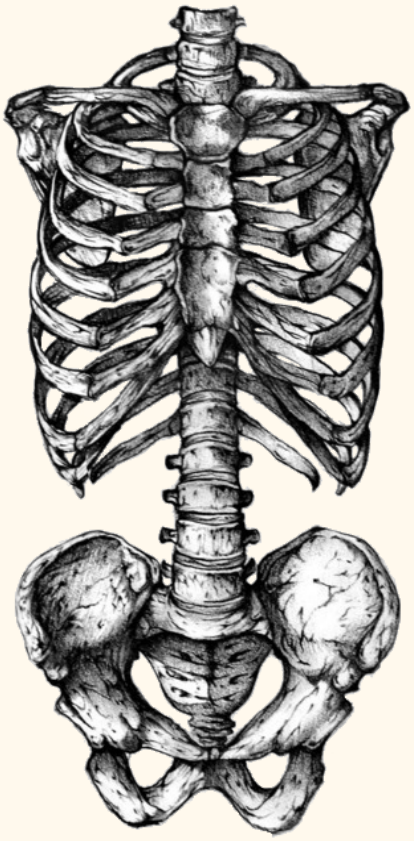
جامعة الملك سعود
King Saud University

434 Orthopedics Team

Lecture 14

Common Adult Fractures



Objectives

1-CLAVICLE FRACTURE

2-HUMERUS (PROXIMAL SHAFT)

3-BOTH BONE FOREARM FRACTURE'

4-DISTAL RADIUS FRACTURE

5-HIP FRACTURE

6- FEMUR SHAFT FRACTURE'

7- TIBIAL SHAFT FRACTURE'

8- ANKLE FRACTURE

CLAVICLE FRACTURE:

- Anatomy of clavicle:

- Clavicle is S shaped bone.
- It is anchored to scapula via ACJ (acromioclavicular joint).
- It is anchored to trunk via SCJ (sternoclavicular joint).

- Fractures are classified into: proximal, middle and lateral third fractures. Most of fractures are of **middle third** (the outer fragment is pulled down by the weight of the arm and the inner half is held up by the sternomastoid muscle).

- Mechanism of injury : Most of fracture occurs as result from fall onto shoulder.

-Physical examination:

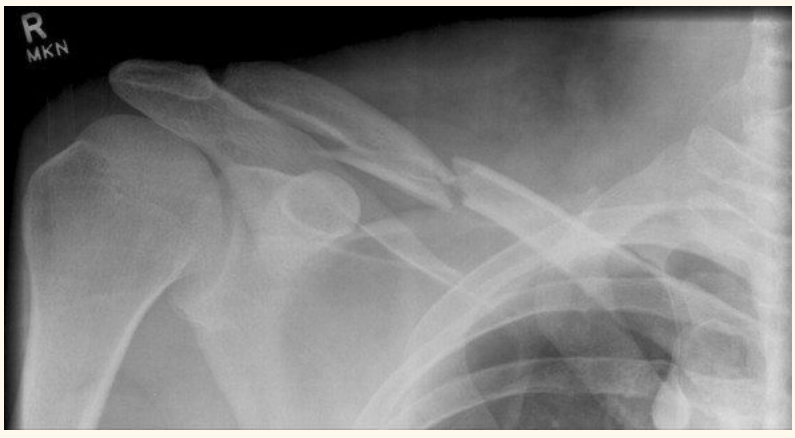
- 1st Step: Expose the area and check the skin integrity, swelling ,ecchymosis .

- 2nd Step: Check brachial plexus and subclavian artery/vein, Auscultation for lung sound in case of pneumothorax.

(Closed clavicle fractures has the tendency to become open fracture because it is subcutaneous structure and may tenting the skin by its sharp bony spike and penetrate it).

-Investigation:

X-ray: AP view and Clavicle special view

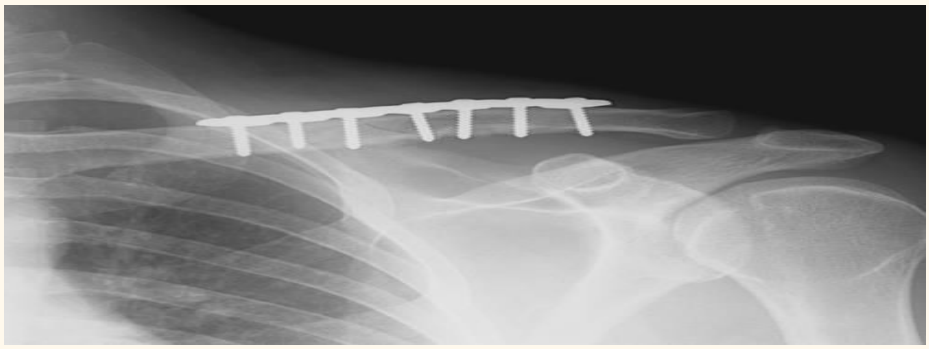


(Fracture in middle third of Clavicle)

Treatment:

conservatively : by using sling.

Surgically: with open reduction and internal fixation: -Skin tenting - Severe displacement (100% displaced or >2cm overlap)



HUMERUS FRACTURES:

- PROXIMAL HUMERUS FRACTURE:

-Anatomy :

It has four anatomic parts: Head , Greater tuberosity, Lesser tuberosity, Shaft.

Fractures occur in Surgical neck more than in anatomical neck.

Anatomical neck fracture associated with AVN (avascular necrosis) -

Mechanism of injury :

In **younger patients:** violent trauma (high energy “car accident”).

- In **older patients**: minor trauma.

- Most fractures are minimally displaced.

Physical examination:

- 1st Step: Expose the shoulder very well and look for fracture signs (skin bruising, swelling …) and Check the skin.

- 2nd Step:peripheral N/V exam by Check for Axillary nerve (deltoid atrophy and upper lateral of arm), examine cervical spine .

- 3rd Step: Ask the patient to move his head and elbow.

Investigations:

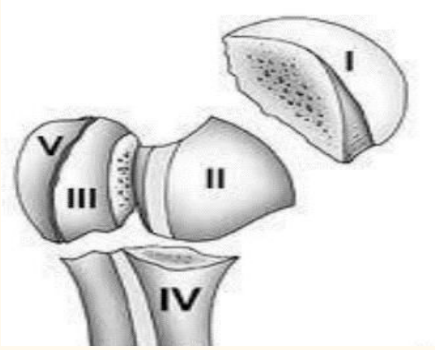
X-ray: AP, lateral and a special view (axillary view)

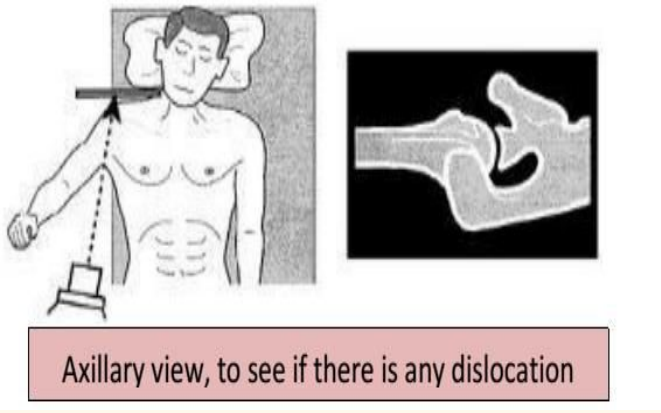
CT scan: for displaced fractures if X-ray isn't clear." always start with extra view of x-ray before chosen any modality ex: CT..)

Fracture is defined by fragment displaced.

Displacement: > 1 cm.

Angulation: > 45 degrees.





Treatment:

If fracture is not displaced, Treat it Conservatively:

- Treatment with sling and Non-weight bearing "NWB" for 6-8 weeks.

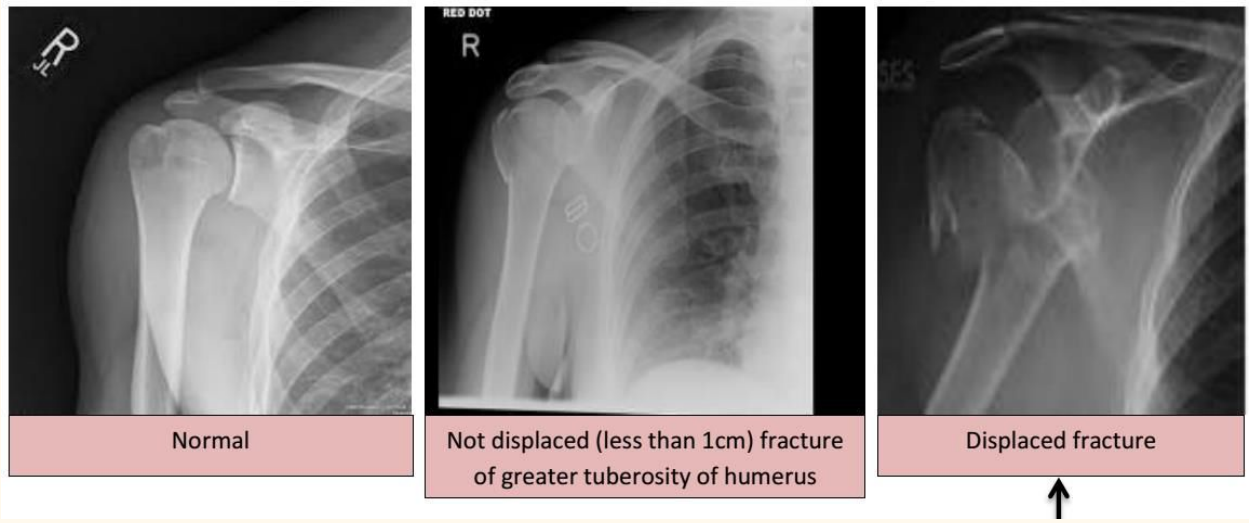
- Early ROM exercises after 2-4 weeks. (To avoid stiffness)

- Normal function can be resumed after 3-4 months.

If the fracture is displaced (2 or 3 fragment), Treat it Surgically:

- ORIF (plate and screws): If the patients is young OR old patient without anatomical neck fracture.

- Shoulder hemi-arthroplasty: If the patient is old with anatomical neck fracture complicated with AVN. (we replace only the head).



- HUMERUS SHAFT FRACTURE:

- It can be classified based on location of fracture: Proximal, middle and distal.

- Fracture of the shaft in an elderly patient may be due to a metastasis.

Physical Examination:

- 1st Step: Expose the area very well and look for fracture signs Check the skin.

- **2nd Step**: Watch for radial nerve palsy.(wrist drop) and vascular examination

- **3rd Step**: Ask the patient to move his shoulder and elbow

- **4th Step**: Check for Compartment syndrome (Patient will complain from continuous aggravating pain even without movement and woody skin).

Investigations: X-ray : AP , lateral

Treatment:

conservatively : Almost all humerus shaft fracture:

- Close reduction by Functional Brace for 4-6 weeks + NWB

- Early ROM of elbow and shoulder.

Surgically: by ORIF (plate and screws)

Indicated for these condition: Segmental fracture - Open fracture - Obese patient - Bilateral fracture (both humerus) - Floating elbow (forearm and humerus).

BOTH BONES FOREARM FRACTURES:

Anatomy:

Forearm is complex with two mobile parallel bones.

Radius and ulna articulate proximally and distally.

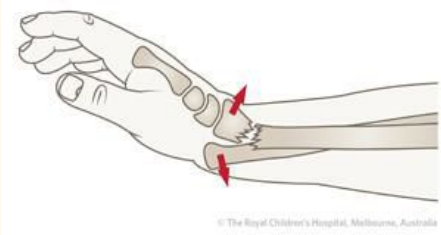
Mechanism of injury : Fractures are often from fall or direct blow.

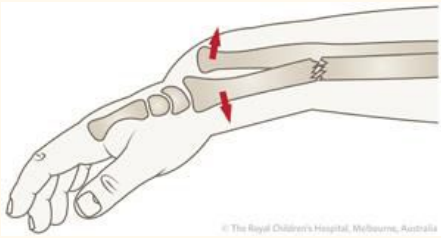
It very unlikely to fracture only one bone without **disruption of their articulation**:

- **Both bone fracture:** Means radius and ulna are broken.

- **Monteggia fracture:** Means proximal or middle third ulna shaft fracture with dislocation of radius proximally (at elbow).

- **Galeazzi fracture:** Means distal third shaft radius fracture with disruption of DRUJ (distal radio-ulnar joint).





Physical Examination:

- **1st Step**: Expose the area, look for fracture signs and check the skin

- **2nd Step**: examine median, ulnar and radial nerve (PIN, AIN) and vascular examination.

- **3rd Step**: Ask the patient to move his wrist and elbow.

- **4th Step**: Check for Compartment syndrome.

Investigations:

- **X-ray**: 2 orthogonal views (AP and lateral views)

- **CT scan**: if fracture extends into joint. (If the fracture extends to the joint, there is a risk of osteoarthritis).

Treatment:

Both bone fracture: - Reduce and splint at ER/clinic (temporary to relief pain). - Are treated almost always with ORIF: (plate and screws).

Monteggia fracture: ORIF ulna and close reduction of radial head.

Galeazzi fracture: ORIF radius and close reduction of DRUJ.

DISTAL RADIUS FRACTURES:

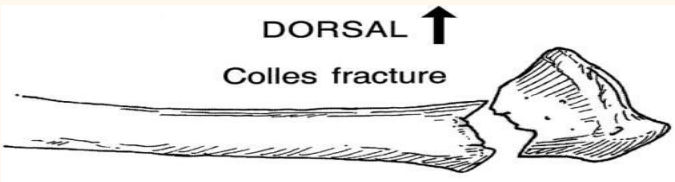
- Most common fracture of upper extremity.

- Most frequently are seen in older women. (osteoporosis), Young adults are most commonly secondary to high energy trauma.

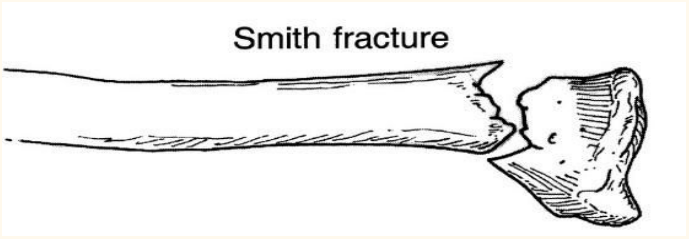
Type of Fracture :

Extra-articular fractures:

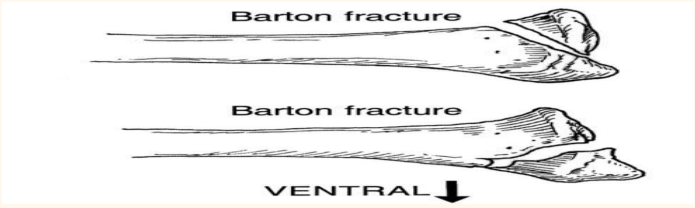
Colle's Fracture: Dorsal angulation and displacement, shortening and radial deviation.



Smith's Fracture: shortening and volar angulation.



Intra-articular Fractures: - Barton's fracture: volar or dorsal.



Investigations:

- AP and lateral X-ray views - CT scan because it extends to joint "Barton's"

Treatment:

- **Extra-articular fracture:**

Close reduction and cast application.

Immobilization for 6-8 weeks.

ROM exercises after cast removal

Surgery: if reducation is not accepted.

Intra-articular fracture:

More than 2mm is an indication of surgery.

ORIF with plate and screws.

LOWER EXTREMITY:

1. HIP FRACTURE:

It is the most common fracture in lower limb. It is associated with osteoporosis.

Mechanism of injury: is a fall from standing height,Other causes of fall (stroke, MI, hypoglycemic attack) should be rolled out during clinical evaluation.

Common associated injuries : Distal radius fracture - Proximal humerus fracture - Subdural hematoma. .

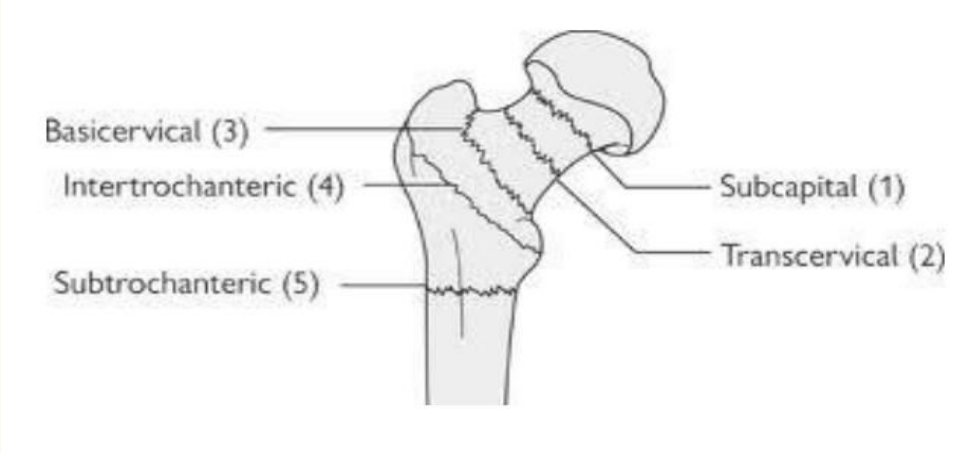
Fracture can be classified into:

- **Intra-capsular**: Subcapital, Trans-cervical.

- **Extra-capsular**: Basicervical, Introchanteric

- **Displaced / Not displaced**.

AVN (avascular necrosis) risk is higher with intra-capsular fracture.



Physical Examination:

- Full detailed history of mechanism of injury.

- R/O syncope, chest pain, weakness etc.

- A detailed systemic review.

- Deformity: Abduction, External rotation and shortening.

- Assess distal N/V status.

- Avoid ROM if fracture is expected.

Investigations:

- X-ray: AP and lateral Hip – AP Pelvis – AP Femur

- MRI: is sensitive for occult fracture .

Treatment:

No close reduction is needed.

No traction is needed

Patient needs surgery ideally within 48 hrs.

The goal is to ambulate patient as soon as possible.

Be sure that DVT prophylaxis is started.

Be sure that patient will be evaluated for osteoporosis after discharge.

If fracture is Intra-capsular:

Displaced:

- Old patient: we do hip replacement (hemiarthroplasty).

- Young patient: internal fixation/intra-medullary nailing (Urgent within 6hrs).

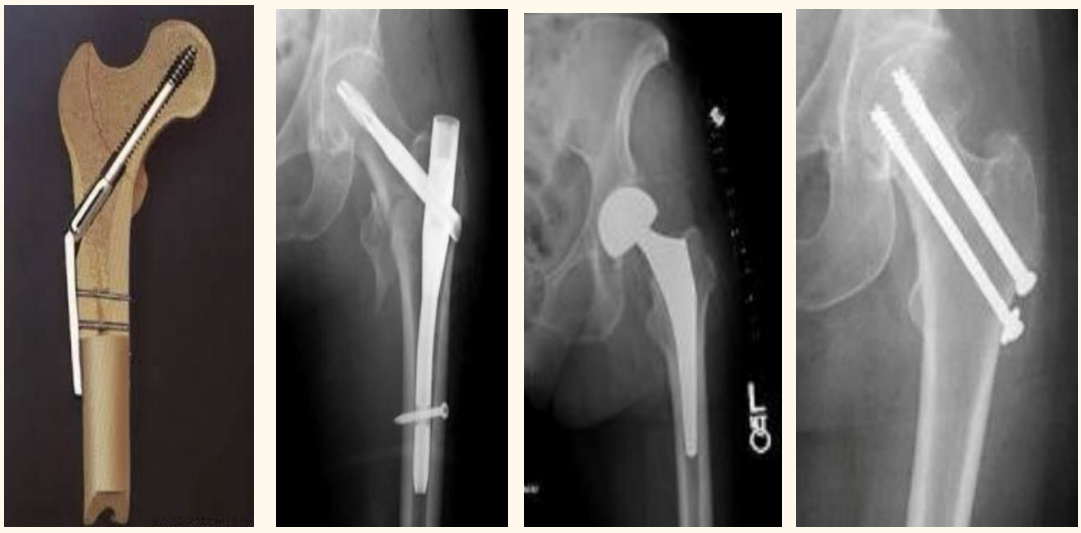
Non-displaced:

- We do percutaneous in situ fixation (Urgent for all patients old and young).

If fracture is extra-capsular

: - **Stable**: Close reduction and DHS (direct hip screw). - **Unstable:** Intra-medullary devise (IM).

Fracture instabilities signs: 1- Large LT fragment 2- Extension to subtrochantric region 3- 4 parts fracture.



Complications:

- **Nonunion:** 30% (most common complication in young patient).

- **AVN** : 30% with displased

- **VTE**

- **Death**: early 4%. At 1 year : 20- 40 %

FEMORAL SHAFT FRACTURE:

- **Most common:** high energy mechanisms - Young patients (male<30 years).

- **Less common:** low energy mechanism (torsional forces) - Old patients.

- R/O pathological fracture in Young + low energy mechanisms.

Associated musculoskeletal injuries:

- Ipsilateral femoral neck fracture (10%. Missed in 30%-50%)

- Knee ligaments injuries: 50%

- Meniscal tear 30%

- Floating knee injury: less common “fracture of shaft of femur+ tibial fracture”.

- Vascular/nerve injuries: rare

- Contralateral femur shaft fracture. (worse prognosis among above)

Associated non-MS injuries:

- Fat embolism. (sudden dyspnea + sudden drop in BP)

- ARDS

- Head injuries.

- Abdominal injuries.

Physical Examination: ATLS

- 1st Step: Expose the area, look for fracture signs and check the skin

- 2nd Step: N/V exam**.**

- 3rd Step: Knee swelling or ecchymosis

- 4th Step: Check for Compartment syndrome

Investigations:

- AP and lateral views femur

- 15° internal rotation AP view ipsilateral hip.

- Knee AP and lateral views

- If femoral neck fracture is suspected CT scan hip.

Treatment:

ATLS: ABC resuscitation.

Skeletal traction (proximal tibial pin) or skin traction

- Early surgical fixation:

Proven to reduce pulmonary complications.

Must be within 24 hrs (ideally < 6 hrs).

If patient is unstable: External fixation. Takes 15 mines (because he can't tolerate surgery).

If Patient is stable: IM nailing. Take 2 hours.

Complication :

Malunion: the most common

More commen with proximal fracture (subcrochantric fracture)

Rotatinoal , angulation and shortening.

Non-unnion: rare

Infection.

VTE.

TIBIA SHAFT FRACTURE:

It is a subcutaneous bone (high suspicion for Skin injury).

Most common large long bone fracture.

It can be secondary to low or high energy mechanism.

It carries the highest risk of compartment syndrome.

20 % of tibial fracture can be associated with ankle intra-articular fracture.

It can be classified based on location and morphology:

- Proximal third - Middle third - Distal third

- Displaced vs. Non-displaced.

Physical examination:

1st Step: Expose the area, look for fracture signs and check the skin

2nd Step: N/V exam & Check for Compartment syndrome (need serial exam)

Investigations:

X-rays: (joint above and below)

AP and lateral tib/fib.

AP/lateral knee

AP/Lateral ankle

CT scan: if fracture extends to joint above or below.

Not displaced

Displaced

Treatment:

- Conservatively only if: NO displacement: < 10° angulation on AP/lateral, not comminuted.

- Surgically: most of the time and treatment by IM nail fixation.

- Indication for surgery : displacement , open fracture, compartment syndrome, Floating knee.

Complication:

Non-union: **the most common complication**

Delayed union

infection : open fracture

DVT/PE

ANKLE FRACTURE:

- Ankle anatomy:

Medial and lateral malleoli, distal Tibia and talus.

- Highly congruent joint

- Fibula is held to distal tibia by syndosmotic ligament

. - Medial malleolus is held to talus by deltoid ligament.

- Lateral malleolus is held to talus by lateral collateral ligament “LCL”.

Low energy (torsional): malleoli fracture.

Classification:

– Stable v.s Unstable fracture (lateral displacement of talus)

. – Medial, lateral or bi-malleolar fracture.

– Lateral malleolus: Weber A, B, C.

Weber type A: - below level of the ankle joint. - Tibiofibular syndesmosis intact. (deltoid ligament intact) - No displacement

-No tenderness of the medial side

-No destruction of the joint line (no talas shift).

Weber type B:

- at the level of the ankle joint, extending superiorly and laterally up the fibula.

- tibiofibular syndesmosis intact or only partially torn, but no widening of the distal tibiofibular articulation.

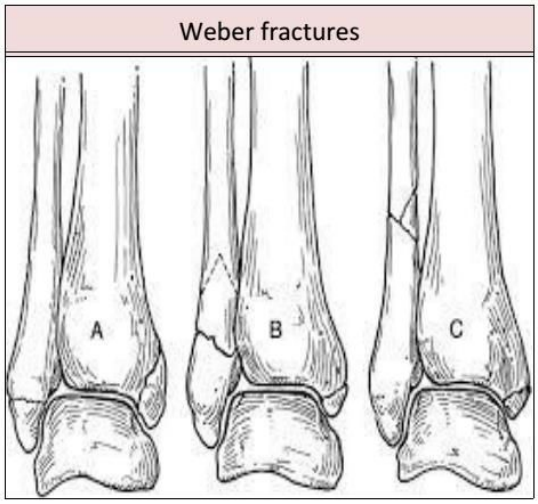
- medial malleolus may be fractured or deltoid ligament may be torn.

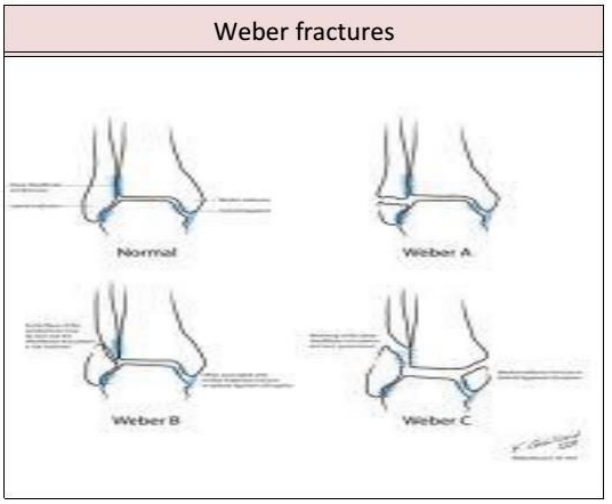
Weber type C:

- Above the level of the ankle joint.

- Tibiofibular syndesmosis disrupted with widening of the distal tibiofibular articulation.

- Medial malleolus fracture or deltoid ligament injury present.





Physical examination:

– Look for Fracture symptoms and signs.

– Assess medial joint ecchymosis or tenderness To assess medial malleolus and deltoid ligament integrity.

– Assess N/V status (before and after reduction).

Investigations:

X-rays: AP/Lateral.

Mortise view: is done with the leg internally rotated 15-20.

Long leg x-rays if only medial malleolus is broken.

CT scan: if fracture extends to articular distal Tibia articulation.

Management:

IF the fracture in medial malleolus or both malleoli: ORIF

- IF the fracture in lateral malleolus:

Weber A: – Splint + NWB X 6 weeks. – Early ROM .

Weber B/C: - If medial joint line widen (unstable): ORIF.

- If not: Call Orthopedic for stress film x-rays.

Summary:
Weber A: no need to operate.
Weber B: most of the time needs surgery.
Weber C: always surgery.

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