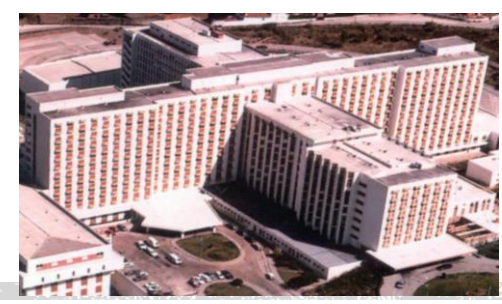




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# Intra-articular calcaneus fractures

**Classification and treatment**



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Isabel Ferreira; Cura Mariano, Jorge Faísca;  
Fernando Fonseca; Fernando Judas .

Department meeting, January 2017

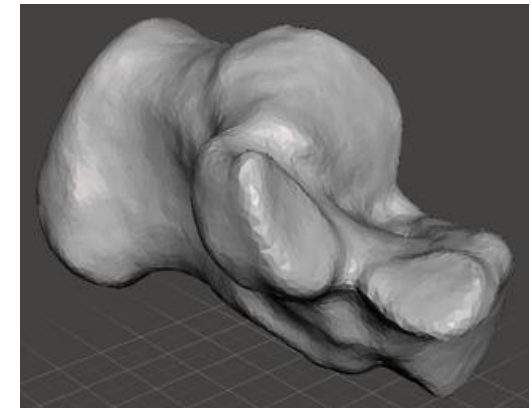
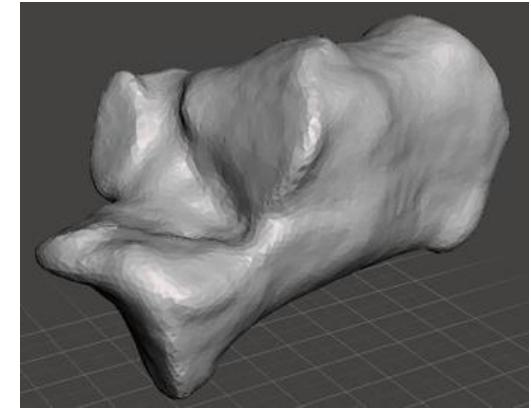
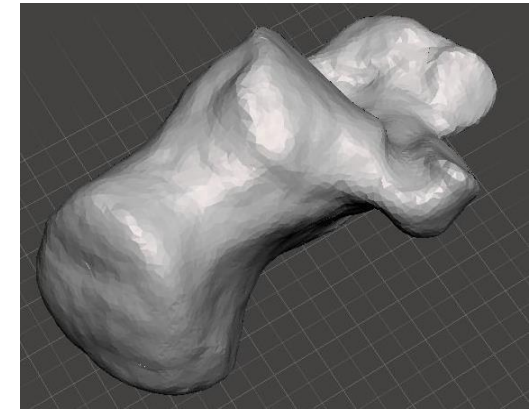
# Introduction

- *Displaced, intra-articular fractures of the calcaneus represent a surgical challenge and the ideal choice of treatment remains a subject of continued debate.*
- *Calcaneal fractures display a wide range of injury patterns with about 80% being intraarticular.*
- *The posterior facet of the subtalar joint is involved in almost 90% of all intra-articular calcaneal fractures*
- *Several studies have shown that only anatomic reconstruction of the calcaneal anatomy and meticulous restoration of joint geometry will lead to acceptable functional results.*



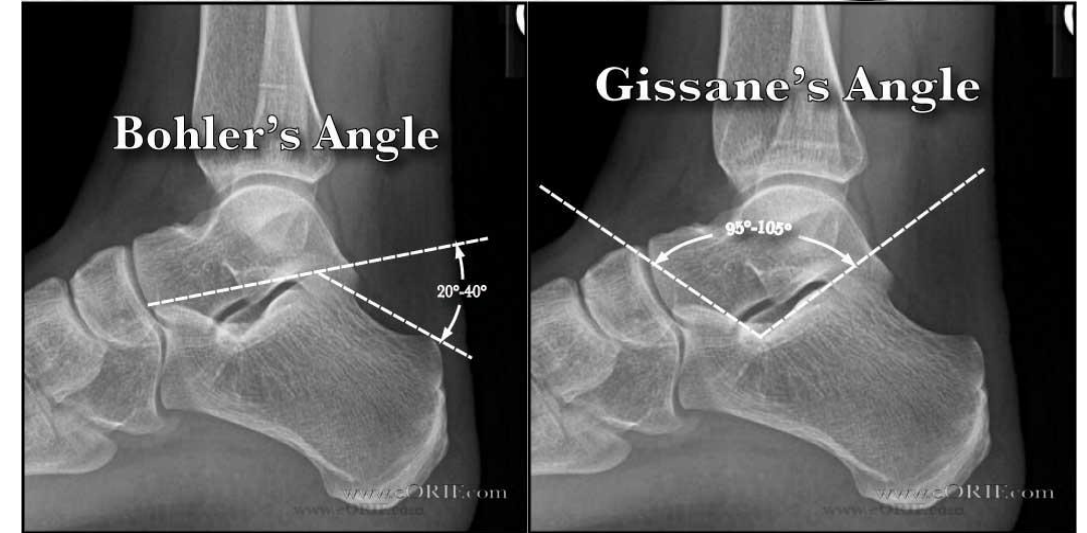
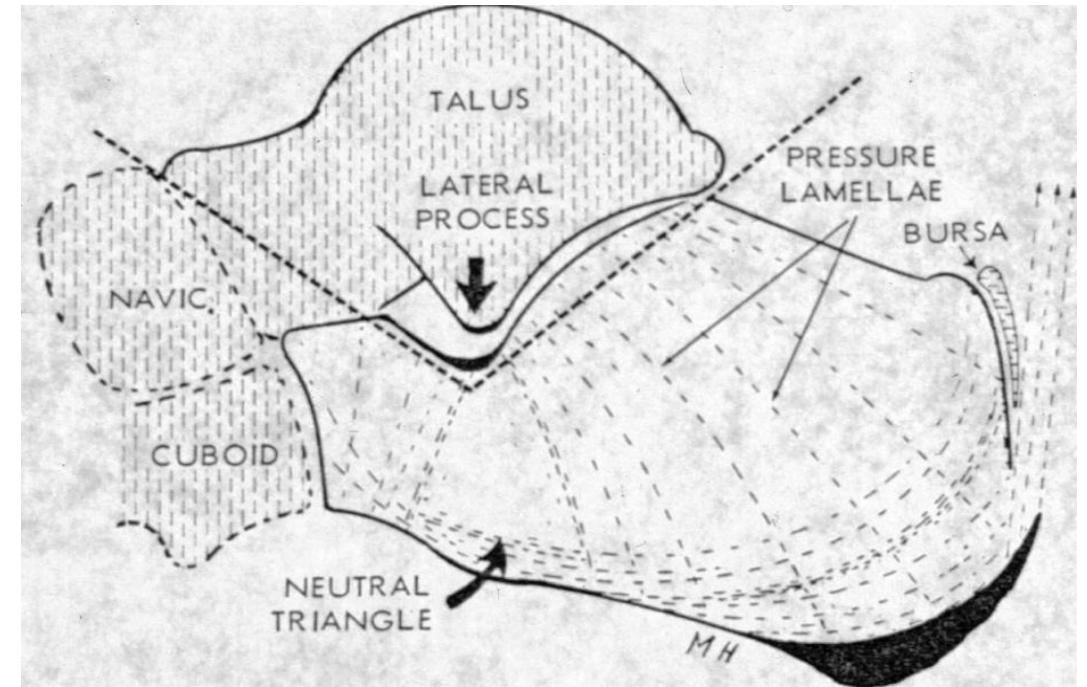
# Surgical anatomy

- *4 articulating surfaces, three superior and one anterior:*
- ***Posterior facet** is separated from the middle and anterior facets by a groove that runs posteromedially, known as the calcaneal sulcus. With the talus sulcus form the canal called the sinus tarsi.*
- ***Middle and anterior facets** articulates with the middle and anterior facets of the talus, respectively.*
- *The triangular **anterior surface** of the calcaneus articulates with the cuboid.*



# Surgical anatomy

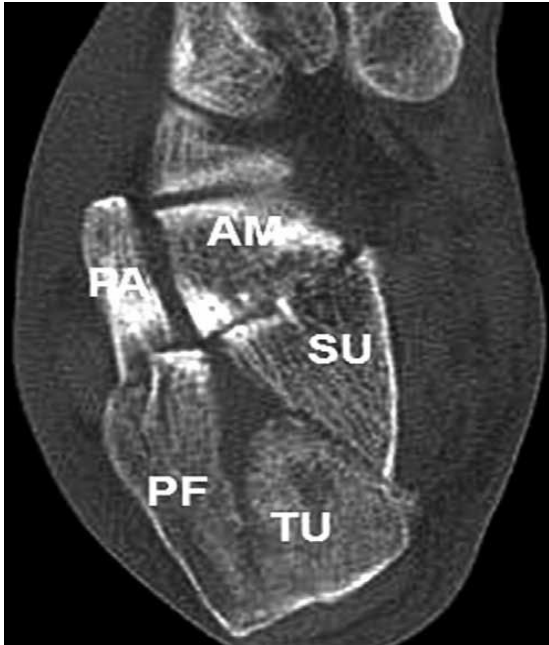
- *The calcaneus is the largest and most irregularly shaped bone of the foot*
- *A dense portion of the cancellous bone is situated below the posterior facet of the subtalar joint and therefore named: *thalamus calcanei*.*
- *The posterior edge of the tuberosity and the subtalar joint form an angle between 25 and 40° (Böhler's angle)*
- *The subtalar joint and superior cortex of the anterior process form Gissane's crucial angle along the calcaneal neck that has a normal value of 120 to 145°*





# Surgical anatomy

- *The fracture lines regularly extend anteriorly and frequently involve the anteromedial subtalar and calcaneocuboid joints.*
- *With the split of the anterior process fragment a maximum of 5 reproducible main fragments results that provides the basis for fracture classification and treatment planning.*



AM – anteromedial fragment  
SU – sustentacular fragment  
TU – tuberosity fragment  
PF – posterior facet fragment  
PA – anterior process fragment

LJF – lateral joint fragment  
SF – sustentacular fragment  
TF – tuberosity fragment



# Clinical features

- *At the hindfoot:*
- *Pain*
- *Swelling*
- *Hematoma*
- *Deformity*
- *Rule out compartment syndrome*



# Classification

*It is based on the amount of displaced fracture lines in the posterior facet of the subtalar joint in the coronal CT scans which has been shown to be of prognostic relevance.*

*Non-displaced fractures - type I*

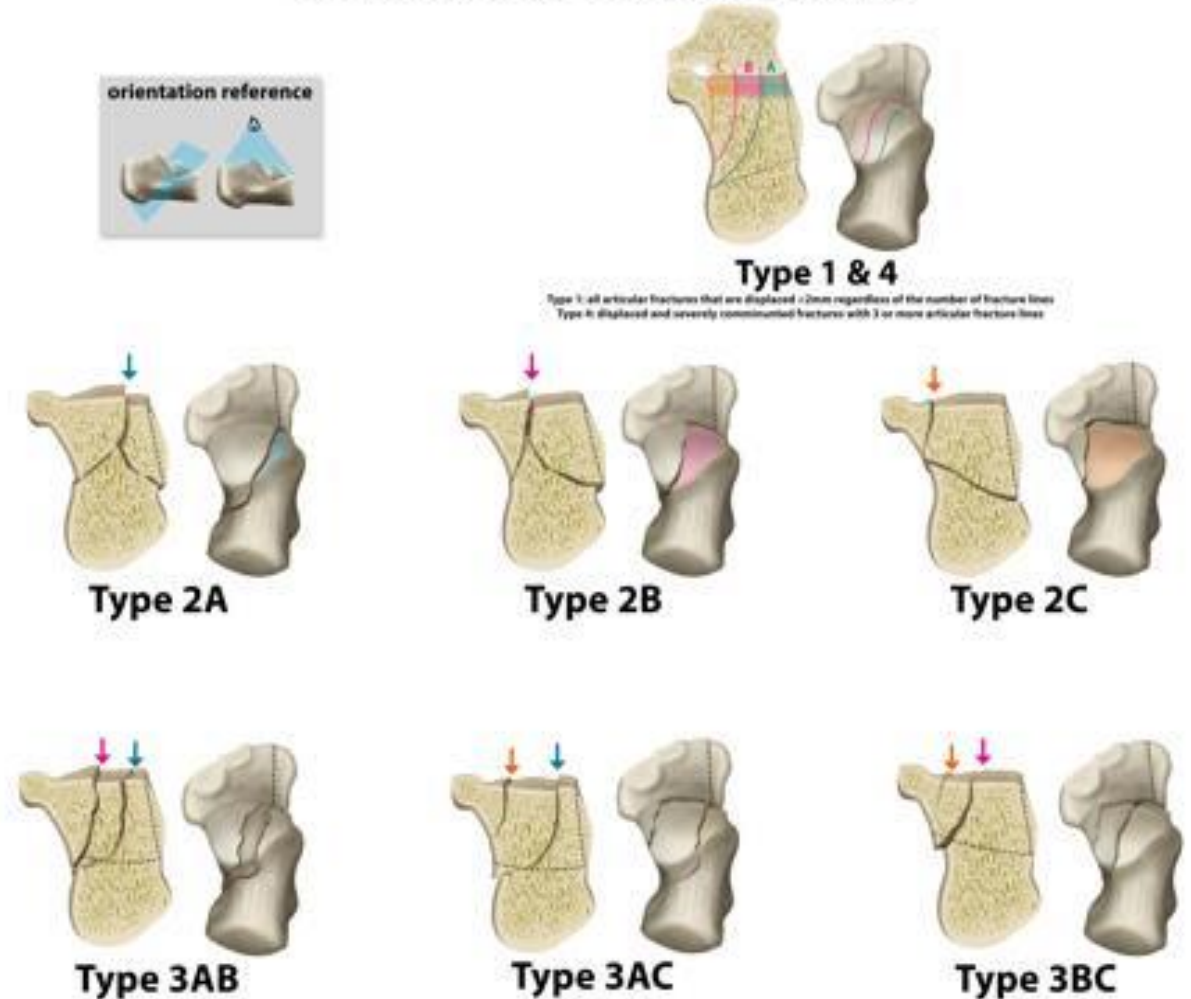
*1 displaced fracture line - type II*

*2 displaced fracture lines - type III*

*3 or more displaced fracture lines - type IV*

*Laterally situated fracture lines are encoded with the letter A, intermediate with B, and medial ones with the letter C.*

## Sanders CT classification of intraarticular calcaneal fractures



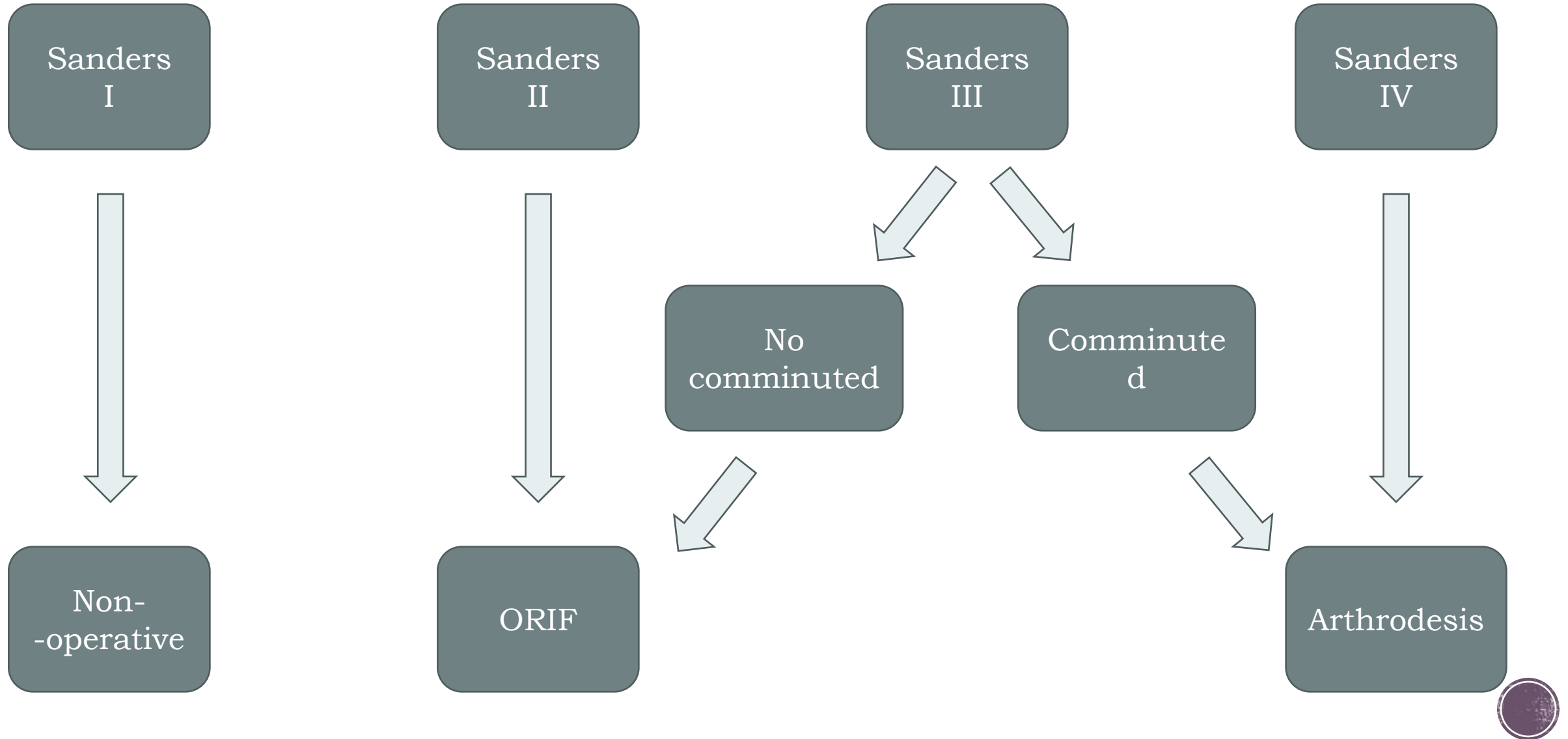
# Treatment

- *Systemic contraindications to open reduction and internal fixation include severe neurovascular insufficiency, poorly controlled insulin-dependent diabetes mellitus, non-compliance and severe systemic disorders with immunodeficiency and/or a poor overall prognosis.*
- *In the absence of local or systemic contraindications, displaced intra-articular fractures should be reduced anatomically.*
- *Higher patient age is not a contraindication to surgery, because favourable results can be obtained in active patients beyond 65 years of age.*



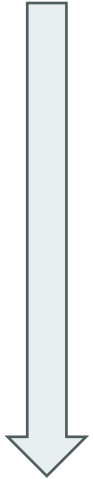


# Treatment



# Treatment

Sanders  
I



Non-  
-operative

*Initially, the affected foot is treated with ice, rest and elevation for 3–4 days. Immobilization Robert-Jones type.*



*Ankle and subtalar range of motion exercises are initiated.*



*Partial weight-bearing of 20 kg on the affected foot (with immobilization) after 6-8 weeks*

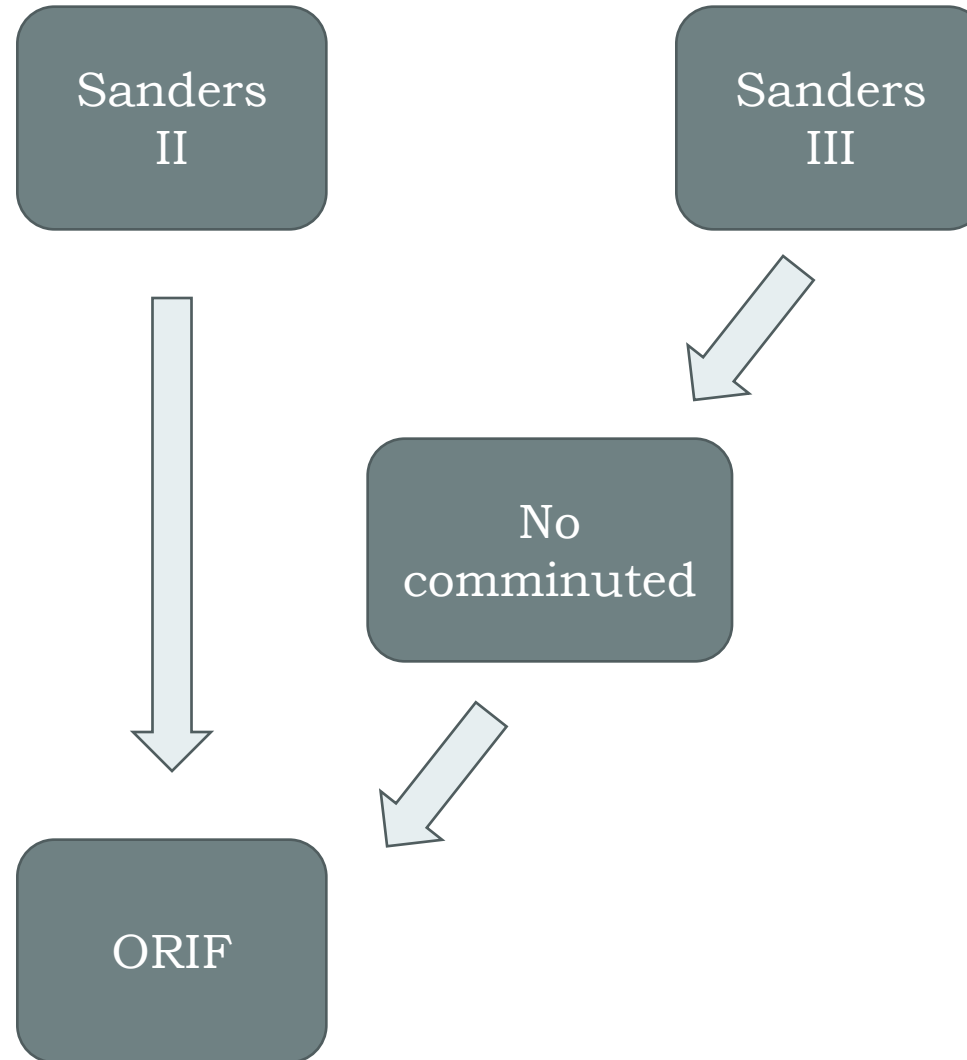


*Full weight-bearing is achieved after 10–12 weeks, depending on the type of fracture and bone quality.*



# Treatment

- *Open reduction and stable internal fixation has been established as the standard treatment for most of these fractures*
- *Good to excellent results in more than two thirds of patients in larger clinical series*
- *Prognostic factors that can be influenced by the surgeon are anatomical reduction of the overall shape of the calcaneus and congruity of the subtalar joint*

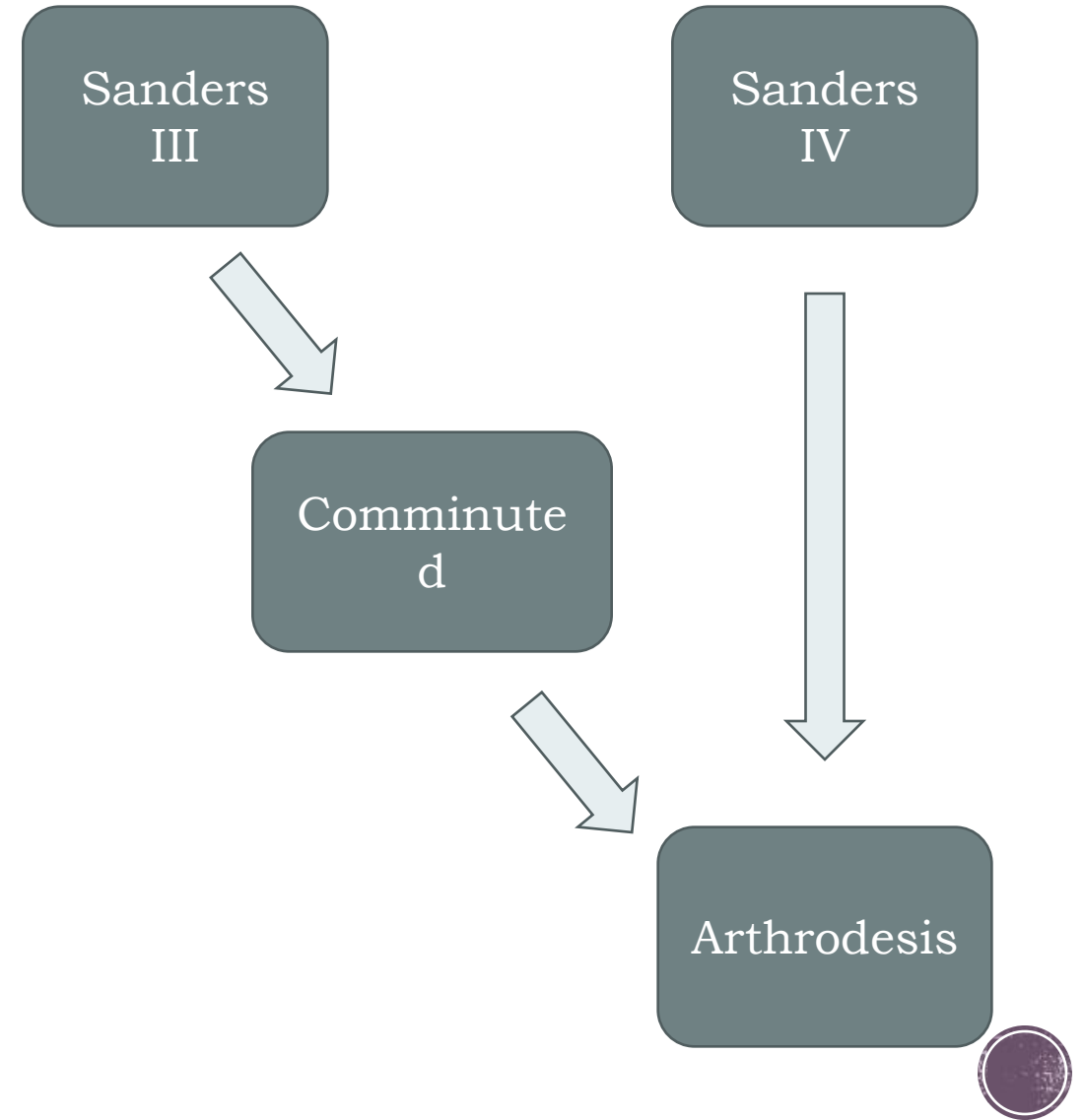


- *The extended lateral approach respects the neurovascular supply to the heel*
- *wound healing problems cannot be completely avoided*
- *Percutaneous and less invasive procedures have successfully lowered the rates of wound complications*



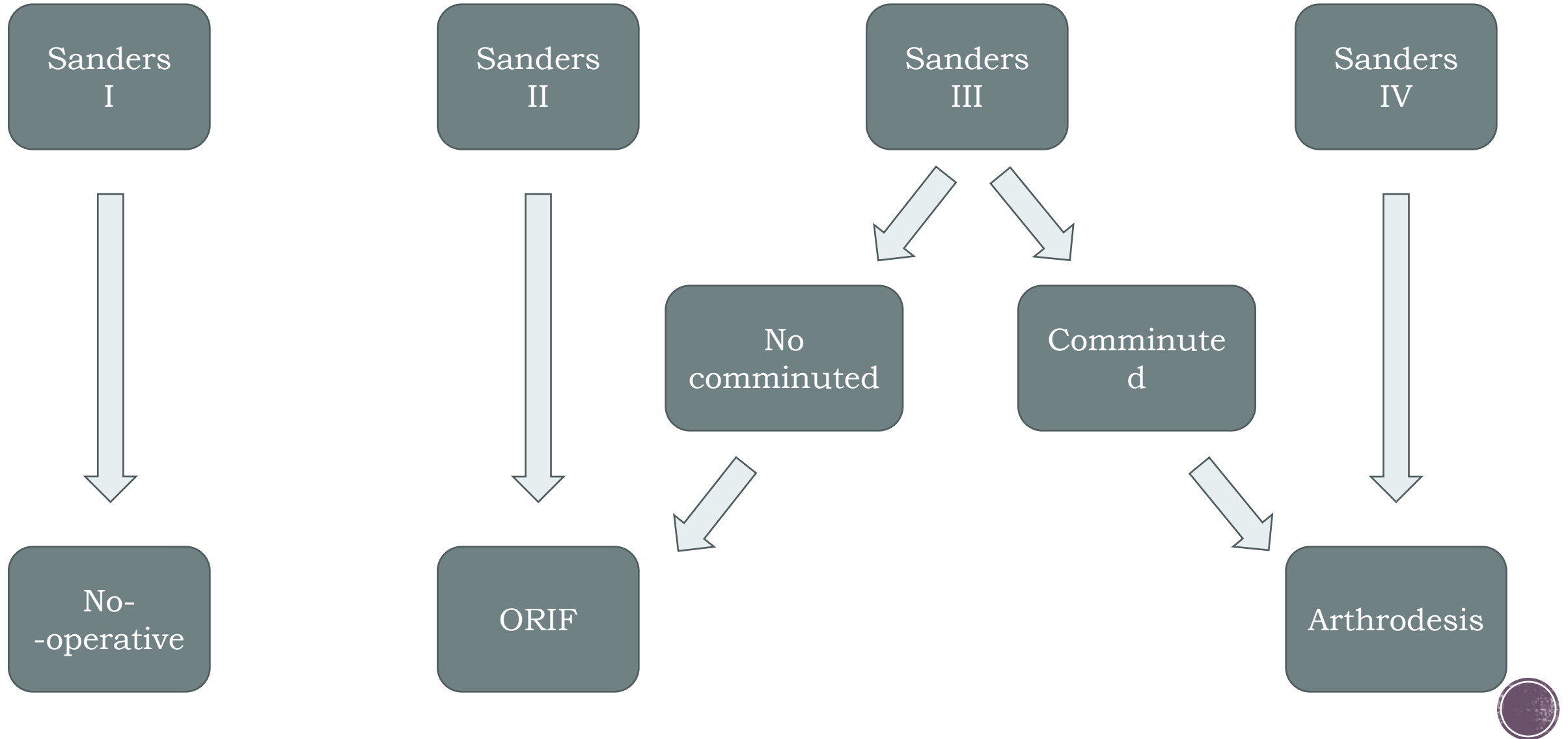
# Treatment

- *combined with ORIF to restore height*
- *correct varus malalignment*





# Treatment

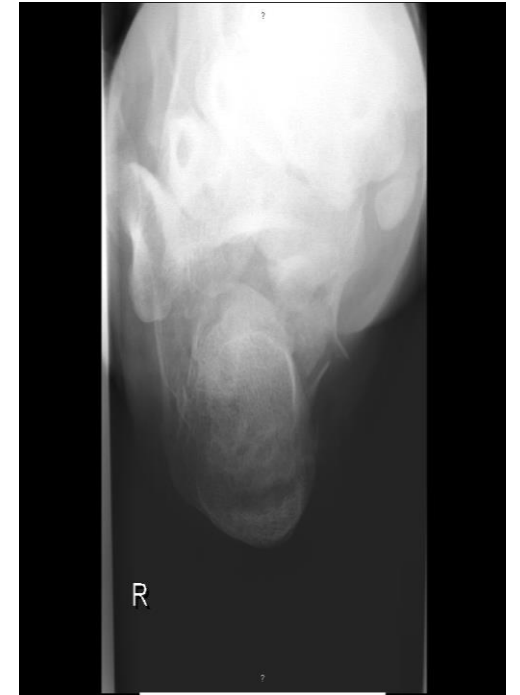
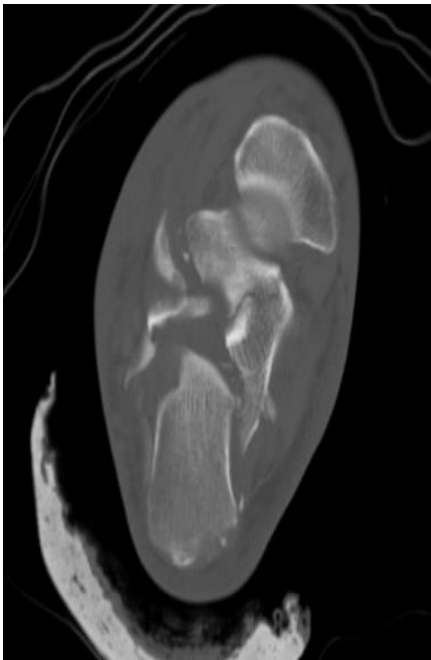


# Case Reports



# Case Report 1

- PJAR, M, 44
- IIIAC



# Case Report 1

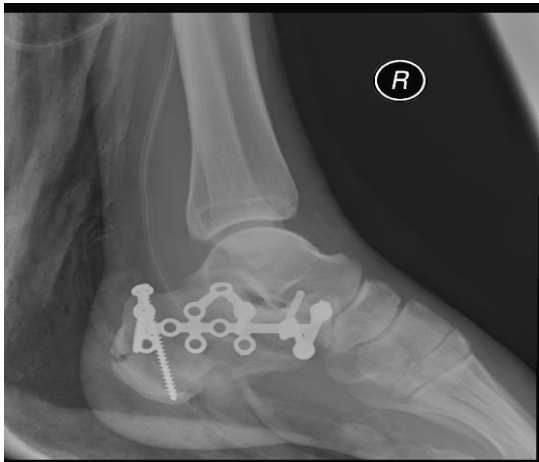
- PJAR, M, 44
- IIIAC





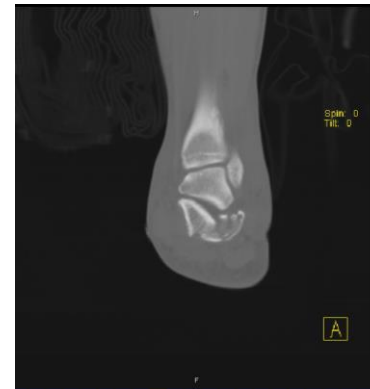
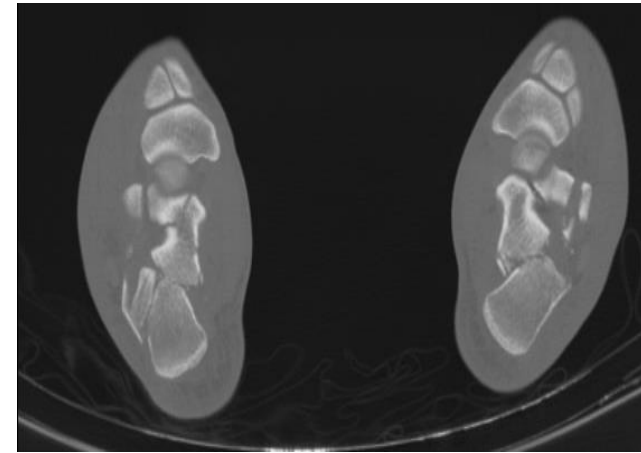
# Case Report 1

- PJAR, M, 44
- IIIAC



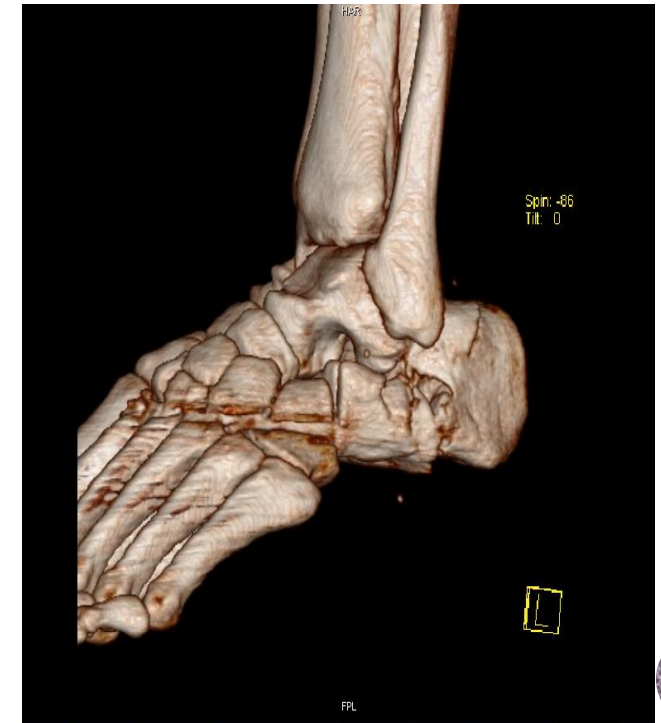
# Case Report 2

- HIMFC, M, 33
- Left: IIIAC
- Right: IIIAC



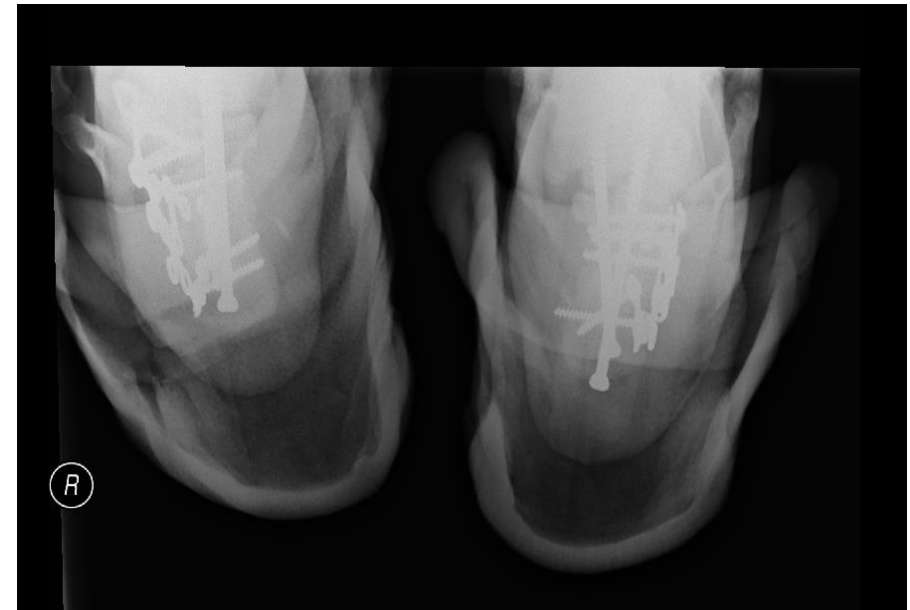
# Case Report 2

- HIMFC, M, 33
- Left: IIIAC
- Right: IIIAC



# Case Report 2

- HIMFC, M, 33
- Left: IIIAC
- Right: IIIAC





# Case Report 3

- JMIS, M, 66



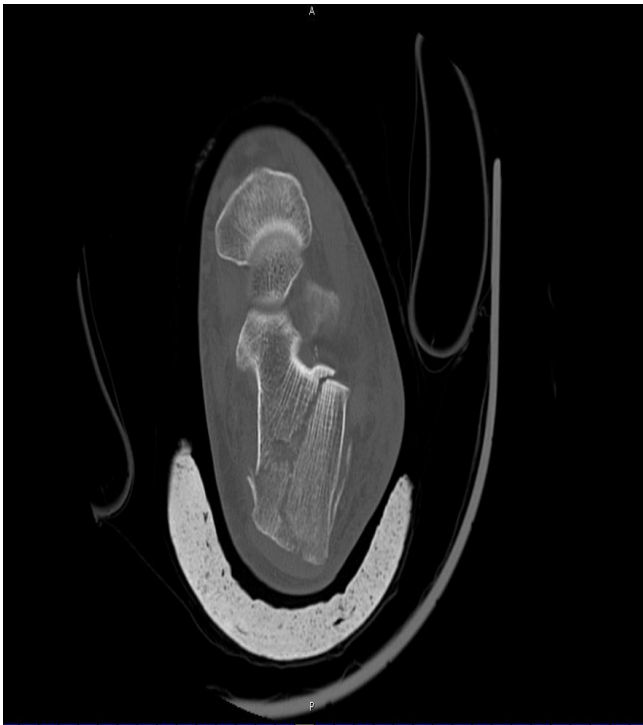
# Case Report 3

- JMIS, M, 66



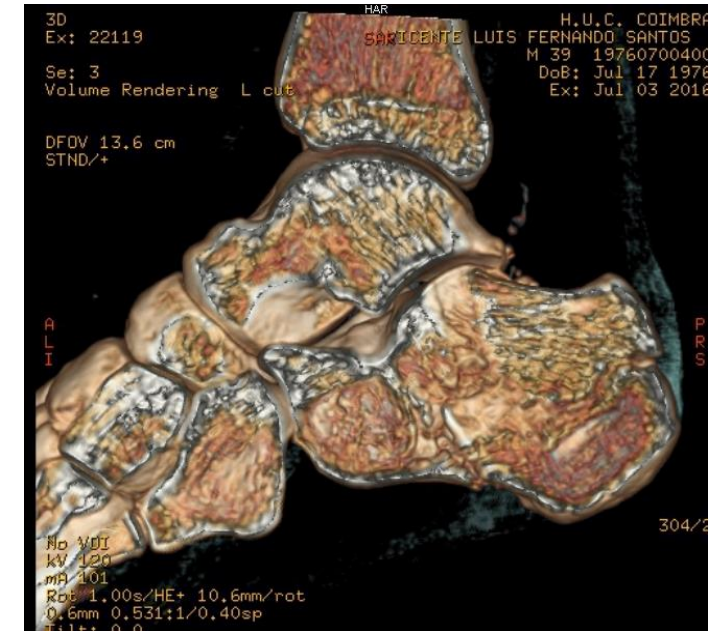
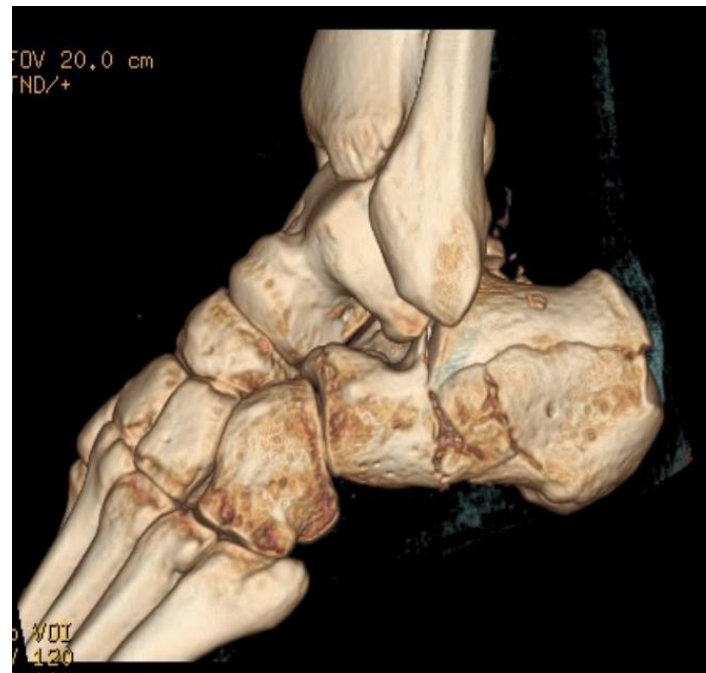
# Case Report 4

- LFSV, M, 36
- IIA



# Case Report 4

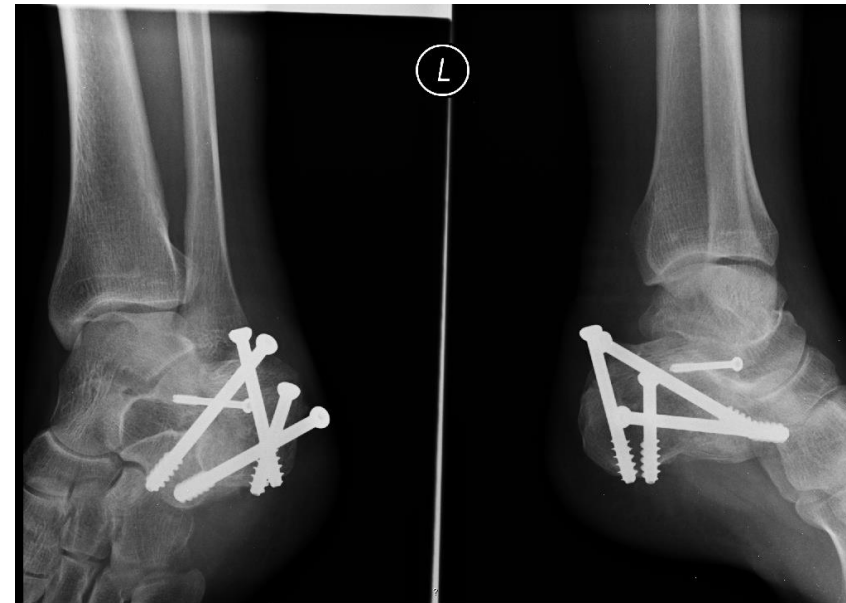
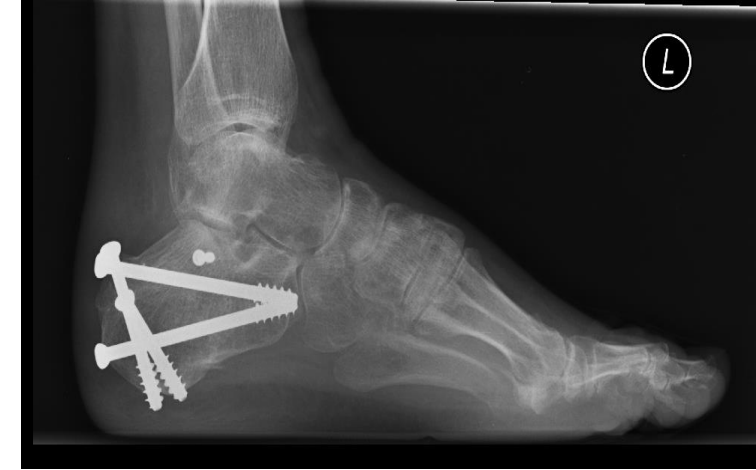
- LFSV, M, 36
- IIA





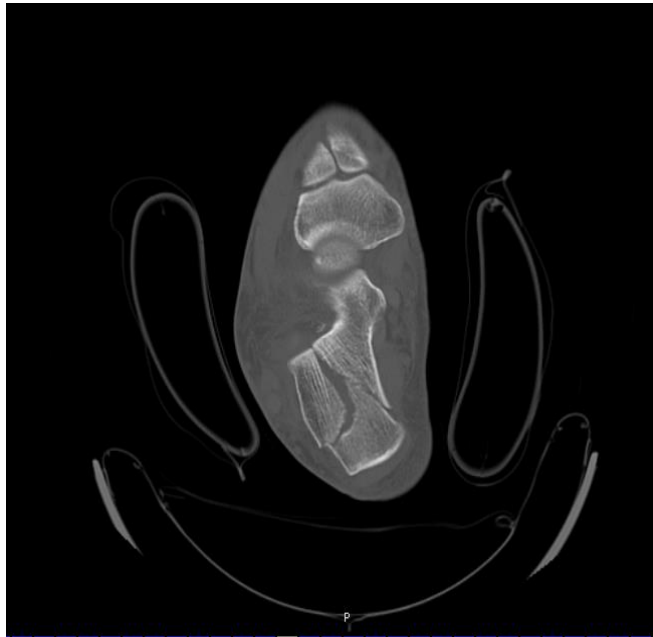
# Case Report 4

- LFSV, M, 36
- IIA



# Case Report 5

- AAMF, M, 45
- IIA



# Case Report 5

- AAMF, M, 45
- IIA



# Case Report 5

- AAMF, M, 45
- IIA

