Orthopedics

1 Introduction to Orthopedics

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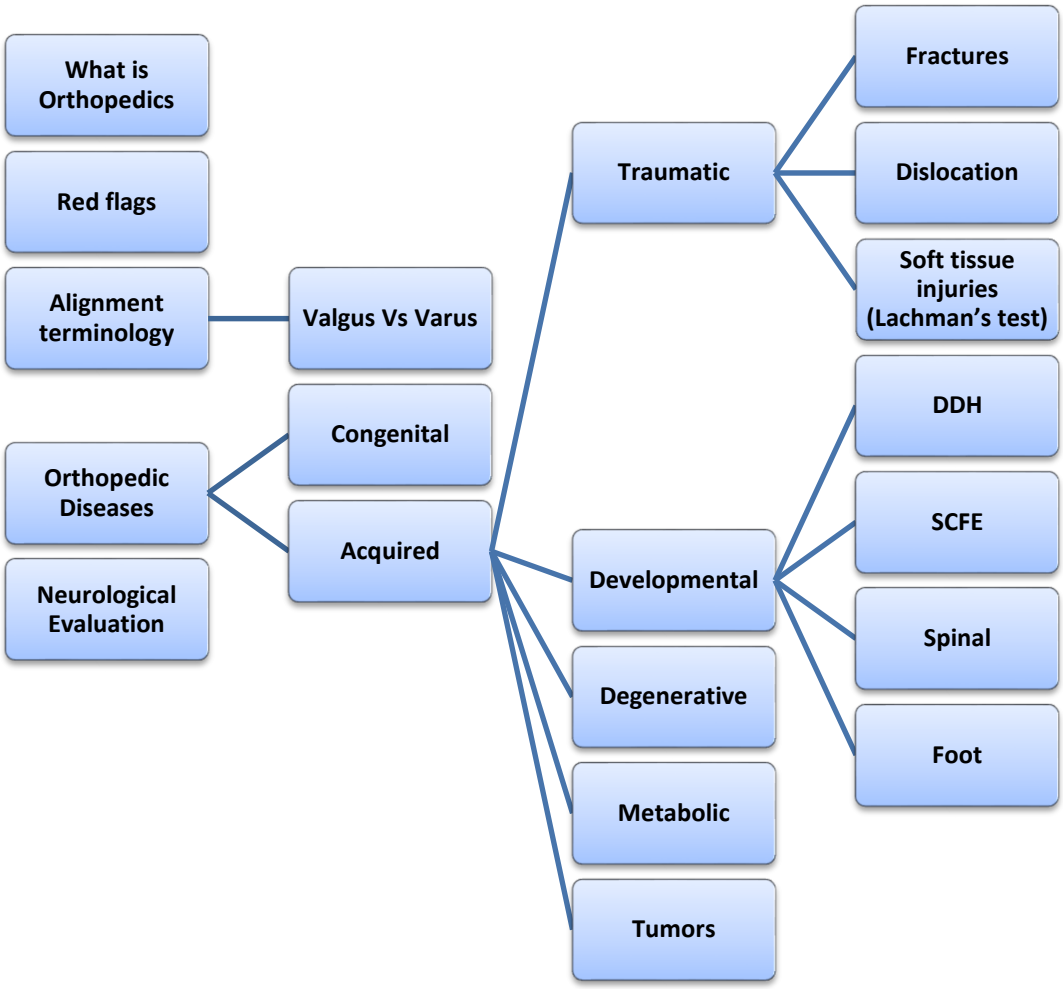
Color Code:

Slides	Doctor's Notes	Team Notes	Important	
431 team work	Arabic Words	Books' notes	Other Sources	

Objectives

- To explain what is Orthopedic and what conditions will be discussed during this course.
- Explain what do we mean by Red Flags.
- List the different causes of orthopedic disease.
- Describe some of clinical examination tests.
- Introduce titles of Clinical Skills which will be taught during this course.

MIND MAP



Orthopedics

- ORTHO = Straight, Upright, Correct. Paios = Child.
- First used by **Nicolas Andry**; a French doctor (1841) in a book titled "Orthopedia: the art to correct and prevent deformities in children".
- Orthopedic specialty is the branch of medicine which manage trauma and disease of musculoskeletal system. It is also known as: Trauma and Orthopedic Surgery.
- **It includes:** bones, muscles, tendons, ligaments, joints, peripheral nerves, vertebral column and spinal cord and its nerves.
- **Sub-Specialties:** Pediatric Orthopedic, Sport and Reconstructive Orthopedic, Orthopedic Trauma, Arthroplasty, Spinal Surgery , Foot and Ankle surgery and Orthopedic Oncology.

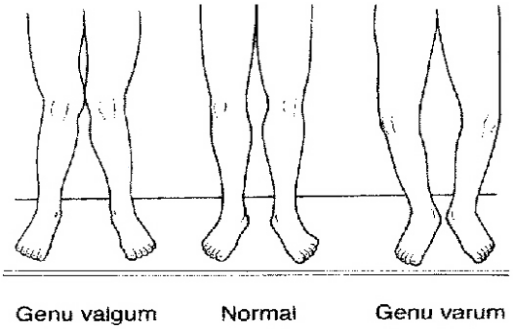
RED FLAGS:

- Red Flag = Warning Symptom or Sign.
- Red flags should always be looked for and remembered.
- Presence of a red flag means the necessity for urgent or different action/intervention.

Examples:

- Open Fractures: more serious and very high possibility of infection and complications.
- Complicated Fractures: fracture with injury to major blood vessel, nerve or nearby structure.
- Compartment Syndrome: increase in intra-compartment pressure which endangers the blood circulation of the limb and may affect nerve supply.
- Acute joint Dislocations: requires urgent reduction or may cause serious complications
- Multiple Trauma or Pelvic Injury: more than one fracture or injury sustained at the same time; consider massive blood loss and associated injuries.
- Cauda Equina Syndrome: compression of the nerve roots of the Cauda Equina at the spinal canal which affect motor and nerve supply to lower limbs and bladder (also saddle or peri-anal area).
- Infection of Bone, Joint and Soft Tissue:
  - Osteomyelitis: Infection of the bone.
  - Septic Arthritis: Infection of the joint.
  - Cellulitis: spreading Infection of the soft tissue, May cause septicemia or irreversible damage.

Alignment terminology:



Valgus: when the limb go lateral and the joint go medial.
Varus: when the limb go medial the joint lateral.

In the upper limb the elbow is called **Cubitus**. So, the same as the lower limb we call it either **cubitus valgus or varus**. In examination you have to describe the alignment before you describe the swelling or small wound.

Cubitus Varus

Cubitus Valgus

Orthopedic Diseases:

Congenital

Present since birth (though may not be evident till some time later).

Talepoequinovarus TEV

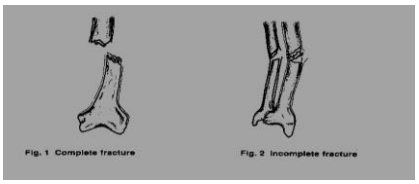
Acquired

Develop or begin after birth.

- Trauma
- Developmental
- Inflammation
- Infection
- Neuromuscular
- Degenerative
- Metabolic
- Tumor

- Traumatic:

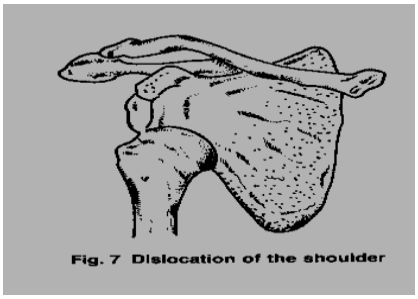
Fractures.	Dislocations.	Fracture dislocation: dislocation associated with nearby fracture.	Soft tissues injuries: ligaments, tendons, menisci.	Nerve injuries.	Epiphyseal injuries.

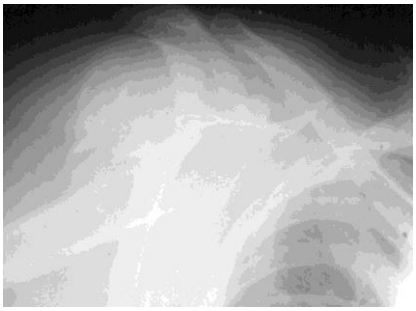


1- Fractures: Break in the continuity of bone.

2- Dislocation: Complete separation of the articular surface

- How to describe dislocation?
  - Distal to proximal fragment: Anterior, Posterior, Inferior, or Superior.
- Acute dislocation may be complicated by neurovascular injury.
- Acute dislocations require urgent reduction

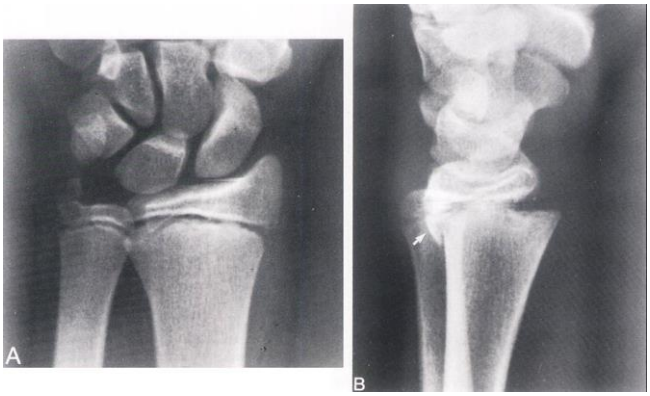




Fracture Dislocation

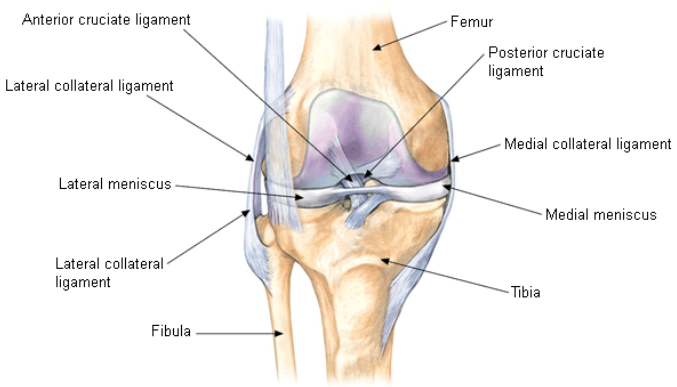
Dislocation and Fracture dislocation of the Spine often results in Paralysis

- **Intra-articular Fractures:** If displaced; should always be treated by ORIF= (Open Reduction and Internal Fixation).
- Failure to reduce and fix such fracture results in loss of function, deformity and early degenerative changes.



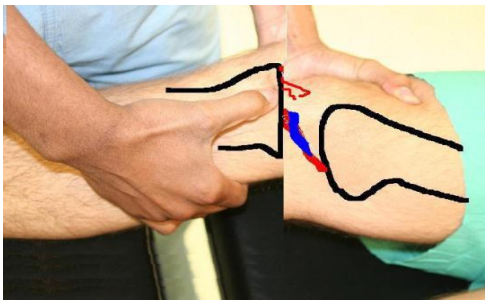
Epiphyseal Injuries:
Salter-Harris classification

3- Soft tissue injuries of the knee:



Anterior Cruciate Ligament injury (MRI)

Lachman's test: To diagnose injury of the anterior cruciate ligament (ACL).



* Video: https://www.youtube.com/watch?v=gfN-p-xZx24

Medial Collateral Ligament (MCL):

Extra articular. We do stress test to the knee to determine if there is an injury to the collateral ligament or not. It appears normal in x-ray.

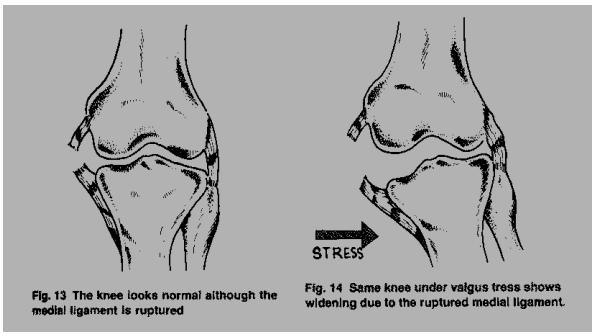


Fig. 13 The knee looks normal although the medial ligament is ruptured

Fig. 14 Same knee under valgus tress shows widening due to the ruptured medial ligament.

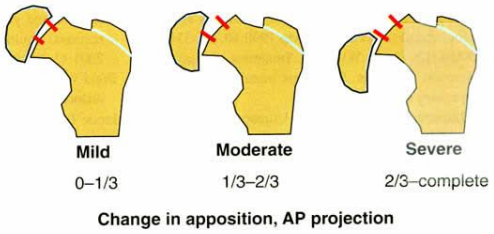
- Developmental:

1-Developmental Dislocation of Hip (DDH): The hip joint has not formed normally. The ball is loose in the socket and may be easy to dislocate. The mother complains of difficulty in changing the baby's diaper. At the beginning we do US because it's easier. When the baby become few months old, we do x-ray.

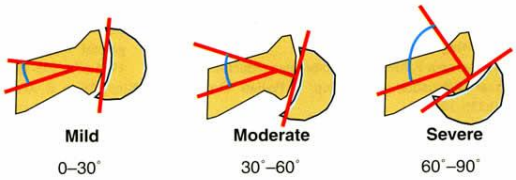
Orthosis: Pavlick Harness for DDH

2- Slipped Capital Femoral Epiphysis (SCFE):

For reasons that are not well understood, the ball at the upper end of the femur (thigh bone) slips off in a backward direction. This is due to weakness of the growth plate. Most often, it develops during periods of accelerated growth, shortly after the onset of puberty.



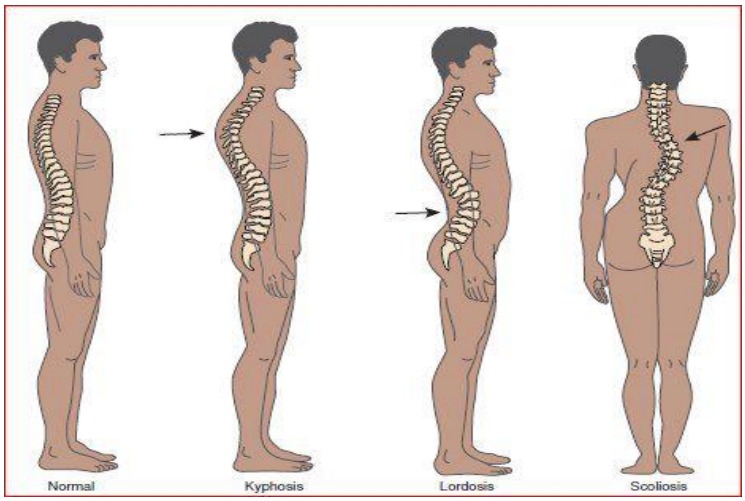
Change in apposition, AP projection



Slip angle, true lateral projection

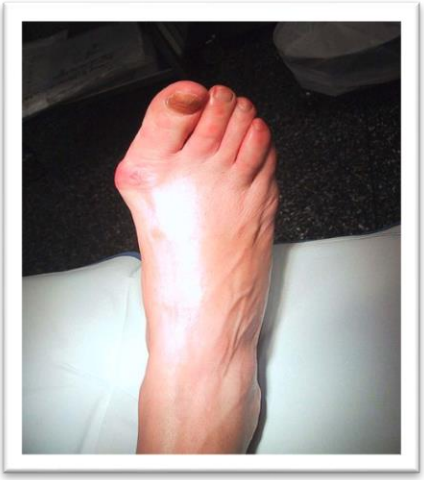
3-Spinal Deformities:

- **Hyperlordosis** is an excessive inwards curvature of the lumbar (lower) spine. It's very common among females in our society.
- **Kyphosis** is an exaggerated curvature of the upper (thoracic) spine that creates a hunchback appearance.
- **Scoliosis** it is the lateral deviation of the spin from the mid line.
  - Most of the time it's painless and
  - Developmental (but it could be congenital).
  - Mostly affect female more than male.



4-Developmental Foot deformity: Hallux Valgus

Forefoot become wide then when patient wearing tight shoes it becomes more deviation.



-Degenerative:

- Occur at any joint
- Can be primary or secondary
- Increased wear and tear
- Can lead to pain, deformity, loss of function
- Increase with advancing age
- Management depends on type and age

The changes which can happen in osteoarthritic hip:

- Decrease in the joint space because the cartilage becomes thinner.
- There may be sclerosis of the hip.
- There will be an osteophyte.

OA Hip

The changes which can happen in osteoarthritic knee:

- Decrease medial joint space.
- Osteophytes formation.
- Sclerosis.

Osteoarthritis of Knee

Total Hip Arthroplasty (THA)

Osteoarthrosis of Knee

- Metabolic:

Rickets: Bow Legs

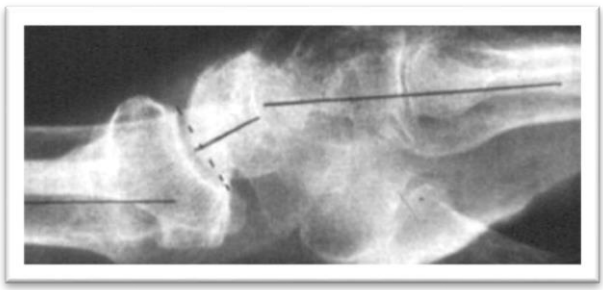
- Unique to children
- It's due to vitamin D, calcium deficiency or insufficient exposure to the Sunlight (nutritional & sun exposure).
- Sometimes the cause is the kidney disease & it's called renal rickets.

Osteoporosis:

- **Fracture of the Neck of the Femur (NOF):** The most dangerous complication especially in old people.
- **Colles fracture**
- **Spinal Osteoporosis:**
  - Mainly affect female more than male due to the decrease of the level of estrogen after the menopause.
  - It's painless & can cause the fractures.
- **Osteoporotic fractures** are painful & can affect the patient's life & he may die from it (especially hip fracture).

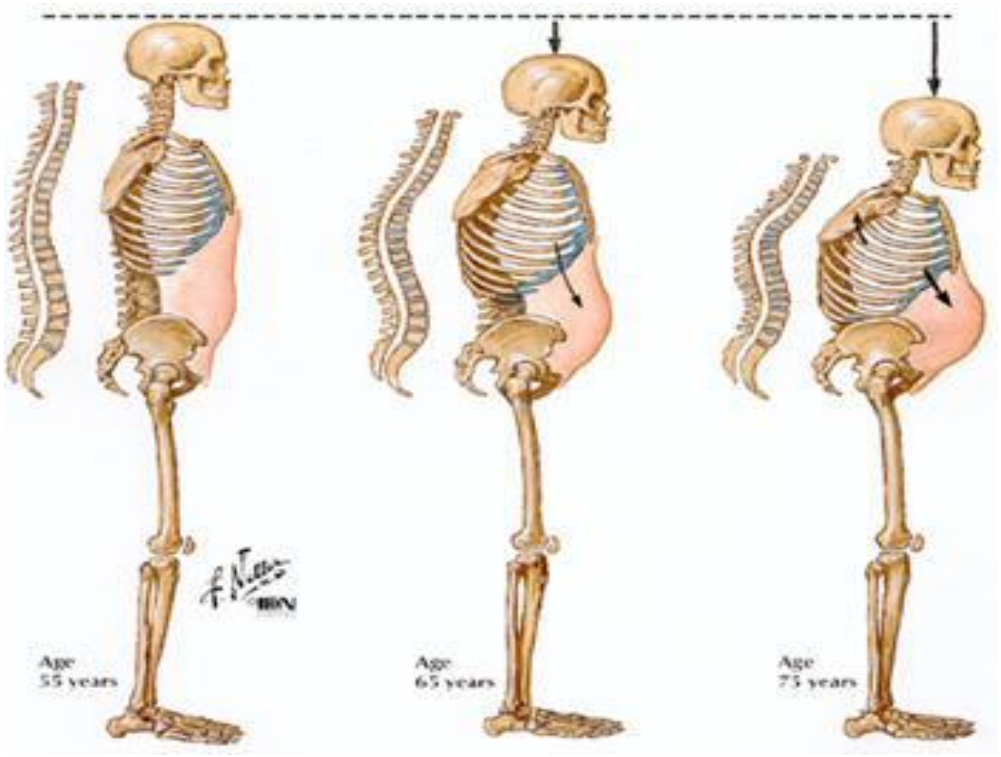

Fractured NOF

Osteoporosis: Colles fracture



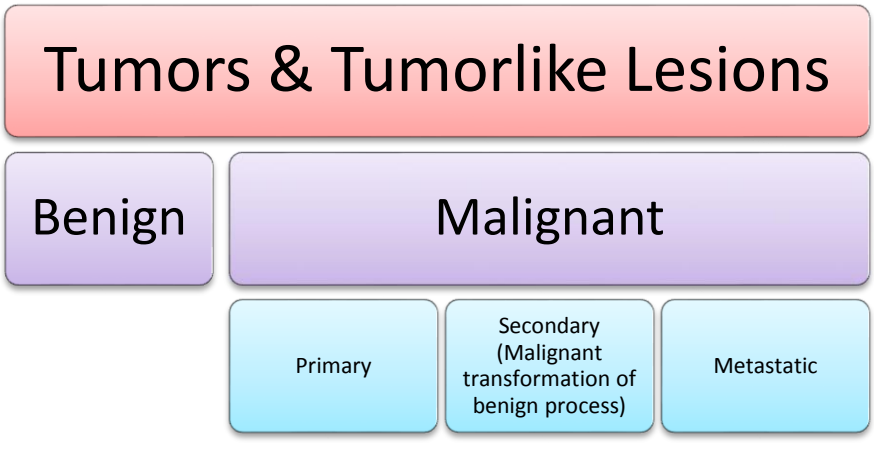

Hemi-Arthroplasty Lt Hip


Osteoporosis: Displaced Intracapsular Fracture



Spinal Osteoporosis

- Bone Tumors:

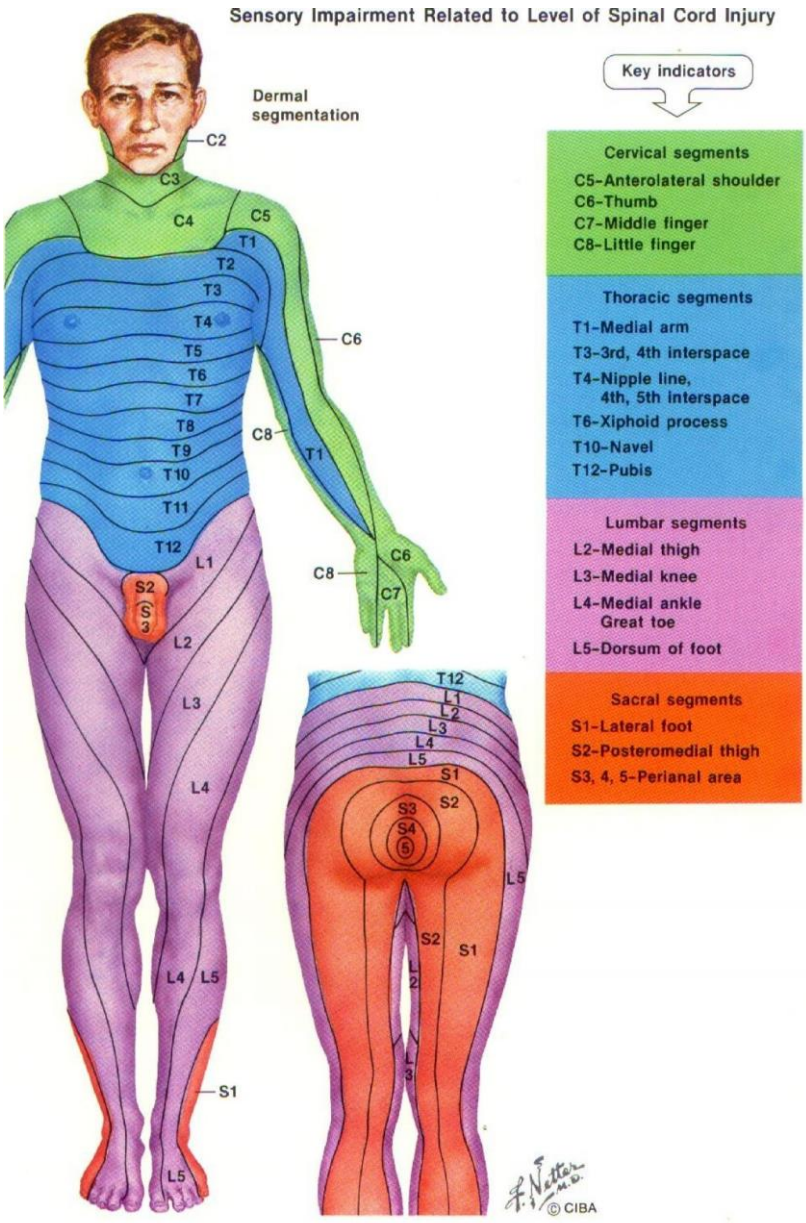


In the x-ray, there are:

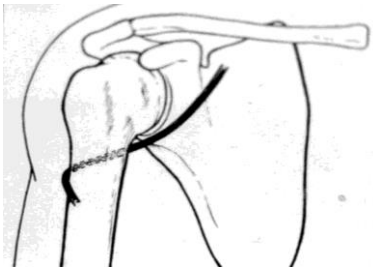
- Bone destruction.
- Pathological fracture.
- Ill-defined lesion.
- Most likely it's malignant tumor.

- Neurological Evaluation:

- **Sensory:**



Axillary Nerve or Circumflex Nerve



- Muscle wasting:

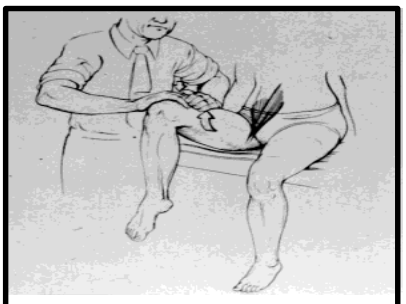
There are differences between the R &L side:

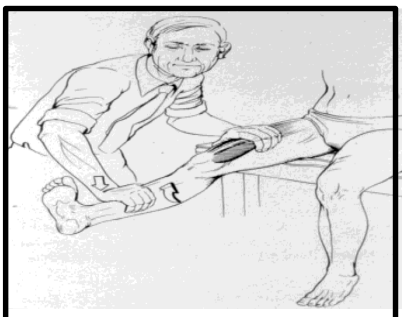
- Difference in the shoulder's shape (the left one has normal contour while the right one is slipped).
- There is atrophy of the muscle at the right side due to nerve damage.

- Muscle Power Testing:

- **Muscle Power testing:**
  - 0 = no power.
  - 1= simple contracting.
  - 2= slight contraction within the gravity.
  - 3= muscle power against gravity
  - 4= against gravity with resistance
  - 5= against gravity with normal resistance

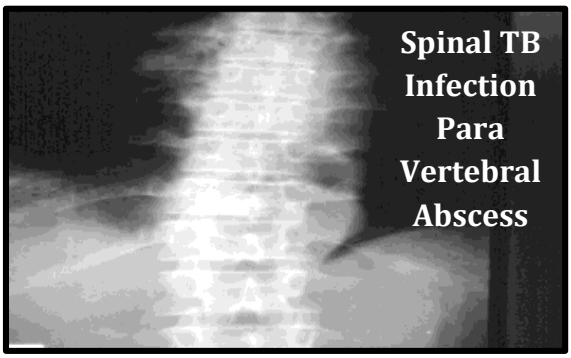

External Fixator: Ilizarove


Iliopsoas muscle


Quadriceps muscle


Neuromuscular disorder: Polio


Chronic Osteomyelitis: discharging


Spinal TB Infection Para Vertebral Abscess


Chronic Osteomyelitis: Sequestrum

Physiotherapy for Orthopedic Patients:

- Physiotherapy is an important part of orthopedic and trauma management.
- It is used for: pain relief, prevention of stiffness, muscle strengthening, mobilization of stiff joint or spine, training non-weight bearing or partial weight bearing.
- Physiotherapy modalities include: heat, cold, exercise, ultrasound, traction, electrical stimulation.

Summary

- **RED FLAGS:** Open Fractures, Complicated Fractures, Compartment Syndrome, Acute joint Dislocations, Multiple Trauma or Pelvic Injury, Cauda Equina Syndrome and Infection of Bone, Joint and Soft Tissue: Osteomyelitis, Septic Arthritis and Cellulitis.
- **Valgus:** when the limb go lateral and the joint go medial.
- **Varus:** when the limb go medial the joint lateral.
- **Orthopedic Diseases:** Congenital and Acquired.
- To describe a **dislocation**, you start by Distal to Proximal fragment: Anterior, Posterior, Inferior, or Superior.
- **Acute dislocation** may be complicated by neurovascular injury.
- **Acute dislocations** require urgent reduction
- **Intra-articular Fractures:** If displaced; should always be treated by ORIF= (Open Reduction and Internal Fixation). Failure to reduce and fix such fracture results in loss of function, deformity and early degenerative changes.
- **Lachman's test:** To diagnose injury of the anterior cruciate ligament (ACL).
- When the mother complains of difficulty in changing the baby's diaper, think about **Developmental Dislocation of Hip (DDH).**
- **Slipped Capital Femoral Epiphysis (SCFE)** develops during periods of accelerated growth, shortly after the onset of puberty.
- **Hyperlordosis** is an excessive inwards curvature of the lumbar (lower) spine. It's very common among females in our society.
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