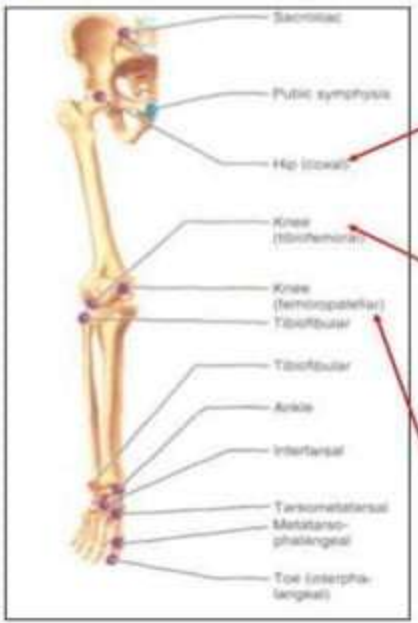
CLINICAL ANATOMY BONES &JOINTS

MADE BY
SURESH CHANDRA
MPT SPORTS FIRST YEAR

BONES AND JOINTS OF UPPER LIMB

REGIONS	BONES	JOINTS
Shoulder Girdle	Clavicle Scapula	Sternoclavicular Joint Acromioclavicular Joint
Bone of Arm	Humerus	Glenohumeral Joint
Bones of Forearm	Radius Ulna	Humeroradial Joint Humeroulnar Joint Proximal Radioulnar Joint Distal Radioulnar Joint
Bones of Wrist and Hand	8 Carpal Bones 5 Metacarpal 14 Phalanges	Intercarpal Joint Carpometacarpal Joint Metacarpophalangeal Joint Interphalangeal Joint

BONES AND JOINTS OF LOWER LIMB



Joints of Lower Limb

- Hip (femur + acetabulum)
  - Ball + socket
  - Multiaxial
  - Synovial
- Knee (femur + tibia)
  - Hinge (modified)
  - Biaxial
  - Synovial
  - Contains menisci, bursa, many ligaments
- Knee (femur + patella)
  - Plane
  - Gliding of patella
  - Synovial

Joints of Lower Limb

- Proximal Tibia + Fibula
  - Plane, Gliding
  - Synovial
- Distal Tibia + Fibula
  - Slight "give" (synarthrosis)
  - Fibrous (syndesmosis)
- Ankle (Tibia/Fibula + Talus)
  - Hinge, Uniaxial
  - Synovial
- Intertarsal & Tarsal-metatarsal
  - Plane, synovial
- Metatarsal-phalanges
  - Condyloid, synovial
- Interphalangeal
  - Hinge, uniaxial

CLINICAL ANATOMY OF UPPER LIMB

SHOULDER JOINT DISLOCATION

•Most commonly dislocated major joint in body.

Large head of humerus to shallow glenoid cavity

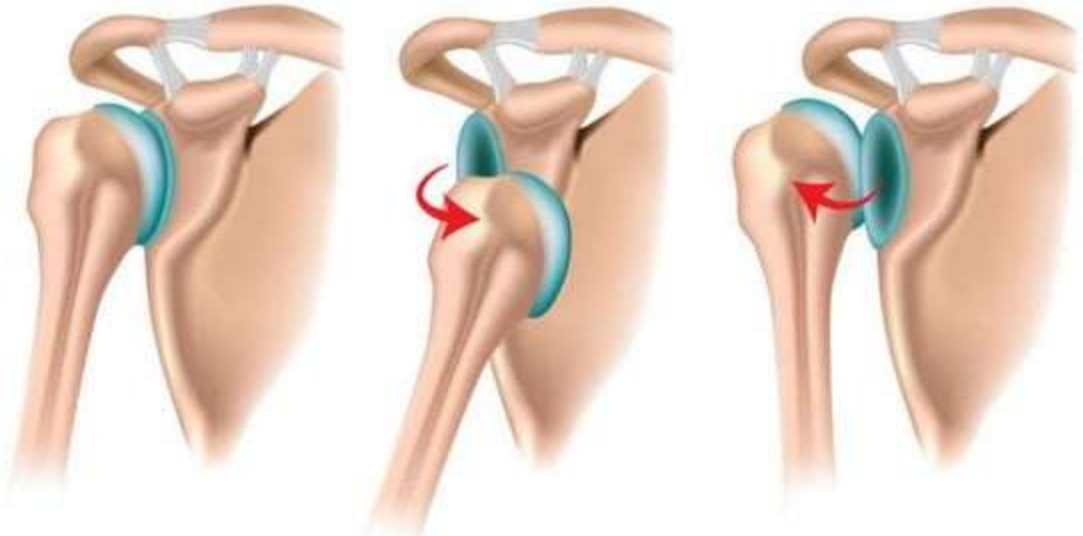
◦Capsule is lax (Wide ROM at cost of stability)

◦Stability depends almost entirely on the strength of surrounding muscles (Rotator Cuff).

Commonly dislocated inferiorly.

◦ Anteriorly shoulder joint protected by subscapularis.
◦ Superiorly shoulder joint protected by supraspinatus.
◦ Posteriorly shoulder joint protected by teres minor and infraspinatus.
◦ Inferior aspect of shoulder joint completely unprotected.

Shoulder Dislocation



Normal anatomy

Anterior dislocation

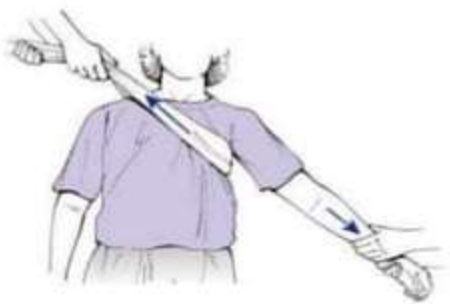
Posterior dislocation

Management

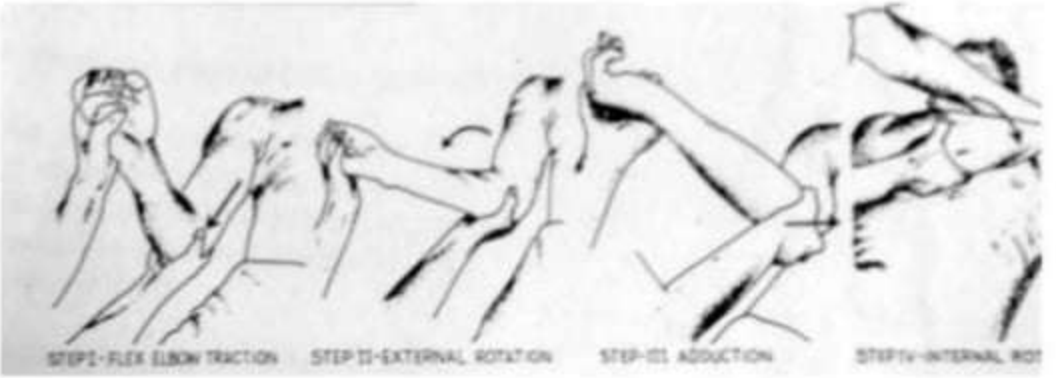
- **Emergency**
- Should be reduced in < 24 hours or else AVN of head of humerus
- Immobilised strapped to the trunk for 3-4 weeks and rested in a collar and cuff

MANEOUVERS

Traction-countertraction



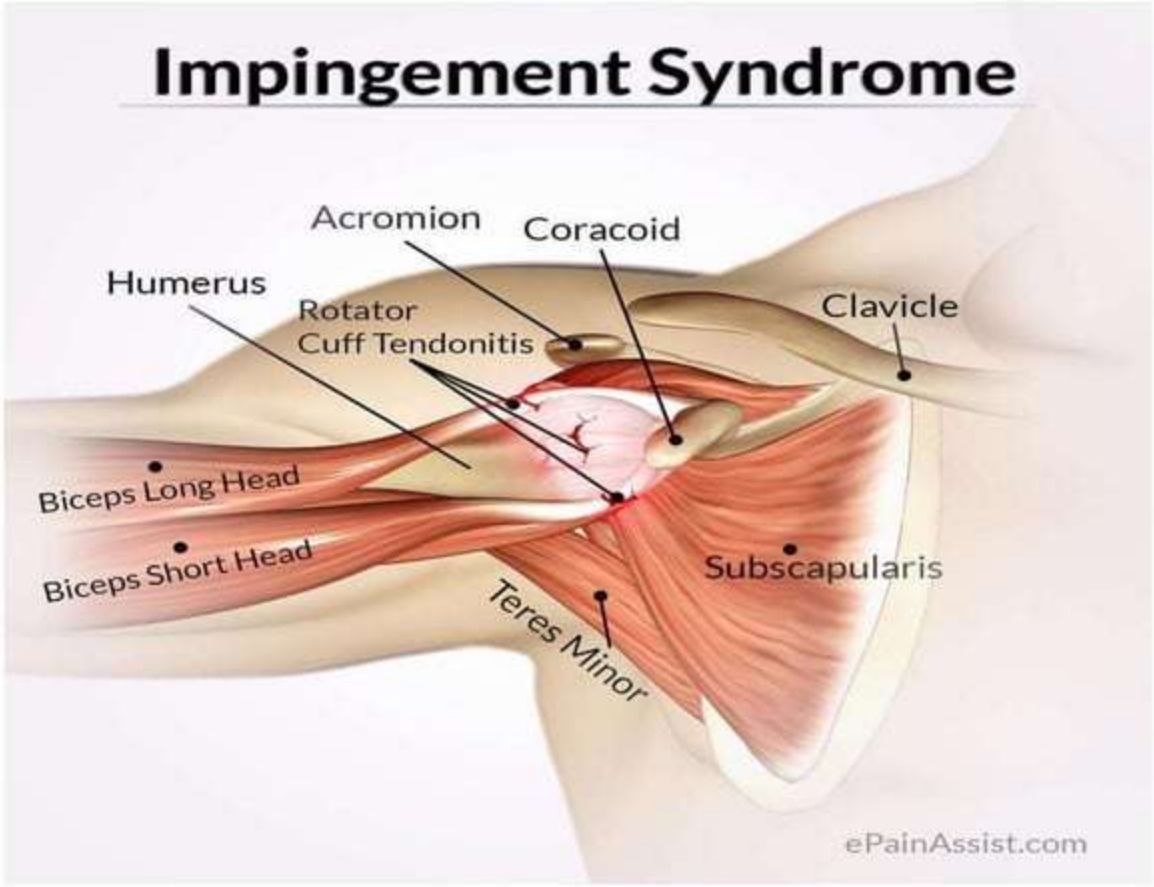
Kocher's Technique



IMPINGEMENTS

- Involves mechanical compression of Supraspinatus tendon, subacromial bursa, and long head of biceps tendon
- Related to shoulder instability and overhead activities
- Failure of RC muscles to maintain position.

Shoulder impingement has **primary** (structural) and **secondary** (posture & movement related) causes.


Impingement Syndrome
Acromion
Coracoid
Humerus
Rotator
Cuff Tendonitis
Clavicle
Biceps Long Head
Biceps Short Head
Subscapularis
Teres Minor
ePainAssist.com

PAINFUL ARC SYNDROME

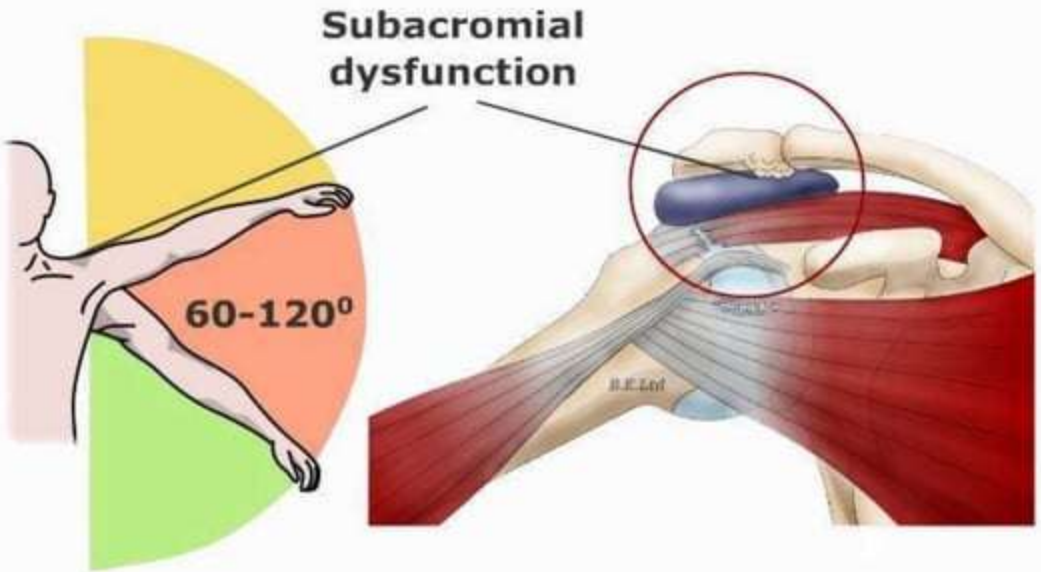
Pain in shoulder region and arm during abduction in mid-range (b/w 60 to 120 degrees of r.o.m)

Complete freedom from pain during initial and terminal stages.

Causes:

1. Tear, inflammatory degeneration, or calcified deposits in supraspinatus tendon.
2. Subacromial bursitis.
3. Contusion and undisplaced fracture of greater tubercle of humerus.

Painful arc syndrome



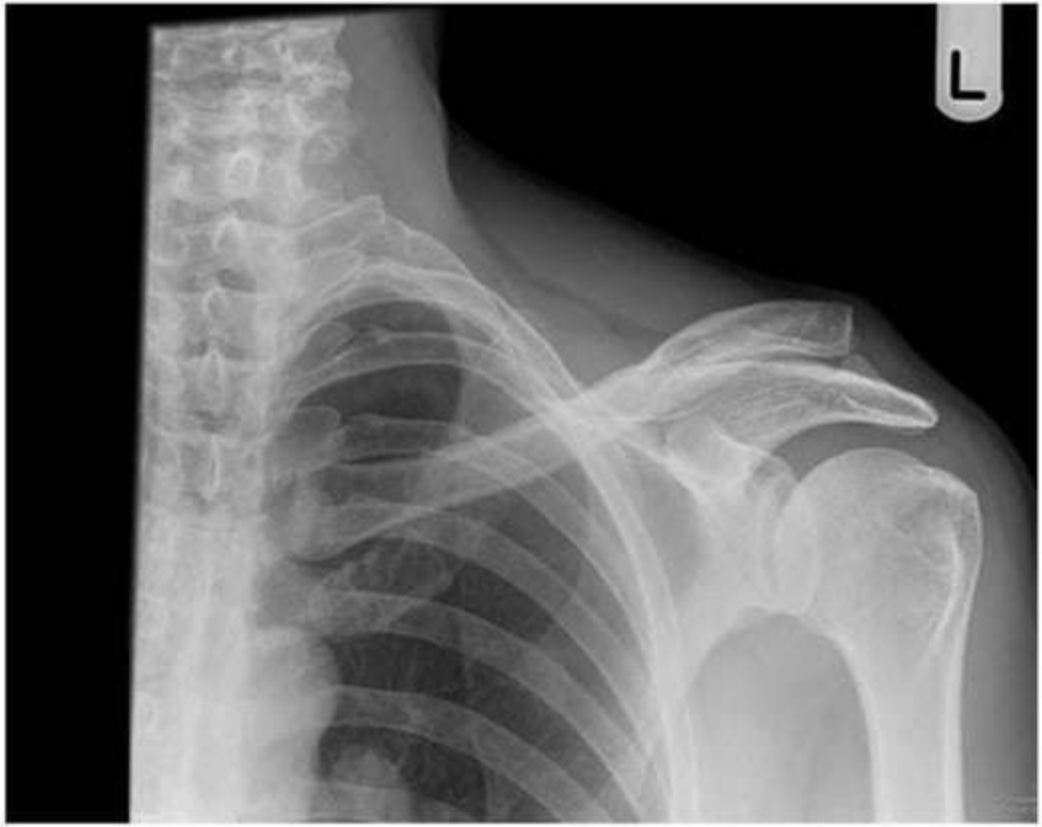
SHOULDER SEPERATION

Tearing of coracoclavicular and coracoacromial ligaments caused by downward blow on tip of shoulder.

Coracoclavicular and coracoacromial joint spaces become 50% wider than in normal contralateral shoulder.

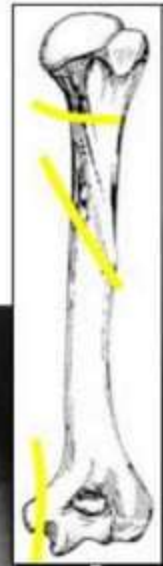
Presenting features:

1. Injured arm hangs lower than normal (contralateral arm)
2. Noticeable bulge at tip of shoulder as a result of upward displacement of clavicle.


L

Fractures of the humerus

- **Radiographic features.**



MANAGEMENT

NON OPERATIVE

- INDICATIONS
  - Undisplaced closed simple fractures
  - Displaced closed fractures with less than 20 anterior angulation, 30 varus/ valgus angulation
  - Spiral fractures
  - Short oblique fractures
- Conservative Treatment
  - >90% of humeral shaft fractures heal with nonsurgical management
    - 20degrees of anterior angulation, 30 degrees of varus angulation and up to 3 cm of shortening are acceptable
    - Most treatment begins with application of a coaptation splint or a hanging arm cast followed by placement of a fracture brace

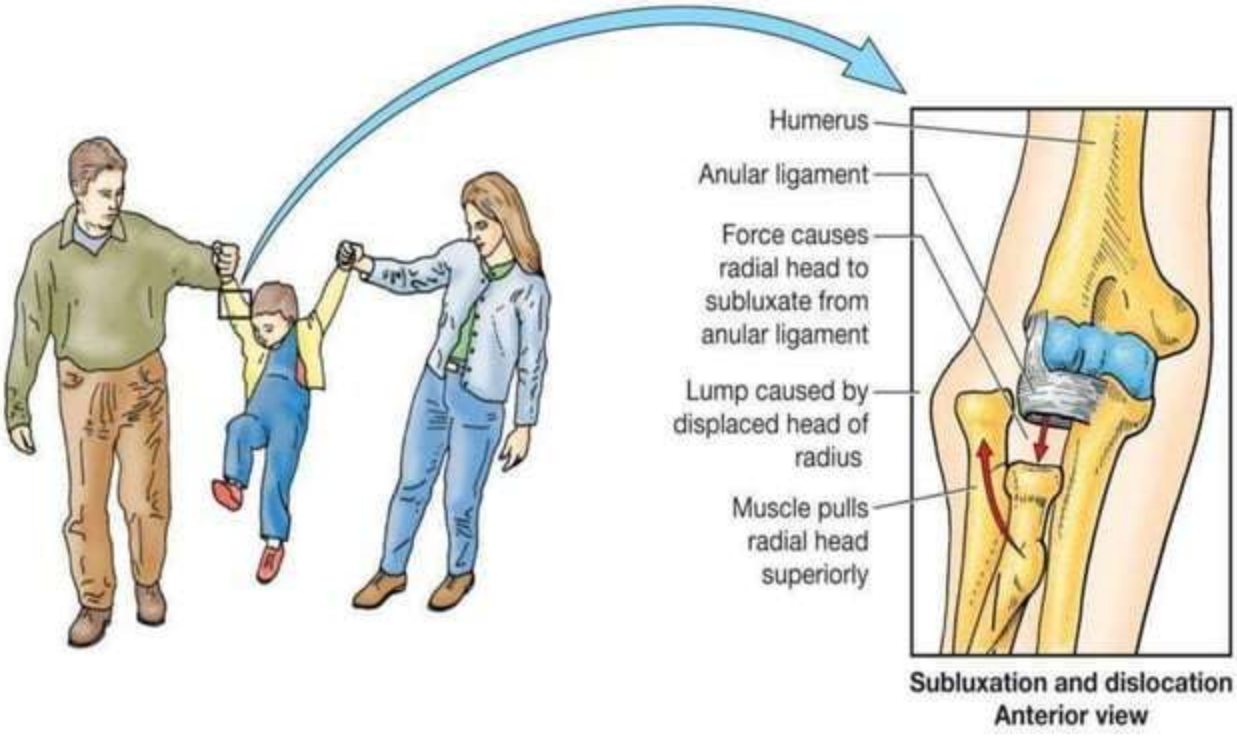
PULLED ELBOW

- Also known as radial subluxation.

- Vulnerable for preschool children (1-3 years old).

- Annular ligament is funnel-shaped in adults, but its sides are vertical in young children. (When child is suddenly lifted/pulled up when forearm is in pronated position, head or radius may slips out partially from annular ligament).

- Pain and limitation of supination.



Subluxation and dislocation
Anterior view

Supracondylar Fractures of Humerus

- It is # which involves the lower end of the humerus usually involving the thin portion of the humerus through

  Olecranon fossa or

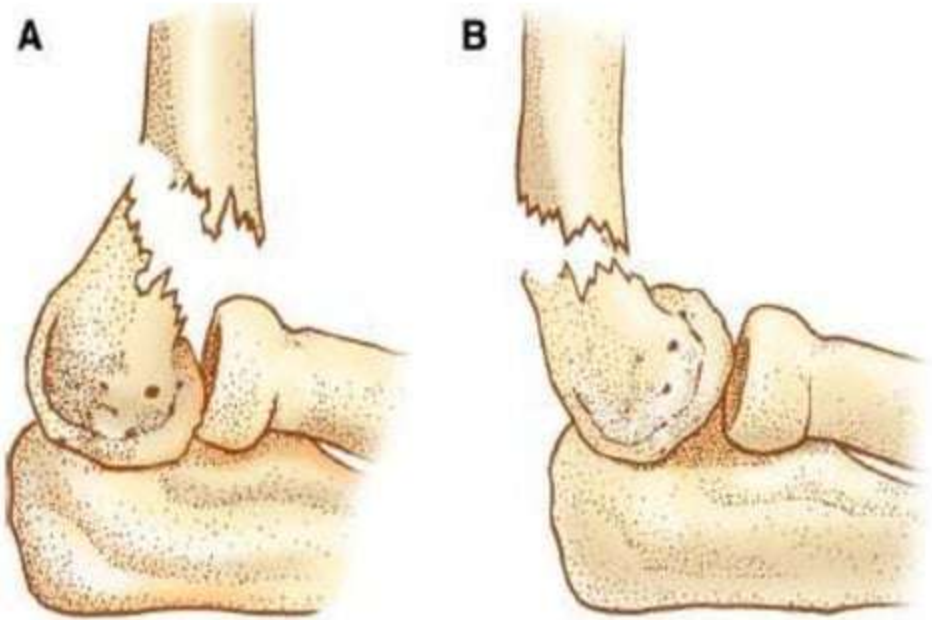
  Just above the fossa or

  Metaphysis

- Most common elbow injuries in children.

- Makes up approximately 60% of elbow injuries.

- Becomes uncommon as the age increases.



Supracondylar fracture, extension type

Supracondylar fracture, flexion type

Treatment

- General principles:

  Splinting elbow in comfortable position

  20-30degrees of flexion of elbow, pending

  Careful physical examination & X-ray evaluation.

  Tight bandaging/ excessive flexion or excessive extension should be avoided

  Associated life threatening complications (if any) to be attended first.

TENNIS ELBOW

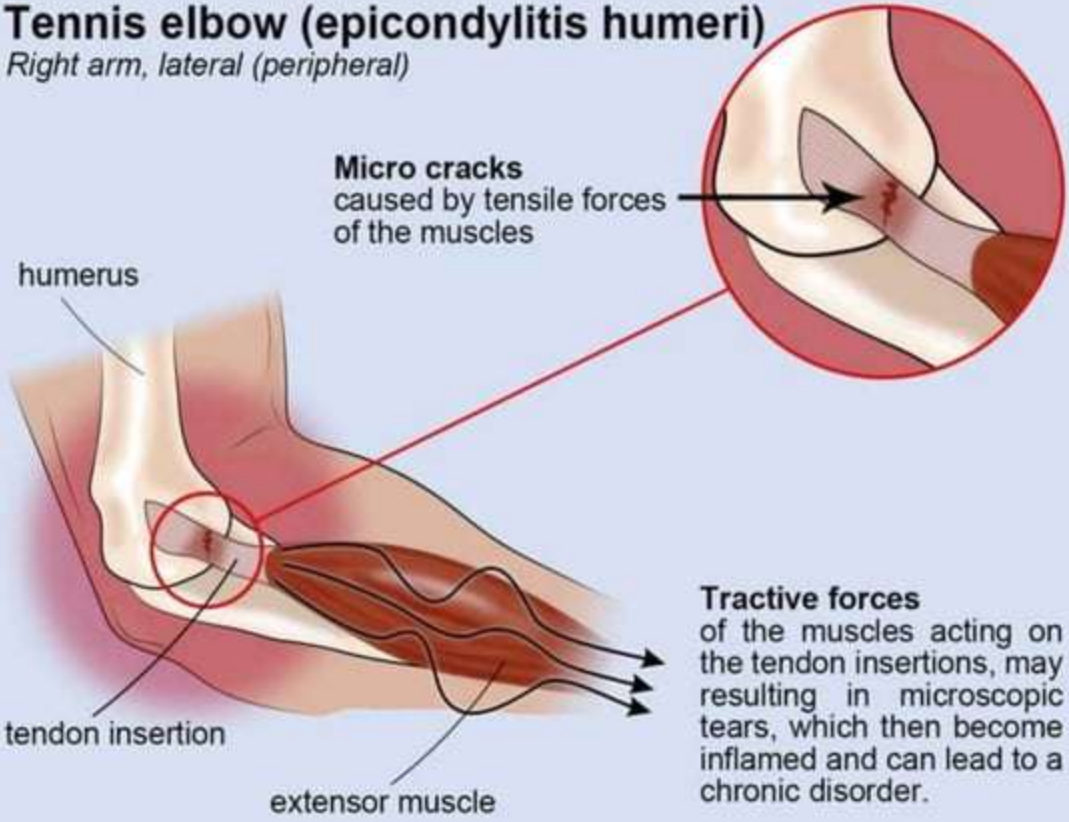
Repeated or violent extension of the wrist with forearm pronated (i.e.movements required during backhand strokes in lawn tennis), leads to tenderness over lateral epicondyle of humerus.

Possibly due to:

- Sprain of radial collateral ligament.
- Tearing of fibers of extensor carpi radialis brevis muscle.
- Inflammation of the bursa underneath extensor carpi radialis brevis
- Strain or tear of common extensor origin

Tennis elbow (epicondylitis humeri)

Right arm, lateral (peripheral)



Treatment

Conservative :

- Mainly to avoid activities which will strain on extensors muscles of forearm like wrist extensor movements.
- NSAIDS.

- Local Ice fomentation

- Tennis elbow belt.

Common distal end radius fracture

Colles' fracture

- Very common extra-articular fractures of the distal radius
- most frequently seen in elderly women.
- Fall in to wrist dorsiflxtion
- Dinner fork deformity
- Transverse fracture at distal radial metaphysis
- Dorsal displacement of the distal fragment

Treatment-

Conservative Method:

For Undisplaced fracture-immobilisation in a below-elbow plaster cast for six weeks

For Displaced fractures- Manipulative reduction followed by immobilization in a colles cast.

Scaphoid fracture

- The most common carpal bone fracture
- Mechanism of injury
  - Direct axial compression or
  - hyperextension of the wrist, such as a fall on the palm on an outstretched hand

Wrist Sprains

Very hard to determine exact ligament that is damaged

MOI

- Usually forced extension but can happen in any direction

Signs and symptoms

- Pain in a specific area or with specific movement
- Laxity when joint is tested
- Swelling and discoloration

Treatment

- RICE
- Limited painful activity
- Rehab exercises to build strength
- A brace may be necessary

CLINICAL ANATOMY OF LOWER LIMB

BONES INJURIES

Knee, leg, and foot injuries are the most common lower limb injuries.

- Injuries to the hips make up less than 3% of lower limb injuries.
- Adolescents are most vulnerable to these injuries because of the demands of sports on their maturing musculoskeletal systems.

INJURIES OF HIP BONE

Fractures of the hip bone are referred to as *Pelvic fractures.*

• The term *hip fracture is most commonly applied* (unfortunately) to fractures of the femoral head, neck, or trochanters.

(A) Pelvic fracture (radiograph)

(B) Hip fracture (fracture of neck of left femur) -- MRI

HIP DISLOCATION

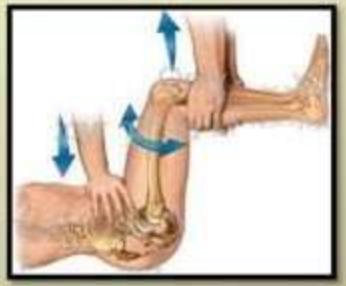
- Posterior dislocations are most common.
- Occurred when the hip is
- flexed, adducted, and medially rotated
- shortening and medially rotating the affected limb.

Traumatic Hip Dislocation ..

Management of Posterior Hip Dislocation :

Allis maneuver

Under GA, place the patient in supine position. While *an assistant stabilizes the pelvis with direct pressure*, Flex the hip and knee to 90° and pulls the thigh vertically upward.



Complications of Posterior Hip Dislocation :

1. Sciatic nerve injury.
2. Vascular injury *(hematoma)*.
3. Avascular necrosis.
4. Osteoarthritis.

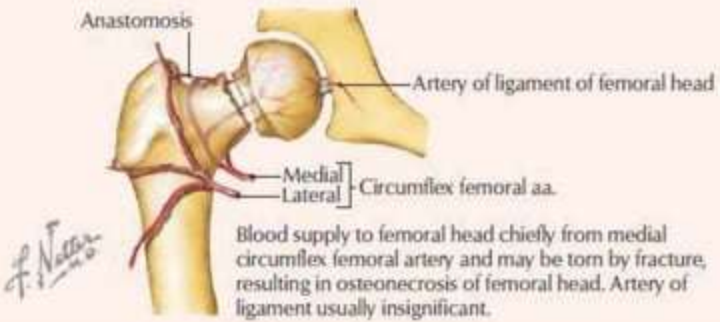
FEMORAL FRACTURES

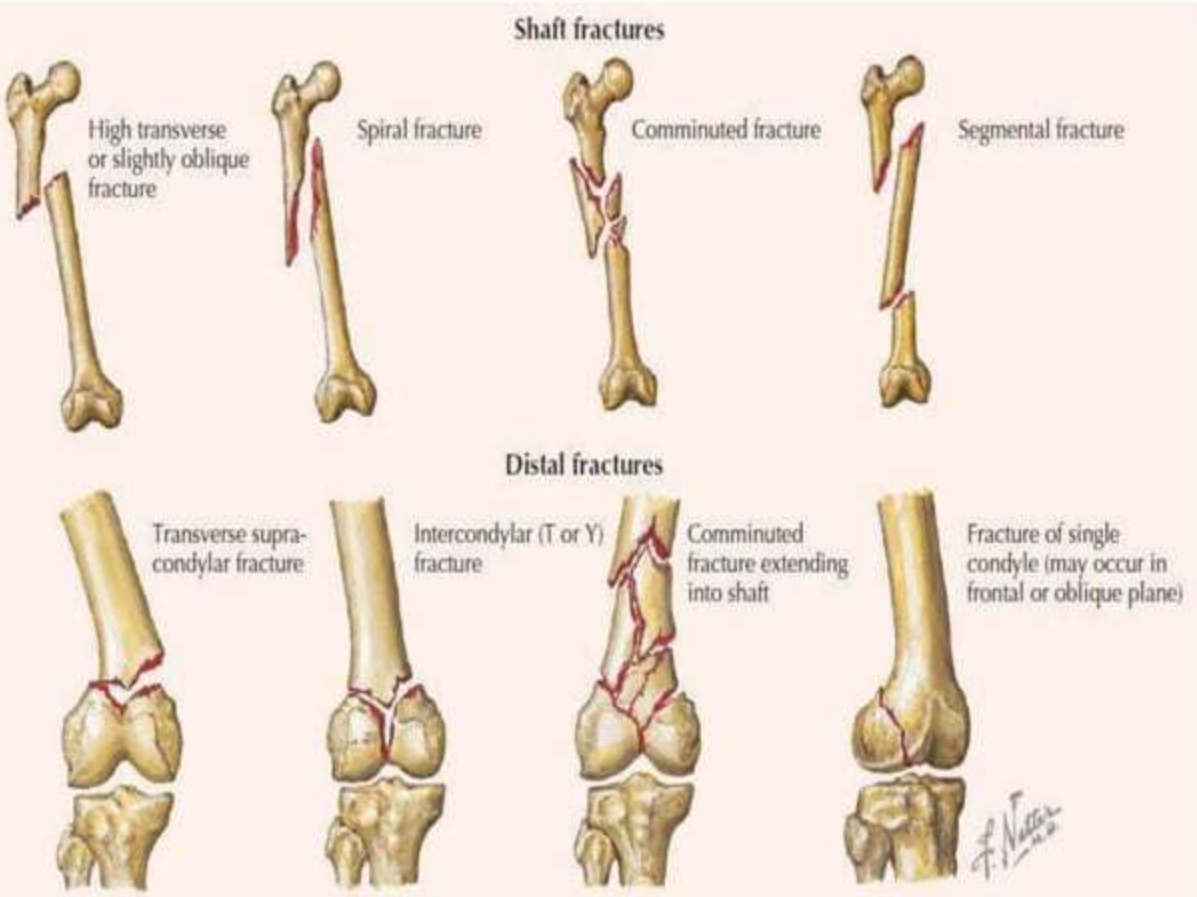
Type I. Impacted fracture

Type II. Nondisplaced fracture

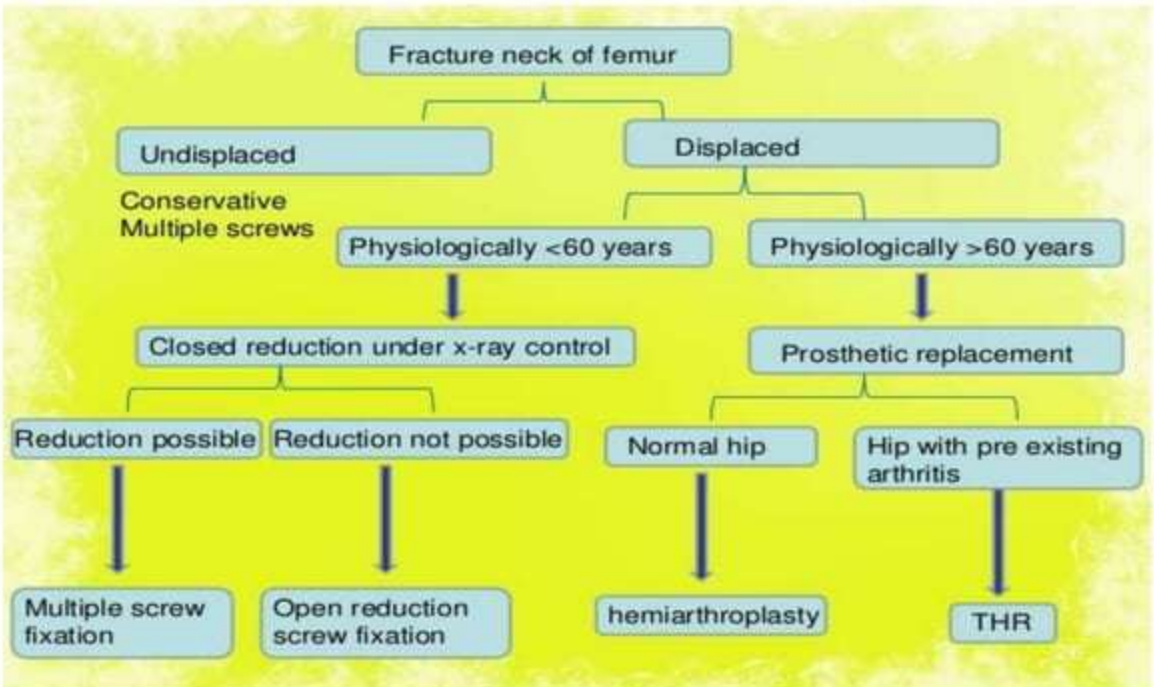
Type III. Partially displaced

Type IV. Displaced fracture

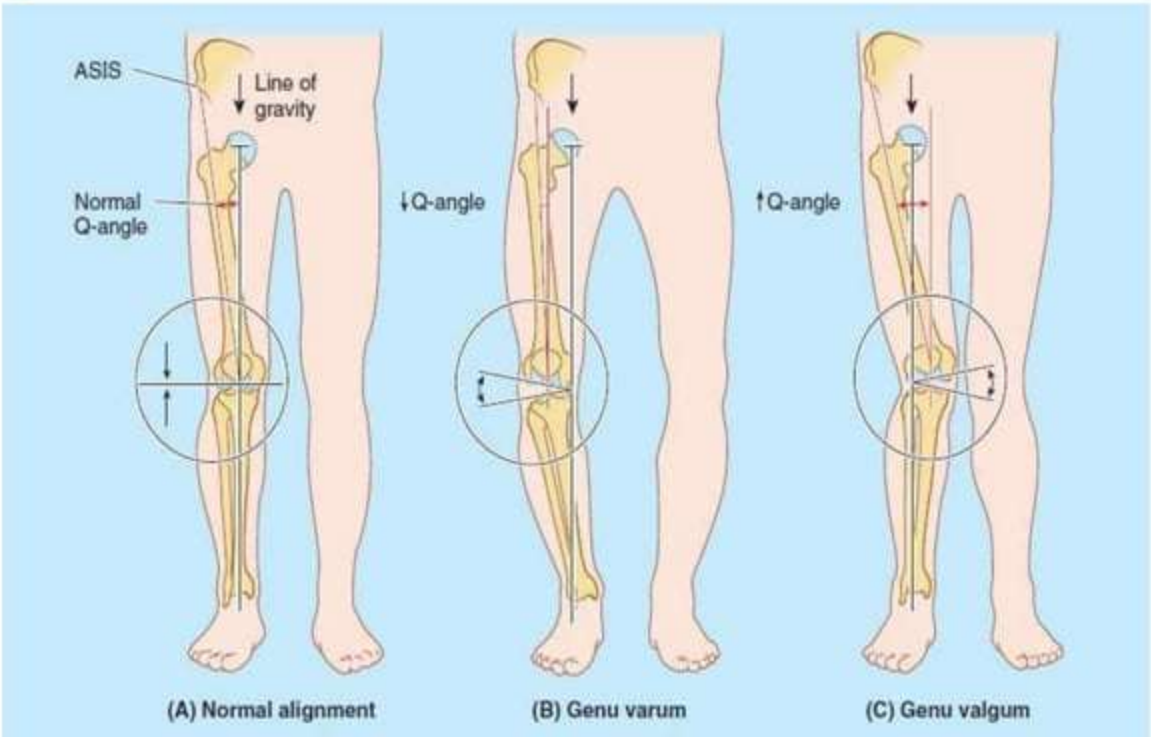



Shaft fractures
High transverse or slightly oblique fracture
Spiral fracture
Comminuted fracture
Segmental fracture
Distal fractures
Transverse supra-condylar fracture
Intercondylar (T or Y) fracture
Comminuted fracture extending into shaft
Fracture of single condyle (may occur in frontal or oblique plane)

MANAGEMENT


Fracture neck of femur
Undisplaced
Conservative
Multiple screws
Displaced
Physiologically <60 years
Physiologically >60 years
Closed reduction under x-ray control
Prosthetic replacement
Reduction possible
Reduction not possible
Normal hip
Hip with pre existing arthritis
Multiple screw fixation
Open reduction screw fixation
hemiarthroplasty
THR

GENU VARUM AND VALGUM



PATELLA DISLOCATION

- When the patella is dislocated, it nearly always dislocates laterally.
- Patellar dislocation is more common in women, presumably because of their greater Q-angle.
- the term *Q-angle was actually coined in reference to the angle of*

pull of the quadriceps).

PATELLA FRACTURE

- Due to : (Transverse fracture)
1. Direct blow
2. Sudden contraction of quadriceps muscle
- Proximal segment will go superiorly with quadriceps tendon.
- Distal segment will stay with patellar ligament

Femur (F), Patella (P), Tibia (T)

Treatment

- **Non-operative**
- **Knee immobilized in extension (brace or cylinder cast) and full weight bearing**
  - Indications
    - Intact extensor mechanism (patient able to perform straight leg raise)
    - Nondisplaced or minimally displaced fractures
    - Vertical fracture patterns
  - Early active ROM with hinged knee brace
    - Early WBAT in full extension
    - Progress in flexion after 2-3 weeks

TIBIAL FRACTURES

The tibial shaft is narrowest at the junction of its middle and inferior thirds, which is the most frequent site of fracture. Unfortunately, this area of the bone also has the poorest blood supply. Because its anterior surface is subcutaneous.

(A) Compound (open) fracture with external bleeding

(B) March (stress) fracture of tibia (*arrows*), most apparent in the MRI study at the right

(C) Diagonal fracture with shortening

(D) Transverse "boot top" fracture

General concept

- **Stable, low-energy fractures**
  → Nonsurgical management
- **Unstable and high-energy fractures**
  → **ORIF**
  - External fixation (uniplanar and multiplanar)
  - Plate fixation
  - Intramedullary nailing

- **Open tibial shaft fractures**
  → the associated
  bone and soft tissue loss

Open Tibia Fractures

- **Fracture stabilization**
  - Soft-tissue healing
  - Prevention of infection

- **External fixation** : an excellent alternative to nailing or plating
- Conversion to nailing : < 2 weeks

FIBULA FRACTURES

Actually, fibula is not very important in biomechanics of lower limb, it is only for muscle attachment , so treatment of its fractures is usually due to pain.

Fibular Shaft fractures Treatment

- Immobilization in posterior splint
- Non-weight bearing until follow-up visit. Weight bearing afterwards
- NB: always generously pad fibular head during casting to avoid peroneal nerve injury
- Treatment of tibial fracture generally treats fibular fracture as well
- ORIF generally reserved for stabilization of complex concurrent tibial injuries

ANKLE INJURY

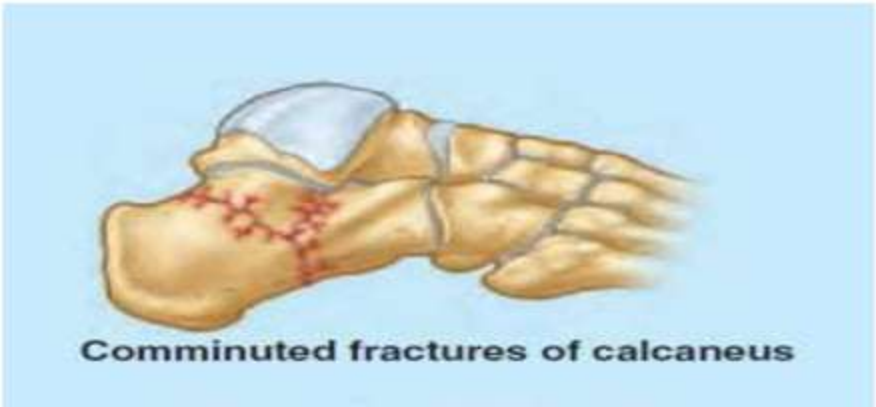
- The ankle is the most frequently injured major joint in the body.
- A sprained ankle is nearly always an ***inversion injury. involving twisting of the*** weight-bearing plantarflexed foot.
- The ***anterior talofibular ligament (part of the*** lateral ligament) is most commonly torn during ankle sprains, either
the anl
joint.

Classification of Ankle Sprains

	Ligament Disruption	Ecchymosis And swelling	Pain with Weight bearing	Treatment	Return to play
Grade 1	**None**	Minimal	Normal	PRICE Exercise +/-Physio	5-14 days
Grade 2	Stretch or Partial tear	Moderate	Moderate	PRICE Exercise, Physio +/- Brace/Tape	14-21 Days
Grade 3 --- High	Complete Tear Partial to full tear	Severe --- variable	Severe --- Variable	PRICE Physio Rehab Brace/Tape +/- Surgery	6-12 Weeks + --- Often 12 weeks +

FRACTURE OF CALCANEUS

- A hard fall onto the heel, from a ladder for example, may fracture the calcaneus into several pieces, producing a *comminuted fracture* .
- A calcaneal fracture is usually disabling because it disrupts the subtalar (talocalcaneal) joint, where the talus articulates with the calcaneus



Comminuted fractures of calcaneus


Stable Fracture
Stable Fracture of Heel Bone


Open Fracture
Open Fracture of Heel Bone
(Fractured bones which break through skin)


Displaced Fracture
Displaced Fracture of Heel Bone


Closed Fracture

CALCANEAL SPUR

- A calcaneal spur (abnormal bony process) protruding from the medial tubercle has long been associated with plantar fasciitis and pain on the medial side of the foot when walking.
- However. many asymptomatic patients are found to have such spurs.

Treatment of Heel Pain

- Non-steroidal anti-inflammatory medications
- Steroidal anti-inflammatory injections
- Orthotics
- Proper shoes
- Stretching exercises (?)
- Physical therapy

Dr. David Secord

FRACTURES OF TALAR NECK

Fractures of the talar neck may occur during severe dorsiflexion of the ankle (e.g., when a person is pressing extremely hard on the brake pedal of a vehicle during a head-on collisi

FRACTURES OF METATARSALS

- Metatarsal can be fractured when

1- heavy object fall on them
2- in female dancer ballet
3- due to prolonged walking

(D) Fractures of 3rd - 5th metatarsals

(E) Avulsion fracture of 5th metatarsal

Treatment of Compound Fracture of Toe Bones (Phalanges)

- Antibiotic Treatment
- Debridement and Irrigation
- Fixation of the Toe Bones
- Reduction Surgery
- Splint and Cast Support

For Information,
Visit: www.epainassist.com

HALLUX VALGUS

Hallux valgus is a foot deformity caused by degenerative joint disease.

- it is characterized by lateral deviation of the great toe (L. *hallux).*
- In some people, the deviation is so great that the first toe overlaps the second toe.
- These indiv[illegible] 1st digit away from their 2[n]

Hallux valgus bunion and corns

REFERENCES

- Ellis, H. (1997) Clinical Anatomy; A revision and applied anatomy for clinical student, 9th edn. Blackwell Science; United Kingdom.
- Hoppenfeld, S. (1976) Physical Examination of the Spine and Extremities. Prentice-Hall; East Norwalk.
- Singh, V. (2007) Clinical & Surgical Anatomy, 2nd edn. Elsevier; New Delhi.
- Snell, R.S. (2007) Clinical Anatomy: An Illustrated Review with Questions and Explanations, 3rd Edn. Lippincott Williams & Wilkins; Philadelphia.