mother) tumour presents restrictions. However, surgery is employed to meet a variety of goals as follows:

a. **Prevention**: it can be used to eliminate or eradicate cancer development especially in situations where the patient is in pre cancer stage (cancer in situ) at which time the cells involved are just beginning to undergo the change. The treatment is effective and can guarantee total cure for the patient.

b. **Cure and Control**: several principles are applicable when surgery is used to cure and control cancer. Thus they include:

   i. Only as much tissue as necessary is removed
   ii. Preventive measures are used to reduce the surgical seeding of cancer cells
   iii. The usual sites of regional spread may be surgically removed to evaluate the presence of microscopic disease or to minimize the risk of recurrence.

Chemotherapy

Chemotherapy involves the use of drugs systemically to treat cancer. These drugs are targeted at cancer cells as they are cytotoxic and they destroy them. The goal is to destroy as many tumour cells as possible with minimal effects on healthy cells. This form of cancer treatment can be used to cure and control cancer and for palliative purposes.

Classification of Chemotherapeutic Agents Against Cancer

There are two major categories of chemotherapeutic drugs that are commonly used:

a. **Cell Cycle Non Specifiers**: these drugs have their effect on the cells that are in the process of cellular replication and proliferation as well as on the cells that are in the resting phase.
b. **Cell Cycle Specifiers**: these drugs are effective only on one specific phase of cell cycle.

Principles of Chemotherapy

i. Combination chemotherapy is far more superior to single chemotherapy
ii. Complete remission is the minimum requisite for cure and even survival
iii. The first round chemotherapy offers the best chance for significant benefit
iv. Maximum dose of drugs is used to attain maximum tumour cell kill; ***"dose reduction tominimize toxicity has been called 'Killing patients with kindness.' "***
v. Induction chemotherapy is always recommended for some specific cancers
vi. Chemoprevention shows promise in the prevention of some second primary cancer.

Drugs Commonly Used in Chemotherapy

1. ***Alkalating Agents:*** e.g. Bulsufan (Myleran)
   - Dose: 4 – 8mg orally daily up to 12mg maximum dose
   - Action: **i**t crosses links of cellular DNA and interferes with RNA transcription leading to cell death.
   - Side Effects**:** unusual tiredness, weakness, anorexia, dry mouth, etc.

   ✓ Nursing Implications**:** monitor the patient's appetite and advise him to take a lot of fluids to avoid dehydration.

2. ***Antimetabolites:*** e.g. Pentostatin (2 Deoxicoformycin)
   - Dose: 4mg/m

- Route: Intravenously
- Action: it leads to cell damage and is useful in the treatment of leukaemia's.
- Side Effects: anxiety, confusion, headache, depression, arrhythmias

✓ Nursing Implications: use cautiously and only under supervision of a qualified medical doctor

3. ***Anti tumour Antibiotics:*** Mitomycin (Mutamycin)
   - Dose: 20mg/m
   - Route: Intravenously
   - Action: binds directly to the DNA hence interfering with ribonucleic transcription through inhibition of the synthesis of DNA
   - Side effects**: n**ausea, vomiting, fatigue, thrombocytopaenia
   - Nursing Implications:

   ✓ Do not give intramuscularly or subcutaneously

   ✓ Warn the patient to watch for signs of infection

   ✓ Stop infusing immediately if extravasation occurs

4. ***Hormonal Agents:*** *Corticosteroids – Dexamethasone*
   - Dose: 10mg
   - Route: intravenously
   - Action: **i**t inhibits mitosis, disrupts cell membranes and increases a sense of wellbeing
   - Side effects**:** mmenstrual irregularities, peptic ulceration, delayed wound healing etc.
   - Nursing Implications:

   ✓ Use cautiously in patients with gastrointestinal tract ulcers

   ✓ Know that the drug makes the elderly susceptible to osteoporosis

5. ***Vinca Alkaloids:*** Vincristine

- Dose: 1.4mg/m squared
- Route: Intravenously
- Action: **i**t arrests mitosis in metaphase, blocks cell division
- Side effects: peripheral neuropathy, headache, ataxia, visual disturbance, diarrhoea etc.

- Nursing Implications:

✓ Use cautiously in patients with hepatic dysfunction
✓ Monitor intake and output of fluid to avoid overload
✓ Drug should not be given more than once a week
✓ Take care to avoid infusion

Radiotherapy

Radiotherapy is the treatment by the use of high ionizing energy rays to treat a variety of cancers. These destroy the cell's ability to reproduce by damaging the cell's DNA as this is the major target. Rapidly dividing cells are more vulnerable than slow dividing cells.

Types of Radiotherapy

1. External radiation

In this type of radiotherapy radiation is given externally from a source placed at a distance from the target site. It is usually given by a high X-ray machine.
The advantage is that it has a skin sparing effect i.e. radiation occurs in the tumour and not the skin surface.

2. Internal Radiation

This type of radiotherapy involves placement of specifically prepared isotopes directly into the tumour itself. This is known as Brachy Therapy. There are two types of internal radiation and these include;

i. *Sealed Source:* This is a type of internal radiation where the radioactive material is enclosed in a sealed container. This is used in intracavity and intestinal therapy.

ii. *Unsealed Source:* This is a type of internal radiation where systemic therapy is used. Radioisotopes are administered intravenously

Goals of Radiation

a. *Cure:* Is a goal in which radiotherapy is used alone a curative modality for treating patients with basal cell carcinoma of the skin
b. *Control:* Radiation is used when controlling the disease process of cancer and is thus considered a reasonable goal in some situations. The treatment is usually given at the time of diagnosis and as additional treatment each time the symptoms occur.
c. *Palliation:* Radiation is used to control distressing symptoms that are occurring as a result of the disease process. It may be used to relieve pain associated with bone metastasis, spinal cord compression, bronchial or tracheal obstruction and bleeding.

Radiation Safety Precautions

1. *Distance:* The greater the distance from the radiation source the less exposure dose of ionizing rays
2. *Time:* There should be promotion of minimal exposure to radiation even though the patient's cure needs must be met
3. *Shielding:* The dose of X – rays and gamma rays is reduced as the thickness of the lead shield is increased.

Additional guidelines for caring for clients undergoing radiation therapy

1. Place the client in a private room to prevent undue exposure to other clients.
2. Do not spend more than 30 minutes with the client

3. Stand either at the patient's shoulder side or at the foot end to avoid close contact with unshielded areas.
4. Use a lead shield in case of exposure to the patient's unshielded parts.
5. Do not care for more than one client with radiation implant at a time.
6. When caring for the patient, all health personnel should wear protective devices.
7. Check all linen for the presence of implants which may pose danger to people found in the laundry.
8. Keep lead shield and lead handled forceps in close range when an implant is taking place.
9. The rooms should be clearly marked with signs to notify others of the presence of radiation.
10. Do not allow children less than 18 years or pregnant mothers to visit clients under radiotherapy.

General nursing care of a patient with malignant disease

Objectives

To treat and care for a patient with cancerefforts are directed towards:

1. Suppression of production of abnormal cells
2. Prevention of common infections and haemorrhage
3. Supporting the patient psychologically and physiologically

Environment

The patient should be nursed in a side ward isolated for fear of the patient acquiring infections –r***everse Isolation***. The room should be well ventilated to support breathing since there can be anaemia in this condition. It should be dust free since dust is a good medium of respiratory tract infections. If possible air entering the room can be filtered to filter microorganisms.

Nurses and other staff attending to the patient are expected to put on face masks and gowns in order to prevent transfer of organisms to the patient. People with infectious diseases are not allowed to come into contact with the patient. When the patient is under radiation therapy the room should be clearly labelled and identified for people to see.

Psychological care

All patients with malignant disease are often depressed, frightened and lonely and as such as caring nurses we should contribute to the comfort of the patient by explaining the importance of reverse isolation and procedures being done on him to alley anxiety. Explain the disease process and prognosis by being honest with the patient about the aspects of his condition to promote self sufficiency and self esteem. Also explain to the patient about the long term chemotherapy and the side effects like alopecia. Encourage the patient to select a wig prior to the time of hair loss and begin to wear it before the hair loss. In males encourage cutting of hair. Encourage him to express his feelings and thoughts about the illness e.g. when he complains the best response may be, *"Will you say how you feel perhaps something can be done about it?"* If the patient is indicated for surgery, create a good nurse – patient relationship, be open to them and verbalise their worries. Explain the hospital routines, procedures and theatre environment. Explain the type of operation to be done, the type of anaesthesia to be used, the expected outcomes and that the operation is life saving or improve their state rather than damage. Explain the postoperative expectations such as where he will be taken to after surgery such e.g. the recovery room or surgical ward and he should be told about the family being allowed to visit him. Spiritual care should be given to help the patient to have hope for improvement and also do provide the diversional therapy like magazines, song books etc. to keep their mind busy and away from fear and worries.

Nutrition

Nutritional problems that most frequently occur in cancer patients are malnutrition, anorexia and altered taste sensation. These problems can be caused by a combination

of many factors such as drug toxicity, effects of radiation therapy, tumour involvement, recent surgery, and emotional stress or difficult with ingestion or digestion of food or the client is inadequately nourished. Normal cells are depressed due to depletion of protein stores. Provide a balanced diet including the basic foods with increased calorie intake. Provide small amounts of appetizing food every few hours. The patient is greatly encouraged to eat but nagging must be avoided at meal times. Teach the patient what to eat rather than stressing the fact that more food should be eaten. Home prepared meals are often more appealing. If the patient is from surgery, for him to recover quickly after surgery, it is important that his nutritional status be improved i.e. foods rich in protein for tissue repair, underweight patients have to be put on a high calorie diet while obese patients have to be put on low calorie diet to reducetheir weight for it delays wound healing. It also gives more load on the heart. Give a lot of fluids especially to dehydrated patients to replace fluid and electrolytes and combat volume deficit. Patients on chemotherapy may easily be nauseated and vomit. It is therefore important if this becomes serious that the patient be given antiemetics.

Hygiene

Daily baths with antiseptic soaps to maintain the skin clean is needed if the patient is weak. Oral toilet should be encouraged to keep the mouth clean, fresh and prevent oral lesions as well as to promote appetite. Oral toilet is also necessary to prevent oral infections like stomatitis. Encourage the use of a soft tooth brush since hard tooth brushes may cause bleeding from the gums. Encourage nail care so as to avoid injuries due to scratching causing bleeding. Pressure area care should be done gently and frequently. If the patient is confined in bed, prevent decubitus ulcers. Change bed linen frequently to prevent infection and to promote the patient's comfort. Hair care should be done to promote a positive body image of the patient despite him having alopecia due to cytotoxic drugs. Prepare the patient psychologically to accept the status. If the patient is indicated for surgery immediately skin care be done i.e. shave the part to be operated on extensively or do it according to the surgeon's order and preference. Cleanse the site with soap and water and a disinfectant like Savlon 1:100 to reduce microorganisms.

Observations

Do vital signs for baseline data. These should include checking of the blood pressure, pulse rate, respiratory rate and temperature. These are done to rule out the patient developing heart and respiratory problems as well as to detect early sings of infections as patients with advanced cancer have a higher chance of frequent infections due to their lowered immunities. Weight should also be checked to assess the patient's nutritional status and progress. Thus daily weighing should be done or they should have a schedule such as weekly checking in place. This is so because the effect of the disease process has a disturbance on the patient's appetite as well as the chemothearpy. Weight loss is frequently associated with nausea caused by cytotoxic drugs. Observe the patient's perception and response to the disease and treatment.

Complications of cancer

Some of the common complications that cancer patients experience are secondary conditions and these include the following:

1. Anaemia
2. Frequent infection due to lowered immunity
3. Loss of weight over time due chronic nausea and vomiting
4. Metastasis
5. Chronic nausea and vomiting
6. Mental and emotional disturbances e.g. mood disorders like anxiety and depression
7. Pain
8. Lymphoedema
9. Malignant pleural effusion
10. Sexual dysfunction and vaginal dryness
11. Hypercalcaemia

3.8 Prevention of cancer and health promotion

At least one-third of all cancer cases are preventable. Prevention offers the most cost-effective long-term strategy for the control of cancer. The main preventive strategies include:

Early detection/screening

EARLY DETECTION OF CANCER

Cancer can be prevented if detected early. This can be achieved by having regular check ups. The beginning of change of normal cells to abnormal cells can bedetected and removed before they turn to cancerous tissue and before they spread to other tissues. Examples are that of the cervix.Cervical cancer if detected early can be prevented by encouraging women to have regular check ups (pap smears) and also if the woman experiences some symptoms such as irregular menses. If there are some abnormal cells in the cervix, pap smear becomes positive and those abnormal cells are destroyed using cryosurgery. Another example is that of the breasts. Women should be taught how to examine their breasts monthly and go medical check-ups yearly and if any abnormal lump is felt, they should seek medical attention so that the lump is removed or abnormal tissue destroyed. Early detection of cancer greatly increases the chances for successful treatment too.

Health promotion

Having good health habits prevents the occurrence of cancer. The body cells remain health and are able to fight infections. Examples of good health promotion include physical activity, dietary factors, obesity and being overweight

Dietary modification is another important approach to cancer control. There is a link between overweight and obesity to many types of cancer, such as, oesophagus, colorectum, breast, endometrium and kidney. Diets high in fruits and vegetables may have a protective effect against many cancers. Conversely, excess consumption of red and preserved meat may be associated with an increased risk of colorectal cancer. In

addition, healthy eating habits that prevent the development of diet-associated cancers will also lower the risk of cardiovascular disease.

Regular physical activity and the maintenance of a healthy body weight, along with a healthy diet, will considerably reduce cancer risk. National policies and programmes should be implemented to raise awareness and reduce exposure to cancer risk factors, and to ensure that people are provided with the information and support they need to adopt healthy lifestyles.

Also avoidance of Tobacco Smoking and Reducing Alcohol Use and Abuse can prevent cancer.

Tobacco use is the single greatest avoidable risk factor for cancer mortality worldwide, causing an estimated 22% of cancer deaths per year. In 2004, 1.6 million of the 7.4 million cancer deaths were due to tobacco use.

Tobacco smoking causes many types of cancer, including cancers of the lung, oesophagus, larynx (voice box), mouth, throat, kidney, bladder, pancreas, stomach and cervix. About 70% of the lung cancer burden can be attributed to smoking alone. Second-hand smoke (SHS), also known as environmental tobacco smoke, has been proven to cause lung cancer in non-smoking adults. Smokeless tobacco (also called oral tobacco, chewing tobacco or snuff) causes oral, oesophageal and pancreatic cancer.

Alcohol use is a risk factor for many cancer types including cancer of the oral cavity, pharynx, larynx, oesophagus, liver, colorectum and breast. Risk of cancer increases with the amount of alcohol consumed. The risk from heavy drinking for several cancer types (e.g. oral cavity, pharynx, larynx and oesophagus) substantially increases if the person is also a heavy smoker. Attributable fractions vary between men and women for certain types of alcohol-related cancer, mainly because of differences in average levels of consumption. For example, 22% of mouth and oropharynx cancers in men are

attributable to alcohol whereas in women the attributable burden drops to 9%. A similar sex difference exists for oesophageal and liver cancers (Rehm et al., 2004).

Health education

Health education plays a major role in the prevention of cancers. The health education include avoidance of predisposing factors, good health practices, early signs and symptoms of cancer. education to promote early diagnosis and screening,

Recognizing possible warning signs of cancer and taking prompt action leads to early diagnosis. Increased awareness of possible warning signs of cancer, among health care providers as well as among the general public, can have a great impact on the disease. Some early signs of cancer include lumps, sores that fail to heal, abnormal bleeding, persistent indigestion, and chronic hoarseness. Early diagnosis is particularly relevant for cancers of the breast, cervix, mouth, larynx, colon and rectum, and skin

That brings us to the end of this unit on oncology. We hope you have found it interesting and informative. Let us now review what you have learnt.

3.9 Unit Summary

In this unit you have learnt about key terms used in oncology, such as carcinogens and neoplasia. We have also discussed the origin of cancer and its pathophysiology. In addition we have looked its classification and characteristics and how to manage a patient with malignant and benign tumours. Lastly, we have considered the prevention of cancer and seen that screening, health promotion and health education play a very important role in prevention.

Congratulations! You have come to the end of this unit on oncology nursing. You can now take a well deserved break. But before you take a break, answer the following questions to review your understand of the content of this unit.

3.10 Self Test

1. ***What is a tumour?***
2. Differentiate between ben***ign and malignant tumours***
3. ***Write some nursing diagnoses in cases of tumo**urs***
4. ***What are the seven early warning signs of cancer?***
5. ***Which information*** would ***you want to give to the patient with cancer?***
6. ***How can cnocer be preneted in the community****?*

Answers to Self-Assessment Test

Q1.A tumour is also called a neoplasm, which is a mass of new tissue which develops from a normal tissue of the body. A Tumour does not perform any useful function for the benefit of the body as a whole. It may develop in any part of the body and consists of any type of tissue, e.g. muscle, fibrous, glandular tissues etc. It tends to increase in size or at least to persist throughout life, although it may disappear spontaneously,

Q2.Benign and malignant

Q3.Chemotherapy, Radiotherapy and Surgery

Q4.Tissue biopsy is the single most important tool for diagnosing cancer

i. X ray
ii. Lymphangiography
iii. Mammography
iv. Endoscopy
v. Barium studies
vi. Isotopes
vii. Computed tomography
viii. Magnetic resonance imaging scan

Q5.

*1. A*naemia
2. Frequent infection due to lowered immunity
3. Loss of weight over time due chronic nausea and vomiting
4. Metastasis
5. Chronic nausea and vomiting
6. Mental and emotional disturbances.
7. Hypercalcaemia
8. Pain
9. Lymphoedema
10.Malignant pleural effusion
11. Sexual dysfunction and vaginal dryness

3.11 Reference

American Cancer Society (2003). "Chapter 85.Neoplasms of the Eye". *Cancer Medicine.* Hamilton, Ontario: BC Decker Inc. ISBN 1-55009-213-8.

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

Burkitt H.G, Clive R.G.Q and Reed J.B. (2007). *Essential Surgery: Problems and Diagnosis and Management,* 4th edit, Churchill Livingstone Elsevier,Toronto.

Ignatavicius, D.D and Workman, M.L., (2006), *Medical Surgical Nursing, 5th Edition,* Elsevier Saunders, London.

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

Linton, A.D. and Maebius, N.K., (2003). *Introduction to Medical-Surgical Nursing*, 3rd Edition, Elsevier, USA.

Maberley, DA; Hollands, H, Chuo, J, Tam, G, Konkal, J, Roesch, M, Veselinovic, A, Witzigmann, M, Bassett, K (March

Mosby Elsevier (2006). *Mosby`s Dictionary of Medicine, Nursing and health Professions*, 7th edit, Mosby Elsevier, St Louis.

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

Stanhope and Lancaster (2004). *Community and Public Health Nursing*, 6th edition, Washington, USA

Wikipedia (2013). *Emergency Management*. Accessed from http://en.wikipedia.org/wiki/Emergency_management2147hrs. [6 August, 2013]

12. http://www.swiss-magen-darm.com/en/speiseroehre.html

13. http://www.emedicine.com/emerg/TOPIC897.HTM

14. http://www.medicinenet.com/achalasia/article.htm

15. http://www.nlm.nih.gov/medlineplus/ency/article/001153.htm#Causes,%20incidence,%20and%20risk%20factors

16. http://www.nlm.nih.gov/medlineplus/ency/article/003888.htm

17. http://www.emedicinehealth.com/barium_swallow/page5_em.htm

18. http://www.nlm.nih.gov/medlineplus/ency/article/002922.htm

19. http://www.nlm.nih.gov/medlineplus/ency/article/000213.htm

20. http://www.nlm.nih.gov/medlineplus/ency/article/000223.htm

21. http://www.medicinenet.com/hiatal_hernia/article.htm

22. http://www.patient.co.uk/showdoc/27000478/

23. http://www.nlm.nih.gov/medlineplus/ency/article/001335.htm

24. http://www.nlm.nih.gov/medlineplus/ency/article/000648.htm

25. http://www.nlm.nih.gov/medlineplus/ency/article/000651.htm

26. http://www.nlm.nih.gov/medlineplus/ency/article/000260.htm

27. http://www.nlm.nih.gov/medlineplus/ency/article/000960.htm

28. http://www.patient.co.uk/showdoc/27000478/

29. http://www.nlm.nih.gov/medlineplus/ency/article/000256.htm

30. http://www.nlm.nih.gov/medlineplus/ency/article/000970.htm

31. http://www.merck.com/mmhe/sec09/ch123/ch123c.html