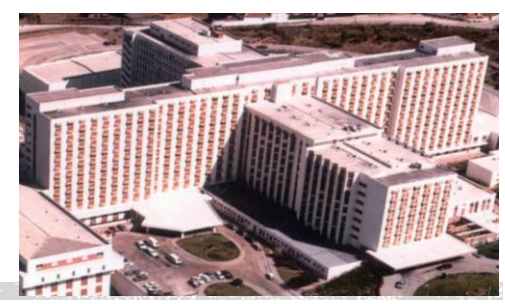




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Intra-articular calcaneus fractures

Classification and treatment



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Isabel Ferreira; Cura Mariano, Jorge Faísca;
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Department meeting, January 2017

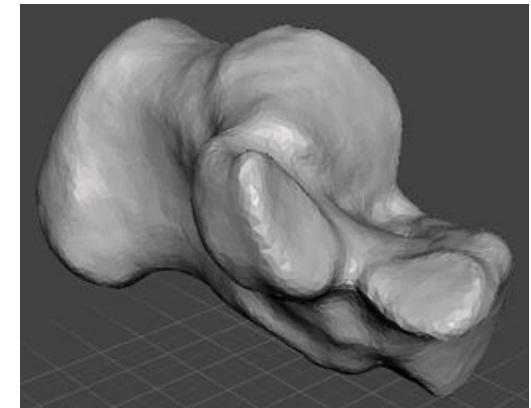
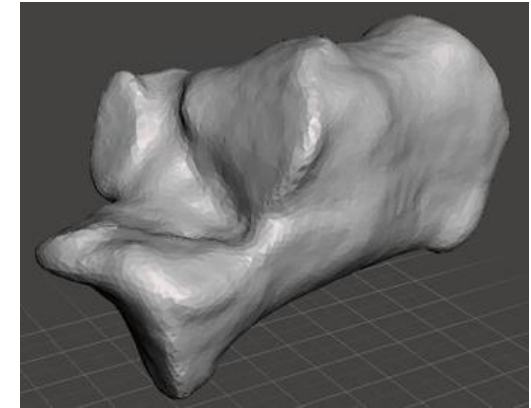
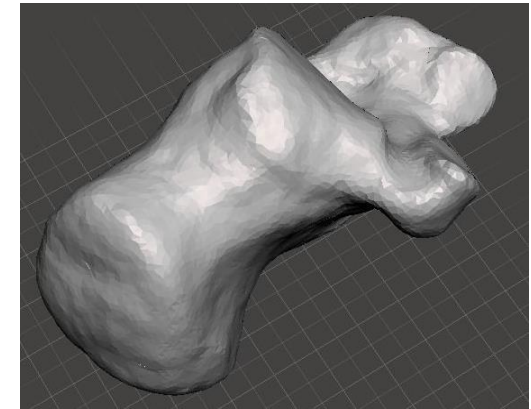
Introduction

- *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.*



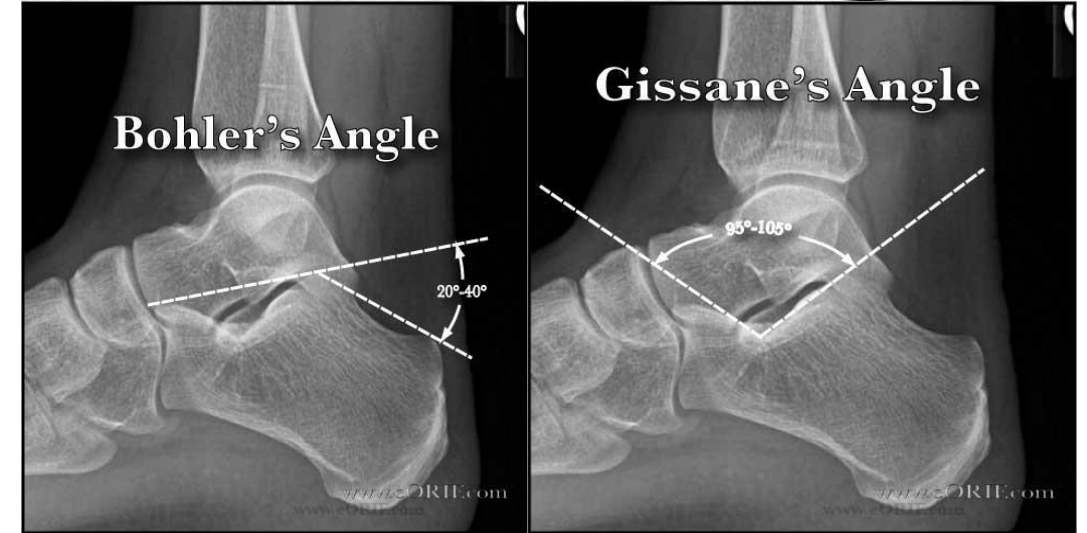
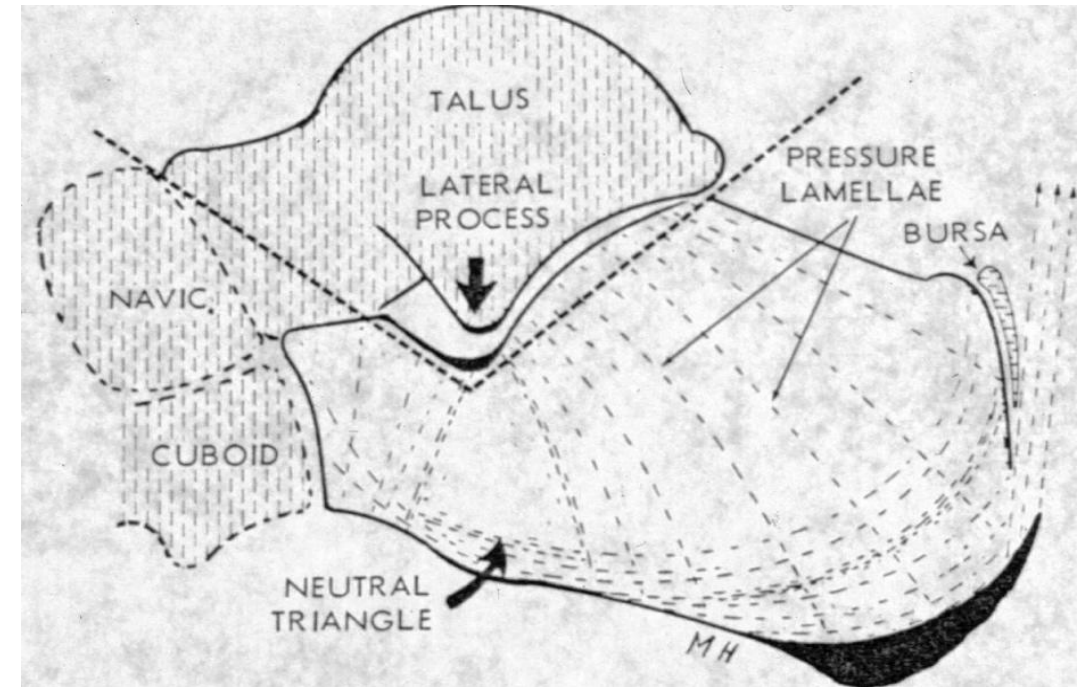
Surgical anatomy

- 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.



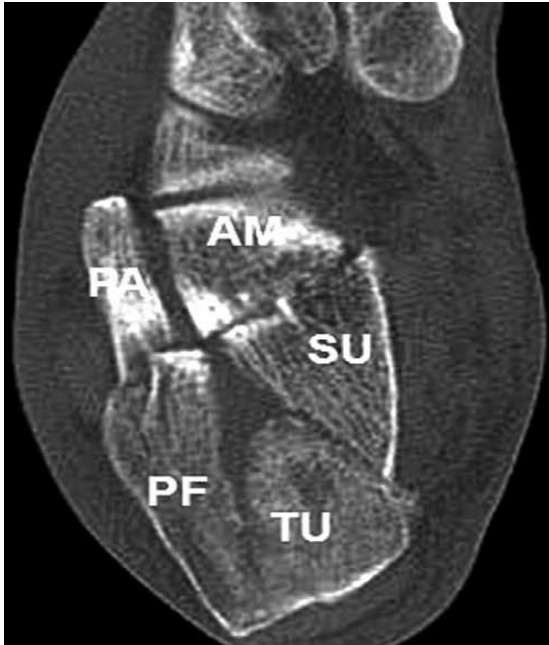
Surgical anatomy

- 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

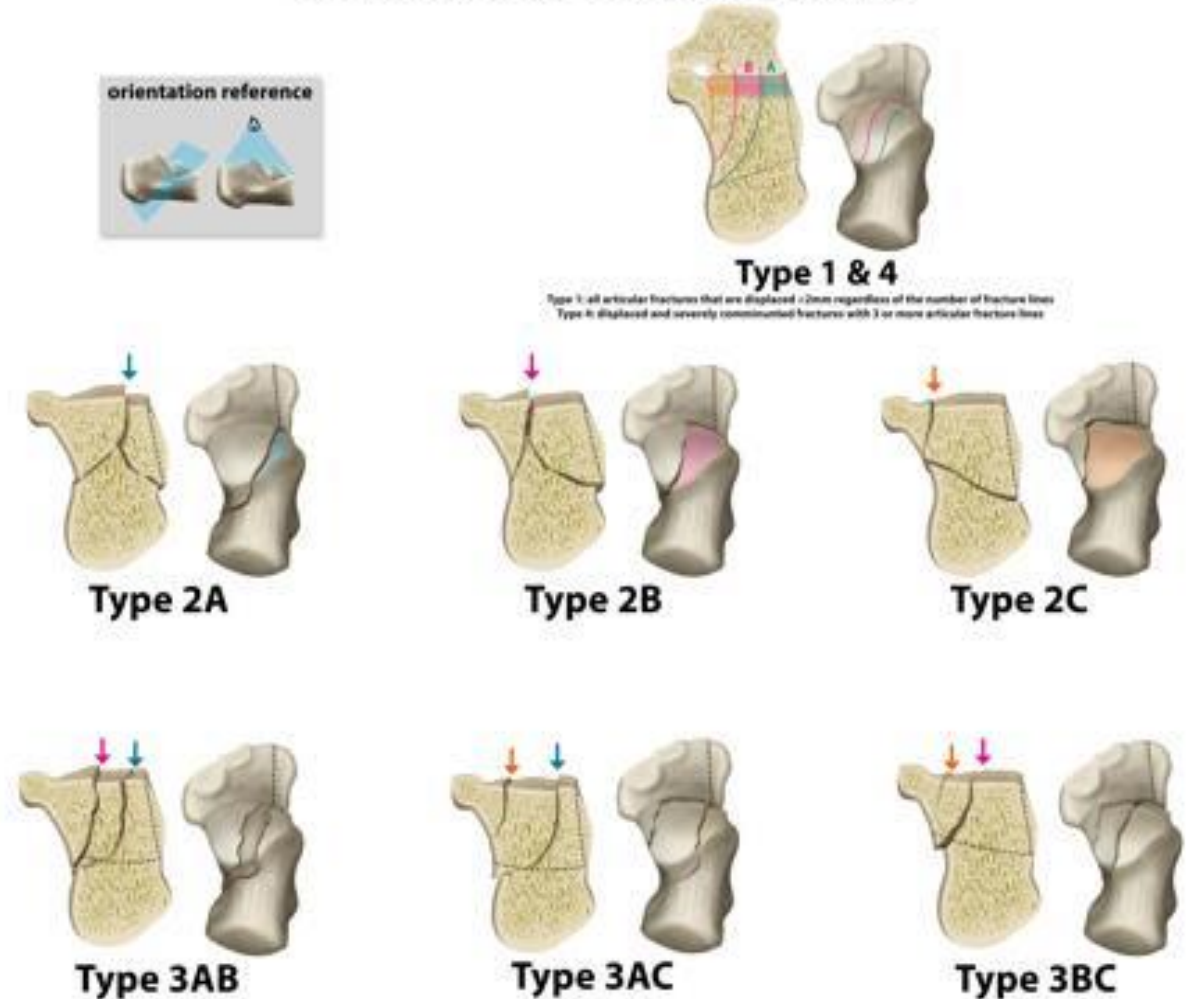
1 displaced fracture line - type II

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

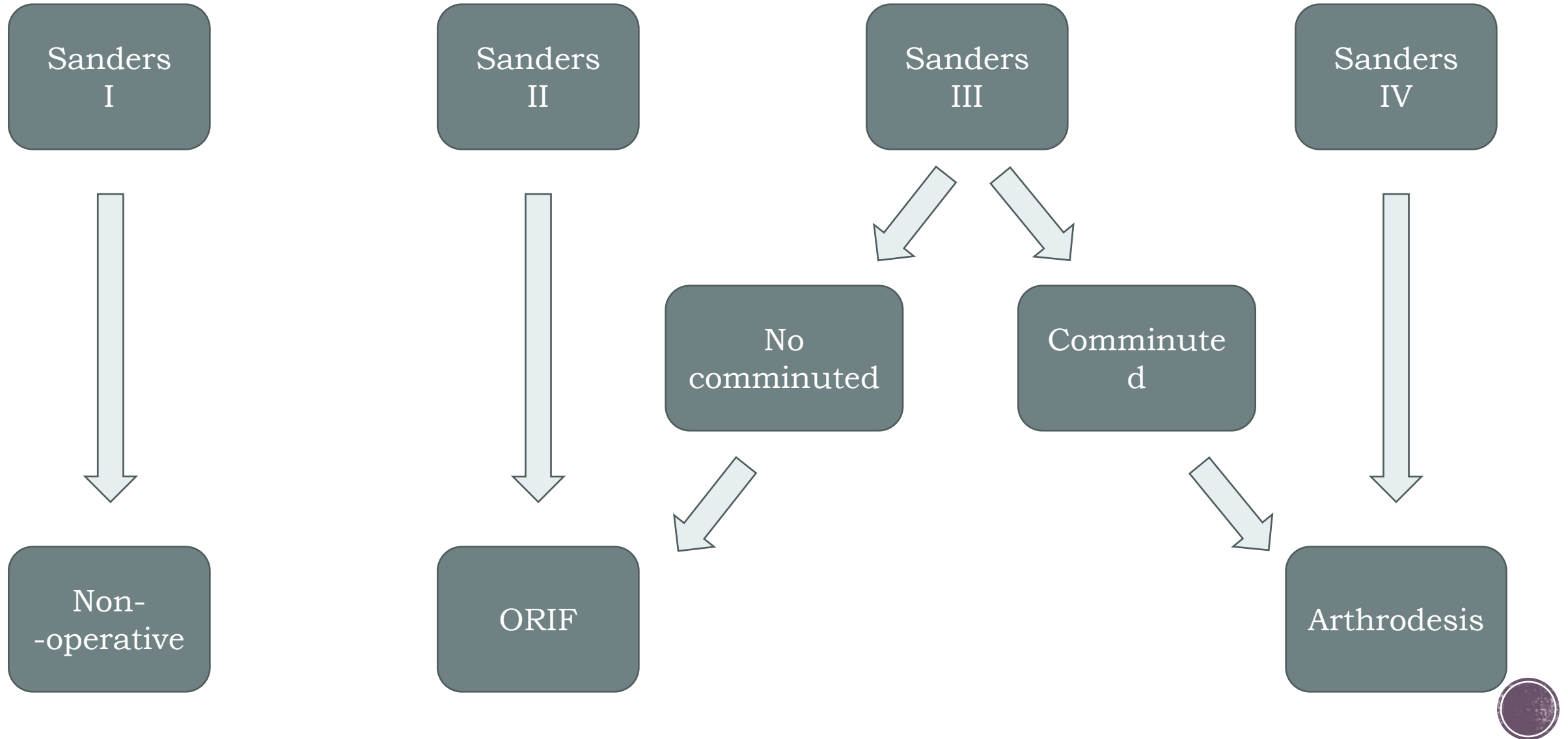


Treatment

- *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.*

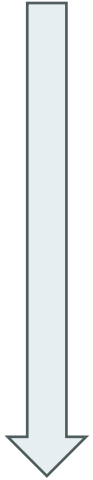


Treatment



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

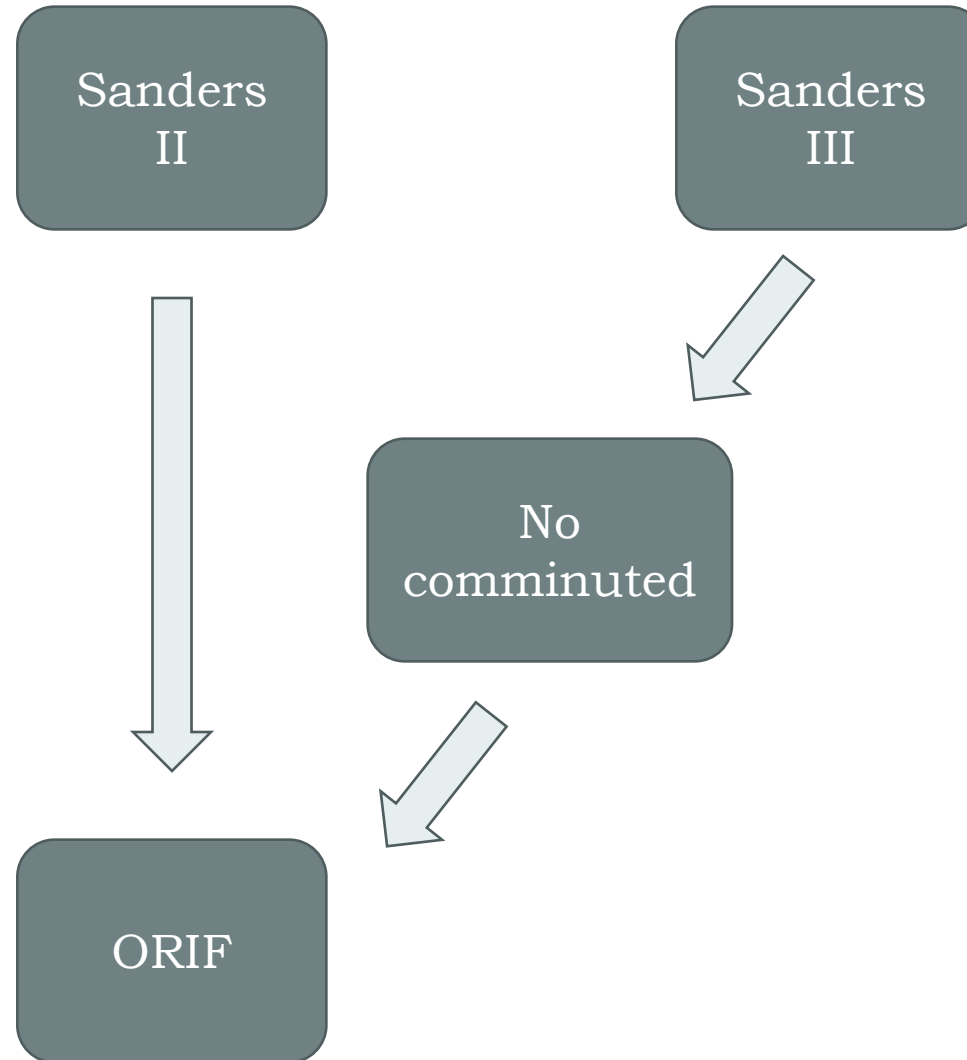


Full weight-bearing is achieved after 10–12 weeks, depending on the type of fracture and bone quality.



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*

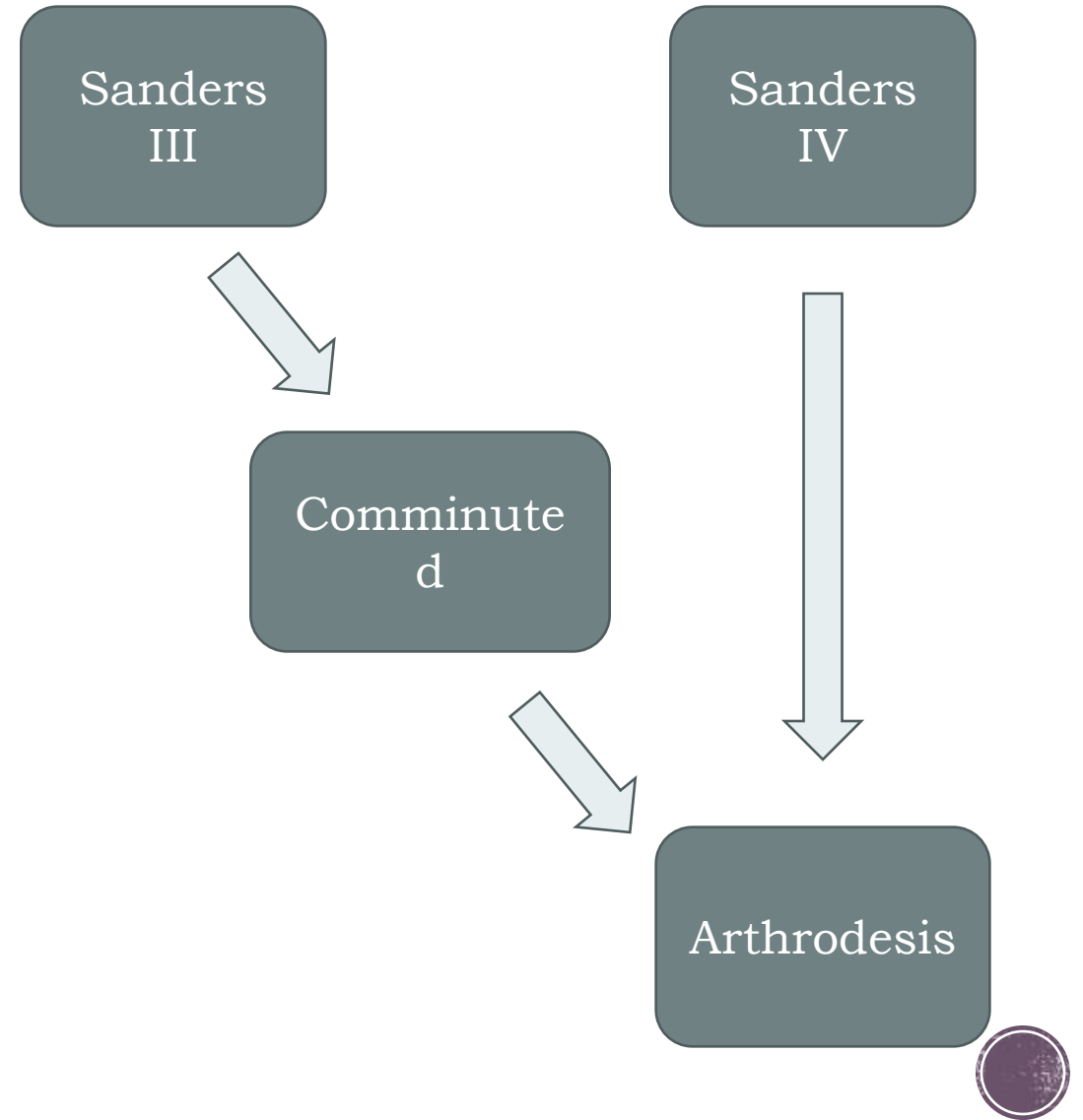


- *The extended lateral approach respects the neurovascular supply to the heel*
- *wound healing problems cannot be completely avoided*
- *Percutaneous and less invasive procedures have successfully lowered the rates of wound complications*

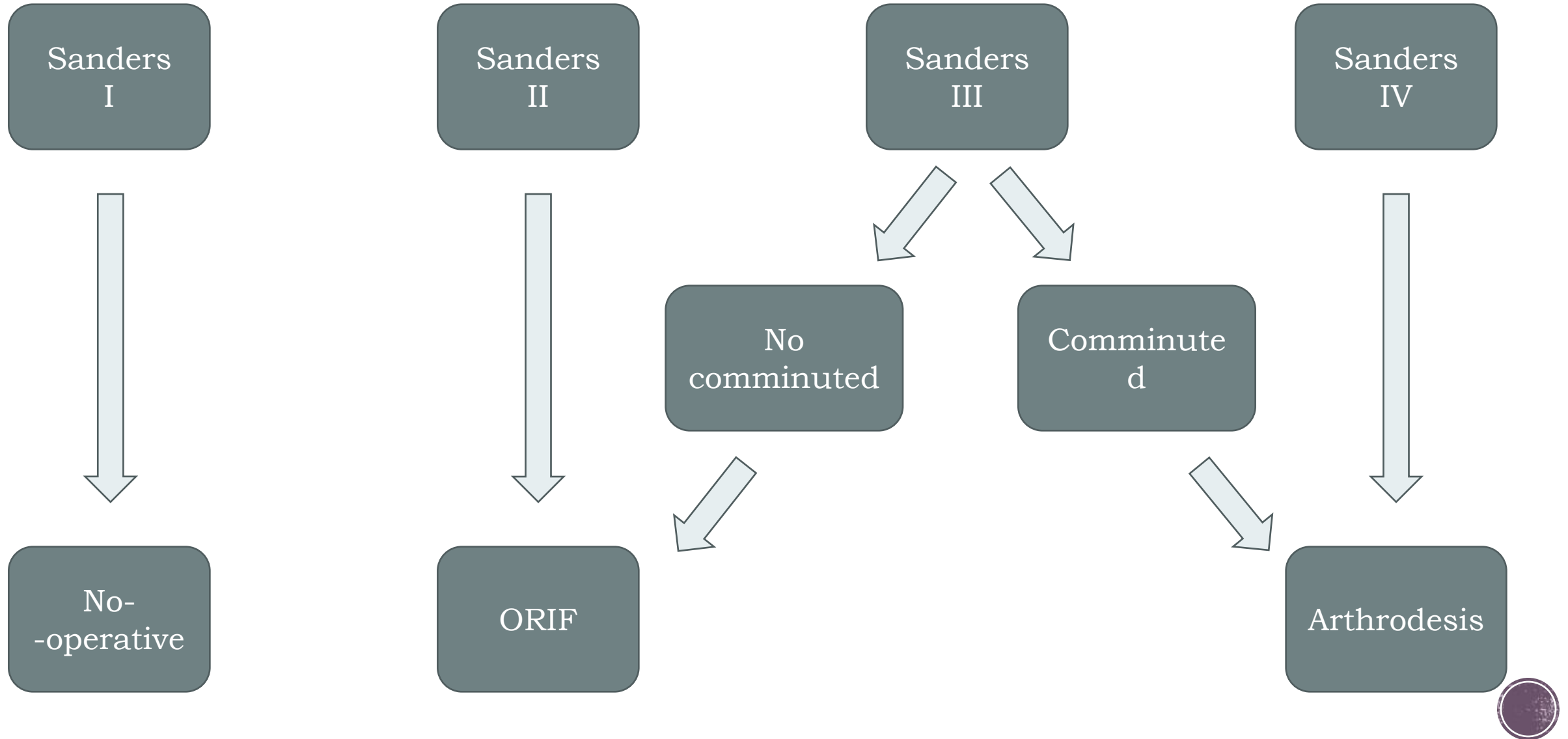


Treatment

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



Treatment

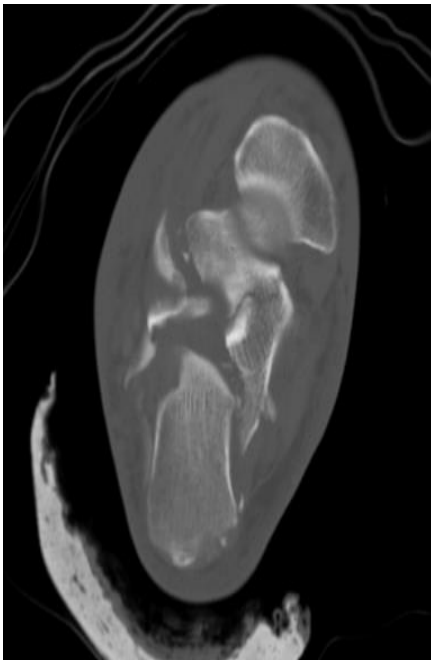


Case Reports



Case Report 1

- PJAR, M, 44
- IIIAC



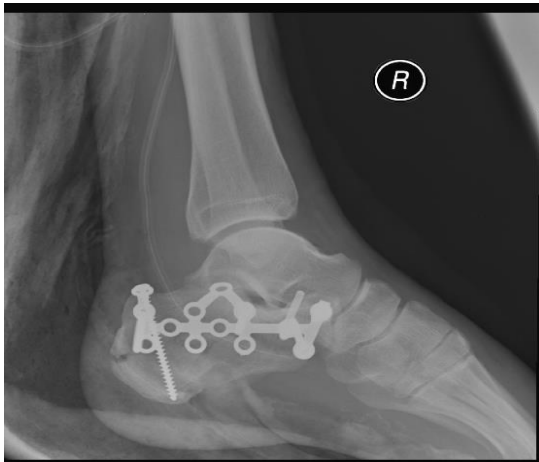
Case Report 1

- PJAR, M, 44
- IIIAC



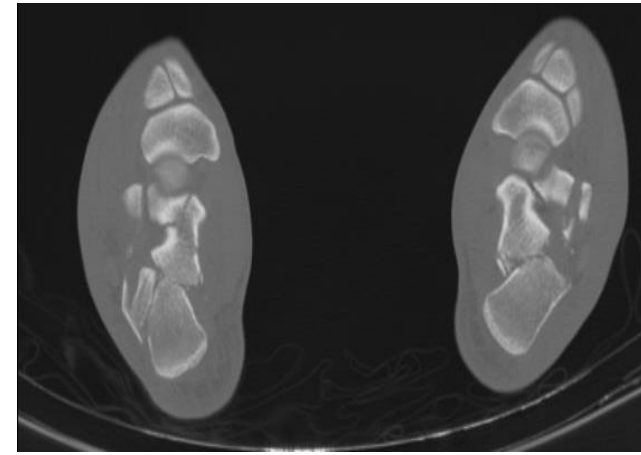
Case Report 1

- PJAR, M, 44
- IIIAC



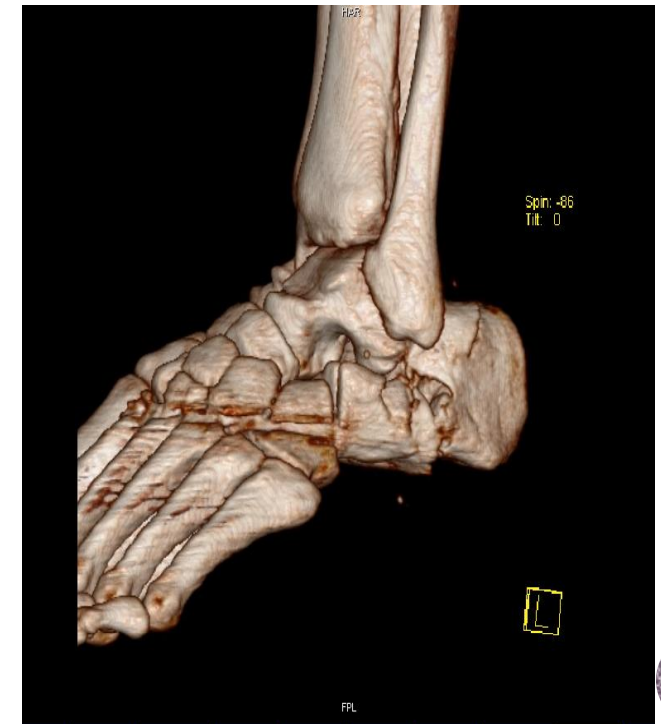
Case Report 2

- 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



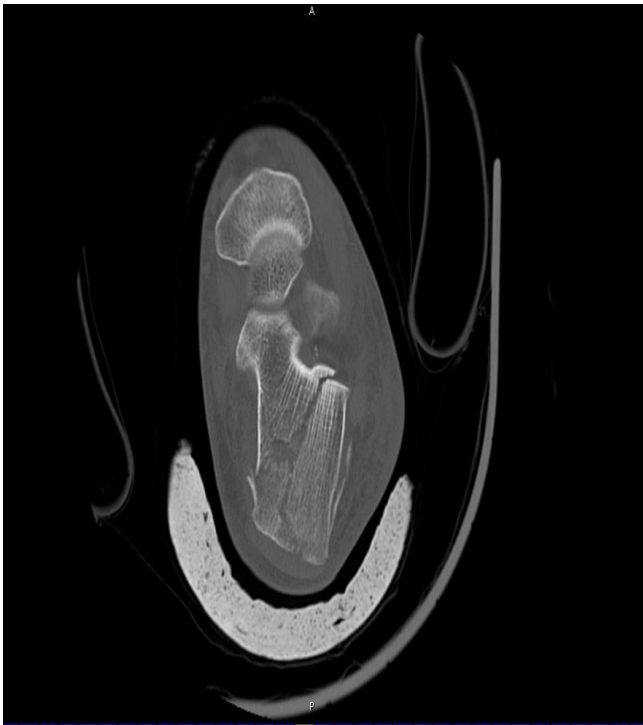
Case Report 3

- JMIS, M, 66



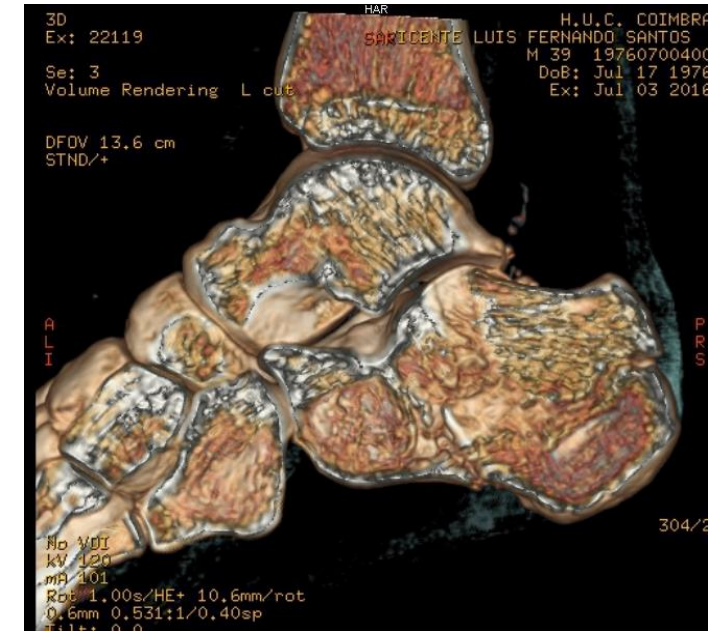
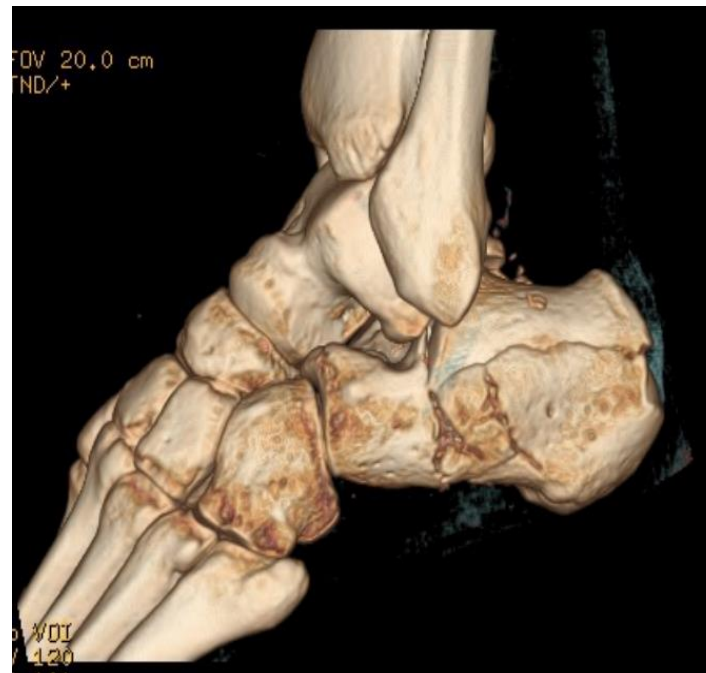
Case Report 4

- LFSV, M, 36
- IIA



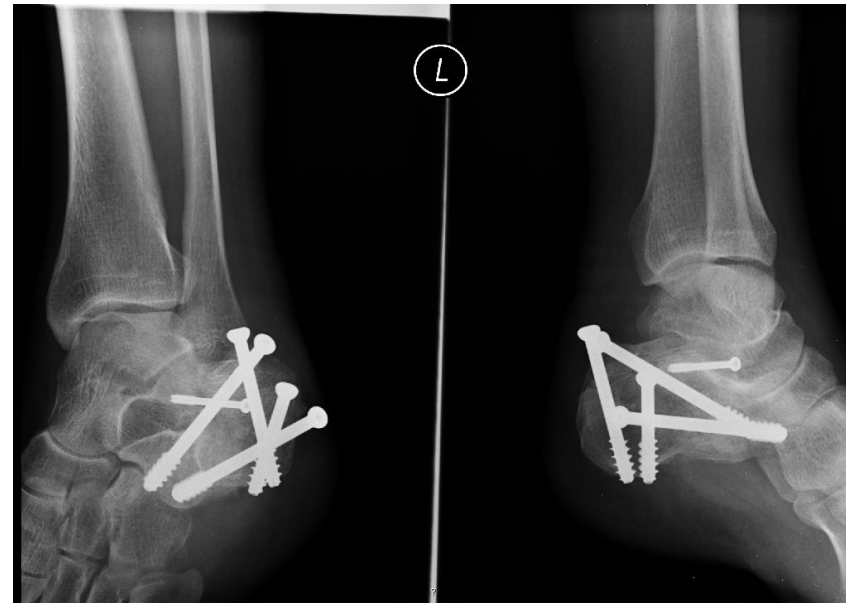
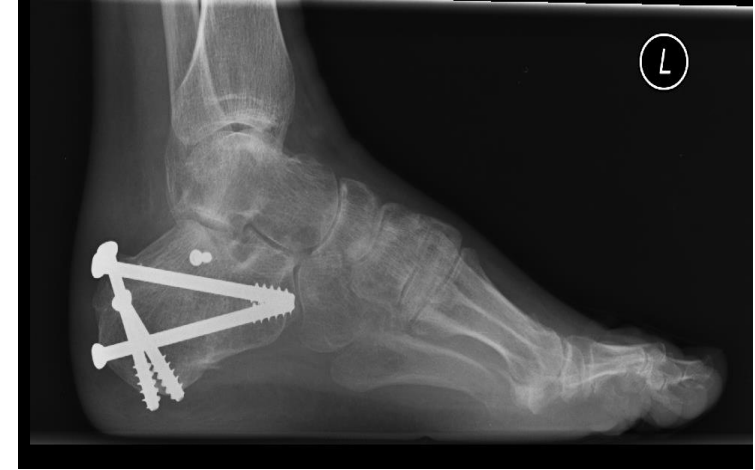
Case Report 4

- LFSV, M, 36
- IIA



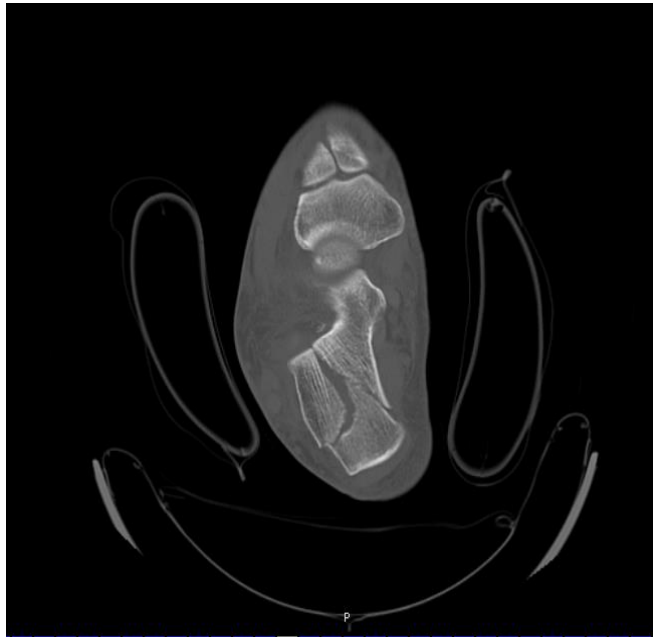
Case Report 4

- LFSV, M, 36
- IIA



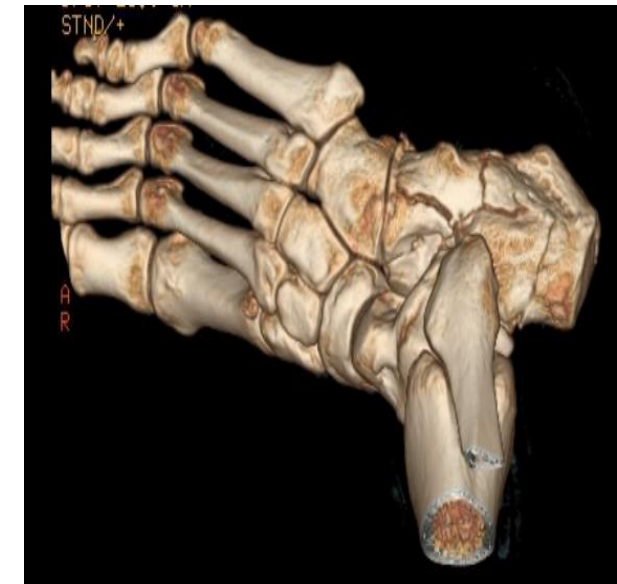
Case Report 5

- AAMF, M, 45
- IIA



Case Report 5

- AAMF, M, 45
- IIA



Case Report 5

- AAMF, M, 45
- IIA

