Orthopedics Practice

By:

Prof. Dr. Mohamed Saleh Moustafa Hassan
Chairman Of OrthopedicSurgery Department,
Faculty of Medicine, Suez Canal University

Second Year

2018/2019

Acknowledgments

This two-year curriculum was developed through a participatory and collaborative approach between the Academic faculty staff affiliated to Egyptian Universities as Alexandria University, Ain Shams University, Cairo University , Mansoura University, Al-Azhar University, Tanta University, Beni Souef University , Port Said University, Suez Canal University and MTI University and the Ministry of Health and Population(General Directorate of Technical Health Education (THE). The design of this course draws on rich discussions through workshops. The outcome of the workshop was course specification with Indented learning outcomes and the course contents, which served as a guide to the initial design.

We would like to thank **Prof.Sabah Al- Sharkawi** the General Coordinator of General Directorate of Technical Health Education, **Dr. Azza Dosoky** the Head of Central Administration of HR Development, **Dr. Seada Farghly** the General Director of THE and all share persons working at General Administration of the THE for their time and critical feedback during the development of this course.

Special thanks to the **Minister of Health and Population Dr. Hala Zayed and Former Minister of Health Prof. Ahmed Emad Edin Rady** for their decision to recognize and professionalize health education by issuing a decree to develop and strengthen the technical health education curriculum for pre-service training within the technical health institutes.

توصيف مقرر دراسى

1- بيانات المقرر		
الرمز الكودى :	اسم المقرر : **Orthopedic techniques**	الفرقة /المستوى :
التخصص :	***Orthopedic surgery*** **Study hours per week 32** • **Theoretical part:** 12 **hours per week for 15 weeks (2nd semester)** • **Practical part:** 20 **hours per week for 15 weeks (2nd semester)**	

2- هدف المقرر:	**Overall Aims of the Course** The course will enable student to become competent in the knowledge and skills to provide orthopedic nursing services
3- المستهدف من تدريس المقرر :	
ا. المعلومات والمفاهيم :	**Intended Learning Outcomes of the Course (ILOs)** **a- Knowledge and Understanding** By the end of this course, the student should be able to: 1. Define human anatomy of the musculoskeletal system. 1. 2. Define the common musculoskeletal disorders. 2. 3. Define the common fractures and dilocation, manifestations, and management. 3. 4. Define nursing management to meet patient with common musculoskeletal disorders. 4. Define the types and techniques of casts and splints in orthopedics. 5. Define the types and techniques of traction in orthopedics. 6. Having the knowledge and ability to provide and practice perioperative and operative care for orthopedic patients.
ب- المهارات الذهنية :	By the end of this course, the students will be able to: 1-Collecting, analyzing and interpreting the patient's knowledge to assist orthopedic surgeon in solving. 2-Critical thinking in recognizing the factors impacting on the patient orthopedic problems. .3-Ability to prioritize patients' problems
ج- المهارات المهنية الخاصة بالمقرر:	By the end of this course, the students will be able to: 1- Examining the musculoskeletal system to define abnormal findings 2- Providing health education of the patient and family regarding mobilization and immobilization aids and cast care and how to watch for complications.

3- Mastering the use of orthopedic equipment. 4- Mastering the techniques of the application, removal, of cast and splint. 5- Mastering the techniques of the application of skin and skeletal traction.	
By the end of this course, the students will be able to communicate with orthopedic patient and his family.	د- المهارات العامة :
Introduction. Chapter (1): Anatomy of musculoskeletal system. Chapter (2): Common musculoskeletal disorders. Chapter (3): Common fractures and dislocations. Chapter (4): Care for patients with musculoskeletal disorders Chapter (5): Casts, splints and traction in orthopedics in orthopedics.	4- محتوى المقرر:

1- Problem solving session in group discussion. **2- Multi-disciplinary seminars.** **3- Patients approach-based lectures using power point presentations.** **4- Hospital Round including emergency orthopedic room, out patients clinic and inward** **5- Hands on workshops.** **6- Hand-outs to simplify the scientific material.** **7- External readings of specialized books.** **Training to answer model question exercises.**	5- أساليب التعليم والتعلم
	6- أساليب التعليم والتعلم للطلاب ذوى القدرات المحدودة
Formative and summative **Formative evaluation of knowledge, attitude and skills every week with feedback to each student.** **Summative evaluation at the end of the course including evaluation of knowledge and skills.**	7- تقويم الطلاب :
a. Class work: **1.** Quiz **2.** Midterm theoretical **3.** Assignments **4.** Clinical Participation **b.** Final exam: • Practical exam • Written theoretical	أ- الأساليب المستخدمة
a. Class work: **1.** Quiz (5th week) **2.** Midterm (7th week)	ب- التوقيت

b. Final exam Practical exam (13th week) written exam (15th week)	
Quiz : 5 mark Midterm: 10 marks Attendance 5 marks Clinical: 25 marks Clinical exam:15 marks Final written exam 90 marks. Total percentage 150 mark.	ج- توزيع الدرجات
8- قائمة الكتب الدراسية والمراجع	
	أ- مذكرات
	ب- كتب ملزمة
	ج- كتب مقترحة
	د- دوريات علمية أو نشرات ..... الخ

Contents

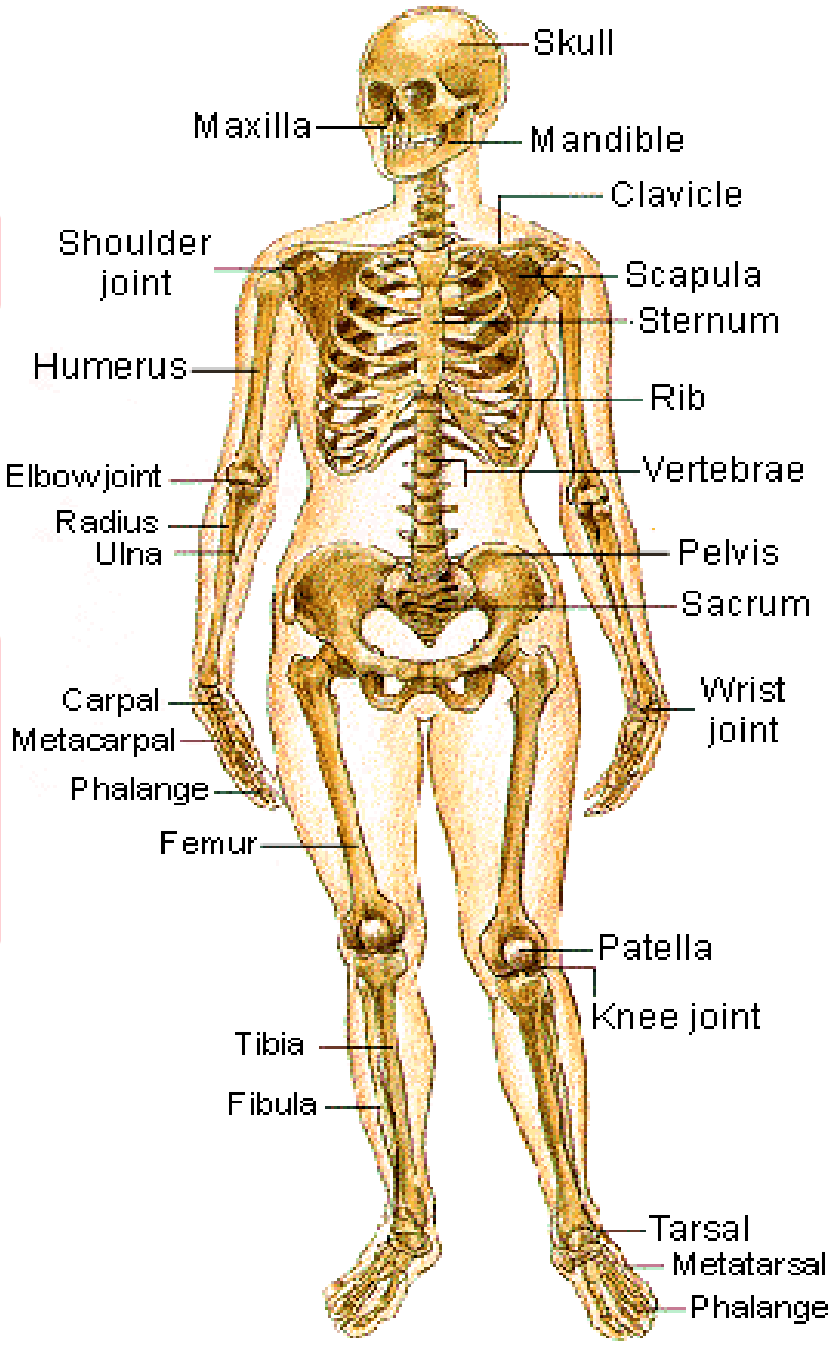
Practice	Theory	Week
Demonstration on anatomy of the upper limb	Anatomy of the upper limb	1st week
Demonstration on anatomy of the lower limb and pelvis	Anatomy of the lower limb and the pelvis	2nd week
Demonstration on anatomy of the spine	Anatomy of spine	3rd week
Clinical round on common orthopedic disorders	Common orthopedic disorders	4th week
Clinical round on common orthopedic disorders	Common orthopedic disorders	5th week
Clinical round on common orthopedic injuries	Common orthopedic injuries	6th week
Clinical round on common fractures	Common fractures	7th week
Clinical round on common fractures	Common fractures	8th week
Workshops on application and removal of Casts and splints	Casts and splints	9th week
Workshops on application of traction	Traction	10th week
Clinical round on Perioperative nursing services	Perioperative nursing services	11th week
Review	Review	12th week

Introduction

Orthopedic nurses must recognize and implement practices that promote patient safety and early recognition of changes in patient condition. Additionally, orthopedic nurses must lead teams with a purpose of preventing patient complications. This course provides students with a knowledge of orthopedic nursing care as it relates to the anatomy of the musculoskeletal system, the pathophysiology of musculoskeletal conditions, and the prevention, management, and rehabilitation of acute and chronic musculoskeletal conditions. The course provides valuable information for nurses managing the care of patients with orthopedic conditions in a variety of setting. it focuses also on the nursing assessment, preventive care, and management of patients who have common musculoskeletal conditions related to trauma, infection, inflammation, degeneration. After completing this course, the student will recognize and apply and integrate this knowledge into their practice and implement changes into the performance of nursing assessments and management.

Chapter 1:

Anatomy of Musculoskeletal system



1. Anatomy of the upper limb:

• Bones:

- Clavicle: is a sigmoid-shaped long bone with a convex surface along its medial end when observed from cephalad position. It serves as a connection between the axial and appendicular skeleton in conjunction with the scapula, and each of these structures forms the pectoral girdle. Though not as large as other supporting structures in the body, clavicular attachments allow for significant function and range of motion of the upper extremity as well as protection of neurovascular structures posteriorly:
- Scapula: Scapula, also called shoulder blade, either of two large bones of the shoulder girdle in vertebrates. In humans they are triangular and lie on the upper back between the levels of the second and eighth ribs. A scapula's posterior surface is crossed obliquely by a prominent ridge, the spine, which divides the bone into two concave areas, the supraspinous and infraspinous fossae. The spine and fossae give attachment to muscles that act in rotating the arm. The spine ends in the acromion, a process that articulates with the clavicle, or collarbone, in front and helps form the upper part of the shoulder socket. The lateral apex of the triangle is broadened and presents a shallow cavity, the glenoid cavity, which articulates with the head of the bone of the upper arm, the humerus, to form the shoulder joint. Overhanging the glenoid cavity is a beaklike projection, the coracoid process, which completes the shoulder socket. To the margins of the scapula are attached muscles that aid in moving or fixing the shoulder as demanded by movements of the upper limb.

- Humerus: is a bone that connects shoulder and elbow. The humerus is the largest bone in the upper limb and the only bone in the upper arm. Humerus movements participate in many days to day essential activities like throwing, lifting, writing and others which require movements of the shoulder joint. Proximally, humerus forms part of the shoulder joint whereas distally, the humerus articulates with the radius and ulna to form the elbow joint.The humerus bone acts as an attachment site for many important muscles and ligaments.
- Radius: The radius is a long bone in the forearm. It lies laterally and parallels to the ulna, It rotates to produce the motion supination and pronation of the forearm. The radius and the ulna to produce movement at the proximal and distal radio-ulnar joints.

- Ulna: Ulna is a long bone in the forearm. It lies medially and parallels to the radius, the other bone in the forearm.It acts as stabilizing the bone, with the radius pivoting to produce pronation and supination movement of the forearm.

- The bone participates in the formation of the elbow joint by articulating with the humerus. Distally, the ulna articulates with the radius, forming the distal radio-ulnar joint. It is the medial bone of the forearm and is homologous with the fibula of the lower limb. Along with other bone called radius connects elbow with radius. Ulna has upper and lower ends and a shaft.

- Carpal bones: he wrist is made up of eight carpal bones, which are arranged in two rows. The wrist or carpus is the region between metacarpals and distal ends of radius and ulna. The carpus or the wrist functions to facilitate effective positioning of the hand and thus allowing efficient use of the power of the extensors and flexors of the forearm. Carpal bones move together in different groups in different movements of the wrist. The combined movements increase the freedom of movements at the wrist. Proximal row from lateral to medial; Scaphoid, Lunate, Triquetral, and Pisiform bones. The Distal Row from lateral to medial; Trapezium, Trapezoid, Capitate, and Hamate.
- Metacarpals: The metacarpal bones form the skeleton of the palm, articulating proximally with the carpus, and distally with the digits. They are five in number, one for each digit, and lie side by side and slightly divergent from each other, being separated by intervals called interosseous spaces. Distinguished numerically from the lateral to the medial side.
- Phalanges: The digits of the upper limb, the fingers, are numbered from 1 to 5 beginning with the thumb. The phalanges refer to the miniature long bones within the fingers. Except for the thumb, each finger has three phalanges – the distal (the bone on the tip of the finger), middle and proximal (the bone at the base of the finger) phalanx. The thumb has no middle phalanx, giving a total of 14 phalanges in each hand.

• Joints:

- Sternoclavicular joint : is a synovial joint between the clavicle and the manubrium of the sternum. It is the only attachment of the upper limb to the axial skeleton. Despite its strength, it is a very mobile joint and can function more like a ball-and-socket type joint
- acromioclavicular : - The acromioclavicular joint is a plane type synovial joint. It is located where the lateral end of the clavicle articulates with the acromion of the scapula. The joint can be palpated during a shoulder

examination; 2-3cm medially from the 'tip' of the shoulder (formed by the end of the acromion)

- Glenohumoral joint (Shoulder) : The shoulder joint (glenohumeral joint) is a ball and socket joint between the scapula and the humerus. It is the major joint connecting the upper limb to the trunk. It is one of the most mobile joints in the human body, at the cost of joint stability. Radiohumeroulnar joint (Elbow): The elbow joint is a synovial joint found in the upper limb between the arm and the forearm. It is the point of articulation of three bones: the humerus of the arm and the radius and the ulna of the forearm.
- The elbow joint is classified structurally as a synovial joint. It is also classified structurally as a compound joint, as there are two articulations in the joint. Synovial joints, also called diarthroses, are free movable joints. The articular surfaces of the bones at these joints are separated from each other by a layer of hyaline cartilage. Smooth movement at these joints is provided by a highly viscous synovial fluid, which acts as a lubricant. A fibrous capsule encloses the joint, and is lined internally by a synovial membrane. Synovial joints can be further categorized based on function. The elbow joint is functionally a hinge joint, allowing movement in only one plane (uniaxial).
- Radioulnar joints (superior & inferior): This articulation is a trochoid or pivot- in between the circumference of the head of the radius ring formed by the radial notch of the ulna and the annular ligament.
- Radiocarpal joint (Wrist): is a complex joint that bridges the hand to the forearm. It is collection of multiple bones and joints. The bones comprising the wrist include the distal ends of the radius and ulna, 8 carpal bones, and the proximal portions of the 5 metacarpal bones.
- Carpometalcarpal joints: The carpometacarpal (CMC) joints are five joints in the wrist that articulate the distal row of carpal bones and the proximal bases of the five metacarpal bones. The CMC of the thumb differs significantly from the other four CMCs and is therefore described separately.
- Metacarpophalangeal joints: There are five Metacarpophalangeal joints in each hand, each of which is an ellipsoid joint. They joint is formed between the heads of metacarpal bones and proximal phalanges. All of the five metacarpophalangeal joints are strengthened by fibrous capsule.
- Interphalangeal joints.

- Nerves:

  - Axillary nerve : One of the terminal branches of the brachial plexus is the axillary nerve, which is derived from the posterior cord (C5-6). It travels through the quadrangular space together with the posterior circumflex artery and vein.

  - It is a mixed nerve, meaning that it has both motor and sensory fibers which innervate important muscles and parts of the skin within the axillary region. It also innervates glenohumeral joint, and due to their close spacial relation, the nerve is often injured whenever the joint is injured. The injuries of the axillary nerve lead to decreasing or complete loss of function within the structures that it innervates.
  - Radial nerve: The radial nerve is the nerve of the posterior arm. This is the case for both the upper arm (three heads of the triceps) as well as the forearm (wrist and finger extensors). The nerve originates from the posterior cord of the brachial plexus (from the ventral rami of C5-T1). The posterior cord runs posterior to the axillary artery, and goes from the anterior to posterior triangle via the triangular interval (bound by the teres major superiorly, the long head of triceps medially and the lateral head of the triceps laterally) and descends in the arm, by spiraling around the humerus. The profunda brachii (the deep branch of the brachial artery) supplies the upper arm muscles with blood, and also runs with the nerve through this triangular space and continues into the spiral groove.
  - Median nerve The median nerve is one of the five main nerves originating from the brachial plexus and provides motor and sensory innervation to parts of the forearm and hand. Its origin from ; lateral root: lateral cord of the brachial plexus (C5,C6,C7), medial root: medial cord of the brachial plexus (C8,T1). The course of the median nerve : laterally to the axillary artery, descends in the arm between biceps brachii and triceps brachii muscles, courses through the forearm with the ulna nerve and vessels before entering the carpal tunnel to the hand. The major branches: anterior interosseous nerve, palmar cutaneous branch, motor branch in the hand. motor supply: flexor compartment of the forearm, thenar and intrinsic hand muscles. Sensory supply: skin over thenar eminence, palmar aspect of the thumb, index, middle finger and radial half of the ring finger:
  - Ulnar nerve The ulnar nerve is one of the 5 terminal branches of the brachial plexus, arising from the medial cord. It supplies motor and sensory innervation to the upper extremity. The ulnar nerve originates from contributions of the ventral rami of C8 and T1 nerve roots. The nerve courses

along the medial arm and forearm, and then it passes into the wrist, hand, and fingers:

Vessels:

- Arteries: Subclavian, Axillary, Brachial, Radial & Ulnar
- Veins: Basalic & Cephalic veins + Vena comitantes.

2. Anatomy of the Lower limb:

- Bones:
  - Pelvis
  - The pelvis is a bony structure that can be found in both male and female skeletons. The exception to this compound structure, when compared to all other bones, is that it has differences that are classified by sex, both for functional and general developmental reasons. The rest of the human skeleton differs only in size, which is genetically determined and is usually slightly larger in males than in females.
  -
  - The structure of the pelvis is designed to give females the ability to undergo pregnancy and childbirth, while males are able to hold larger and heavier muscles upon their frame. Therefore it is heavier in men and has more muscle attachments, a narrower pubic arch, subpubic angle and space between the ischial tuberosities which in turn makes the pelvic outlet smaller. The ilia in women are comparatively more flared than in men which makes their greater pelvis more shallow. The shape of the pelvic inlet and the obturator foramen is oval in women and heart-shaped and round in men respectively. In general, the pelvis is broader in women so that there is ample space for the fetus to exit its mother's body.
  - Femur : or thigh bone, is the single bone of the thigh region . It is the longest and strongest bone of the body, and accounts for approximately one-quarter of a person's total height. The rounded, proximal end is the head of the femur, which articulates with the acetabulum of the hip bone to form the hip joint. The fovea capitis is a minor indentation on the medial side of the femoral head that serves as the site of attachment for the ligament of the head of the femur. This

ligament spans the femur and acetabulum, but is weak and provides little support for the hip joint. It does, however, carry an important artery that supplies the head of the femur.

- Tibia : The tibia, or the shin bone, is a long bone articulating superiorly with the inferior articulating surfaces of the femur, and with the talus inferiorly. The tibia extends down along the medial surface of the talus and forms the medial malleolus. It is the second largest bone in the body after the femur and its size results from the heavy weight distribution that is required of it.
- Fibula : The fibula is one of two long bones in the lower leg. A long bone is defined as one whose body is longer than it is wide, with growth plates (epiphysis) at either end, having a hard outer surface of compact bone and a spongy inner surface known as cencellous bone containing bone marrow. Both ends of the bone are covered in hyaline cartilage to help protect the bone and aid in shock absorption. The fibula is much more slender than the tibia and is not directly involved in weight transmission. It has a proximal head, a narrow neck, a long shaft and a distal lateral malleolus.
- Patella: The patella or kneecap is the sesamoid that lies within the quadriceps tendon/patellar ligament and forms part of the knee joint and is situated in front of the lower end of femur appx 1 cm above the knee joint. If it lies higher, it is called patella alta and if it is lower, it is called patella baja. It is the largest sesamoid bone of the body. The ossification centers of the kneecap appear between 3 and 6 years. They fuse at puberty, with higher levels of activity.
- Tarsal : the proximal tarsal bones are the talus and the calcaneus. These comprise the hindfoot, forming the bony framework around the proximal ankle and heel. The talus is the most superior of the tarsal bones. It transmits the weight of the entire body to the foot
- Metatarsals: Metatarsals are part of the bones of the mid-foot and are tubular in shape. They are named by numbers and start from the medial side outward. The medial side is the same side as the big toe.
- Phalanges : The phalanges are long bones in the foot located distal to the metatarsals. Like in the hand, each toe consists of three phalanges, which are named the proximal, middle and distal phalanges. However, the hallux (great toe) only has two phalanges, a proximal

and a distal one. Occasionally, there are only two phalanges in the little toe. The phalanges consist of a proximal base, a shaft and a distal head

- Joints:
  - Hip joint :
  - The hip joint is a ball-and-socket synovial joint: the ball is the femoral head, and the socket is the acetabulum. The hip joint is the articulation of the pelvis with the femur, which connects the axial skeleton with the lower extremity. The adult os coxae, or hip bone, is formed by the fusion of the ilium, the ischium, and the pubis, which occurs by the end of the teenage years. The 2 hip bones form the bony pelvis, along with the sacrum and the coccyx, and are united anteriorly by the pubic symphysis.
  - Knee joint : The knee is the largest joint in the body, and one of the most easily injured. It is made up of four main things: bones, cartilage, ligaments, and tendons.
  -
  - Bones. Three bones meet to form knee joint: thighbone (femur), shinbone (tibia), and kneecap (patella).
  - Articular cartilage. The ends of the femur and tibia, and the back of the patella are covered with articular cartilage. This slippery substance helps knee bones glide smoothly across each.
  - Meniscus. Two wedge-shaped pieces of meniscal cartilage act as "shock absorbers" between femur and tibia. Different from articular cartilage, the meniscus is tough and rubbery to help cushion and stabilize the joint. Ligaments. Bones are connected to other bones by ligaments. The four main ligaments in your knee act like strong ropes to hold the bones together and keep knee stable.
  - Collateral Ligaments. These are found on the sides of knee. The medial collateral ligament is on the inside of knee, and the lateral collateral ligament is on the outside. They control the sideways motion of knee and brace it against unusual movement.
  - Cruciate ligaments. These are found inside knee joint. They cross each other to form an "X" with the anterior cruciate ligament in front and

the posterior cruciate ligament in back. The cruciate ligaments control the back and forth motion of the knee.

- Tendons. Muscles are connected to bones by tendons. The quadriceps tendon connects the muscles in the front of the thigh to your patella. Stretching from patella to tibia is the patellar tendon.
- Ankle joint : The ankle joint is a hinged synovial joint with primarily up-and-down movement (plantarflexion and dorsiflexion). However, when the range of motion of the ankle and subtalar joints (talocalcaneal and talocalcaneonavicular) is taken together, the complex functions as a universal joint

• Nerves:

- Femoral nerve : he femoral nerve is the largest branch of the lumbar plexus and provides motor innervation to the anterior thigh (quadriceps). It arises from the posterior cords of the lumbar plexus (L2-L4), contrasting with the obturator nerve, which arises from the anterior cords (L2-L4) and supplies the medial compartment of the thigh (Adductor Magnus, longus and brevis muscles). The femoral nerve emerges lateral to psoas major, and descends to pass beneath the inguinal ligament at approximately its mid-point. It passes through the femoral canal lateral to the femoral artery and vein.
- Once it passes beneath the inguinal ligament, it divides into a deep and superficial branch. The deep branch supplies the quadriceps. The superficial branch divides into the medial cutaneous and anterior cutaneous nerve of the thigh. The nerve terminates as the sensory saphenous nerve, in the gaiter region of the leg.
- Obturator nerve: The obturator nerve begins at the medial border of the psoas major muscle. It travels through the obturator foramen (an opening in the pelvic bone) before entering the thigh, where it branches into two parts, an anterior branch and posterior branch. The obturator nerve is part of the group of nerves called the anterior lumbar plexus.
- Sciatic nerve: The sciatic nerve is the largest and longest single nerve in the human body, about as big around as a man's thumb at its largest point. The nerve originates in the lower spine as nerve roots exit the

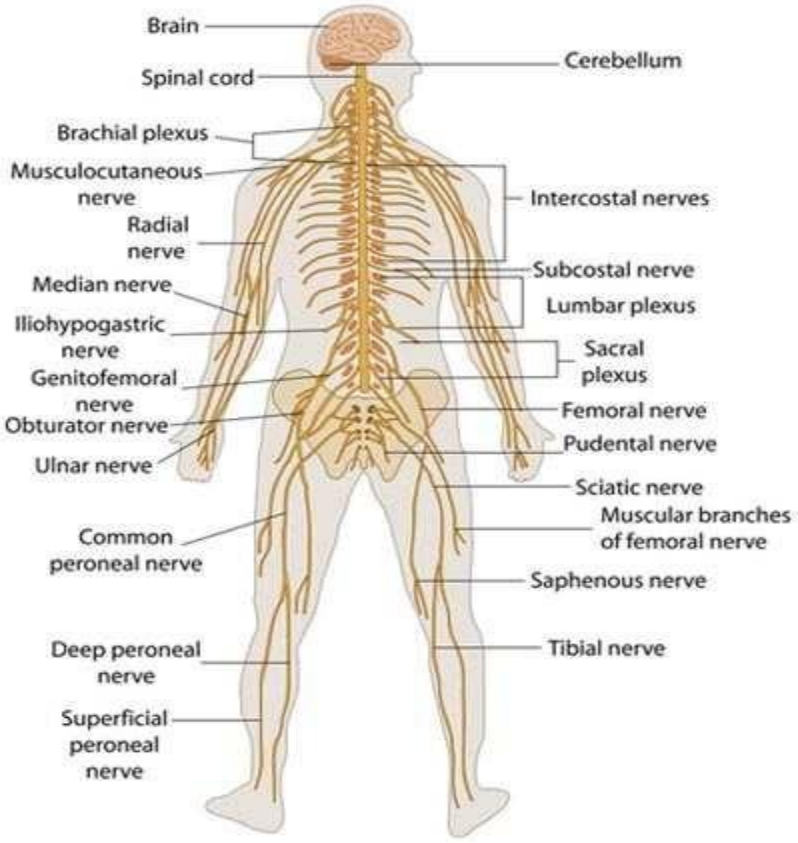
spinal cord (through gaps in the bones at the back of the spine), and extends all the way down the back of the leg to the toes. The sciatic nerve supplies sensation and strength to the leg as well as the reflexes of the leg. It connects the spinal cord with the outside of the thigh, the hamstring muscles in the back of the thighs, and muscles in the lower leg and feet. As such, when the sciatic nerve is impaired, it can lead to muscle weakness and/or numbness or tingling in the leg, ankle, foot, and/or toes

- Tibial nerve: The tibial nerve is a branch of the sciatic nerve, and arises at the apex of the popliteal fossa. It travels through the popliteal fossa, giving off branches to muscles in the superficial posterior compartment of the leg. Here, the tibial nerve also gives rise to branches that contribute towards the sural nerve, which innervates the posterolateral aspect of the leg.
- The tibial nerve continues its course down the leg, posterior to the tibia. During its descent, it supplies the deep muscles of the posterior leg. At the foot, the nerve passes posteriorly and inferiorly to the medial malleolus, through a structure known as the tarsal tunnel. This tunnel is covered superiorly by the flexor retinaculum. Within this tunnel, branches arise from the tibial nerve to supply cutaneous innervation to the heel. Immediately distal to the tarsal tunnel, the tibial nerve terminates by dividing into sensory branches, which innervate the sole of the foot.
- Common fibular nerve: The common peroneal nerve is the smaller and terminal branch of the sciatic nerve which is composed of the posterior divisions of L4, 5, S1, 2.It courses along the upper lateral side of the popliteal fossa, deep to biceps femoris and its tendon until it gets to the posterior part of the head of the fibula. It passes forwards around the neck of the fibula within the substance of fibularis (peroneus) longus, where it terminates by dividing into the superficial and deep fibular (peroneal) nerves. The nerve can be palpated behind the head of the fibula and as it winds around the neck of the fibula. The common fibular (peroneal) nerve gives articular branches to the knee and superior tibiofibular joint. The lateral cutaneous nerve of the calf supplies the posterolateral side of the proximal two-thirds of the leg. It usually arises in common with the fibular (peroneal) communicating branch which joins the sural nerve in the middle third of the leg.

- Superficial fibular nerve: The superficial peroneal nerve or superior fibular nerve, innervates the peroneus longus and peroneus brevis muscles and the skin over the antero-lateral aspect of the leg along with the greater part of the dorsum of the foot (with the exception of the first web space, which is innervated by the deep peroneal nerve)
- Deep fibular nerve: The deep peroneal nerve, more commonly known as the deep fibular nerve supplies a number of muscles in the leg and foot, which are essential for normal gait and movement of the ankle.

Vessels:

- Arteries: External iliac, Femoral, popliteal, dorsalis pedis & posterior tibial
- Veins: Deep veins, Superficial veins



3. Anatomy of the back:

• Bones: the vertebral column consists of 33 vertebrae which are divided into:

- Cervical:
- The cervical spine is made up of 7 vertebrae. The first 2, C1 and C2, are highly specialized and are given unique names: atlas and axis, respectively. C3-C7 is more classic vertebrae, having a body, pedicles, laminae, spinous processes, and facet joints.
-
- C1 and C2 form a unique set of articulations that provide a great degree of mobility for the skull. C1 serves as a ring or washer that the skull rests upon and articulates in a pivot joint with the dens or odontoid process of C2. Approximately 50% of flexion extension of the neck happens between the occiput and C1; 50% of the rotation of the neck happens between C1 and C2.
-
- The cervical spine is much more mobile than the thoracic or lumbar regions of the spine. Unlike the other parts of the spine, the cervical spine has transverse foramina in each vertebra for the vertebral arteries that supply blood to the brain.
- Thoracic: The thoracic spine is made up of the middle 12 vertebrae. These vertebrae connect to your ribs and form part of the back wall of the thorax (the ribcage area between the neck and the diaphragm). The thoracic spine's curve is kyphotic, a "C"-shaped curve with the opening of the "C" in the front. This part of the spine has very narrow, thin intervertebral discs. Rib connections and smaller discs in the thoracic spine limit the amount of spinal movement in the mid back compared to the lumbar or cervical parts of the spine. There is also less space inside the spinal canal.
- Lumber: The Lumbar spine consists of the vertebral body, posterior elements, intervertebral disks, and ligaments. The lumbar spine is made up of the five lumbar vertebrae located between the thoracic spine and the sacrum. This area is commonly called the “lower back”. The lumbar vertebrae are the largest of the vertebrae because of their weight-bearing function supporting the torso and head. The function of the structures of the lumbar spine is to protect and support the spinal cord and spinal nerves. The spinal nerves pass through a large

hole (foramen) in the center of each vertebrae, which when lined up is called the spinal canal. The lumbar spinal nerves branch off the spinal cord at each level between the vertebrae. The joints—a joint is where two or more bones meet—between the vertebrae contain a disk (intervertebral disk) that acts as a shock absorber.

-
- The vertebrae of the back are "linked" together by pedicles (lamina, transverse process, and spinous process) to form facet joints.
- Sacral: The sacrum is a part of the spine that lies between the fifth segment of the lumbar spine (L5) and the coccyx. Sacrum consists of five fused vertebrae S1-S5 and is triangular in shape. It is part of the pelvic girdle and forms the posterior wall of the pelvis and articulate with iliac bones at the sacroiliac joints. The sacrum is formed by the fusion of five sacral vertebrae has three surfaces, a base, and an apex. The body of the first segment is large and is similar to the lumbar vertebra whereas the bodies of the next bones get progressively smaller, are flattened from the back, and curved to shape.
-
- The sacrum articulates with four other bones – iliac bones on either side, L5 above and coccyx below. It is tilted forward and curved with anterior concavity and posterior convexity allowing greater room for the pelvic cavity. The curvature of sacrum varies in individuals

- Coccyx: The coccyx, also known as the tailbone, is a small, triangular bone resembling a shortened tail located at the bottom of the spine. It is composed of three to five coccygeal vertebrae or spinal bones. The vertebrae may be fused together to form a single bone; however, in some cases, the first vertebra is separate from the others.

Questions Chapter 1

1- Define anatomy and function of the radius and ulna.
2- Define the anatomy of the shoulder joint
3- What is the type the hip joint; mention the bony component of the hip joint?
4- Define the anatomy of the sciatic nerve?

Chapter 2

Common musculoskeletal disorders

The most common musculoskeletal disorder that affect the human body's movement and the musculoskeletal system:

1- Carpal Tunnel Syndrome: a medical condition due to compression of the median nerve as it travels through the wrist at the carpal tunnel. The main symptoms are pain, numbness and tingling in the thumb, index finger, middle finger and the lateral side of the ring fingers. Patients with diabetes, hypertension, hyperthyroidism and pregnant women are at risk of developing carpal tunnel syndrome.

Causes and Contributing Factors in Carpal Tunnel Syndrome

Aberrant anatomy,Anomalous flexor tendons,Congenitally small carpal canal, Ganglionic cysts, Lipoma,Proximal lumbrical muscle insertion, Thrombosed artery, Infections, Lyme disease, Mycobacterial infection, Septic arthritis, Inflammatory conditions, Connective tissue disease, Gout or pseudogout, Nonspecific flexor tenosynovitis, Rheumatoid arthritis ,Metabolic conditions, Acromegaly, Amyloidosis, Diabetes, Hypothyroidism or hyperthyroidism, Increased canal volume, Congestive heart failure, Edema, Obesity and Pregnancy.

Diagnosis:

The principal clinical tests for carpal tunnel syndrome are Phalen's maneuver and Tinel's sign. Phalen's maneuver is positive when flexing the wrist to 90 degrees for one minute elicits symptoms in the median nerve distribution. Tinel's sign is positive when tapping over the carpal tunnel elicits symptoms in the distribution of the median nerve. Sensory findings in carpal tunnel syndrome also may be elicited by two-point discrimination, vibration, and monofilament testing.

nerve conduction studies is considered the diagnostic standard for carpal tunnel syndrome.

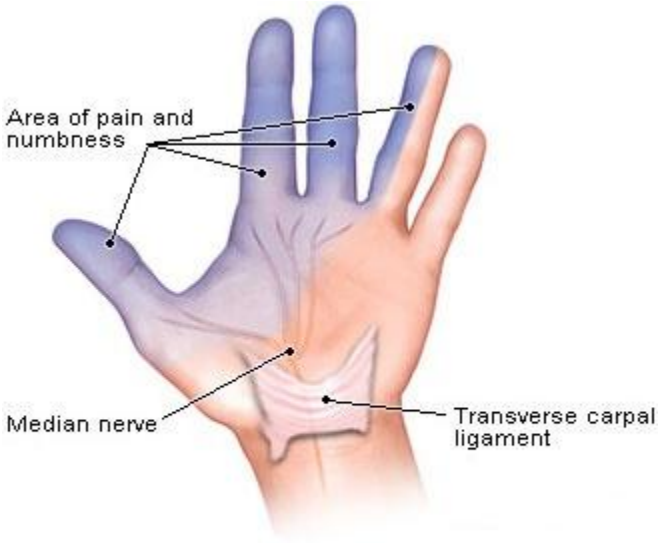
Treatment

Splinting the wrist at a neutral angle helps to decrease repetitive flexion and rotation, thereby relieving mild soft tissue swelling or tenosynovitis. Splinting is probably most effective when it is applied within three months of the onset of symptoms.

Diuretics, non steroidal anti-inflammatory drugs (NSAIDs), pyridoxine (vitamin B6), and orally administered corticosteroids have been used with varying degrees of success in patients with carpal tunnel syndrome.

Combined injection of a corticosteroid and a local anesthetic into or proximal to the carpal tunnel can be used in patients with mild to moderate carpal tunnel syndrome.

Carpal tunnel release surgery should be considered in patients with symptoms that do not respond to conservative measures and in patients with severe nerve entrapment as evidenced by nerve conduction studies, thenar atrophy, or motor weakness



Carpal Tunnel Syndrome

2- Radial Tunnel Syndrome: a set of symptoms that include fatigue or a dull, aching pain at the top of the forearm with use. Although less common, symptoms can also occur at the back of the hand or wrist. The symptoms are caused by pressure on the **radial** nerve, usually at the elbow.

2- Rotator Cuff tendonitis: The rotator cuff is a group of four tendons that covers the humeral head and controls arm rotation and elevation. These muscles and their tendons work together with the deltoid muscle to provide motion and strength to the shoulder for

all waist-level and shoulder-level or above activities. Rotator Cuff tendonitis affects the tendons and muscles that move the shoulder joint. It means that the tendons are inflamed or irritated. It occurs most often in people who repeatedly perform overhead motions. The risk of rotator cuff tendonitis also increases with age.

The classic symptoms include a 'toothache' like pain radiating from the outer arm to several inches below the top of the shoulder. Pain may also occur in the front and top of the shoulder. It may interfere with sleeping comfortably. It may even awaken people from a sound sleep with a nagging pain in the upper arm.

The symptoms are usually aggravated by raising the arms overhead or in activities that require reaching behind the body, such as retrieving an object from the back seat of a car. Furthermore, reaching behind the back to fasten underclothing or to pass a belt may aggravate the arm and shoulder pain.

Diagnosis: A thorough history and physical exam will nearly always lead to a correct diagnosis. X-rays will often show changes on the arm bone where the rotator cuff muscles attach, but an MRI provides the definitive diagnosis. This test clearly shows the muscles and indicates if the muscle is inflamed, injured or torn.

Treatment : Medical; The following steps should be taken as a conservative approach to treating rotator cuff tendonitis:

-Stop or markedly decrease the activity that required the use of the shoulder at or above shoulder level.

-Apply ice to the affected area.

-Take anti-inflammatory medication to reduce arm and shoulder pain.

-Begin an exercise program to maintain flexibility.

-Avoid carrying heavy objects with the affected arm or using shoulder-strap bags on the affected side.

-In the early phases, over-the-counter anti-inflammatory medications may provide benefit. However, to allow the inflammation to resolve, it is vital to curtail any repetitive activity and it is equally important to try to keep the elbow below the shoulder level when using the arm.

-Daily stretching while in a hot shower is also beneficial. If shoulder pain becomes more severe, prescription strength medication or a cortisone type injection may help.

-Cortisone injections can be very effective in the treatment of the pain. When used, injections should be done in conjunction with a home exercise program for flexibility and strengthening, modification of activities and ice. Other pain controlling options include heat, ice, ultrasound and therapeutic massage.

-For a young patient under the age of 30 and with a first-time episode of rotator cuff tendonitis that is treated immediately with the above protocol, the average length of time for rehabilitation is two to four weeks. For those with recurrent episodes of tendonitis and some risk factors, rotator cuff tendonitis may take months to heal and in rare cases may require surgery.

-Surgical: If symptoms persist, surgery to remove a spur on the acromion can increase the space available for the inflamed tendon and may prevent further fraying or complete rupture. If an MRI shows a complete muscle injury, surgical repair may be required.

Surgery for recurrent rotator cuff tendonitis (bursitis) is occasionally performed to:

-Remove a prominence or spur on the undersurface of the acromion.
-Remove chronically inflamed, thickened and fibrotic bursal tissue.
-Inspect the tendons and tidy up and sometimes repair a tear in the tendons.
-These procedures are often done in combination. This can be done either through an -open or an arthroscopic approach with the start of an early rehabilitation program one or two days after surgery and advancing to a more comprehensive program between two and five weeks after surgery. The initiation and progression of these exercises is dependent upon the patient's findings at surgery, surgical procedure and rate of healing.

4- Epicondylitis of the elbow: is a condition associated with repetitive forearm and elbow activities. Both lateral epicondylitis (tennis elbow) and medial epicondylitis (golfer's elbow) are characterized by elbow pain during or following elbow flexion and extension.

5- Trigger Finger: is a painful condition that causes the fingers or thumb to lock in flexion. It can affect any finger, or more than one. When it affects the thumb, it's called trigger thumb. It is caused by inflammation of a tendon sheath. Predisposing factors are a repeated movement or forceful use of fingers or thumb. Diabetes, rheumatoid and gout predispose trigger fingers and thumbs.

6- DeQuervain's disease: is inflammation of two tendons that control movement of the thumb and their tendon sheath. This results in pain at the outside of the wrist. It is caused by overuse. It also is associated with pregnancy and rheumatoid disease. It is most common in middle-aged women.

8- Rheumatoid arthritis (RA.): is a chronic inflammatory disease of the joints causes pain, swelling and stiffness in joints is an autoimmune disorder of unknown etiology characterized by symmetric, erosive synovitis and, in some cases, extraarticular involvement . Most patients experience a chronic fluctuating course of disease that, despite therapy, may result in progressive joint destruction, deformity, disability, and even premature death. Disability from RA causes major economic loss and can have a profound impact on families. Baseline laboratory evaluations should include a complete blood cell count (with white blood cell differential and platelet counts), rheumatoid factor (RF) measurement, and measurement of ESR or CRP. Evaluation of renal and hepatic function is necessary, since many antirheumatic agents cause renal or hepatic toxicity and may be contraindicated if these organs are impaired. Since the hands and feet are so frequently involved in RA, radiographs of these joints as well as other affected joints establish a baseline for future assessment of structural damage. Arresting and preventing structural damage is a primary goal of therapy, and radiographic studies of major involved joints may be needed periodically.

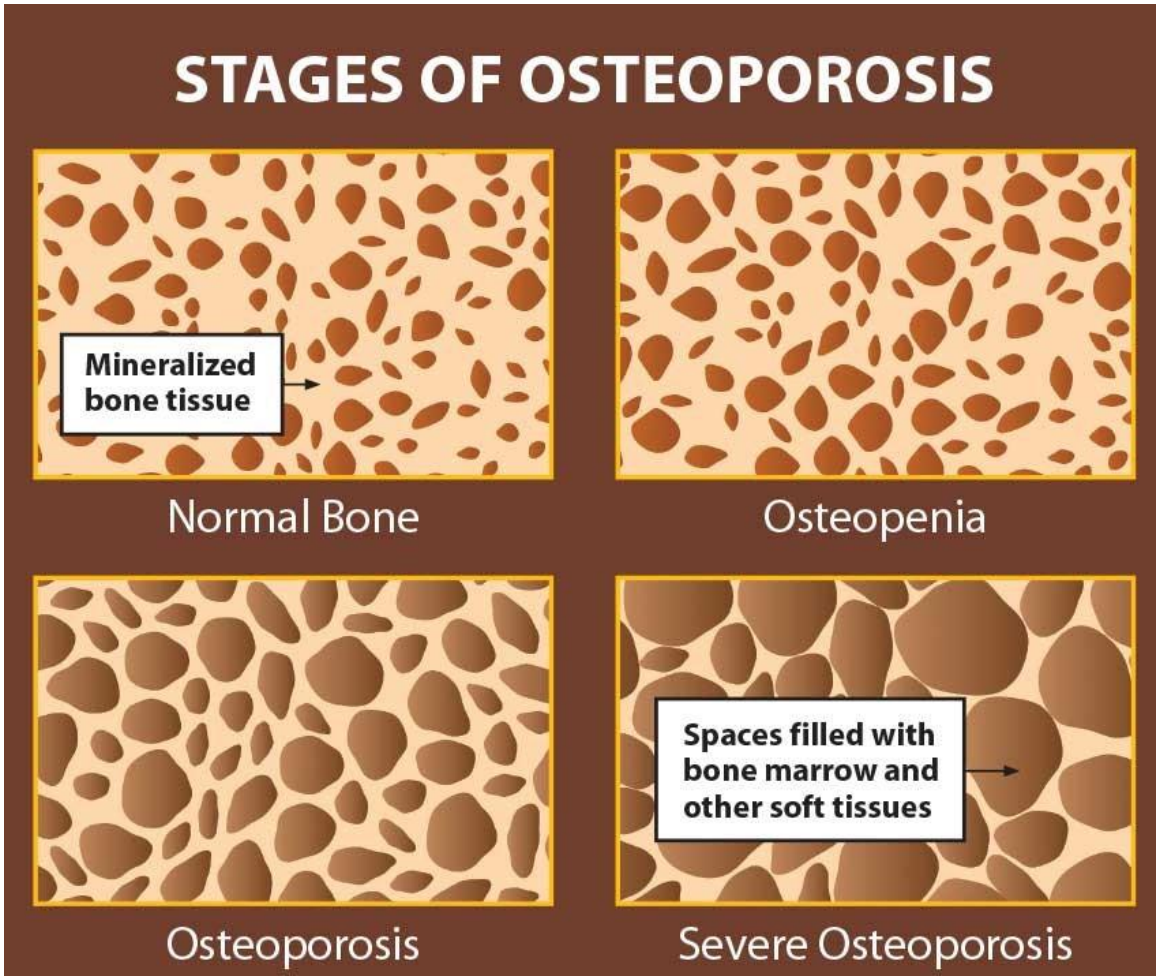
The ultimate goals in managing RA are to prevent or control joint damage, prevent loss of function, and decrease pain. Treatment begins with educating the patient about the

disease and the risks of joint damage and loss of function, as well as reviewing the risks and benefits of existing treatment modalities. Nonsteroidal antiinflammatory drugs (NSAIDs), glucocorticoid joint injection, and/or low- dose prednisone may be considered for control of symptoms. Most patients with newly diagnosed RA should be started on disease- modifying antirheumatic drug (DMARD) therapy within 3 months of diagnosis. In patients who have unacceptable levels of pain, loss of range of motion, or limitation of function because of structural joint damage, surgical procedures should be considered. Surgical procedures for RA include carpal tunnel release, synovectomy, resection of the metatarsal heads, total joint arthroplasty, and joint fusion. New prosthetic materials and cements for fixing joint prostheses have greatly advanced the prevention of aseptic loosening and have increased the longevity of total joint prostheses in patients with RA

8-Osteoporosis: is a disorder of bone metabolism in which there is a reduction of total bone mass, making bones abnormally prone to fracture. It affects one fourth of all older adults, and the greatest incidence occurs among white females between the ages of 50 and 70 years. Predisposing Factors include postmenopausal status, long-term corticosteroid use, prolonged immobilization Osteoporosis is diagnosed clinically or radiographically. Osteoporosis may present with low-impact fractures (occurring from a fall at or below standing height) or fragility fractures (occurring spontaneously).7 Osteoporosis is most commonly diagnosed with a T-score of −2.5 or below as determined by central DEXA scan of the total hip, femoral neck, or lumbar spine and nutritional deficiency.

Recommendations for treatment of postmenopausal women and men with a personal history of hip or vertebral fracture, T-score of −2.5 or below, or low bone mass (T-score between −1 and −2.5).

Treatment include: fall prevention, a daily intake of at least 1,200 mg of calcium is recommended for all women with osteoporosis, For patients with documented vitamin D deficiency, oral ergocalciferol is recommended. Oral bisphosphonates inhibit osteoclastic activity and are potent antiresorptive agents. raloxifene, calcitonin, teriparatide may be used in treatment of osteoporosis.



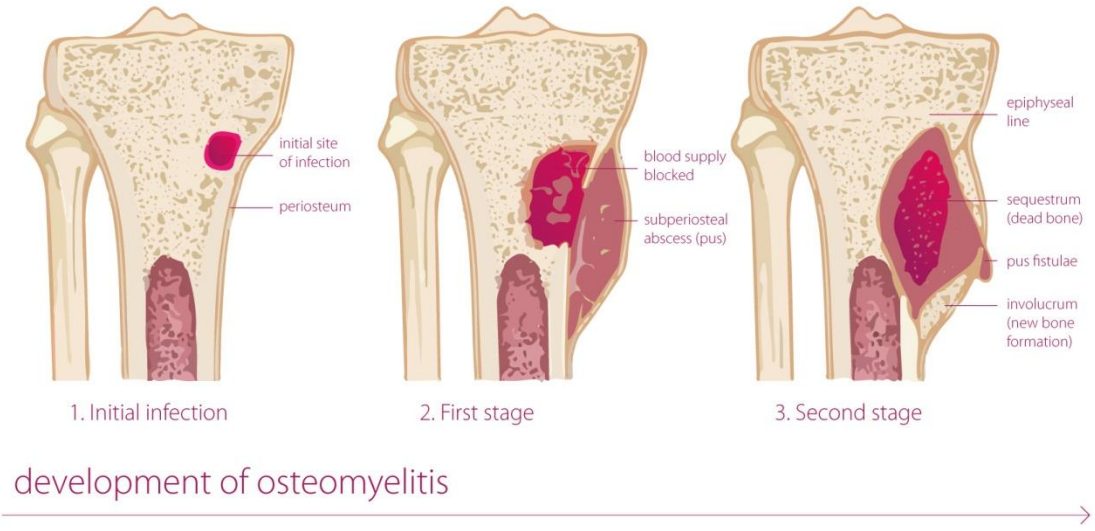
9- Back pain: classified into; mechanical Back Syndrome: is a common medical problem, means the source of the pain may be in the spinal joints, discs, vertebrae, or soft tissues. Acute mechanical back pain may also be called acute low backpain, lumbago, idiopathic low back pain, lumbosacral strain or sprain, or lumbar syndrome, degenerative disc disease is when normal changes that take place in the disks. spinal disks are like shock absorbers between the vertebrae, or bones, of the spine, ruptured / herniated disc, A true *herniated disc* (also called a *ruptured* or *slipped disc*) occurs when the *disc* annulus cracks or *ruptures*, allowing the gel-filled center to squeeze out. Sometimes the *herniation* is so severe that a free fragment occurs, meaning a piece has broken completely free from the *disc* and is in the spinal canal. Patients with low back pain is placed into 1 of 3 broad categories: nonspecific low back pain, back pain potentially associated with radiculopathy or spinal stenosis, or back pain potentially associated with another specific spinal cause. The history should include assessment of psychosocial risk factors, which predict risk for chronic disabling back pain (strong recommendation, moderate-quality evidence). Routine imaging or other diagnostic tests in patients with nonspecific low back pain Patients should not be done but it should perform diagnostic imaging and testing for patients with low back pain when severe or progressive neurologic deficits are

present or when serious underlying conditions are suspected based on history and physical examination. Evaluation of patients with persistent low back pain and signs or symptoms of radiculopathy or spinal stenosis with magnetic resonance imaging or computed tomography only if they are potential candidates for surgery or epidural steroid injection (for suspected radiculopathy. For most patients, first-line medication options are acetaminophen or nonsteroidal anti-inflammatory drugs, skeletal muscle relaxants, Tricyclic antidepressants, Gabapentin. Surgical treatment is indicated in persistent disabling pain lasting more than 6 weeks that have failed nonoperative options (and epidural injections), progressive and significant weakness and cauda equina syndrome.

9- Osteomyelitis: Osteomyelitis is a sever bone infection. The most common pathogens in osteomyelitis depend on the patient's age. Staphylococcus aureus is the most common cause of acute and chronic hematogenous osteomyelitis in adults and children. Group a streptococcus, Streptococcus pneumoniae, and Kingella kingae are the next most common pathogens in children. Group B streptococcal infection occurs primarily in newborns. In adults, S. aureus is the most common pathogen in bone and prosthetic joint infections. Increasingly, methicillin-resistant S. aureus (MRSA) is isolated from patients with osteomyelitis. In more chronic cases that may be caused by contiguous infection, Staphylococcus epidermidis, Pseudomonas aeruginosa, Serratia marcescens, and Escherichia coli may be isolated. Fungal and mycobacterial infections have been reported in patients with osteomyelitis, but these are uncommon and are generally found in patients with impaired immune function. Acute hematogenous osteomyelitis results from bacteremic seeding of bone. Children are most often affected because the metaphyseal (growing) regions of the long bones are highly vascular and susceptible to even minor trauma. More than one-half of cases of acute hematogenous osteomyelitis in children occur in patients younger than five years. Children typically present within two weeks of disease onset with systemic symptoms, including fever and irritability, as well as local erythema, swelling, and tenderness over the involved bone. Chronic osteomyelitis in children is uncommon. Chronic osteomyelitis is generally secondary to open fractures, bacteremia, or contiguous soft issue infection. Hematogenous osteomyelitis is much less common in adults than in children. It typically involves the vertebrae, but can occur in the long bones, pelvis, or clavicle. Patients with vertebral osteomyelitis often have underlying medical conditions (e.g., diabetes mellitus, cancer, chronic renal disease) or a history of intravenous drug use. Back pain is the primary presenting symptom. Chronic osteomyelitis from contiguous soft tissue infection is becoming more common because of the increasing prevalence of diabetic foot infections and peripheral vascular disease. Up to one-half of patients with diabetes develop peripheral neuropathy, which may reduce their awareness of wounds and increase the risk of unrecognized infections. Peripheral vascular disease, which is also common in patients with diabetes, reduces the body's healing response and contributes to

chronically open wounds and subsequent soft tissue infection. These conditions may act synergistically to significantly increase the risk of osteomyelitis in these patients. Clinical symptoms of osteomyelitis can be nonspecific and difficult to recognize. They include chronic pain, persistent sinus tract or wound drainage, poor wound healing, malaise, and sometimes fever, localized bone pain, tenderness, heat, and edema in the affected area. Increase in WBCs increase in ESR, positive blood culture, radiograph and bone scan. The physical examination should focus on identifying common findings, such as erythema, soft tissue swelling or joint effusion, decreased joint range of motion, and bony tenderness.

Treatment of osteomyelitis depends on appropriate antibiotic therapy and often requires surgical removal of infected and necrotic tissue. Choice of antibiotic therapy should be determined by culture and susceptibility results, if possible, In the absence of such information, broad-spectrum, empiric antibiotics should be administered. False-negative blood or biopsy cultures are common in patients who have begun antibiotic therapy. If clinically possible, delaying antibiotics is recommended until microbial culture and sensitivity results are available. Indications for surgery include antibiotic failure, infected surgical hardware, and chronic osteomyelitis with necrotic bone and soft tissue.



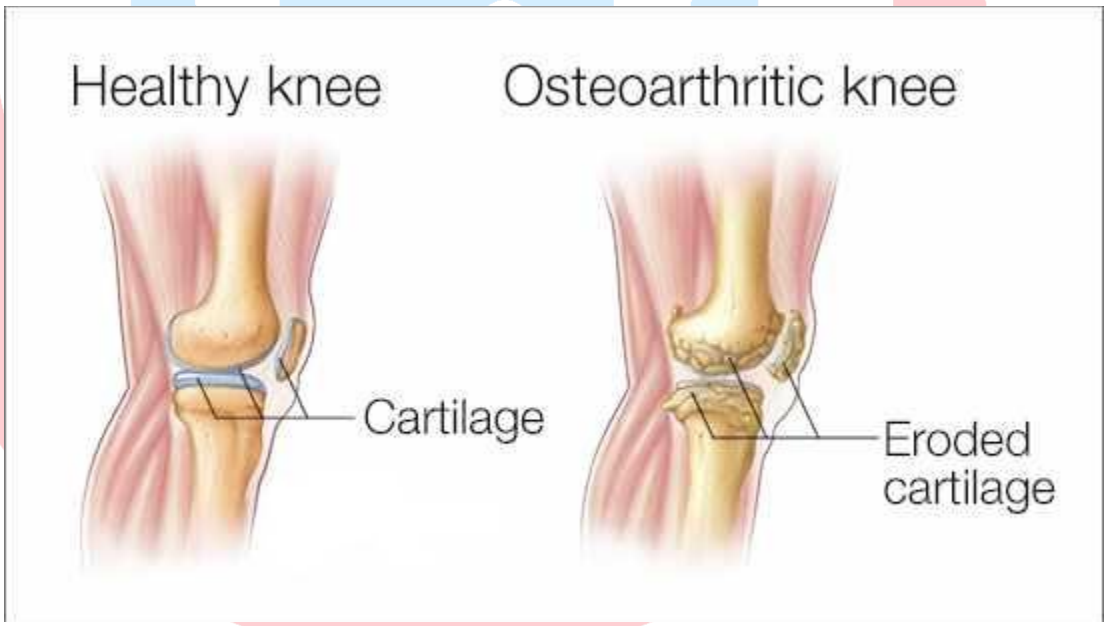
10- Osteoarthritis: Osteoarthritis is a slowly progressive, degenerative joint disease characterized by variable changes in weight- bearing joints. It affects both sexes, with onset usually after age 4o. Predisposing Factors include; obesity, aging, trauma, congenital abnormalities. It may have genetic predisposition. It may a result of mechanical and biologic events that destabilize the normal process of degradation and synthesis of articular cartilage chondrocytes, extracellular matrix, and subchondral bone. It involves the entire joint, including

the articular cartilage, subchondral bone, pericapsular muscles, capsule, and synovium. The condition leads to loss of cartilage, sclerosis and eburnation of the subchondral bone, osteophytes, and subchondral cysts. Diagnosis of osteoarthritis is often able to be diagnosed by its characteristic symptoms pain and muscle spasms (after exercises, at night, in the early morning), limited motion in affected joints. Flexion contractures, primarily in the hip and knee and joint tenderness are also noticed pain, decreased movement and/or deformity. Osteoarthritis maybe confirmed with an x-ray or MRI scan. Common findings include narrowing of the joint space between bones, a loss of cartilage and bone spurs or bone growths. Blood tests may be used to exclude other possible conditions, but they cannot diagnose osteoarthritis.

Treatment: There is no cure for osteoarthritis but the progression of the disease can be slowed and pain and disability reduced. Treatment will depend on the nature and severity of the condition and treatment will be tailored to the individual. Treatment options include: Healthy body weight, maintaining a healthy body weight will reduce stress on the arthritic joints, exercise can assist with weight loss, the maintenance of muscle strength and the mobility of arthritic joints. Activity at a level that does not cause pain is not thought to worsen osteoarthritis. Non weight-bearing exercises such as swimming or aqua jogging in a heated pool may be beneficial, as may gentle forms of exercise or stretching such as yoga. Physiotherapist can advise on appropriate exercises to improve mobility, increase muscle strength and decrease pain with the aim of improving function and maintaining independence. Heat or ultrasound treatment may also be used to relieve pain and relax muscles. Occupational therapy, If activities of daily living become difficult, occupational therapists can provide advice on suitable home adaptations and special devices. These may include handrails, tap or bottle turners, large pegs, tongs or other gadgets. Equipment to assist mobility may include a walking stick or walking frame .Medications can play an important role in the management of pain caused by osteoarthritis. There are different classes of medications that have proven useful. These include simple pain relievers (eg: paracetamol), non-steroidal anti-inflammatory drugs (NSAID's) and corticosteroids (eg: prednisone). A class of NSAID called COX-2 inhibitors eg: celecoxib (Celebrex) has proven effective in the management of osteoarthritis pain. However, some medications in this class have been linked to an increased risk of heart attacks and stroke. For advice on suitable pain relief medications please consult a medical practitioner who can prescribe and monitor appropriate medication. Nutritional supplements such as glucosamine and chondroitin sulphate have been reported to relieve the pain. Diet; The role of diet in the management of osteoarthritis is largely unproven. There are claims that some specific diets (eg: elimination diets) can help to relieve the symptoms of osteoarthritis but research has yet to back up these claims. It is recommended that a healthy balanced diet is followed as this can assist with overall wellbeing and with maintaining a healthy body weight. Some dietary supplements, such as certain fish oils and Evening Primrose Oil, are thought to have mild anti-inflammatory properties and have been reported to

relieve symptoms in some people. Synovial fluid supplements, when medications, exercise or physiotherapy do not provide adequate relief of symptoms, a synovial fluid supplement may be injected into the joint. Synovial fluid is a clear, sticky, viscous solution that lubricates, protects and supports joints. In osteoarthritis this fluid does not function effectively. Synovial fluid supplements can reduce joint cartilage damage and delay the need for joint replacement surgery.

Surgery: When osteoarthritis has caused extensive joint damage and produces severe pain, joint replacement surgery may be necessary. The most common procedures are hip joint replacement and knee joint replacement. However, partial or complete replacement of the shoulder, elbow, wrist, finger, ankle and toe joints are also possible in some cases. The surgery is performed by an orthopaedic surgeon and can greatly reduce the symptoms of osteoarthritis in the affected joint. This allows greater mobility and an improved quality of life. In osteoarthritis of the knee, if one side of a knee joint has more damage than the other, a bone realignment (knee osteotomy) might be helpful. In this procedure, a surgeon cuts across the bone either above (thigh bone) or below (shin bone) the knee, and either removes or adds a wedge of bone. A knee osteotomy shifts a person's body weight off the damaged part of the knee.



Questions Chapter 2

1- What is carpal tunnel syndrome,, what are the principles of diagnosis and treatment of carpal tunnel syndrome?
2- What is Osteoporosis? Methods of diagnosis and treatment?
3- What is Osteoarthritis? Symptoms and management ?
4- What are the causes, symptoms of osteomylitis? Methods of diagnosis and treatment?
5- What are the defination, symptoms of rheumatoid arthritis? Methods of diagnosis and treatment?

Chapter 3
Common fractures and dislocations

Definition of fractures

A fracture is a partial or complete interruption in the continuity of bone most common causes are trauma and diseases (e.g., osteoporosis) that result in weakened bone structure. The latter results in pathologic fractures, which are fractures of unhealthy bone due to trivial trauma.

Weakening of bone structure may result from osteoporosis, bone tumors, metastasis, Paget disease.

Open fractures occur when fracture hematoma connected with the exterior and the bone is exposed due to severe soft tissue injury and associated with a significant risk of infection and poor wound healing. Fracture management can be conservative (e.g., cast or splint) or surgical, and generally involves anatomic reduction, fixation, and/or immobilization. Complications include acute nerve and vascular injury and compartment syndrome, as well as long-term complications such as avascular necrosis and nonunion.

Fracture classification is based on the following
Anatomy
Location: affected bone (proximal, distal)
Position: diaphysis, metaphysis, epiphysis
Extent
Complete
Incomplete
Orientation: transverse, oblique, spiral
Displacement: non displaced, displaced, and angulated
Fragmentation
Comminuted fracture
Segmental fracture
Soft tissue involvement
Closed fracture (simple fracture)
Open fracture
Growth plate involvement (pediatric fractures): Salter-Harris

Types of bone fracture

Different types of fracture include:

Closed (simple) fracture – the broken bone has not pierced the skin

Open (compound) fracture – the broken bone juts out through the skin, or a wound lead to the fracture site. Infection and external bleeding are more likely

Greenstick fracture – a small, slender crack in the bone. This can occur in children, because their bones are more flexible that an adult's bones

Hairline fracture – the most common form is a stress fracture, often occurring in the foot or lower leg as a result of repeated stress from activities such as jogging or running

Complicated fracture – structures surrounding the fracture are injured. There may be damage to the veins, arteries or nerves, and there may also be injury to the lining of the bone (the periosteum)

Comminuted fracture – the bone is shattered into small pieces. This type of complicated fracture tends to heal more slowly

Avulsion fracture – muscles are anchored to bone with tendons, a type of connective tissue. Powerful muscle contractions can wrench the tendon free and pull out pieces of bone. This type of fracture is more common in the knee and shoulder joints

Compression fracture – occurs when two bones are forced against each other. The bones of the spine, called vertebrae, can have this type of fracture. Older people, particularly those with osteoporosis, are at higher risk.

Not all fractures are of a person's arm or leg. Trauma to the head, chest, spine or pelvis can fracture bones such as the skull and ribs. These fractures are further complicated by the underlying body structure that the bone normally protects. Some of these fractures can be very difficult to manage using first-aid principles only as they may represent life-threatening injuries. Always seek emergency assistance if you suspect this type of fracture.

Clinical features

Pain, redness, and swelling at the site of injury

Deformity and axis deviation

Bone fragments penetrating the skin

Palpable step-off or gap

Bone crepitus

Concomitant soft tissue injuries

Neurovascular compromise below site of injury

Diagnostics

Clinical assessment

Assessment of signs of a fracture and concomitant injuries

Assessment of neurovascular compromise and compartment syndrome with the 5 .P's: pain, pallor, pulselessness, paresthesia, paralysis in addition to hotness

Imaging

X-ray

:Conditions

views

joints (if limb fracture)

times (prereduction and postreduction)

Radiographic signs of a fracture include a radiolucent fracture line and cortical disruption
Describe fracture based on the anatomic location, alignment, angulations, and .articular involvement
X-ray imaging has a low sensitivity for detecting stress fractures
CT/MRI (not routine)
Indications: preoperative planning for complicated fractures, assessment of associated injuries, and inconclusive x-ray findings

First aid for bone fractures
Good first-aid care of fractures is always important. Moving the broken bones can increase pain and bleeding and can damage tissues around the injury. This can lead to complications in the repair and healing of the injury later.

First aid for fractures is all about immobilizing (limiting movement of) the injured area. Splints can be used for this. Control any external bleeding. Complicated breaks where a limb is very deformed may need to be realigned before splinting.
If a bone fracture is suspected, the following should be done:
- Keep the patients still and do not move them unless there is an immediate danger, especially if fracture of the skull, spine, ribs, pelvis or upper leg is suspected.
Attend to any bleeding wounds first. Stop the bleeding by pressing firmly on the site with a clean dressing. If a bone is protruding, apply pressure around the edges of the wound
If bleeding is controlled, keep the wound covered with a clean dressing
Never try to straighten broken bones
For a limb fracture, provide support and comfort such as a pillow under the lower leg or forearm. However, do not cause further pain or unnecessary movement of the broken bone
Apply a splint to support the limb. Splints do not have to be professionally manufactured. Items like wooden boards and folded magazines can work for some fractures. The limb should be immobilize above and below the fracture.
Use a sling to support an arm or collarbone fracture
Raise the fractured area if possible and apply a cold pack to reduce swelling and pain

Diagnose bone fractures with x-rays. They may also use CT scans (computed tomography) and MRI scans (magnetic resonance imaging).

Broken bones heal by themselves – the aim of medical treatment is to make sure the pieces of bone are lined up correctly. The bone needs to recover fully in strength, movement and sensitivity. Some complicated fractures may need surgery or surgical traction (or both).
Depending on where the fracture is and how severe, treatment may include:
Splints – to stop movement of the broken limb
Braces – to support the bone
Plaster cast – to provide support and immobilize the bone
Traction – a less common option

Surgically inserted metal rods or plates – to hold the bone pieces together
.Pain relief
Complications
Acute complications
Neurologic and vascular injury (e.g. bleeding, hematoma, seroma)
Compartment syndrome
Wound infection, osteomyelitis
Long-term complications
Avascular necrosis
Complex regional pain syndrome
Post-traumatic osteoarthritis
Joint stiffness/contracture
Joint instability
Heterotopic ossification
Children: growth disturbances after growth plate injury (→ Salter-Harris fracture)
Nonunion: incomplete healing of a fracture
Clinical features: pain, swelling, limited weight-bearing capacity, and reduced range of motion persisting after the normal duration of healing (usually 6–9 months)
Treatment: debridement and resection, osteosynthesis (fixation), antibiotics in the case of infected nonunion
Complications due to immobilization
Thrombosis, pulmonary embolism
Infections (e.g., pneumonia, urinary tract infection)

Operation procedure for bone fractures
A cast made from plaster of Paris is one of the most common ways of immobilizing a limb. This cast is made from a preparation of gypsum that sets hard when water is added. Depending on the location and severity of the fracture, the operation procedures can include: Closed or simple fractures – the two ends of the broken bone are lined up and held in place. The limb is thoroughly bandaged, then the wet plaster is applied. Sometimes, once the plaster is dry, the cast is split into two and the two halves are re-bandaged on the outside. This allows for any swelling that may occur
Open or compound fractures – these are thoroughly cleaned in the operating room to remove debris before being set, because a broken bone exposed to the open air may become infected
Long bones – long bones such as the bone of the thigh (femur) are difficult to keep aligned. In adults these are often treated by internal nailing. A child may need traction for a couple of days before setting the bone in a cast. Once the two ends of bone start to show signs of healing, the leg and hip joint are immobilized in plaster of Paris. In other cases, pins are inserted above and below the fracture and secured to an external frame or 'fixator'. This is done under a general anesthetic immediately after an operation on a bone fracture
Postoperative follow up include assessment of full feeling in the area. For example, if a broken arm in plaster, they may ask the patient to move fingers. They will also check the limb for tingling, pallor (pale color) or coolness. These tests check whether the splint is

affecting limb's nerve and blood supply. The injured part is kept as still as possible in the first few days.

It is crucial to determine the difference between the pain of fracture and any pain that could be caused by the splint, traction, plaster cast, poor alignment of the limb or swelling of the limb.

Common fractures in children

1- Supracondylar fracture of the humerus

Supracondylar fractures of the humerus are the most frequent fractures affecting the paediatric elbow1 and their correct management is important because they can cause catastrophic complications.

The distal humerus anatomy is predisposed to fractures because its configuration in two columns connected by thin bone represents a zone of weakness.

Types

Extension-type fractures represent 97% to 99% of the total cases and Flexion-type fractures represent about 1% to 3% of cases and the fracture is usually caused by direct trauma to the flexed elbow.

Clinical signs

Extensive ecchymosis, soft-tissue swelling, skin puckering indicate severe trauma and deformity. Vascular status evaluation is very important in displaced fractures. Neurological examination is mandatory. The median nerve and anterior interosseous and radial nerves should be assessed.

Radiological assessment:

Standard anteroposterior (AP) and true lateral radiographs of the elbow are usually sufficient to diagnose and classify the fracture.

Management

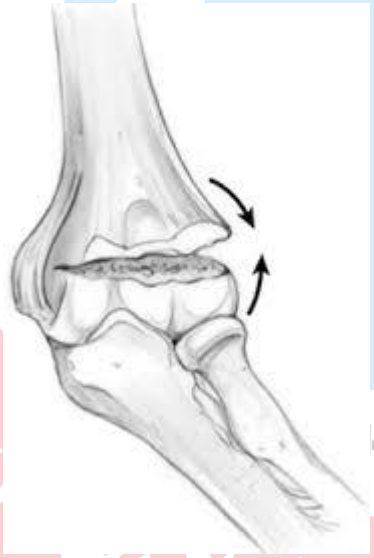
Management in the emergency room In the emergency department, immobilizing the elbow with a long-arm splint at 30° to 40° of flexion is sufficient until surgery is performed in order to control pain, avoid neurovascular injuries and minimize the risk of compartment syndrome.

Fractures can be reduced by closed or open means. Open reduction has been related to a higher incidence of infection and stiffness. Closed reduction is a reliable technique for the majority of displaced fractures.

Complications

-Vascular injury.

- Neurological injury.
- Compartment syndrome.
- Cubitus varus.



Epiphyseal injury

In children the growth plate is up to five times *weaker*than the ligaments stabilising the adjacent joint.The adjacent bone is also stronger than the cartilaginous growth plate. Injury thus often leads to separation of the growth plate leaving the ligaments and capsule intact. The separation takes place in the middle layer (hypertrophied) of the growth plate.

The force is seldom parallel with the growth plate and the bone on either the metaphyseal, epiphyses or both sides of the plate. This is the basis of the Salter Harris classification of growth plate injuries.

Type I Injuries: Due to a separation through the growth plate of the metaphysis and diaphysis.

Type II Injuries : An incomplete type I with a metaphyseal bone fragment still attached to the epipyhseal end. Type I and II have a good prognosis as the blood supply to the germinal layer (ephyseal side) is still intact and angulation and growth arrest are uncommon.

Type III Injury This fracture occurs only rarely,and is seen in the pre pubescent child. It is seen in the femur or tibia. THe mechanism is a fracture that runs completely through the epiphysis and separates part of the epiphysis and growth plate from the metaphysis. Surgery is sometimes necessary to restore the joint surface to normal. The outlook or prognosis for growth is good if the blood supply to the separated portion of the epiphysis is still intact, if the fracture is not displaced, and if a bridge of new bone has not formed at the site of the fracture.

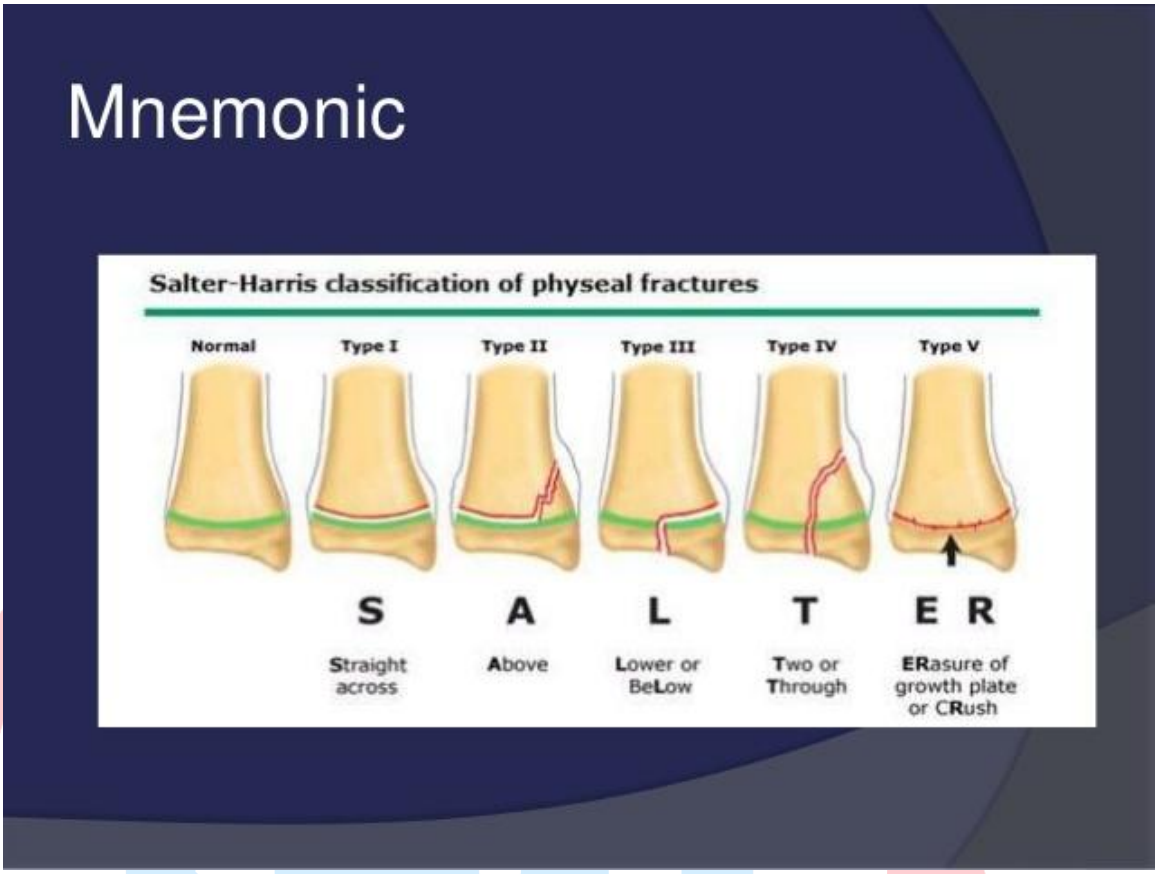
Type IV Injury Here the fracture is through the metaphysis and epiphysis. As in the type III it is intra-articular and will need open reduction and internal fixation. The prognosis for future growth disturbances and angulation is poor.

Type V Injury Is due to a compression force destroying all or part of the growth plate. This is difficult to diagnose and in most cases is a retrospective diagnosis where angulation developed without radiological evidence of a growth plate injury.The diagnosis can be established with MR imaging if hemorrhage or a haematoma is identified within the growth plate immediately after injury.

Management

Salter Harris I and II injuries are usually managed by closed manipulation and plaster cast. Because they are intra-articular and often displaced, types III and IV injuries require open reduction and internal fixation. Computer Tomography may help in planning the procedure.

Damage to any area of the physis can lead to significant abnormalities of physeal growth and long bone development. Physeal discontinuity can result in disruption of longitudinal bone growth.



Fracture neck femur

Femoral neck fractures are intracapsular fractures. The capsule is the area that contains the fluid that lubricates and nourishes the hip joint. Fractures in this area are categorized based on the location of the fracture along the femoral neck:

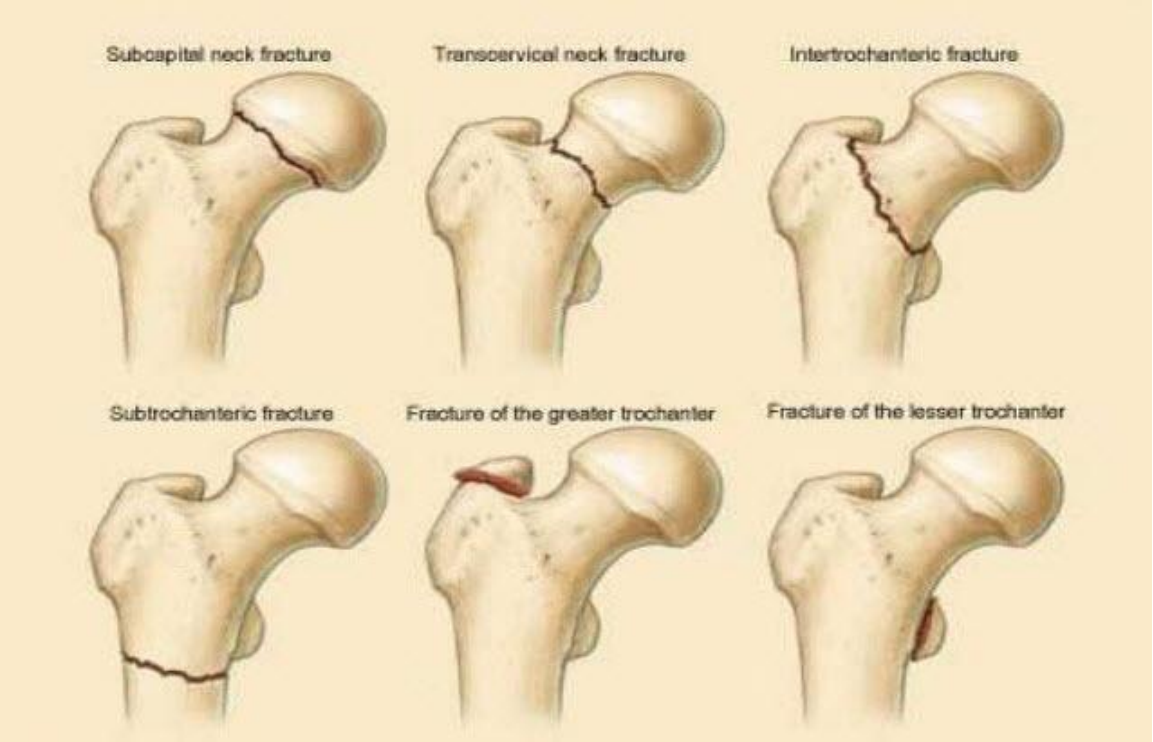
- subcapital is the femoral head and neck junction
- transcervical is the mid portion of femoral neck
- basicervical is the base of femoral neck

Though anyone can fracture their femoral neck, it's considerably more common in elderly adults who have poor bone density. More than 90 percent of these fractures occur in people older than 50. They are more common in women.

A femoral neck fracture can tear the blood vessels and cut off the blood supply to the femoral head. If the blood supply to the femoral head is lost, the bone tissue will die (a process called avascular necrosis), leading to the eventual collapse of the bone. Fractures that occur in places where the blood supply is not disrupted have a better chance of healing.

For these reasons, treatment for an elderly patient with displaced femoral fractures will depend upon the location of the break and the quality of the blood supply.

The standard of care for a displaced fracture where the blood supply is disrupted involves replacing the femoral head (hemiarthroplasty or a total hip arthroplasty). If there's no displacement, then surgically stabilizing the fracture with screws or other hardware may be done. However, there's still the risk that the blood supply.



Fractures lower end radius (coll's fracture)

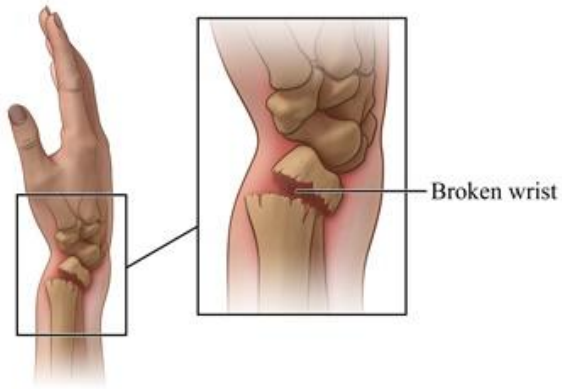
Colles' fracture specifically is defined as metaphyseal injury of cortico-cancellous junction (within 2−3 cm of articular surface) of the distal radius with characteristic dorsal

tilt, dorsal shift, radial tilt, radial shift, supination and impaction. Most of the fractures are caused by a fall on the outstretched hand with the wrist in dorsiflexion.

Radiographic imaging is important in diagnosis, classification, treatment and follow-up assessment of these fractures. The routine minimal evaluation for distal radius fractures must include two views-a postero-anterior (PA) view and lateral view.

CT may be useful and can give significant information in comparison with that obtained with conventional radiography in evaluation of complex or occult fractures, distal radial articular surface, distal radio-ulnar joint, ventro-medial fracture fragment.

MRI has proved to be a very important diagnostic tool for delineating perforation of triangular fibrocartilage complex (TFCC), perforation of interosseous ligaments of proximal carpal row, evaluating occult fractures, post-traumatic or avascular necrosis of carpal bones



Treatment

The basic principle of colle's fracture treatment is to obtain accurate fracture reduction and then to use a method of immobilization that will maintain and hold that reduction.

Closed reduction and casting

Pins and plaster technique

Percutaneous pinning

External fixation

Open reduction and internal fixation

Complications

The most frequent complication is malunion with an intra-articular or extra-articular deformity as the most frequent complication. Other complications include non-union, hardware complications tendon attrition/rupture and neurological injuries.

Joint dislocations

A joint dislocation is a complete separation of two articulating bony surfaces, often caused by a sudden impact to the joint. A partial or incomplete dislocation is called a subluxation. Although any joint may become dislocated, common sites include the shoulder, finger, patella, elbow, and hip. Dislocations can occur in contact sports, such as football and hockey, and in sports in which falls are common, such as downhill skiing, gymnastics and volleyball. Basketball players and football players also commonly dislocate joints in their fingers and hands by accidentally striking the ball, the ground or another player. A hard blow to a joint during a motor vehicle accident and landing on an outstretched arm during a fall are other common cause

Symptoms

A dislocated joint can be: Visibly deformed or out of place, swollen or discolored, Intensely painful and Immovable. Pain and Numbness or weakness in the injured area.

Diagnosis: a complete medical history of the patient and how the injury occurred ?.

Diagnostic procedures may help to evaluate the problem include:

- X-ray of the joint is used to confirm the dislocation and may reveal broken bones or other damage to joint.
- MRI. To assess damage to the soft tissue structures around a dislocated joint. history, physical examination

Treatment of the dislocation depends on the site and severity of your injury. It might involve:

Reduction. gentle maneuvers to reduce bones back into position. Depending on the amount of pain and swelling, a local anesthetic or even a general anesthetic before manipulation may be needed.

Immobilization. After reduction immobilize with a splint or sling for several weeks. How long the splint or sling depends on the joint involved and the extent of damage to nerves, blood vessels and supporting tissues.

Surgery: might be need surgery if dislocated joint cannot be reduced or if the nearby blood vessels, nerves or ligaments have been damaged. Surgery may also be necessary in recurrent dislocations.

Rehabilitation. After removal of splint or sling, a gradual rehabilitation program designed to restore joint's range of motion and strength.

Shoulder dislocation

The shoulder joint is the body's most mobile joint. It can turn in many directions. But, this advantage also makes the shoulder an easy joint to dislocate.

A partial dislocation (subluxation) means the head of the upper arm bone (humerus) is partially out of the socket (glenoid). A complete dislocation means it is all the way out of the socket. Both partial and complete dislocations cause pain and instabilitiy in the shoulder.

Symptoms of shoulder dislocation include:

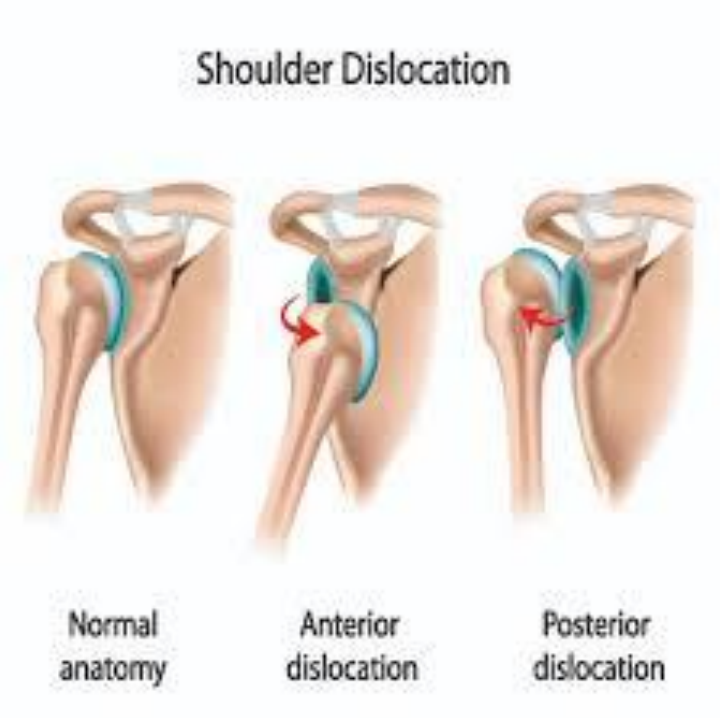
- Deformity
- Swelling
- Numbness
- Weakness
- Bruising

Sometimes a dislocation may tear ligaments or tendons in the shoulder or damage nerves.

The shoulder joint can dislocate anteriorly, posteriorly, or superiorly, inferiorly. A common type of shoulder dislocation is when the shoulder slips forward (anterior instability). This means the upper arm bone moved forward and out of its socket. It may happen when the arm is put in a throwing position

Physical examination of the shoulder will begin with inspection. In an anterior dislocation, the shoulder appears to look "squared off," with a loss of the normal rounded appearance of the shoulder caused by the deltoid muscle. In thinner patients, the humeral head may be palpated or felt in front of the joint. Posterior dislocations may be difficult to assess just by looking at the shoulder joint injured.

Plain X-rays should be taken to confirm the diagnosis of shoulder dislocation and to exclude bones fractures associated with the dislocation. Two common fractures are the Hill-Sachs deformity, a compression fracture of the humeral head, and a Bankart lesion, a chip fracture of the glenoid fossa. Other fractures of the humerus and scapula may make shoulder reduction more difficult



Question Chapter 3

1- What is the definition of fracture? Types of fractures? Methods of diagnosis? First aid management? Methods of treatment?

2- What is the definition of dislocation? Methods of diagnosis? First aid management? Methods of treatment?

3- What is the mechanism of injury of supracondylar fracture of the humerus? Mention the symptoms and signs of supracondylar fracture of the humerus, methods of diagnosis and treatment, what are the complications of this fracture?

4- What is epiphyseal injury? Methods of diagnosis and treatment, what are the complications of this injury?

5- Define Coll's fracture, Methods of diagnosis and treatment, what are the complications of this injury?

6- What is the mechanism of injury of fracture neck femur? Mention the symptoms and signs, methods of diagnosis and treatment, what are the complications of this fracture?

7- What is the mechanism of dislocation of the shoulder joint? Mention the types, the symptoms and signs, methods of diagnosis and treatment of shoulder dislocation?

Chapter 4

Care for patients with musculoskeletal disorders

The role of nurses in care for people affected by musculoskeletal disorders.

Orthopedic nursing is a specialty that focuses on musculoskeletal diseases and disorders. These orthopedic issues include conditions like arthritis, bone fractures, joint replacements, genetic malformations, arthritis, and osteoporosis. Orthopedic nurses are familiar with traction, casting, mobility devices, and pain management. When musculoskeletal conditions require surgery, orthopedic nurses assist physicians with preparation for the procedure and assists patients with their postoperative recovery. Some orthopedic nurses may even work in the operating room.

Orthopedic nurses work in hospital units, offices, and outpatient care clinics. They work with a wide age range of patients and care for both men and women. Accordingly, they must be familiar with a large variety of orthopedic conditions, medications, and operations. Orthopedic nurses work a variety of shifts dependent on their employment facility. Office and outpatient nurses usually work during the day, but orthopedic nurses on hospital inpatient units have the ability to work day, evening, or night shift. Orthopedic nurses assist and educate those with orthopedic conditions and complications. They provide support to the office, outpatient, and inpatient procedures. Orthopedic nurses provide an imperative role to patients during a time where they advocacy, encouragement, and education.

An orthopedic nurse is an expert in orthopedic conditions and caring for patients experiencing these conditions. Orthopedic nurse works closely with the patient, their family, and the orthopedic team to ensure clear client education, a smooth recovery, and minimal complications. The orthopedic nurse performs musculoskeletal health exams, assists with casting and traction, and administers pain medication. An orthopedic nurse spends time encouraging patients to increase their mobility, educates about how to protect their joint and bone health, and implements strategies to minimize their pain and complications.

As an orthopedic nurse, you must be empathetic when working with patients dealing with chronic pain and mobility concerns. Some orthopedic nurses take care of postoperative orthopedic patients, which opens a whole new world of nursing skills!

Education is the most important aspect of being an orthopedic nurse to promote patient health, prevent disease, encourage patient understanding of troubling symptoms, and promote compliance with ongoing treatments. An orthopedic nurse is an excellent educator that gives patients extensive, comprehensive information. They also educate

patients and family members who have questions and concerns about medications, pain management, and discharge service coordination. Orthopedic nurses are well versed in educating patients on the risks and complications of orthopedic treatment and surgery.

Pain is the main symptom experienced by patients with musculoskeletal problems. Patients with musculoskeletal conditions want to know how to manage their pain and to have a nurse to talk to when the pain has a negative effect on their mood. Patients with low back pain, rheumatoid arthritis and osteoarthritis should be able to receive simple structured advices about the benefits mobilization and physiotherapy.

Care of Patients with Musculoskeletal Disorders

Osteoporosis

Osteoporosis, or porous bone, is the most common disease of bone and is characterized by low bone mass, deterioration of bone tissue, and compromised bone strength, leading to bone fragility and fractures. Osteoporosis may be due to too little bone formation or excessive bone loss. When bone loss is mild or moderate, it is referred to as osteopenia. More severe bone loss is referred to as osteoporosis, and osteoporosis in the presence of one or more fragility fractures is referred to as severe osteoporosis. Osteoporosis can be categorized as primary or secondary

Nursing Interventions: The role of nurses in caring for patients with osteoporosis or at risk for osteoporosis, regardless of setting, includes enhancing patients' knowledge about osteoporosis and promoting behavior change. Specific nursing actions include: providing patient education across the lifespan about bone health and prevention of osteoporosis and fractures, including discussing strategies to ensure bone health in adolescents as well as young adults and older patients; assessing patients' risk for low bone density or osteoporosis; providing education to patients with or at risk of osteoporosis and their families about pharmacologic and nonpharmacologic treatment strategies; educating patients and their family caregivers about the risk for falling and strategies to prevent falls at home; assessing the risk factors for falls and implementing strategies during a patient's hospitalization to decrease the risk of falls and fracture in those with or at risk for osteoporosis; providing nursing care for patients at risk for complications of osteoporosis; and promoting adherence to medication and lifestyle changes. Administer analgesics as prescribed to relieve pain. Assist patient with putting on back brace. Encourage walking daily for strong bone remodeling. Encourage young women at risk to maximize bone mass through good nutrition (contain calcium) and exercises

Osteomyelitis

Osteomyelitis can be described as the inflammation of bone and bone marrow and it usually indicates the presence of an infection. Although the term of osteomyelitis among children usually expresses acute hematogenous osteomyelitis, it may occur as sub-acute and rarely as chronic. Although bacteria are the main cause for it, fungi, parasites and other microorganisms can also be responsible. If the infection is not treated in the acute period, chronic osteomyelitis is unavoidable. Then, the surrounding of the infection-focus filled with pus and granulation tissue will be surrounded by a fibrous capsule and sclerosing bone-tissue and the "Brodie" abscess will be formed.

The care of children who suffer from heavy musculoskeletal infections; for a wide range of evaluation it requires a multidisciplinary team approach that consists of as well as the hospital staff and services, pediatricians, orthopedists and infectious diseases specialists. The main objectives of care; to avoid possible complications, reduce pain, to inform the children and their families about the process of the disease and the treatment management. In the acute stage of the disease, restriction of movement may be observed in the affected joints. However, by supporting the affected joint, the child will be in a comfortable position. Cautiously and gently moving the patient will reduce the pain. Pain treatment will relieve the patient. Vital findings are taken and recorded. If important changes may occur in the measurements, then this is shared with the team members .

In the antibiotic treatment, careful observation should be performed; the vascular pathway area and the intravenous sets should be observed. Generally, several antibiotics are used together. One should consider that the used drugs are compatible with each other. The use of drugs that are not compatible should be avoided. For long-term antibiotics treatment, intermittent infusion devices or a central catheter (PICC) with peripheral input is used. The antibiotics therapy is often continued at home [19].

Isolation should be applied to children with an open wound. In wound care, the prescribed medicines are used. In addition, the insertion of antibiotic solutions into the wound care is very effective.

The received-removed fluid amount is continuously measured and recorded. Moreover, the wound drainage is also recorded. The state of healing of the wound tissue is evaluated and recorded.

To provide immobility, plaster is used and in such cases, routine plaster maintenance is performed.

Nursing Intervention:

The following are among nursing initiatives: Teaching the child to walk with crutches when necessary, ensuring that the child is kept away from slippery floors, preventing the child from moving in an uncontrolled manner during risk of insufficient mobility due to the plaster, and during the Risk of Trauma due to the dangers of walking with crutches. Again, when necessary, supporting and observing the child during his/her walk and ensuring that the parents carry their children in or to safe environments. The family must be informed about the weight of the plaster and advised to adjust the body mechanics carefully while carrying the child or while giving position to him/her. The family must be warned not to take support from the plaster while lifting the child. Protecting the extremity in plaster from impacts is also among important nursing initiatives. Administer analgesics and analgesics. Provide ROM, and no weight bearing on affected limb. Provide sterile dressing.

Osteoarthritis

Osteoarthritis is also identified as degenerative joint disease or degenerative arthritis or osteoarthrosis. It is a group of mechanical abnormalities involving degradation of joints in human beings that includes articular cartilage and sub-chondral bone. It develops slowly over many years as this cartilage continues to wear down and forces more painful bone-on-bone rubbing. Osteoarthritis is usually confined to the joints, more specifically joints in hands, knees, hips, and spine. It is the responsibility of nursing care to properly prepare the patient for diagnosis test. Once it is carried out and the patient is diagnosed, doctor suggests medication then it is nursing care provider responsibility to guide the patient about taking medicine and care about diet. Nurses assist in diagnosing and assessing the disease functional and its psychosocial impacts. They help to provide medication and pain management, they monitor disease progress, and share disease information with patients, and coordinate care with other providers (physical, occupational, and psychosocial therapists. Their understanding of the clinical expressions and the diagnostic criteria for osteoarthritis provide the footing for these activities. Administer medications as prescribed (, NSAIDs), Prevent infection, provide care during transfer of the patient, teach the proper use of assistive devices, Observe closely for signs and symptoms of other complications.

Peri operative and operative care

Definition of prioperative ensuring care: perioperative nursing is the comprehensive patient care provided within the framework of the nursing process before, during, and

after surgical or invasive procedures. It is a planning to evaluate a patient and identify problems that may put the patient at high risk for poor surgical and anesthesia outcomes.

Phases of peri operative nursing care:

1. Preoperative period: starts when a surgical intervention is planned to when the patient is taken to the operative room.

2. Intraoperative period: starts from when the patient arrives in the operative suite to when the patients ready to depart the operative suite.

3. Postoperative period: from the conclusion of the surgical intervention through the recovery phase.

Goals of the perioperative care:

1. To manage patient care before, during, and after surgery.

2. To coordinate the needs of the surgical team.

3. To identify the risks and potential problems associated with a surgical procedure and to

Facilitate positive outcomes.

4. To actively engage patients in their own care whenever possible

5. Improve quality of care and restore the patient to the desired level of function.

6. For elective procedures, the first transition in care in the perioperative environment commonly occurs as patients transfer to the surgeon.

7. Initial preoperative patient meeting with a nurse among other care team members are ideal for preparing surgical patients.

8.The nurse provides necessary information and clarifies expectations for the patients.

9.After the surgical procedure, the intraoperative nursing team provides a report of the processes that occurred during the surgical procedure.

10. The post anesthesia nursing care team initiates the transfer of care to the postsurgical nursing team who typically cares for patients on surgical care units and ultimately prepares patients to home.

Operating room (OR) Nurse Service: OR Nurse services are working with the patient being prepped for surgery, their family, and as a member of the interdisciplinary care

team. The OR nurse helps to evaluate the patient, then plan and implement various steps to, during, and beyond surgery. OR nurses must be capable of making decisions regarding care of the patient, having skills that help guide them when dealing with doctors and other staff members. Communication skills, organizational skills, and a strong ego are all indispensable in the OR. These skills are necessary to maintain good outcomes for the patients.

Roles of the OR nurse:

1- Operation Preparation: The best operating room nurses know exactly how the surgeon prefers the room to be set up and equipment to be positioned. The nurse is also there to continue to allay patient fears and anxieties. Because the operating room nurse has already built a rapport with the patient, he or she can be the determining factor between a happy patient and an unhappy one.

2-Working as Part of the Surgical Team: There are many different OR nurse services. A circulating nurse, scrub nurse and anesthesia nurse. OR nurses must work as part of the surgical team.

3-Gather all supplies needed for the operation.

4- Assume responsibility of keeping the operating room sterilized.

5- Position and prepare patient on operating table.

6- Pass medical instruments or other objects to the surgeon during operation.

7-Monitor patient's vital signs to detect abnormalities.

8- Evaluate patient in postoperative phases.

9- Adhere to safety standards and precautions.

10- Assume duties within or out of the sterile field as assigned.

Question Chapter 4

1- What are the principles of patient's care by the orthopedic nurse?
2- What is the role of nurse in management of patients with osteoporosis?
3- What is the role of nurse in management of a child diagnosed with osteomylitis?
4- What is the role of nurse in management of patients with osteoarthritis?
5- What are the roles of nurses in the perioperative care of orthopedic patients?
6- What are the roles of orthopedic nurses in the operative theater?

Chapter 5

Casts ,Splints and Traction in Orthopedics

One of the most important responsibilities of nurses is to understand the basic procedures involved in the care of their patients. It is important for nurses to know why casts are used, the materials they are made of, and the application and removal processes. More importantly, nurses need to be aware of proper cast care in order to accurately educate their patients and maintain their health.

A cast holds a broken bone in place as it heals. Casts also help to prevent or decrease muscle contractions, and are effective at providing immobilization, especially after surgery. It immobilizes the joint above and the joint below the area that is to be kept aligned and immobilized.

Splints, also known as half-casts, provide less support than casts, but are faster and easier to use. They also can be tightened or loosened easily if the swelling in the arm or leg increases or decreases. Different types of splints are used for management of various musculoskeletal conditions. Splints are non circumferential immobilizers. That means they do not cover the limb they splint circumferentially, unlike cast. Ready-made or off-the-shelf splints are available in many different sizes and shapes. In some cases, custom-designed splints must be used. Velcro straps make it easier for the patient or healthcare provider to put the splint on or take it off.

Types of casts and splints materials

The outside, or hard part of the cast, is made from two different kinds of casting materials:.

- Plaster (white in color) consisting of a fine white powder (calcium sulfate hemihydrates), which hardens when moistened.
- Fiberglass (comes in a variety of colors, patterns, and designs).

Cotton and other synthetic materials are used to line the inside of the cast to make it soft and to provide padding around bony areas, such as the wrist or elbow.

Types of casts

Below is a description of the various types of casts, the location of the body they are applied, and their function.

Type of cast	Location	Uses
Short arm cast	Applied below the elbow to the hand.	Forearm or wrist fractures. Also used to hold the forearm or wrist muscles and tendons in place after surgery.
Long arm cast	Applied from the upper arm to the hand.	Upper arm, elbow, or forearm fractures. Also used to hold the arm or elbow muscles and tendons in place after surgery.
Arm cylinder cast	Applied from the upper arm to the wrist.	To hold the elbow muscles and tendons in place after a dislocation or surgery.
Shoulder Spica cast	Applied around the trunk of the body to the shoulder, arm, and hand.	Shoulder dislocations or after surgery on the shoulder area.
Minerva cast	Applied around the neck and trunk of the body.	After surgery on the neck or upper back area.
Short leg cast	Applied to the area below the knee to the foot.	Lower leg fractures, severe ankle sprains/strains, or fractures. Also used to hold the leg or foot muscles and tendons in place after surgery to allow healing.
Leg cylinder cast	Applied from the upper thigh to the ankle.	Knee, or lower leg fractures, knee dislocations, or after surgery on the leg or knee area.

Type of cast	Location	Uses
Short leg hip Spica cast	Applied from the chest to the thighs or knees.	To hold the hip muscles and tendons in place after surgery to allow healing.
Unilateral hip Spica cast	Applied from the chest to the foot on one leg.	Thigh fractures. Also used to hold the hip or thigh muscles and tendons in place after surgery to allow healing.
One and one-half hip Spica cast	Applied from the chest to the foot on one leg to the knee of the other leg. A bar is placed between both legs to keep the hips and legs immobilized.	Thigh fracture. Also used to hold the hip or thigh muscles and tendons in place after surgery to allow healing.
Bilateral long leg hip Spica cast	Applied from the chest to the feet. A bar is placed between both legs to keep the hips and legs immobilized.	Pelvis, hip, or thigh fractures. Also used to hold the hip or thigh muscles and tendons in place after surgery to allow healing.
Abduction boot cast	Applied from the upper thighs to the feet. A bar is placed between both legs to keep the hips and legs immobilized.	To hold the hip muscles and tendons in place after surgery to allow healing.

Instructions for cast and splints care

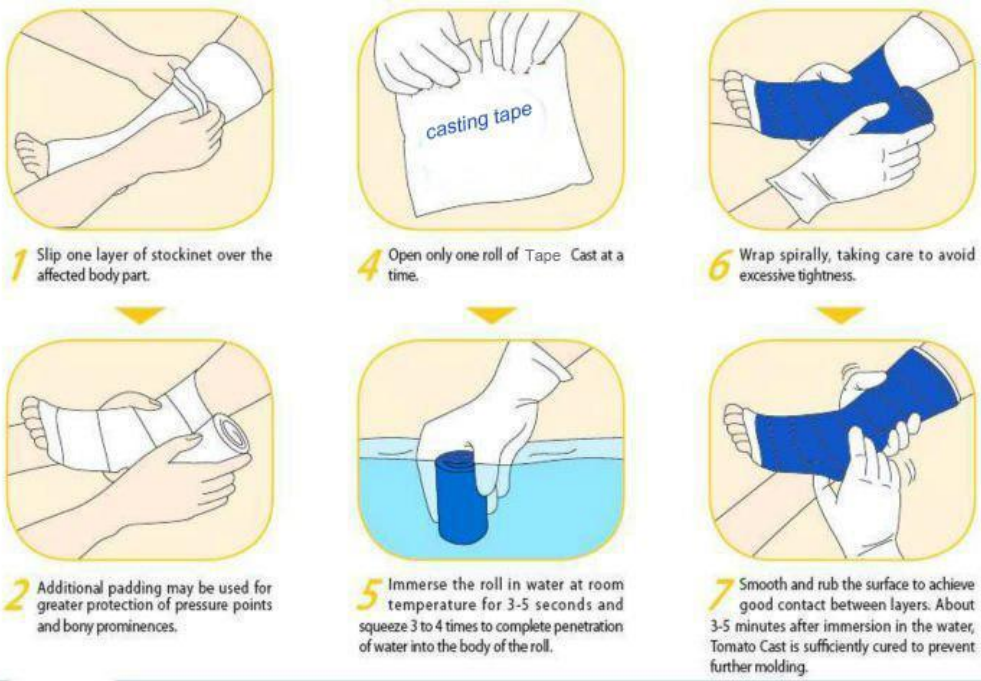
- Keep the cast clean and dry.
- Check for cracks or breaks in the cast.
- Rough edges can be padded to protect the skin from scratches.
- Do not scratch the skin under the cast by inserting objects inside the cast..
- Do not put powders or lotion inside the cast.
- Cover the cast while your child is eating to prevent food spills and crumbs from entering the cast.
- Prevent small toys or objects from being put inside the cast.
- Elevate the cast above the level of the heart to decrease swelling.
- Encourage child to move his or her fingers or toes to promote circulation.
- Do not use the abduction bar on the cast to lift or carry the child.

Older children with body casts may need to use a bedpan or urinal in order to go to the bathroom. Tips to keep body casts clean and dry and prevent skin irritation around the genital area include the following:

- Use a diaper or sanitary napkin around the genital area to prevent leakage or splashing of urine.
- Place toilet paper inside the bedpan to prevent urine from splashing onto the cast or bed.
- Keep the genital area as clean and dry as possible to prevent skin irritation.

Instructions by nurse when the patient comes immediately to the hospital.

- Fever greater than 101° F (38.3° C)
- Increased pain
- Increased swelling above or below the cast
- Complaints of numbness or tingling
- Drainage or foul odor from the cast
- Cool or cold fingers or toes



Traction in orthopedics

Definition: Traction refers to the set of mechanisms for straightening broken bones or relieving pressure on the spine and skeletal through a force applied by weights or other devices to treat fractures, dislocations, or muscle spasms in an effort to correct deformities and promote healing.

Types of traction:

There are two types of traction used in orthopedic surgery; kin traction and skeletal traction. The type of traction used will depend on the location and the nature of the problem.

Indications of traction:

- Stabilize and realign bone fractures, such as a broken arm or leg.
- Help reduce the pain of a fracture before surgery.

- Treat bone deformities caused by certain conditions, such as scoliosis.
- Correct stiff and constricted muscles, joints, tendons, or skin.
- Stretch the neck and prevent painful muscle spasms.

Skin Traction

Definition: Skin traction is far less invasive than skeletal traction. It involves applying splints, bandages, or adhesive tapes to the skin directly below the fracture. Once the material has been applied, weights are fastened to it. The affected body part is then pulled into the right position using a pulley system attached to the hospital bed.

Indications: Skin traction is indicated when the soft tissues, such as the muscles and tendons, need to be repaired. Less force is applied during skin traction to avoid irritating or damaging the skin and other soft tissues. Skin traction is rarely the only treatment needed. Instead, it's usually used as a temporary way to stabilize a broken bone until the definitive surgery is performed.

The Risks of skin traction
-Distal Edema

-Vascular obstruction

-Peroneal nerve palsy

-Skin Necrosis over bony

Bed Blocks

Bed Blocks must be placed under the foot end of the bed with all the above types of traction. Raising the foot of the bed a few centimeters provides a counter force to prevent the patient being pulled distally down the bed by the longitudinal traction.

Skeletal Traction

Skeletal traction involves insertion of a pin, wire, or screw in the fractured bone. After one of these devices has been inserted, weights are attached to it so the bone can be pulled into the correct position. This type of surgery may be done using a general, spinal, or local anesthetic to keep you from feeling pain during the procedure. The amount of time needed to perform skeletal traction will depend on whether it's a preparation for a more definitive procedure or the only surgery that will be done to allow the bone to heal. Skeletal traction is most commonly used to treat fractures of the femur. It's also the preferred method when greater force needs to be applied to the affected area. The force is directly applied to the bone, which means more weight can be added with less risk of damaging the surrounding soft tissues.

The Risks of skeletal traction:

-An adverse reaction to the anesthesia

-Excessive bleeding

-An infection of the pin site

-Damage to the surrounding tissue

-Nerve injury or vascular injury from too much weight being applied

-The prescribed medications aren't relieving your pain

-The skin around the pin site becomes red, hot, or swollen with drainage.

TYPES OF TRACTIONS

- Manual-Pulling on body using hands and strength
  - Used frequently to replace dislocation
- Skin-Devices applied to skin such as pelvic belt, Buck's/Russell's traction
- Skeletal-Pulls directly on bone with wires, pins, tongs into bone

Question Chapter 5

1- Define: cast, splint, Skin traction and skeletal traction.
2- Enumerate the types are of casts and splints materials?
3- What are the types of casts and splints?
4- What are the steps of care for orthopedic patients with of cast and splints?
5- What are the types of traction in orthopedic? Indications of each type? What are the risks for each type and how to prevent?
6- What is the importance of bed blocks in skin traction?

- **Book Coordinator ; Mostafa Fathallah**
- **General Directorate of Technical Education for Health**