

# ORTHOPEDIC

Lec. 17

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## Injuries of Ankle & Foot

### Acute Ligamentous Injury of the Ankle:

Patient stumbles & inverts his foot under him. Mostly there will be only partial tear of lateral collateral ligament (LCL) and its commonly called ankle sprain. Occasionally MCL involved or there may be complete tear of the ligament, which lead to temporary subluxation of the talus that immediately relocates.

#### **Clinical features:**

1. Lateral side (or medial side) of the ankle may show immediate extensive bruising in cases of complete tears or mild & late bruise in cases of partial tears.
2. There is always associated ankle swelling.
3. Local tenderness on the injured collateral ligament.
4. Tender passive inversion of the foot in partial tear of LCL, or Tender passive eversion in case of partial tear of MCL.
5. In cases of complete tears there is excessive inversion (LCL) or eversion (MCL) in comparison with other limb, sometimes this is tender and done under local or general anesthesia. We can also do x-ray stress films at the same time.

**X-ray:** Plain films are usually normal. But most important is the stress film by taking x-ray for both ankles and we do passive inversion (LCL) or eversion (MCL), sometimes done under anesthesia. An excessive inversion or eversion of 10 degrees or more in comparison with the other limb is regarded pathological of complete tear of the involved ligament.

#### **Treatment:**

**Partial tears:** The principle of treatment is by activity. Elevation, pressure bandage & active exercise until patient is comfortable where he can stand and walk some aid as soon as possible.

#### **Complete tears:**

1. Surgical repair: indicated for young athletes or those with demanding jobs, it's by surgical suturing and repairs of the torn ligament.
2. Conservative treatment: elevation & POP boot 5-7 days later do full POP boot with elevation. Weight bearing allowed with aids and the POP retained for 10 weeks followed by active exercise & physiotherapy.

#### **Complications:**

1. **Adhesions:** occurs with partial tears that are improperly treated with poor exercises & physiotherapy causing frequent pain & giving way, they are treated by MUA with local steroid injection.
2. **Recurrent ankle subluxation:** It occurs when complete tears are undiagnosed or after failed conservation treatment. Clinical features: Frequent ankle pain & swelling with history of giving-way POP excessive inversion in comparison with the other limb. Check x-ray +/- anesthesia and stress views to prove the instability. Treatment: a) Conservative: outer heel raise of the shoe. b) Surgical reconstruction: it's used after failure of conservative treatment. Aim is to improve joint stability on lateral side by using nearby tendons to pass through and fixed in bones in such a way to take the function of torn ligament e.g. peroneus brevis tendon.

### Fractures of the Ankle:

**Mechanism of injury:** Mostly due to indirect force in which the ankle is twisted & the talus tilts &/or rotate forcefully in the mortise, causing a low – energy fracture of one or both malleoli, with or without associated ligament injuries. So if a malleolus is pushed off, it fractured obliquely, but if it pulled off it will fracture transversely the precise fracture pattern is determined by:

- (a) Position of the foot.
- (b) Direction of the force.



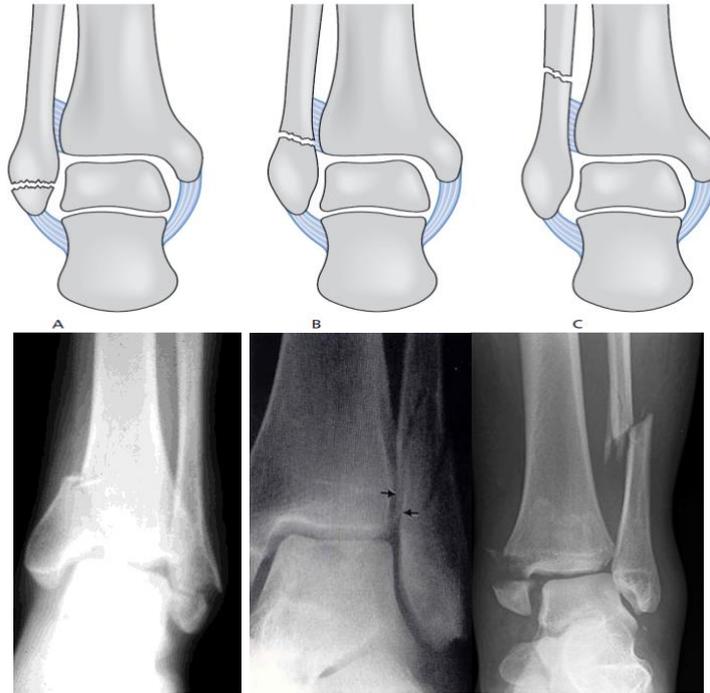
The foot may be pronated or supinated & the force may be adduction, abduction or external rotation or a combination of these.

**Clinical Features:** History of twisting injury followed by intense pain & inability to stand on the leg. The ankle is swollen & deformity may be obvious. The sites of tenderness in med. & lat. sides suggest a double injury (bony or ligamentous).



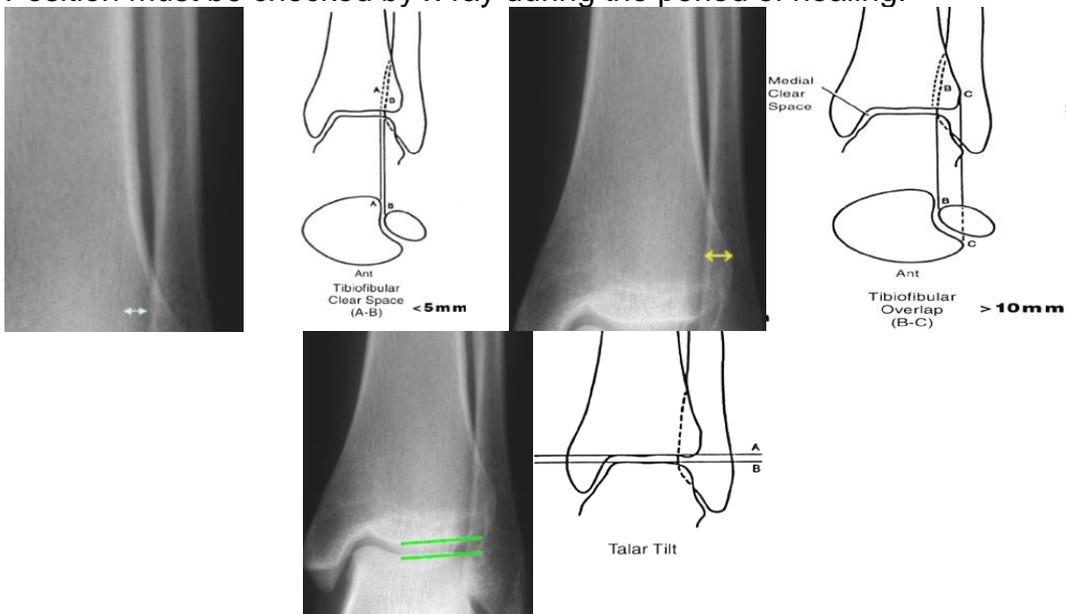
**X-ray & classification:** AP, Lat. & mortise view (30° oblique) are needed to know the level of the fibular fracture & if there is diastasis of the inferior tibio-fibular ligament (Syndesmosis). According to these it classified by Danis-Weber in to:

- **Type A:** fracture fibula below syndesmosis +/-fracture of medial malleolus. The force is adduction or adduction & internal rotation.
- **Type B:** fracture fibula at the level at syndesmosis +/-fracture of med. malleolus or tear of the deltoid lig (MCL) the force is external rotation.
- **Type C:** fracture fibula above syndesmosis (which means that the inferior Tibio-Fibular ligament & part of interosseous membrane must have been torn) + /- injury to the med. side (tear or fracture) or fracture posterior malleolus. The fore is abduction or abduction & external rotation.



**Treatment:** Principles of treatment are:

1. Don't delay because the swelling is rapid and severe so early treatment is needed.
2. Treat the entire injury not only the fracture.
3. Reduce accurately because it is intraarticular fracture.
4. Check & maintain accurate reduction by:-
  - (a) The fibula must be restored to its length.
  - (b) Talus must rest squarely in the mortise & the surfaces are parallel to the tibia.
  - (c) Medial joint space < 4mm (i.e. same width as the tibio-talar space).
  - (d) Oblique view shows no tibio-fibular diastasis.
  - (e) Position must be checked by x-ray during the period of healing.



Undisplaced fracture: the key of treatment is the integrity of the **syndesmosis**;

If there is tear the joint is unstable.

If the syndesmosis is intact the joint is stable.

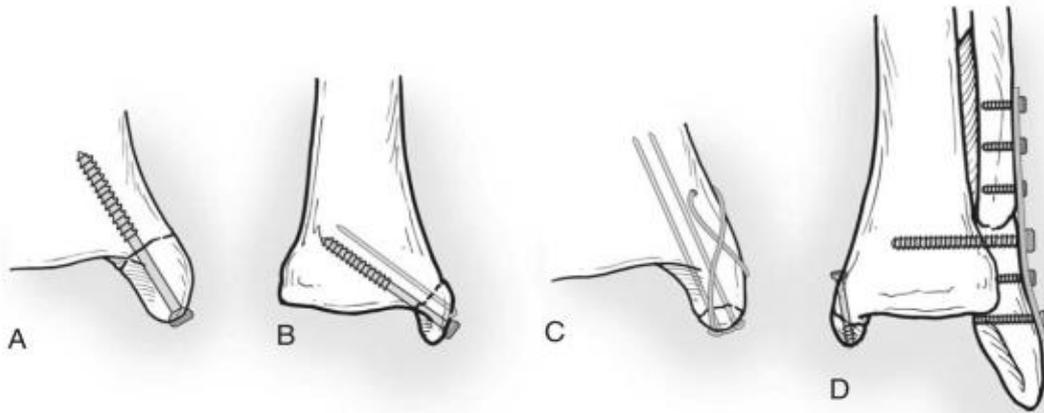
SO: Type A: treated by cast for 6-8 wk then exercise.

Type B ----- Stable ----- treated by cast for 6-8 wk then exercise.

----- Unstable ----- ORIF

Type C ----- ORIF

Displaced fracture: ----- ORIF



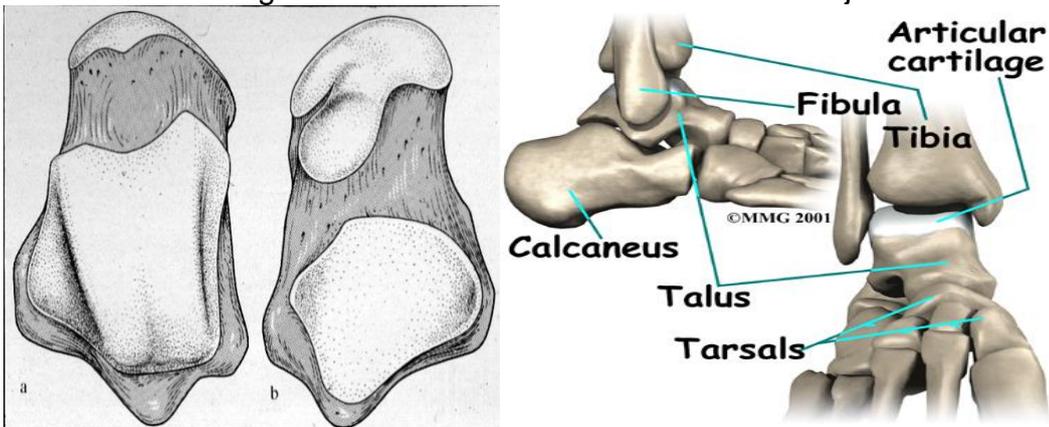
**Complication:**

1. Wound breakdown & infection.
2. Incomplete reduction.
3. Complex regional pain syndrome.
4. Nonunion (e.g. med. malleolus because of periosteal interposition in the fracture site).
5. Joint stiffness.
6. OA.

**Fractures of the Talus:**

Talus Fractures are uncommon injuries and potentially the most devastating injury in the foot. It is 60% covered by cartilage that limits perforating vessel ingrowth.

Talar injuries include: fracture of head, neck, body, bony processes or osteochondral fracture & these need a violent force e.g. car accidents or FFH to cause these injuries.



**Mechanism of injury:** fracture the talar neck is produced by violent hyperextension of the ankle in which the talar neck is forced against the anterior edge of the tibia, which acts like a cleaver (e.g. car accident).

Fractures of the body usually compression fractures due to FFH. Avulsion fractures are associated with ligament strains around the ankle J.

**Clinical features:** The foot & ankle are painful & swollen if the fracture is displaced there will be deformity & the skin may be tented or split & if the fracture or dislocation not reduced the skin may slough & become infected.

**X-ray & Classification:** AP, lateral & oblique views but may be difficult to diagnose undisplaced fracture so we need C.T. scan. **Howkin's classification:**

- Type I → undisplaced fracture.
- Type II → Subtalar dislocation.
- Type III → Subtalar and tibiotalar dislocation.
- Type IV → Subtalar, tibiotalar, and talonavicular dislocation



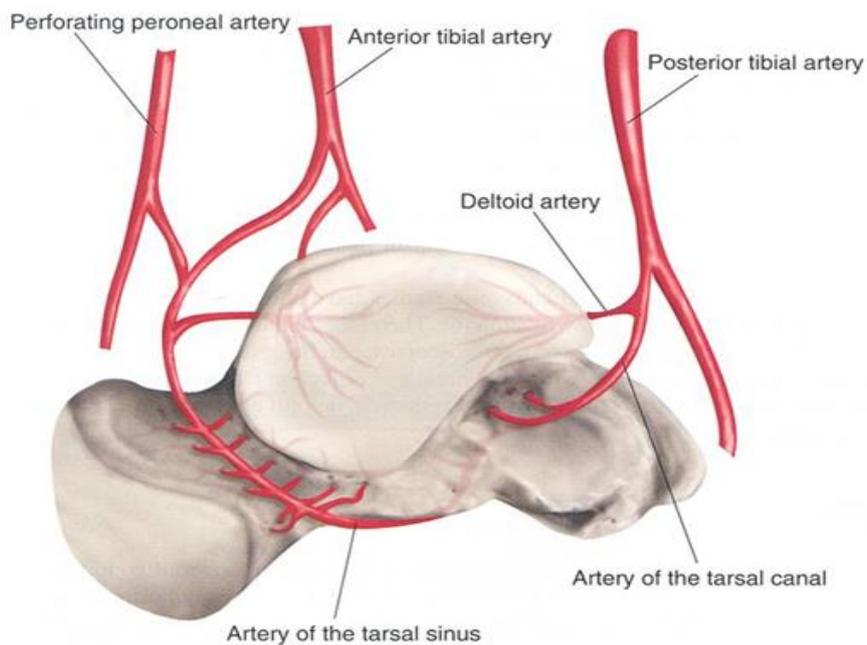
**Treatment:**

1) Undisplaced fracture (type I) ----- conservatively by back-slab for 1-2 wk then when swelling subsided POP cast for 6-8 wk.

2) Displaced fracture (type II&III) ----- need urgent reduction. Closed reduction is tried first if fail does ORIF then below- knee plaster for 6-8 wk.

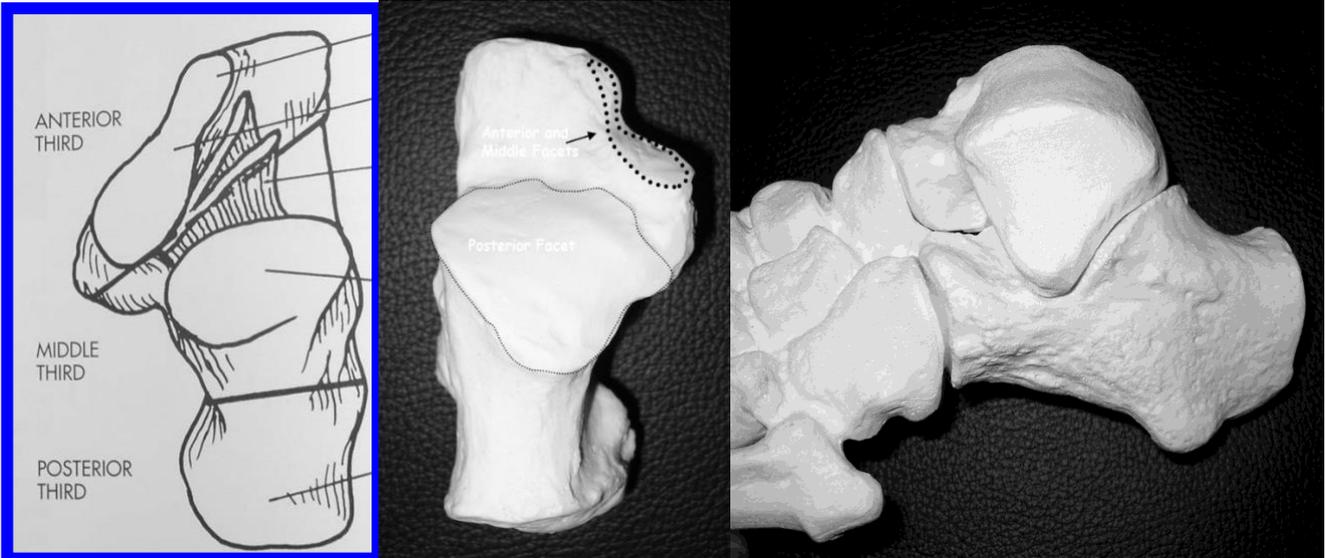
**Complication:**

1. Skin damage.
2. Avascular necrosis: fracture of the neck lead to avascular necrosis of the body & the incidence is 10% in type I, 30-40% in type II & > 90% in type III. This is can be treated by Ankle Arthrodesis.
3. O.A.



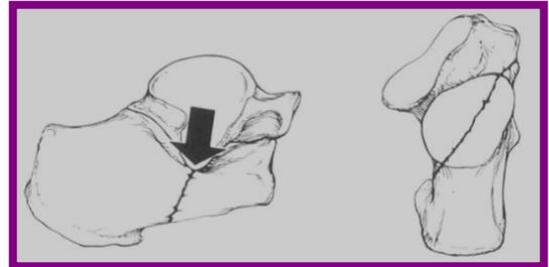
## Fractures of Calcaneum:

It account for 2% of all fractures. Calcaneum is the most commonly fractured tarsal bone (60% of all tarsal fractures). 5-10% of cases both heels are injured. 75% involve subtalar joint. 90% of calcaneus fractures occur in working individuals in their peak earning years (Age 20-40).

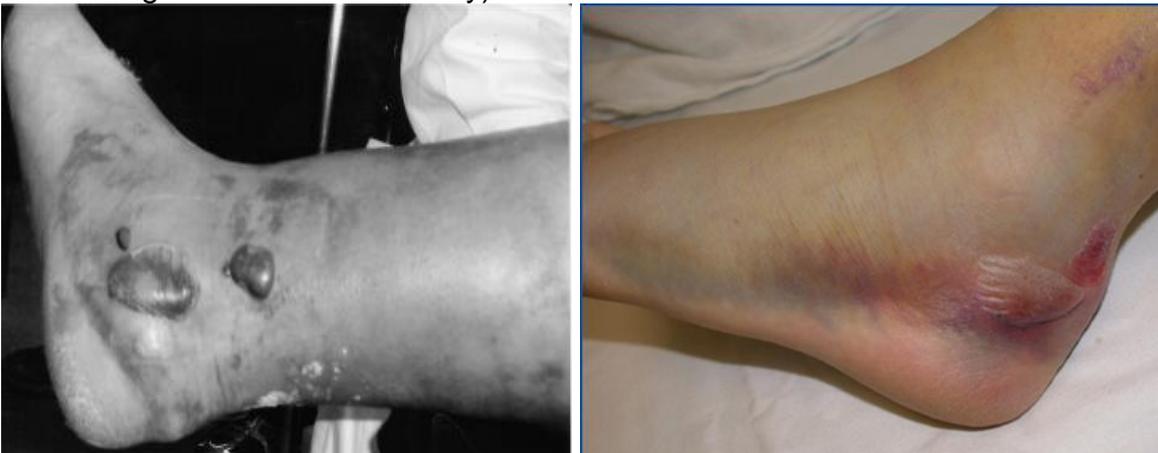


### **Mechanism of injury:**

1. Mostly due to FFH onto one or both heels. The calcaneum split or crushed by the talus (lateral process of talus acts as wedge impaction fracture). About 20% have associated injury of the hip, pelvis or spine.
2. Avulsion fracture due traction injuries of tendo-achillis or ankle ligament.
3. Direct blow may shatter the bone.



**Clinical features:** The foot is painful, swollen & bruised the heel may look broad & squat. The normal concavity below the lat. malleolus is lacking the subtalar J. cannot be moved but the ankle movement is possible. We should check for compartment syndrome of the foot (Intense pain, extensive bruising & decrease sensibility).

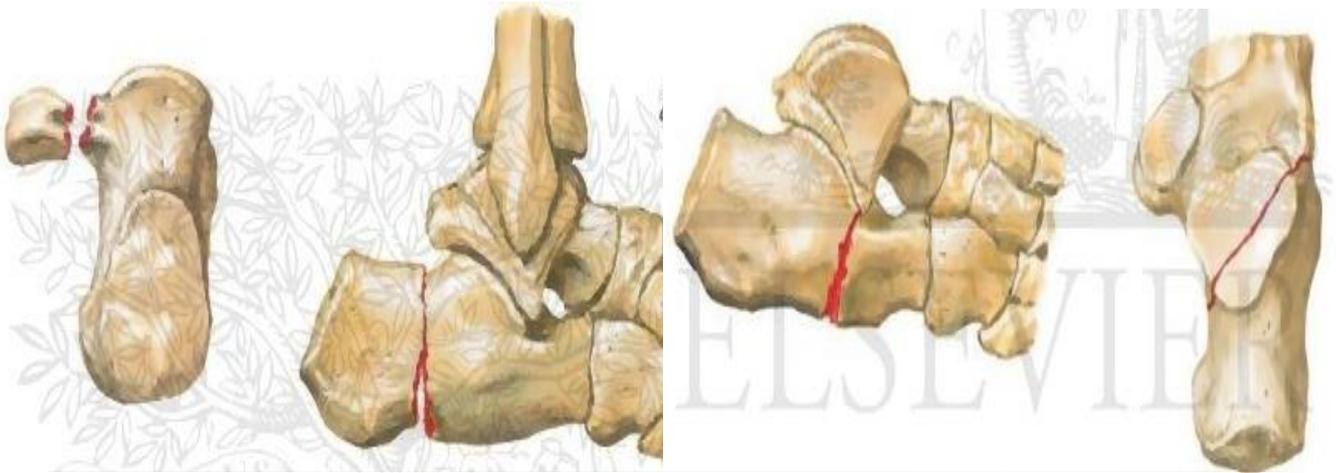


**X-Ray:** Include axial, lateral & oblique view with severe injuries & bilateral fracture it is essential to X-ray the knee, spine & pelvis.

**C.T. scan:** For accurate definition of the fracture & when surgery needed( gold standerd imaging)

### **Classification: Palmer's classification:**

- 1- Extra-articular fracture 25% (involves calcaneal processes or body post to the Talocalcaneal J).
- 2- Intra- articular fracture 75% (those involve the Talocalcaneal J.)



**Treatment:** for all except minor injuries, the patient is admitted to hospital so that the leg & foot can be properly examined, followed, elevated, & treated with ice packs till swelling subsides.

- 1- Extra-articular fracture: good prognosis treatment conservatively by RICE (Raise, Ice-pack, Compressive bandage, Exercise). Unless the fragment is large & badly displaced need to be fixed back in position.
- 2- Intra-articular fracture: -----ORIF.

*Post operatively: exercise as soon as pain subsided after 2-3 wk the pt start non-weight bearing on crutches, partial weight bearing after 8wk, full weight bearing after 12wk.*

**RICE:**  
rest, ice,  
compression  
and elevation



**Complication:**

1. Swelling & blistering of the foot: treated by elevation e.t.c.
2. Compartment syndrome (10%): treated by operative decompression (fasciotomy).
3. Peroneal tendon impingement against the lat. malleolus.
4. Insufficiency of the tendo-achillis: The loss of heel height may result in decrease tendo-achillis action. If this interfere with walking then treatment by subtalar fusion with insertion of a bone block.
5. Talocalcaneal J stiffness & OA.
6. Broadening of the heel, which may cause problem in shoe fitting.

**Metatarsal Fractures:**

**Mechanism of injury:** Metatarsal fracture may be caused by:

1. Direct blow.
2. Severe twisting injury.
3. Repetitive stress.

In usual case there is a history of injury & the foot is painful & somewhat swollen.

**X-ray:** examination (AP& oblique) will show the fracture.

**Treatment:** A walking plaster may be applied, mainly for comfort & is retained for 3wk, in severe displacement reduction & K.wire fixation may be needed & wt bearing is avoided for 3wk & this is followed by a further 3wk in a wt bearing cast..indication of surgery( open#,multiple#,severe angulation with skin proplem)

**Stress fracture of metatarsal (March fracture):**

In a young adult often soldiers or a nurse the foot may become painful after over-use. A tender lump is palpable just distal to the mid-shaft of metatarsal bone, usually the 2<sup>nd</sup> sometime 3<sup>rd</sup>, the x-ray may at first be normal, but a radioisotope scan will show an area of intense activity in the bone. Later a hairline crack may be visible & later still a mass of callus or periosteal new bone is seen. No displacement occurs & neither reduction nor splintage is needed. The foot may be supported with elasto-plast (crepe bandage) & normal walking is encouraged.

*The importance of this fracture it may be missed as an Osteo-sarcoma so we should be careful.*

**Fractures of the Toes**

A heavy object falling on the toes may fracture phalanges. If the skin is broken, it must be covered with sterile dressing the fracture is disregarded & the pt. encouraged to walking in a suitably adapted boot. However if pain is marked, the toe can be splinted, by strapping, it to its neighbour for 2 – 3 wk.