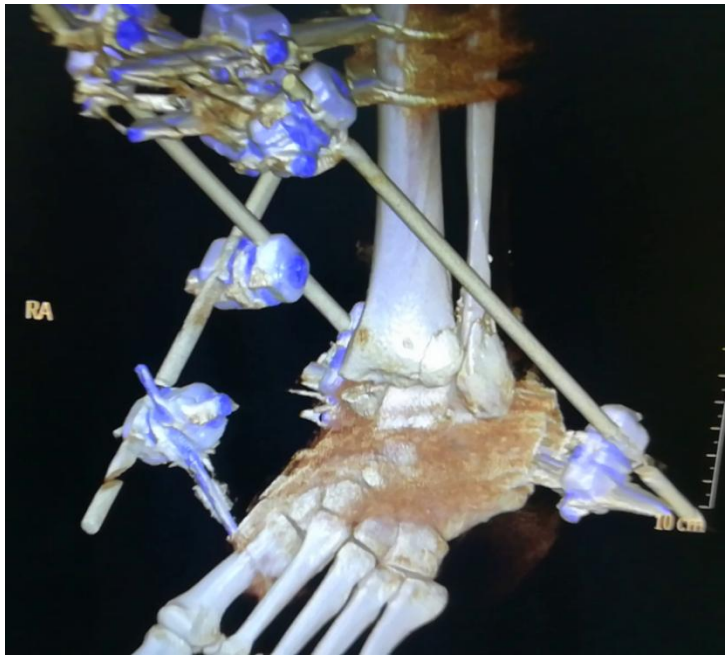
PLEASE CLICK ON THE FOLLOWING LINK TO WATCH THE LECTURE ONLINE:-

https://www.youtube.com/watch?v=7-n08dSu4Rg&list=PLuBRb5B7fa_cjuGL06zhWXRxCDRoGpJlh

ANKLE FRACTURES

ankle fractures



The treatment of ankle fractures is often straightforward , with some successfully treated conservatively and operative reduction and stabilization providing good results

Abdullah Alkhawaldah MD, FACS

RMS Jordan. Foot And Ankle surgery

Asian Federation of Foot and Ankle Surgeons
Established in 1993

a 28-year-old woman with an isolated lateral malleolus fracture without an associated medial-sided injury.

Learning outcomes

- Describe the anatomy of the ankle and the radiologic parameters.
- Classify ankle fractures.
- Outline surgical techniques for different types of ankle fractures.
- Explain management for different fracture types

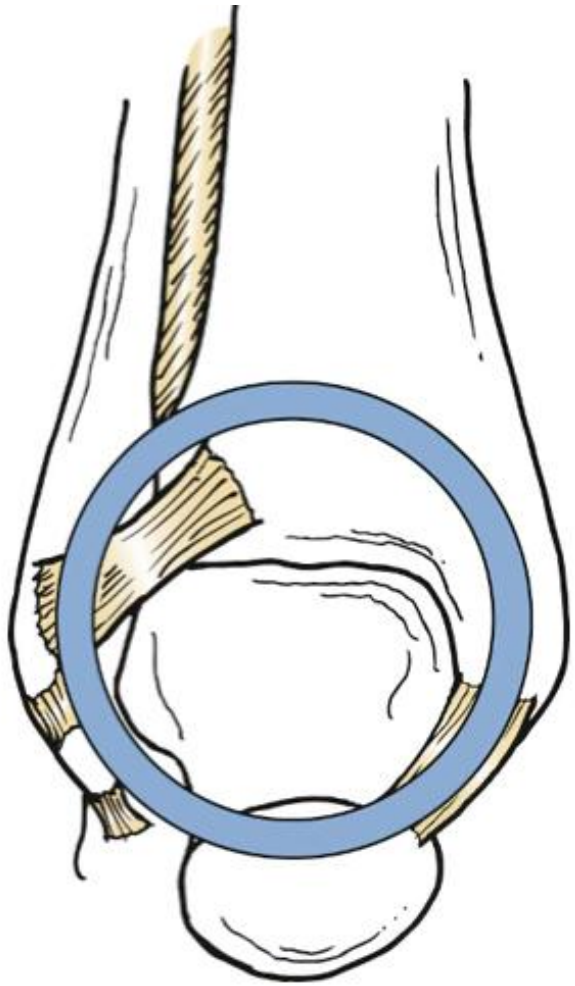
Ankle Anatomy

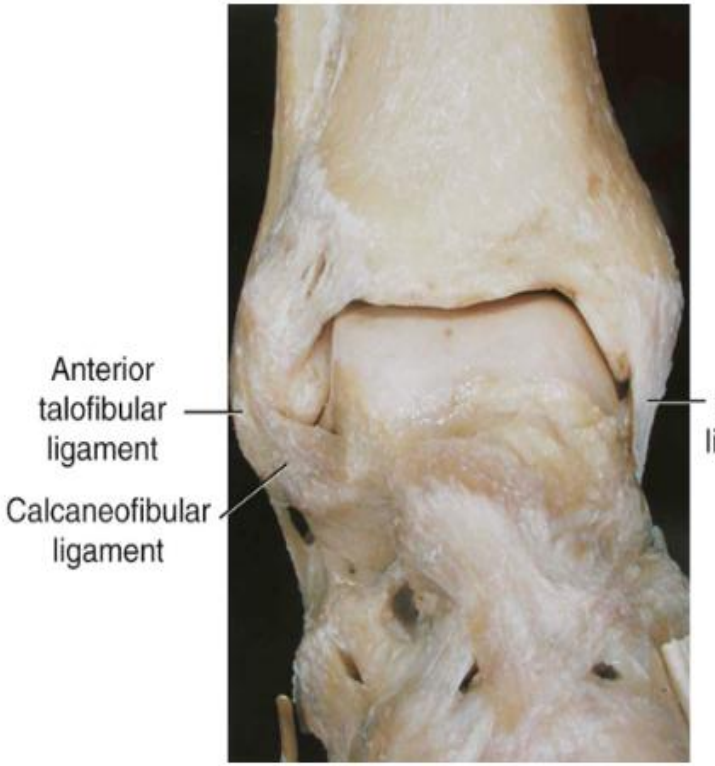
- Complex joint comprising the articulation of the tibia and fibula with the foot at the talus
- **Intrinsic** stability arises from congruous **bony** articulations and **muscular** forces across the ankle
- **Extrinsic** stability arises from the medial and lateral **ligament** complex and **capsule**
- The ankle is therefore considered to have three important

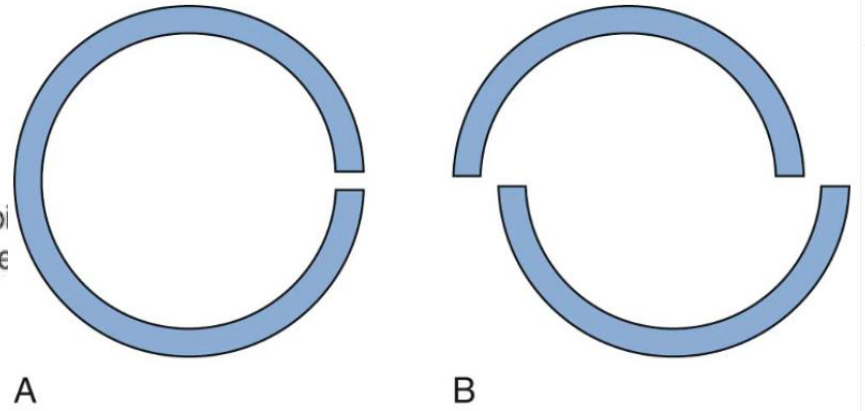
static stabilizers: The medial and lateral osteoligamentous complexes

and the syndesmosis

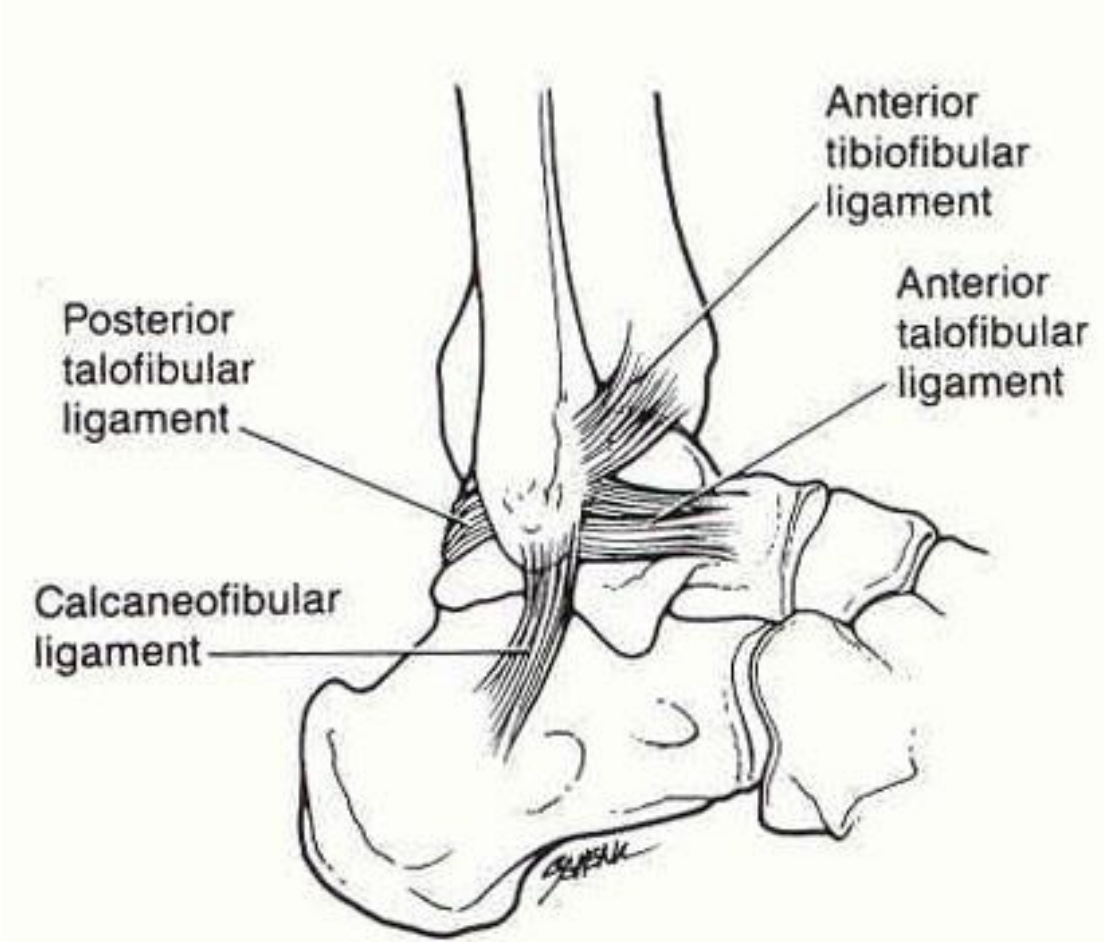
Anatomy



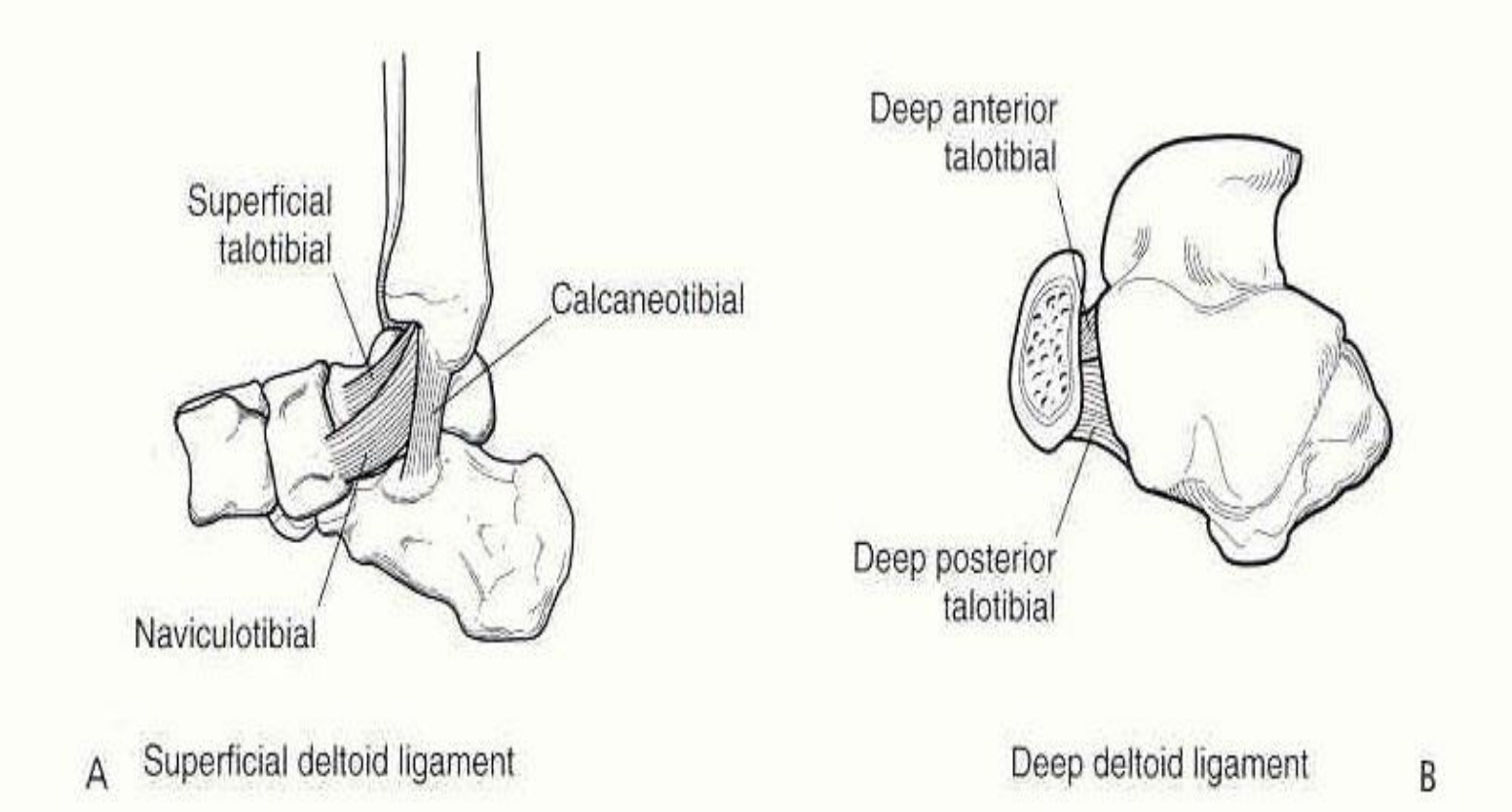

Anterior
talofibular
ligament
Calcaneofibular
ligament


A
B

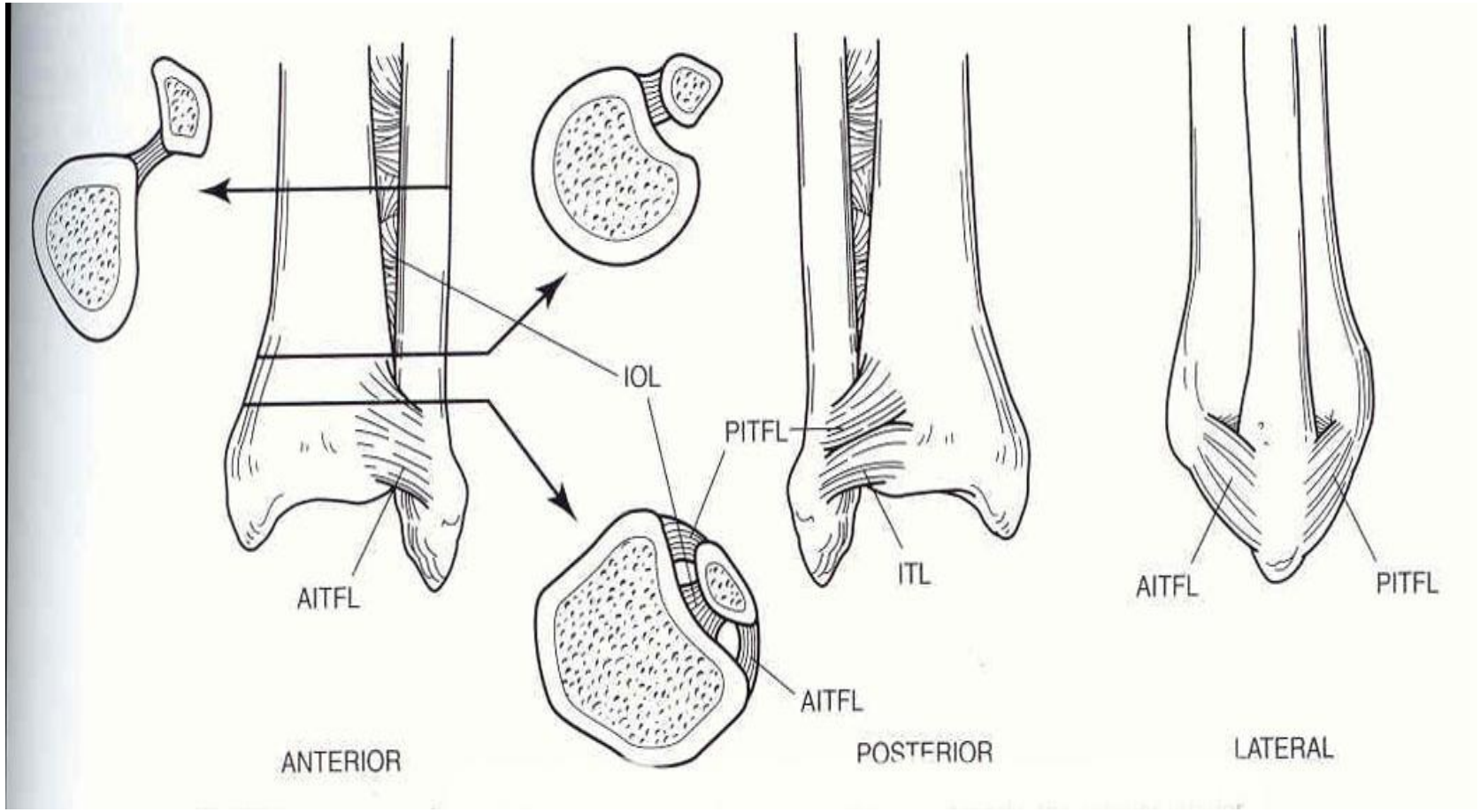
Lateral Ligamentous Anatomy



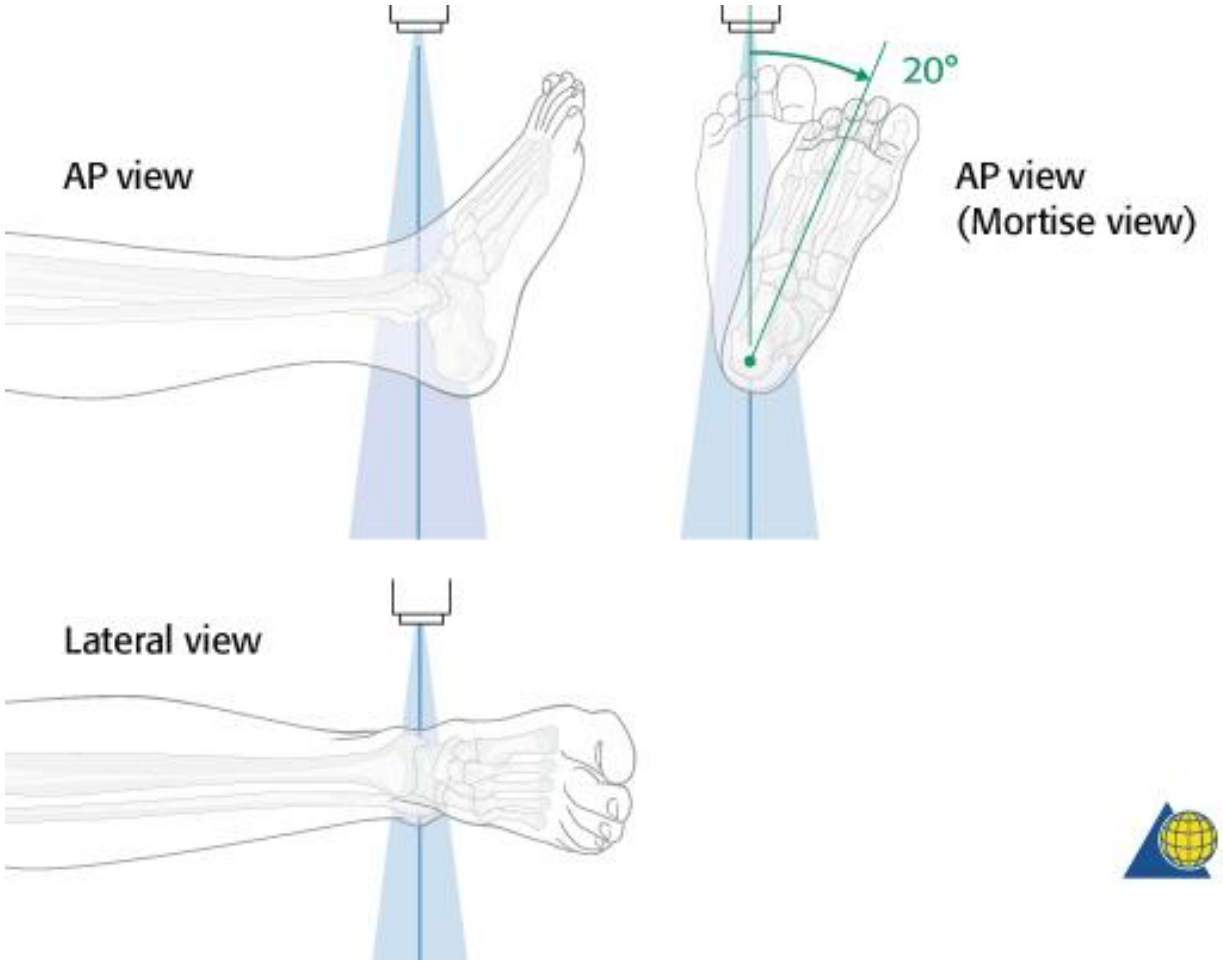
Medial Ligaments



Syndesmosis

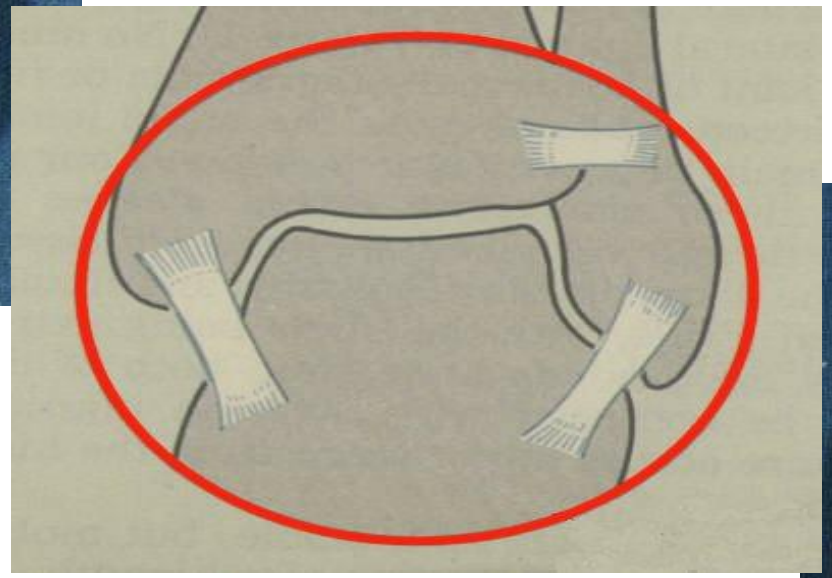


X-ray examination—AP, lateral, and mortise views



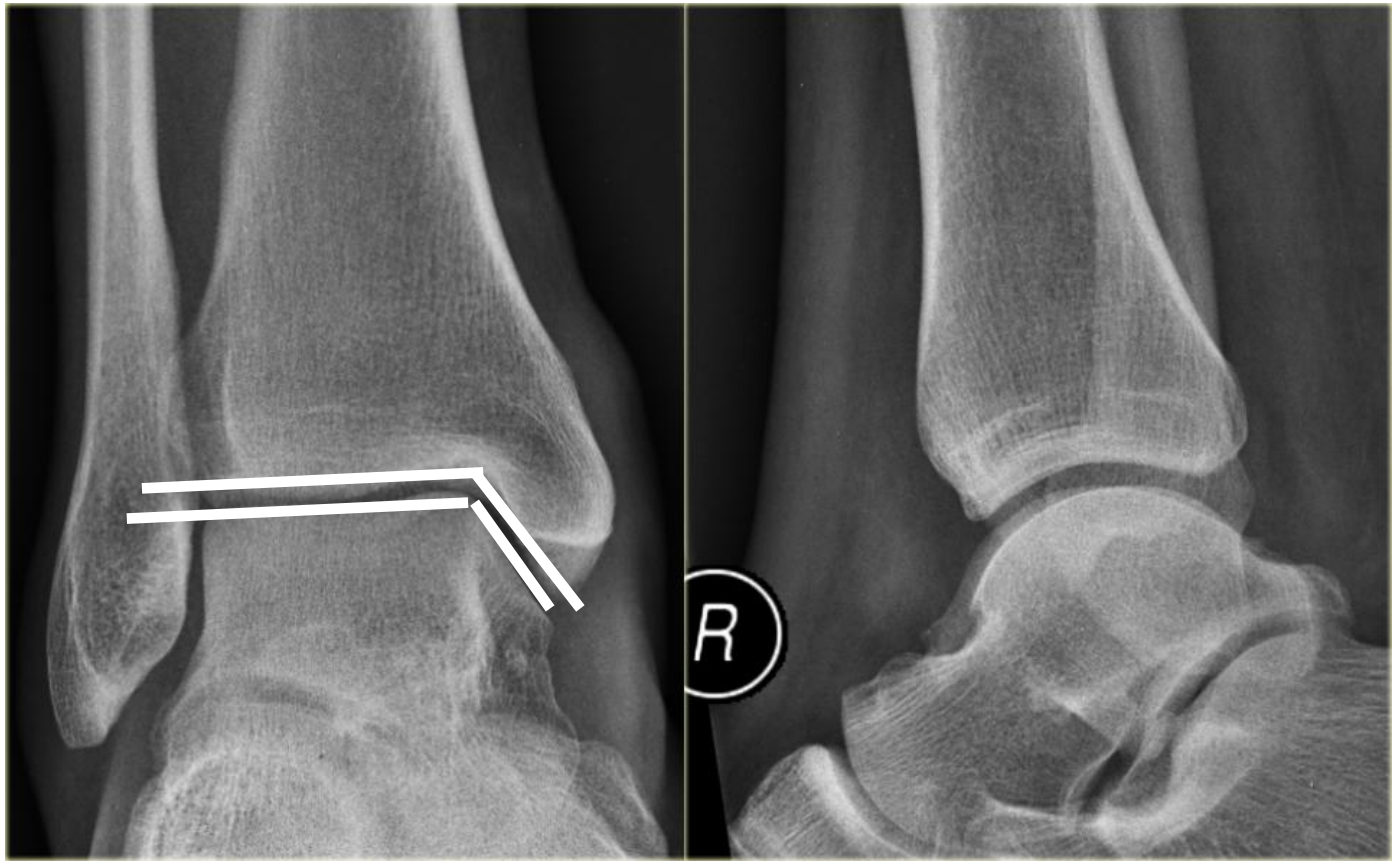
CT scan

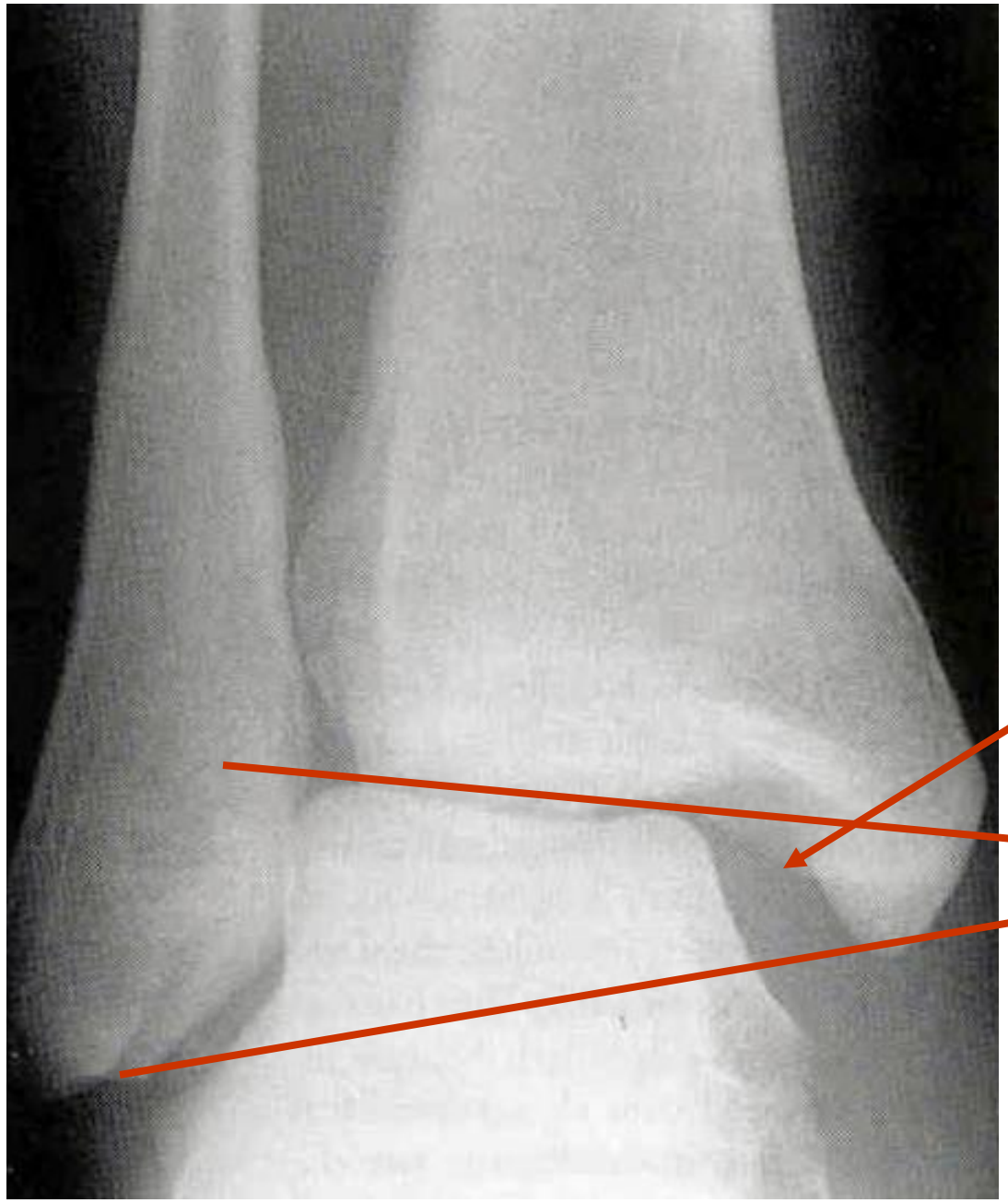
Stability



Anatomy

Talus-plafond space (Uniform)
Medial clear spaces =
talus-plafond space





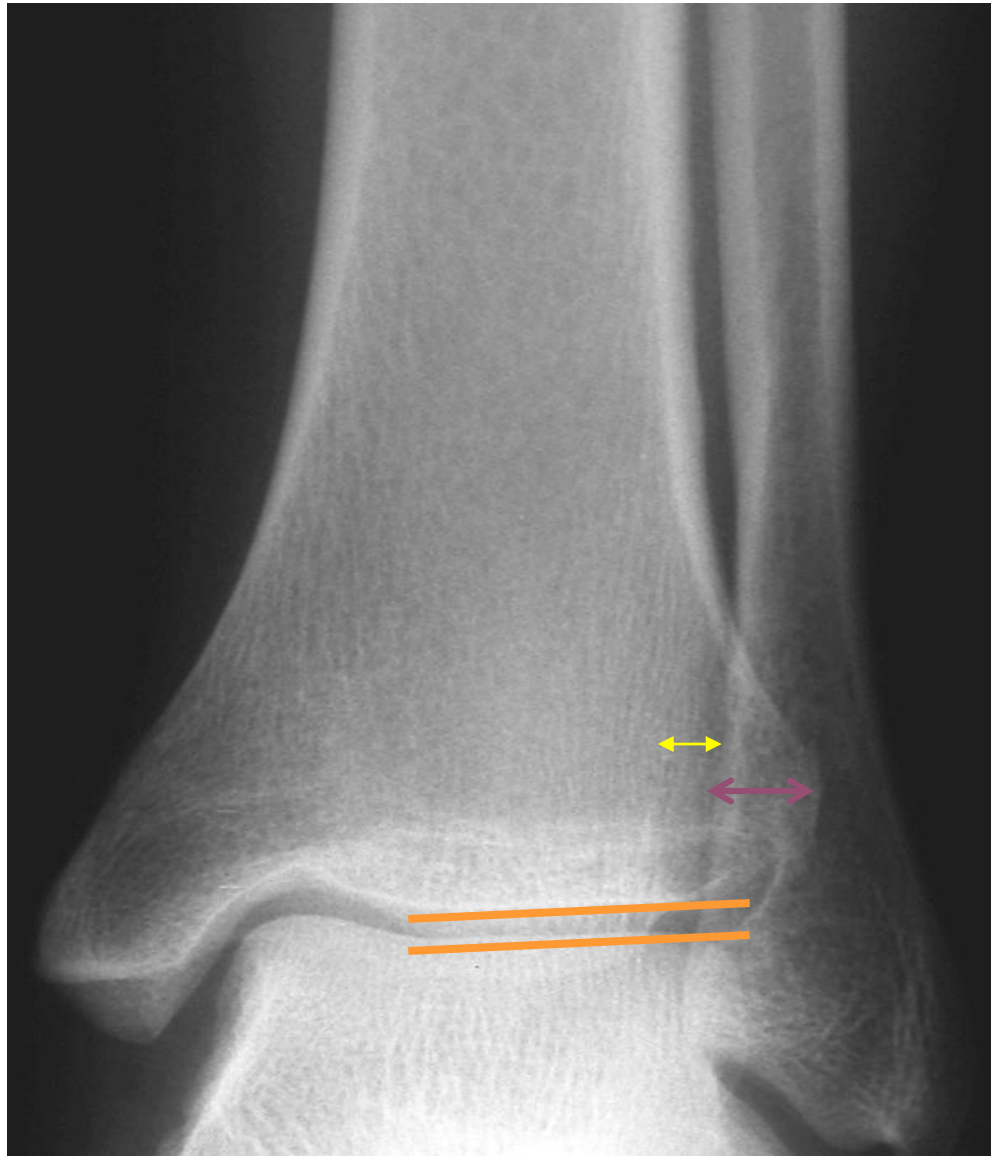
Anatomy

Syndesmotic Injury with Deltoid Ligament Rupture

Radiographic Anteroposterior View

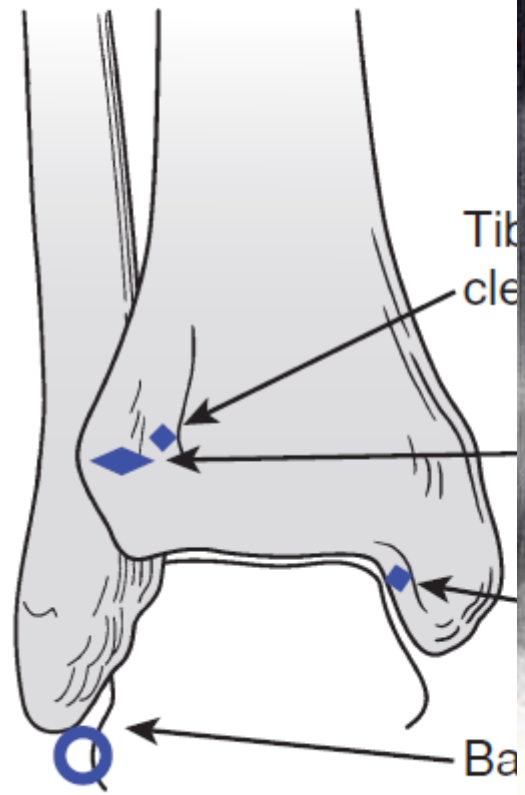
- Tibiofibular overlap >6mm
- Tibiofibular clear space <6mm
- Talar tilt

- Comparison Radiograph?



Mortise View

- Foot is internally rotated and AP pı
  is performed
- Abnormal findings:
  - medial joint space widening >4mm
  - talocural angle <8 or >15 degrees
    (comparison to normal side is helpful)
  - tibia/fibula overlap <1mm
- The “ball” sign is an unbroken curve
  connecting the recess in the distal tip
  of the fibula and the lateralprocess
  of the talus



A Normal

B Talocrural angle

Lateral View

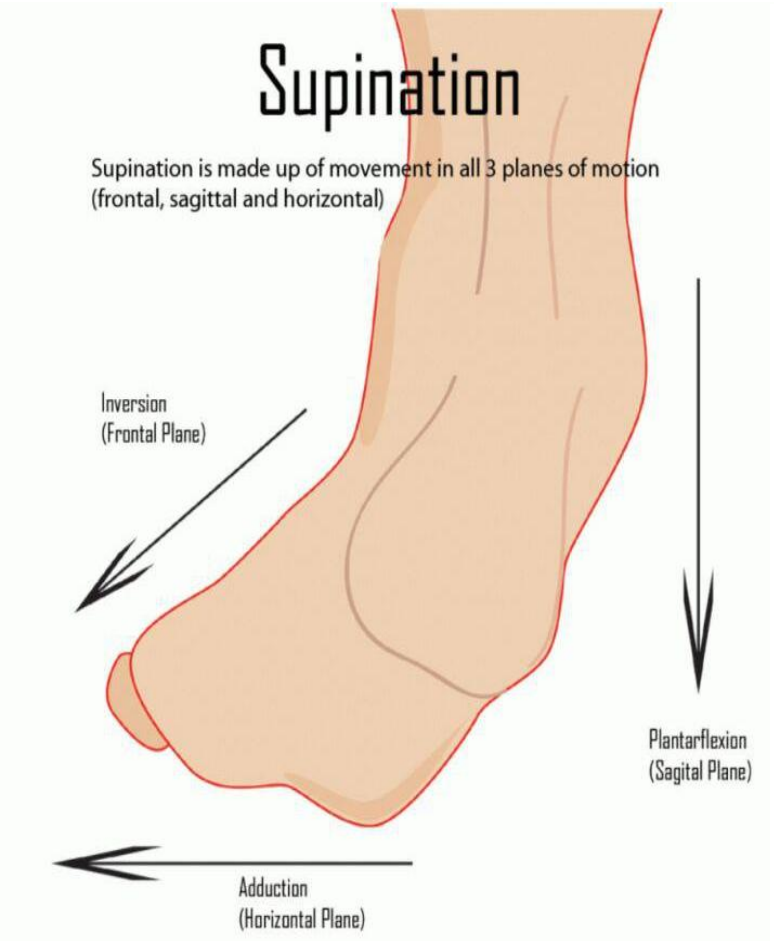
- Posterior mallelolar fractures
- Anterior/posterior subluxation of the talus under the tibia
- Angulation of distal fibula
- Talus fractures
- Associated injuries

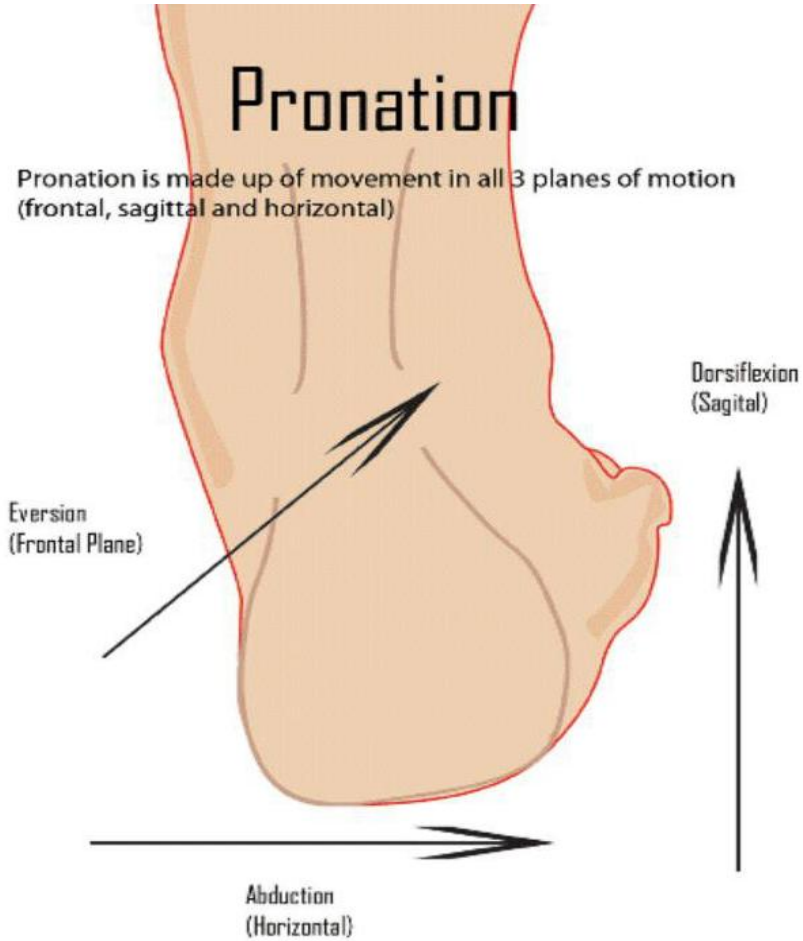
- Classification
  - Lauge-Hansen
    - **Supination–external rotation -SER**
    - **Supination-adduction -SAD**
    - **Pronation External Rotation -PER**
    - **Pronation-abduction -PAB**
  - Danis-Weber
    - A – Inferior to syndesmosis
    - B – Level of syndesmosis
    - C – Proximal to syndesmosis
- **Golden rule : Tension side fails first**

Terminology used in Lauge-Hansen

- 1st Word : position of foot at time of injury
- Supination/pronation—position of the foot as it rotates around the subtalar joint

Supination





Pronation

Terminology used in Lauge-Hansen

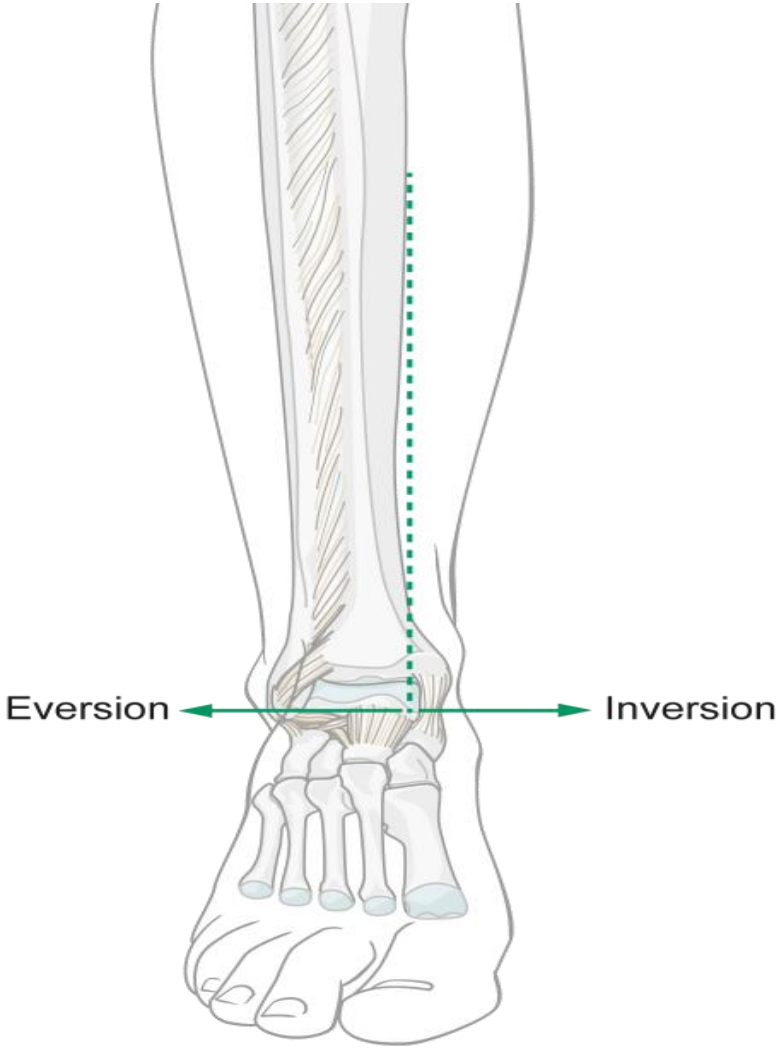
2nd Word : Direction of force

ER / IR

- Rotation of the **talus** around axis of the **tibia**

Adduction/abduction

- Rotation of the **talus** around **its long axis**

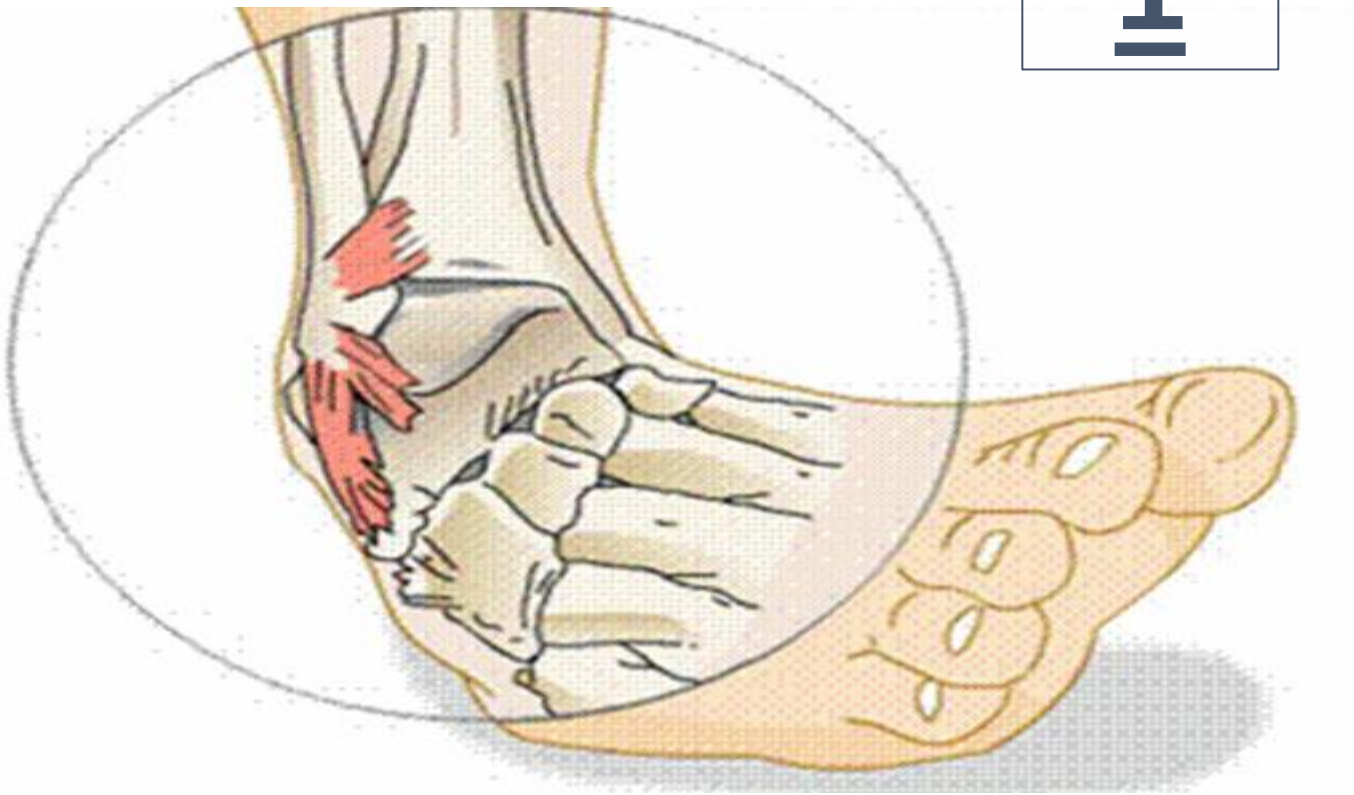


Supination Adduction

1

Supination Adduction

foot force



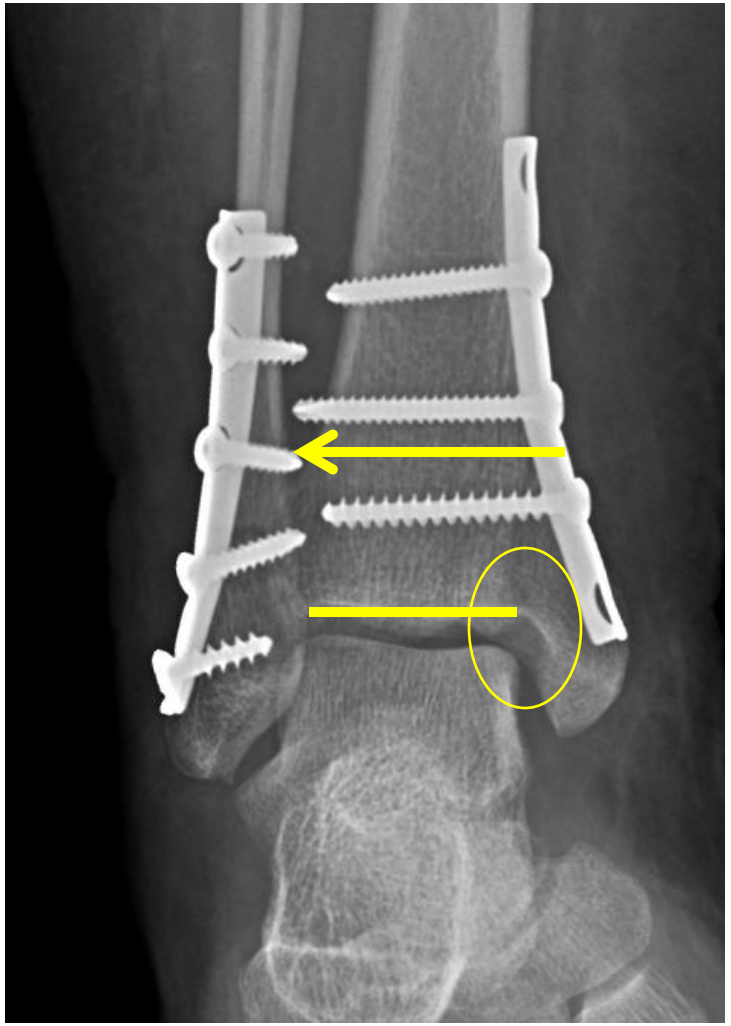
Golden rule = tension side fails first

Supination-adduction

- • Stage I—transverse distal fibula fracture at or below level of ATFL or lateral ligament injury
- • Stage II—oblique or vertical fracture of medial malleolus

SAD – Supination Adduction

- Vertical Medial Malleolar Fracture
  - **Screws go parallel to joint**
  - **Antiglide plate**
- <u>Articular Impaction</u>
  - Anteromedial Tibia
  - **MUST be reduced**



Supination External Rotation

foot

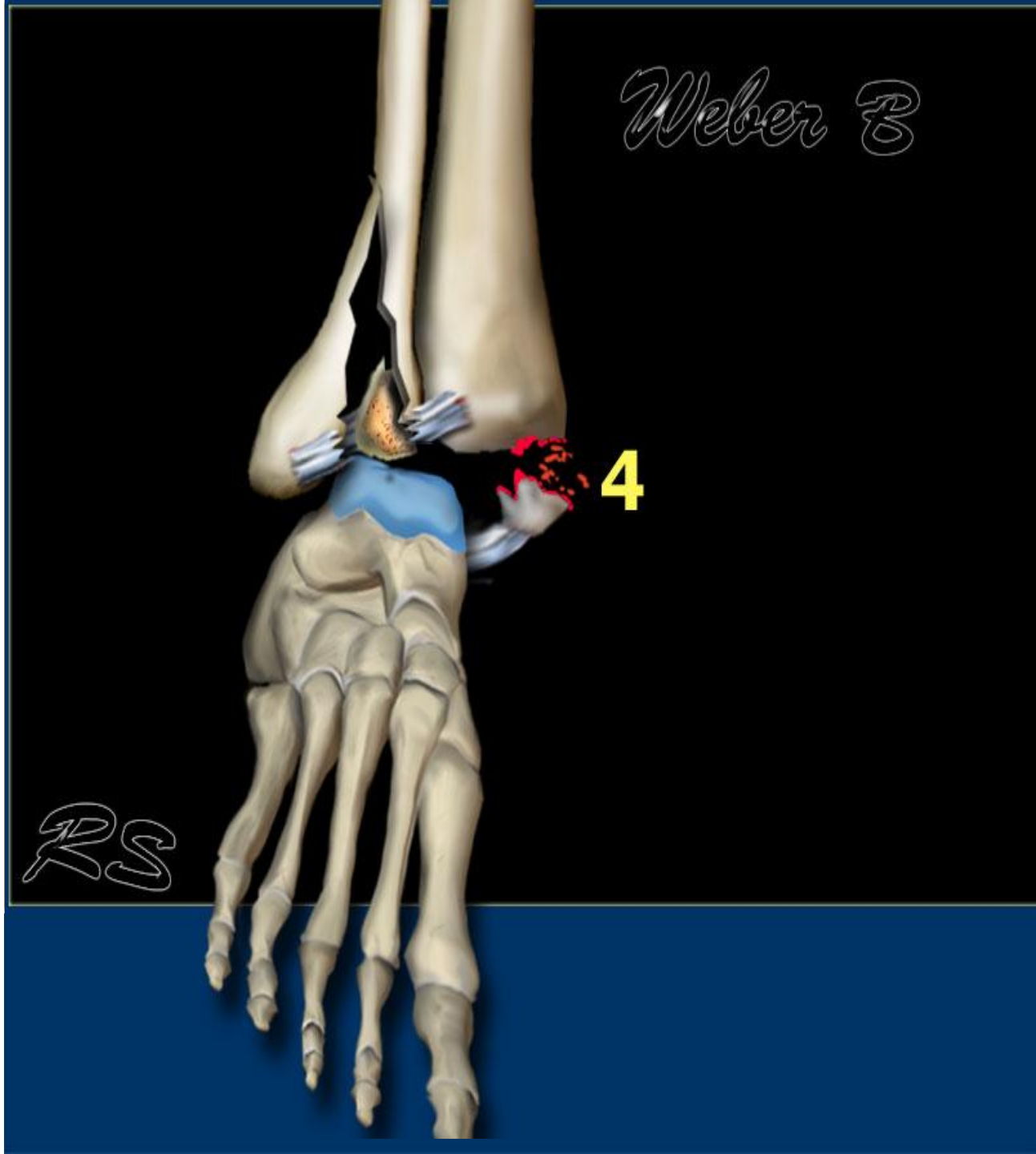
force

2

Golden rule = tension side fails first

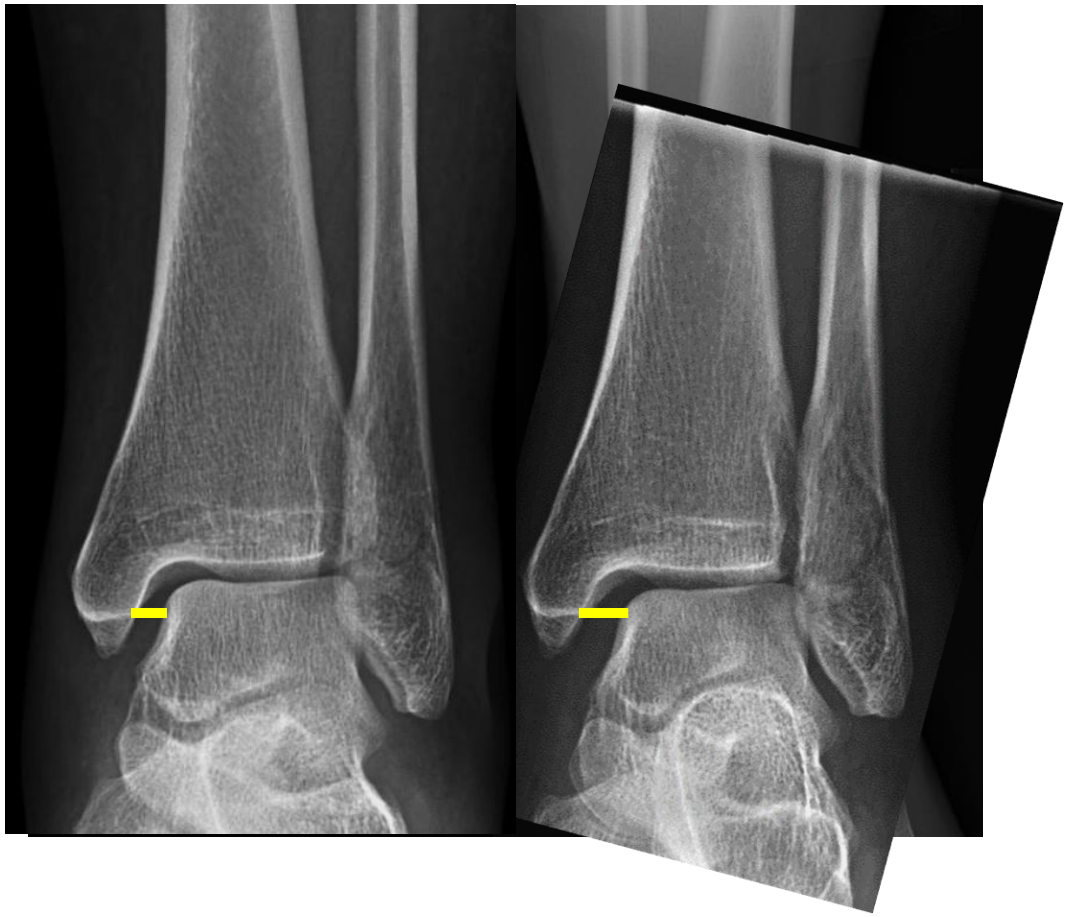
Supination–external rotation

- Stage I—rupture of (AITFL)
- • Stage II—oblique or spiral fracture of distal fibula
- • Stage III—rupture PITFL or avulsion fracture of posterior malleolus
- • Stage IV—transverse or oblique fracture of medial malleolus or deltoid disruption
- • Stress test typically performed to identify stable (SER-II) versus unstable (SER-IV)



SER – Supination External Rotation

- Most common
- Oblique Fibular Fracture
  - Anteroinferior to posterosuperior
- Transverse Medial Malleolar fracture
- SER II – Stable
  - Deltoid intact
- SER IV – Unstable
  - **Stress Radiograph**



Pronation-abduction

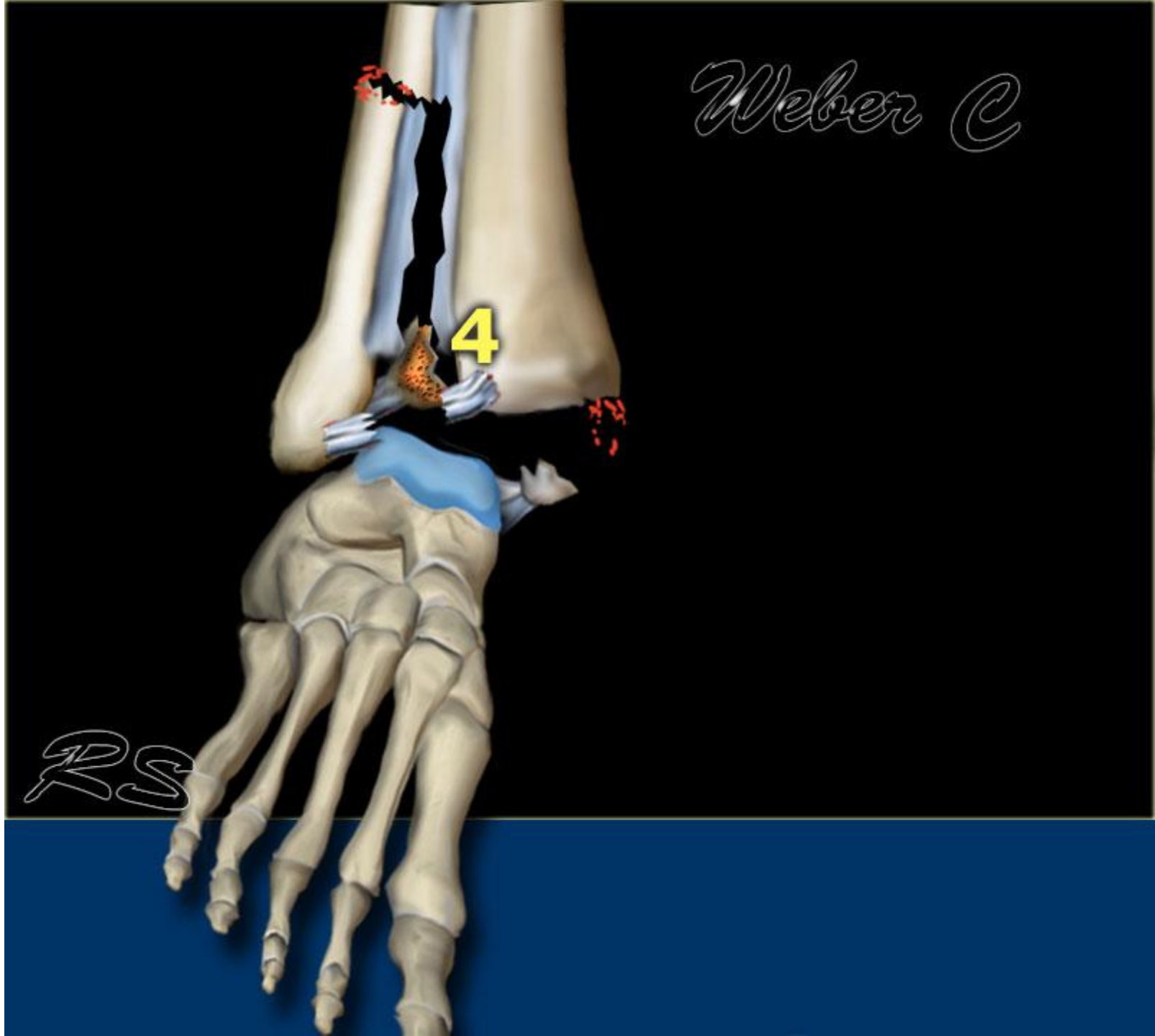
- Stage I—rupture of deltoid ligament or transverse fracture of medial malleolus
- • Stage II—rupture of the AITFL or avulsion of anterolateral tibia chaput tubercle
- Stage III—transverse or comminuted fracture of fibula above level of syndesmosis

PAB – Pronation Abduction

- **Comminuted Fibula**
- **Obvious syndesmotic injury**
- Transverse Medial Malleolar Fracture
- ORIF
  - Must include syndesmotic fixation

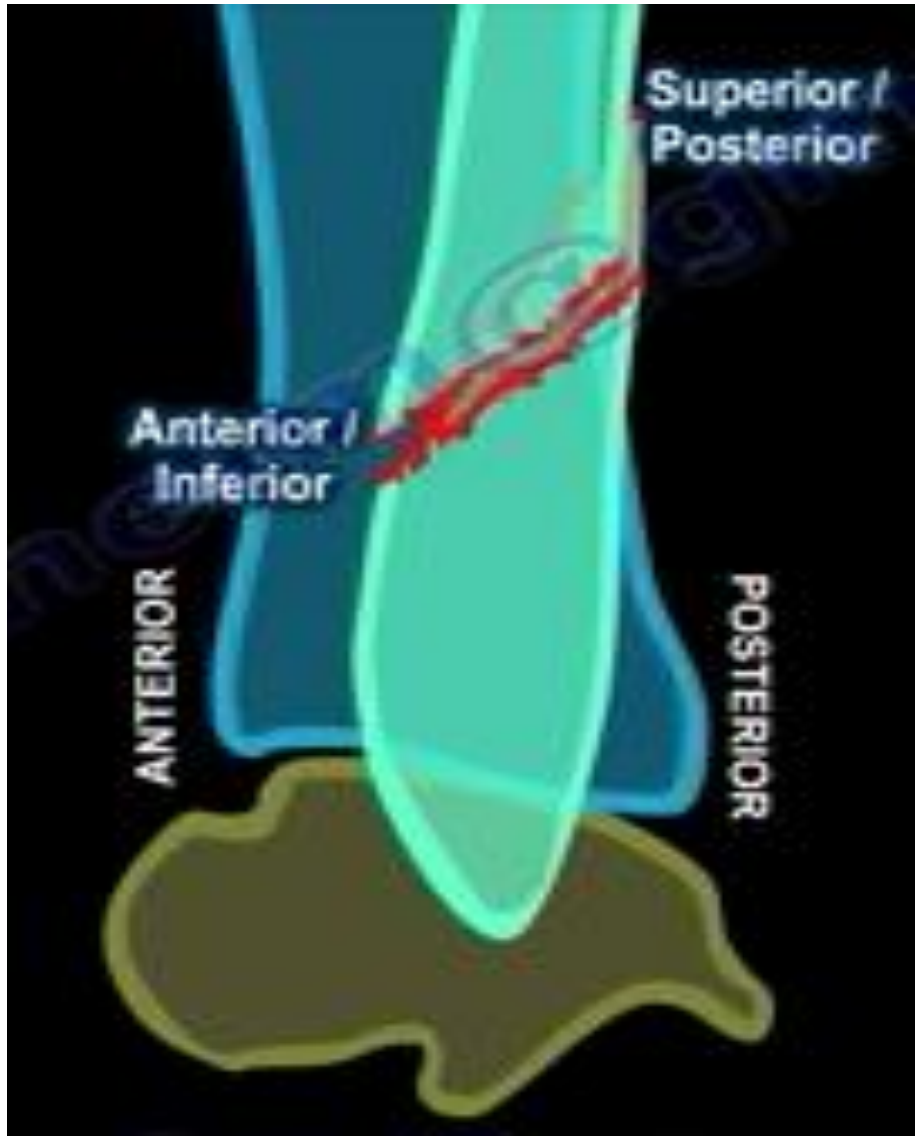
Pronation - external rotation

- Stage I—medial malleolus fracture
- • Stage II— rupture of AITFL or avulsion fracture chaput tubercle
- • Stage III—fracture of fibula above level of syndesmosis
- • Stage IV—rupture of PITFL or avulsion fracture of posterior malleolus

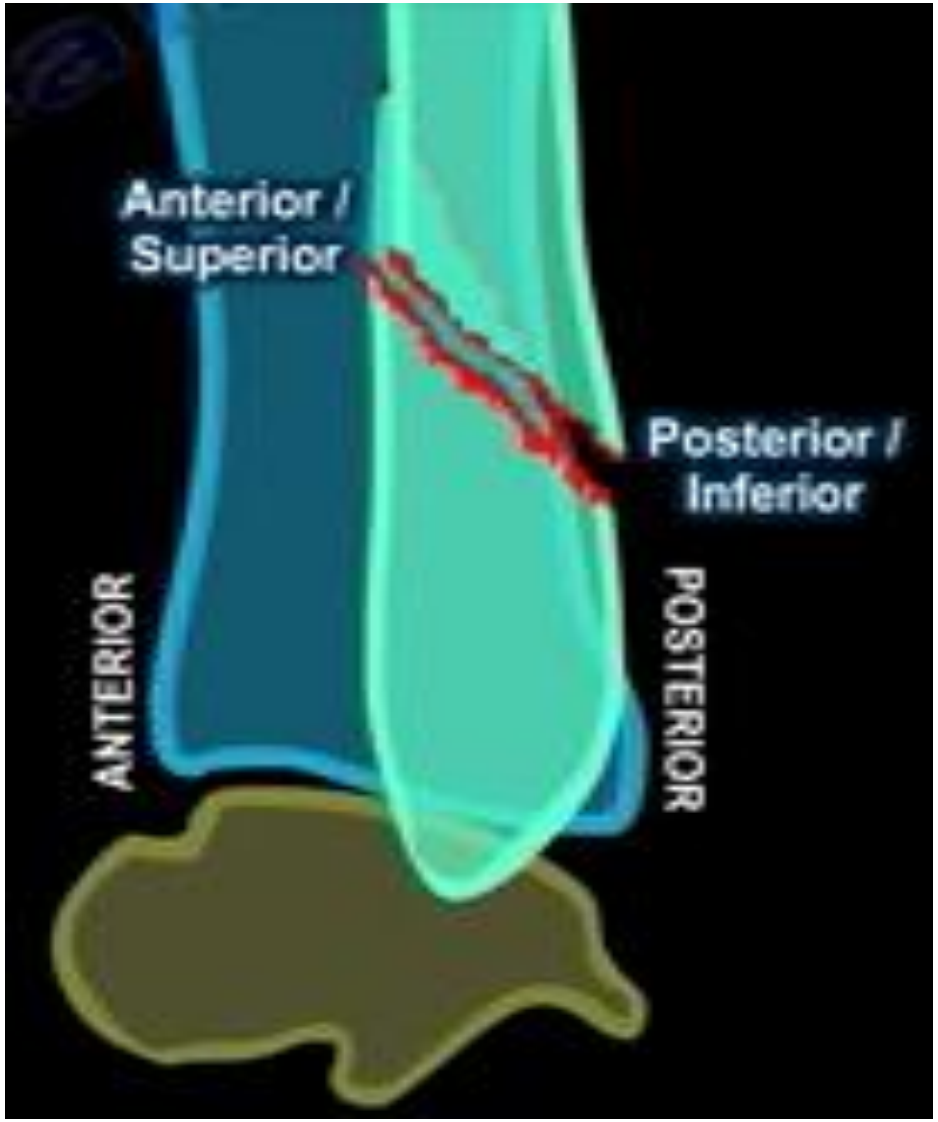


PER – Pronation External Rotation

- High fibular Fracture
- Anteriosuperior to posteroinferior
  - NOT comminuted
- Transverse Medial Malleolar Fracture
- High rate of syndesmotic injury



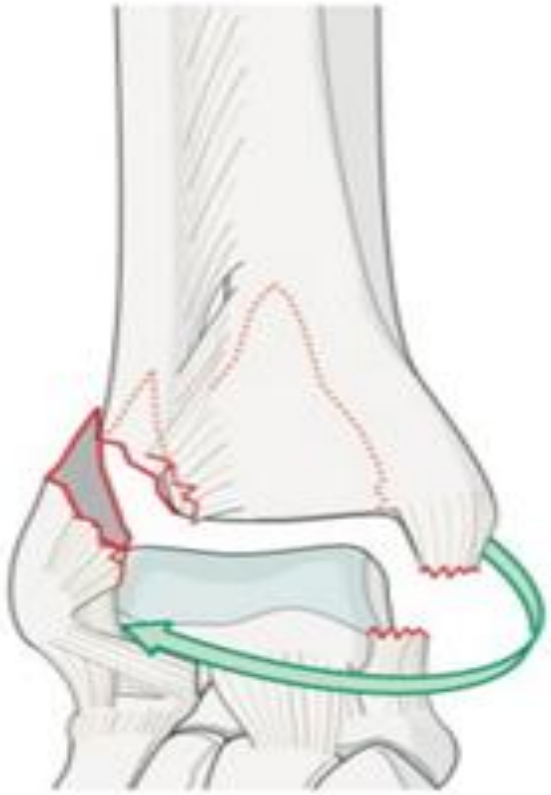
Supination / External Rotation



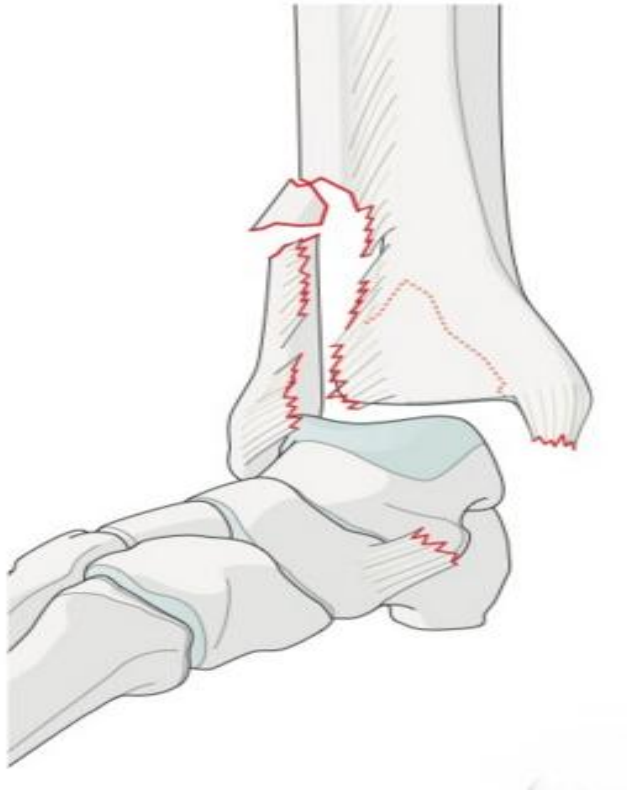
Pronation / External Rotation

Classification simplified

Weber A
SAD



Weber B
SER / PAB



Weber C
PER

Clinical and radiologic assessment
All ankle fractures are potential soft-tissue disasters

Clinical examination—soft tissues, nerves, vessels, and general examination of patient

Understanding the Pathology
Analysis of the initial X-ray

Management

Conservative

Operative

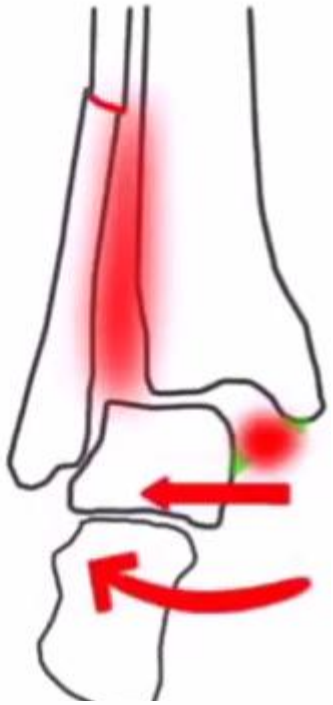
Treatment goals

1. Maintain concentric reduction of the ankle joint mortise.
2. Prevent ankle joint arthrosis.
3. Allow early mobilization of the patient.
4. Regain function.

Displaced fractures

Unstable fractures

WB FILMS FOR UNSTABLE ANKLE FRACTURE



Displaced:
medial clear space >5mm

Weight-bearing radiographs are the best method of evaluating
stability of isolated distal fibula fractures.

Timing

- 1st 6-8 hours or wait till resolution (wrinkle sign)
- All ankle fractures are potential soft-tissue disasters
- **Span**
- **Scan**
- **Plan**

Principles of fixation

Preoperative planning

Lateral malleolus/fibula

Medial malleolus

Posterior tibial lip

Syndesmosis

- Choice of implants
- Position of the patient
- Surgical approaches
- Sequence of reduction and fixation
- Pitfalls and hazards

If you cannot plan it, you cannot do it

Nonoperative Treatment

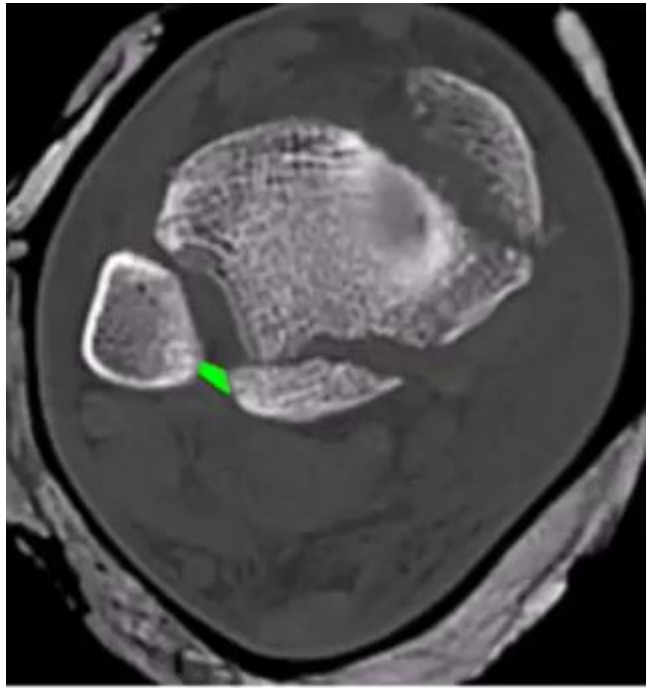
- **Stress Radiograph Required**
- Tests integrity of the **Deltoid Ligament**
  - Normal Medial Clear Space
    - <4mm
    - Or equal to superior clear space
- If medial clear space normal with stress
  - **WBAT in Functional Brace**

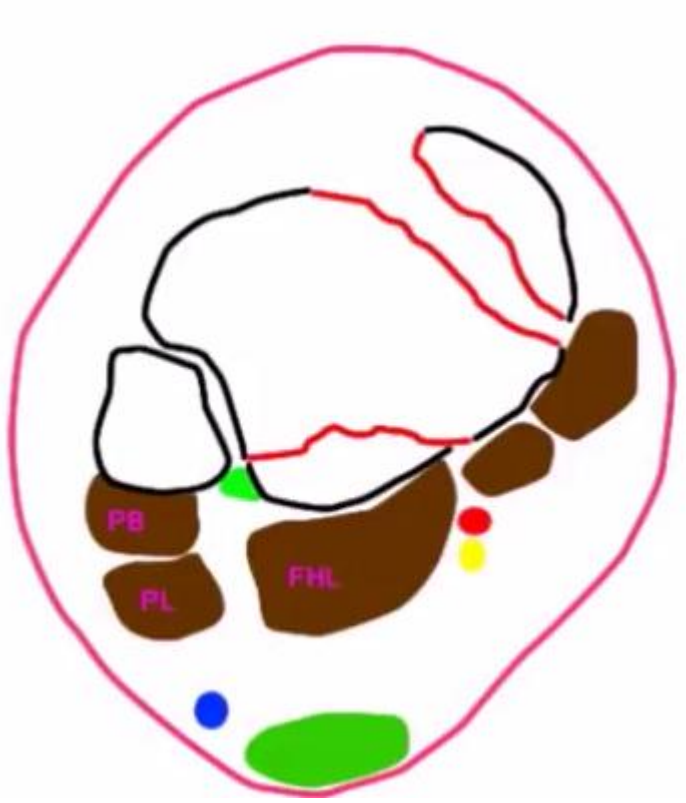
Posterior Malleolar Fracture

- Recent Push to Fix posterior mall fragment – regardless of size
  - Direct reduction of syndesmosis (PITFL)
  - Prevent DJD in long-term
    - **> 2mm displacement -- ORIF**
- Posterolateral approach
  - **Between FHL and Peroneals**

Posterior malleolus fractures

- > 25% of articular surface
- > 2 mm of displacement
- Posterior subluxation of talus
- To restore stability of syndesmosis





classification

In 1940, Nelson and Jensen30 classified fractures of PM of the distal tibia as classical,affecting more than one-third of the articular surface, and minimal, involving less than one third. For the classical type they recommended screw fixation from the posteromedial approach and introduced the **“one-third rule”** still used by many surgeons until today.

AO Radiologic Classification

This classification published in 1987[45] identified three types of PM fractures with regard to the amount of articular surface involved: (1) extra-articular fracture, (2) small fragment of the articular surface, and (3) large fragment of the articular surface.

Haraguchi Two-Dimensional Computed Tomography Classification

This first CT-based classification of 2006 was developed based on the analysis of axial CT scans of 57 patients.[11] These authors distinguished three types:

- Type I: posterolateral oblique fracture as the most common variant (67%). The fracture involves a triangular fragment separated from the posterolateral part of the distal tibia.
- Type II: medial extension fracture (19%) affects the posterior part of the medial malleolus and may be formed by one or two fragments.
- Type III: small-shell fracture (14%) involves small fragments of the PM cortex.

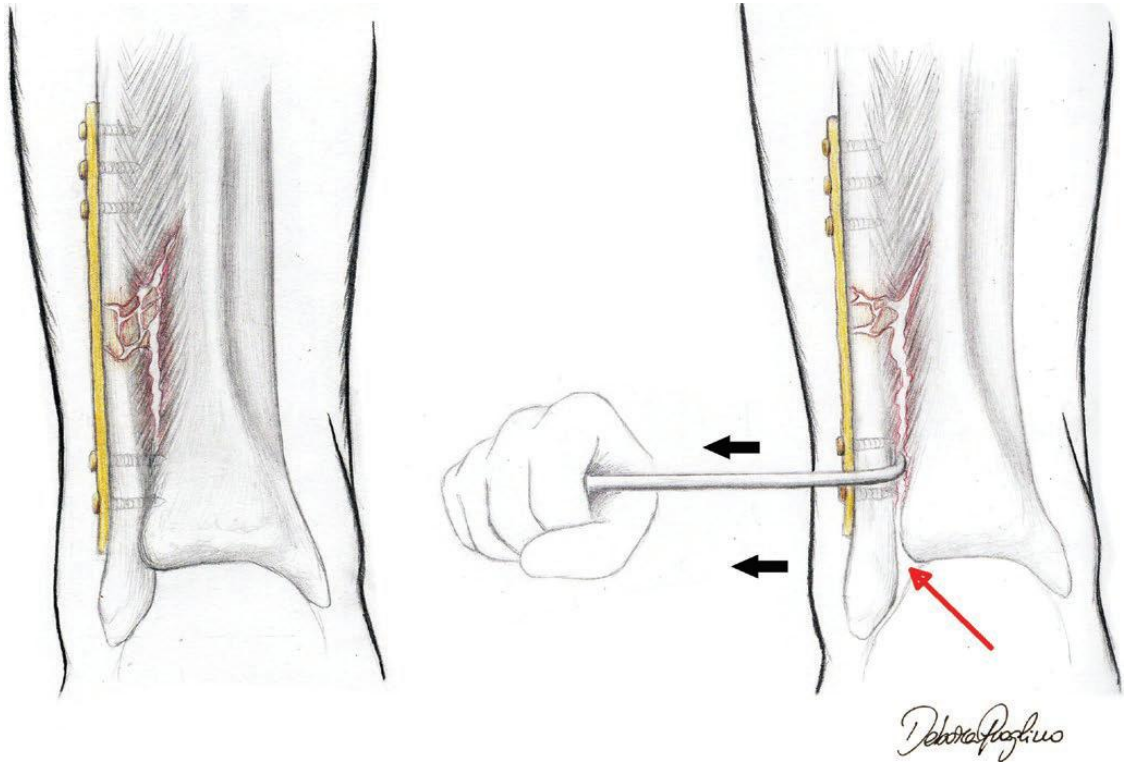
However, the authors, used only transverse sections, without two-dimensional (2D) or 3D CT reconstructions that would show the exact outline of the PM fragment.

Table 1
Anatomic features of PM fractures according to the Bartoníček and Rammelt classification

Type	Common Feature	Frequency (%)	Male: Female	Talus Subluxation (%)	Transverse Area (%)	Fragment Height (mm)	Fragment Depth (mm
1	Extraincisural	8	8:3	36	9	11.2	8.1
2	Posterolateral	52	41:33	39	14	17.9	8.7
3	Two-part	28	13:26	59	24	29.1	12.7
4	Large triangular	9	1:12	85	29	37.4	18.1

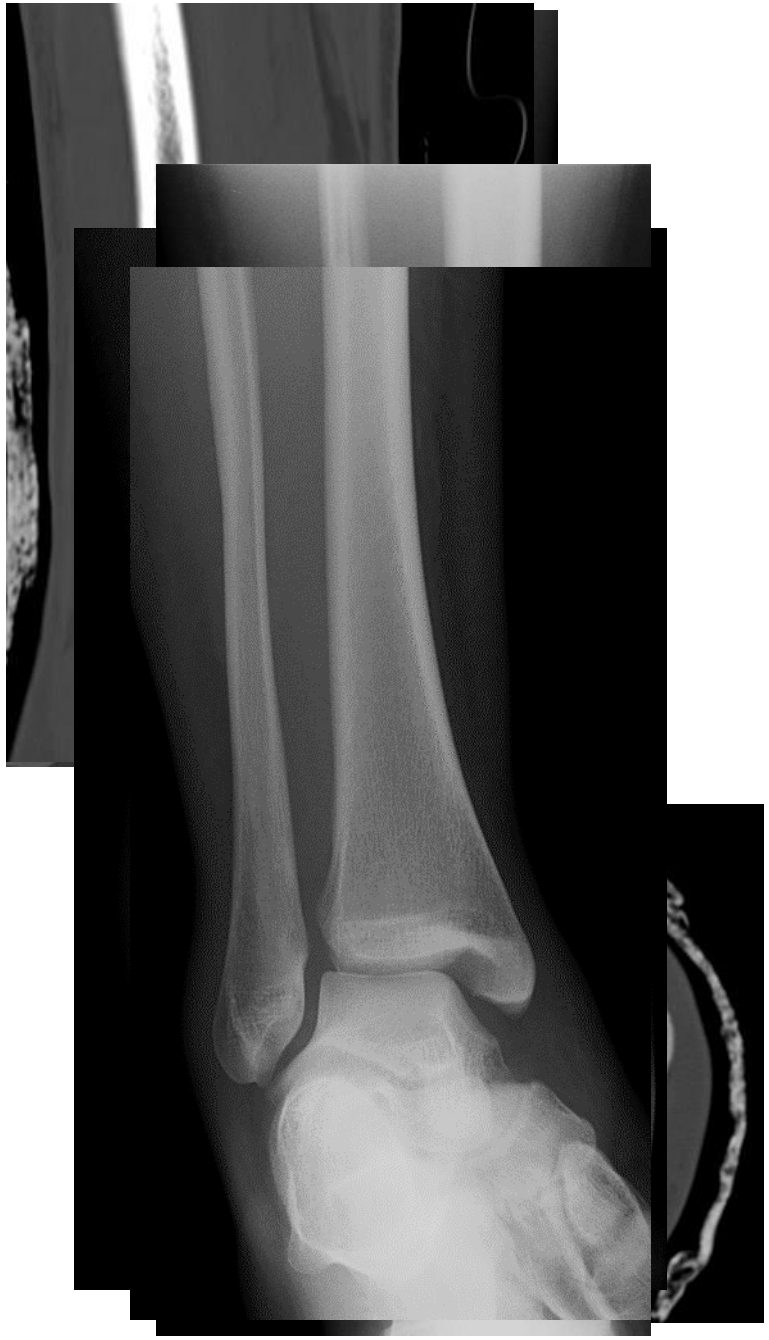
Syndesmotic injury

- **Intraop stress view MANDATORY**
- hook test :directly pulling the fibula laterally with a hook or a reduction clamp



Syndesmotic Injury

- Signs of Syndesmotic Injury
  - Positive Squeeze Test
  - **Posterior Malleolar Fracture**
  - Wide Medial Clear Space
    - Without any obvious Fractures
    - **Need Tib/Fib Xray**
  - **Proximal Fibular Fracture**
  - **Medial clear space widening with ER stress test**
- Radiographically
  - Wide Tib/Fib Clear Space >6mm
  - Lack of Overlap of the Tibia and Fibula on Mortise

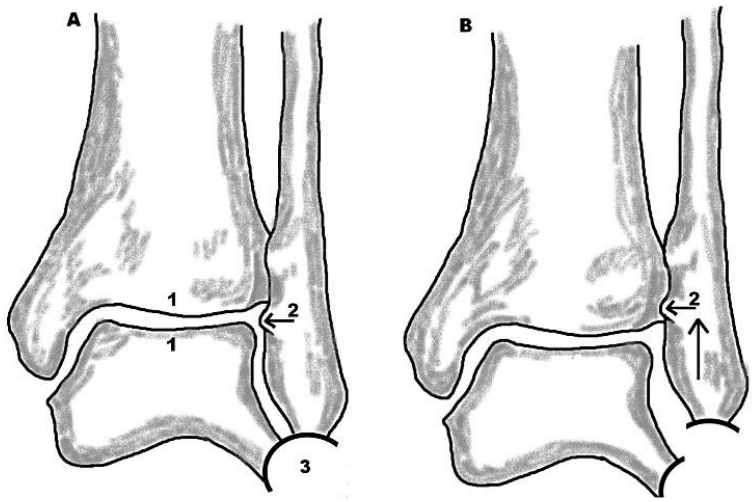


Syndesmotic Fixation

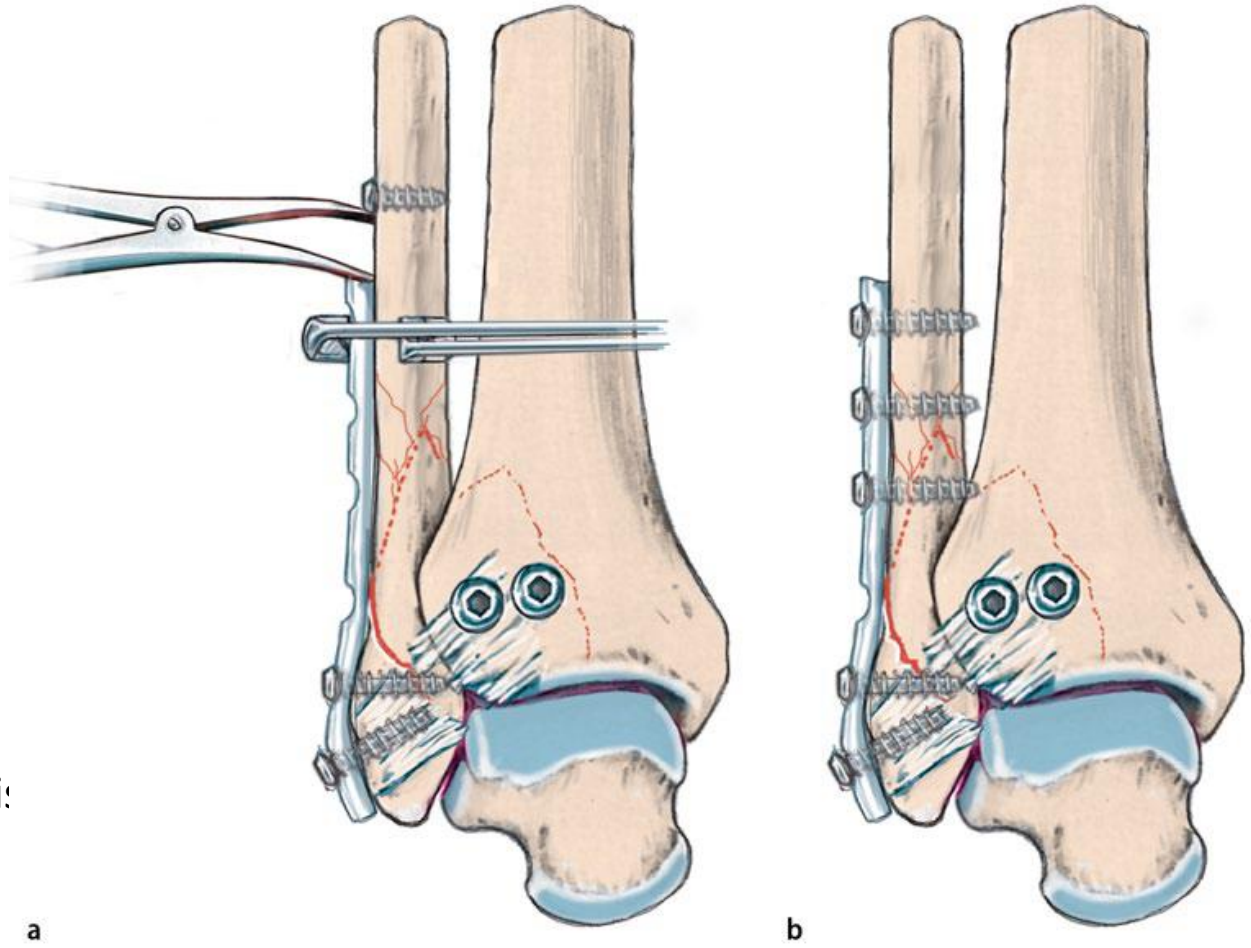
- **Intraop stress view MANDATORY**
  - **External Rotation Stress**
- Cotton : applying a lateral force to the heel to displace the fibula laterally
- hook test :directly pulling the fibula laterally with a hook or a reduction clamp

- Treatment
  - **Open Reduction and Internal Fixation**
    - Decreases rate of malunion compared to percutaneous treatment
  - Placement of Syndesmotic Screw
    - Size, Number, and Cortices are not clinically relevant

Fibular length



The criteria for normal fibular length as seen on the mortis
view:



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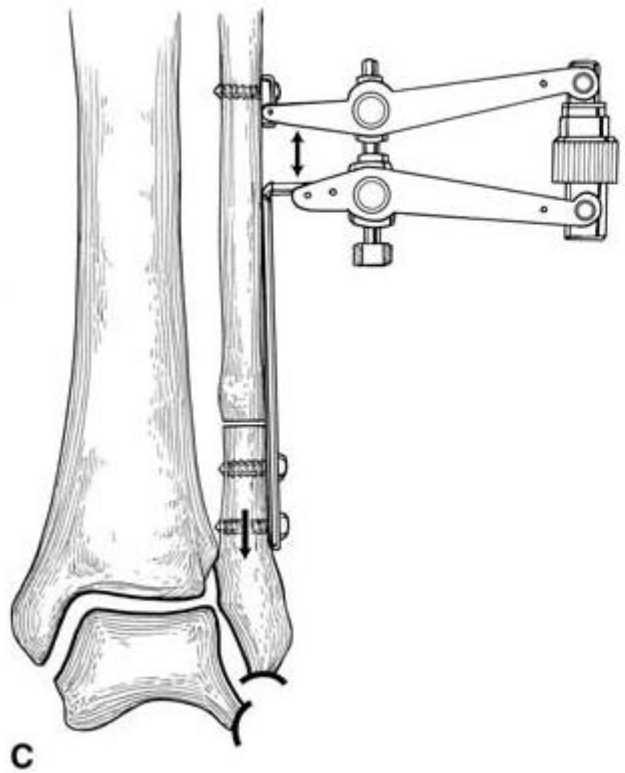
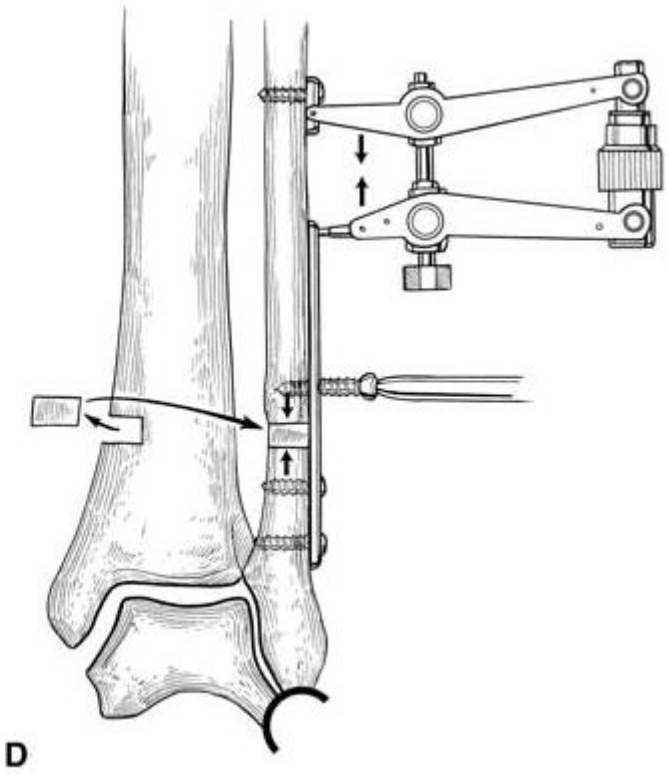




*J Am Acad Orthop Surg 2009;17:*230-220

Take-home messages:

- Always target normal anatomy
- Timing = soft tissue condition ; **Span Scan & Plan**
- Plan your surgery according to injury type & extent
- If inadequate fixation , revise early , don’t wait for arthrosis.

PILON FRACTURES

Learning objectives

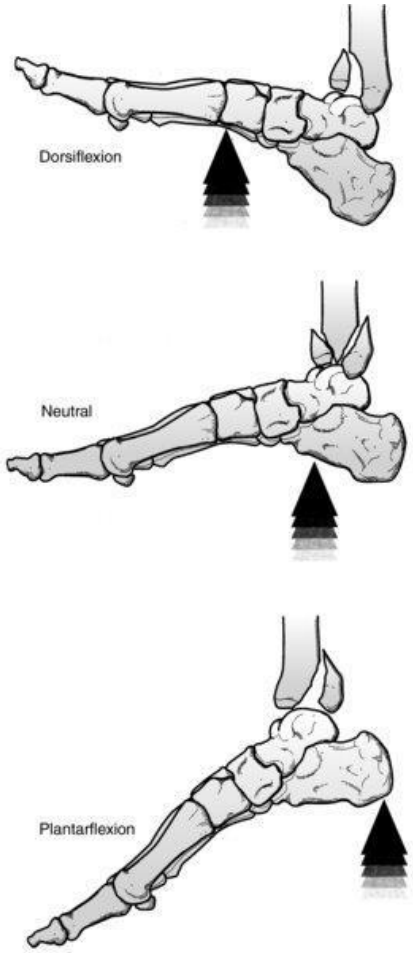
- Specify the goals and principles of pilon fracture management
- Describe the initial assessment of pilon fractures
- Outline the classification of pilon fractures and the implications for treatment
- Discuss Selection of surgical approach in pilon fractures
- Outline the definitive management of soft tissues and the fracture

- The term “pilon” is from the French language and refers to a pestle,
- “plafond” fracture

Spectrum of injuries

≠

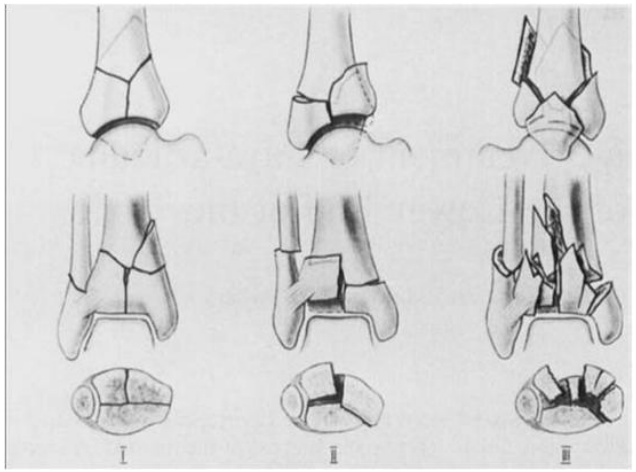
The position of the foot at the time of axial load determines which portion of the tibial plafond sustains the major impact of the talus.



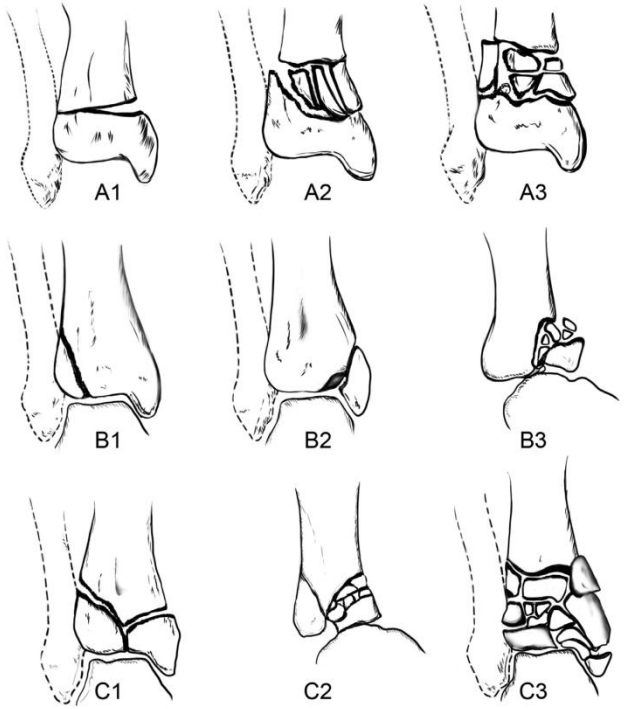
Classification Systems

Ruedi/Allgower classification

I II III



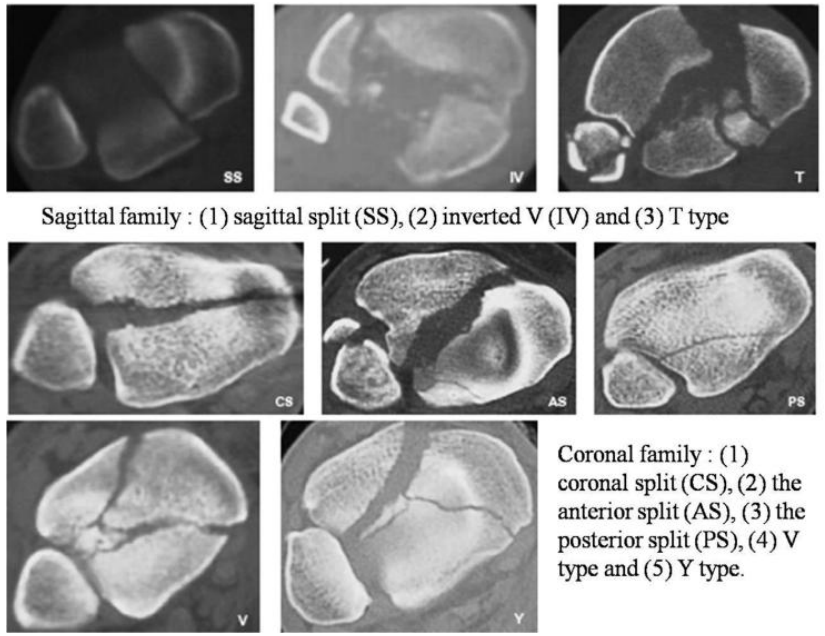
AO/OTA Fracture classification 43 (distal tibia)



X-ray based

Classification

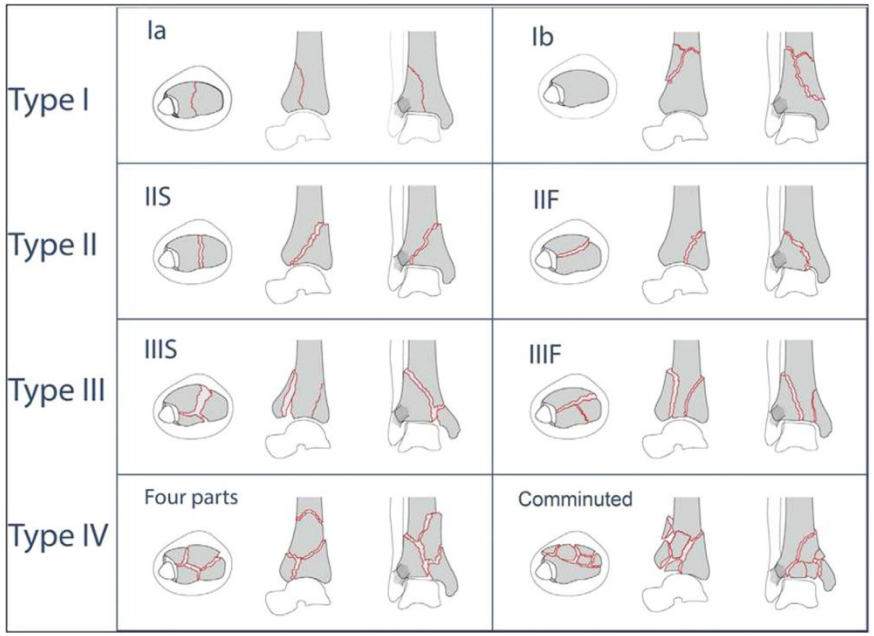
Topliss classification



Sagittal family : (1) sagittal split (SS), (2) inverted V (IV) and (3) T type

Coronal family : (1) coronal split (CS), (2) the anterior split (AS), (3) the posterior split (PS), (4) V type and (5) Y type.

Leonetti classification



type I, nondisplaced
type II,displaced 2-part fractures
type III, displaced 3-part fractures
type IV, displaced 4-part or

Assessment & management

physiologic status of the patient .

- (ATLS)
- Systemic injuries occur in 27%-51% of patients

- Soft Tissue Injury

1. NV Status
2. Compartment Syndrome Risk
3. swelling/blistering/skin tenting

Closed Reduction & Splintage

:

Improve Vascular Flow

Realign the Limb

Take Pressure off Soft Tissue

Evolution of Surgical Treatment

- In 1969, Rüedi and Allgower proposed 4 classic tenets in open treatment of pilon fractures
  - not reproducible
- A Staged Protocol for Soft Tissue Management. In 1999, Sirkin et al .

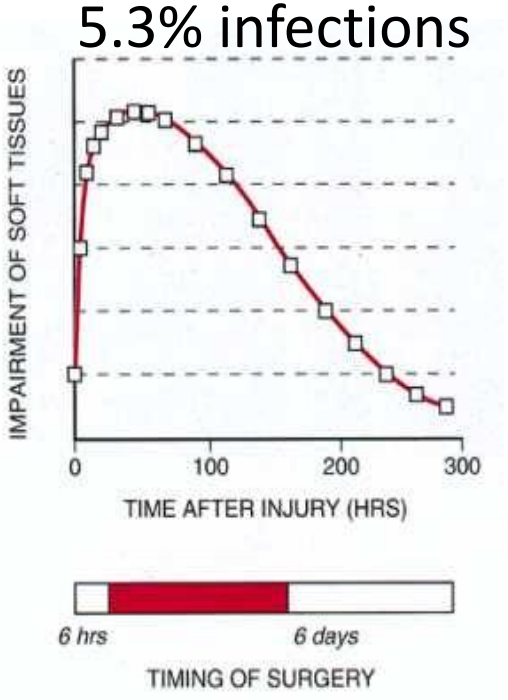
Treatment options

- Plaster immobilization
- Ankle-spanning external fixator
- Articulated external fixator
- Limited internal with external fixator
- Hybrid ring/small wire external fixator
- ***Open reduction and internal fixation (ORIF)***

Staged protocol for ORIF

- **Patterson et al, 1999**
- 22 C3 pilon fractures
- Average 24 days to ORIF
- No infections

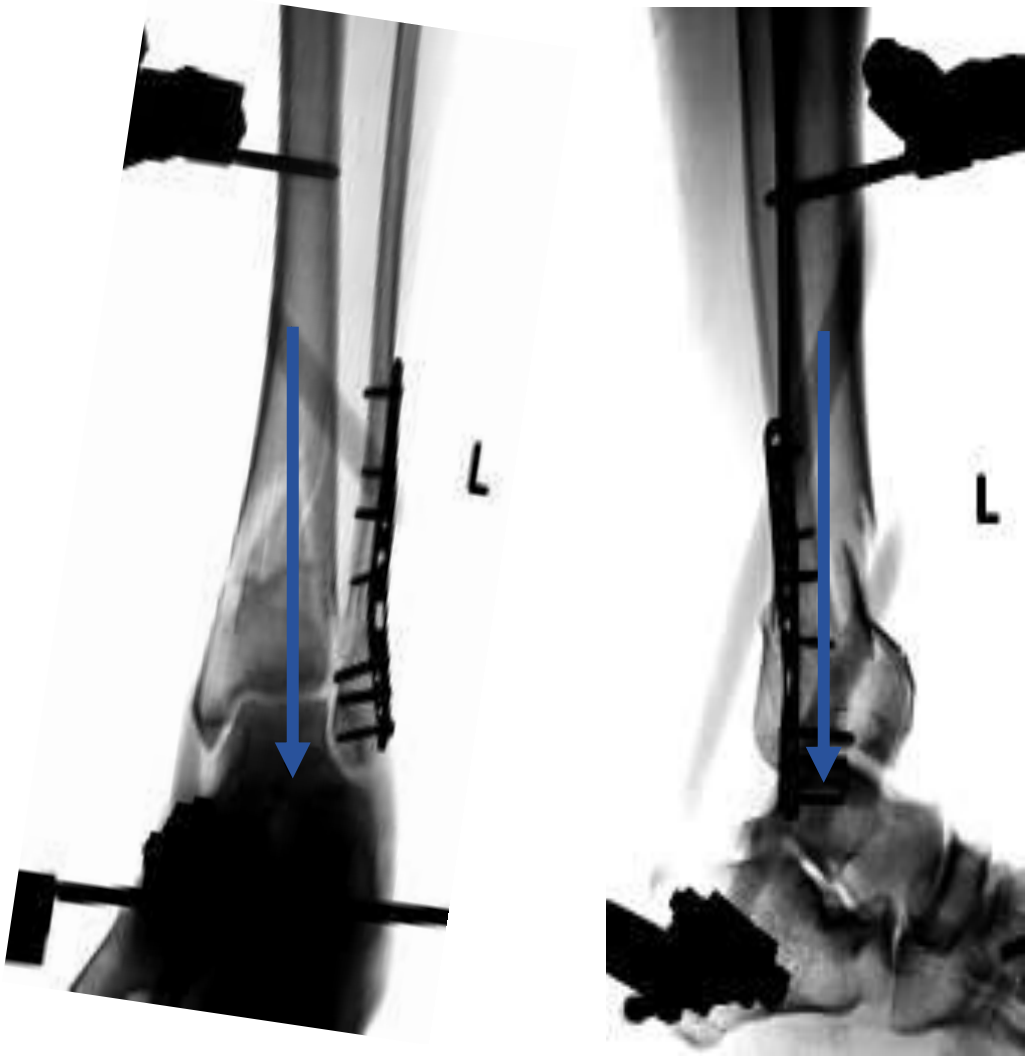
- **Sirkin et al, 1999**
- 56 pilon fractures
- Average 14 days to ORIF
- 5.3% infections



1st stage
Reduction with External Fixation

Goals:
Stabilize the Soft Tissue Envelope
Realign the Talus

Talus centered



Common 1st Stage Errors

Plate overlapping ex-fix pin sites

NIH Public Access
Author Manuscript
J Orthop Trauma. Author manuscript; available in PMC 2015 September 01.

Published in final edited form as:
J Orthop Trauma. 2014 September ; 28(9): 518–522. doi:10.1097/BOT.0000000000000077.

Definitive plates overlapping provisional external fixator pin sites: is the infection risk increased?

Chirag M. Shah, M
Brimmo, MD*, Sam

Conclusions—Placement of definitive plate fixation overlapping previous external fixator pin sites significantly increases the risk of deep infection in the two-staged treatment of bicondylar tibial plateau and pilon fractures. Surgeons must make a conscious effort to place external fixator

Injury, Int. J. Care Injured xxx (2018) xxx–xxx

Contents lists available at ScienceDirect

Injury

journal homepage: www.elsevier.com/locate/injury

Does external fixator pin site distance from definitive implant affect infection rate in pilon fractures?
Possible option at the reviewers'/editors' discretion: 'Deep infection in pilon fractures: analysis of external fixator pin site distance from definitive implant and other risk factors'

Michael M. Hadeed*, Cody J. Evans, Brian C. Werner, Wendy M. Novicoff, David B. Weiss

fractures. There are many variables to consider when placing an external fixator construct. In this cohort, pin site distance from definitive implant location was not associated with an increase in deep infections.
Level of evidence: Level III.

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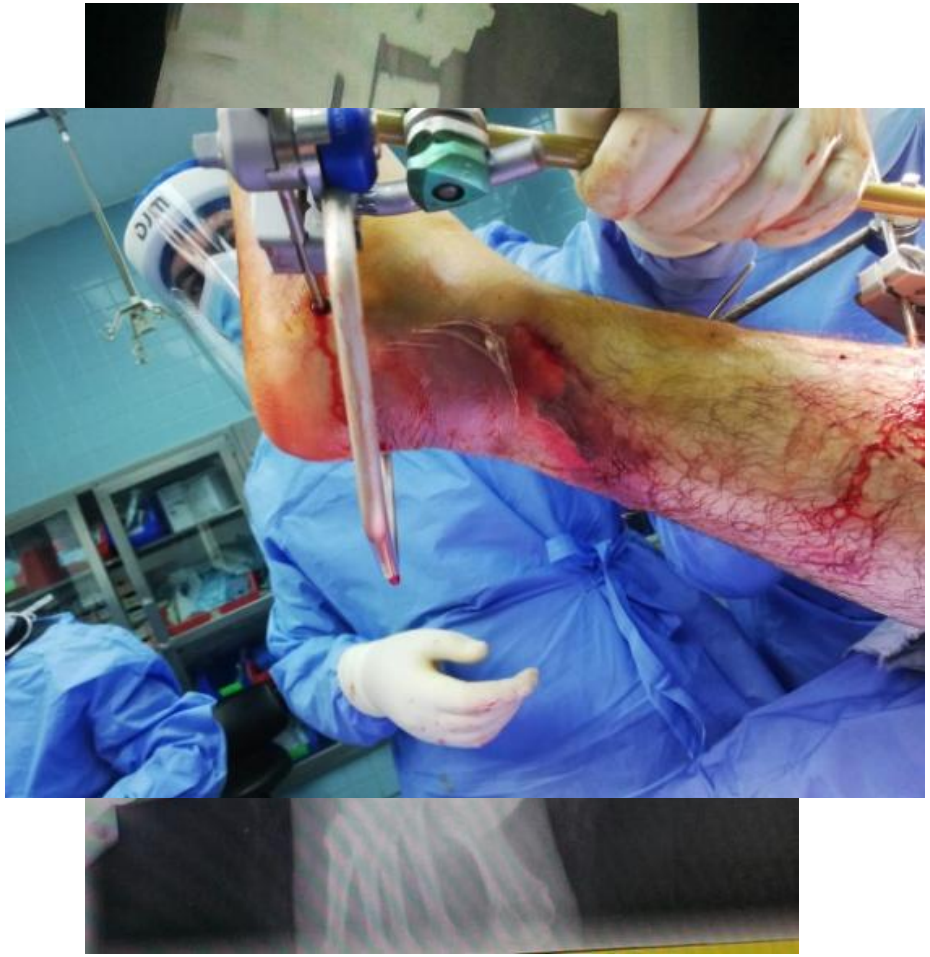
Don’t fail to regain length and alignment

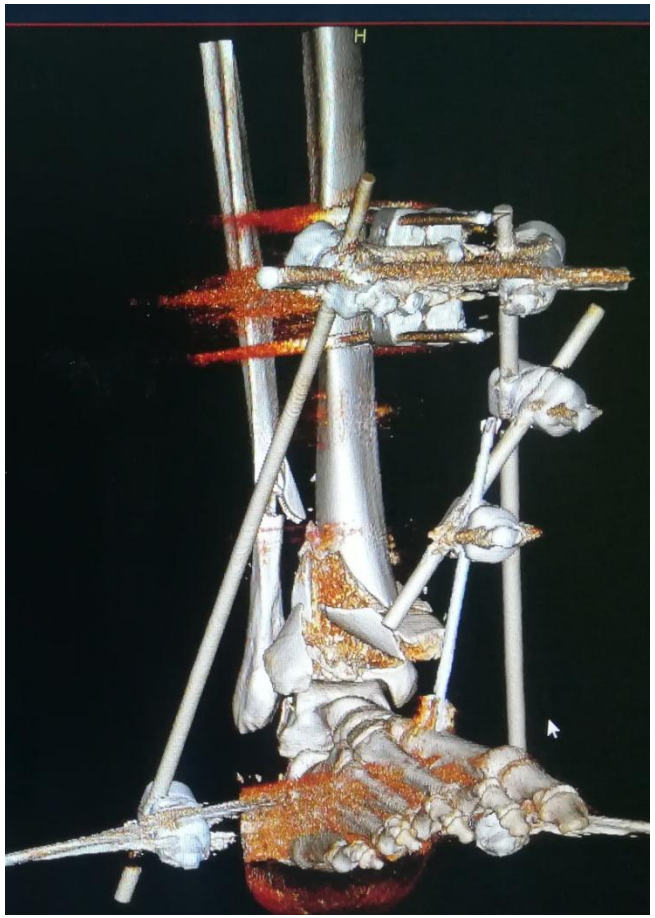
ACUTE FIXATION OF FIBULA

Index surgeon for definitive surgery

Soft tissue progression



Postoperative CT
wait for soft tissue recovery



Preoperative Planning

- Definitive fixation after soft tissue recovery

The basic principles of definitive treatment

1. Articular reduction and stabilisation.
2. Restoration of alignment by reduction in the reconstructed articular block to the diaphysis.
3. Management of bone loss
4. soft tissue envelope
5. Early motion

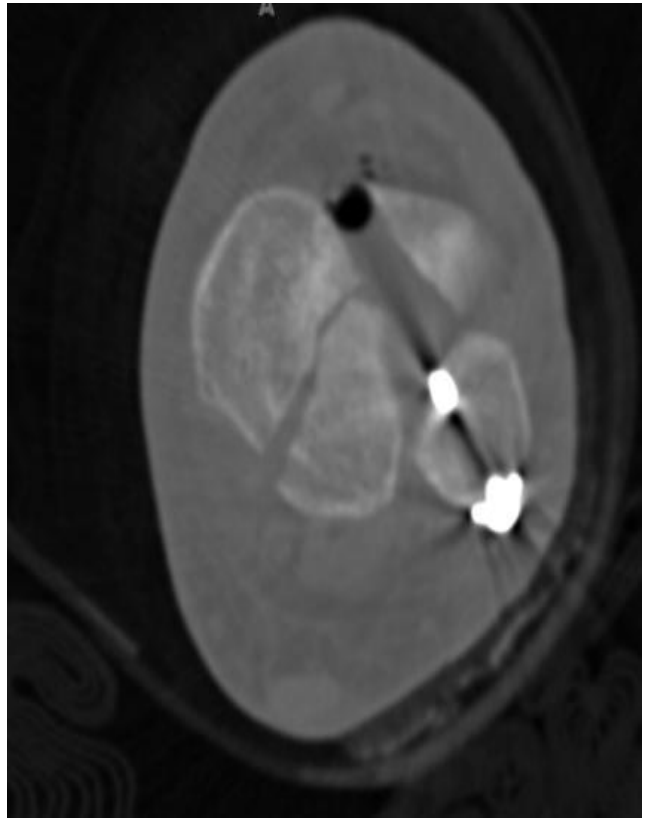
Tension

Compression

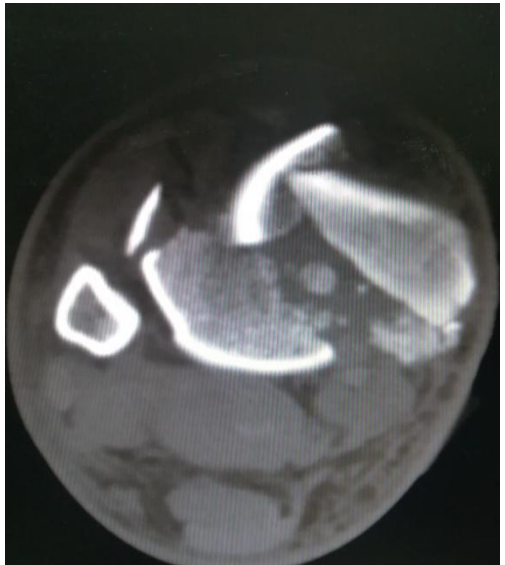
Intact

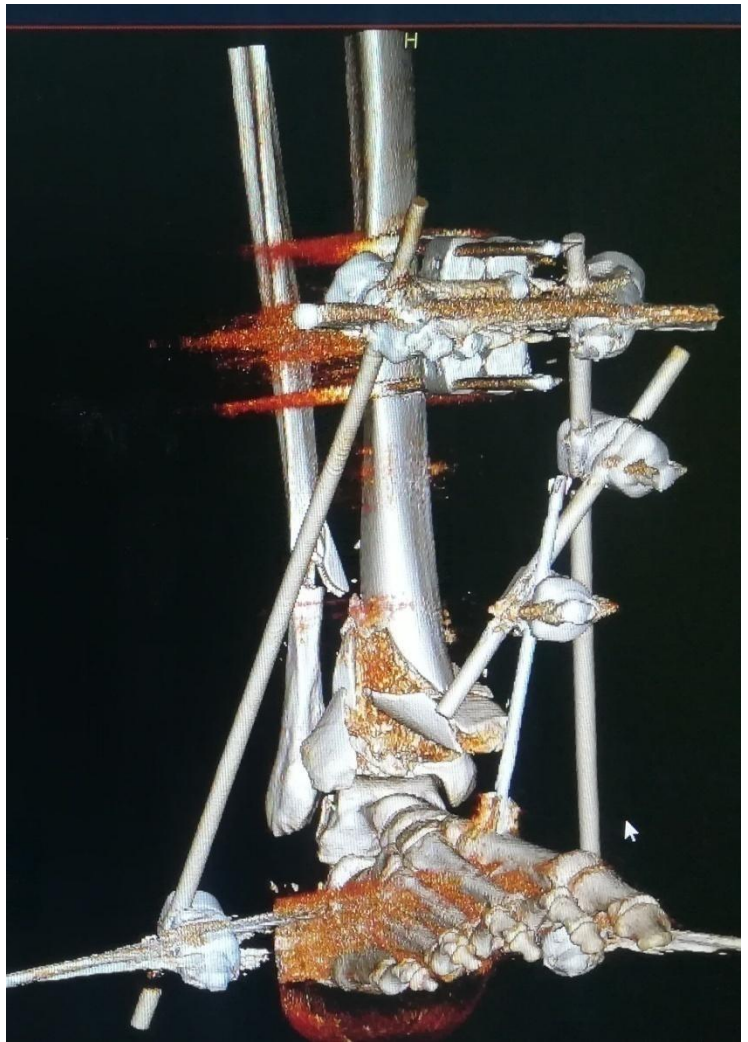
Beware

Metadiaph



- Often the metadiaphysis can be reduced first
- This large metadiaphyseal spike may help determine surgical approach as well

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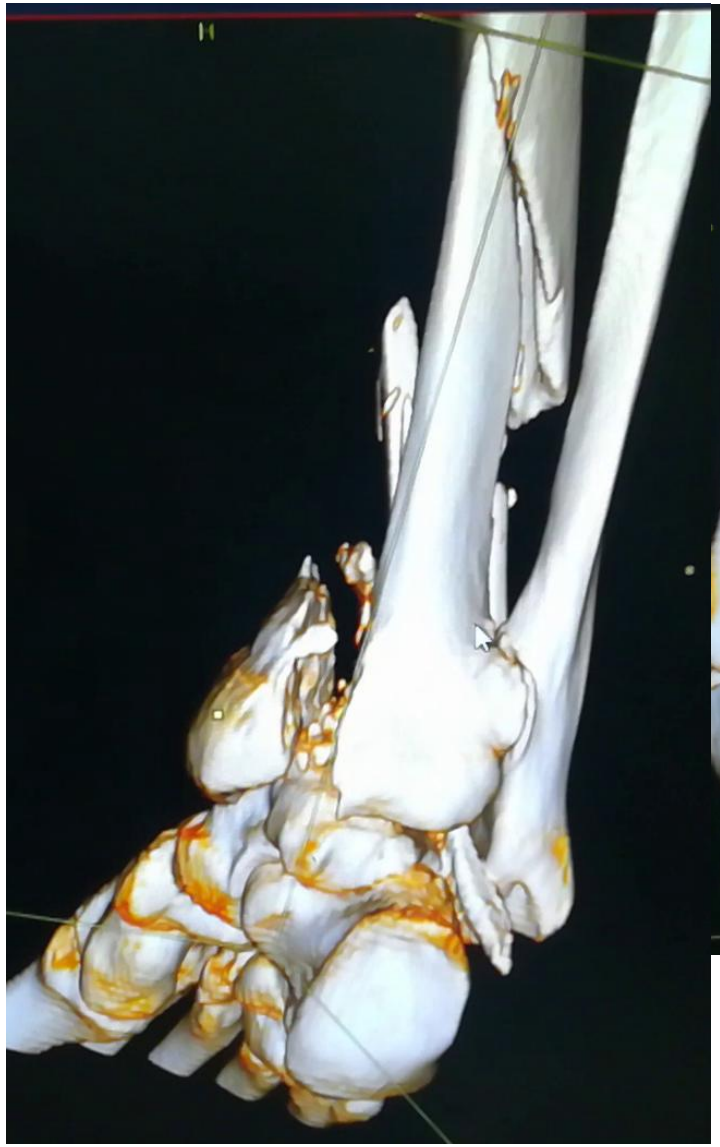
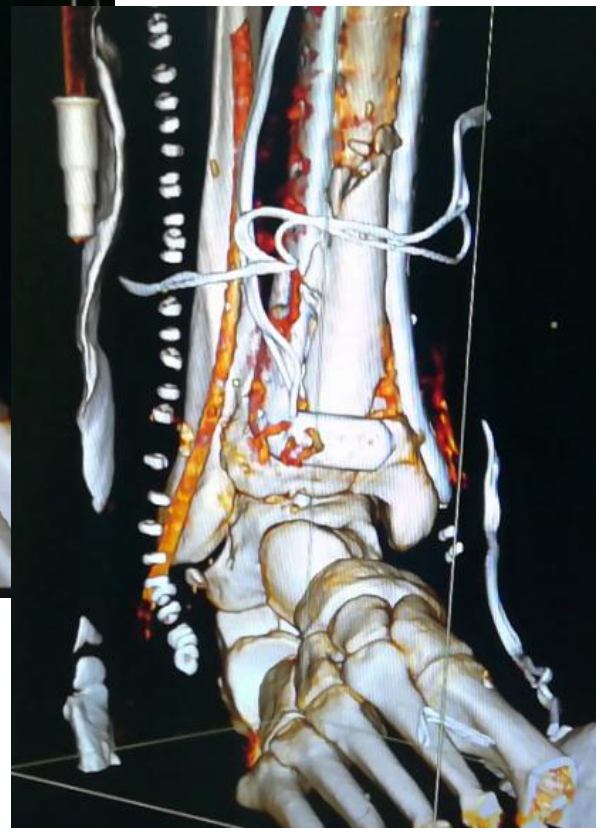
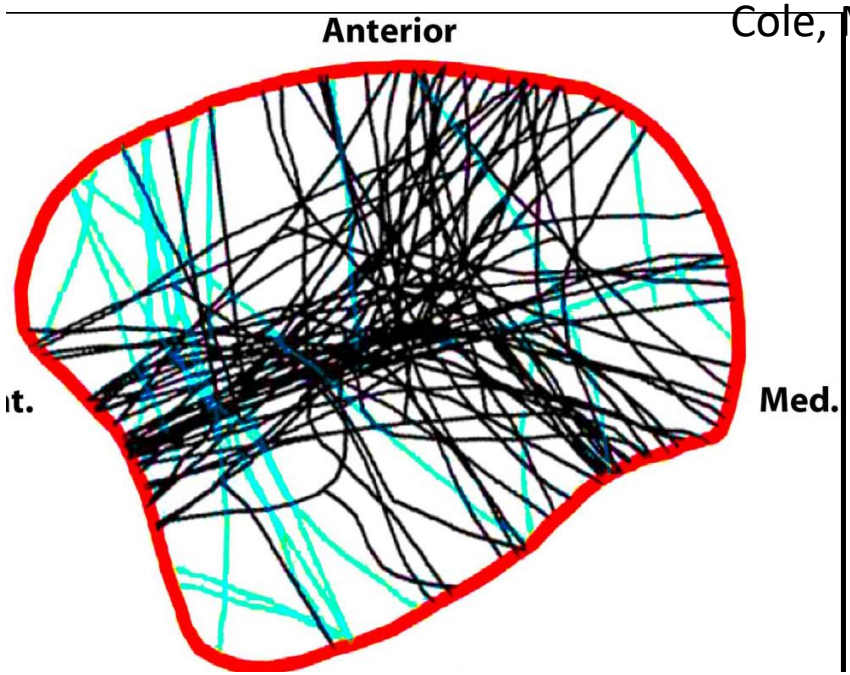
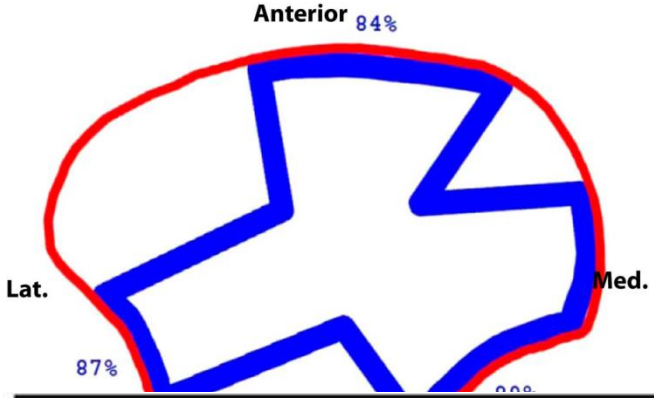
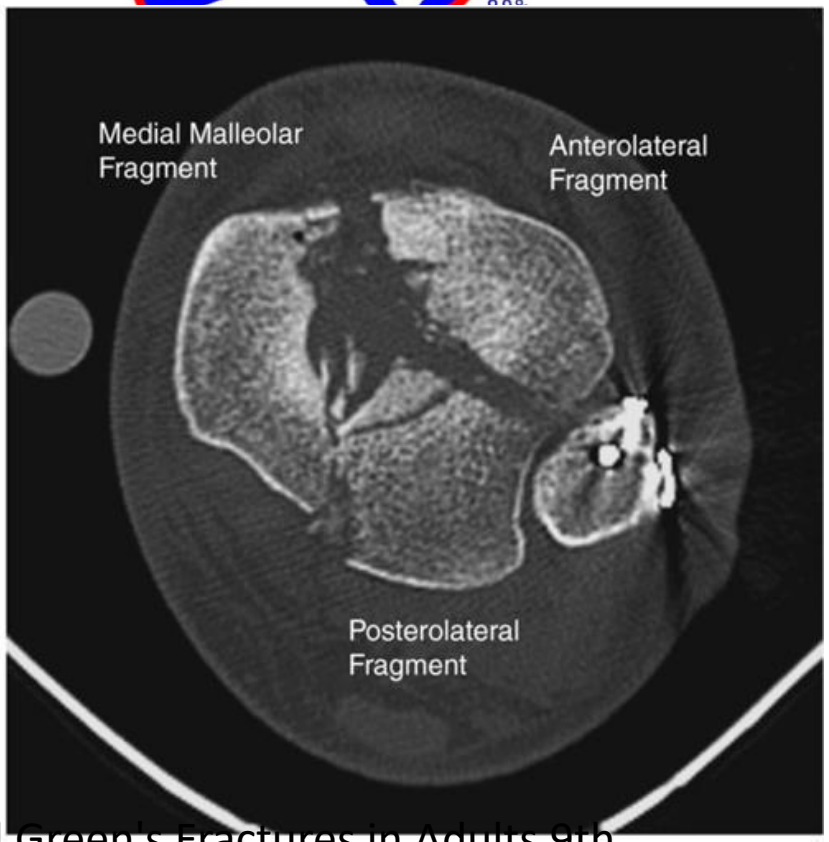




Cole, Mehrle et al JOT 2013







Rockwood and Green's Fractures in Adults 9th Edition

Surgical Approaches

STATE OF THE ART

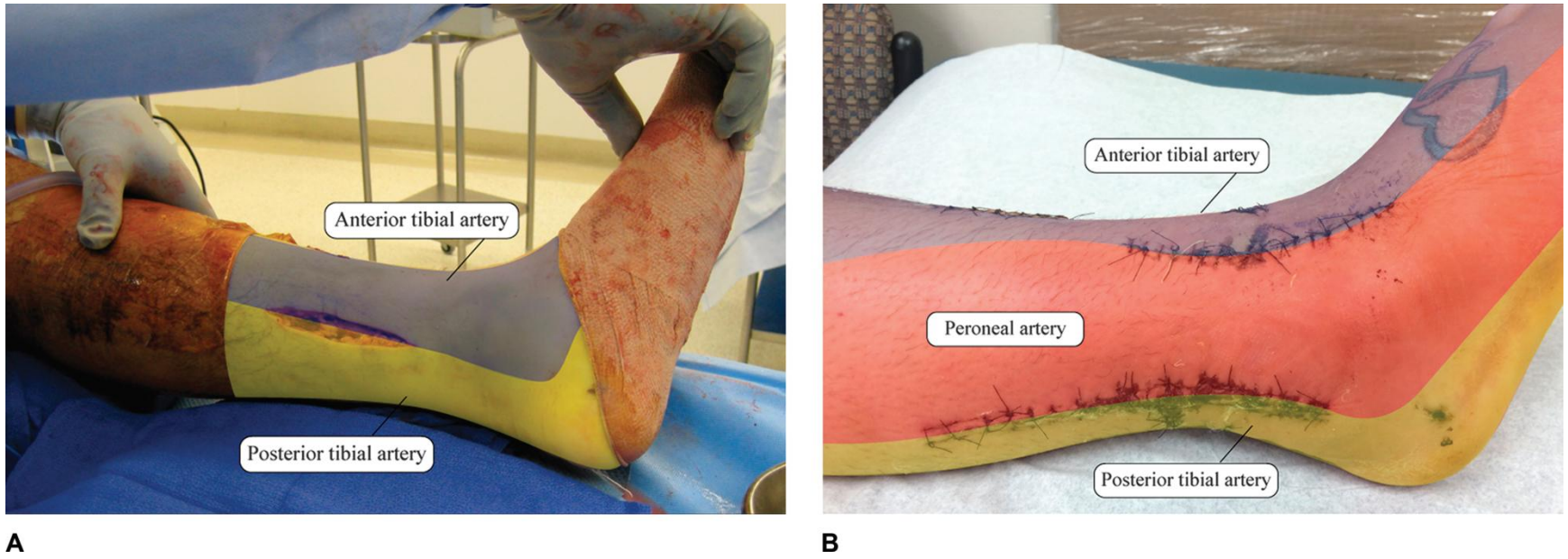
Strategies for Surgical Approaches in Open Reduction Internal Fixation of Pilon Fractures

Mathieu Assal, MD,† Adrien Ray, MD,‡ and Richard Stern, MD**

- Surgical approach should be determined by fracture pattern, soft tissue injury, as well as knowledge of local anatomy.
- The surgical approach (or approaches) should allow for direct reduction of both the articular surface and any proximal cortical extensions. T

Angiosomes

anatomic unit describing the skin and muscle supplied by a source artery



Stephen A. Kottmeier, MD, et al

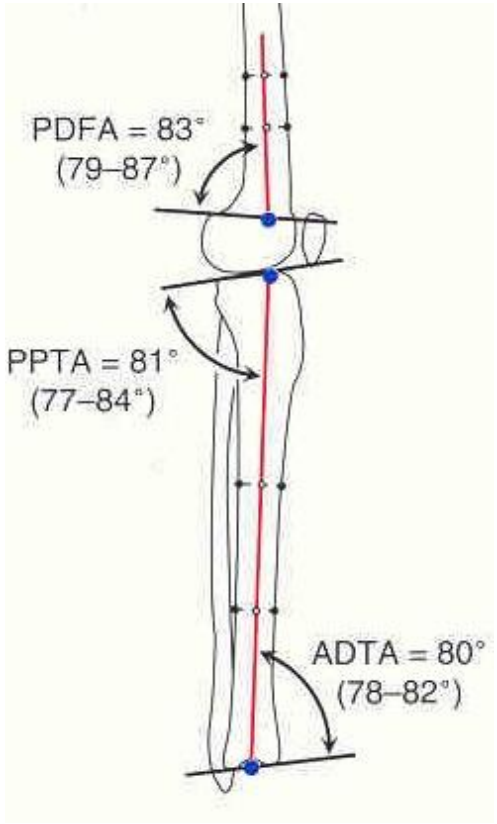
Intraoperative photographs showing the medial (A) and lateral (B) aspects of the lower leg in two different patients, with the three angiosomes roughly delineated. Posteromedial (A) and anterolateral and posterolateral (B) approaches were performed between the angiosomes, thereby limiting risk to the resultant skin

Vascular Abnormalities as Assessed with CT Angiography in High-Energy Tibial Plafond Fractures

George F. LeBus, BA and Cory Collinge, MD†*

Conclusions: In more than half of high-energy tibial plafond fractures, CTA identified significant abnormalities to the arterial tree of the distal leg. These injuries most commonly involved the anterior tibial artery and included a variety of lesions. CTA appears to be a safe and potentially useful tool for the assessment and preoperative planning of high-energy tibial plafond fractures.

Surgical Approaches



Surgical Approaches

- Anteromedial

  between tibial crest and tibialis anterior tendon sheath. Do not violate the tendon sheath.

Advantages:

- Excellent Joint Visualization
- Extensile Proximally

Risks:

- Higher incision complication rate
- Saphenous nerve/vein

Anterolateral

-Protect superficial peroneal nerve

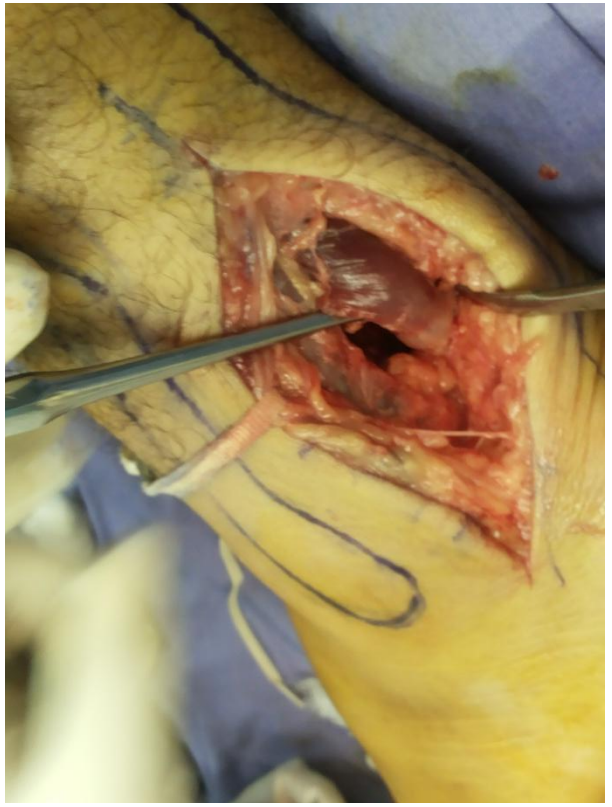
-Anterior compartment retracted medially to expose the distal tibia.

Soft Tissue Friendly

- Difficult to access medial
- Superficial peroneal nerve
- Poor proximal extension

Posterolateral

Elevation of FHL muscle belly allows access to posterior distal tibia

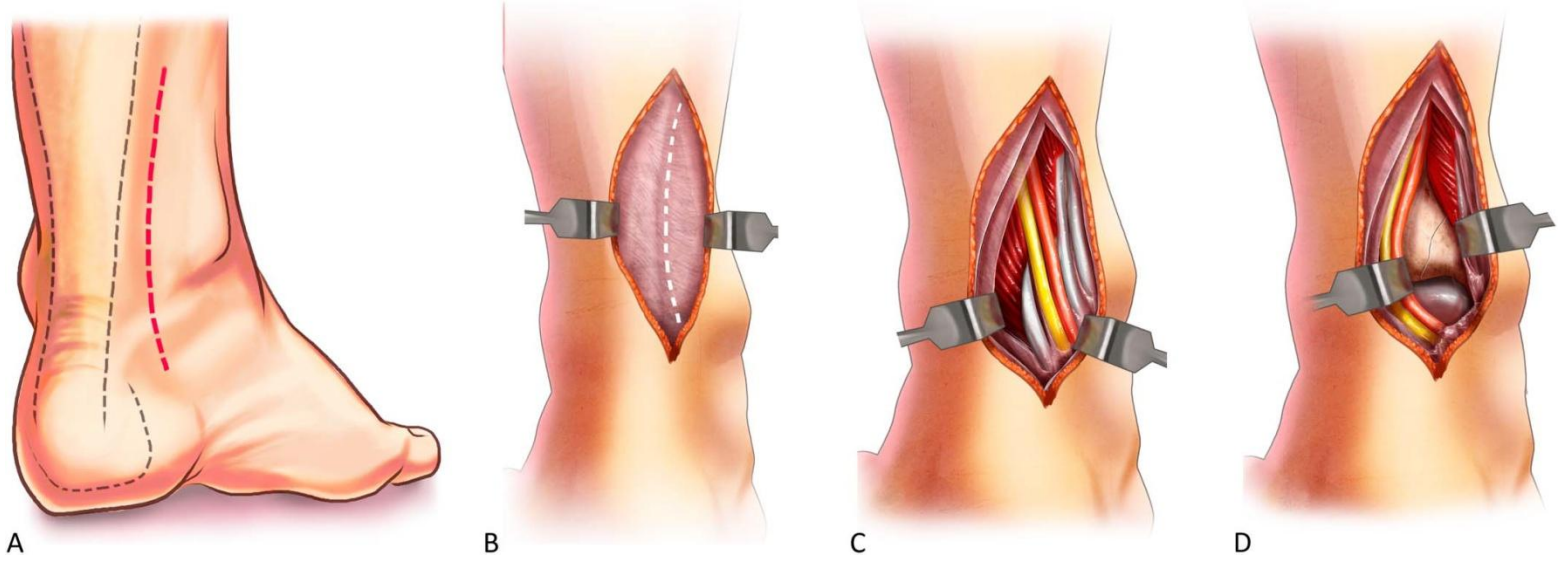


Deep interval →FHL and peroneals

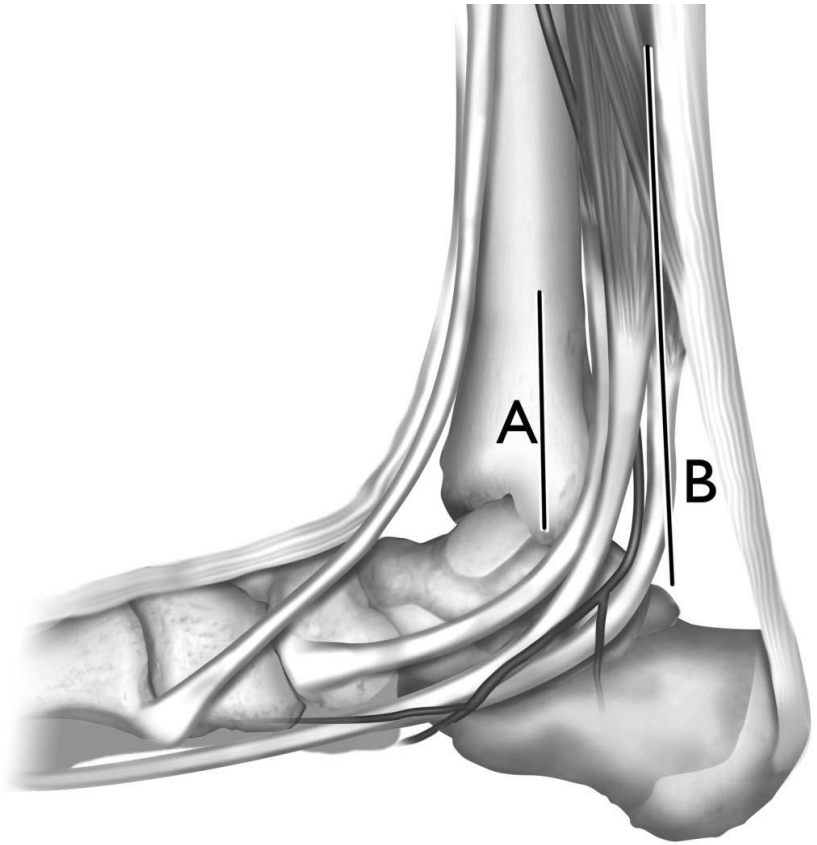
does not allow articular visualization.

Posteromedial

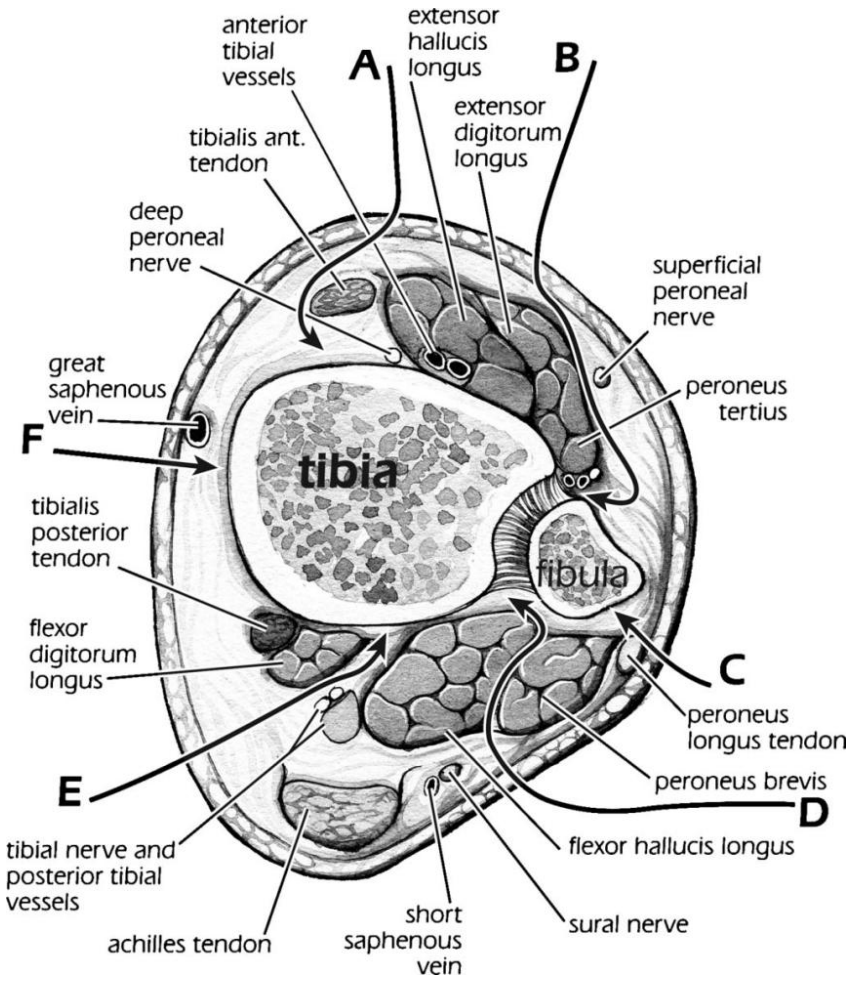
- Skin incision between Achilles and posteromedial border of tibia.
- Intervals between the posterior tibial tendon, FDC, and FHL can be used to access the posteromedial distal tibia.



Mathieu Assal et al J Orthop Trauma 2015;29:69–79

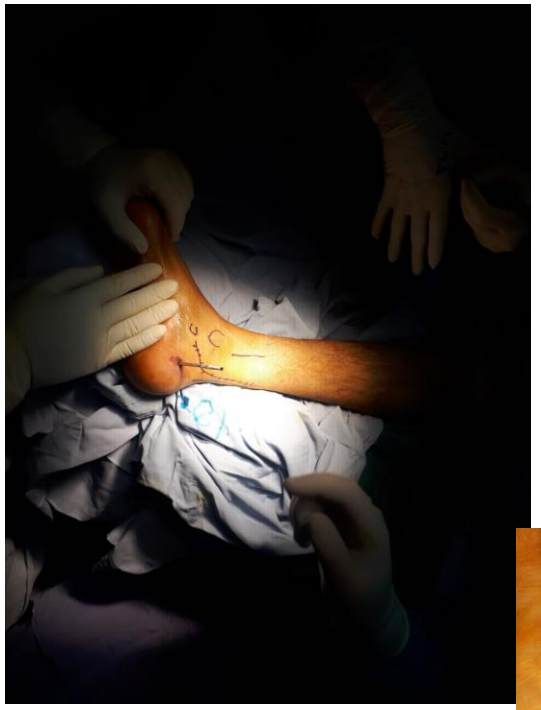


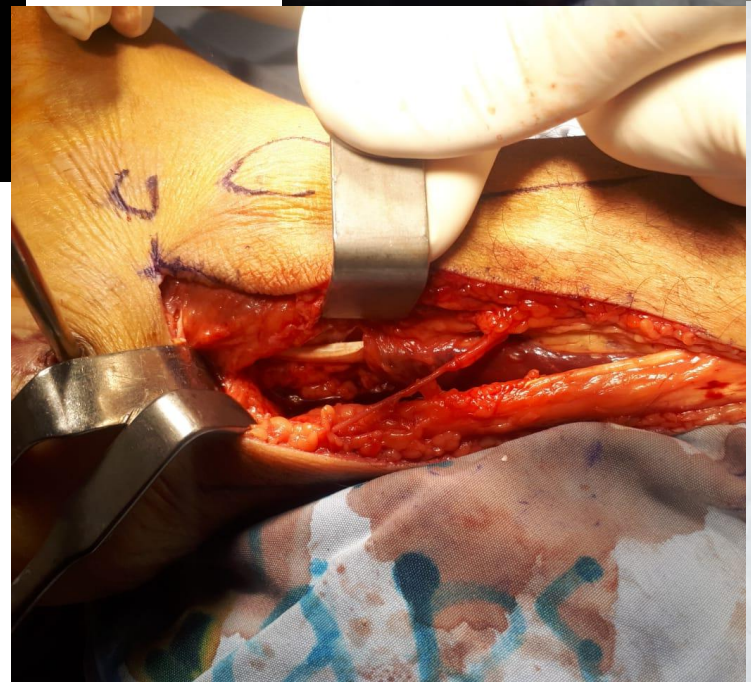
James L. et al J Orthop Trauma 2008;22:299–306



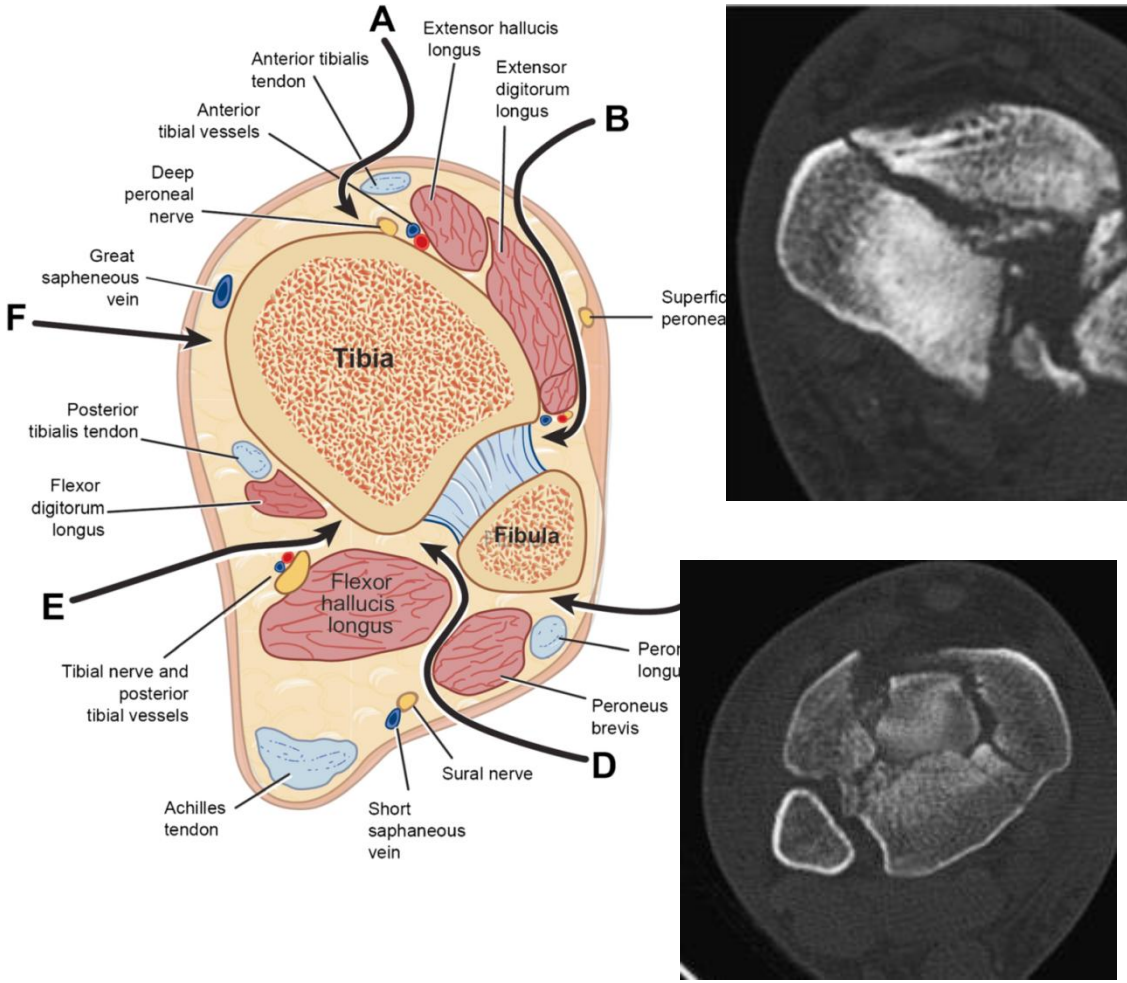
James L. et al J Orthop Trauma 2008;22:299–306

Supine or prone





Selection of appropriate surgical approaches



Boris A. Zelle et al International Orthopaedics (SICOT) (2019) 43:1939–1950

Open pilon

ORIGINAL ARTICLE

Treatment Protocol for Open AO/OTA Type C3 Pilon Fractures With Segmental Bone Loss

Michael J. Gardner, MD, Samir Mehta, MD,† David P. Barei, MD,* and Sean E. Nork, MD**

Conclusions: Limb salvage in the most severe open pilon fractures is difficult. In patients with benign soft tissues at several weeks after temporary external fixation, open reduction, antibiotic bead placement, and a delayed bone grafting procedure are associated with a low complication rate and predictable fracture healing.

Take-home messages

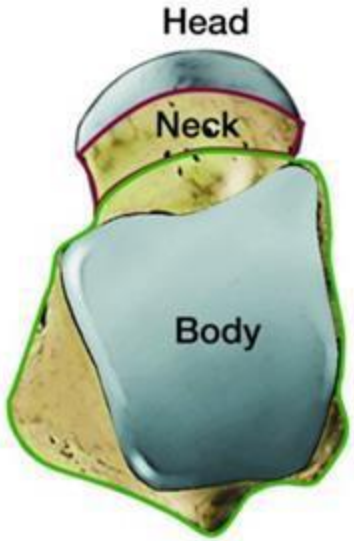
- Pilon fractures continue to be challenging injuries to treat
- Even with proper timing, favorable host factors,and expert surgical technique, restoration of function and avoidance of complications are not always achievable
- patient-specific approach to fixation and soft-tissue coverage.

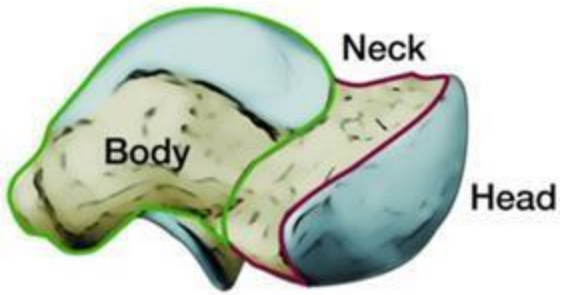
TALUS FRACTURES

objectives

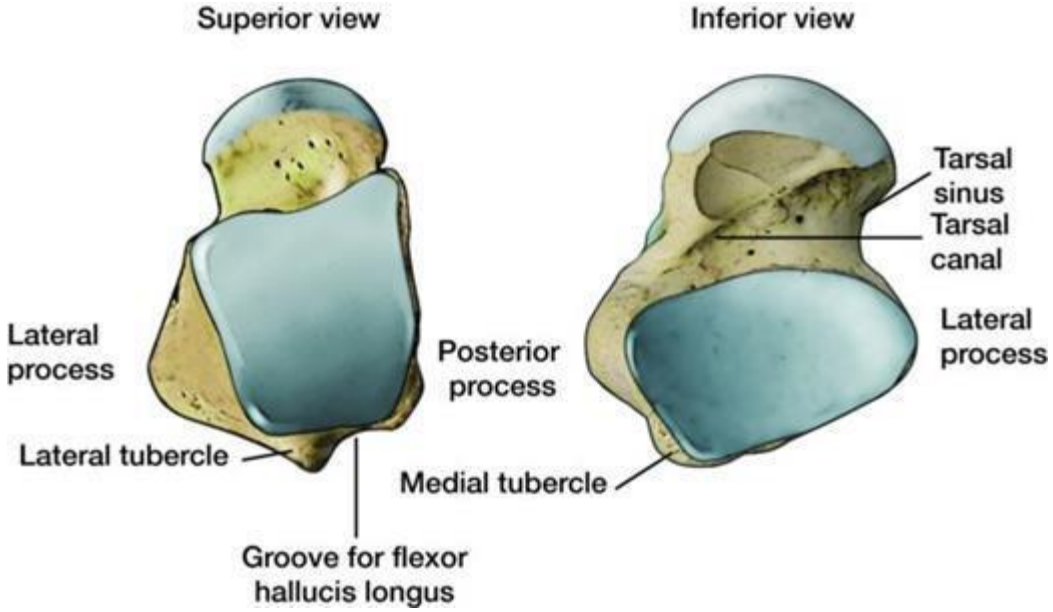
- Review talus anatomy .
- Outline the management of talus fracture and associated injuries .
- Discuss surgical approach and Fixation methods.
- complications

anatomy



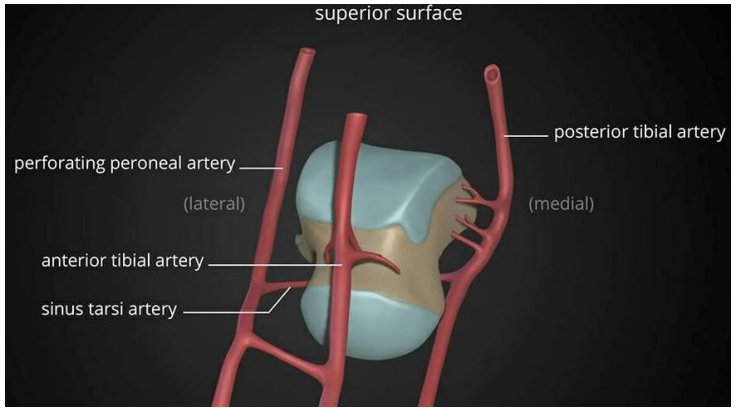


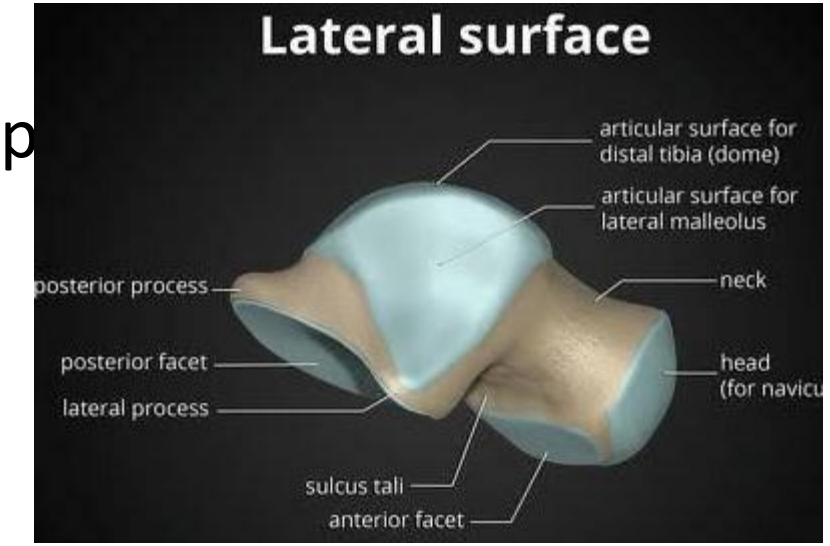
‘bony meniscus

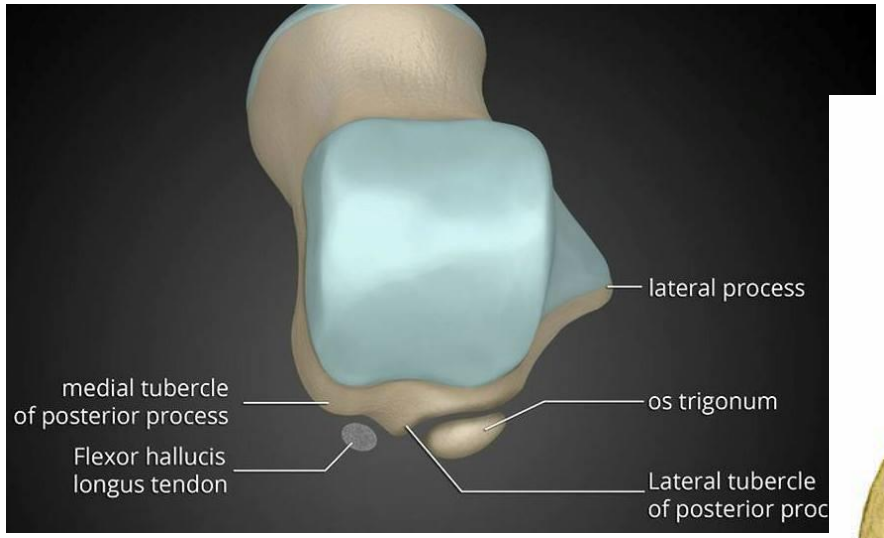


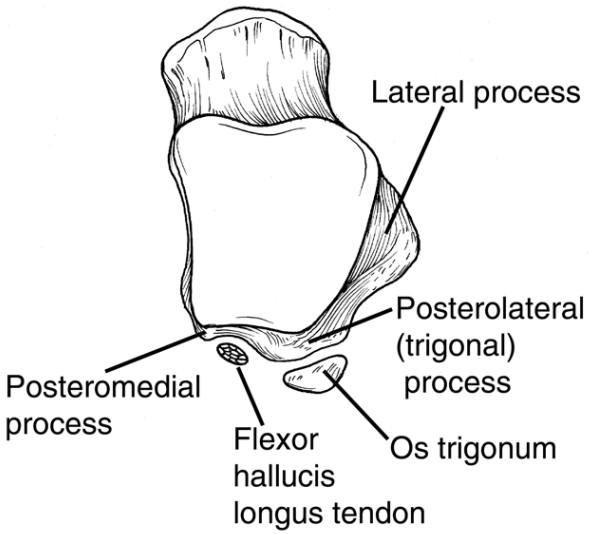
Anatomy

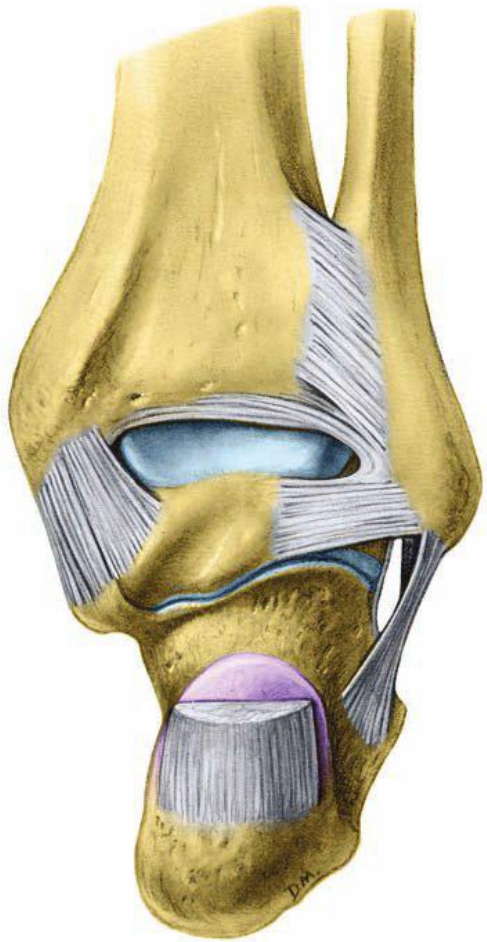
- 60% covered by articular cartilage
  - Tibiotalar (ankle) joint
  - Subtalar joint
  - Talonavicular joint
- No tendon attachments
- Limited area for vascular supp

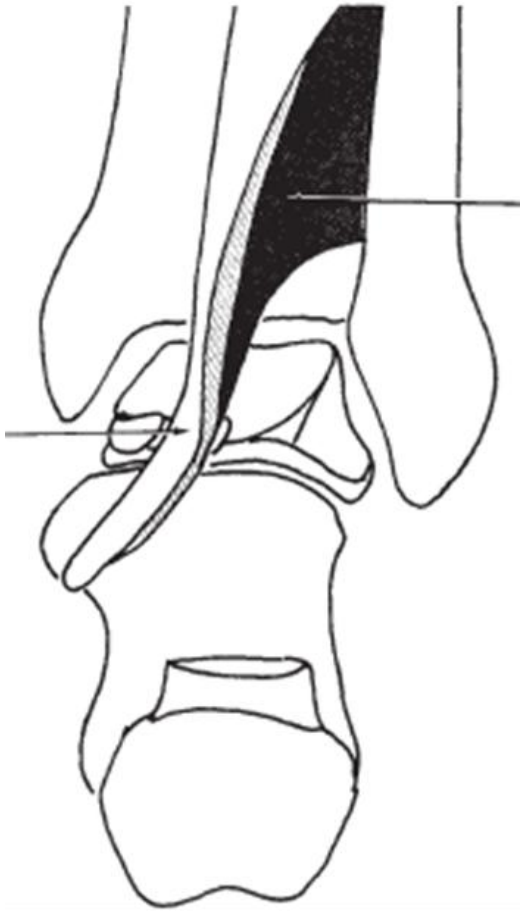




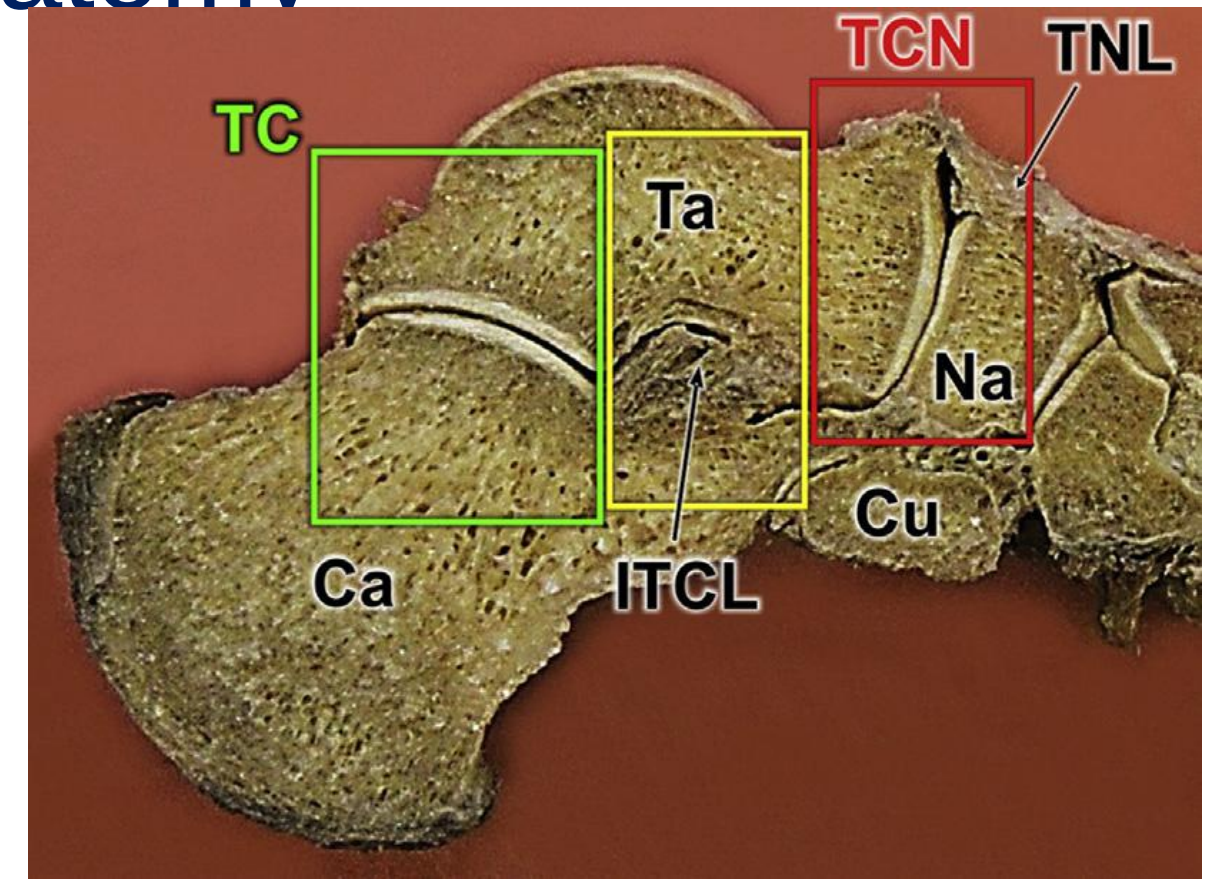

lateral process
medial tubercle
of posterior process
os trigonum
Flexor hallucis
longus tendon
Lateral tubercle
of posterior proc


Lateral process
Posterolateral
(trigonal)
process
Posteromedial
process
Flexor
hallucis
longus tendon
Os trigonum



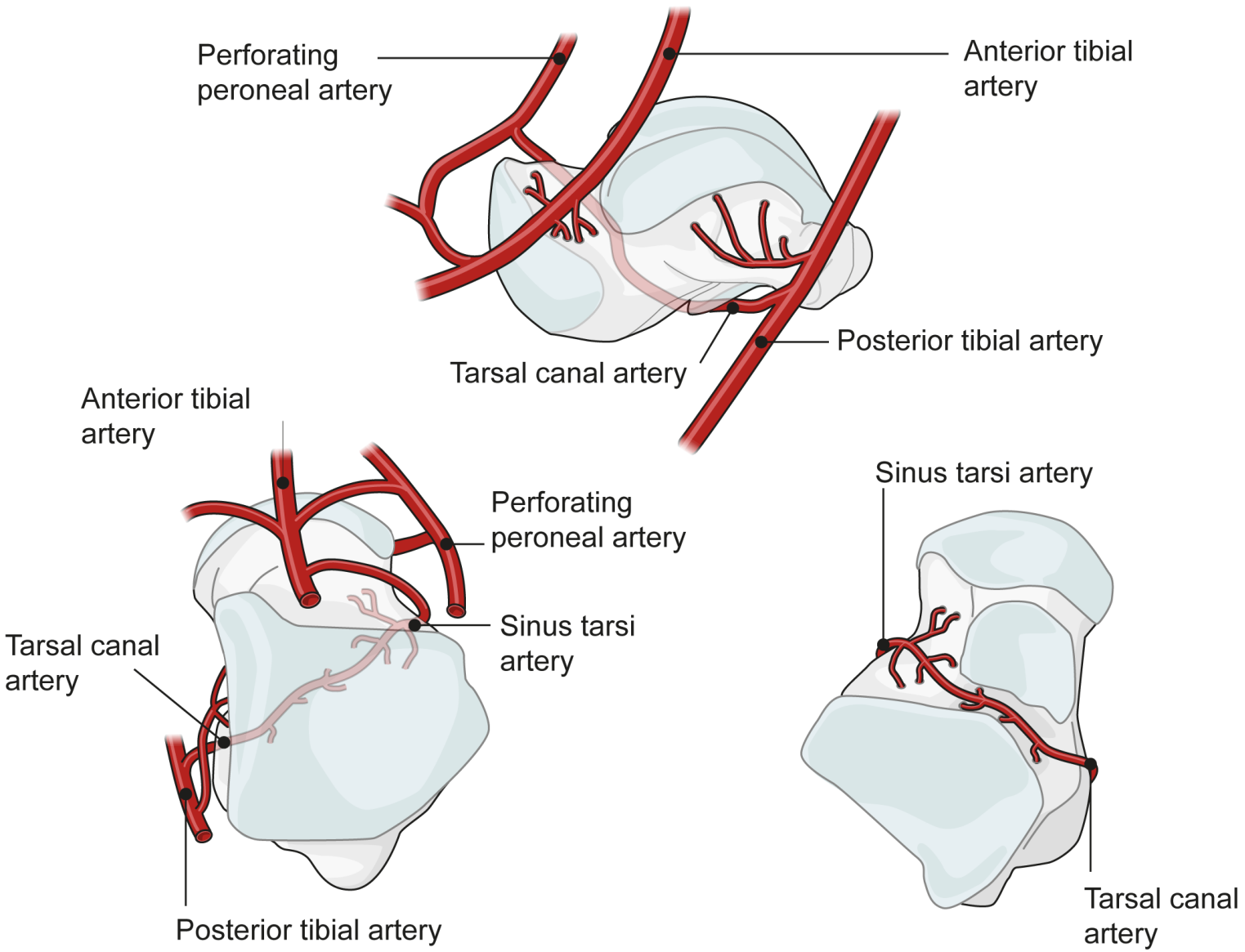


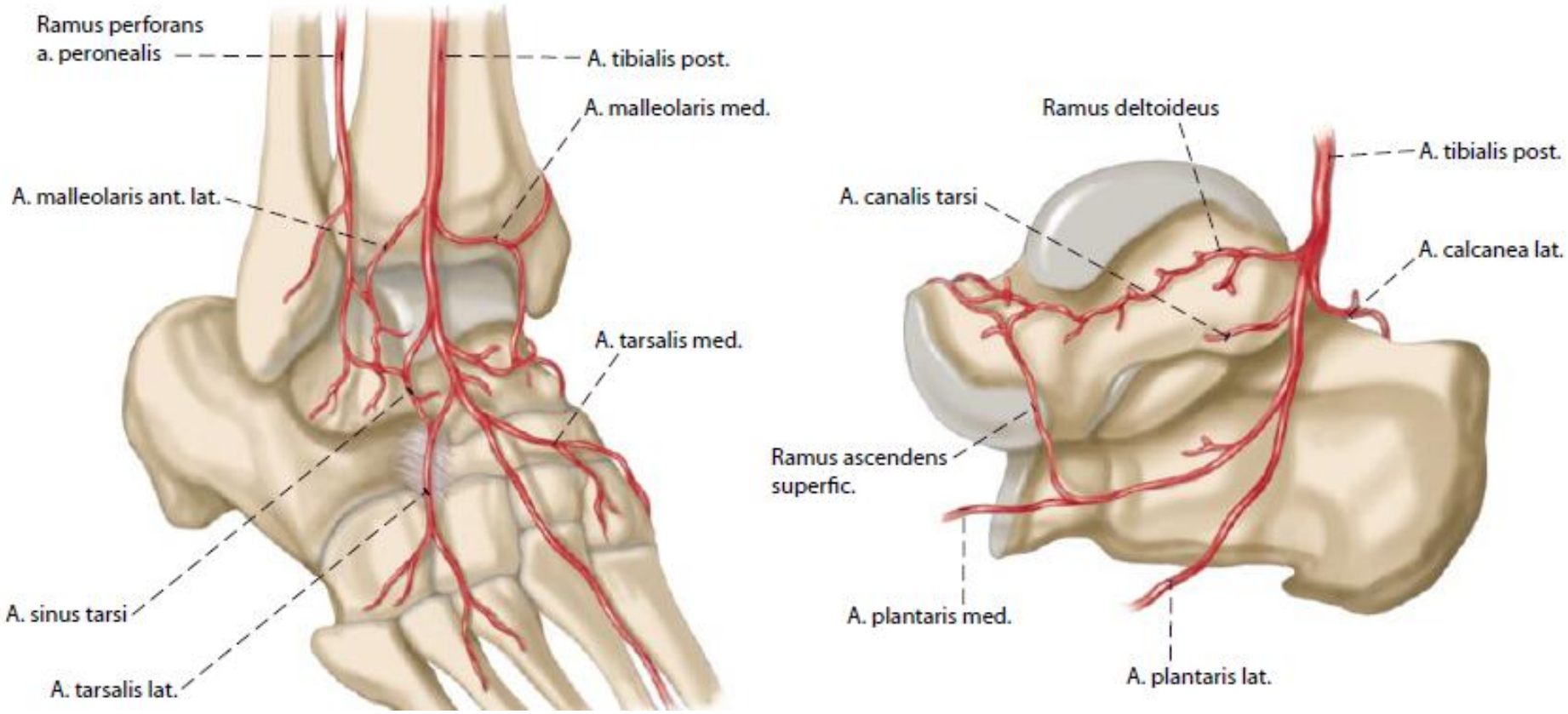
anatomy



Bartonı´cek et al .anatomy of the subtalar joint 1083-515/18/ª 2018 Elsevier Inc

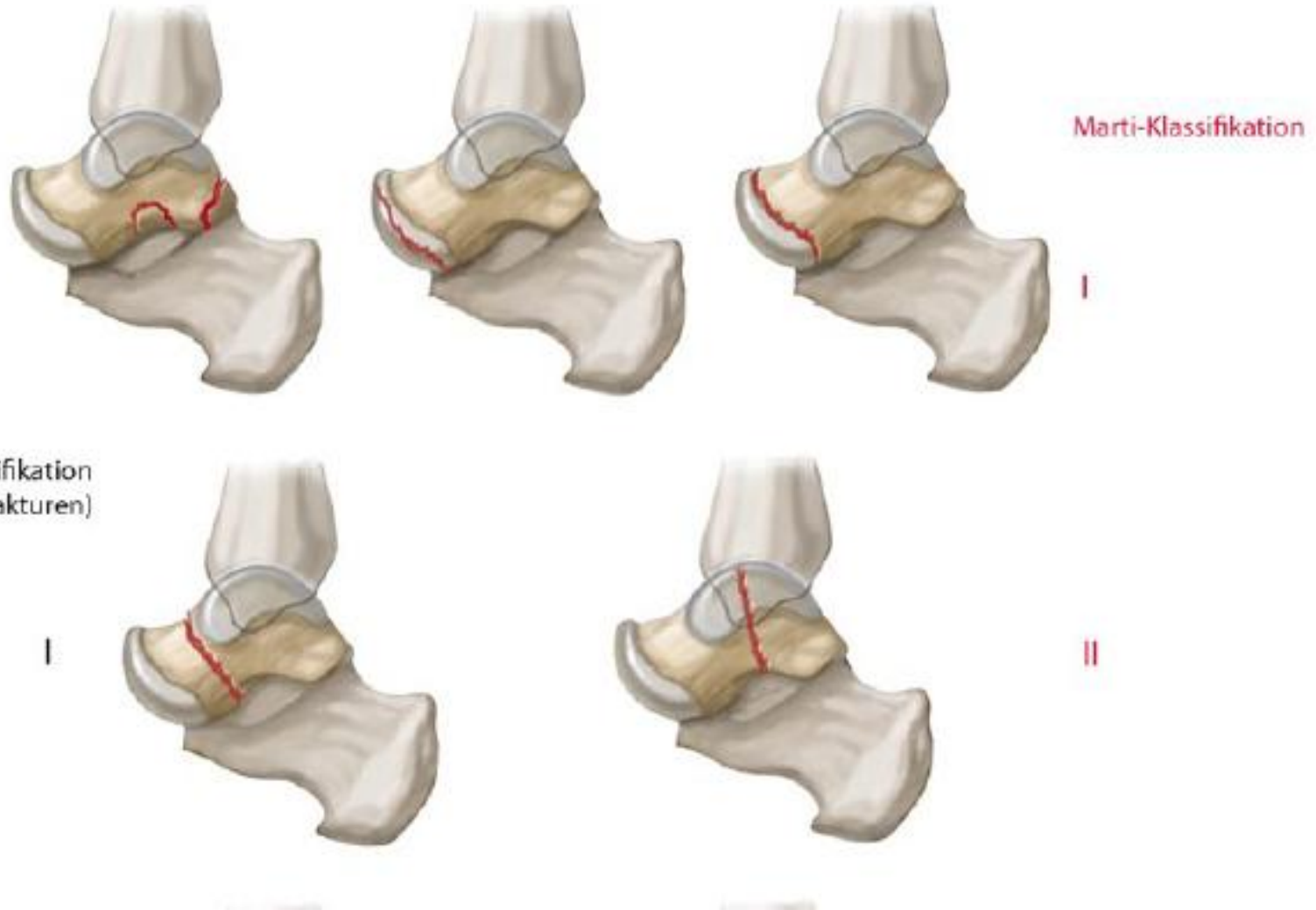
Blood supply



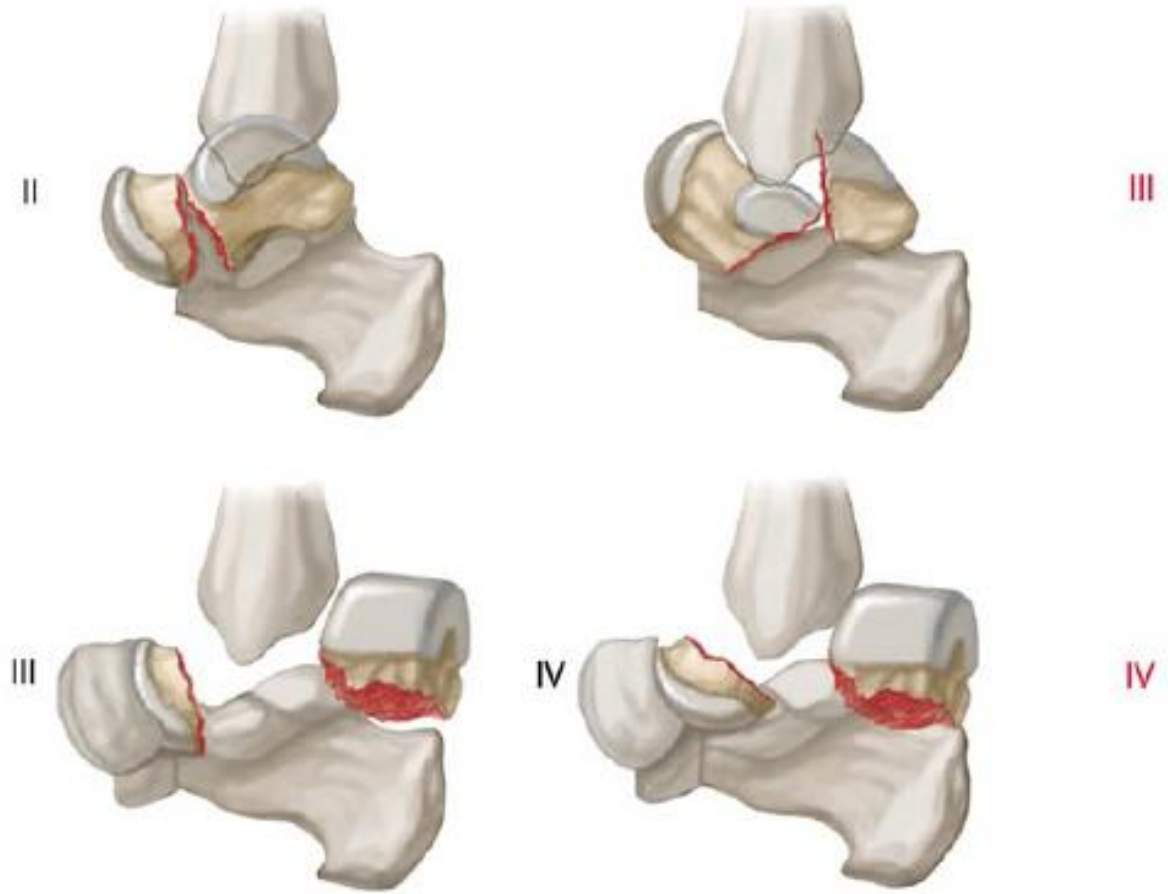


Operative Orthopädie und Traumatologie 6 · 2013

Classification



Operative Orthopädie und Traumatologie 6 · 2013



Operative Orthopädie und Traumatologie 6 · 2013

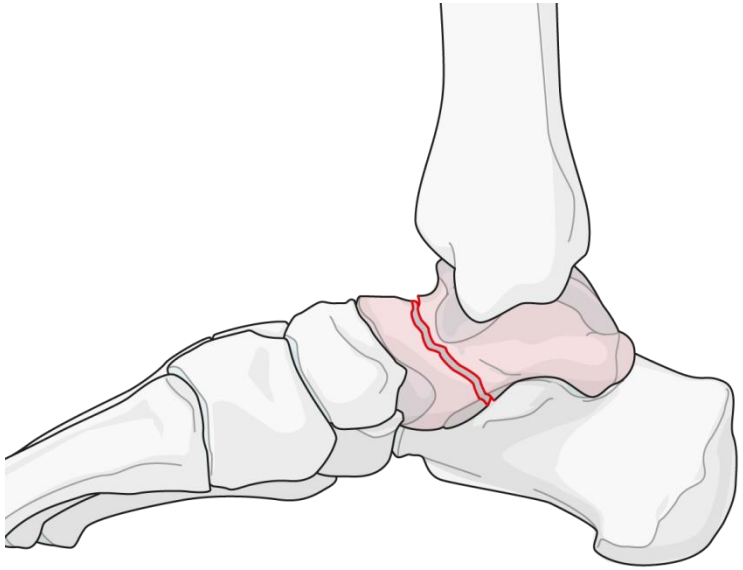
Talar neck fractures

- Hyperdorsiflexion injury
- The “aviator’s astragalus”
- Relatively uncommon overall, but the most common (~50%) talus fracture type
- Typically a high energy injury with frequent complications

Hawkin's Classification

- Type 1 – Nondisplaced

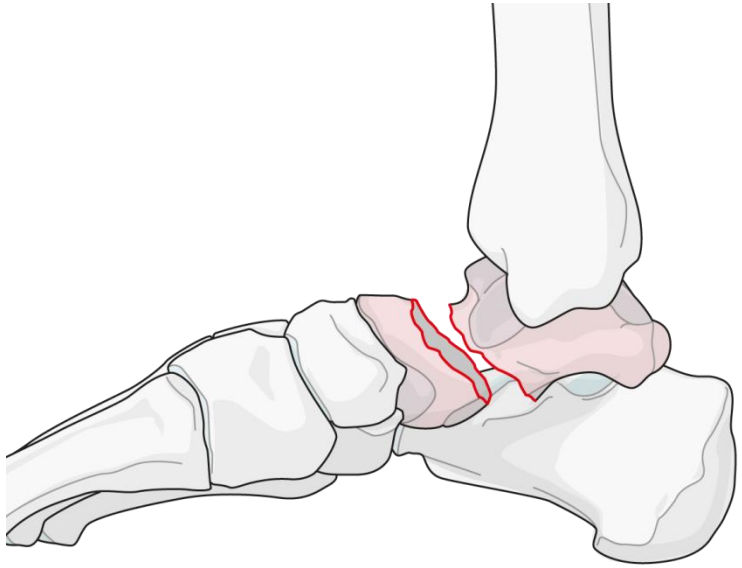
- AVN rate: 0-13%



Hawkin's Classification

- Type 2 – Subluxation of Subtalar joint

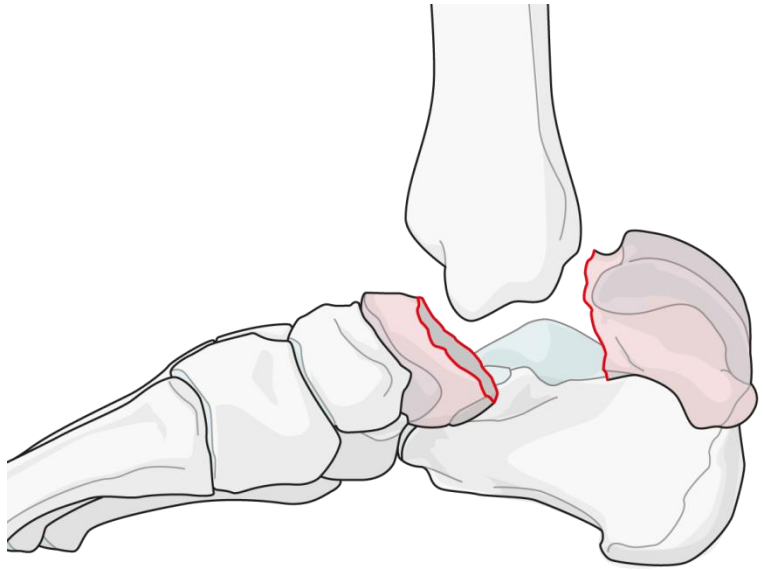
- AVN rate: 20-50%



Hawkin's Classification

- Type 3 – Subluxation of Subtalar and Ankle joint

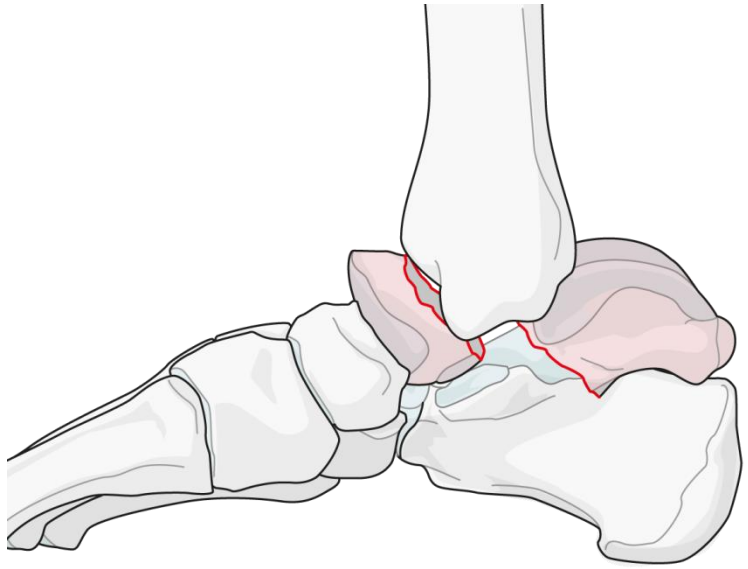
- AVN rate: 75-100%



Hawkin's Classification

- Type 4 – Subluxation of Subtalar, Ankle, and Talonavicular joint

- AVN rate: Near 100%



Talar emergencies?

- Dislocated closed fractures
- Open fractures
- Closed fractures with soft tissue at risk
- Neurovascular compromise
- All talar neck fractures?

Operative treatment

- Consider for most fractures, even Hawkins I
- Allows earlier ROM
- You otherwise have to splint them in equinus to prevent displacement → contracture
- Radiographs and CT underestimate displacement seen at ORIF
- Small amount of malunion significantly reduces subtalar ROM

Timing of Surgery

- Experience suggests a wait of several days for ORIF probably does not increase osteonecrosis risk – provided joints reduced

- Allows for
  - ORIF during daytime hours with the right team
  - Soft tissue condition to improve
  - Patient to be adequately resuscitated

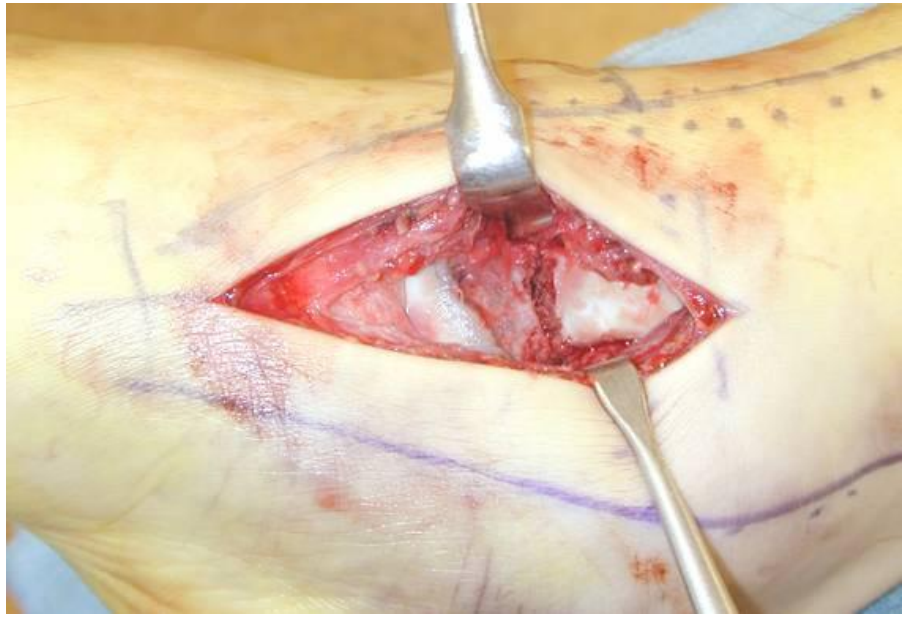
Goals of open reduction

- Restoration of anatomy
- Alignment of talar neck
- Maximization of revascularization
- Allow early ROM

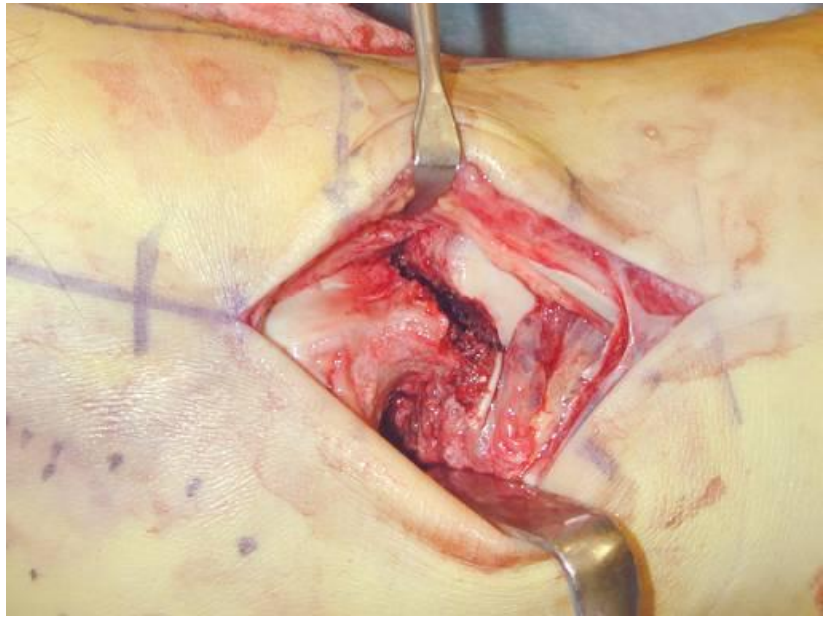
Anteromedial and anterolateral incisions

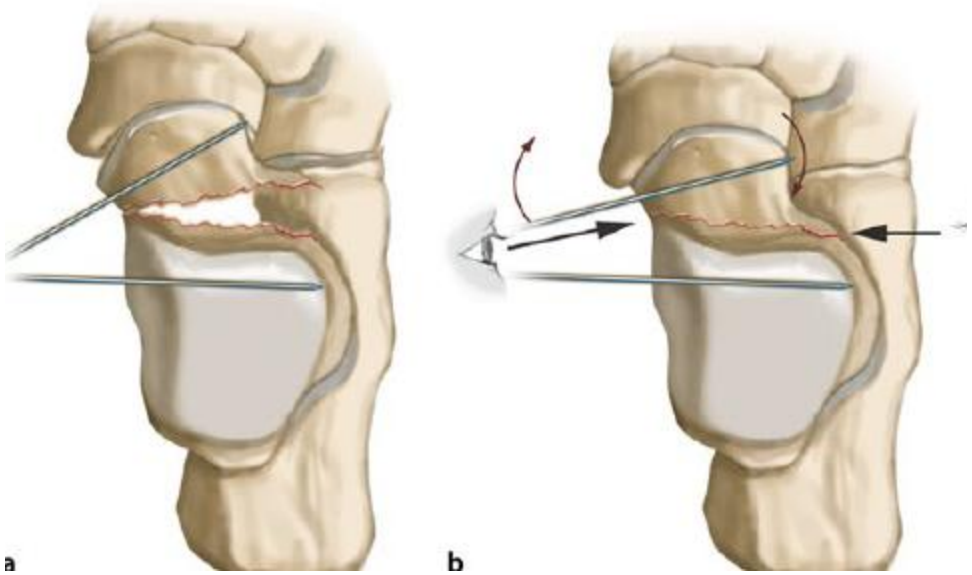
Minimal soft-tissue stripping

Medial



Lateral





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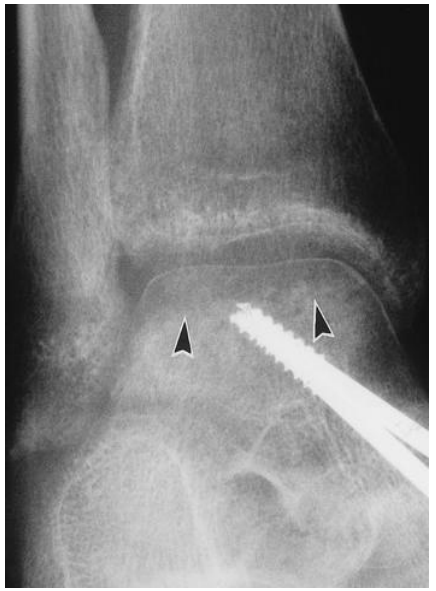
Complications



- Infection
- Avascular necrosis .Hawkins sign

- AVN is diagnosed by a radiopaque appearance of the talar body on plain radiographs 4–6 months after the injury
- Posttraumatic arthritis
- Malunion and non-union

Malunions and non-unions of the talar neck and body are disabling conditions

Other fracture types

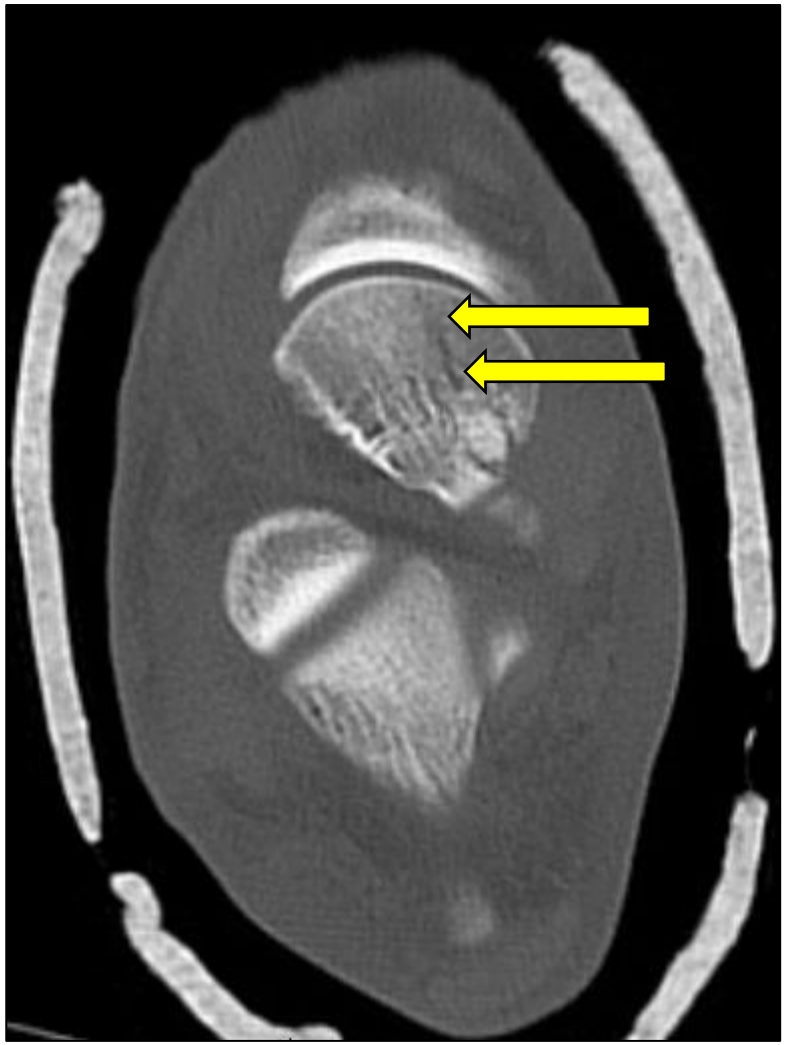
- Talar Body
- Talar Dome
- Talar Head
- Posterior Process
- Lateral Process

Talar Body Fractures

- Posterior to the lateral process
- Intra-articular into the tibiotalar joint

Talar Head Fractures

- Often minimally displaced and stable



Lateral Process Fractures

- Snowboarder's fx
- Involves varying amounts subtalar joint
- Approach via sinus tarsi incision
- Larger fragments: fix with interfrag screws
- Smaller fragments: consider excision

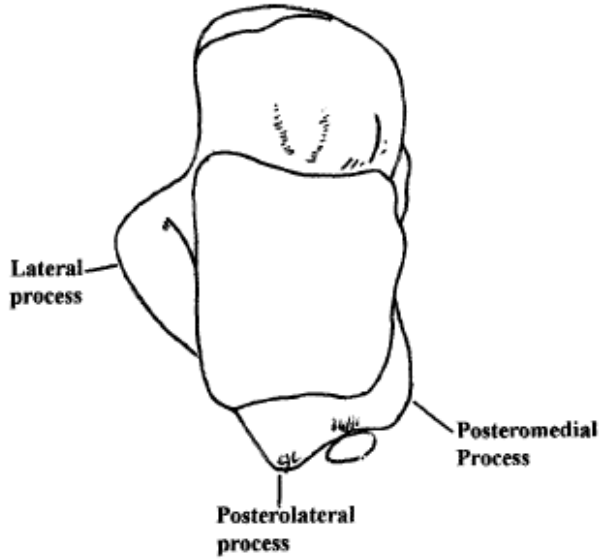
Treatment

- Nonoperative Rx
  - Type I only
    - Must obtain CT scan to ensure non-displaced
    - Splint/Cast in plantarflexion
    - Rarely indicated

posterior process

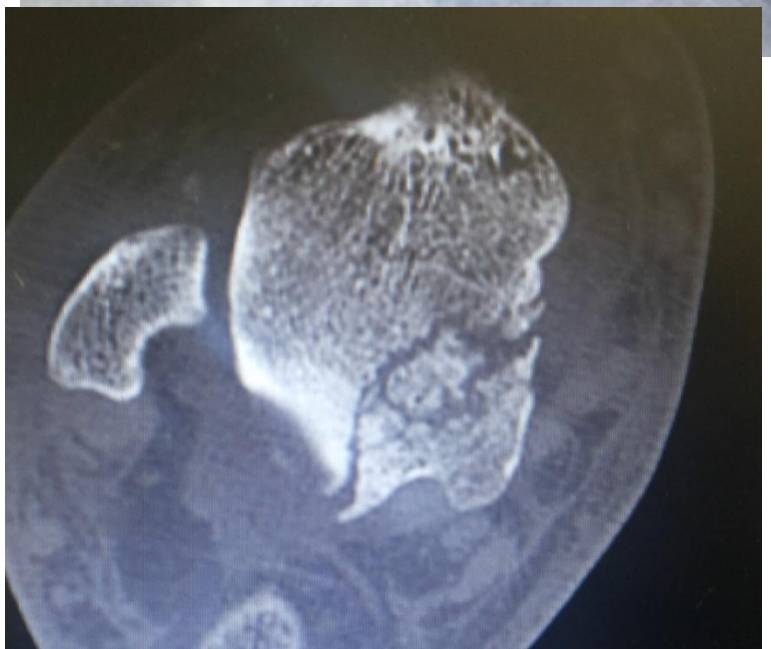
- fracture posterior process of talus with subtalar dislocation is extremely rare.

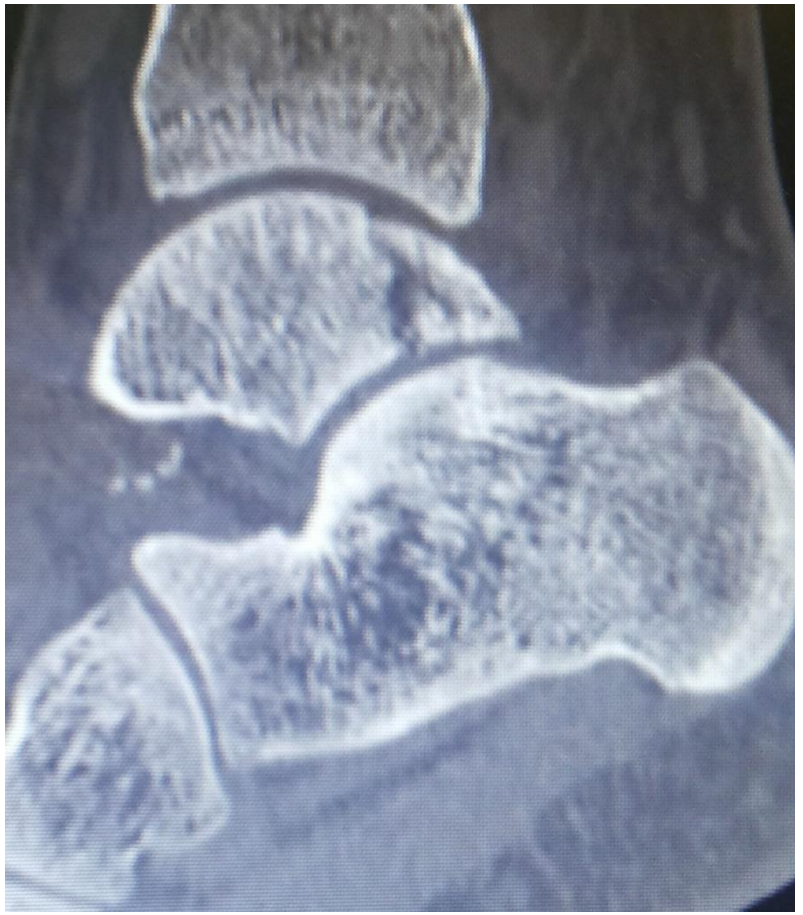
•The first fracture described in the posterior part of talus was by Shepherd in 1882 based on anatomical dissections it was about the lateral tubercle (Steida's process
medial tubercle fractures were first described by Cedell in 1974



subtalar dislocation

A30 yr old male FD, Rt ankle trauma . no dislocation





In less than 2 years

Indications

- Posteromedial talar process fractures with the following characteristics:
- Acute (<4 wk old)
- Displaced (>2 mm)
- Fracture fragments >1 cm
- Subtalar articular disruption
- Without active infection, compromised soft tissues, or significant comorbidities.

most of the available information comes from previously published case reports

40 year old male, FD 2 m. right

Take-home message

- Accurate reduction is critical
- Dual approaches
- Avoid varus
- Osteonecrosis does not equate a poor result
- Arthritis is common