introduction

- Most common intra-articular fracture of a weight bearing joint.
- Malunion leads to arthritis and abnormal pressure distribution – Ramsey, Hamilton
- Goals- congruent joint, union, prevention of arthritis.
- Frequent occurrence – certain disregard for seriousness.

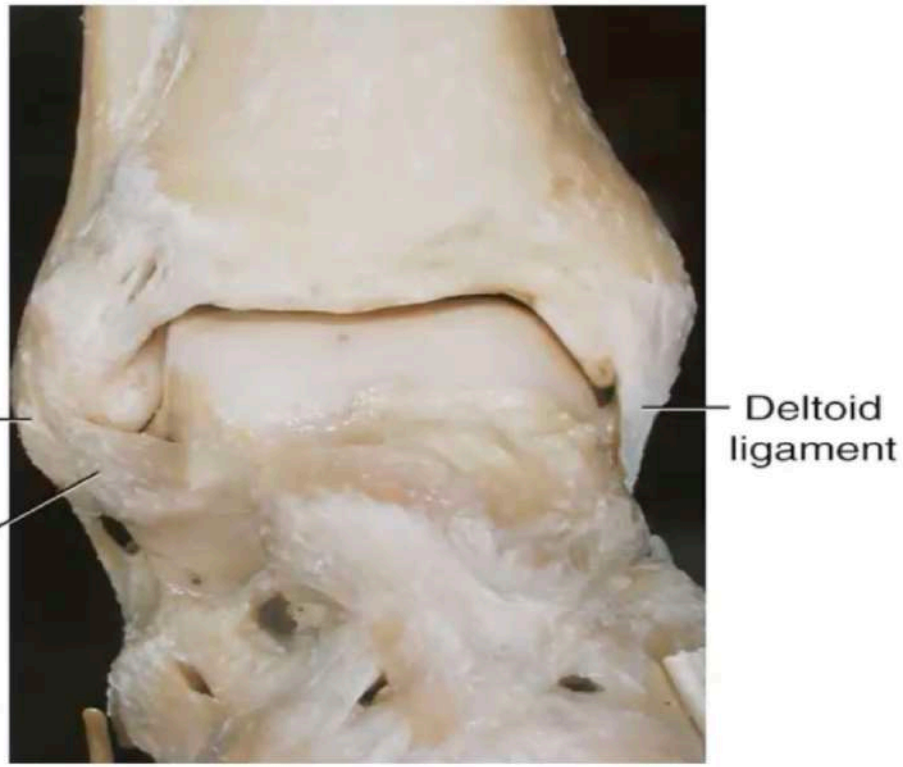
anatomy

- Modified hinge joint
- 3 bones- tibia, fibula, talus
- Complex ligamentous structure
- Movements in multiple planes-

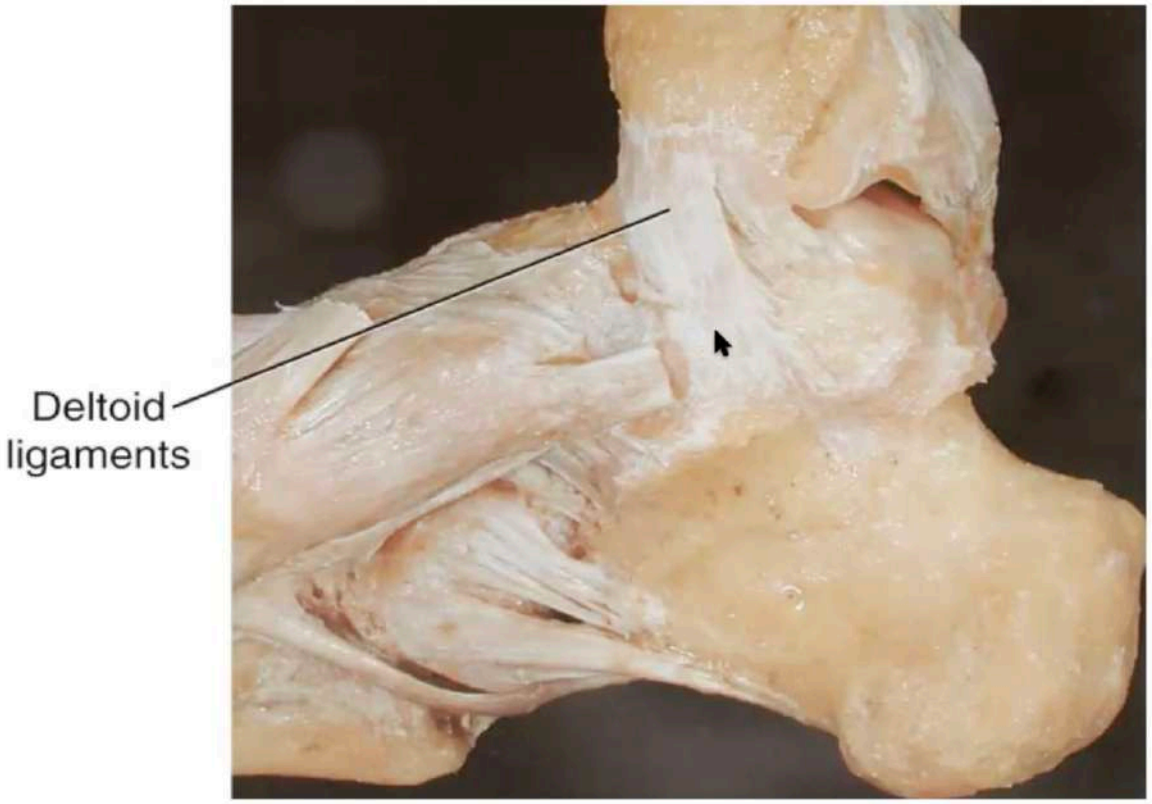
    sagittal – plantar and dorsi flexion

    coronal and axial – coupled rotations

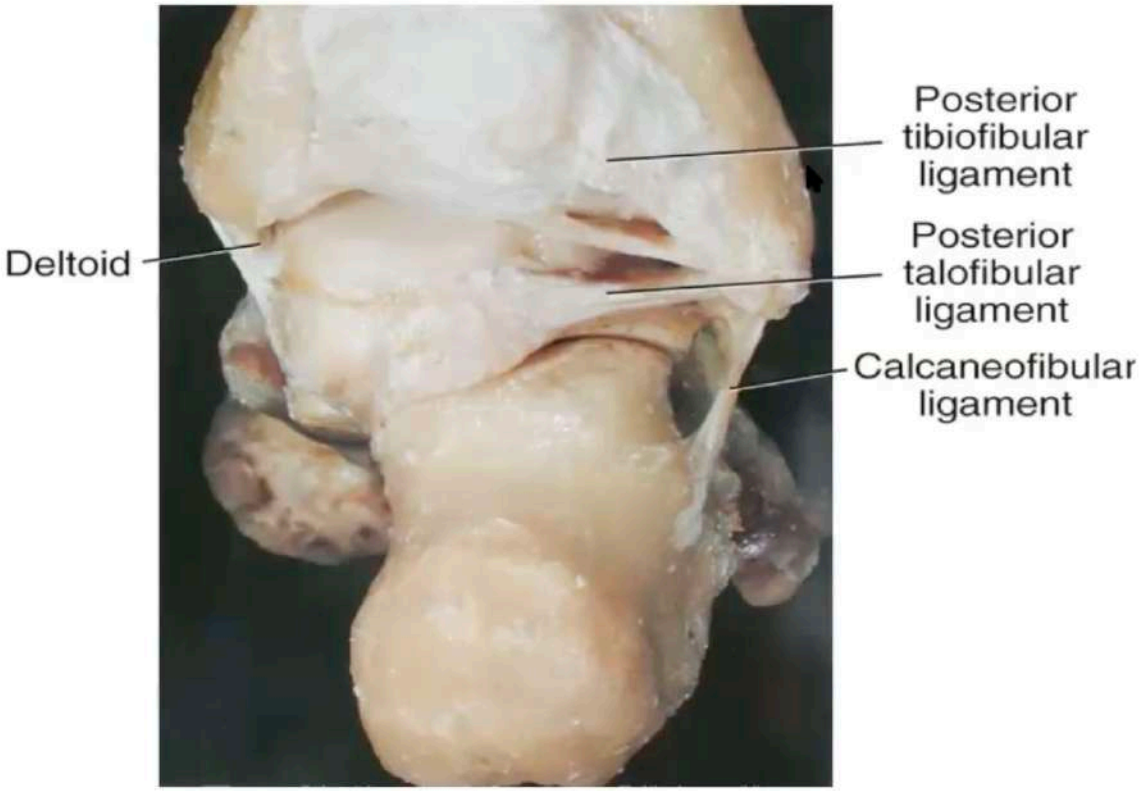
Anterior ankle



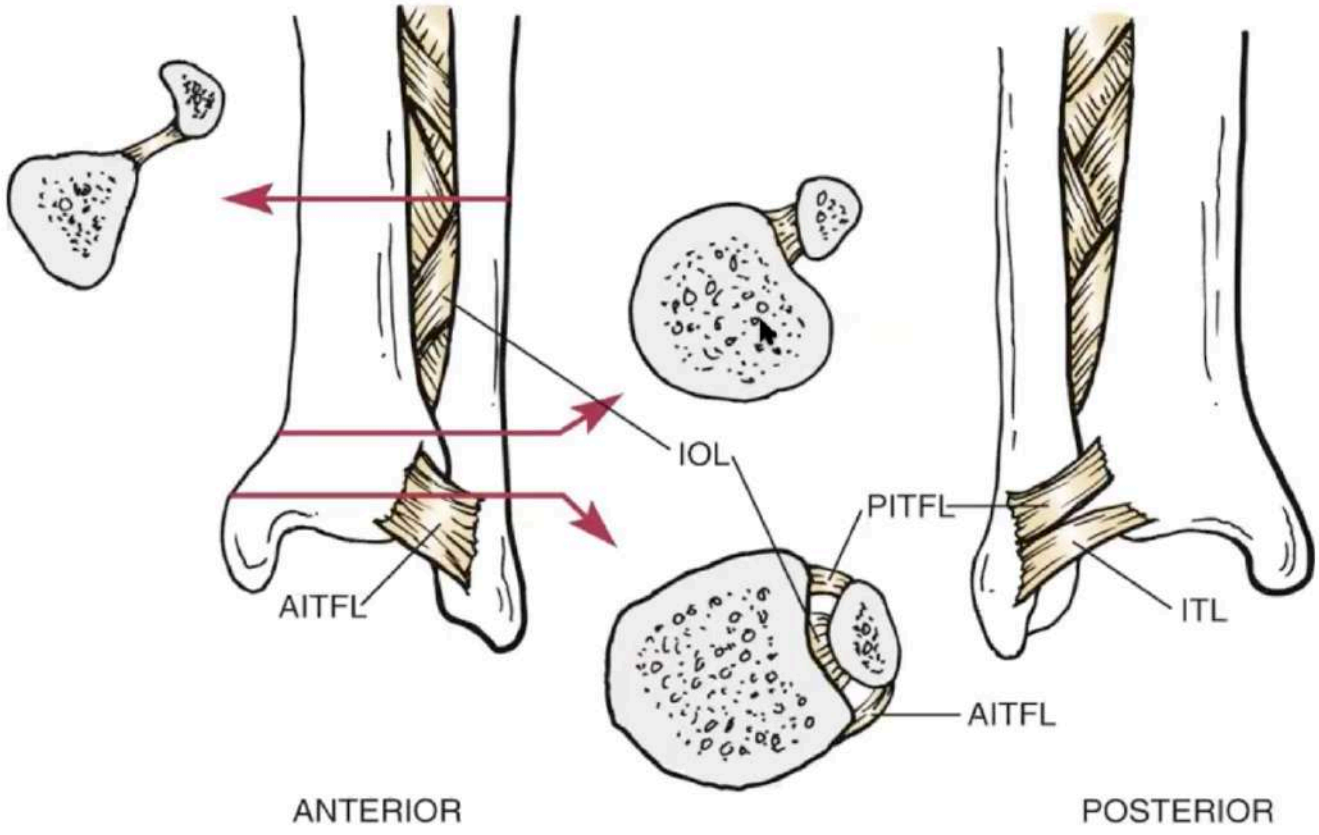
Medial ankle



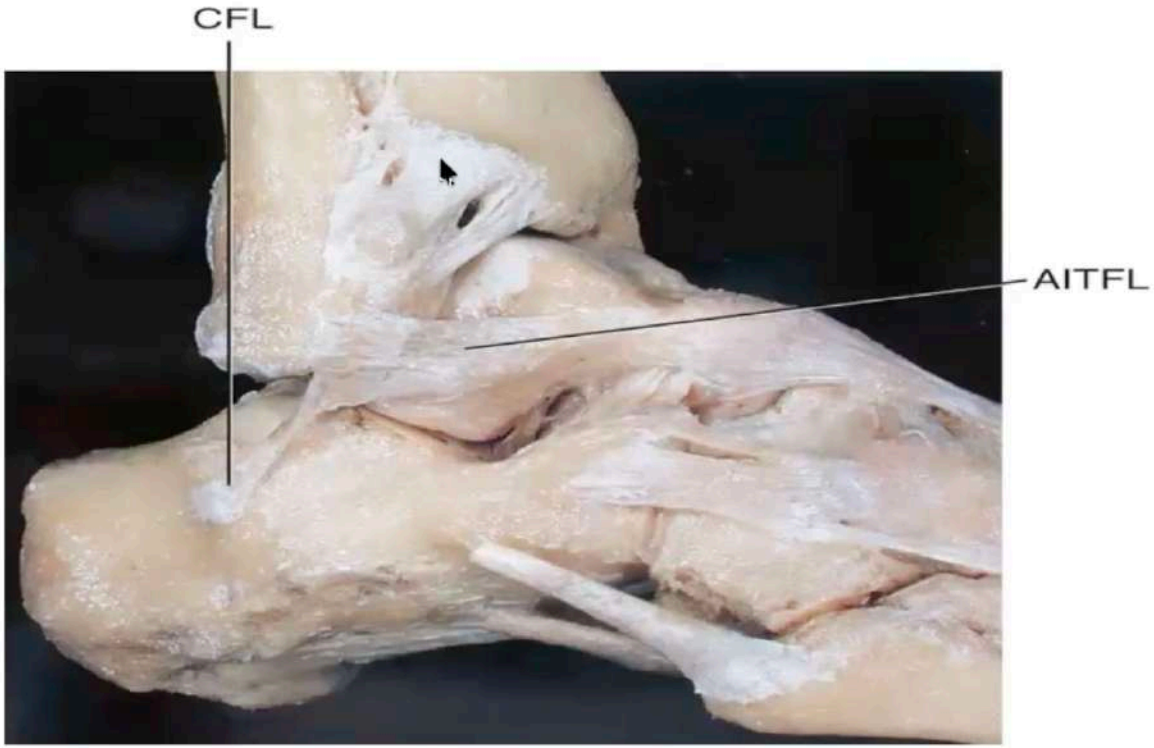
Posterior ankle



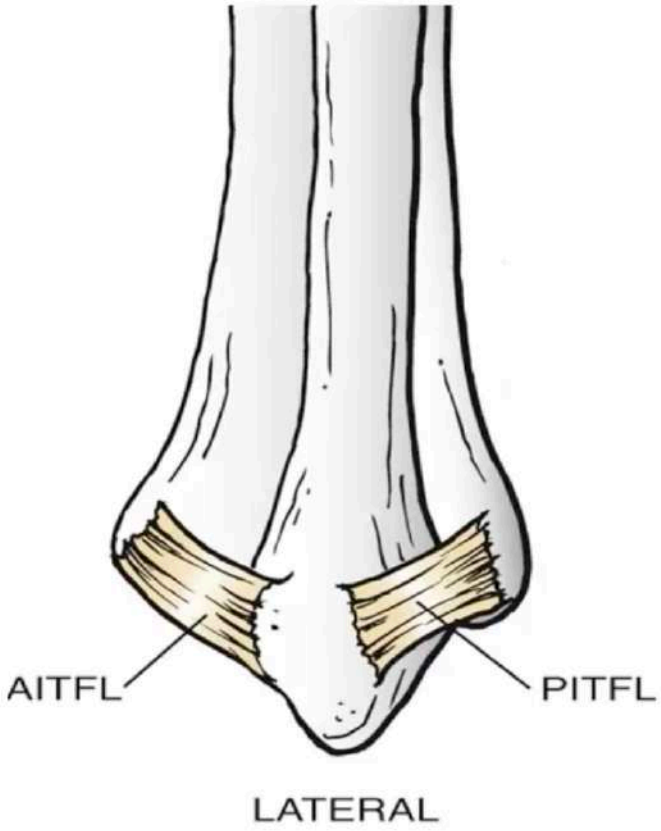
syndesmosis



Lateral ankle



lateral collaterals

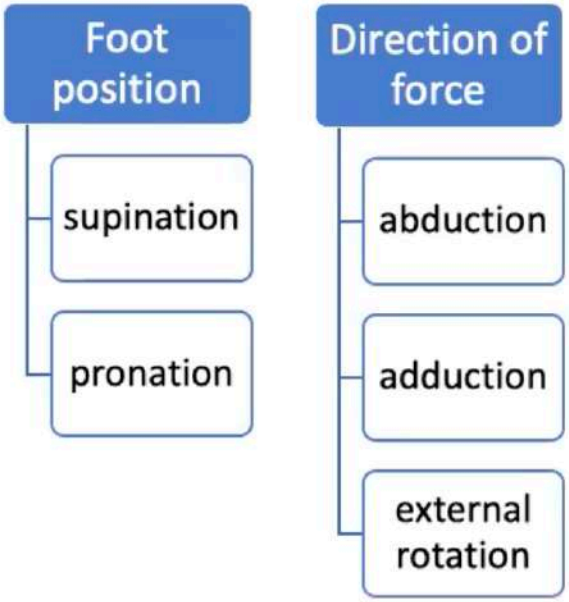


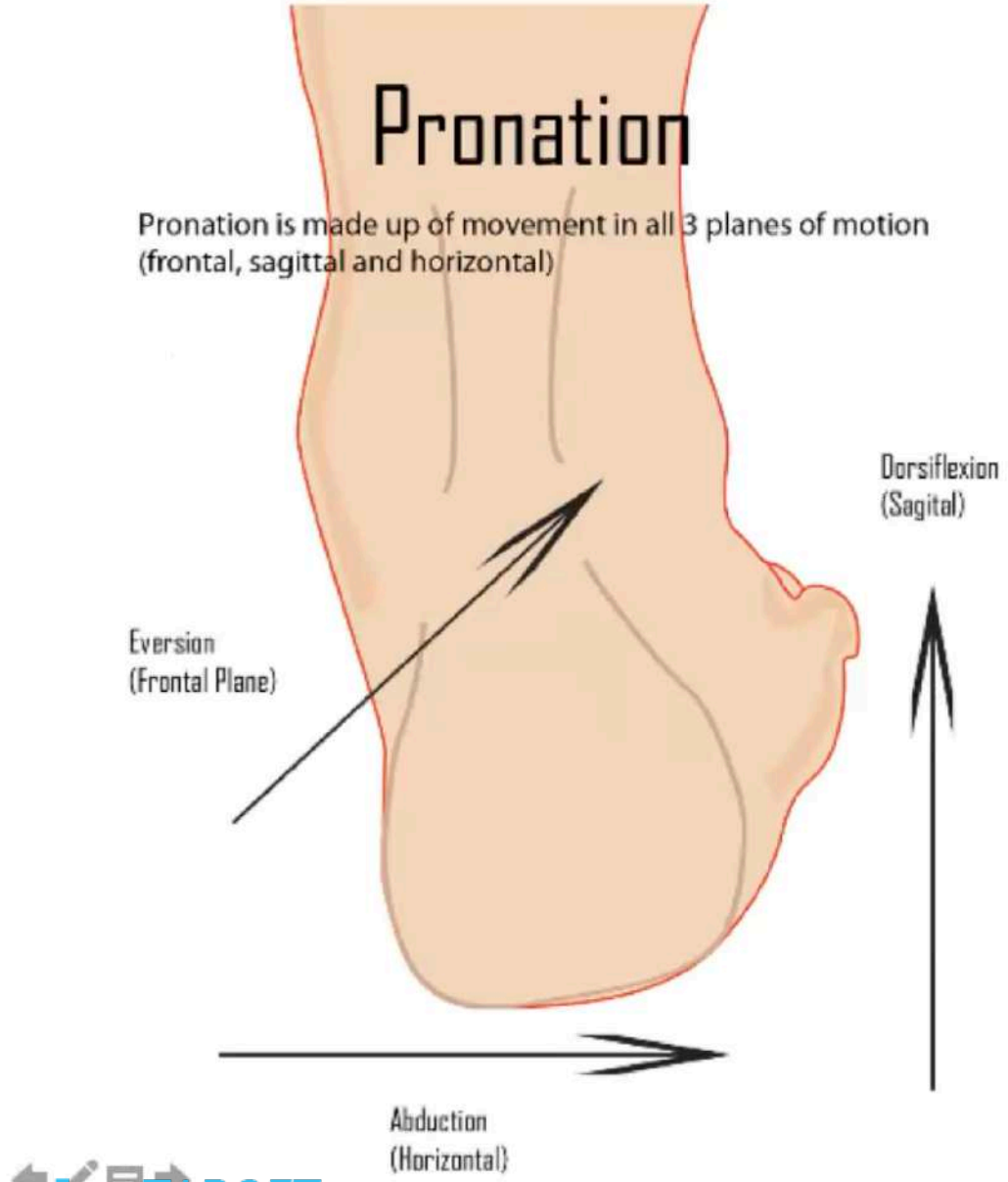
classification

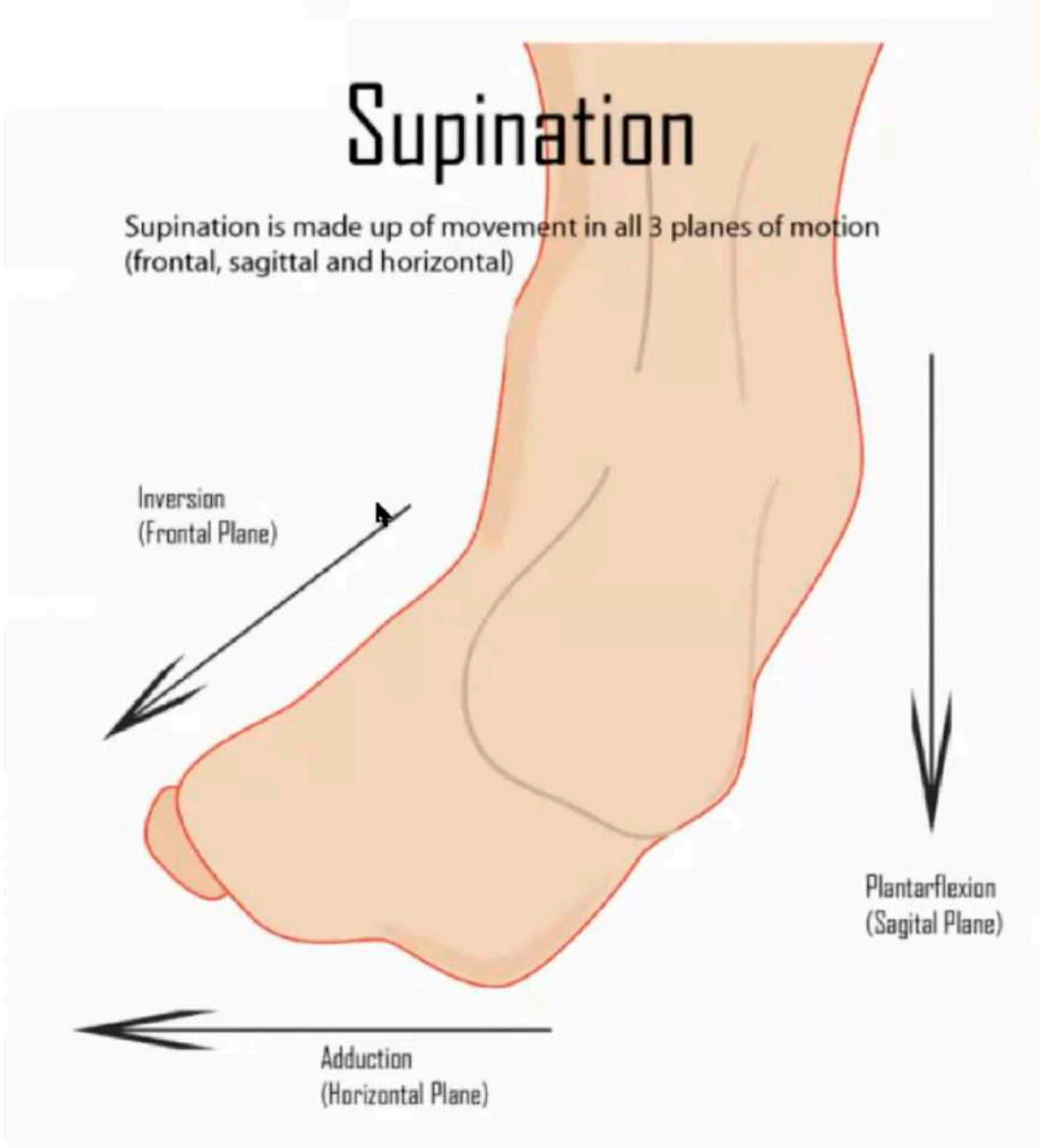
- Fracture pattern explanation, treatment options, prognostic expectation.
- Lauge-Hansen
- Danis –weber
- Ao muller classification
- Combination

Lauge-Hansen classification

- Based on suspected injury mechanism



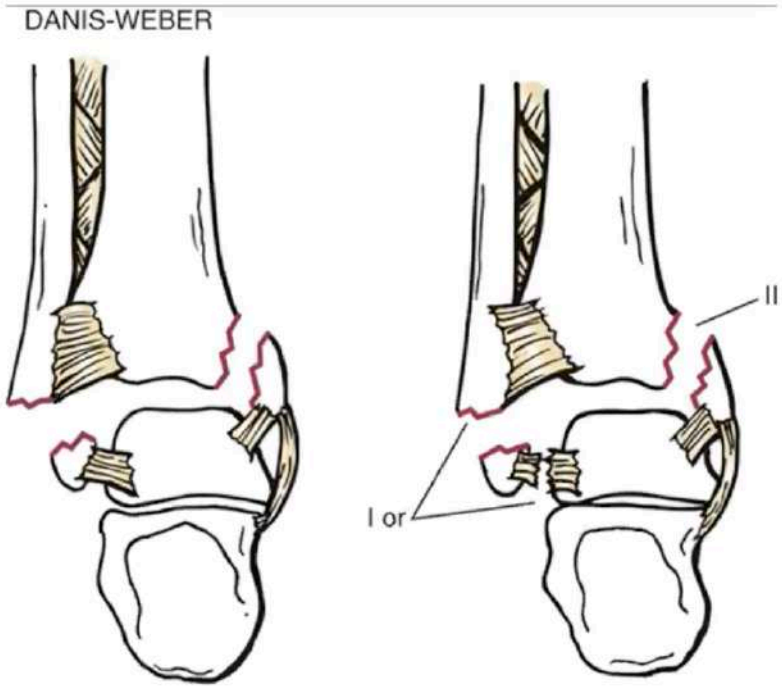




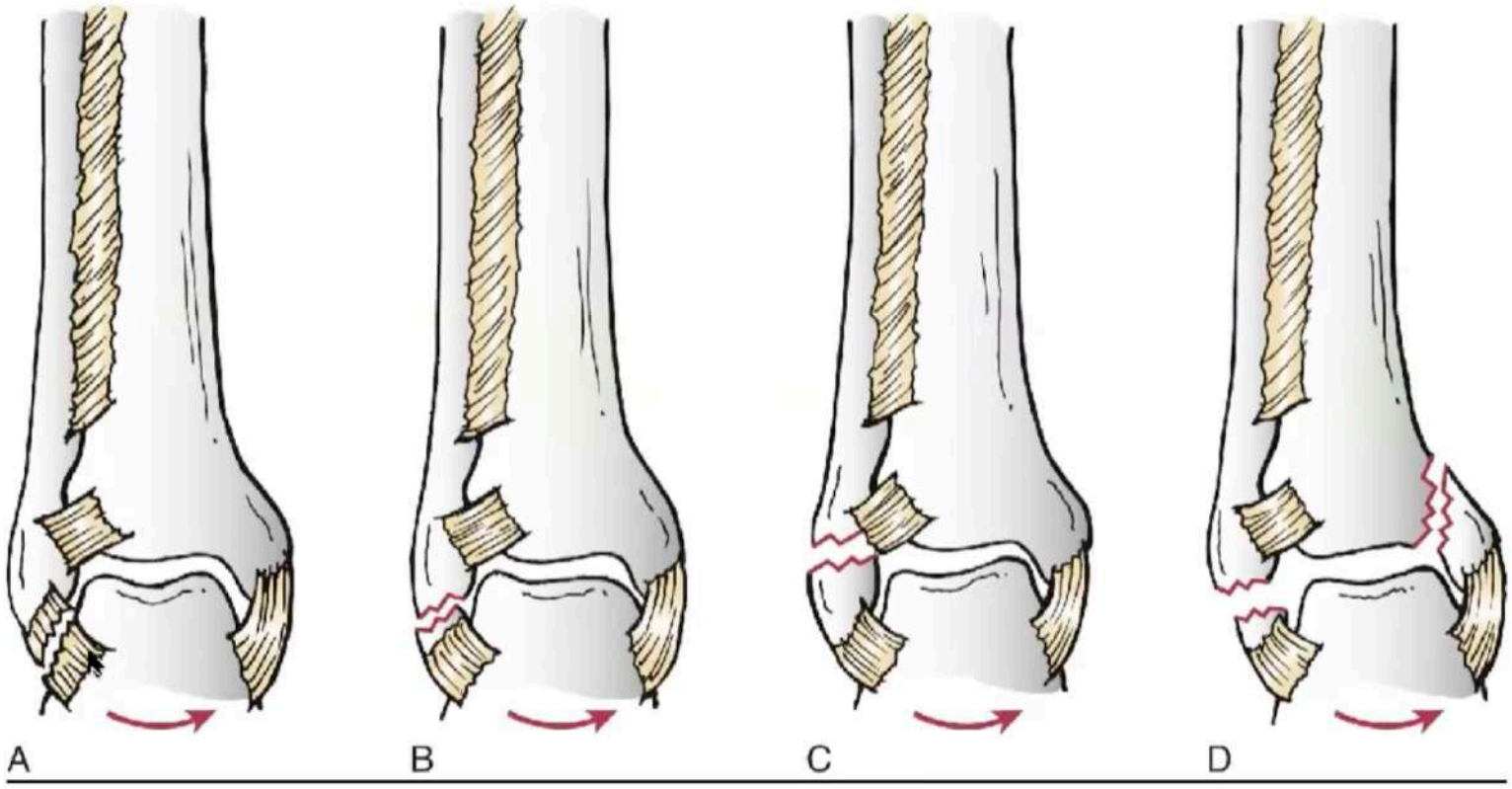
Danis-weber classification

- Based on level of fibula fracture
- More relevant to decision making

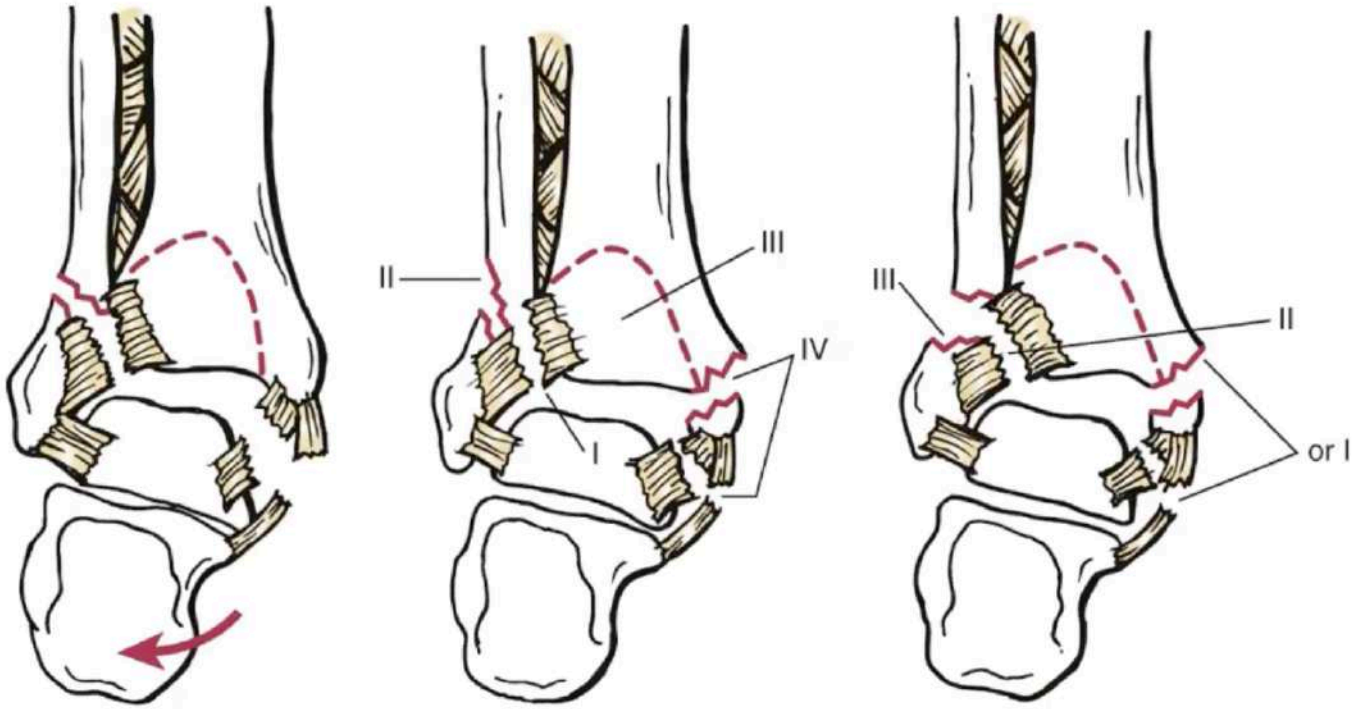
Ao muller – type a (infrasyndesmotic)



Sequence of morphologic events



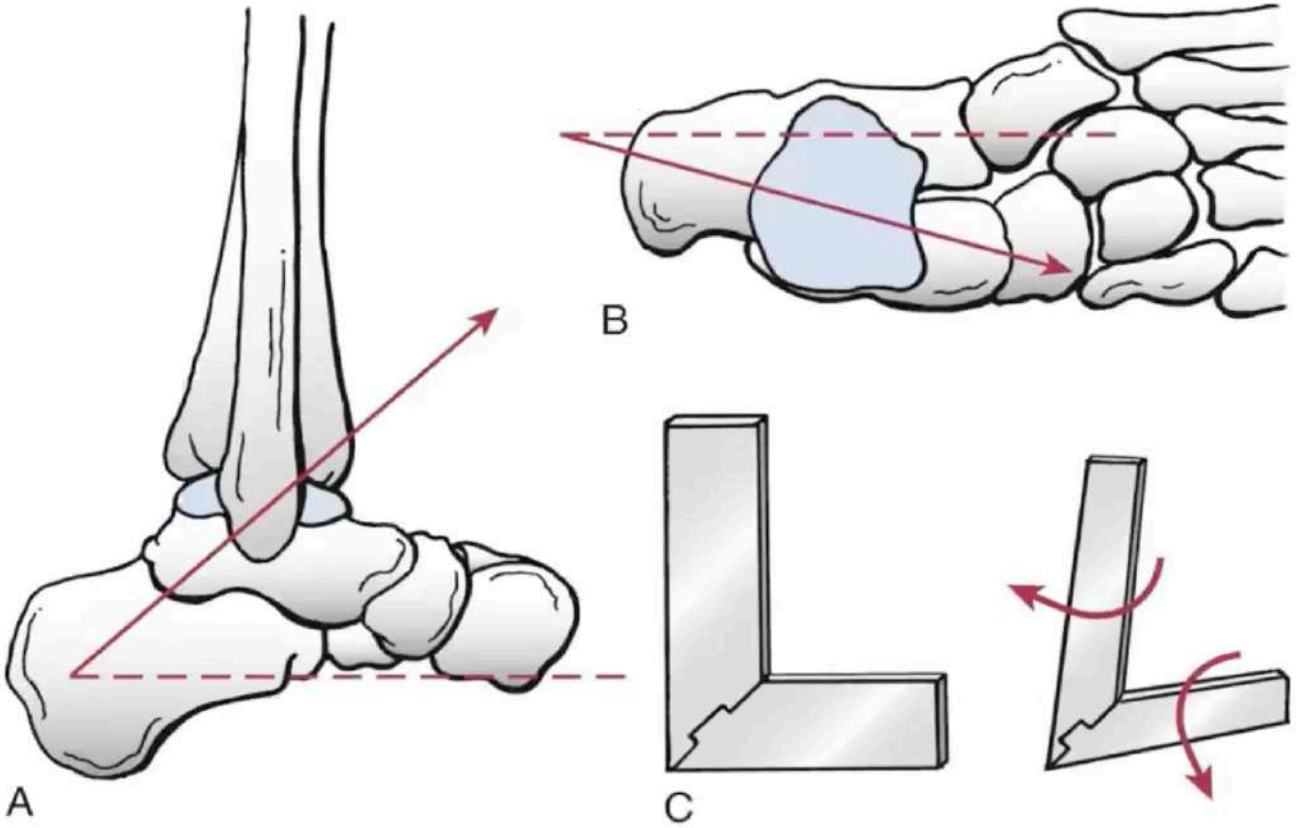
Type b- trans-syndesmotic



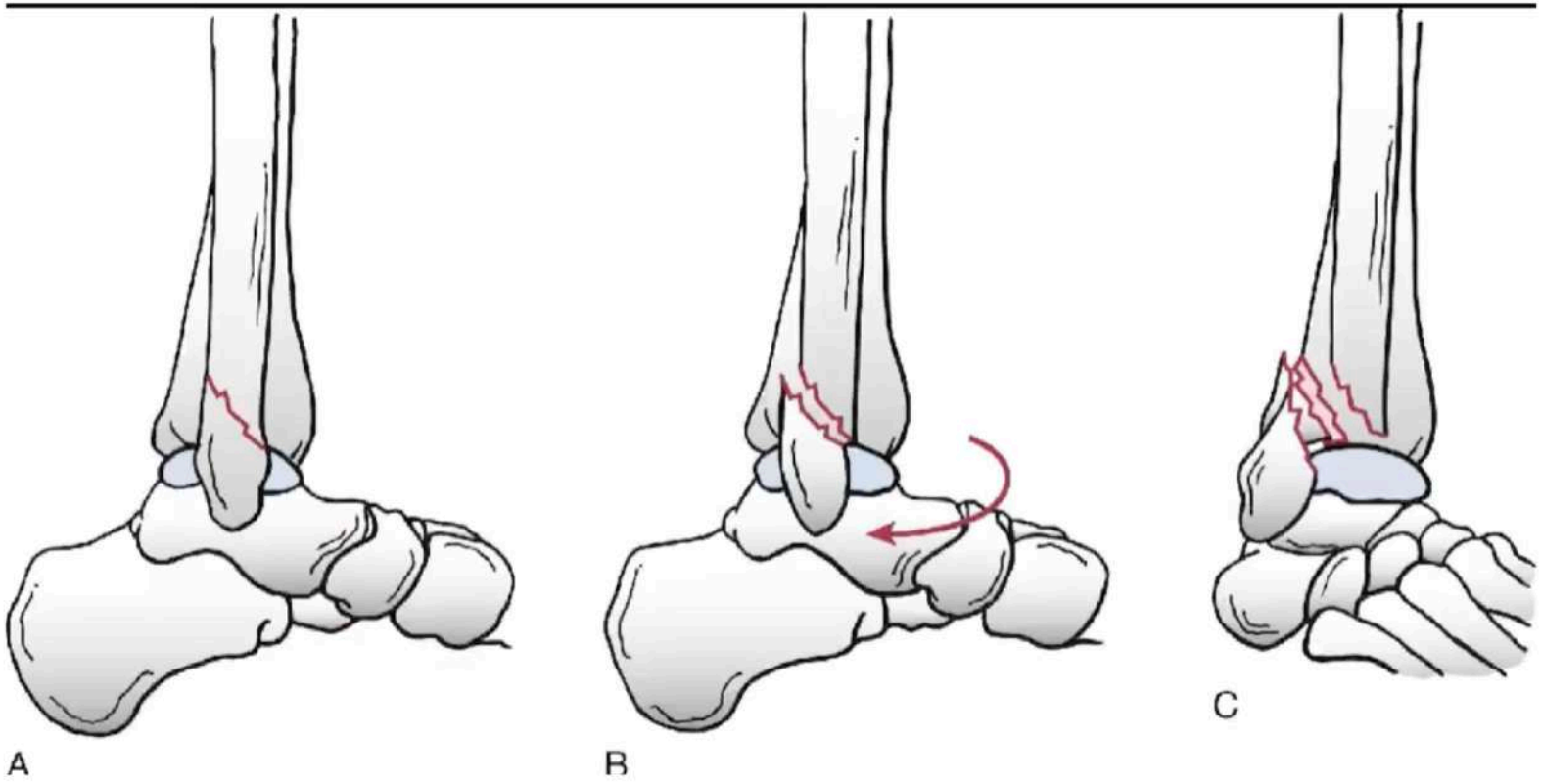
Supination–external rotation stages I - IV

Pronation–abduction stages I - III

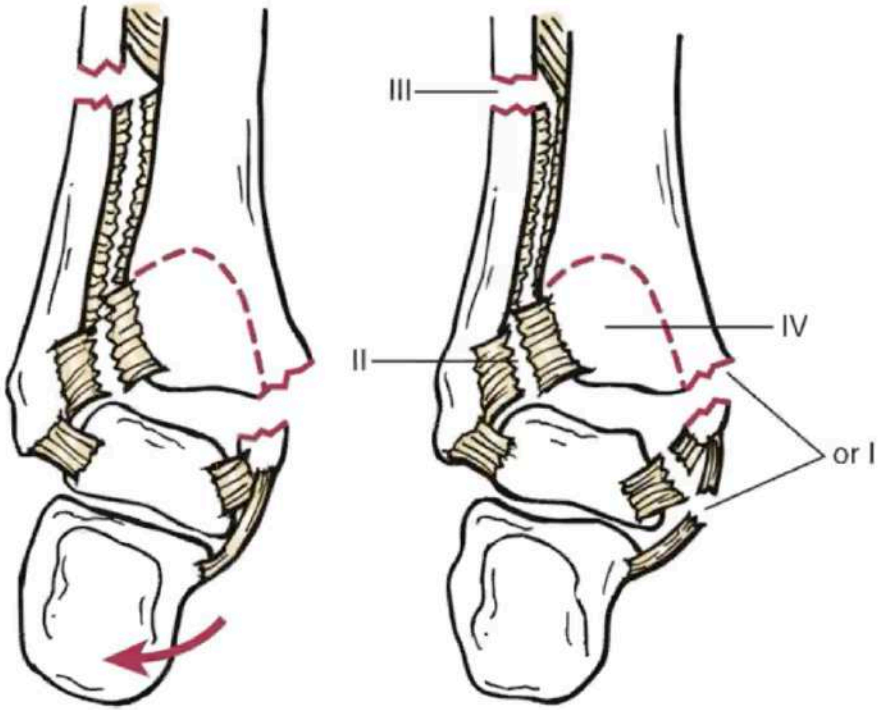
Movement around subtalar joint



Morphologic events of type b

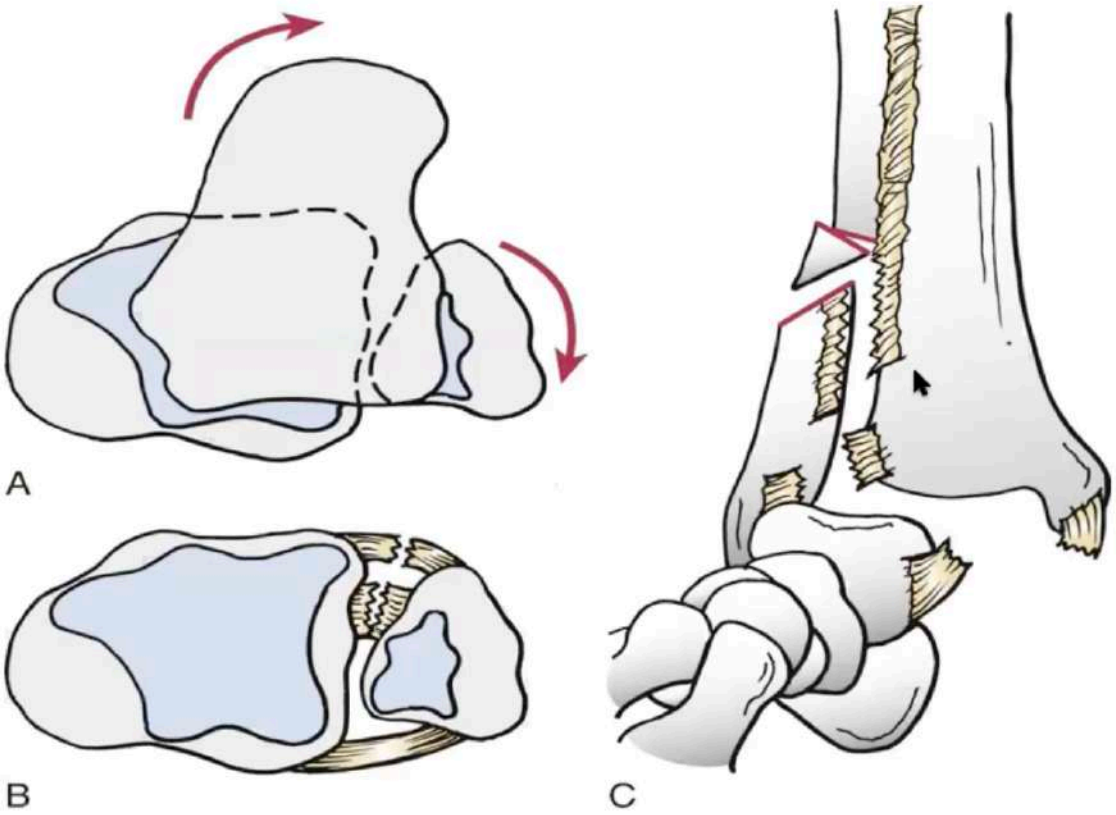


Type c- supra-syndesmotic



Pronation–external rotation stages I - IV

Morphologic sequence type c



radiology

- Mechanism of injury
- Severity of injury
- Best approach
- Adequacy of treatment- surgical/ conservative

Ottawa ankle rules

- Tells When to perform ankle radiograph series
- As per the rule ankle series is needed only if patient has pain in malleolar region

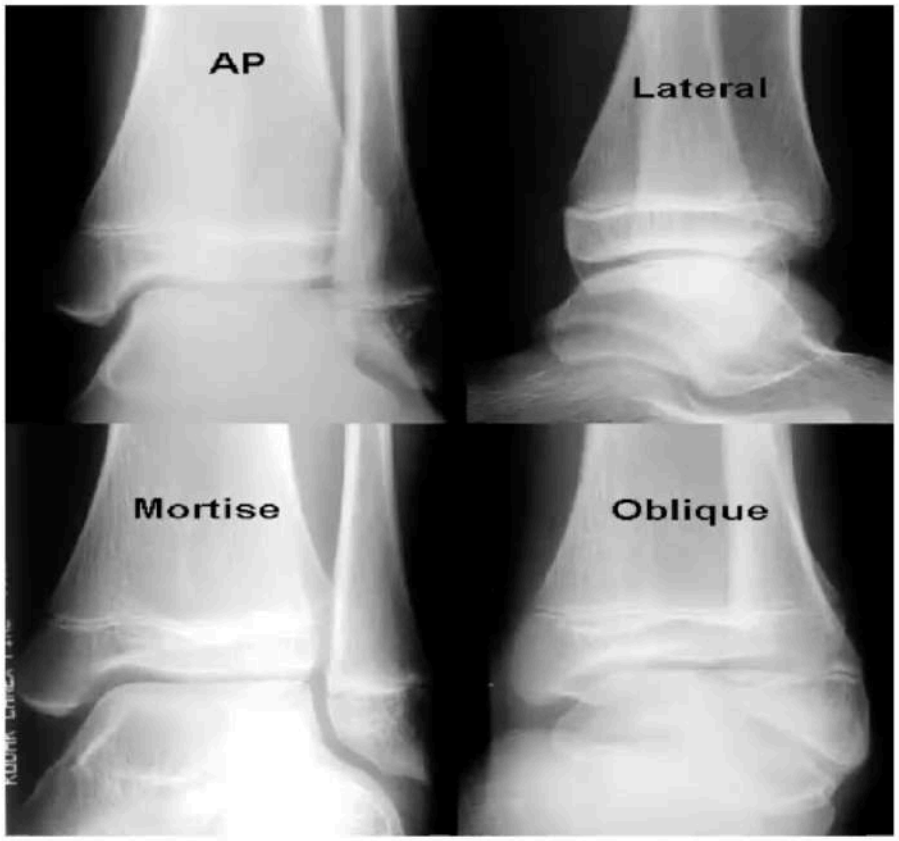
Plus any of the following:

1.bone tenderness at the posterior edge or tip of the lateral malleolus

2. inability to bear weight both immediately and in er

- When in doubt obtain xrays

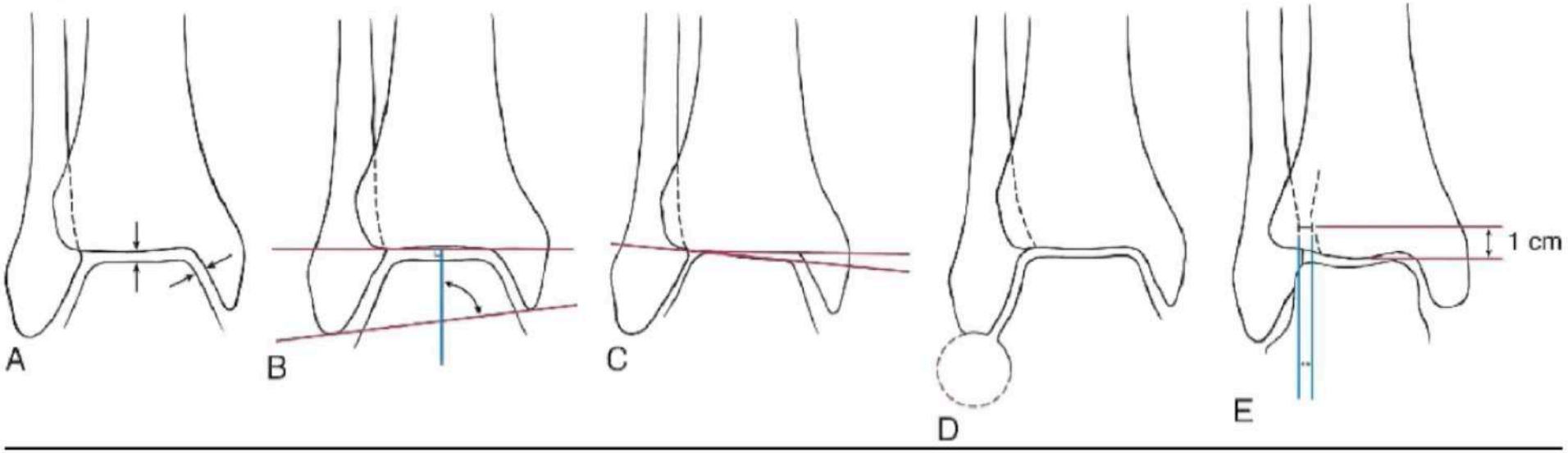
Xray views



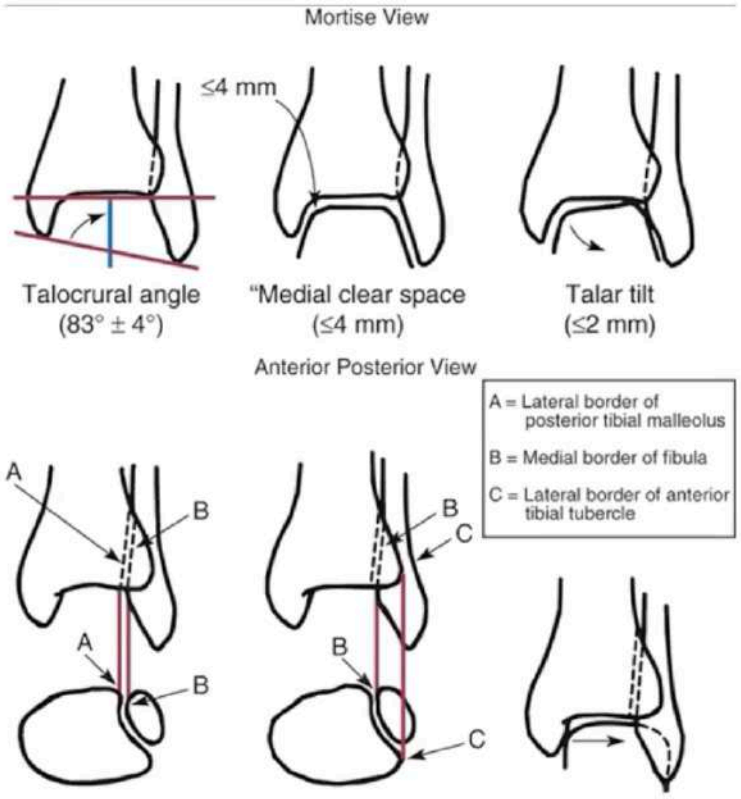
Additional views

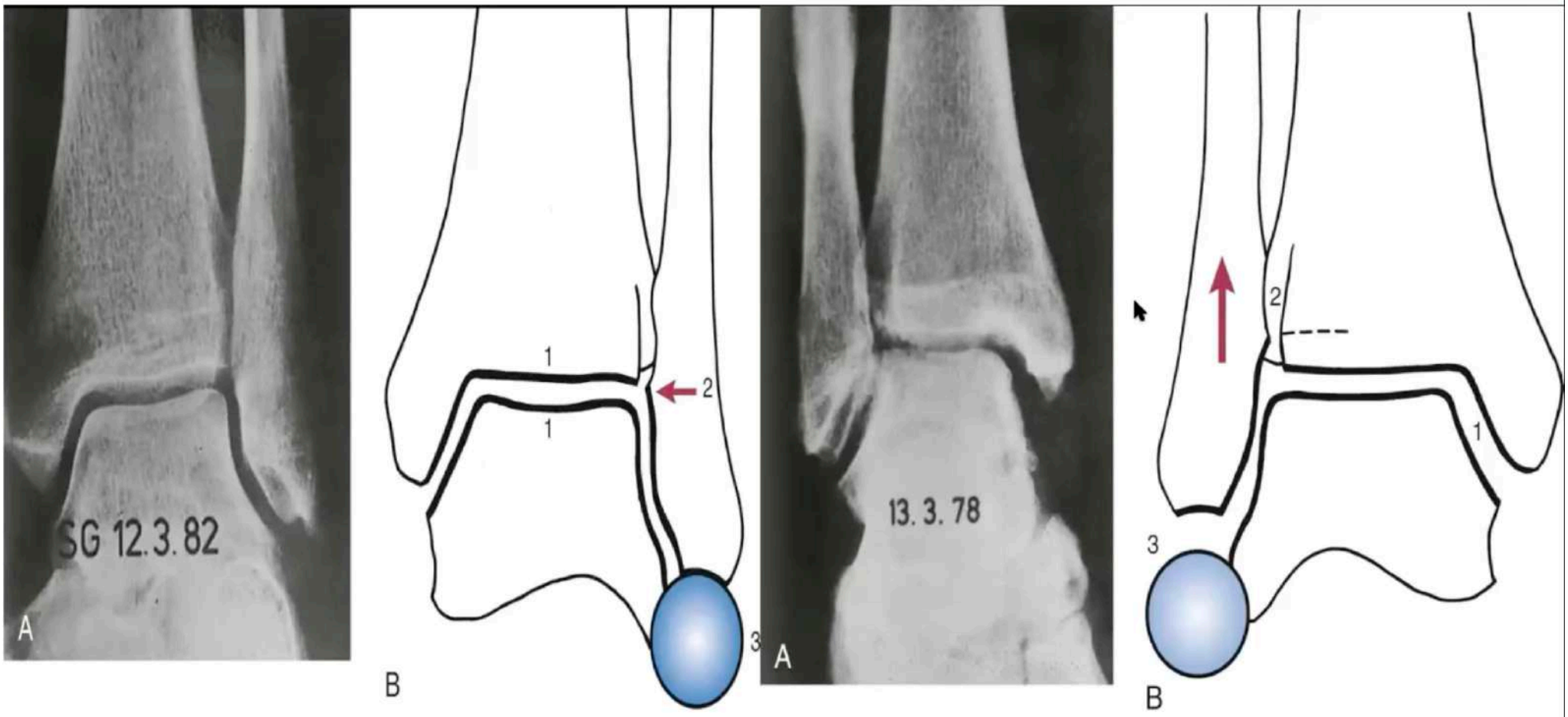
- Full length view of tibia and fibula – Maisonneuve # (per)
- Ct scan- comminuted #

Important radiological indices



SYNDESMOTIC IMAGING CRITERIA





Example

TYPE C

Example : SAD

Example: PER

Example: SER Type 4

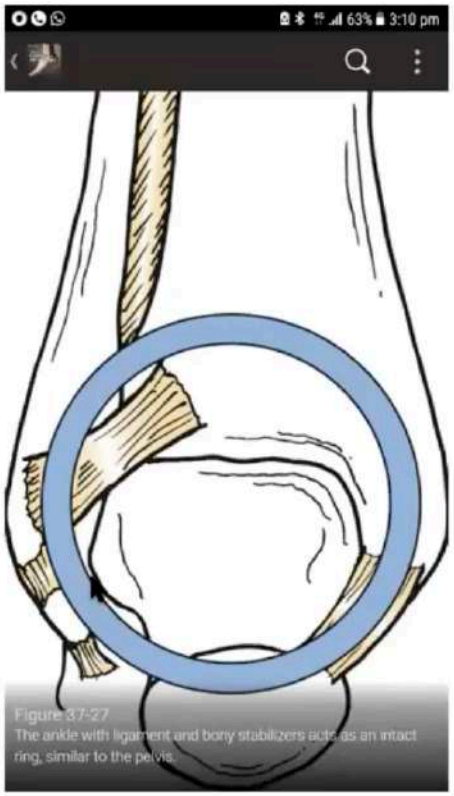
TREATMENT CONCEPTS

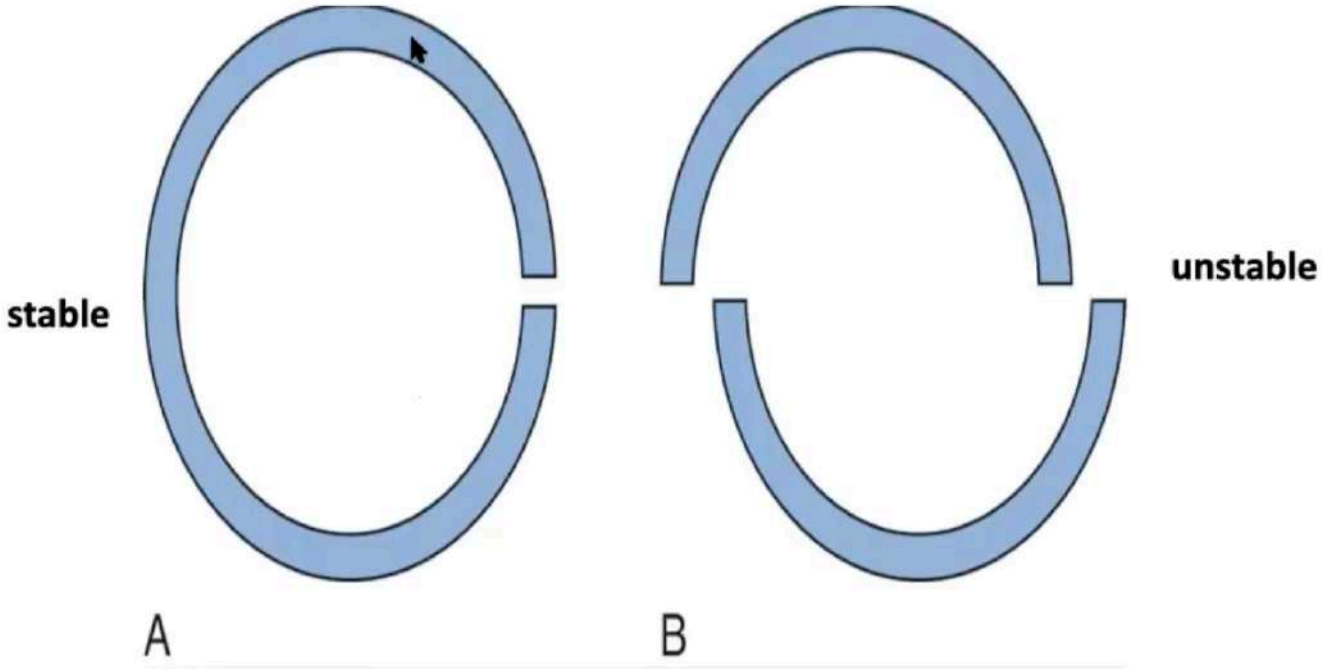
- Anatomical reduction
- Early mobilization
- Soft tissue consideration- swelling, hematoma, skin necrosis, open injury
- early reduction of dislocation
- Prolonged immobilization: muscle atrophy, myostatic contracture , decreased joint motion , capsular and synovial adhesions, cartilage degeneration, bone atrophy.

Operative vs non-operative

- Aim to get best anatomical reconstruction.
- Obtain best structural stability.
- Radiographic and ct assessment.
- Earliest mobilization

Ring concept

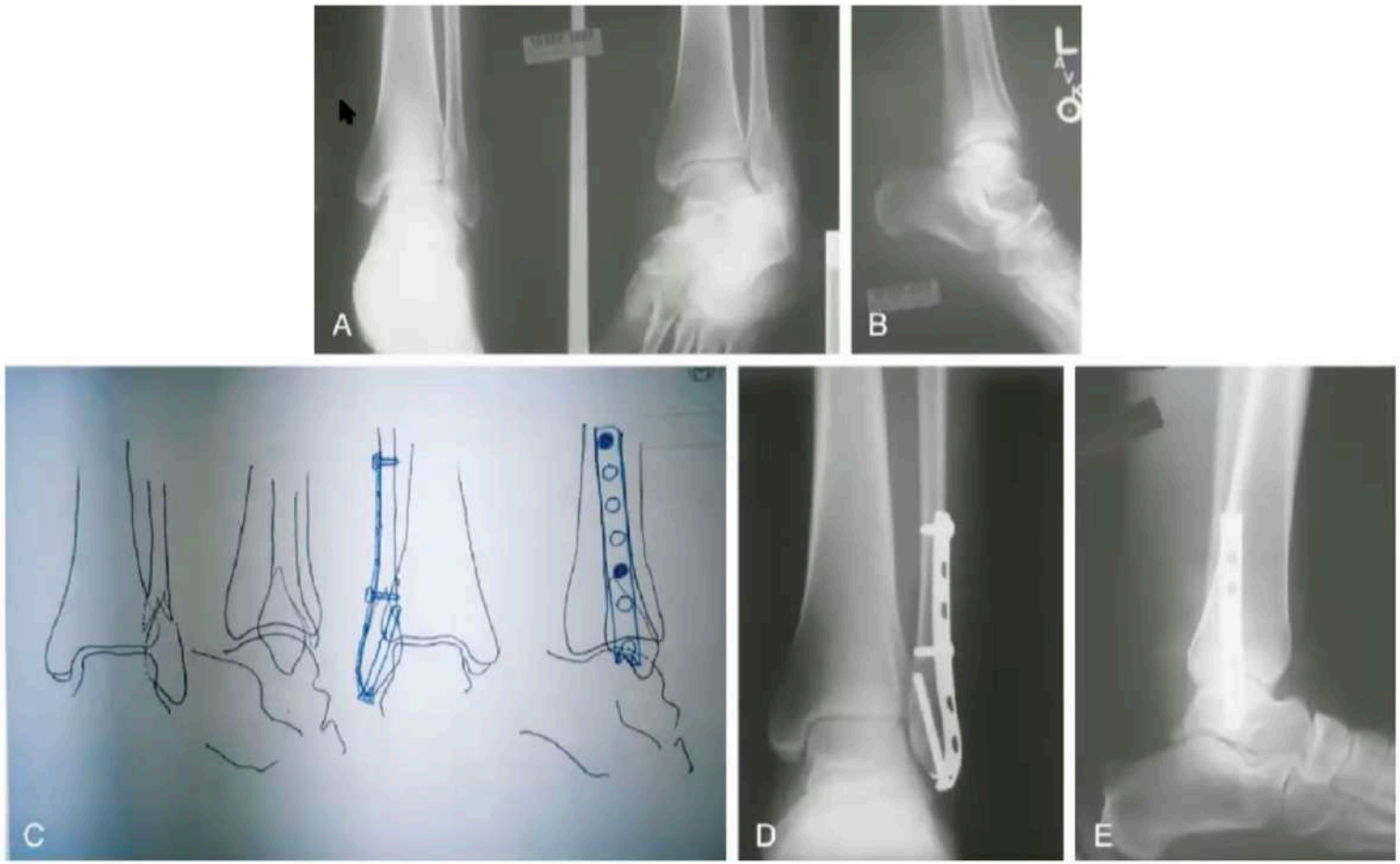


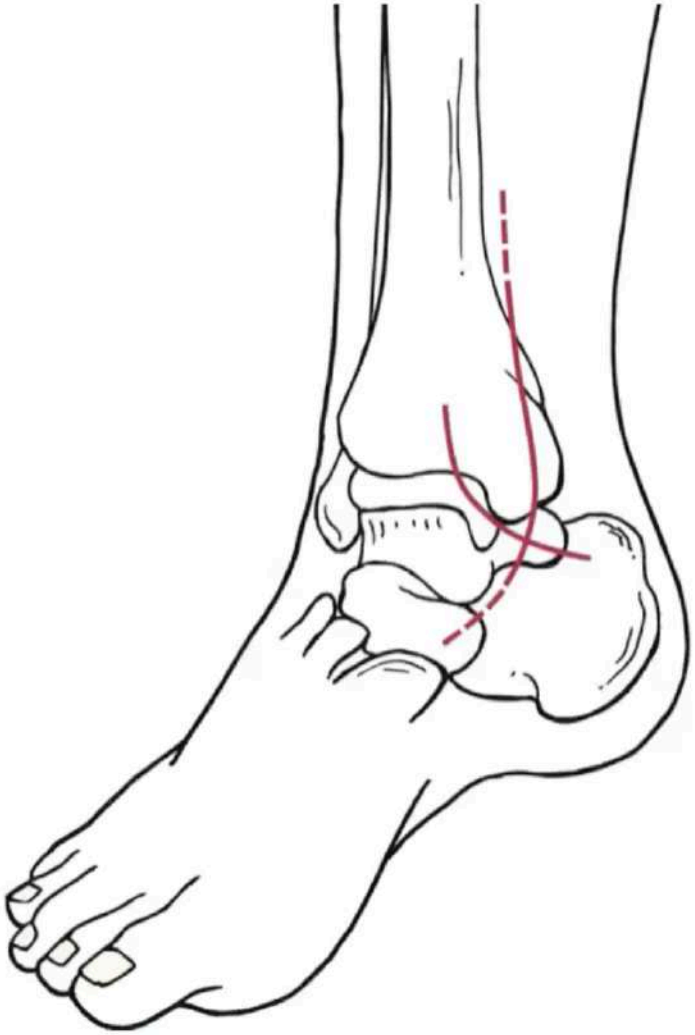


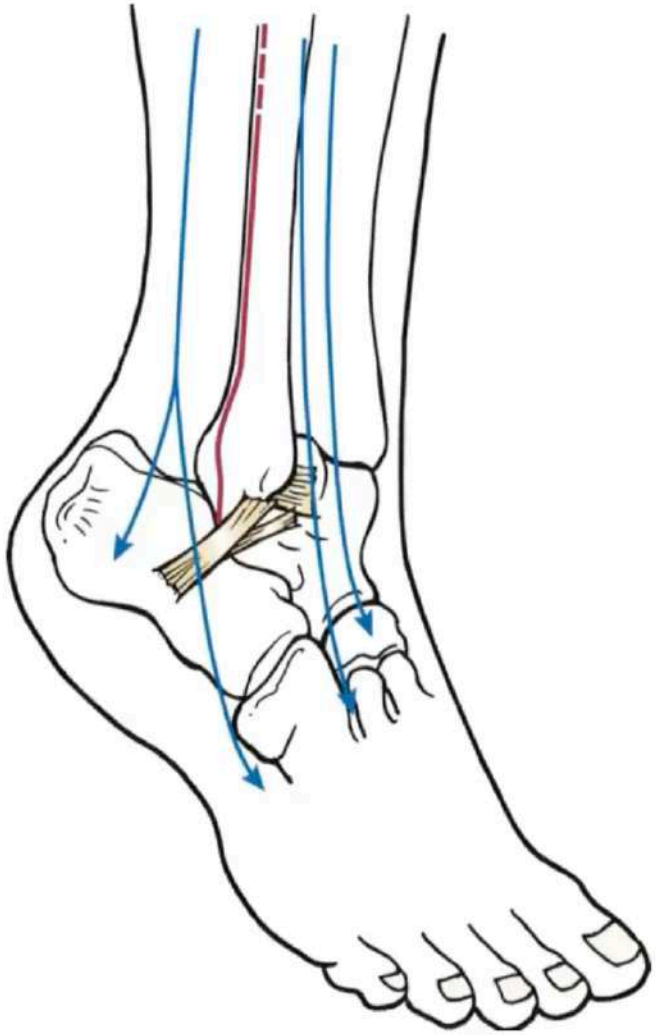
Timing of surgery

- Dislocations need urgent reduction
- Good results depend on recognition and management of associated soft tissue injury.
- Clean and dress the abrasions to prevent bacterial colonization
- Deep dirty wounds after 12-24 hours- contraindication for surgery
- Ideal time- before tissue swelling edema develops.
- If blisters are present in line of surgical incision- delay surgery, splint

- Do adequate preop planning by radiographs
- Ct if needed
- Templating for difficult fractures
- Patient positioning.
- Plan of incisions





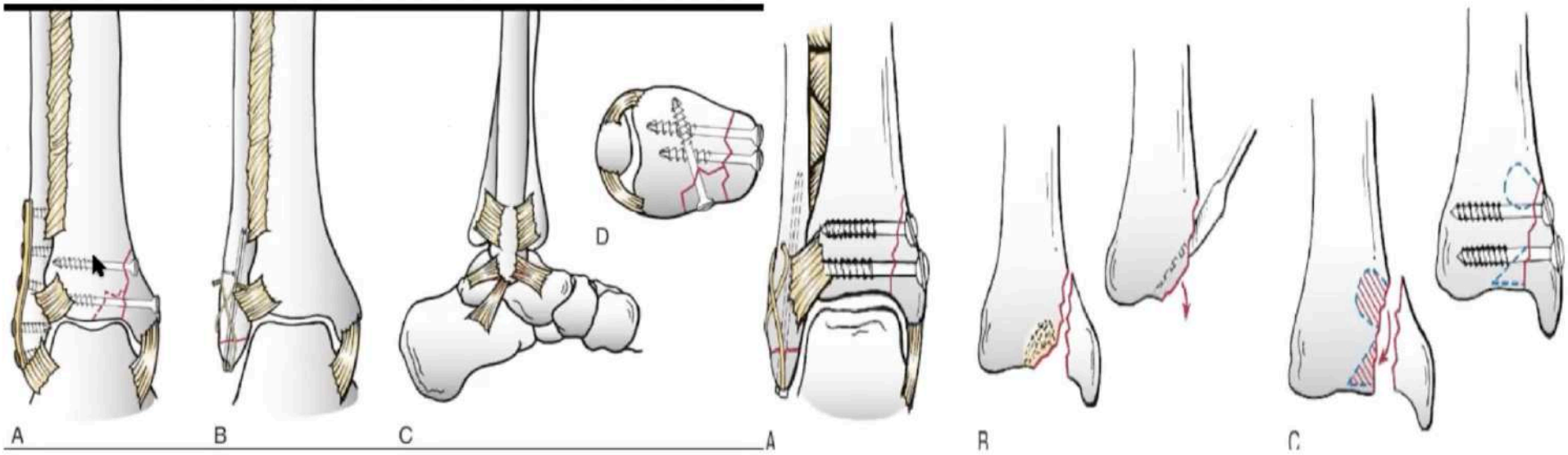


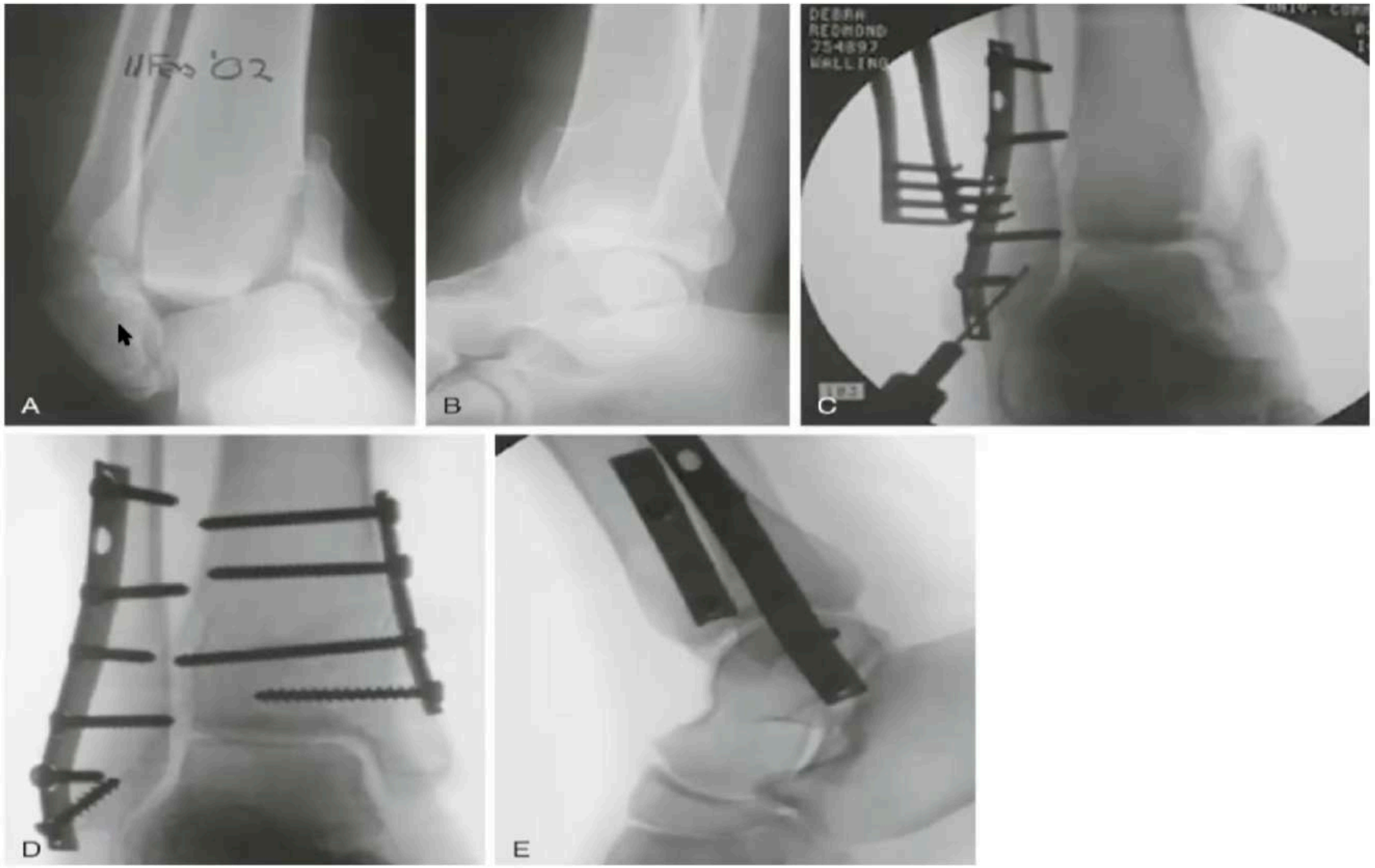
Sequence of fixation

- First step is reduction of fibula – provisional / definitive
- Medial exposure in case of difficulty- deltoid ligament, osteochondral fragment
- Definitive fixation

Type a (infrasyndesmotic) fractures

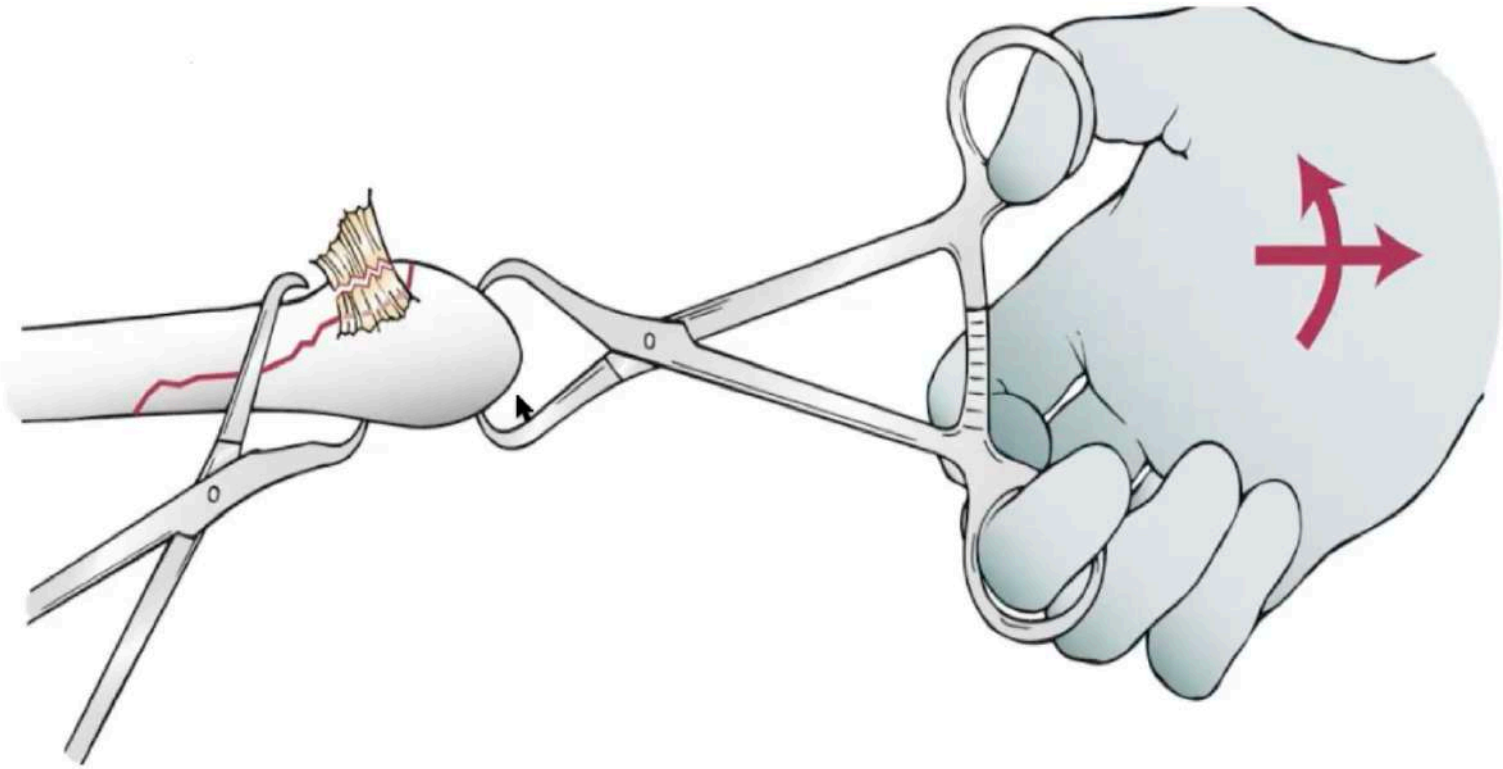
- **Isolated lateral malleolus with minimal displacement**- stable fracture and treated by **cast and non weight bearing cast.**
- **Unstable fractures- orif with plate or tbw with repair of ligaments**
- **Medial malleolus-compression srew or gliding plates**





Type b (transsyndesmotic) fractures

- Oblique fibular fracture- distal anterior to proximal posterior
- Fibula is proximally shifted, displaced posteriorly and rotated externally
- **Gentle traction, internal rotation of foot**- reduction.



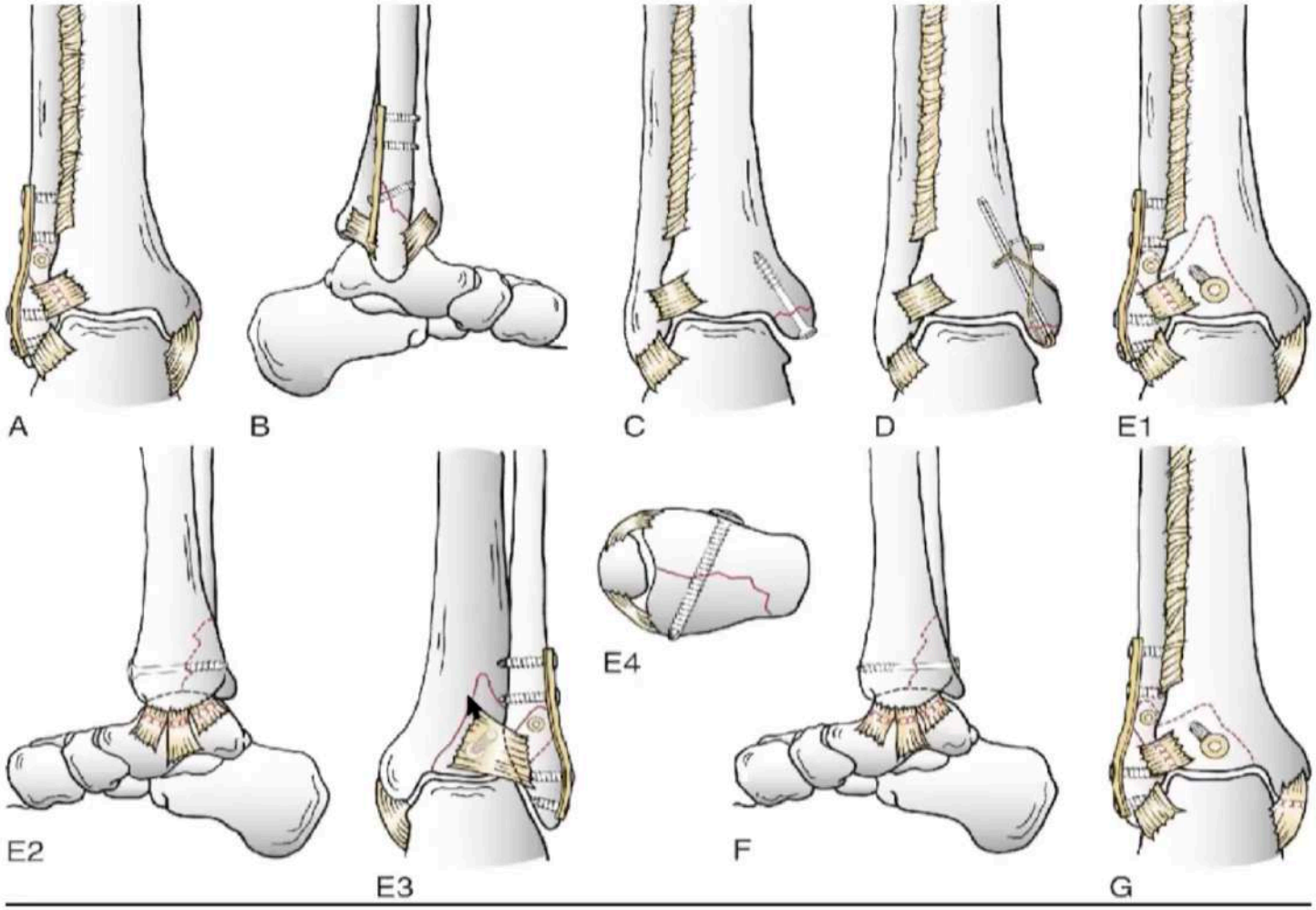
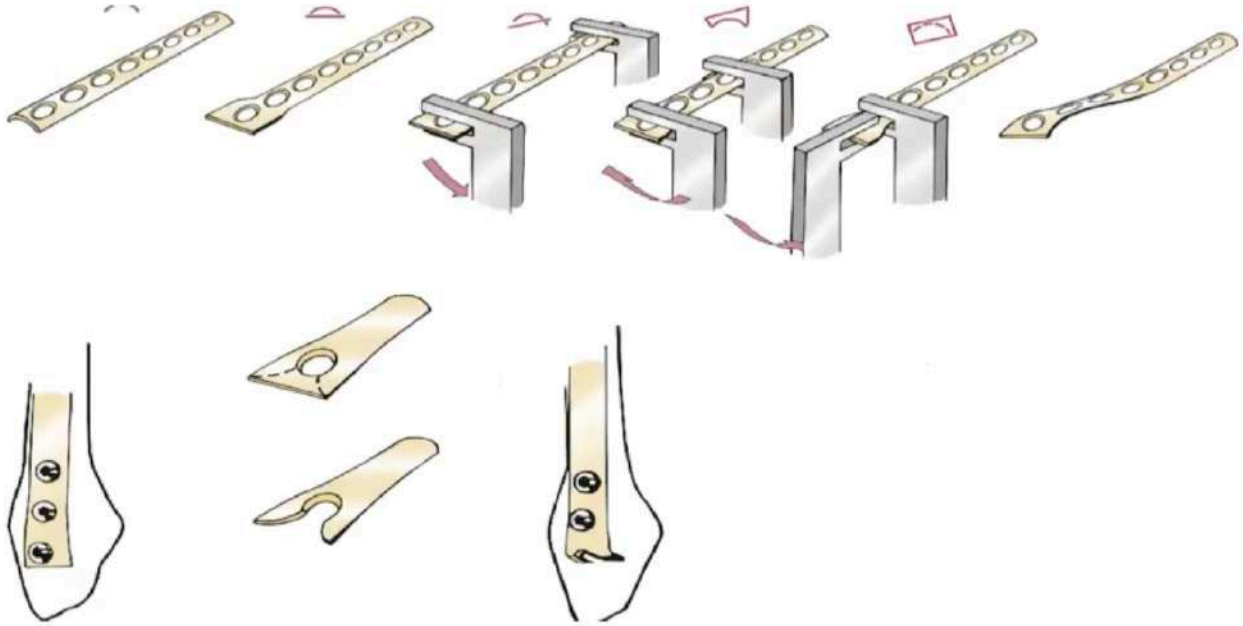
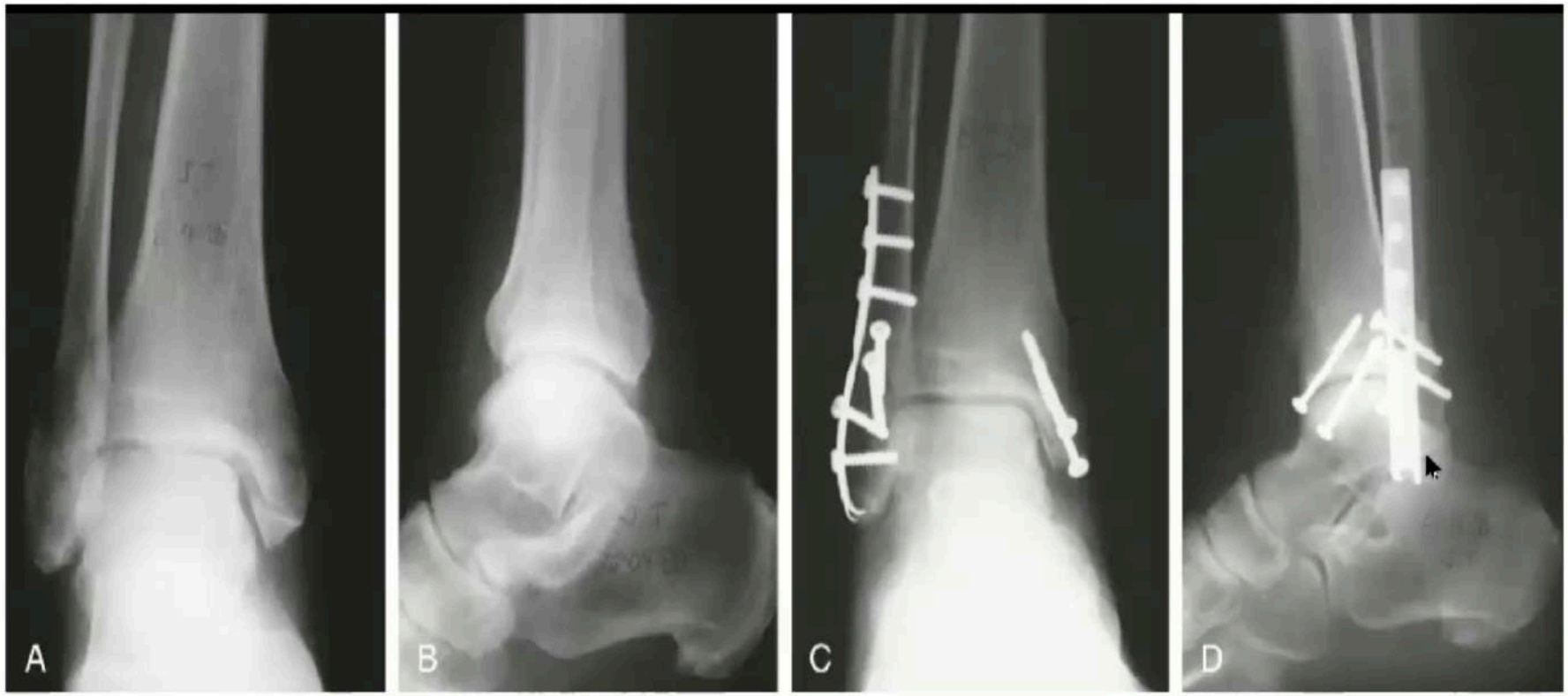


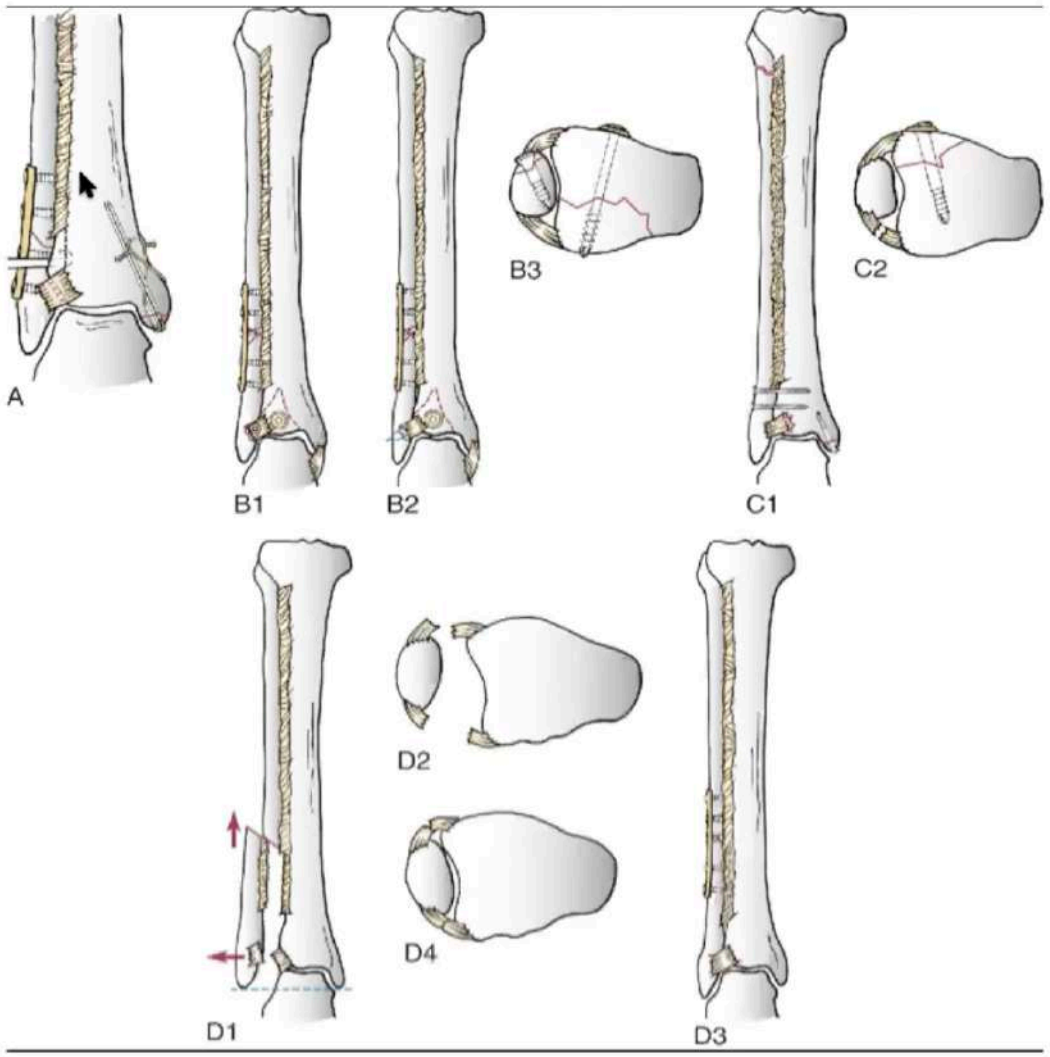
Plate moulding

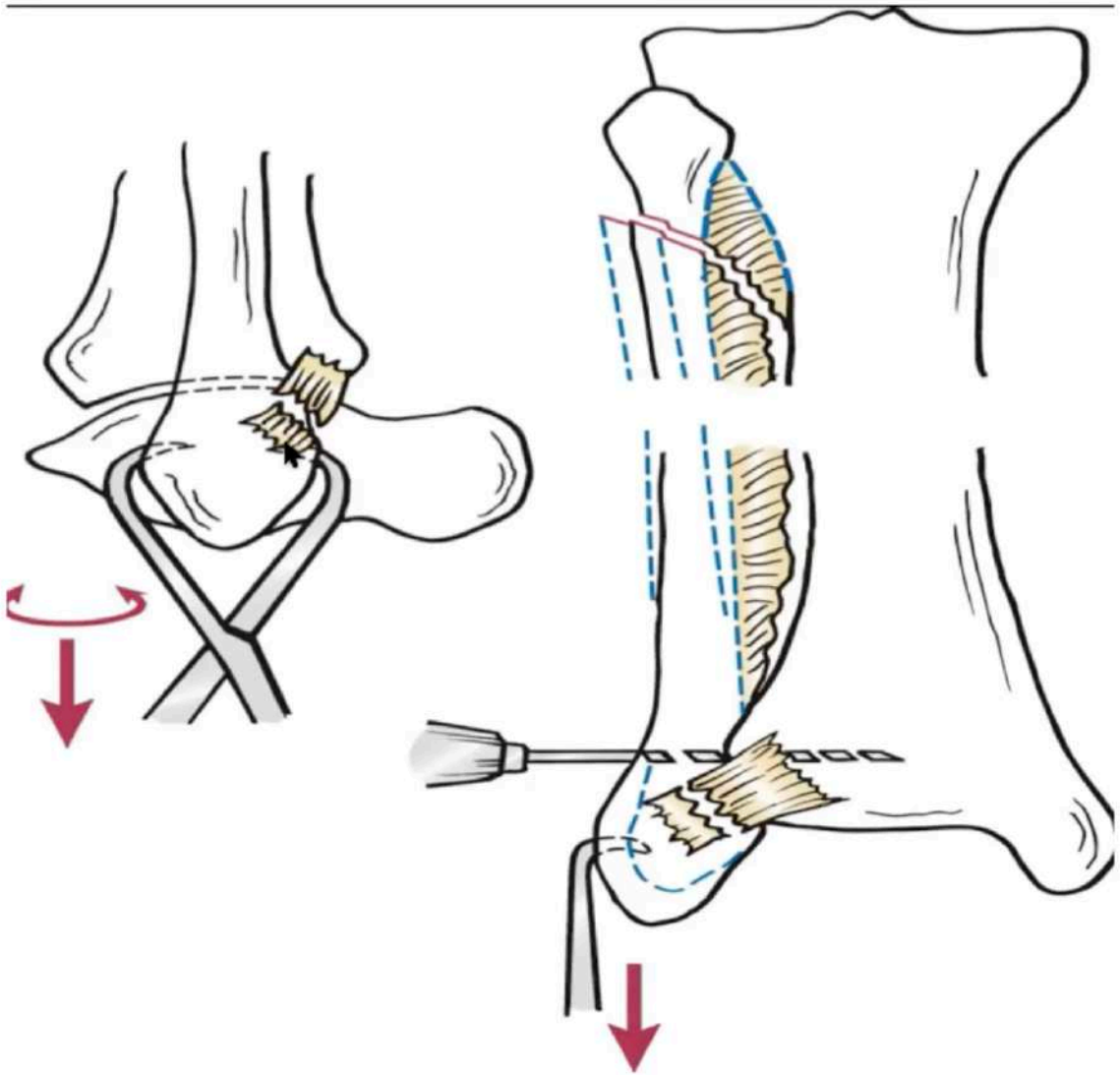


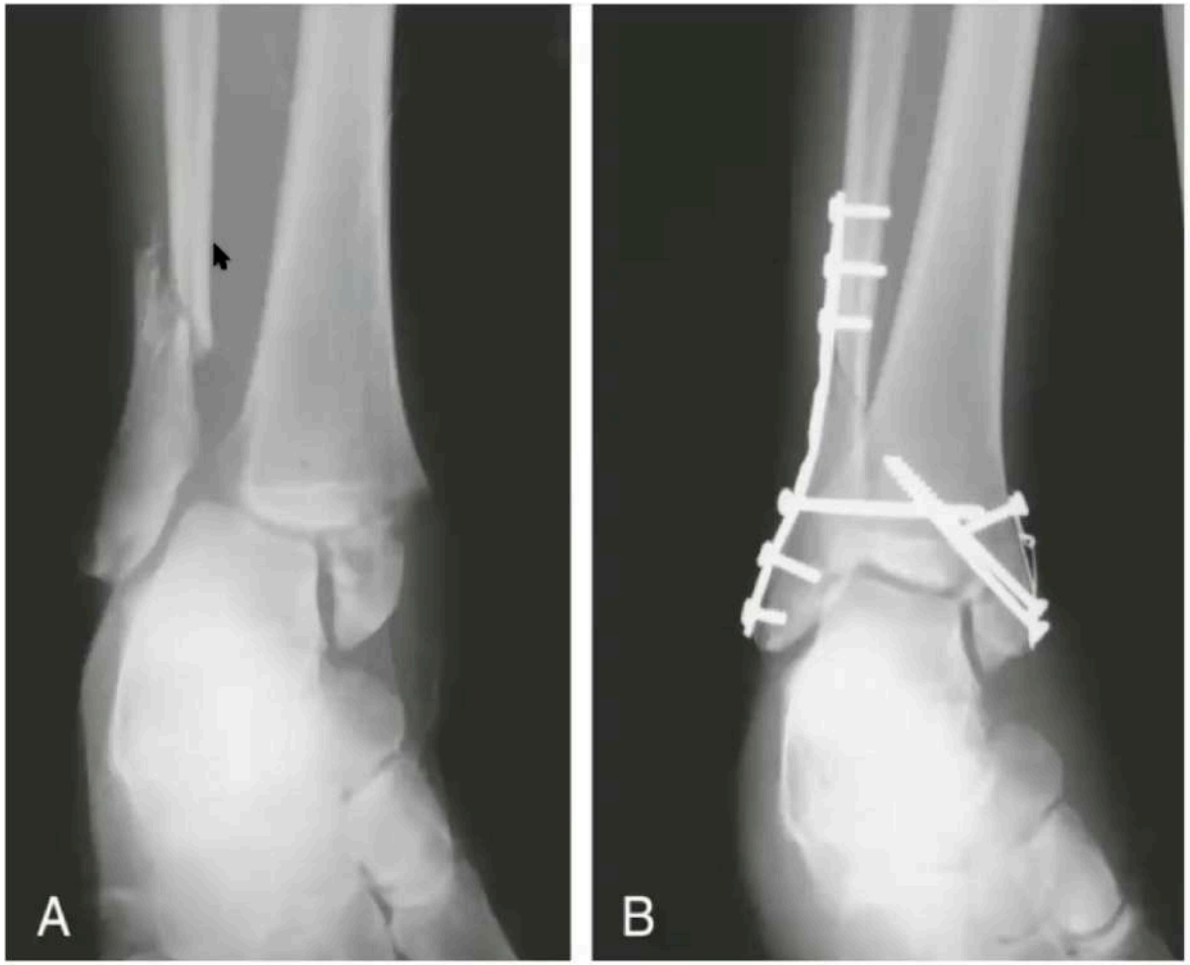


Type c (suprasyndesmotic) fractures

- First step – approach fibula
- Achieve rotation and restores length



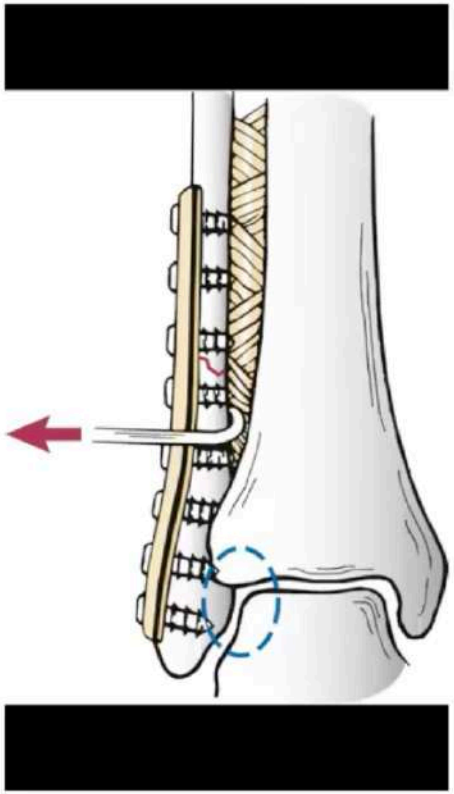




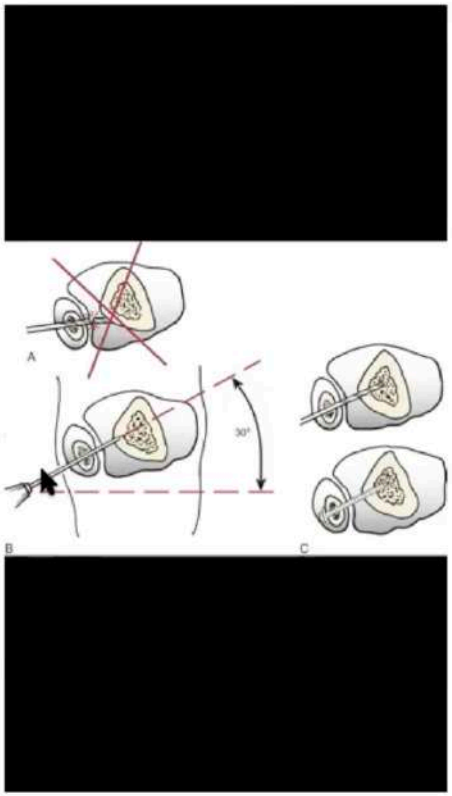
Syndesmotic injuries

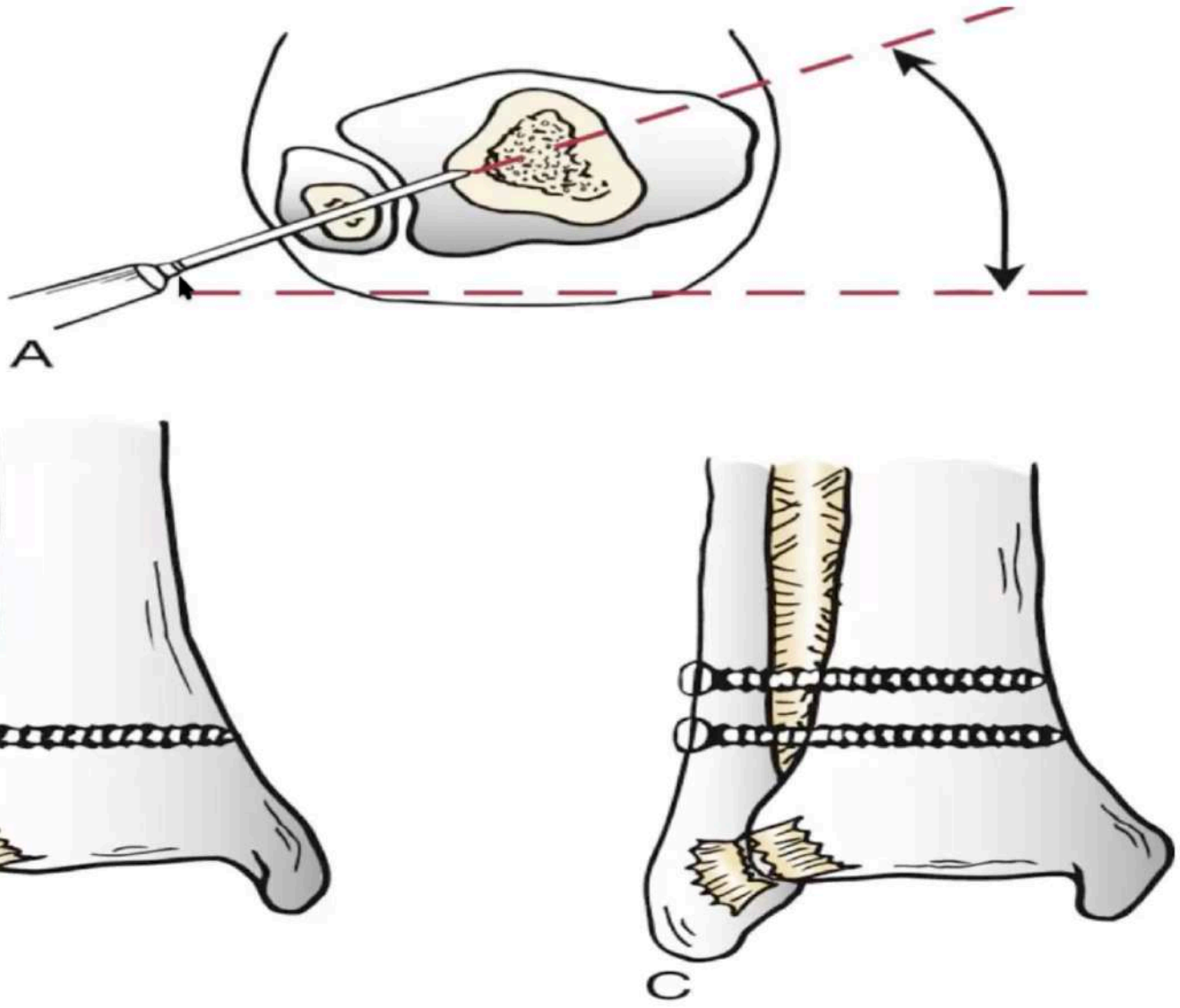
- Obvious diastasis with suprasyndesmotic fracture (type c) needs fixation.
- Bimalleolar fracture with in 3.5 to 4.5 cm of ankle joint if anatomically fixed does not need syndesmotic fixation.
- Once the fibular length is restored, fibula fixed, medial side reconstructed- assess stability intra op (**cotton's test) – widening of medial joint space by >2mm suggests instability**

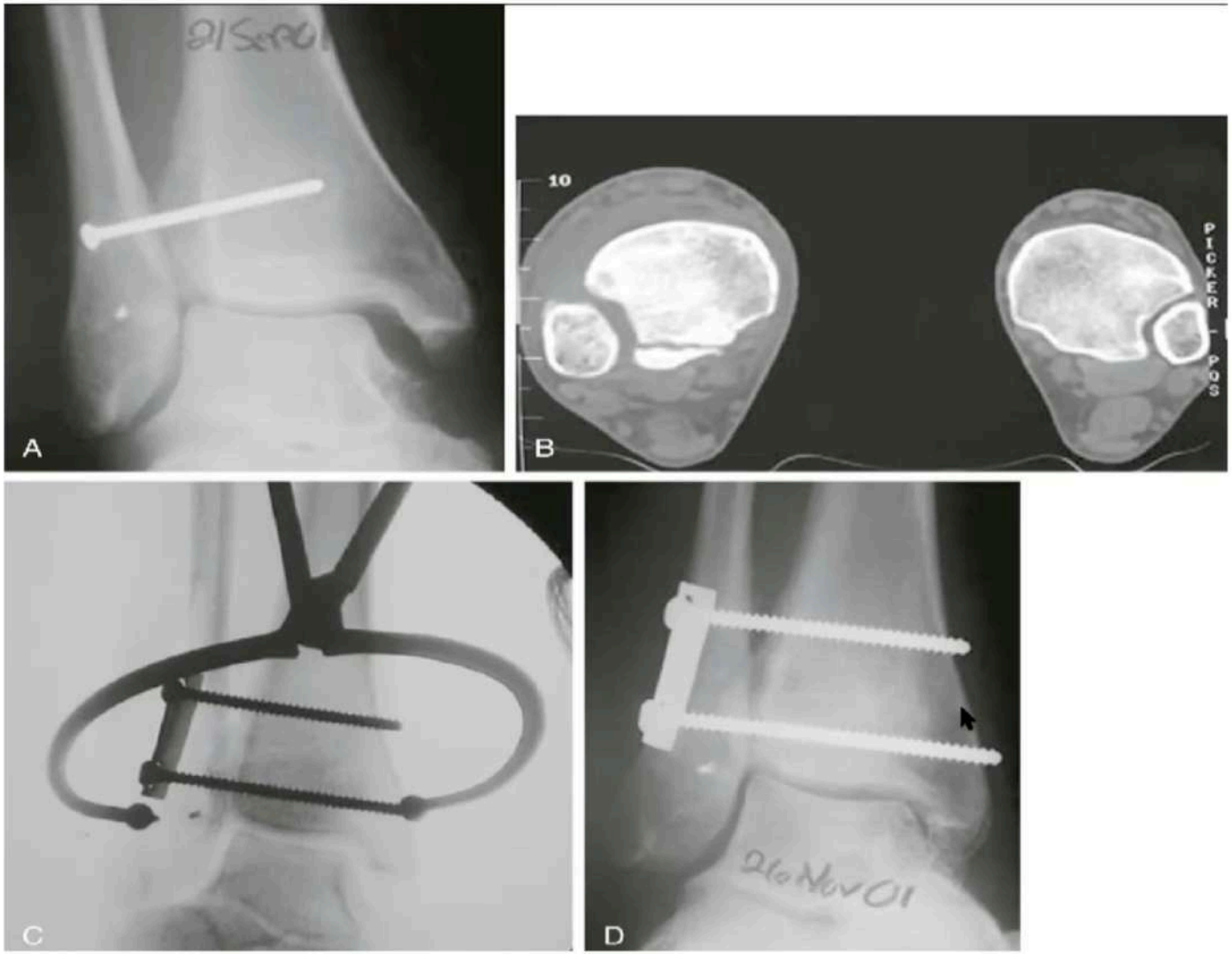
Assessment post fibula fixation- cottons test



Screw placement







take home !!!!

- Identify fracture pattern
- Take all necessary radiographs and ct
- Decide the plan of action.
- Congruent joint, full rom and early mobilization is vital for best outcome.

SYNDESMOSIS

Tibiofibular

overlap<10mm

MALLEOLAR LENGTH

Talocrural angle

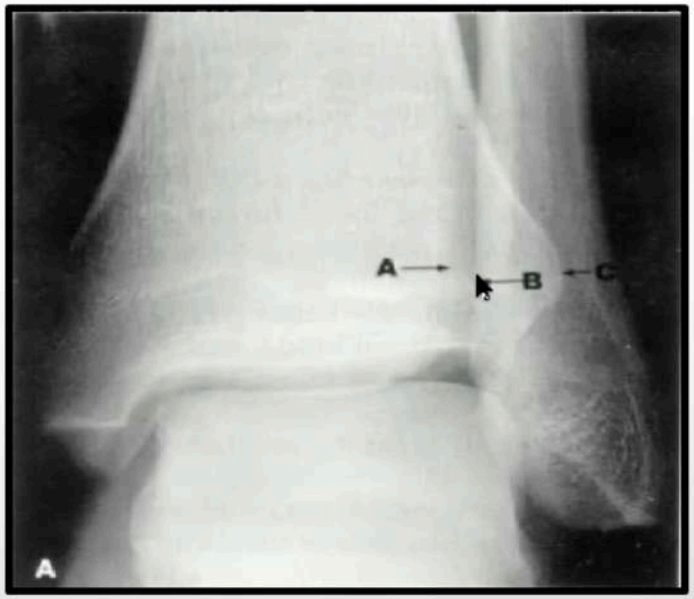
83+_4 deg

TALAR TILT

- sup clear space-

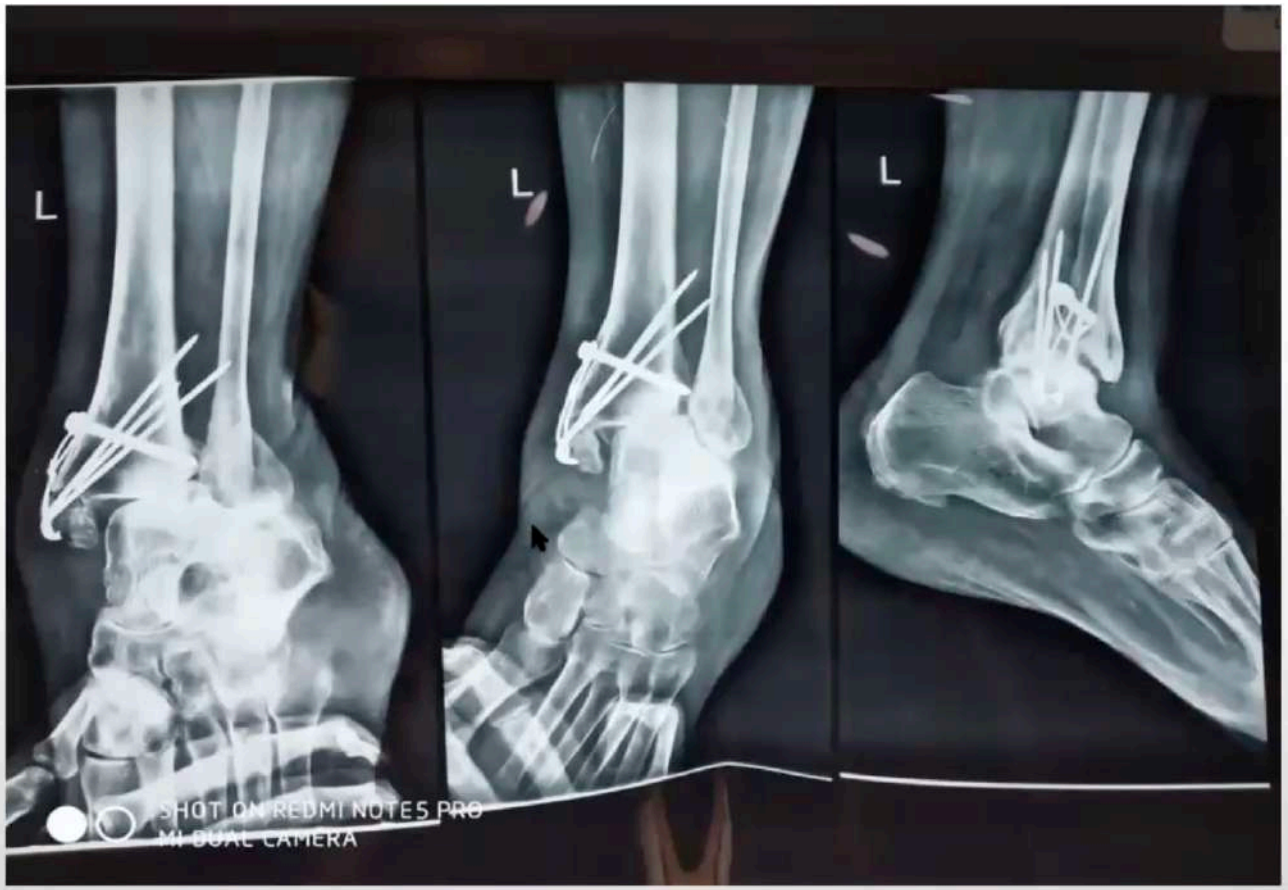
med clear space diff

<2mm



STRESS VIEWS ARE HELPFUL

- HIGH CLINICAL SUSPICION
- PERSISTENT COMPLAINTS OF PAIN



IDENTIFY THE FAILURE SITE

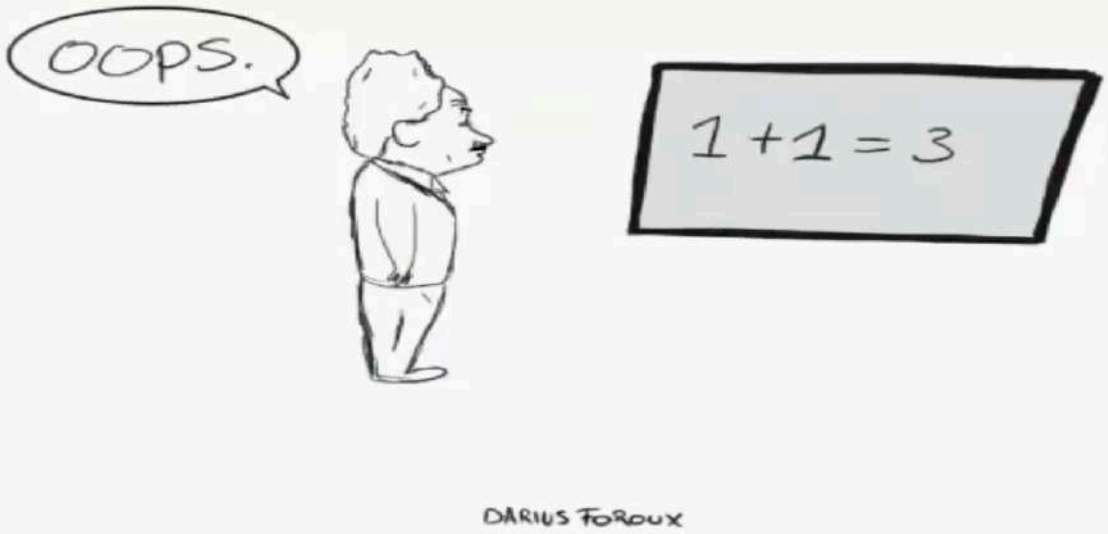
Valgus failure

- Rigid lateral fixation.
- No intramedullary fixation of fibula

Varus failure

- Rigid medial buttressing
- No single screw fixation.

Mistake #3:



SYNDESMOTIC FIXATION: SCREW OR TIGHT ROPE?

Dr. Rahul Upadhyay
Consultant Foot & Ankle Surgeon, Jaipur

The big debate

Why are we debating ?

Complication?

Technology !!!

Aspiring for more and better ?

2009 Hamid N, et al Outcome after fixation of ankle fractures with an injury to the syndesmosis. The effect of a syndesmosis screw

52 patients

27 intact screws (AOFAS score 83)
15 elective removal (AOFAS score 86)
10 broken screws (AOFAS score 92)

Average 30 (12-56) month follow-up

AAOS

2007: Wahlquist M. Late Diastasis of the Syndesmosis following Syndesmotic Screw Removal (podium presentation)

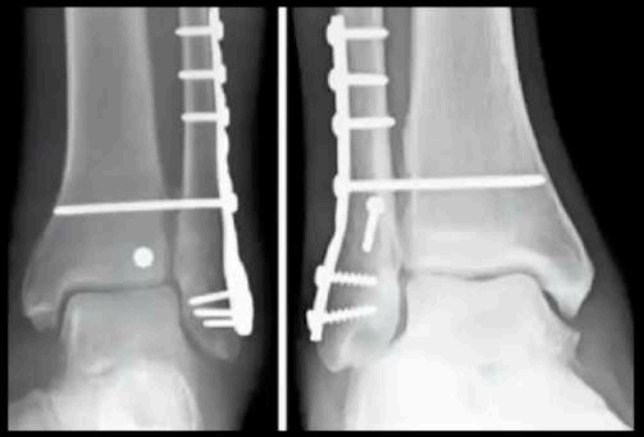
21 patients

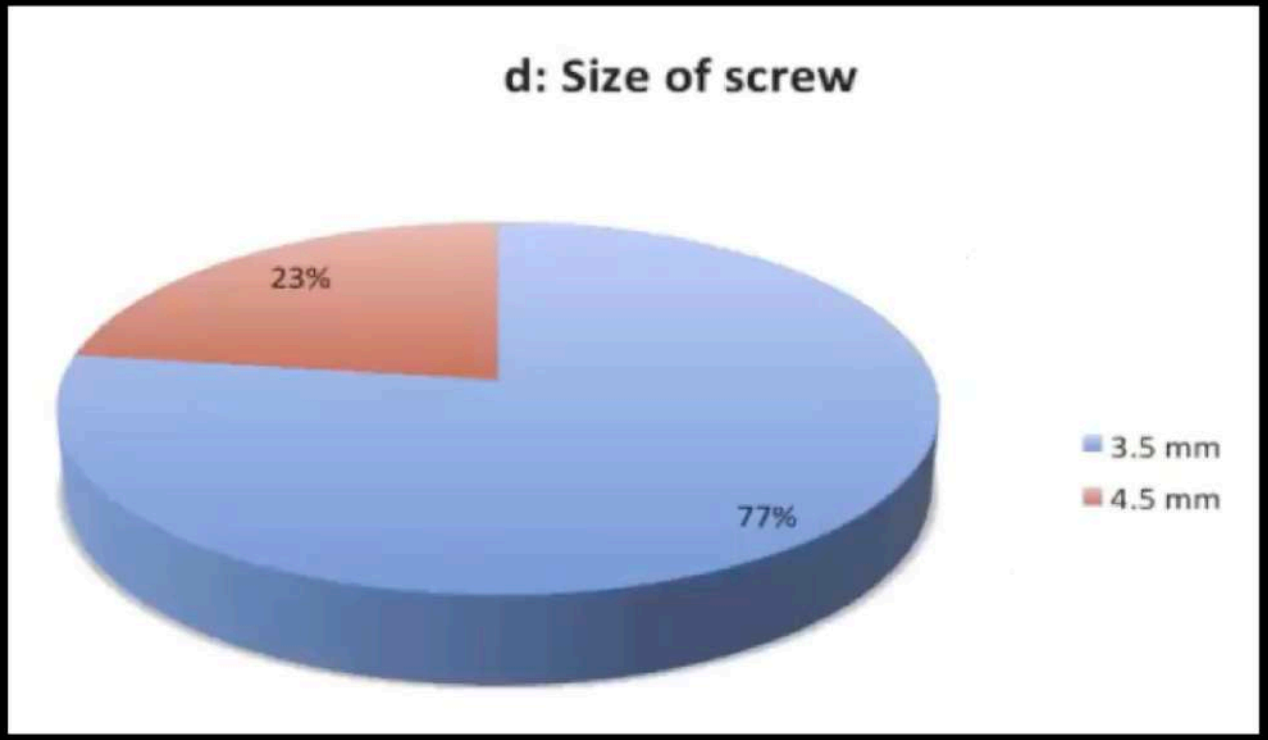
Average **2mm widening** of tibio-fibular clear space

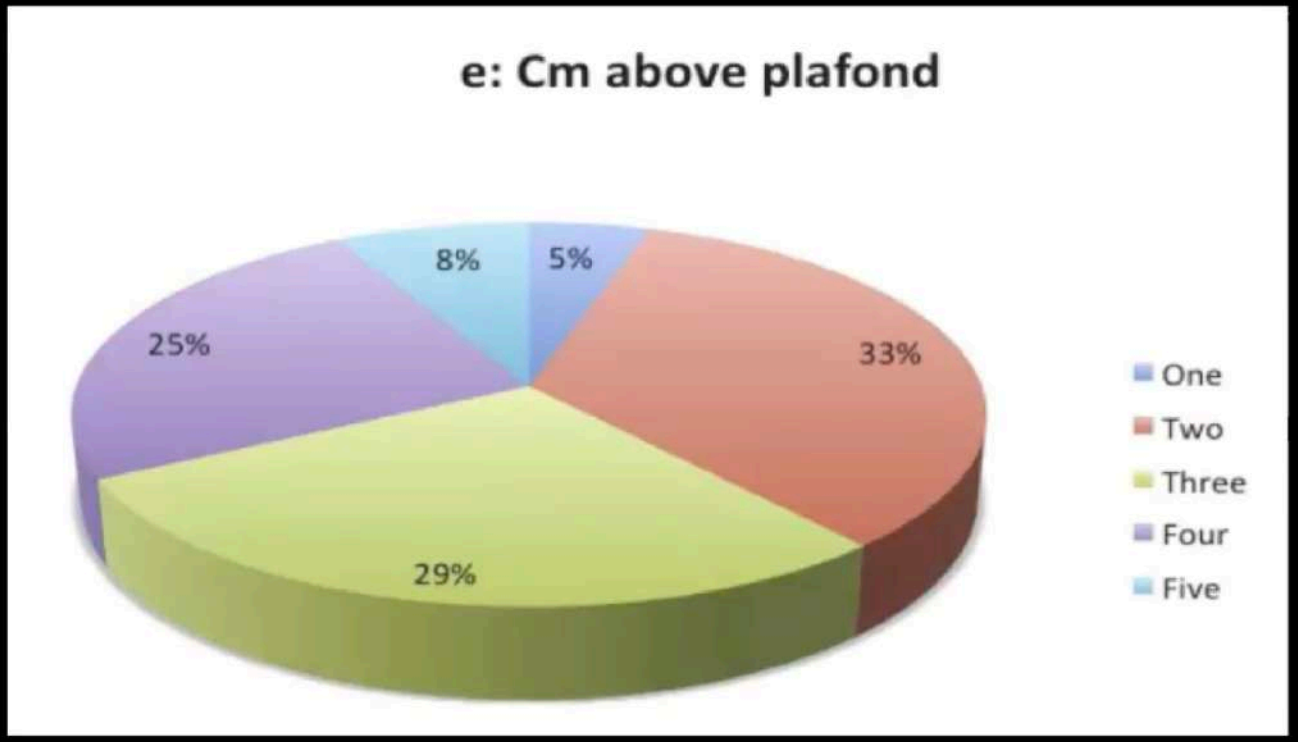
38% of patients symptomatic

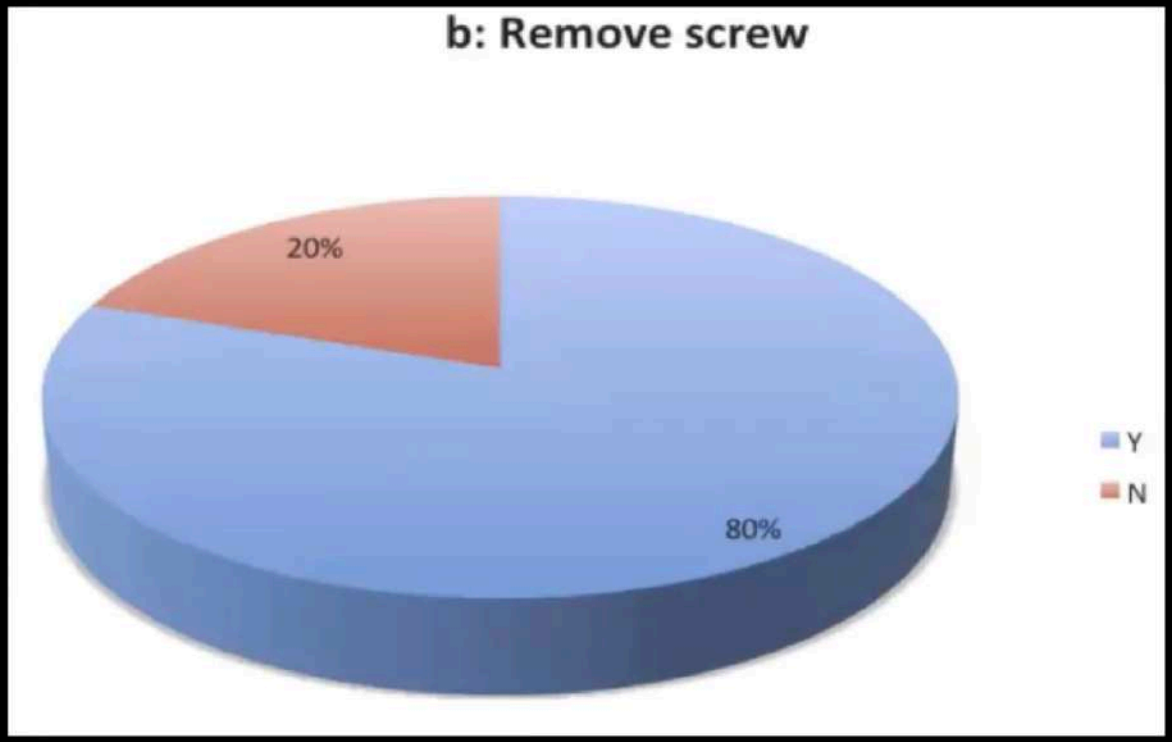
DEBATE STILL EXISTS….

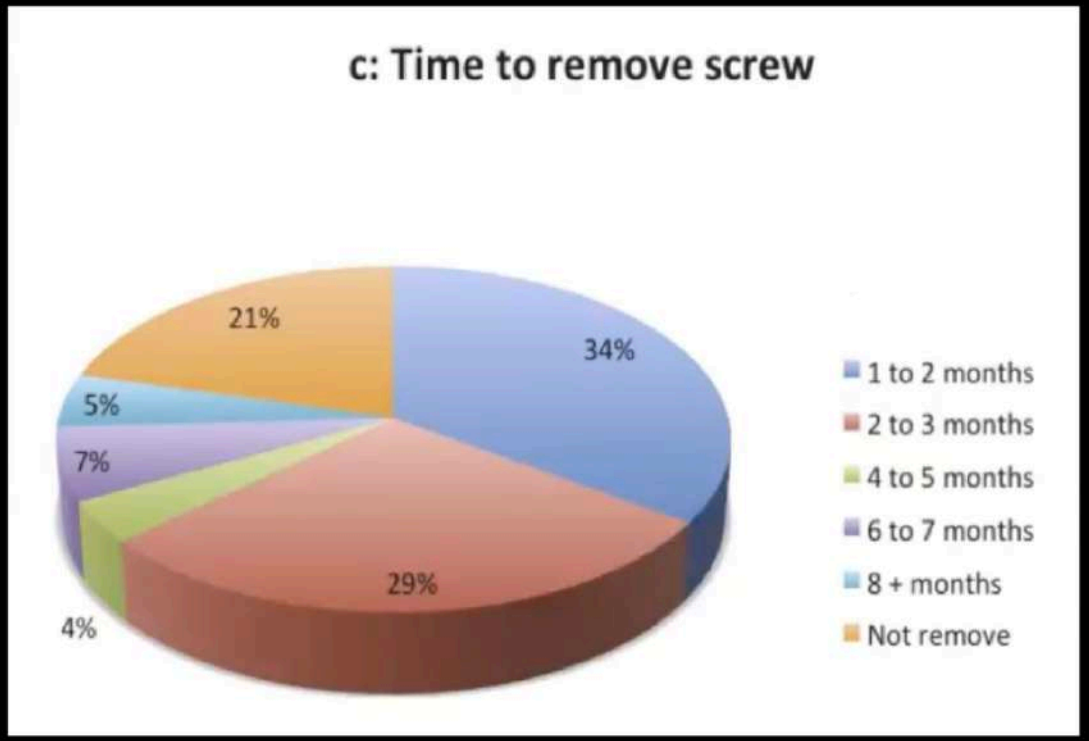
- What size and number of screws should be used ?
- How many cortices should be engaged?

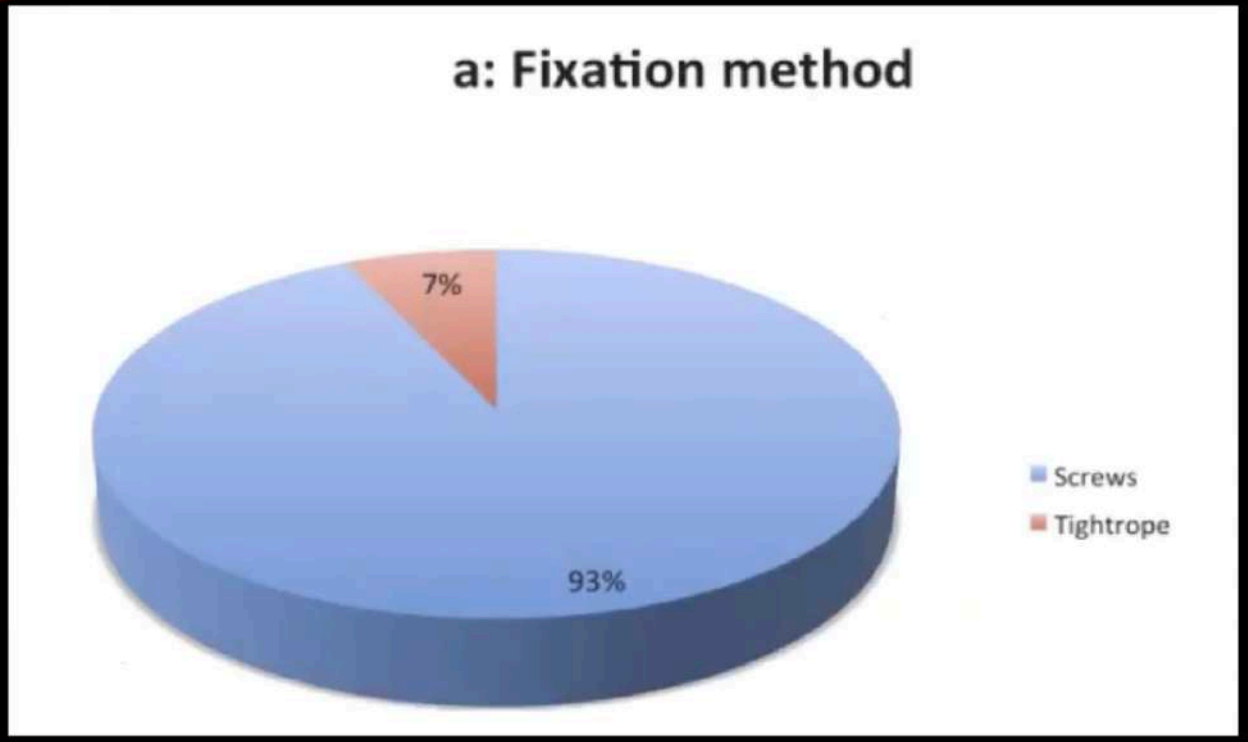


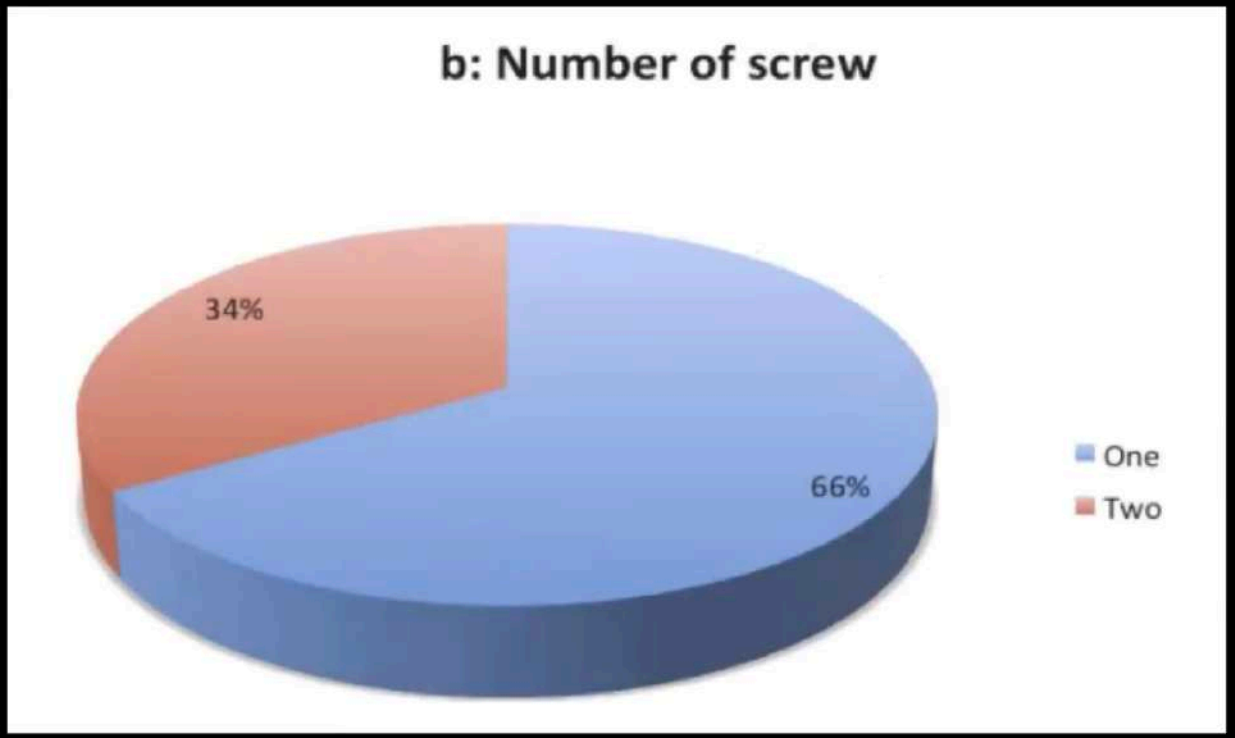


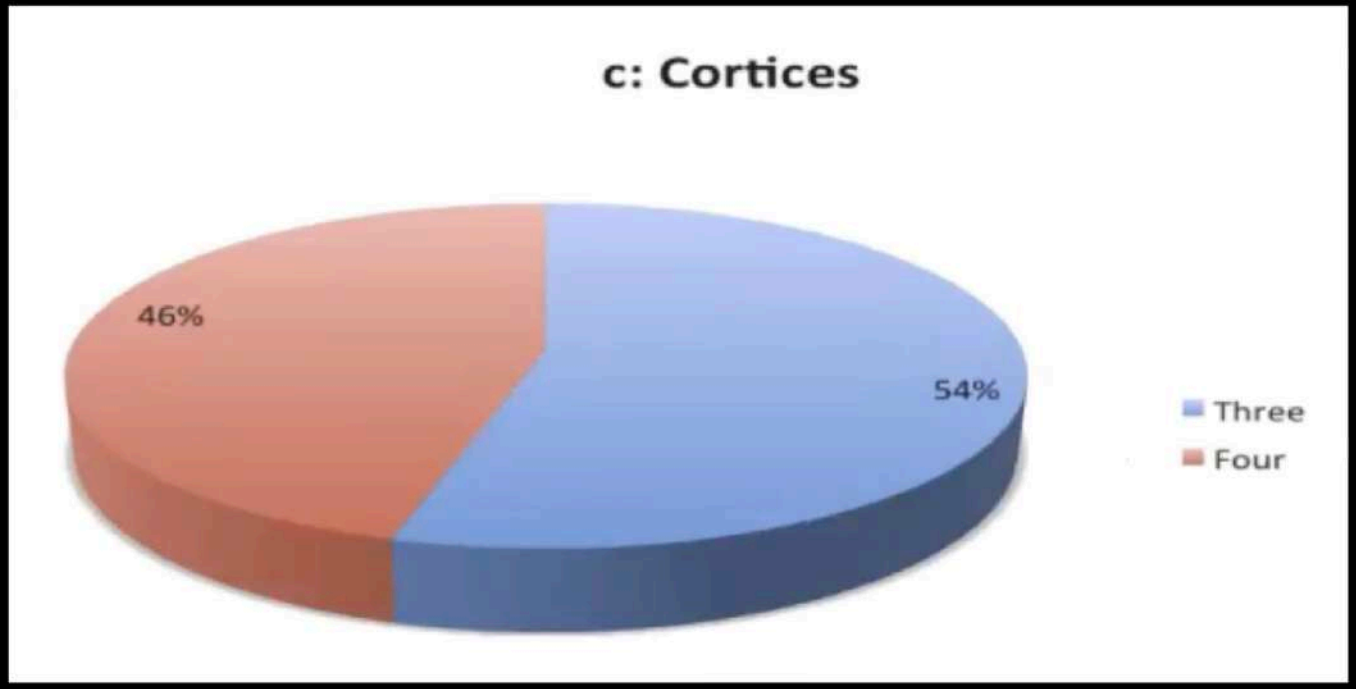












7.1. Screws vs tight rope/endobutton(suture)

Our study shows an overwhelming favour of screws over tightrope/endobutton. This is consistent with Bava et al. [1]USA survey which showed only 7% using Tightrope. Despite recent advances in the syndesmosis technology, this has not been adopted. The evidence does not favour one over the other. Zhang et al. [26] undertook a systematic review of suture-button vs screw fixation for syndesmosis injuries. They found no difference in terms of functional outcomes, but that endobutton can lead to an earlier return to work and better objective range of motion. Degroot et al. [5] noted a 25% complication rate where the suture button had to be removed due to local irritation although Naqvi et al. [15] developed a method to overcome this. Overall Zhang et al. noted there was less need to remove implants in suture button, but noted there was a lack of high quality randomized controlled trials to give a strong final judgement. Adoption of a new technology must show proven superiority, technical ease and a cost efficiency. At this moment, endobutton does not show this, which is consistent with our survey.