# Early and definitive treatment of Pilon fracture

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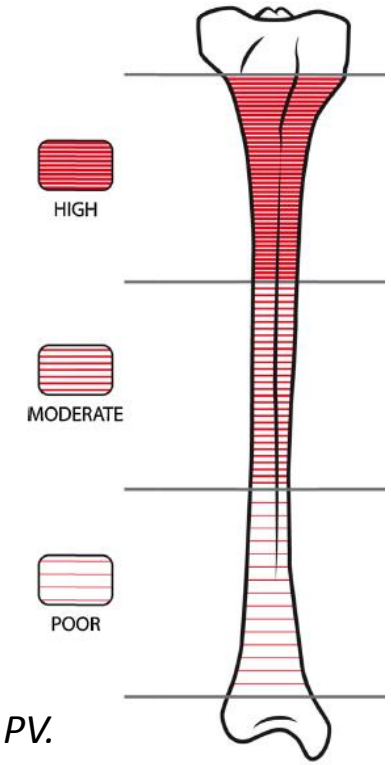
## Pilon: Message

# SOFT TISSUES !!!

High energy fracture at anatomic location with:

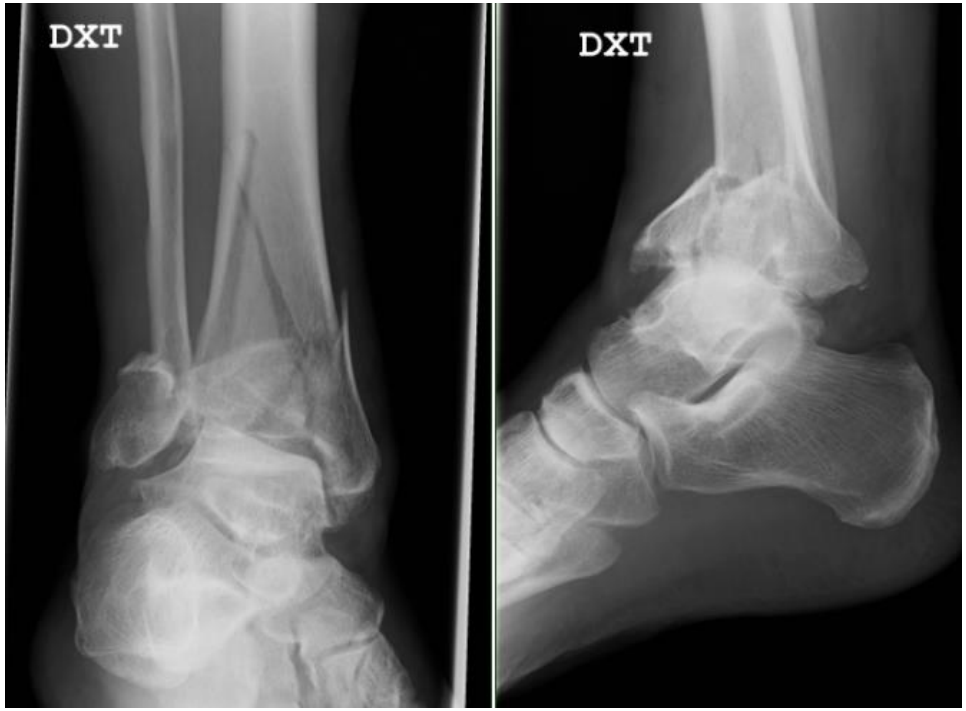
- very gracile soft-tissue envelope
- vulnerable blood supply

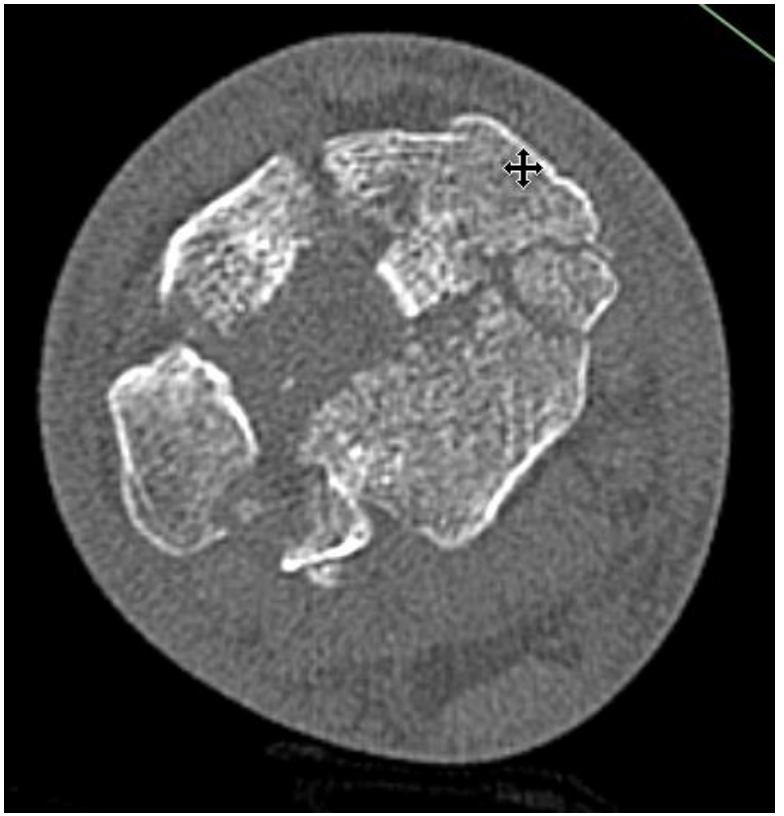



*Different degree of vascularisation of the tibia*
*From: Femoral and tibial blood supply: A trigger for non-union?*
*Santolini E, Goumenos SD, Giannoudi M, Sanguineti F, Stella M, Giannoudis PV.*
*Injury. 2014 Nov;45(11):1665-73*

# Pilon fracture definition ??

This presentation is about high-energy fractures where the talus acts an mortise to destroy the distal tibial articular surface (fracture type 43.C)



Strat Traum Limb Recon (2015) 10:137–147
DOI 10.1007/s11751-015-0231-5

REVIEW

# Management of high-energy tibial pilon fractures

**Nebu Jacob[1,3] · Amit Amin[1] · Nikolaos Giotakis[2] · Badri Narayan[2] · Selvadurai Nayagam[2] · Alex J. Trompeter[1]**

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**Abstract** Tibial pilon fractures result from high-energy trauma unlike usual ankle fractures. Their management provides numerous challenges to the orthopaedic surgeon including obtaining anatomic reduction of articular surface and the management of associated soft tissue injuries. This article aims to review major advances and principles that guide our practice today. We also discuss a treatment algorithm based on a staged approach to the fracture: initial spanning external fixation followed by definitive fixation.

from falls from a height or from motor-vehicle-related accidents [1]. The degree of trauma to the surrounding soft tissue envelope cannot be underestimated; there is limited muscle cover between the skin and bone at this level of the lower limb, and the energy of the injury is transferred directly to these soft tissue structures. Open fractures are common, and even in the absence of an open lesion, significant soft tissue damage must be appreciated in closed injuries [2].

**High complication rates even when treated properly as result of ”nature of the fracture”.**

Pollack et al. JBJS, 2003; 85A: ”Outcomes after treatment of high energy tibial plafond fractures”. 2 years follow-up:

Pilon fractures had lower SF-36 scores than:

- pelvic fractures
- AIDS
- coronary artery diseases

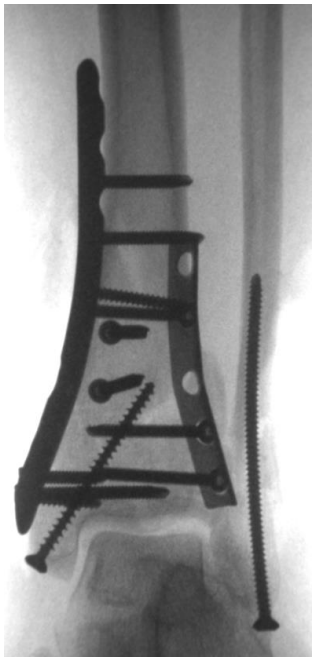
# What goes surgically wrong ?

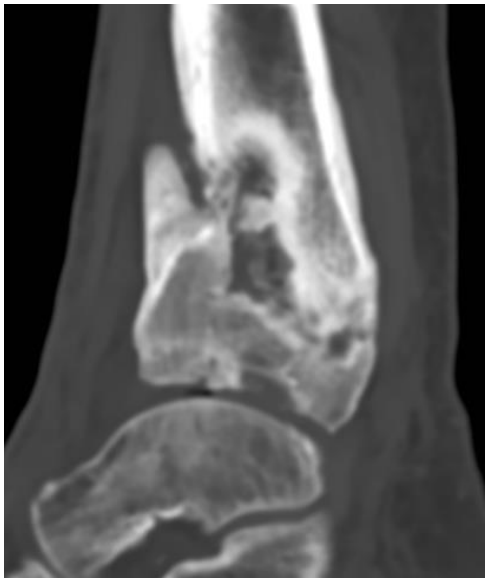
Insufficient soft-tissue handling:

- high risk of disaster (infection, amputation)

Insufficient fracture reduction and fixation:

- high risk of long-term complications (non-union with bone loss, osteoarthritis)





# 2-staged treatment protocol

1. External fixation (span-scan-plan)

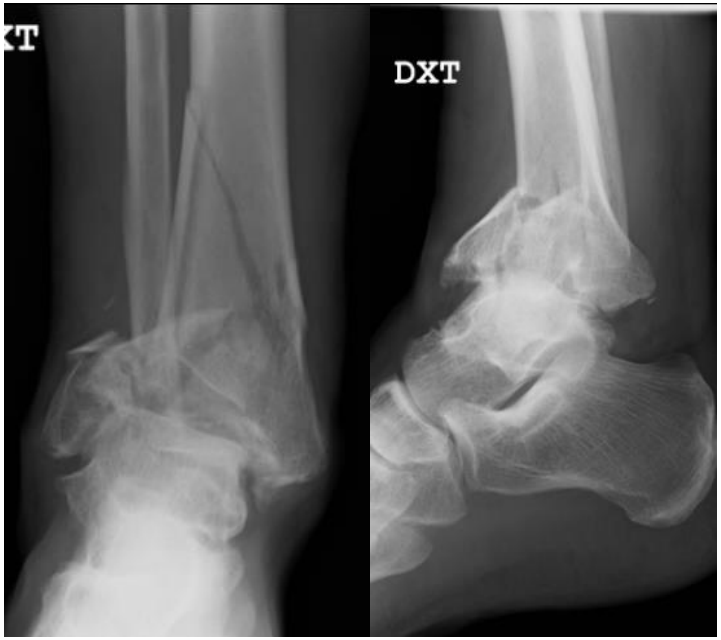
2. Subsidence of soft-tissue swelling:

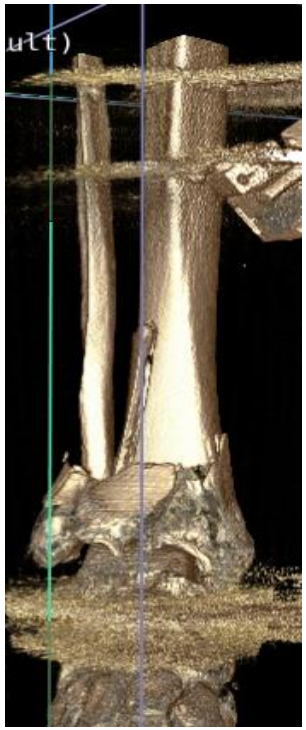
    - definitive open reduction and fixation
    - Internal fixation or
    - limited internal fixation and external fixation

# Early treatment of Pilon fracture: span – scan – plan

External fixation from mid-tibia to calcaneus

- keep pins out of zone of injury and away from possible later incisions
- maybe: limited internal fixation (fibular fracture)



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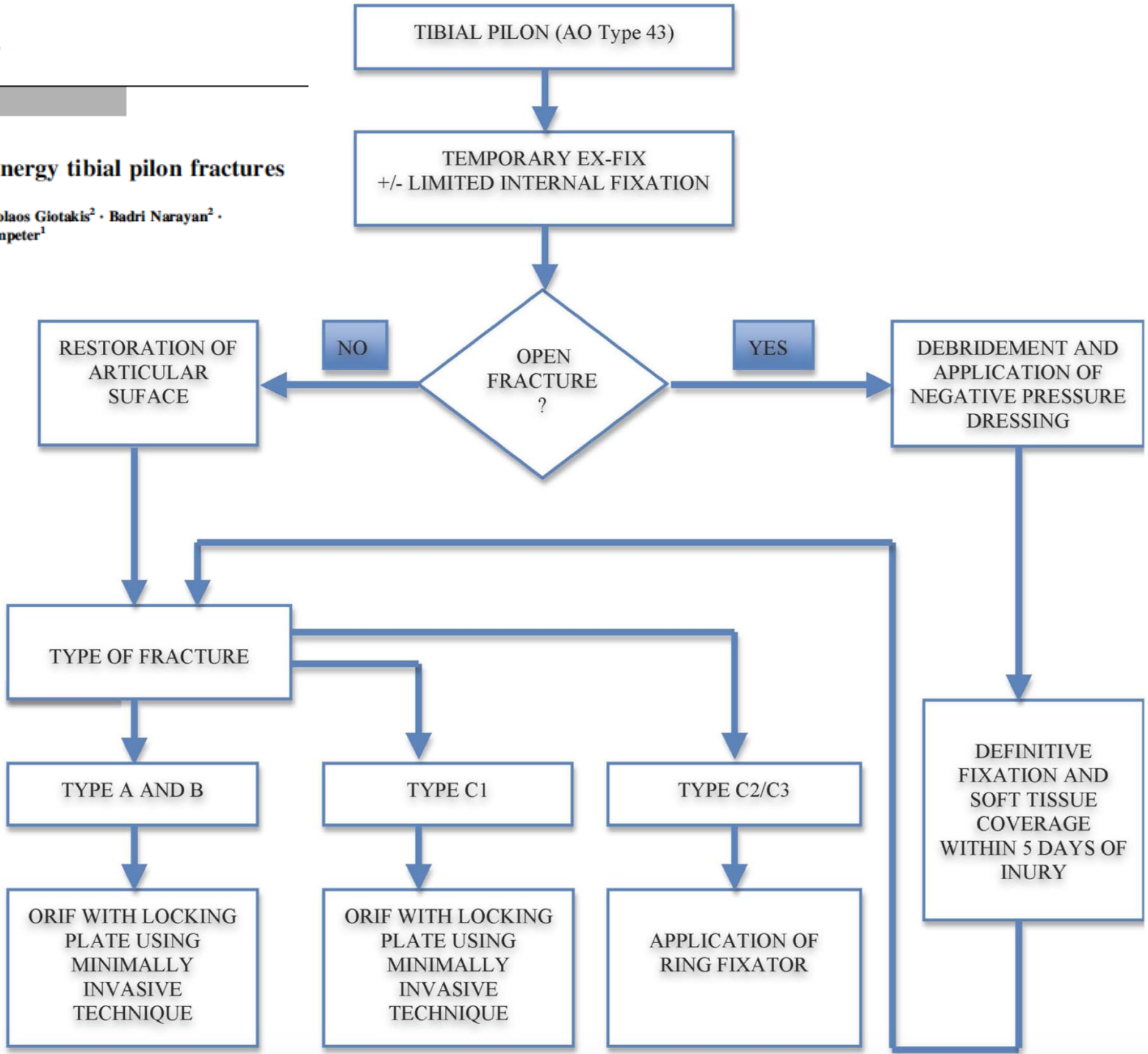

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## Treatment goals

1. Articular reduction and stabilisation.
2. Restoration of alignment by reduction in the reconstructed articular block to the diaphysis.
3. Management of bone loss at primary surgery or as a planned late intervention (C3 injuries).
4. Respect for the soft tissue envelope
5. Early restoration of motion

# Definitive treatment of Pilon fracture

KNOW AND RESPECT YOUR LIMITATIONS

PLAN-PLAN-PLAN and re-PLAN

(plan A, plan B, plan C…)

Day-time surgery

Plan and perform the surgery with your traumatologist colleague

# Individualized plan

When can definitive surgery be performed? How long can I wait before reducing the fracture?/staged surgery?

How do I reduce the fracture?

How do I fix the fracture segments?

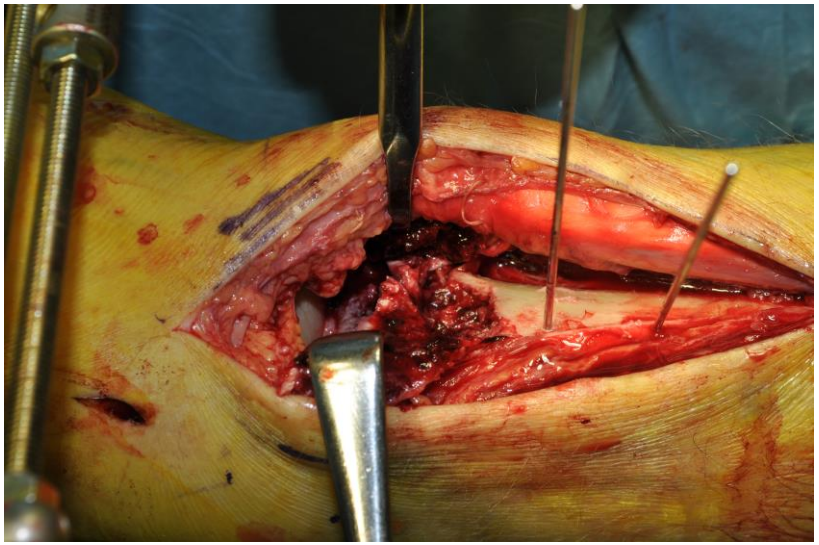
Treatment of bone loss?

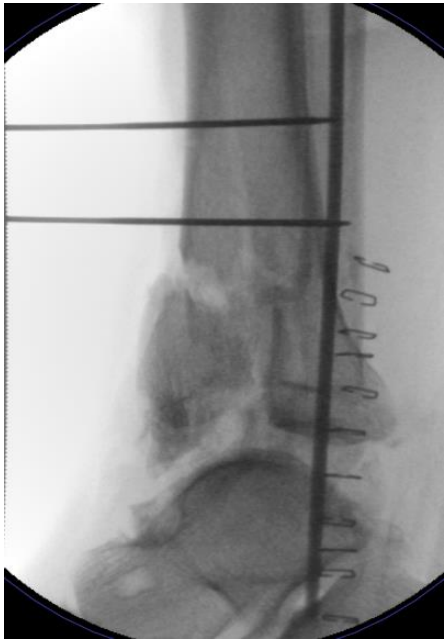
Incisions? Sufficient space between incisions? Access to bone fragments without opening through compromised soft-tissues: antero-medial, antero-lateral, postero-lateral, postero-medial

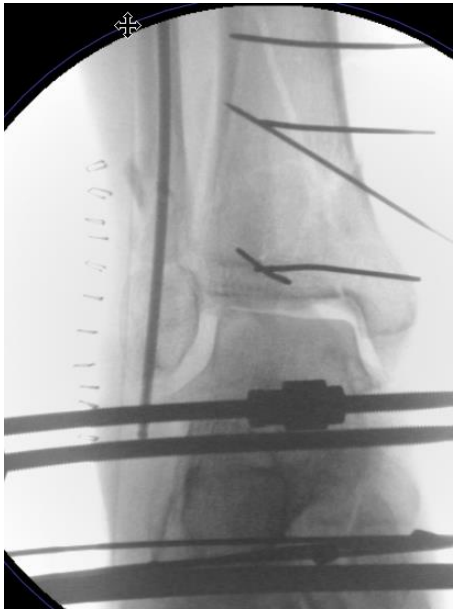
Careful soft-tissue handling!! Post-operative handling of soft-tissues: Prevena-VAC on critical incisions

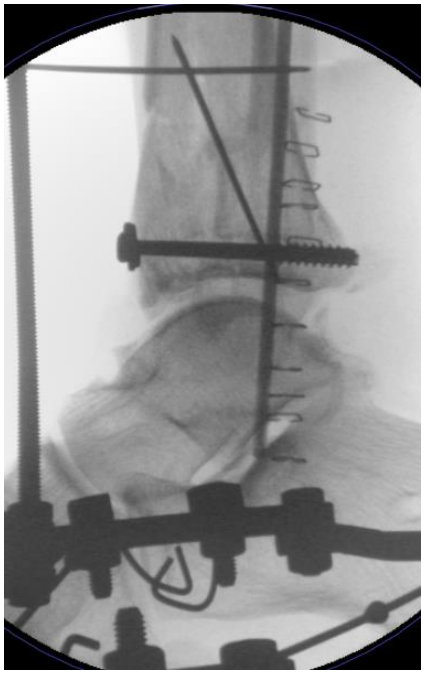
# Intraoperative goals

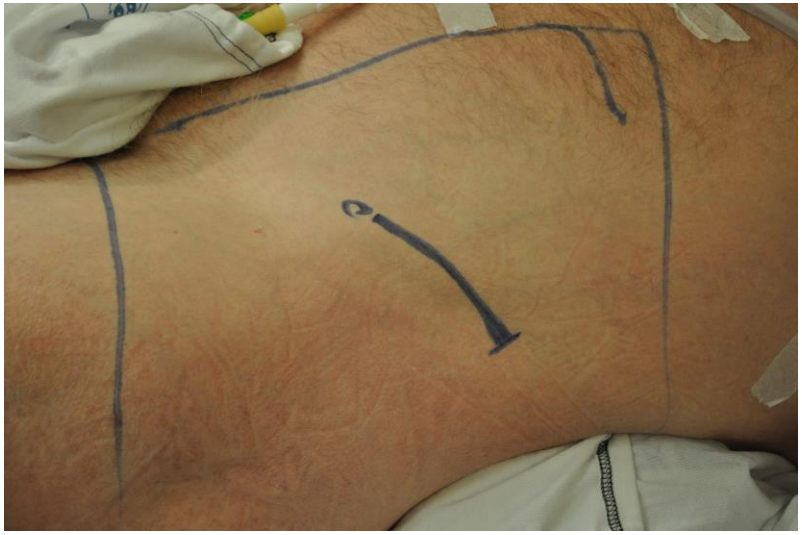
- Proper length of fibula (plate, nail)
- Open reduction and internal fixation (screws) of articular fragments
- Medial support (prevent collapse of fracture into varus)
  - Circular frame or
  - Plate
- Bone graft ?: metaphyseal/diaphyseal bone loss

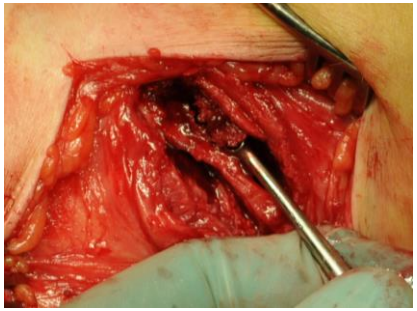


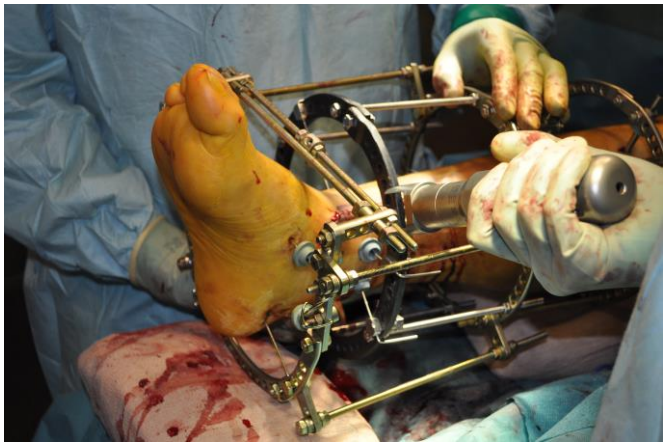


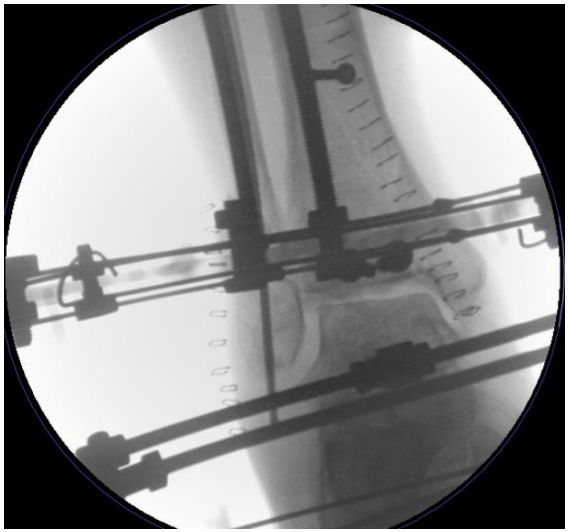


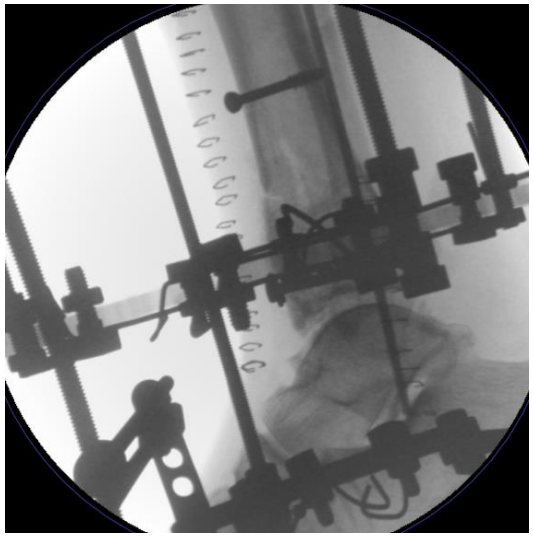












Definitive treament: Open reduction and internal fixation with plates . (I do not have experience with this)

Timing of surgery, placement of incisions, soft-tissue handling becomes even more important !!

Staged plating (Sanders)

- Posterolateral approach
- Fibula plating and posterior tibial plating
- External fixation
- Wait: 7-14 days
- Anterior tibial plate

# Take home message: Pilon fracture

***SOFT TISSUES !!!!!!***

2-staged treatment protocol:

1. Initial reduction and external fixation

2. Subsidence of soft-tissue swelling: definitive open reduction and fixation (external or internal)

# Definitive treatment: circular frame or plates

***Pro circular frame:***

- More forgiven on soft-tissues
- Facilitates fracture reduction, even though open reduction is still needed
- Foot-frame kept for 8-12 weeks: avoids flexion contracture of the ankle joint

***Cons circular frame:***

- Clinical set-up
- Patient comfort
- Superficial wire infection
- Treatment of post-operative soft-tissue swelling