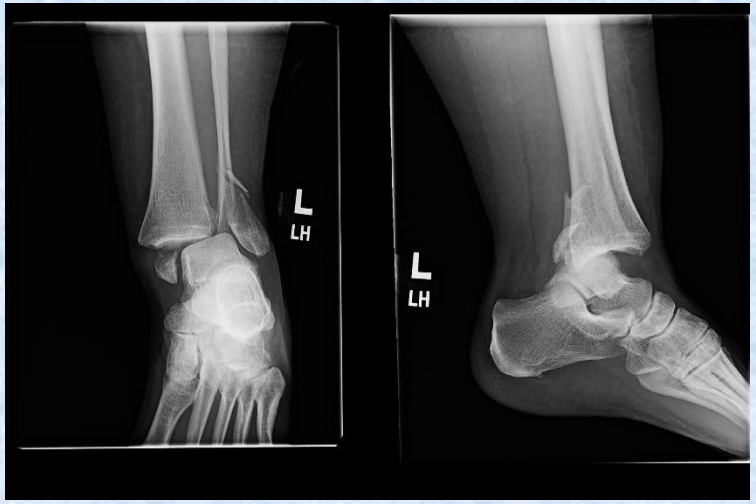
FOOT AND ANKLE INJURIES

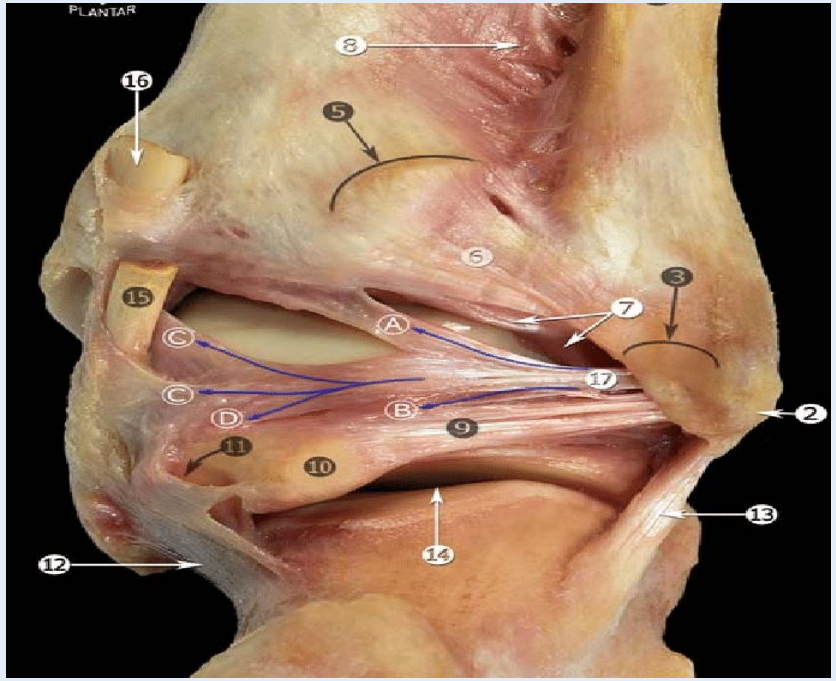
M. CHARISIS

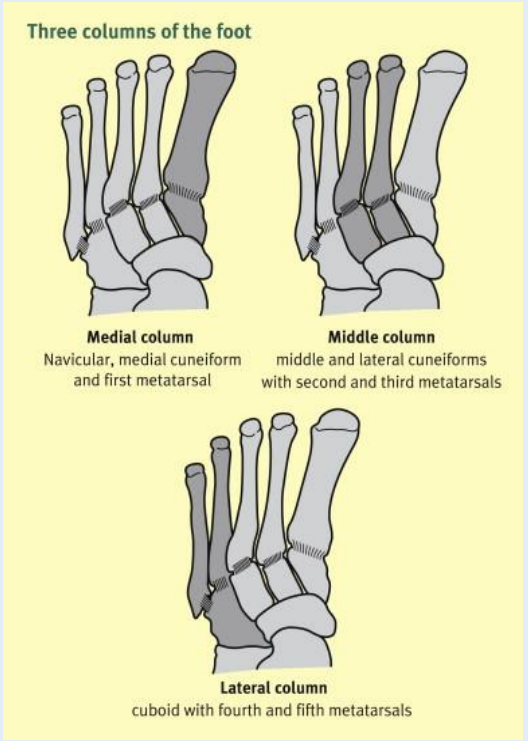
ORTHOPAEDIC DEPARTMENT

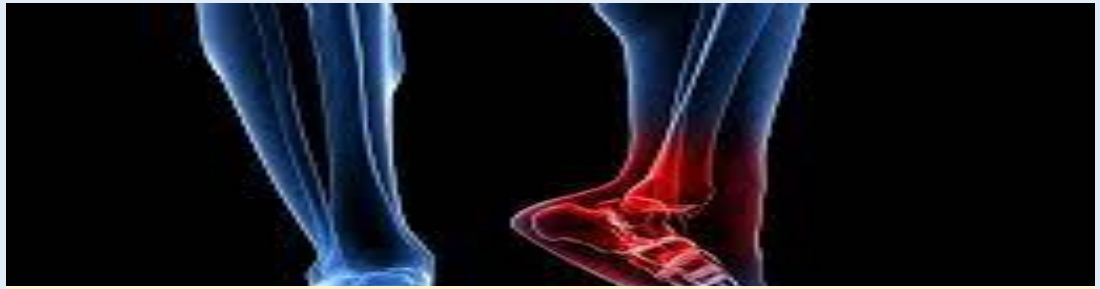
KILKIS GENERAL HOSPITAL



FOOT AND ANKLE ANATOMY







ANKLE INJURIES

FRACTURES

- Malleolous fractures
- Tibial Plafond fractures
- Talus fractures
- Osteochondral lessions

LIGAMENTS AND TENDON INJURIES

- Ankle sprains
- Ligament and tendon rapture

FOOT INJURIES

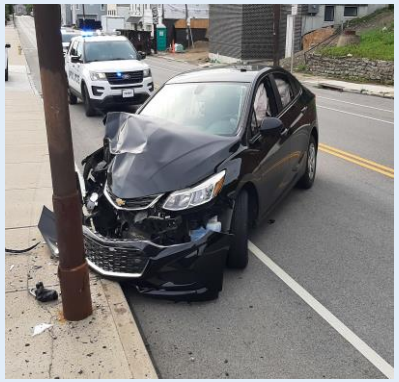
FRACTURES

- Calcaneous fractures
- Midfoot injuries: Chopart joint injuries, tarsal scaphoid, cuboid, Navicular, cuneiform fractures, and Lisfranc joint injuries
- Metatarsal fractures-dislocations
- Phalanx fractures-dislocations

LIGAMENTS AND TENDON INJURIES

INITIAL ASSESSMENT

Is there any acute or blunt Trauma or not ?



High Energy Trauma

α) Fall from height

β) Car accidents

Low Energy Trauma

Sport Injuries

- **Mechanism of Injury**

Axial Load

Rotational Forces

Supination – Adduction

Pronation – Abduction

Direct impaction

Medical History Data

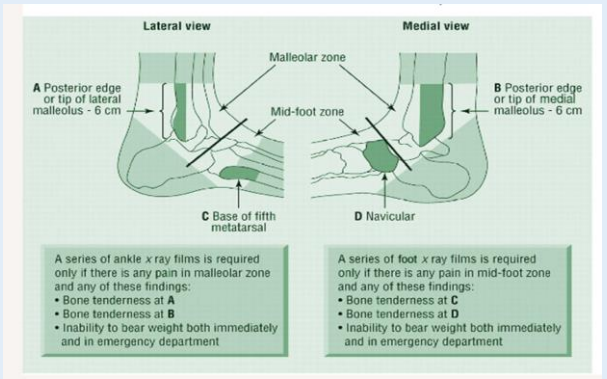
- ✓ Comorbidities
- ✓ Gait disturbances
- ✓ Age and Activity
- ✓ Bone Quality
- ✓ Previous Surcical Procedures around the Ankle and Foot
- ✓ Anatomical Variants of the Ankle and Foot

INSPECTION

- Soft tissue edema, Blisters, Skin tenting (assessment with Tcherne classification)
- Open fracture (Gustillo Classification)
- Ecchymosis and swelling, Skin necrosis
- Deformity
- Difficulty or inability to bear weight
- Limited motion

PALPATION

- Crunching Sensation
- Located Tenderness

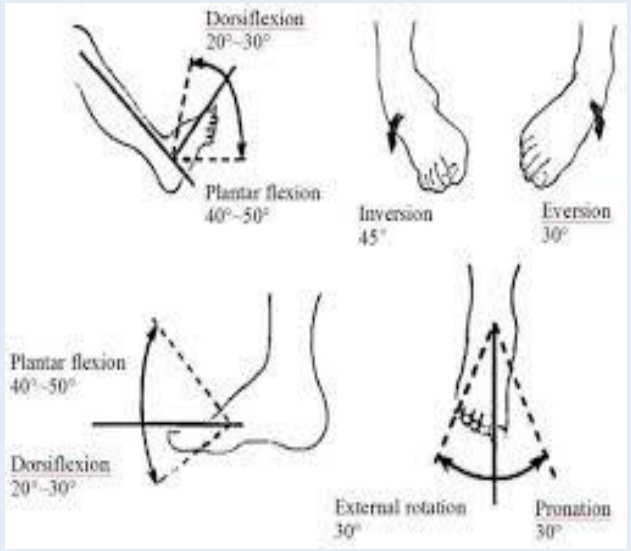


Ottawa rules

Palpable Gap

❖ The examination of the adjacent joints should not be missed(fibula Maisonneuve fracture)!!

ROM



NEUROVASCULAR ASSESSMENT

Foot Compartment Syndrome

Symptoms

- Pain out of proportion to injury

Physical exam

- Pain with dorsiflexion of toes (MTPJ)
- Tense swollen foot
- Loss of two-point discrimination
- Presence of pulses does not exclude diagnosis

SPECIAL TESTS

Anterior Drawer Test

Talar Tilt Test

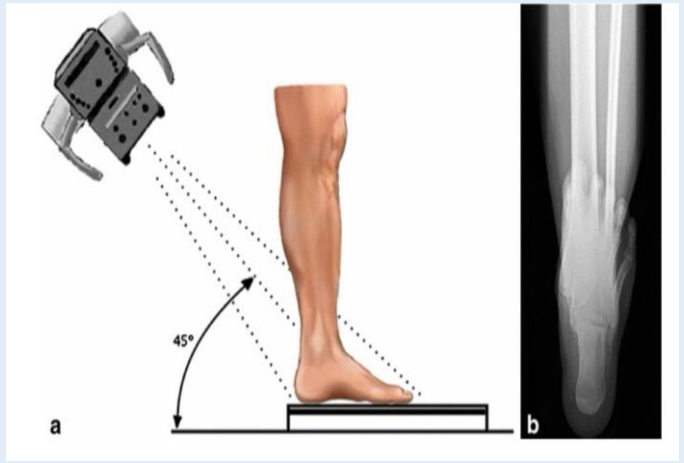
Heel tap test

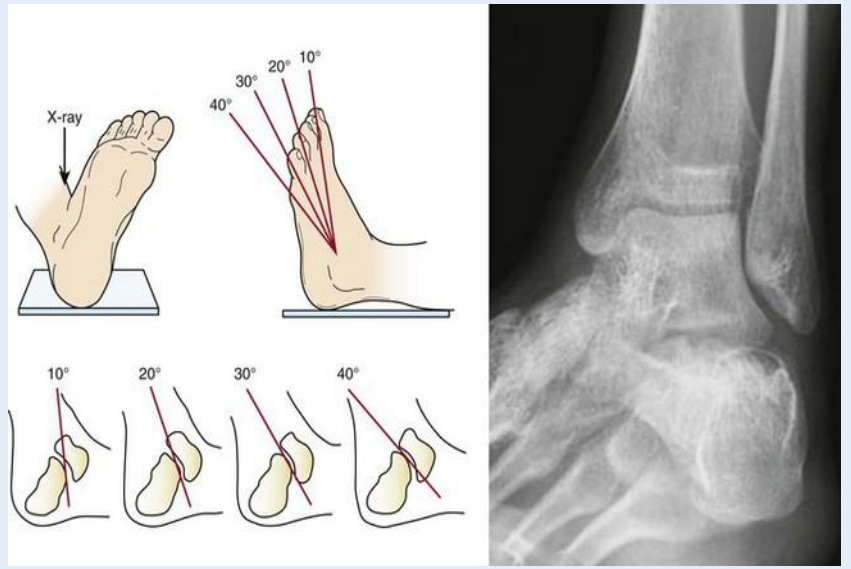
Thompson test

IMAGING

ANKLE

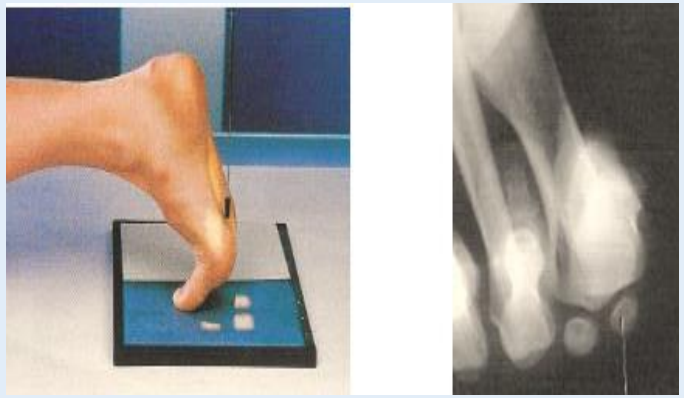
- ❑ Anteroposterior
- ❑ Side
- ❑ Oblique
- ❑ Mortise
- ❑ Stress or Weight bearing views

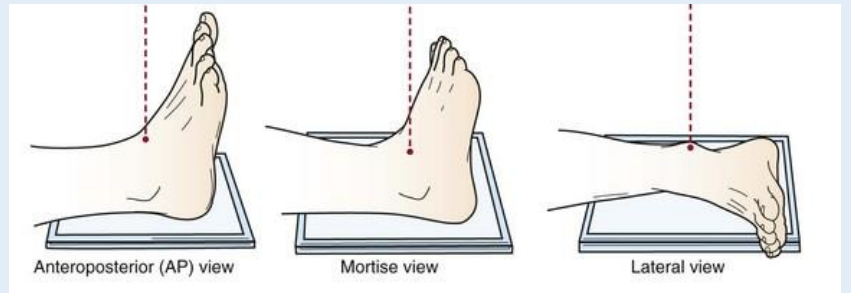


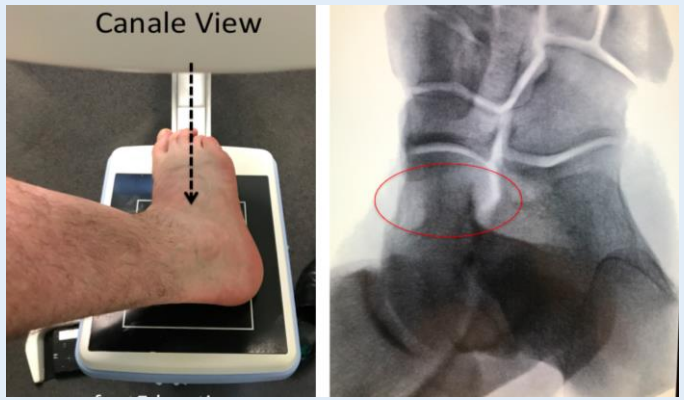


FOOT

- ❑ Anteroposterior
- ❑ Side
- ❑ Oblique
- ❑ Stress
- ❑ Broden view
- ❑ Canale view
- ❑ Harris view
- ❑ Sesamoid Xray

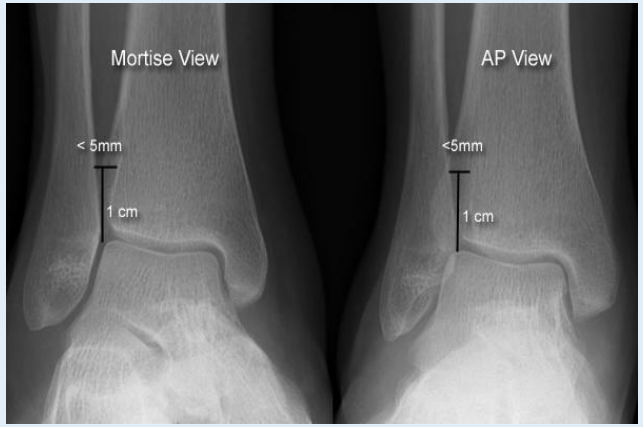






- ❖ Comparative radiographs of both sides
- ❖ When a fracture is suspected with negative radiograph think about a CT scan
- ❖ Always check the adjacent joints.
- ❖ U/S maybe useful in some cases

XRAY EVALUATION



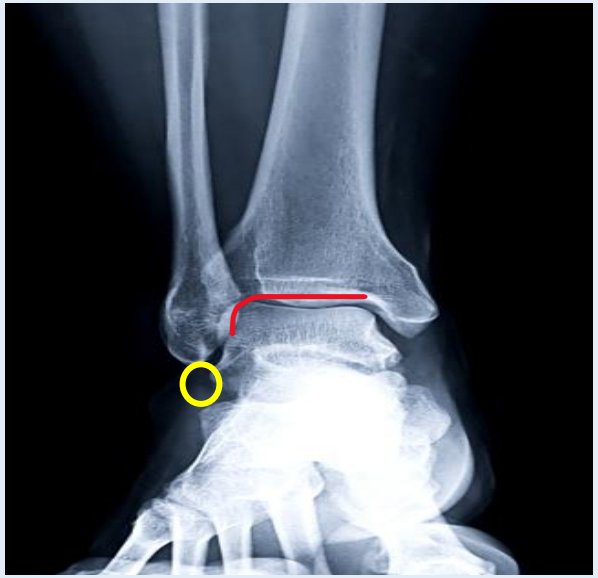
Lateral clear space < 5mm

Medial clear space < 4mm

Tibiofibular Overlap ≥6mm

Talocrural angle 83°± 4°
Fibula Shortening > 2°

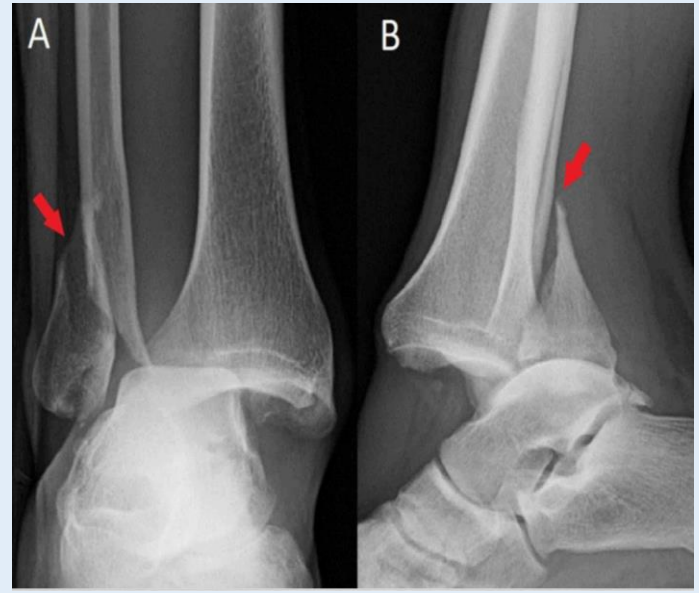
Tibiotalar tilt angle <2° on non-stress radiographs
<5° on inversion stress radiographs



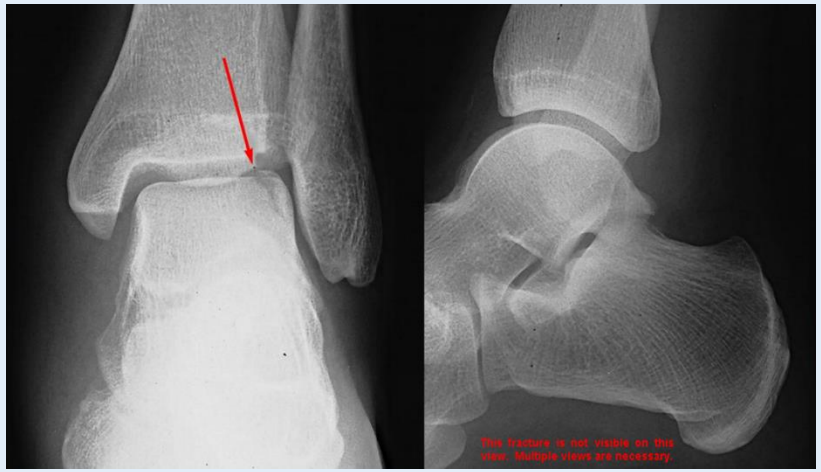
Shenton line and Dime sign

Bimalleolar Fracture

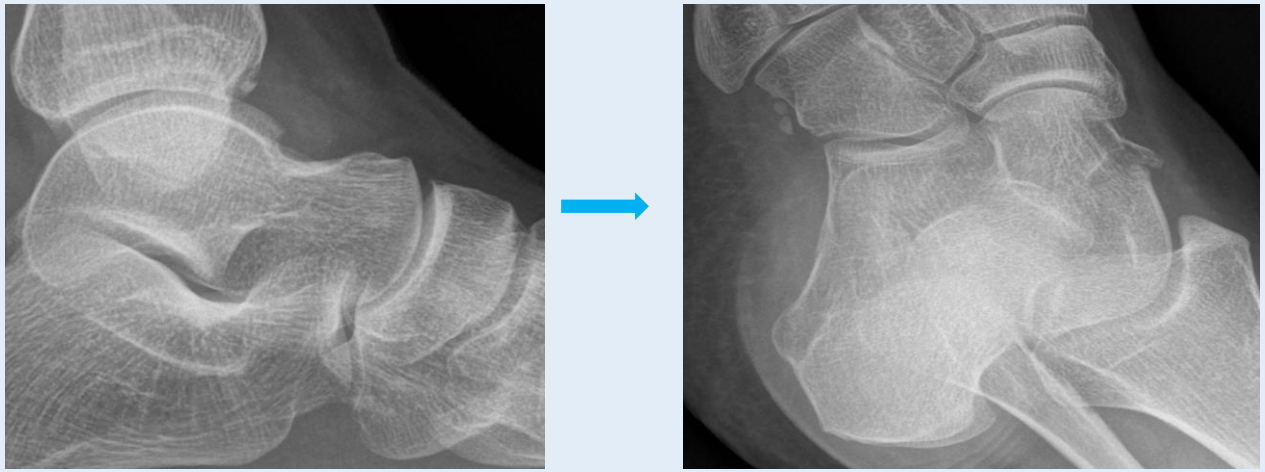
Pilon Fracture



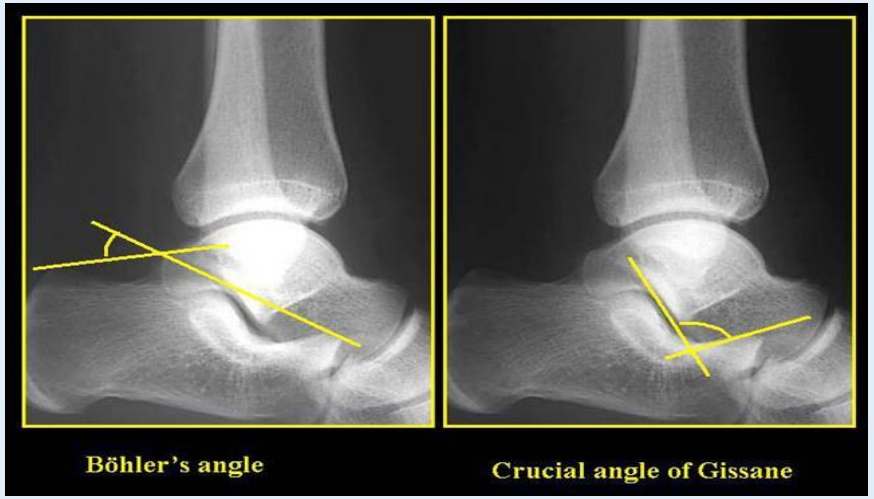
Trimalleolar- Bosworth Fracture-Dislocation



Osteochondral fracture of the Talus



Talar neck Fracture (Hawkings I) after Canale View



Bohler agnle 20-40°

Gissane angle 130-145°

Flattening of Bohler's angle

Fleck Sign

Lisfranc Injury

- Disruption of the medial column line
- Widening of the interval between the 1st and 2nd ray

Lisfranc Injury

Widening >2mm in AP stress views

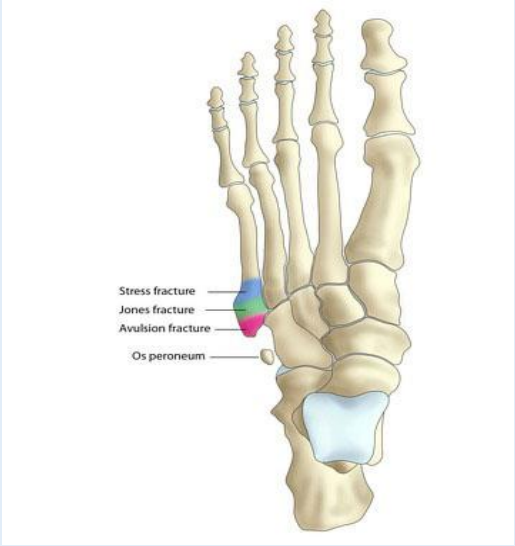
Lisfranc Injury

Chopart Fracture-Dislocation

Second Metatarsal Stress Fracture

Jones Fracture

Avulsion 5th Metatarsal Fracture



Bipartite Sesamoid

Fractured Lateral Sesamoid

Os Trigonum

Accessory Foot Bones

INJURY CLASSIFICATION

- Weber
- AO-OTA
- Lauge-Hansen
- Ruedi-Algower
- Hawkings
- Sanders
- Torg
- Sangeorzan

❖ Maybe a CT is mandatory to classify certain fractures

TABLE 1. Open Fractures—Gustilo Classification[1,2]

Type I	Open fracture with a skin wound <1 cm in length and clean.
Type II	Open fracture with a laceration >1 cm in length without extensive soft tissue damage, flaps, or avulsions.
Type III	Open segmental fracture with >10 cm wound with extensive soft tissue injury or a traumatic amputation (special categories in Type III include gunshot fractures and open fractures caused by farm injuries).
III_A	Adequate soft tissue coverage.
III_B	Significant soft tissue loss with exposed bone that requires soft tissue transfer to achieve coverage.
III_C	Associated vascular injury that requires repair for limb preservation.

Rüedi and Allgöwer	
Type 1 Type 2 Type 3	Nondisplaced intra-articular Displaced without comminution Displaced with comminution
AO/OTA-43	
A – Extra-articular	1-Simple 2-Wedge 3-Multifragement
B – Partial articular	1-Split 2-Split and depressed 3-Depressed
C – Complete articular	1-Simple 2-Simple articular, multifragmentary metaphyseal 3-Multifragmentary

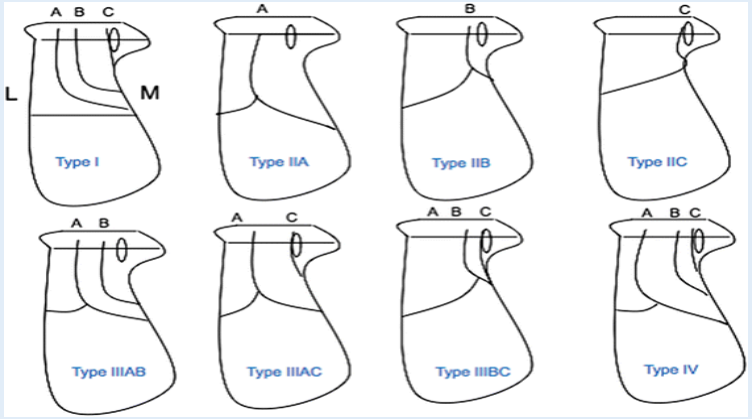


Fig 5: Hawkins Classification of Talar neck Fracture

Table 2: Hawkins Classification of Talar neck Fracture

Type	Description	AVN
Hawkins I	Nondisplaced	0-13% AVN
Hawkins II	Subtalar dislocation	20-50%
Hawkins III	Subtalar and tibiotalar dislocation	20-100%
Hawkins IV	Subtalar, tibiotalar, and talonavicular dislocation	70-100%

Type	*Description*
SER	1 Injury of the anterior inferior tibiofibular ligament
	2 Oblique/spiral fracture of the distal fibula
	3 Injury of the posterior inferior tibiofibular ligament or avulsion of the posterior malleolus
	4 Medial malleolus fracture or injury to the deltoid ligament
Supination–adduction	1 Transverse fracture of the distal fibula
	2 Vertical fracture of the medial malleolus
Pronation–external rotation	1 Medial malleolus fracture or injury to the deltoid ligament
	2 Injury of the anterior inferior tibiofibular ligament
	3 Oblique/spiral fracture of the fibula proximal to the tibial plafond
	4 Injury of the posterior inferior tibiofibular ligament or avulsion of the posterior malleolus
Pronation–abduction	1 Medial malleolus fracture or injury to the deltoid ligament
	2 Injury of the anterior inferior tibiofibular ligament
	3 Transverse or comminuted fracture of the fibula proximal to the tibial plafond

TREATMENT

MALEOLOUS FRACTURES

Nonoperative

INDICATIONS

- Stable ankle fracture ,isolated stable medial and lateral malleolus fracture, avulsion tip fractures of medial or lateral malleolus , non-ambulatory patients or patients with comorbidities or suffering severe trauma

Operative

INDICATIONS

- Any talar displacement, bimalleolar or trimalleolar fracture, Maisonneuve fracture ,Bosworth fracture-dislocations,open fractures, non acceptable reduction

PILON FRACTURES

Nonoperative

INDICATIONS

- Stable fracture patterns without articular surface displacement (Type I),Significant risk of skin problems (diabetes, vascular disease, peripheral neuropathy)

Operative

INDICATIONS

- Unstable fractures (bone fragments displacement> 2mm, open fractures, type II & III fractures

TALAR FRACTURES

INDICATIONS

Noperative

- Talar neck fractures (Hawking I) nondisplaced

Talar head, body and processes minimally displaced <2mm

Operative

- Talar neck fractures-dislocations (Hawking II-IV)

Talar head, body and processes minimally displaced >2mm

CALCANEOUS FRACTURES

INDICATIONS

Nonperative

- Small extra-articular fracture <1 cm and <2 mm displacement, Sanders Type I ,near normal Böhler's angles (20-40°), anterior process fracture involving <25% of calcaneocuboid joint

Operative

- Intrarticular fractures, extra-articular fractures >1 cm and >2 mm displacement, Saders II, III, open, displaced tongue-type fractures

MIDFOOT AND METATARSAL FRACTURES-DISLOCATIONS

INDICATIONS

Nonoperative

- Cuboid and navicular fractures <2mm displacement ,first metatarsal non-displaced fractures, second through fourth (central) metatarsals isolated ,non-displaced or minimally displaced fractures,stress fractures

Operative

- Open fractures, any displacement of the first metatarsal, central metatarsals with sagittal plane deformity more than 10 degrees or >4mm translation or multiple fractures, displaced 5th metatarsal in active patients, Lisfranc Injuries,Chopart Injuries, cuboid, navicular displaced and intrarticular fractures, cuneiform fractures

PHALANX FRACTURES-DISLOCATIONS

INDICATIONS

Nonperative

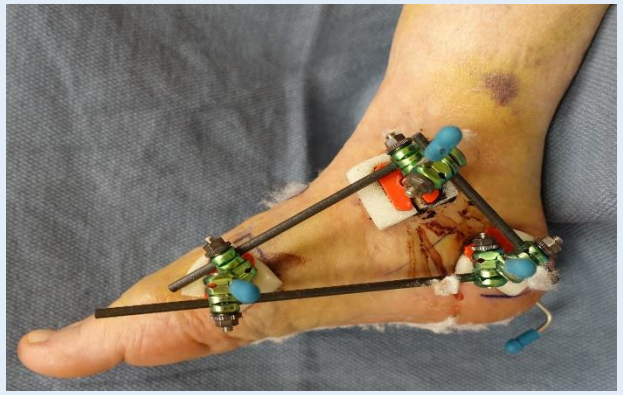
- Intrarticular or extra-articular nondisplaced fractures with an acceptable degree of displacement, rotation, or angulation, stable concentrically reduced joint

Operative

- Intrarticular or extra-articular displaced fractures, joint unstable following a reduction attempt

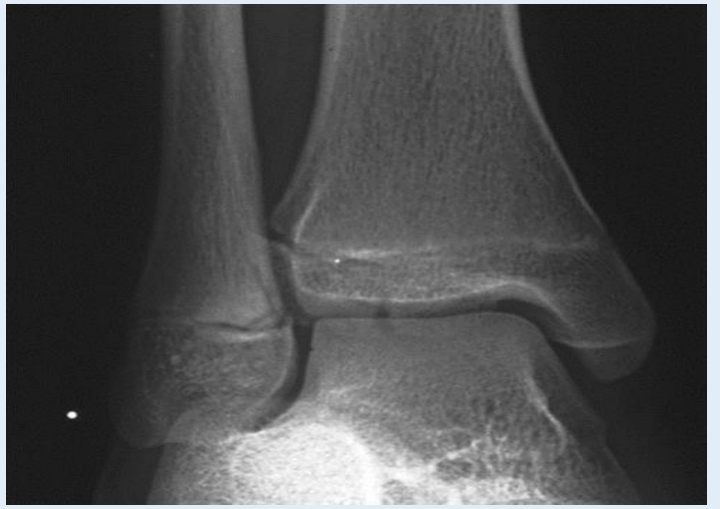
OPEN FRACTURES

- Collect >2 swabs for wound culture
- Start urgent IV antibiotic scheme according to the protocol
- Tetanus prophylaxis
- Surgical debridement of devitalized tissue and partial or complete soft tissue coverage
- Wound irrigation with 6-10L N/S 0,9%
- Neurovascular assessment
- Temporary fracture stabilization with cast or ex-fix



PEDRIATRIC FRACTURES

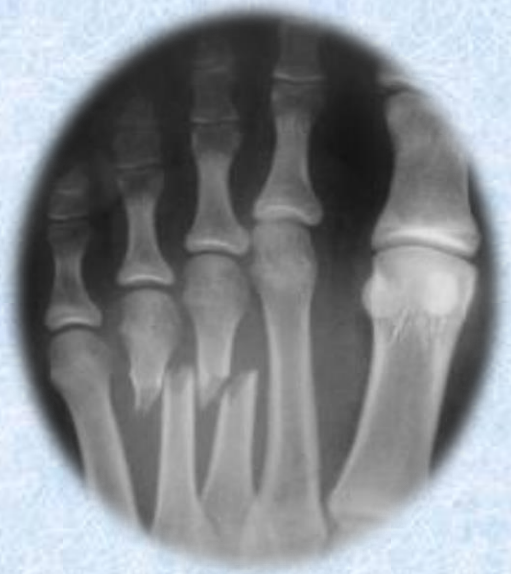
Angulated Salter-Harris II fracture of 5th proximal phalanx



TILLAUX FRACTURE

Fractures of distal 2nd-4th metatarsals

Salter-Harris III fracture of medial malleolus



THANK YOU!!