

INTRODUCTION TO ORTHOPEDICS



Lecture objectives:

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

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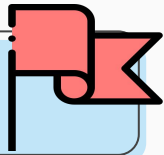
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References: Dr's slides & 436 team

INTRODUCTION

- Branch of surgery concerned with conditions involving the musculoskeletal system. Orthopedic surgeons use both surgical and nonsurgical means to treat musculoskeletal trauma, spine diseases, sports injuries, degenerative diseases, infections, tumors, and congenital disorders.
- It includes: bones, muscles, tendons, ligaments, joints, peripheral nerves, vertebral column, spinal cord and its nerves. *Not only bone surgery.*
- Subspecialties: General, pediatric, sports and reconstructive (**commonly ACL “anterior cruciate ligament” injury**), trauma, arthroplasty, spinal surgery, foot and ankle surgery, oncology, hand surgery, upper limb (new) **elbow & shoulder**

RED FLAGS



One or two will come in OSCE

- Red Flags = Warning Symptom or Sign = necessity for urgent or different action/intervention. *you always have to take them seriously and you should not delay any interventions.*
- Red flags should always be looked for and remembered.

Examples of red flags:

1. **Open fractures:** (Fractures communicate with the external environment, open fracture is a red flag because of the complications that can happen if you didn't intervene.)
 - More serious and **very high possibility of infection** and complications.
2. **Complicated fractures:** (Fracture with a neurovascular damage E.g. leg fracture with foot drop)
 - Fracture with injury to the major blood vessel E.g. **bleeding or DVT**, nerve or nearby structures
3. **Compartment Syndrome:** (you have to diagnose it early)
 - Increase in intra-compartment pressure which endangers (**compromise**) the blood circulation of the limb and may affect nerve supply.
4. **Cauda Equina Syndrome:**
 - **Compression of the nerve roots of the Cauda Equina** at the spinal canal **which affects** motor and nerve supply **to lower limbs and bladder** (incontinence) (also saddle or peri-anal area sensory).
5. **Infection of bone, joint and soft tissue:** very important red flag always think about it especially the joint infection, infection can affect joints, bones and all the soft tissues.
 - Osteomyelitis: Infection of the bone.
 - **Septic Arthritis: Infection of the joint.**
 - Cellulitis: Spreading Infection of the soft tissue. May cause septicemia or irreversible damage.
6. **Multiple Trauma or Pelvic Injury:** (complicated fracture) More than one fracture or injury sustained at the same time. Consider massive blood loss and associated injuries (**it's associated with internal organs injuries, which can lead to massive blood loss**)
7. **Acute joint Dislocations:** (complicated fracture)
 - Requires urgent reduction or may cause serious complications such as **neurovascular injury or arthritis.** **Must treated by 24h** **bc blood supply is compromised.**
 - Dislocation: complete disruption of the joint
 - Subluxation: partial dislocation

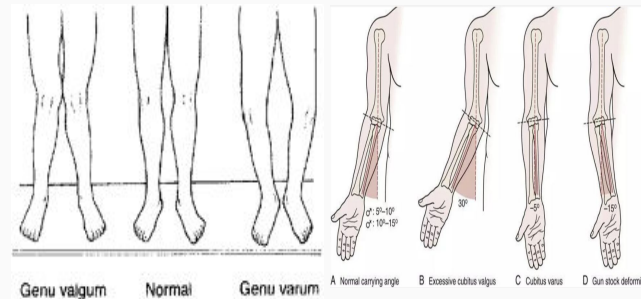
ALIGNMENT TERMINOLOGY

In OSCE during inspection you should comment on: Atrophy, alignment and deformities.

We describe the alignment as:

- Normal → leg is straight.
- Varus → (bow-legged) (knees are pushed away from each other; “RUM in English means alcohol bottle” So imagine a bottle between the knees)
- VaLgus → (knees are stick to each other; valGum)
 - L: “the distal part” lateral from the central line.

Extra

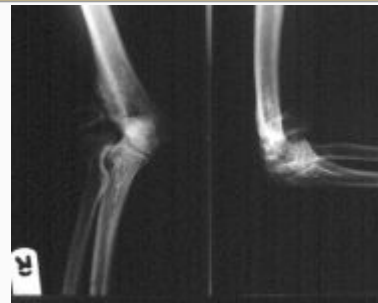


Cubitus varus



Distal piece of humerus is going towards the ulna, medially (you can kind of see the olecranon)

Cubitus valgus



Distal piece of humerus is going away from the ulna (away from olecranon)

DEFORMITIES



Congenital:

- Common congenital anomaly: Talipes Equinovarus (TEV), AKA clubfoot (very common in KSA) .

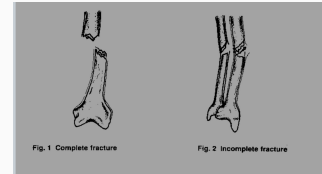
Acquired:

- Trauma “most common”
 - It includes fractures (break in the continuity of bone), dislocations, soft tissues injuries (ligaments, tendons), nerve injuries and epiphyseal injury.
- Developmental:
 - Developmental Dislocation of Hip, Developmental Foot deformity, Slipped Capital Femoral Epiphysis, Spinal Deformities.
- Inflammation: rheumatological dx, autoimmune
- Infection: Osteomyelitis
- Neuromuscular: Poliomyelitis, Duchenne muscular dystrophy, cerebral palsy.
- Degenerative: Primary or secondary (osteoarthritis)
- Metabolic: Rickets, osteoporosis
- Tumor: osteosarcoma, myosarcoma, chondrosarcoma

TRAUMATIC INJURIES

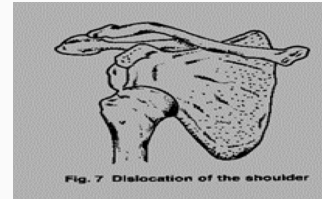
Fractures: Break in the continuity of bone.

1. complete: complete separation.
2. incomplete: incomplete separation.



Dislocations: Complete separation of the articular surface.

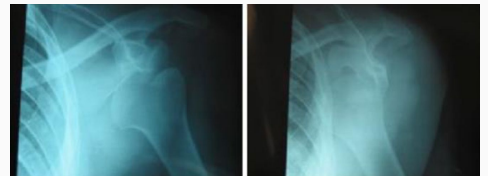
Distal to proximal fragment: Anterior, Posterior, Inferior, Superior.



Fracture dislocation: Dislocation with fracture of the bone.

When you have dislocation always think about fracture

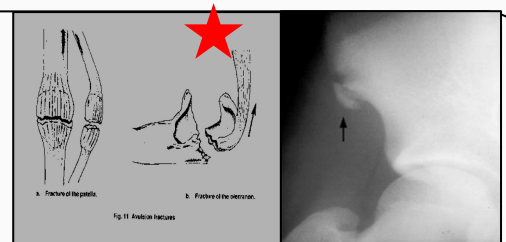
Always need to have X-Ray joint Above and Below.



Avulsion Fracture: Fracture due to resisted muscle action.

basically muscle contraction that force you to resist muscle action, will cause this pattern, usually it's transverse pattern.

- Examples: fracture of anterior superior iliac spine due to resisted action of sartorius muscle.



Avulsion¹ → Transverse pattern

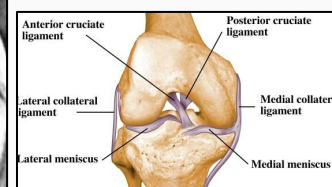
Intra-articular Fractures:

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



Soft tissue injury:

- Most common soft tissue injury: knee joint.
- Most common knee joint injury:
 - Anterior Cruciate Ligament (ACL) →
 - “Common in sport injuries”



1. An avulsion fracture is when a tendon or ligament pulls a piece of fractured bone away

DEVELOPMENTAL DEFORMITIES

Developmental Dislocation (Dysplasia) of Hip (DDH):

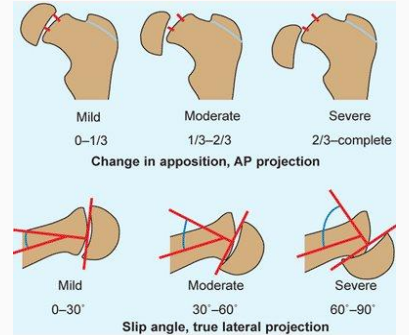
Underdeveloped Epiphysis
(seen on the left side)



Developmental Foot Deformity Hallux Valgus



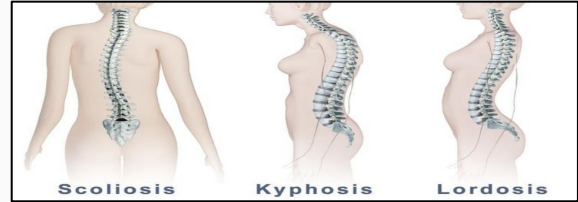
Slipped Capital Femoral Epiphysis (SCFE)



Spinal Deformities

These deformities may be congenital or acquired

- Hyperlordosis
- Kyphosis
- Scoliosis



DEGENERATIVE DISORDERS

- Occur at any joint.
- Can be primary or secondary (more common).
- Can lead to pain and/or deformity and/or loss of function.



Osteoarthritis of Hip

4 signs of OA Usually Arthritis on x-ray: **imp**

1. Osteophytes
2. Sclerosis
3. Decrease in joint space
4. Cystic changes



Osteoarthritis of Knee


Usually Arthritis involves the medial side.

NEUROMUSCULAR DISORDER

Poliomyelitis: very rare nowadays due to vaccination
 “Pure motor involvement”

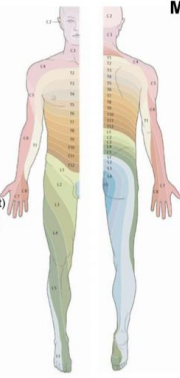


★ Nerve Injury:

Axillary nerve injury	Spinal cord injury
<p style="color: green;">Wasting of Deltoid muscle</p> 	<ul style="list-style-type: none"> • Often results from fracture dislocation of spine. • When injury is at cervical spine it may result in Tetraplegia. • Injury at dorsal spine may result in Paraplegia.

★ Neurological Evaluation: Sensory & Motor

You have to know

Dermatomes		Myotomes
<ul style="list-style-type: none"> • C4 (collar) • C5 (lateral shoulder) • C6 (thumb) • C7 (no Heaven) • C8 (pinky) • T4 (teet-pore) • T7 (xiphoid) • T10 (belly-butTen) • L1 (Inguinal Ligament) • L4 (medial malleolus) • L5 (top of foot) • S1 (Heel) 		<ul style="list-style-type: none"> C5 – Shoulder abduction (deltoid) C6 – Elbow flexion (biceps;brachiorad) C7 – Elbow extension (triceps) C8 – Wrist flexion (FDS) T1 – Finger abduction (DABs) L2 – Hip flexion (iliopsoas) L4 – Knee extension (quad fem) L5 – Dorsiflexion (tibialis anterior) S1 – Plantar flexion (gastrocnemius)

We have two important medical terminologies we have to know the **difference**:

- Central nerve examination: examine the myotomes and dermatomes [we use it in spine condition]
- Peripheral nerve examination: examine the ulnar, radial, median and so on [on fracture condition]

METABOLIC DISORDERS

Rickets (bow legs):



Osteoporosis:

there are fractures that usually associated with it like :
Pathological Fracture Of hip | Colles fracture



BONE TUMORS



it can be obvious but
sometimes you have to do
advanced imaging to see if it's
benign or malignant.

INFECTIONS



they can be clear, like this
picture you can see
discharging sinus but
sometimes you have to do
x-ray and advanced
imaging to diagnose them.

Chronic Osteomyelitis → Discharging sinus, **Sequestrum***

PHYSIOTHERAPY

★ 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.
- surgery is not always the answer,sometimes you can treat the patient with physiotherapy and good rehab.

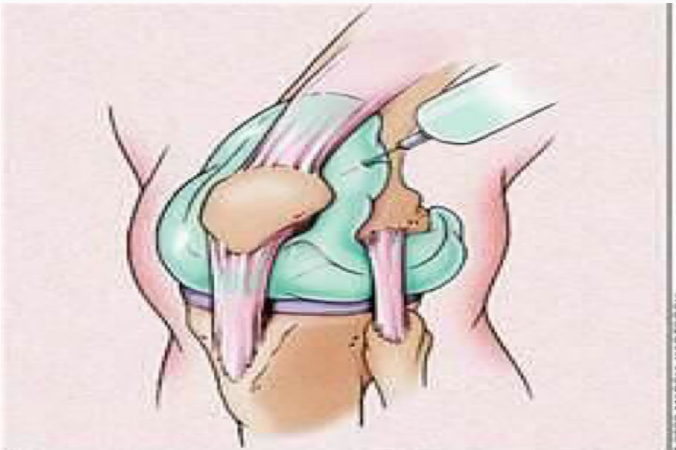
CLINICAL SKILLS

CAST APPLICATION



not everything in orthopedic requires surgery,sometimes we can treat the patient with reduction of the fracture and stabilize it, especially in the pediatric population.

KNEE ASPIRATION



it's an important skill to confirm one of the red flags which is septic arthritis,also it important in the administration of medication such as cortisone in people with arthritis to relief the pain.

QUESTIONS

1). Which one of the following presentations will most likely have urinary incontinence?

- A. An 18-year-old male that has a grade III open fracture of the left femur following a major car accident
- B. A 23-year-old sexually active male presenting with sudden monoarthritis of the knee
- C. A 60-year-old mechanic that has a herniated disc in the lumbar region
- D. A 30-year-old male presenting with very severe pain and paralysis in the right leg following a road traffic accident

2). Which one of the following radiological signs is NOT consistent with osteoarthritis?

- A. Formation of osteophytes
- B. Formation of a pannus
- C. Subchondral sclerosis
- D. Narrowing of the joint space

3). Which one of the following orthopedic red flags carries the highest risk of infection?

- A. Open fracture
- B. Compartment syndrome
- C. Cauda equina syndrome
- D. Acute joint dislocations

4). Which one of the following signs indicate chronic instead of acute osteomyelitis?

- A. Soft tissue swelling
- B. Bone demineralization
- C. Development of sequestra
- D. None of the above

ANSWERS: 1:C 2:B 3:A 4:C