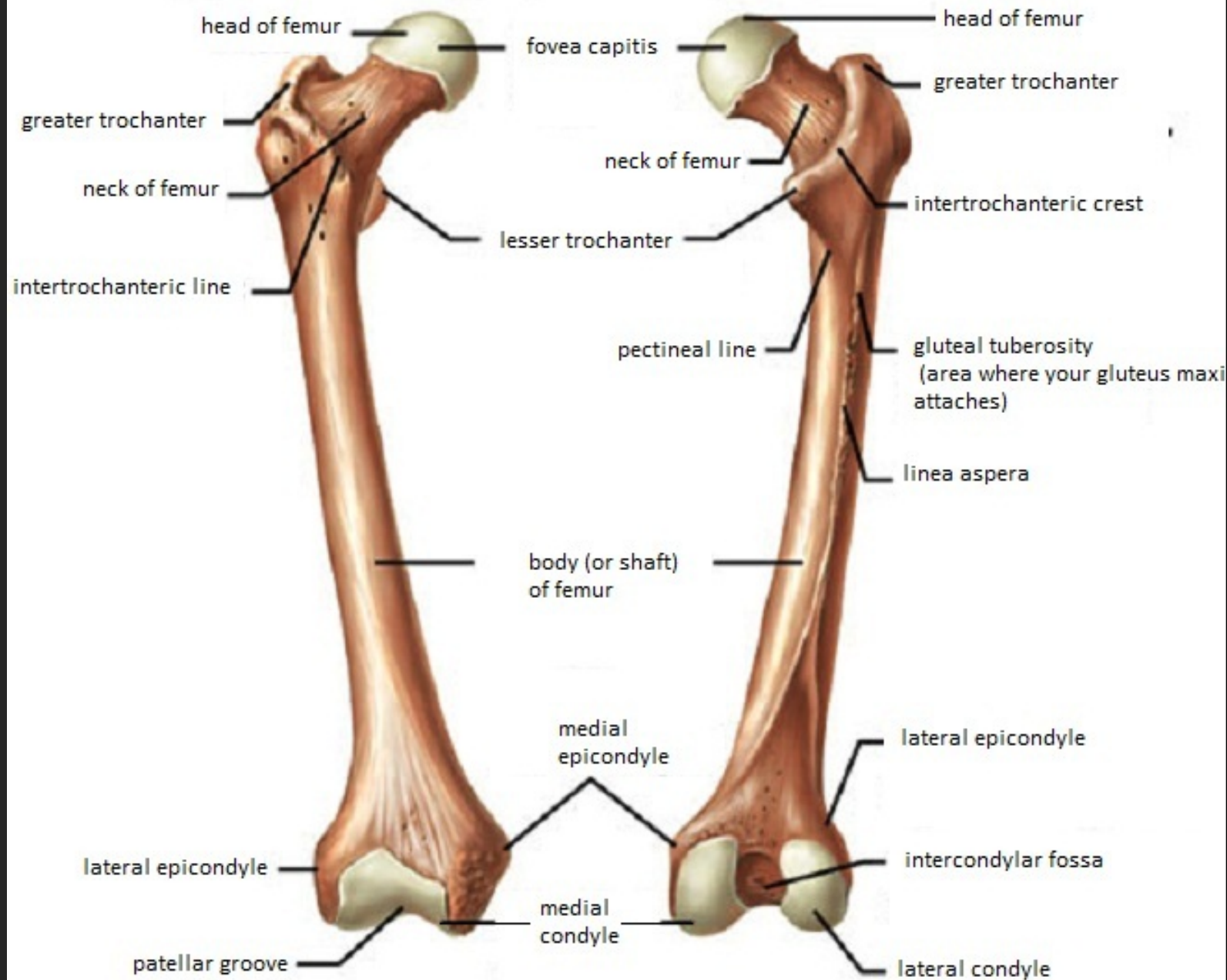


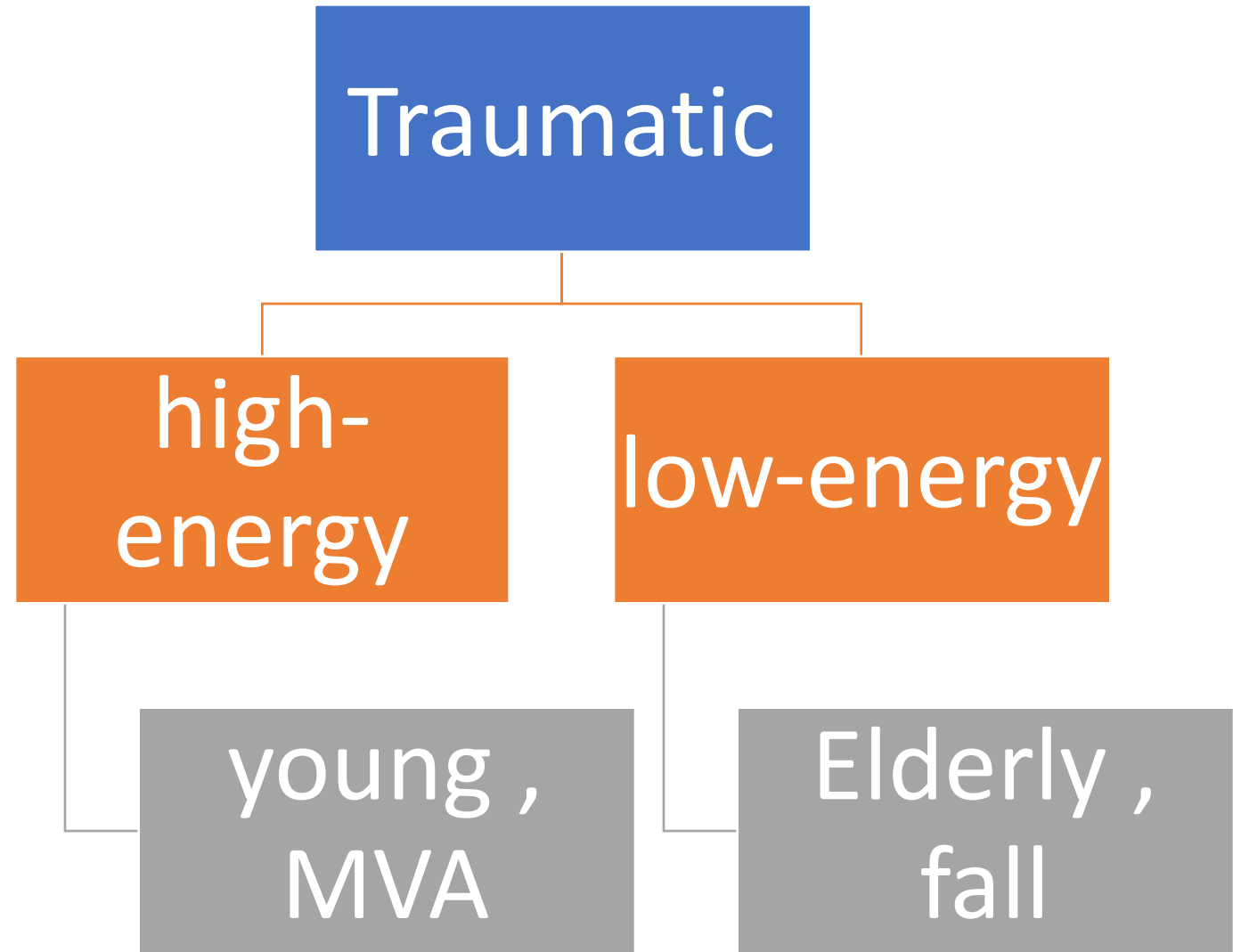
Femoral shaft fractures

Dr. Mohammad Hamdan

Anatomy



Mechanism



Associated conditions

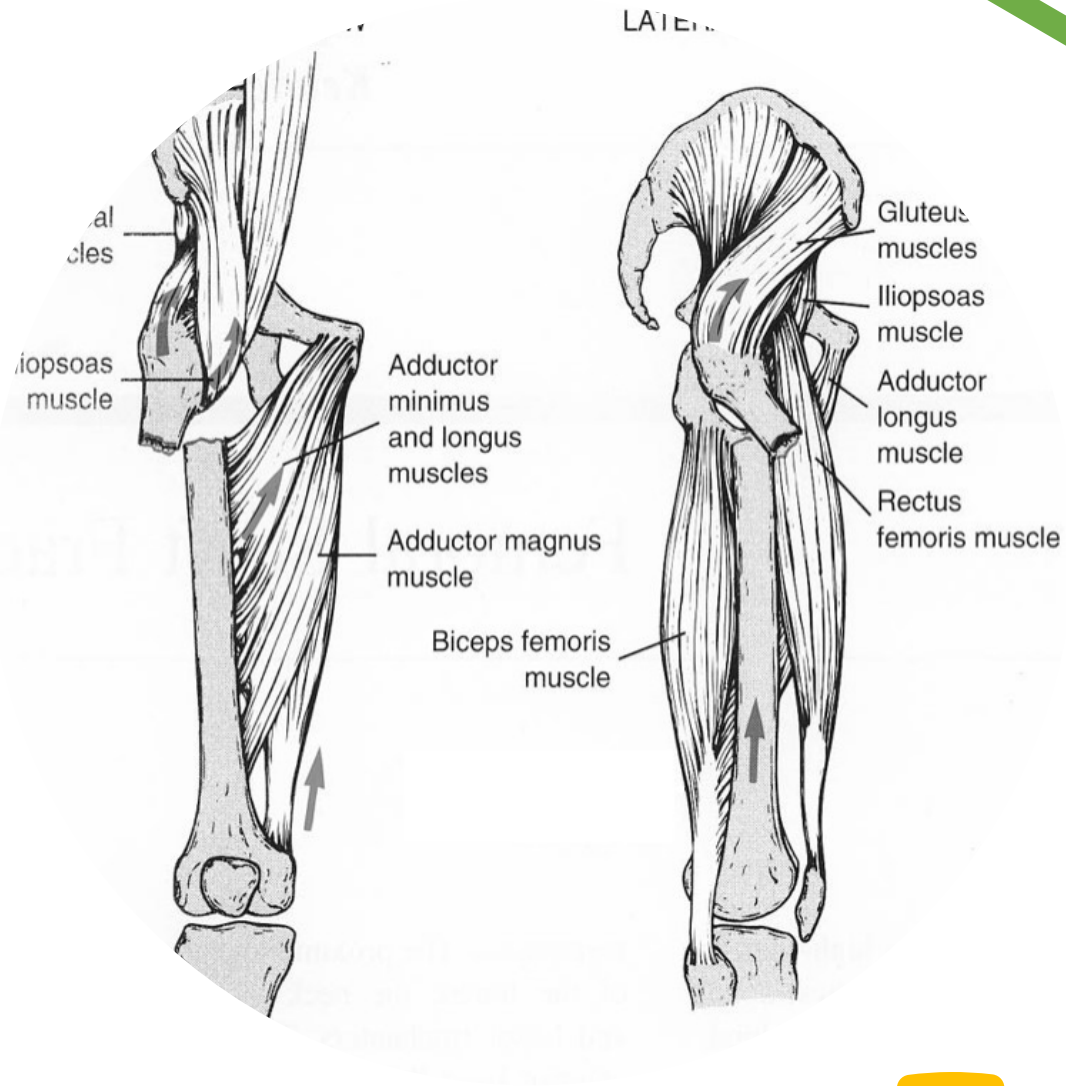
ipsilateral femoral neck

- missed

bilateral femur

- significant risk of pulmonary complications
- Higher mortality as compared to unilateral fractures

Deforming forces



classification



A



A1



A2



A3



B



B1



B2



B3





Examples

Symptoms



PAIN IN THIGH



INABILITY TO WALK

Physical exam

- tense, swollen thigh
 - blood loss 1000-1500ml
- Shortened leg
- tenderness
- Check neurovascular status



Imaging

AP and lateral views of entire femur
showing the hip and knee, CT

Treatment



Advanced Trauma Life Support
(ATLS)



Nonoperative

not practical



Operative

ORIF
OREF

Examples



Examples

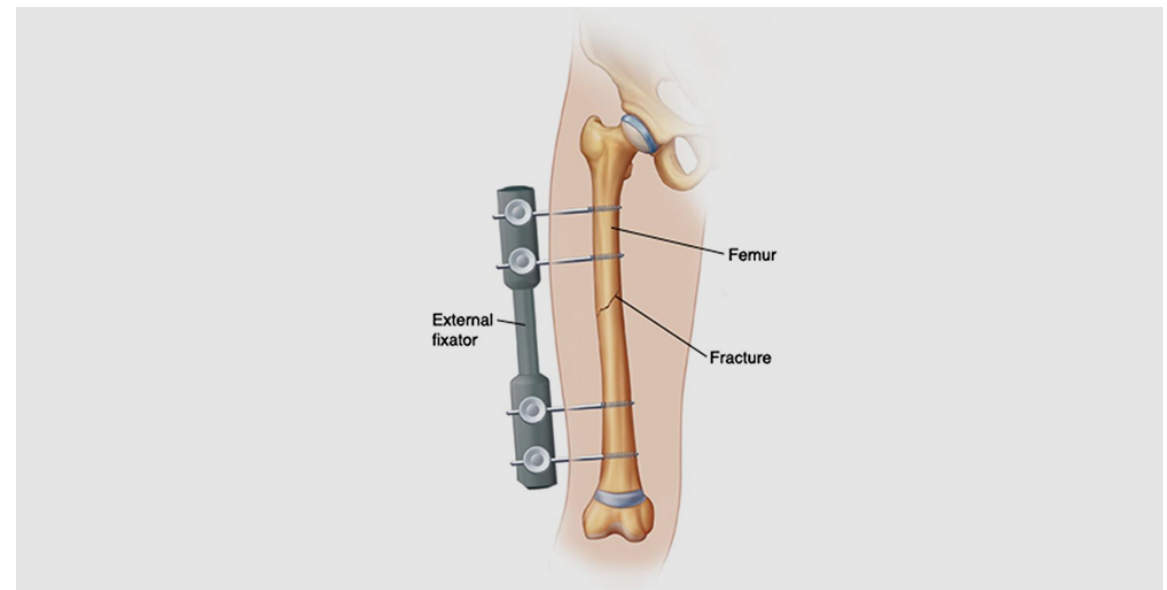


Intramedullary Nail

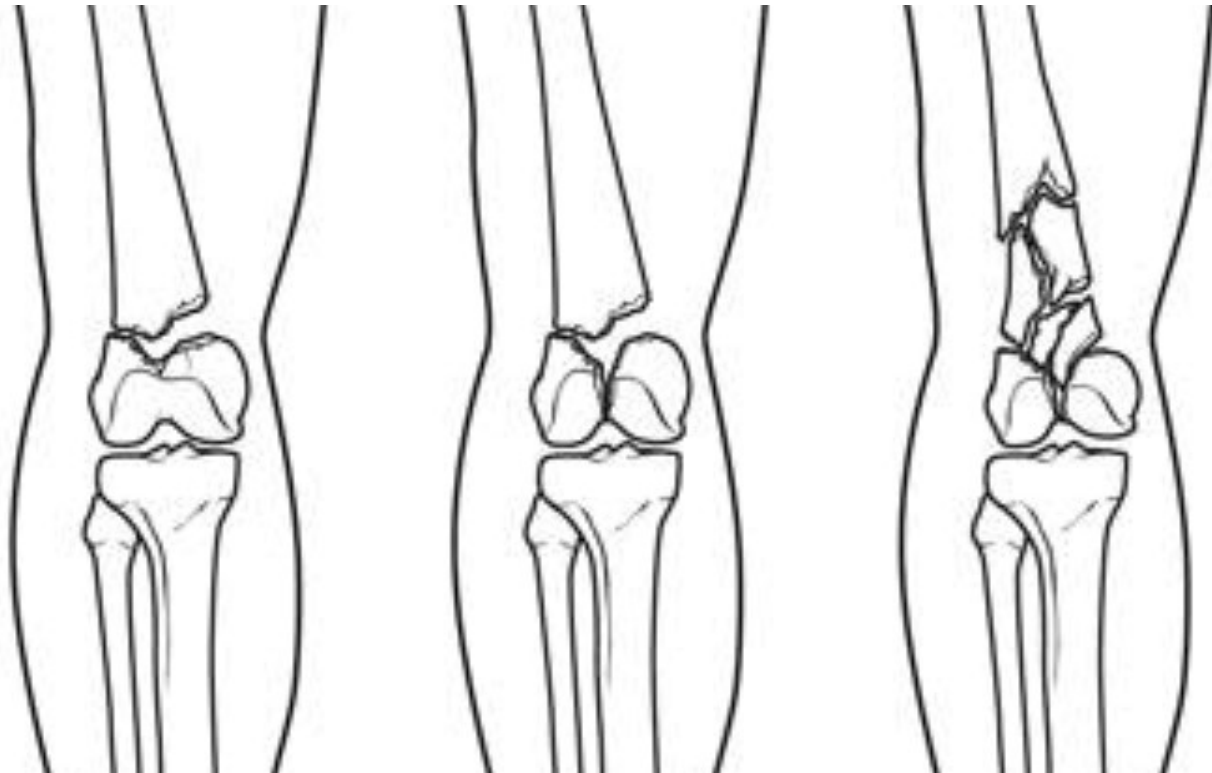


Screws

Plate



Distal femur fractures



Introduction

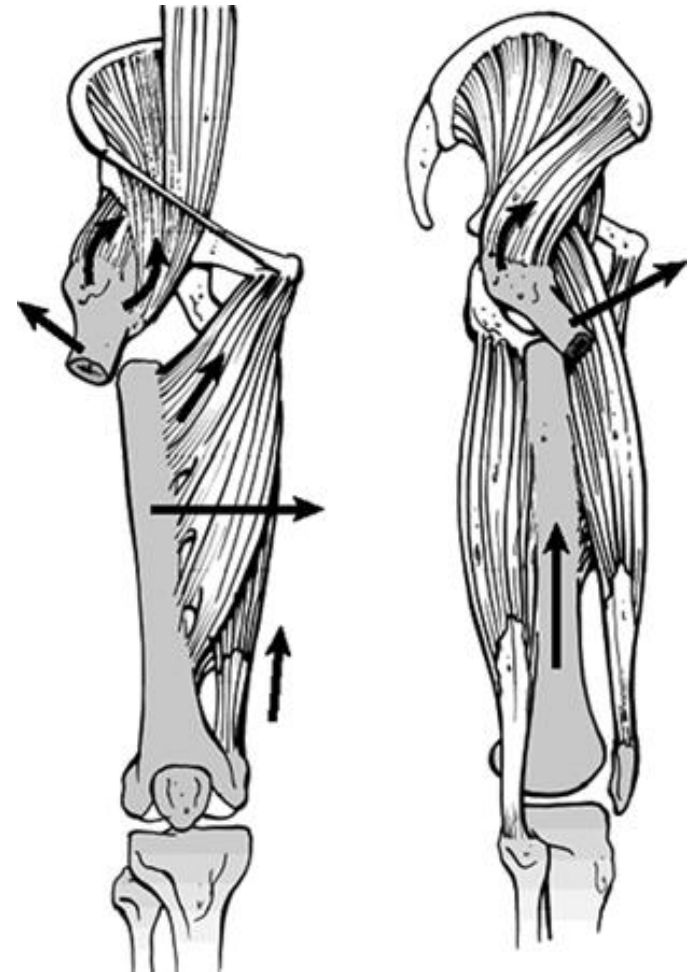
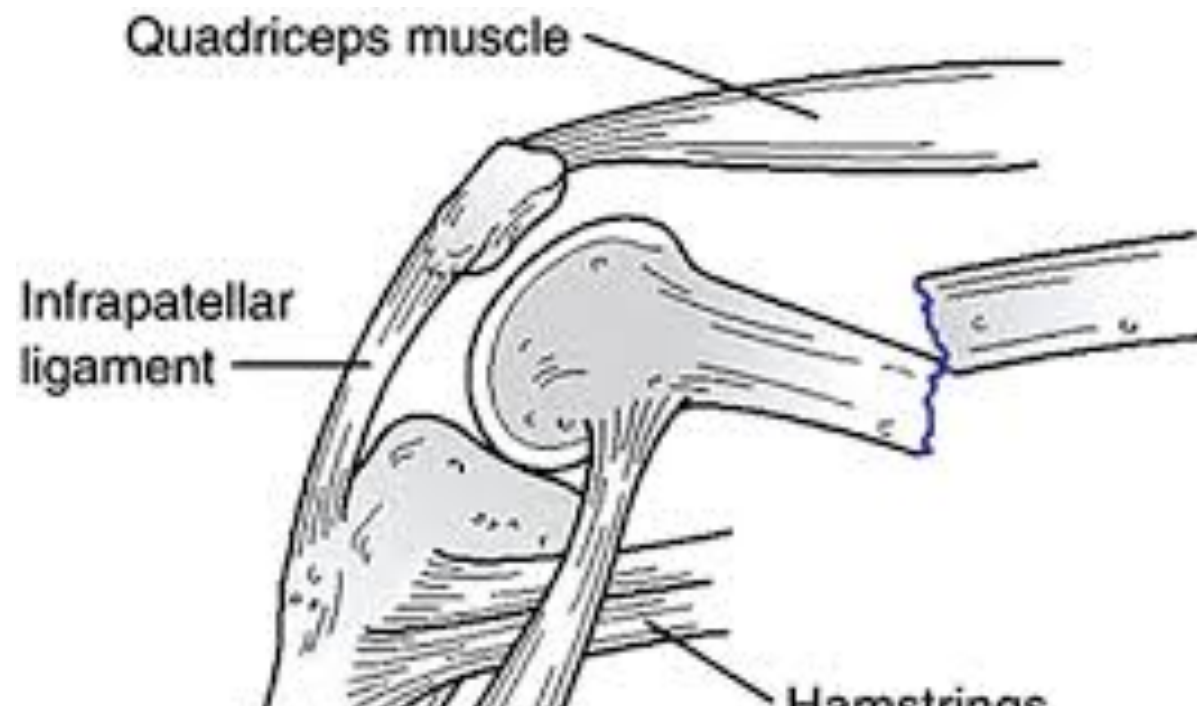


Traumatic injuries involving the region extending from the distal metaphyseal-diaphyseal junction to the articular surface of the femoral condyles



Bimodal distribution

Deforming forces







A2



A3



B2



B3



C2



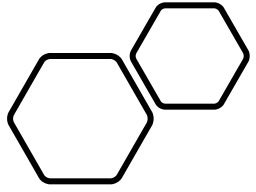
C3



Classification



X-rays



Symptoms

pain of
distal femur

inability to
weight-bear



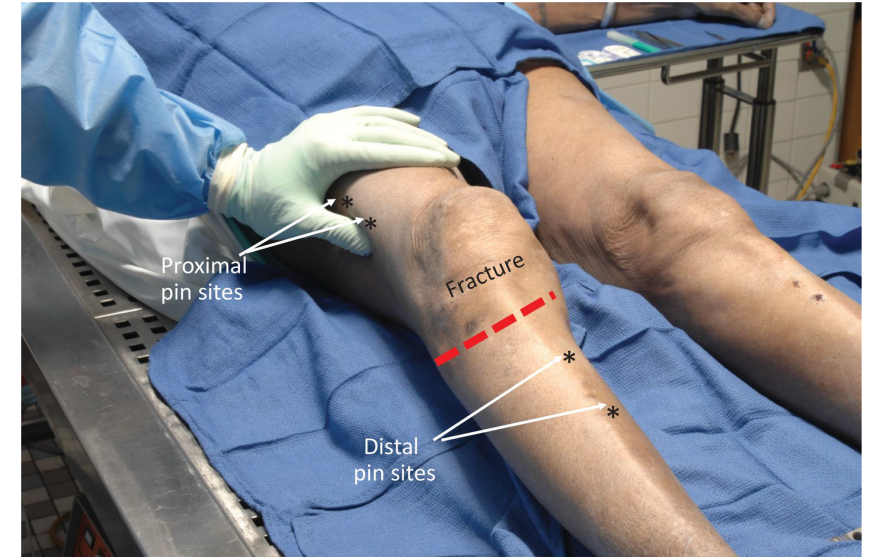
tenderness, swelling, ecchymosis of the distal thigh and knee



deformity



effusion



Physical exam



vascular evaluation

potential for injury
to popliteal artery

absent pulses,
rapidly expanding
hematoma,
massive bleeding

Ankle-brachial
index (ABI) if there
is a concern for
vascular injury

angiography is
indicated if <0.9

Imaging



XRAY (AP AND LAT.)



CT IF INTRAARTICULAR



ANGIOGRAPHY

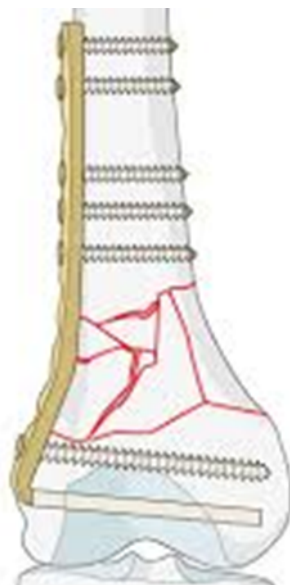
Treatment

Nonoperative

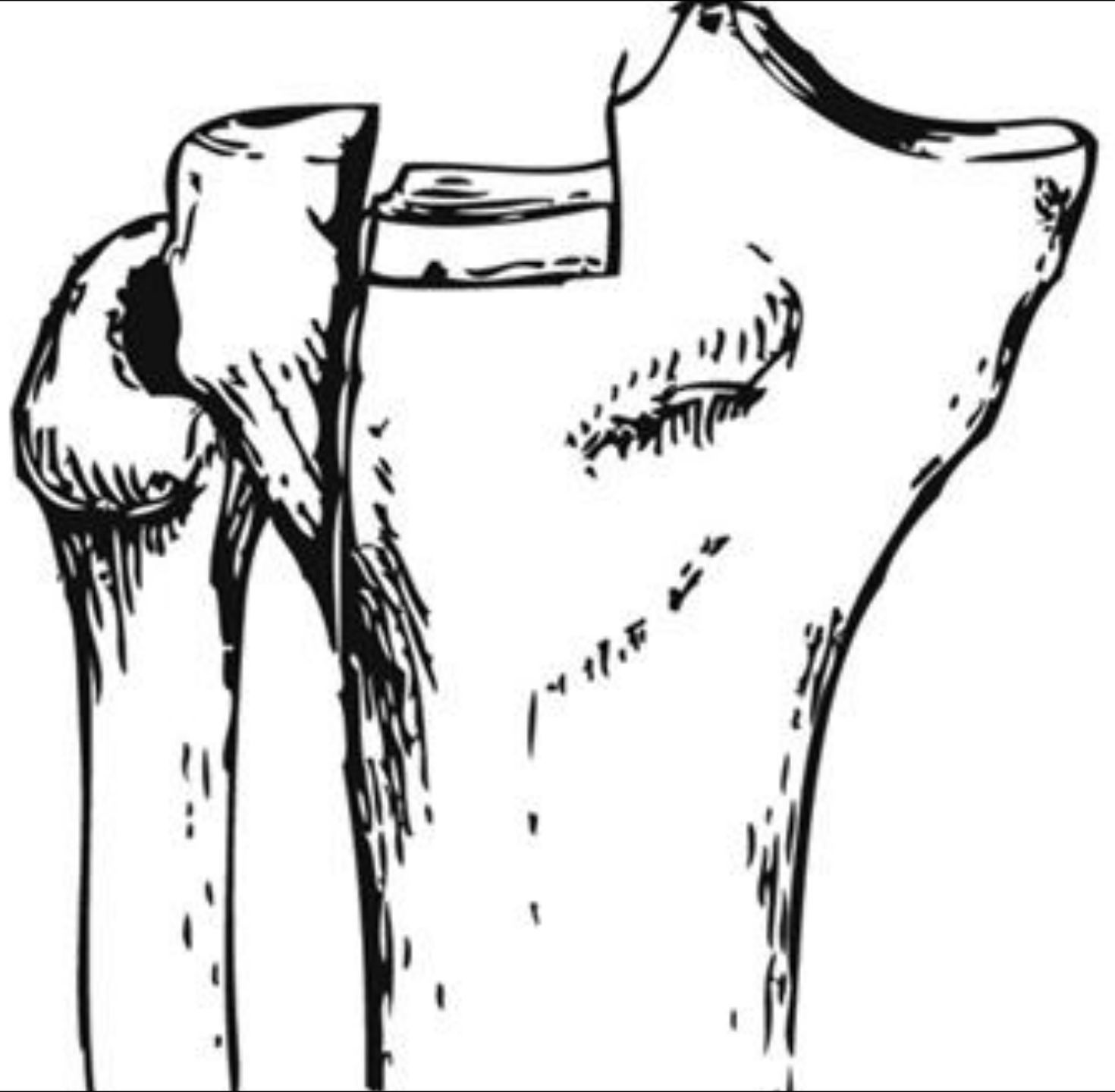
- **hinged knee brace**

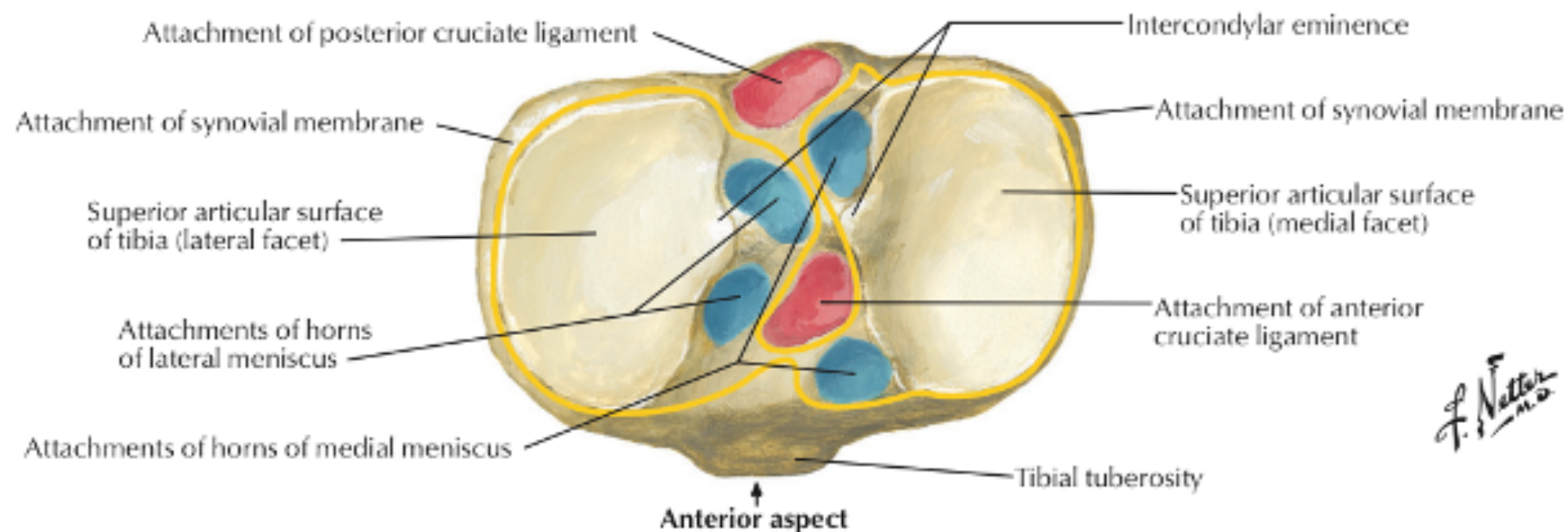
Operative

- External fixation
- ORIF
- IM nail



Tibial Plateau Fractures





F. Netter M.D.

Defenition

Periarticular injuries of the proximal tibia frequently associated with soft tissue injuries



bimodal distribution

males in 40s (high-energy trauma)

females in 70s (falls)

Mechanism

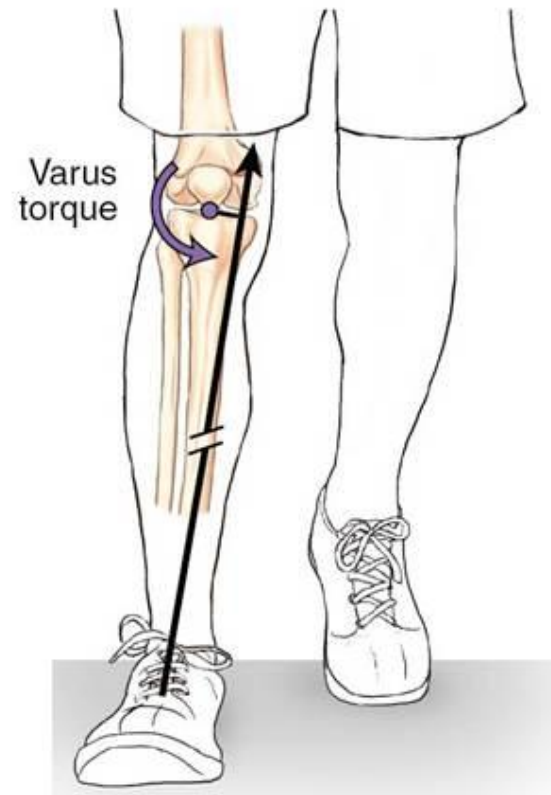
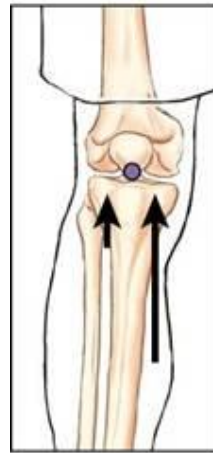
varus/valgus load with or without axial load

high energy

- frequently associated with soft tissue injuries

low energy

- usually insufficiency fractures



Associated conditions

meniscal tears

ACL injuries

compartment syndrome

vascular injury

Schatzker classification





Symptoms



pain in the knee



inability to weight-bear

Physical exam

1

rule-out any open
injury

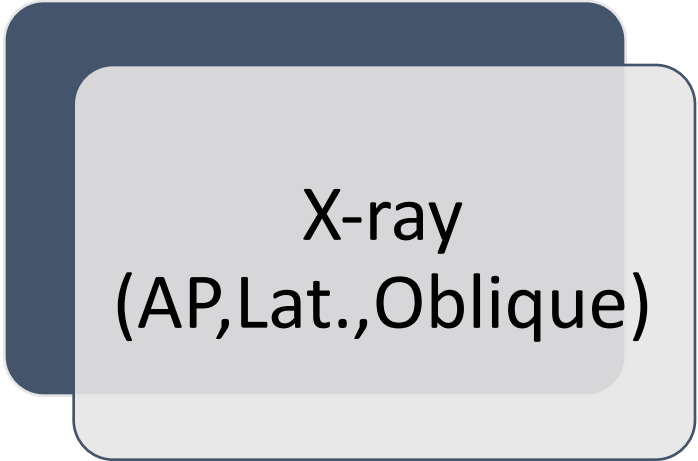
2

consider
compartment
syndrome

3

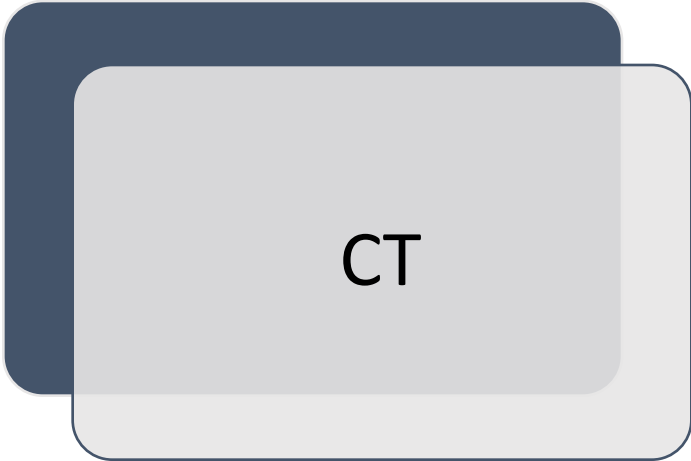
Do neurovascular
exam...ABI

Imaging



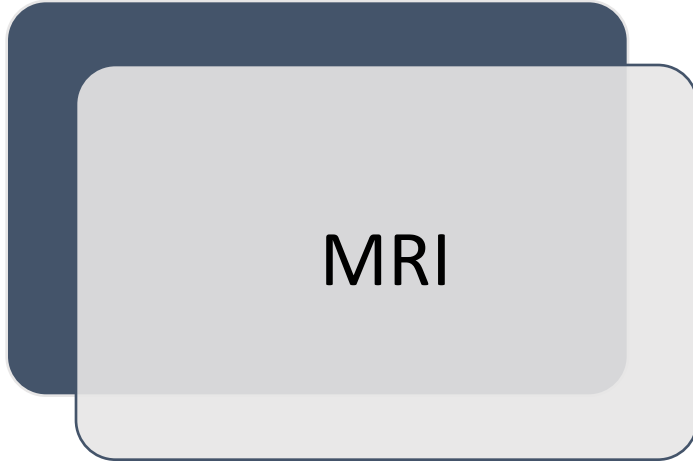
X-ray
(AP, Lat., Oblique)

The diagram shows a dark blue rounded rectangle partially overlapping a light gray rounded rectangle. The text is centered within the light gray rectangle.



CT

The diagram shows a dark blue rounded rectangle partially overlapping a light gray rounded rectangle. The text is centered within the light gray rectangle.



MRI

The diagram shows a dark blue rounded rectangle partially overlapping a light gray rounded rectangle. The text is centered within the light gray rectangle.

Treatment



Nonoperative

hinged knee brace
Back slab or cast



Operative

External fixation
ORIF



Tibial Shaft Fractures

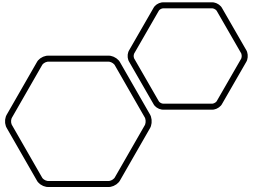


Soft tissue injury



Epidemiology

most common long bone fx



Mechanism

- low energy fx pattern
 - torsional injury
 - spiral fx
 - fibula fx at different level
 - Tscherne grade 0 / I soft tissue injury



Mechanism

- high energy fx pattern
 - wedge, short oblique or comminuted fx
 - fibula fx at same level
 - severe soft tissue injury
 - Tscherne II / III
 - open fx



Associated conditions

soft tissue injury (open wounds)

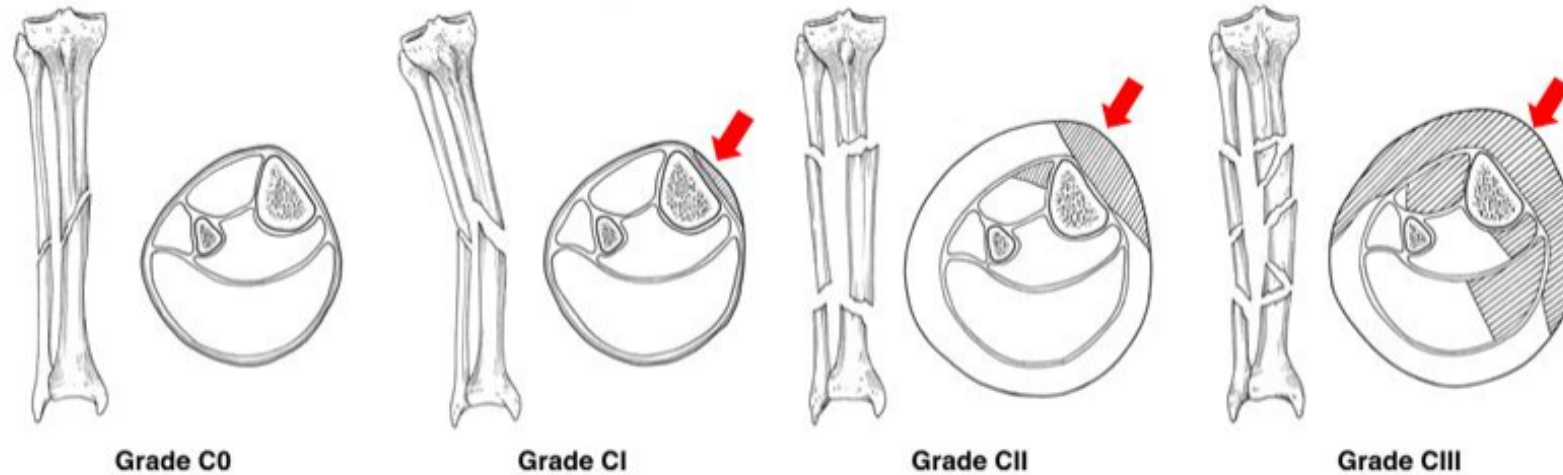
- More important than the fx itself

compartment syndrome

bone loss

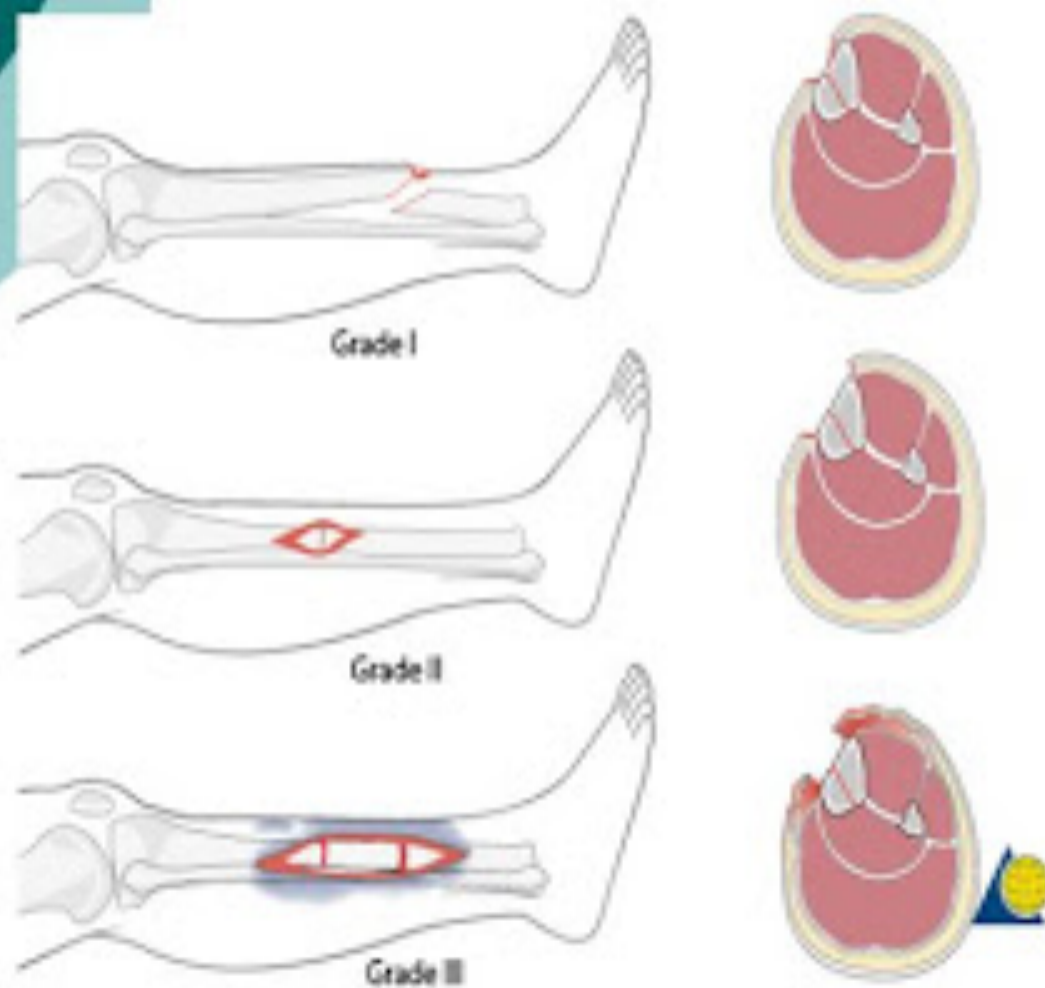
ipsilateral skeletal injury (plateau or plafond)

Oestern and Tscherne classification (Close Fracture)



- Grade C0 : Little or no soft-tissue injury
- Grade C1 : Superficial abrasion
- Grade C2 : Deep, contaminated abrasion with local contusional damage to skin or muscle
- Grade C3: Extensive skin contusion or crushing or muscle destruction
(compartment syndrome) ←

(Open Fracture)



Gustilo and Anderson Classification of Open Fractures

Fracture Type

Characteristics

Type I	Wounds <u>less than 1 cm</u> ; minimal contamination and soft-tissue injury; simple fracture pattern
Type II	Wounds <u>1 to 10 cm</u> ; moderate comminution and contamination
Type IIIA	<u>Minimal periosteal stripping</u> and soft-tissue coverage required
Type IIIB	Significant periosteal stripping at the fracture site; <u>soft-tissue coverage required</u>
Type IIIC	Indicates an associated <u>repairable vascular injury</u>

Symptoms

pain, inability to bear weight, deformity

Physical exam

deformity / angulation / malrotation

contusions

blisters

open wounds

Neurovascular examination

roll-out compartment syndrome

Imaging

full length AP
and lateral views
of affected tibia

CT: intra
articular
extension

Treatment

- Closed Tibia Fractures
 - Nonoperative: closed reduction / cast immobilization
 - Operative: external fixation/IM nail/ORIF with plating



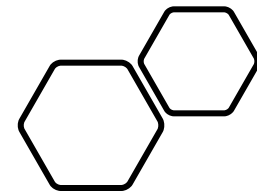
Treatment

- Open Tibia Fractures
 - Irrigation, Urgent IV antibiotics, tetanus prophylaxis, extremity stabilization and dressings
 - external fixation/IM nail/ORIF with plating





X-rays





Tibial Plafond Fractures

- pilon fractures
- high energy axial load (motor vehicle accidents, falls from height)
- associated fibula fractures

43-A1

43-A2

43-A3



43-B1

43-B2

43-B3



43-C1

43-C2

43-C3



Classification



Symptoms

- ankle pain, inability to bear weight, deformity

Physical exam

deformity / angulation / malrotation

contusions

blisters

open wounds

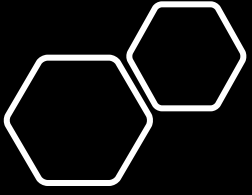
Neurovascular examination

Imaging

recommended views

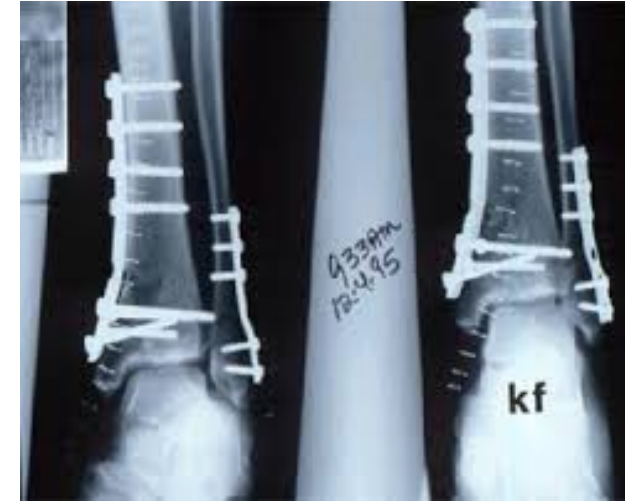
- AP
- lateral
- mortise
- full-length tibia/fibula and foot x-rays performed for fracture extension

CT



Treatment

- Nonoperative
 - Immobilization
- Operative
 - temporizing spanning external fixation across ankle joint
 - ORIF

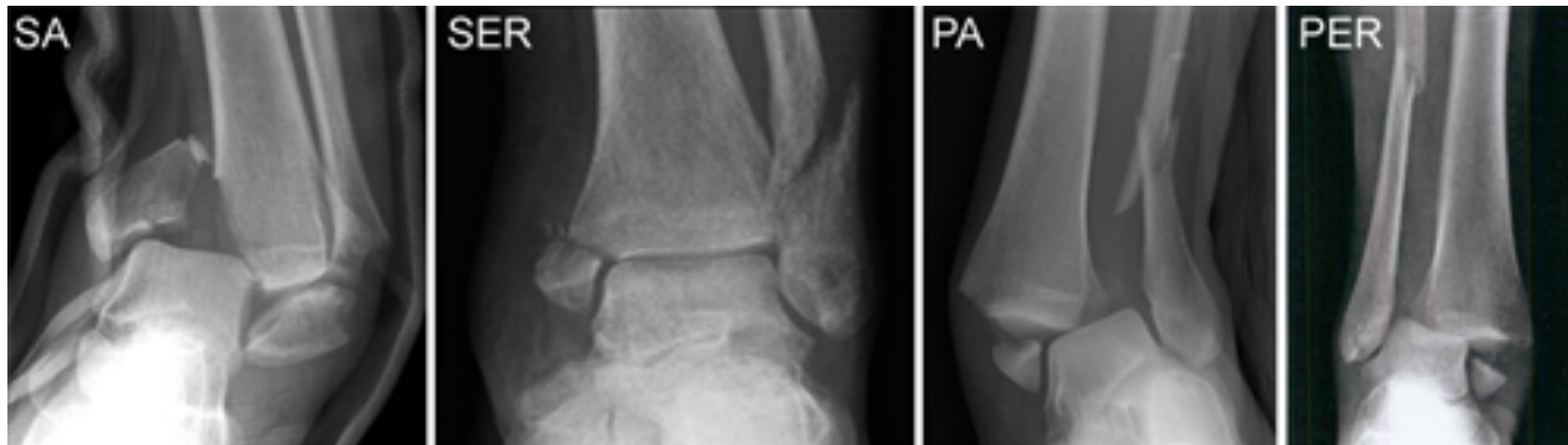


External Fixation of Pilon Fracture



© medlineplus.com

Ankle Fractures



Classification and treatment

Type A

- **Below** level of the ankle joint
- Tibiofibular **syndesmosis intact**
- Deltoid ligament intact
- Medial malleolus often fractured
- Usually stable



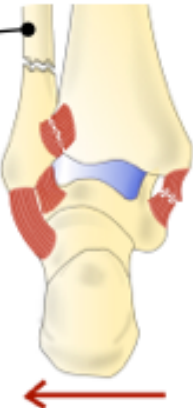
Type B

- **At the level** of the ankle joint
- Syndesmosis intact or partially torn
- No widening of distal tibiofibular articulation
- Medial malleolus may be fractured
- Deltoid ligament may be torn
- Variable stability

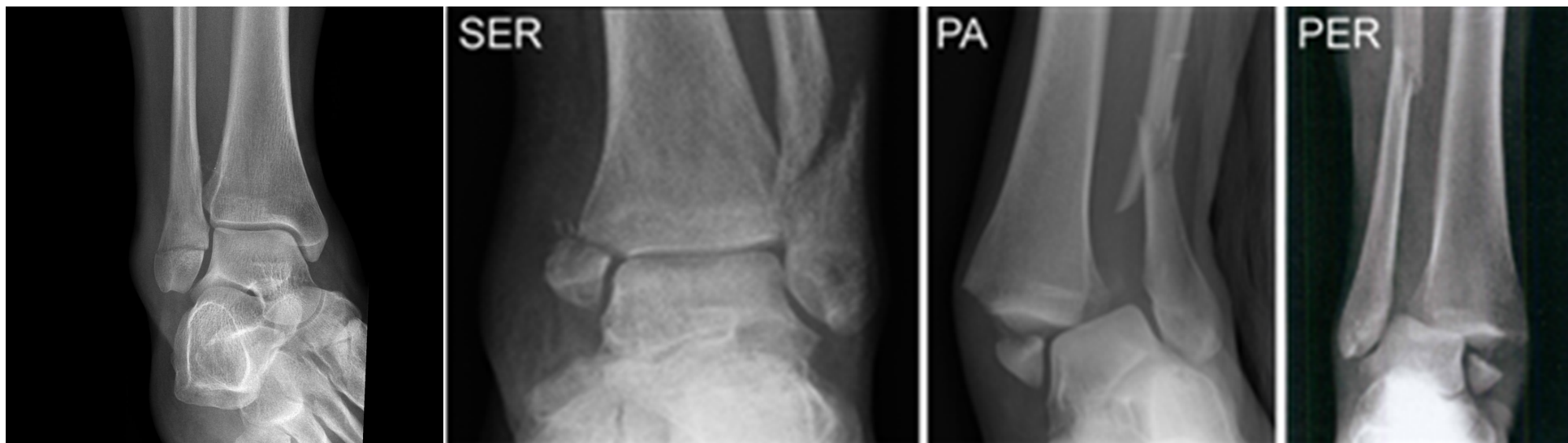


Type C

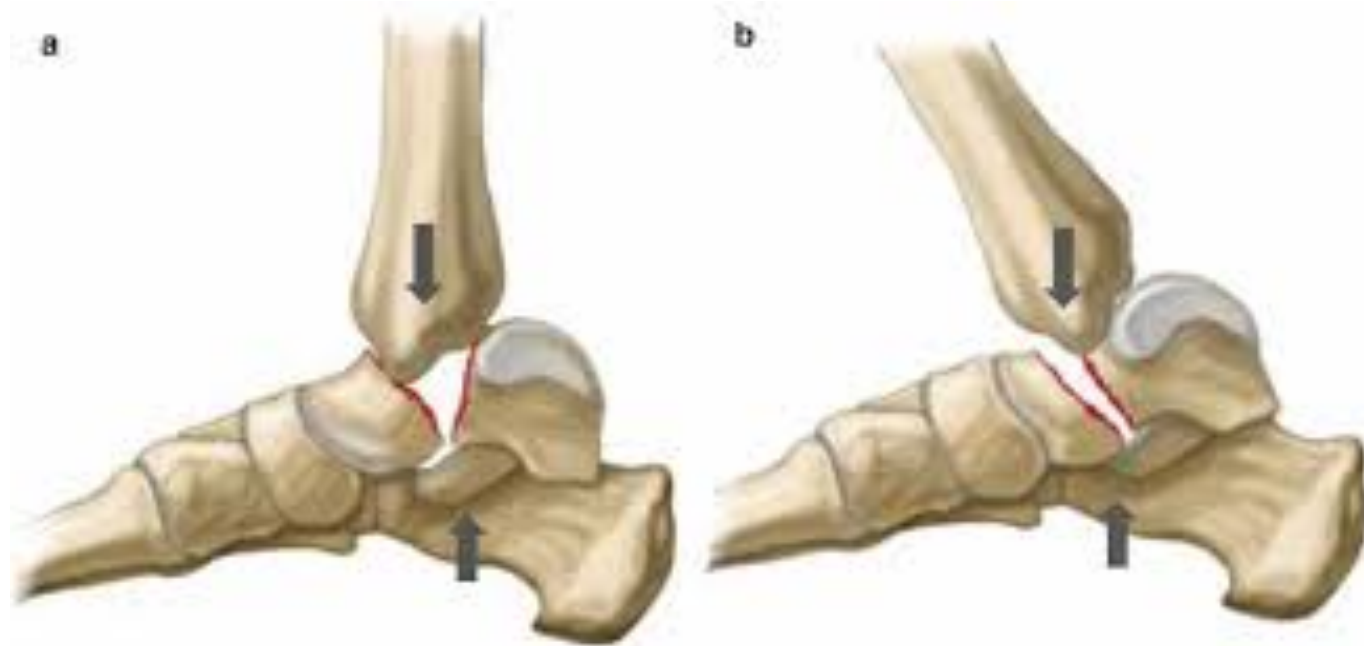
- **Above** the level of the ankle joint
- **Syndesmosis disrupted**
- Widening of distal tibiofibular articulation
- Medial malleolus fracture
- Deltoid ligament injury
- Unstable (requires ORIF)



- Danis-Weber



Talar Neck Fractures



Epidemiology

most common fracture of talus (50%)



Mechanism

a high-energy injury
dorsiflexion with axial load



Associated conditions

ipsilateral lower extremity fractures common



What is
important to
remember
talar neck



Poor vascularity



Articulating bone

Treatment



NONOPERATIVE



OPERATIVE:ORIF

complications



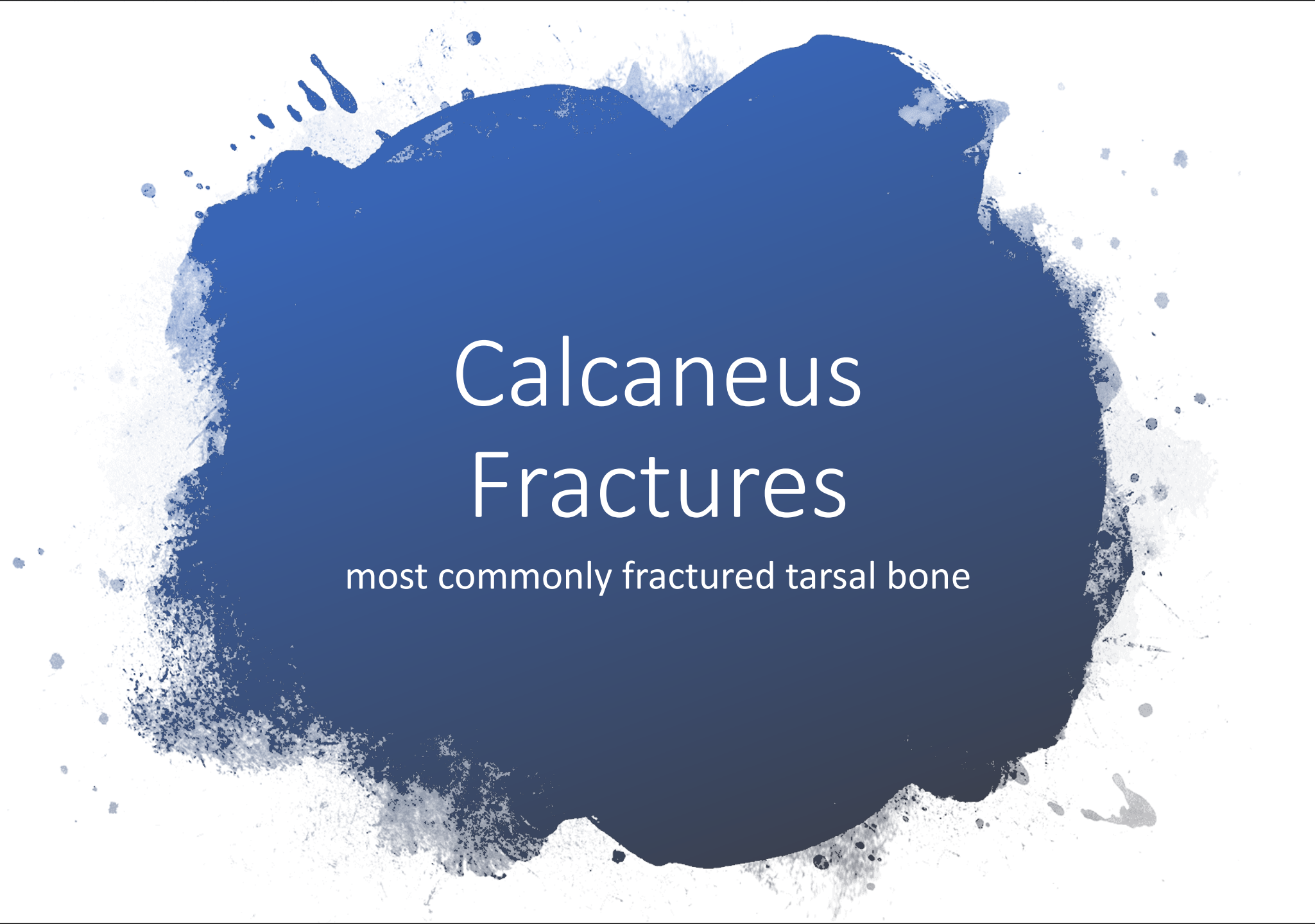
OSTEONECROSIS



POSTTRAUMATIC
ARTHRITIS



VARUS MALUNION

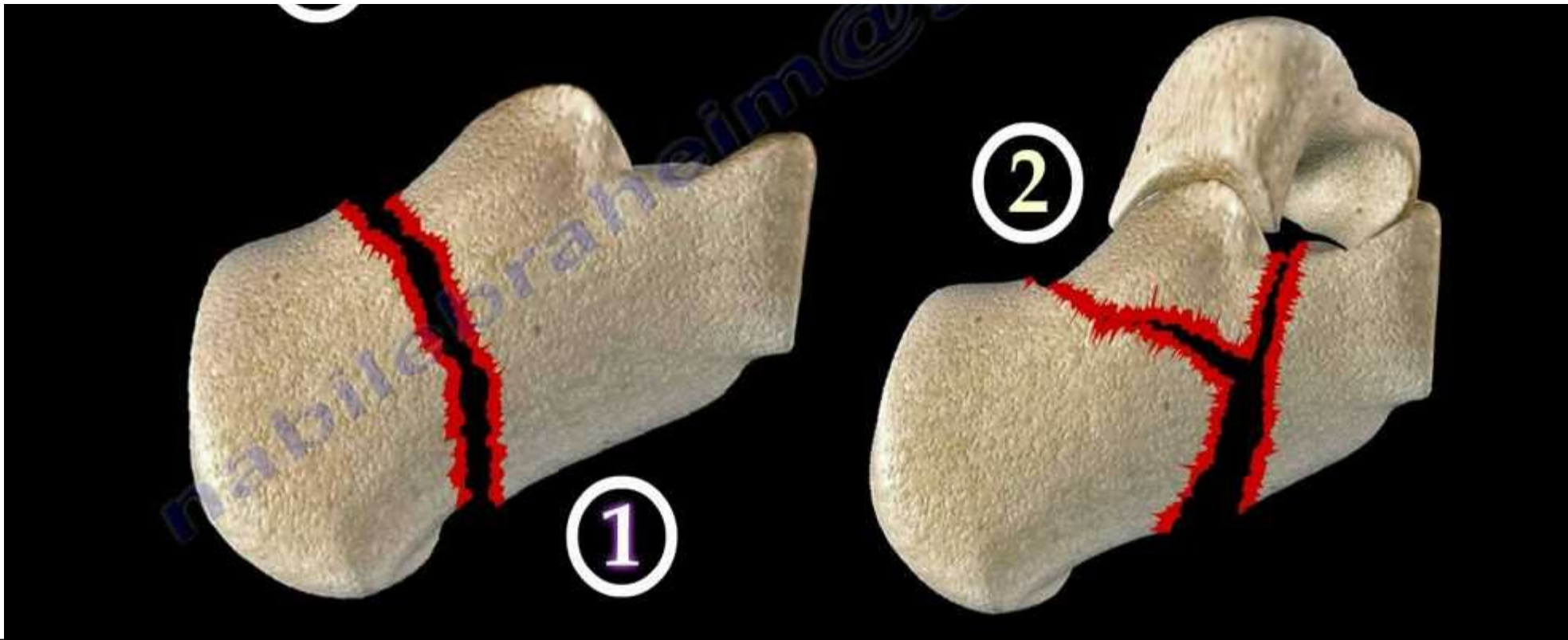


Calcaneus Fractures

most commonly fractured tarsal bone

Classification

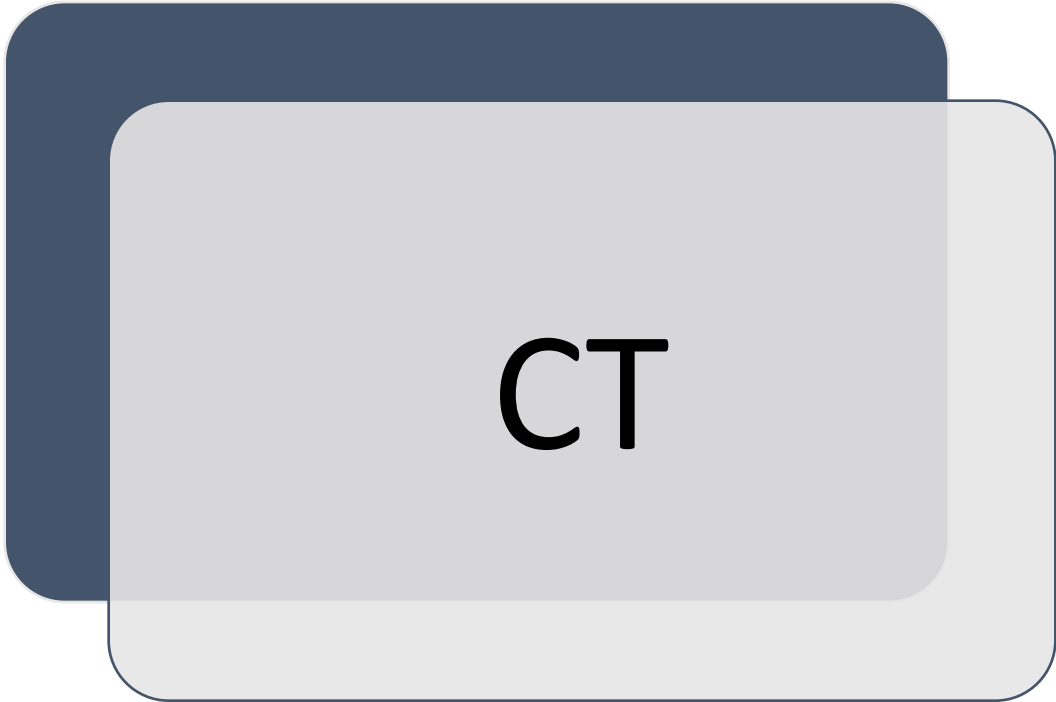
- Extra-articular (25%)
- Intra-articular (75%)



imaging

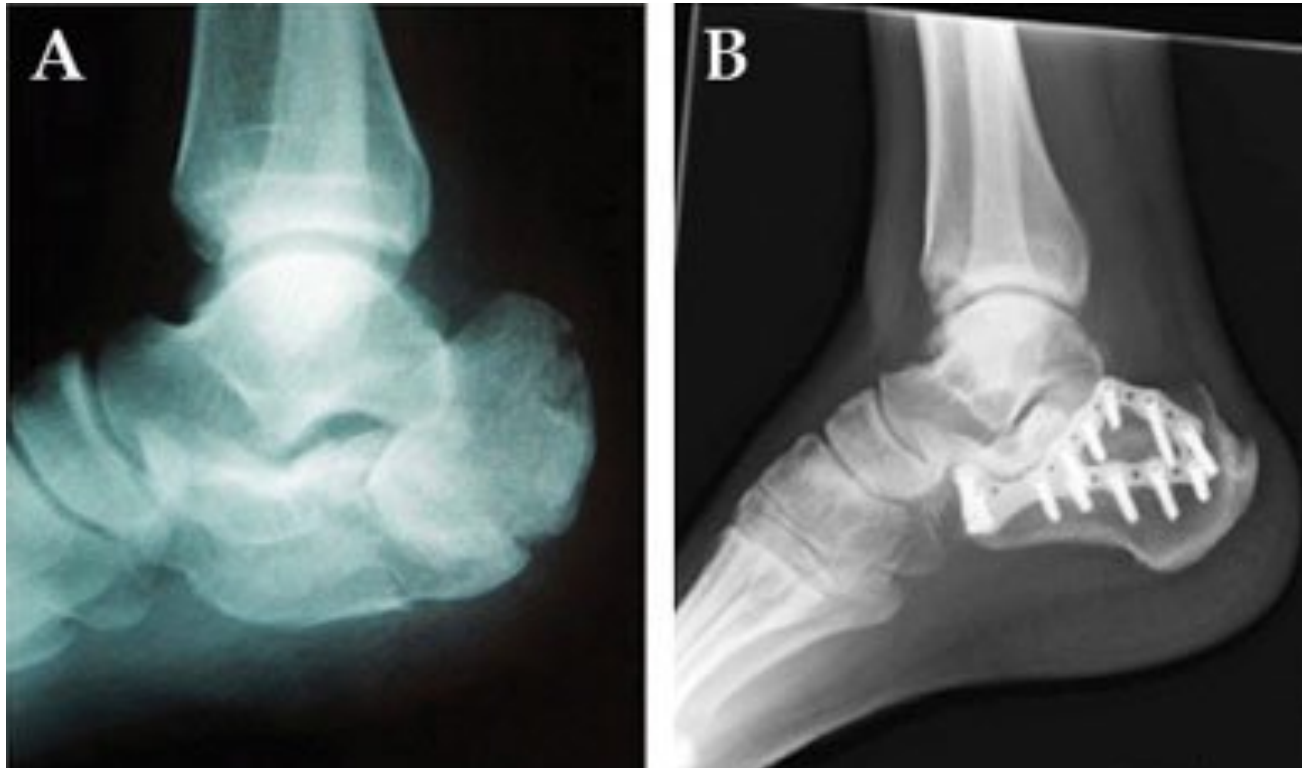
A stylized icon for an X-ray machine. It consists of a dark blue rounded rectangle in the background, with a light gray rounded rectangle in the foreground. The text "X-ray" is centered in the light gray area.

X-ray

A stylized icon for a CT scanner. It consists of a dark blue rounded rectangle in the background, with a light gray rounded rectangle in the foreground. The text "CT" is centered in the light gray area.

CT

Treatment



- Nonoperative :
 - cast immobilization with non-weightbearing
- Operative:
 - closed reduction with percutaneous pinning
 - ORIF