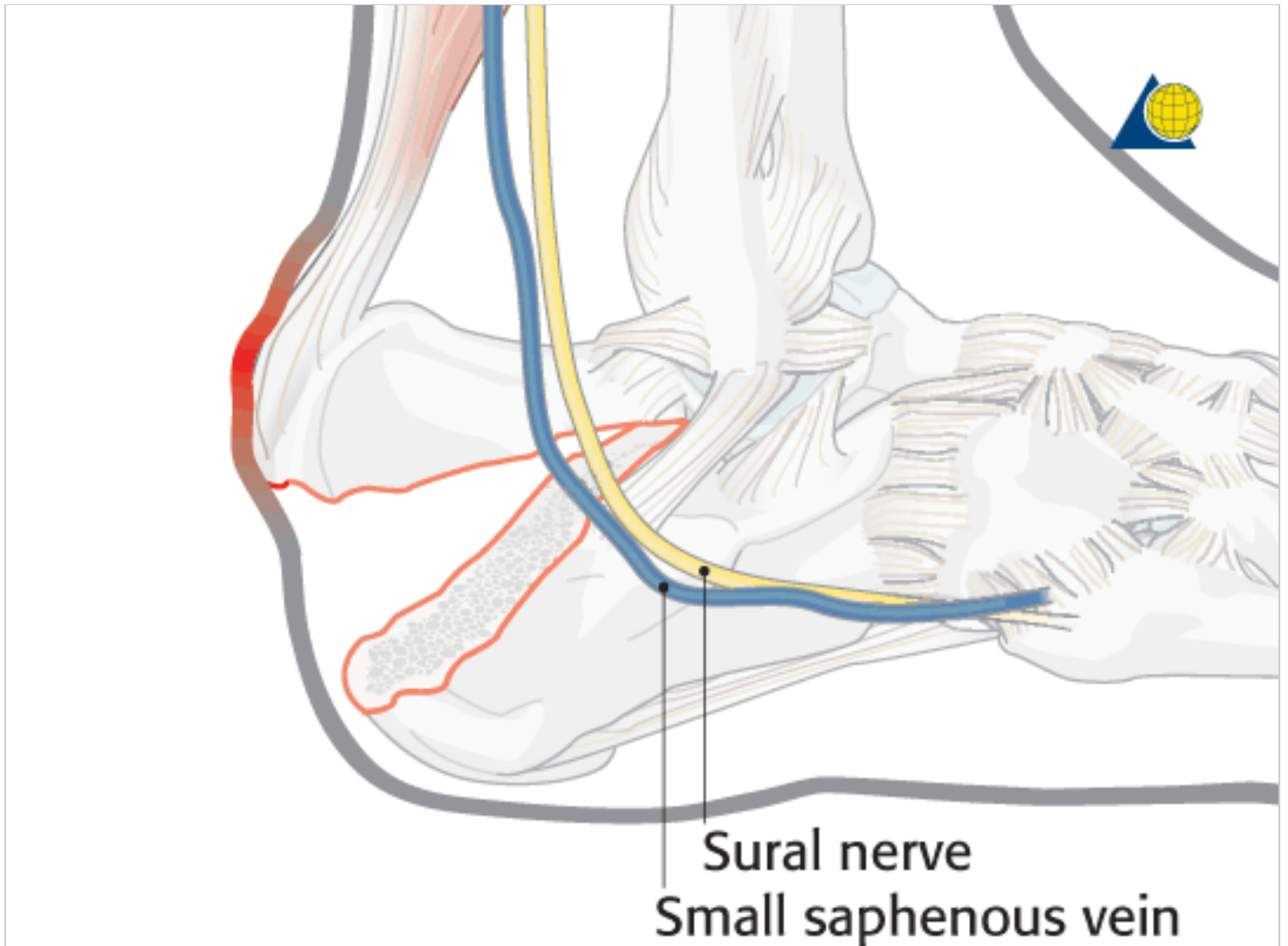


## 1. Diagnosis

### “Beak” fracture



This unusual displaced calcaneal fracture can be intra- or extraarticular. The most important feature of this fracture is its association with significant soft-tissue injury and potential soft-tissue complications. Because of marked disruption of the posterior soft tissues, if it does not present as an open fracture at the time of admission to hospital, the pressure from within on the posterior skin will soon cause it to break down and convert it into an open fracture.



This fracture occurs as a result of the Achilles tendon, which is extremely strong, avulsing a posterior fragment which may be either intra- or extraarticular. Occasionally, it is completely extraarticular but deserves the same operative treatment and reduction. If it is not reduced accurately, weakness from Achilles tendon dysfunction will occur.

This drawing shows an open intraarticular “beak” fracture, requiring urgent operative reduction for reasons of soft-tissue sparing and joint reduction.

### Indications for operative treatment



The surgeon must consider the patient and the fracture when making decisions about treatment. Operative management is indicated in patients with beak fractures

- with displacement of more than a few millimeters posteriorly
- present or impending posterior soft-tissue compromise
- no medical contraindications to operative care.

If the patient is medically safe for surgery, then immediate operative reduction is indicated to prevent this from becoming an open fracture.

### **Patient compliance**

Few injuries are more devastating or have more long-term impact on a patient's life. Patient and family education is crucial for enabling the patient to understand the significance of this injury. Important factors such as limb elevation, limb range of motion, smoking cessation and medical wellness (example: diabetic insulin control) allow patients to successfully complete required care pathways.

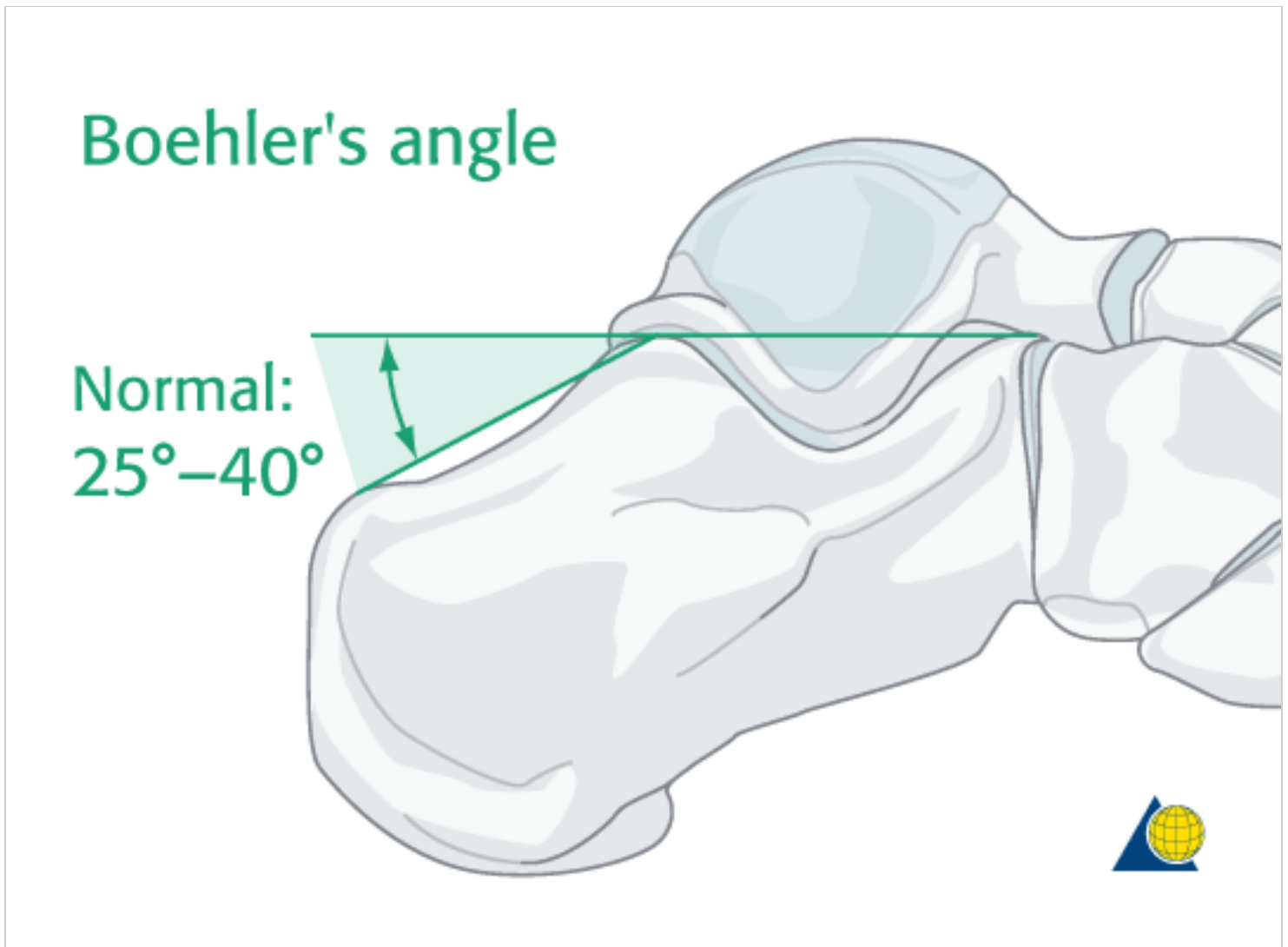
### **Radiology**





### *Radiographic views*

Lateral ankle x-rays show the dramatic displacement of the posterior tuberosity of the calcaneus. This x-ray will demonstrate also whether or not this fracture extends into the subtalar joint, or is completely extraarticular, leaving the posterior facet uninvolved.



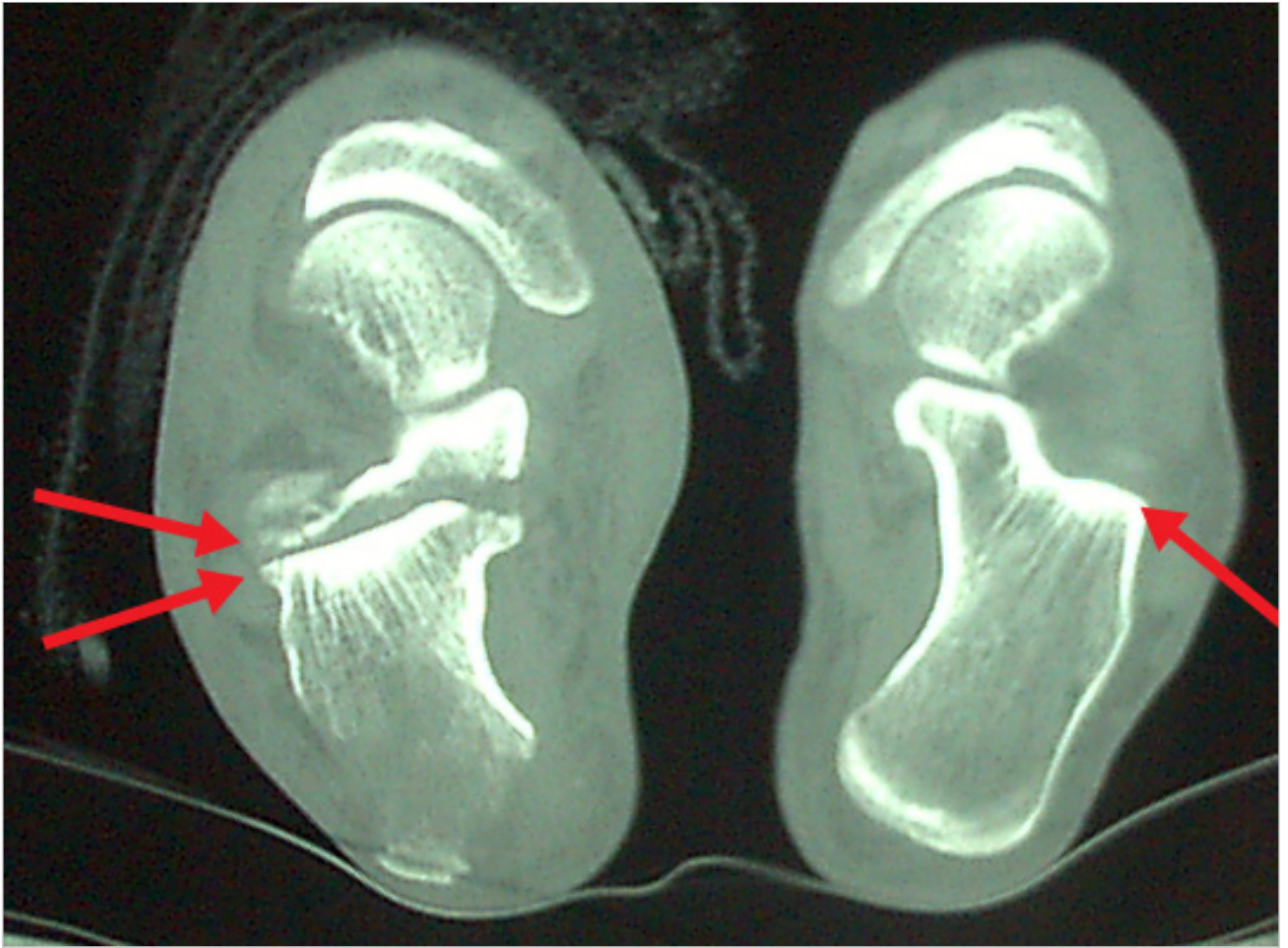
### *Böhler's angle*

A decrease in Böhler's angle demonstrates the severity of joint injury and displacement (depression) as measured on the lateral x-ray. The normal angle is 25 degrees to 40 degrees. If this angle remains above 15 degrees, nonoperative care can be suggested.



*Axial view*

This view is difficult to interpret because the displaced tuberosity hides the injury as it is in the plane of displacement.



### *Computed tomography*

If there is time before skin compromise, a CT will be helpful to discern the exact amount of joint displacement. This CT shows a normal foot and an axial cut of a patient with a beak fracture, showing the double line of the articular surface which demonstrates the articular split.

## 2. Soft-tissue principles

### Soft-tissue injury





All heel fractures have a spectrum of soft-tissue injury. Rest, ice, elevation and compression will help in resolving the soft-tissue injury, and prepare the foot for definitive care regardless of fracture type and treatment type. Non-weightbearing is essential until the final treatment plan has been executed. Sometimes, delay is not possible because of a bony fragment pressing on the overlying skin and threatening immediate breakdown. When this occurs, one is not only faced with an open fracture, but necrotic soft tissue, which usually leads to a terrible scenario.

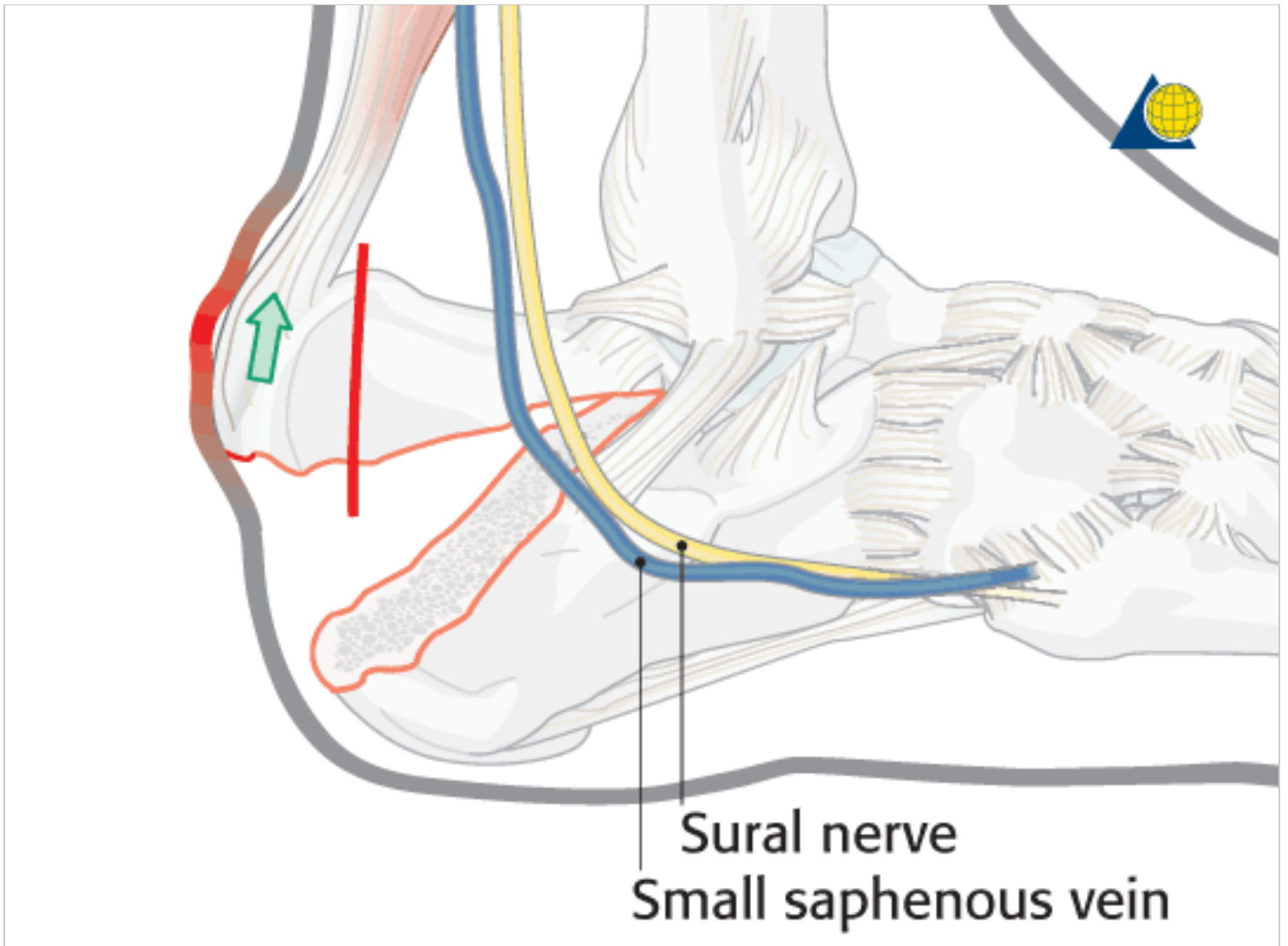




Without urgent debridement and reduction, this fracture soon penetrates soft tissues by skin necrosis. The photograph demonstrates a case with skin incision and the immediate exposure of the “beak” fracture. With careful immediate open reduction, the skin is salvaged.

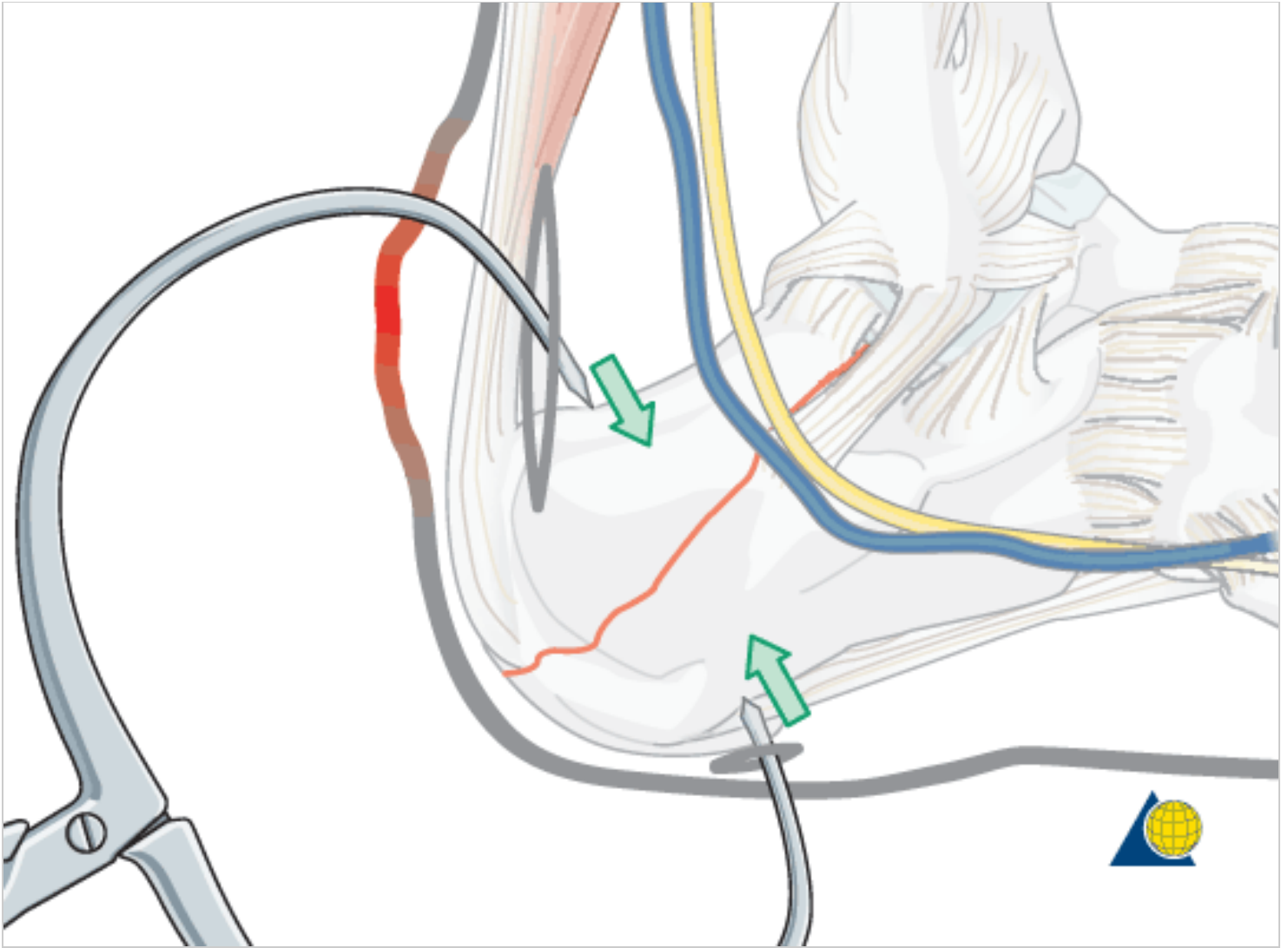
### 3. Reduction and Fixation

#### Approach



The fracture is approached through the proximal portion of the posterior arm of the extended lateral approach to the calcaneus.

### Reduction

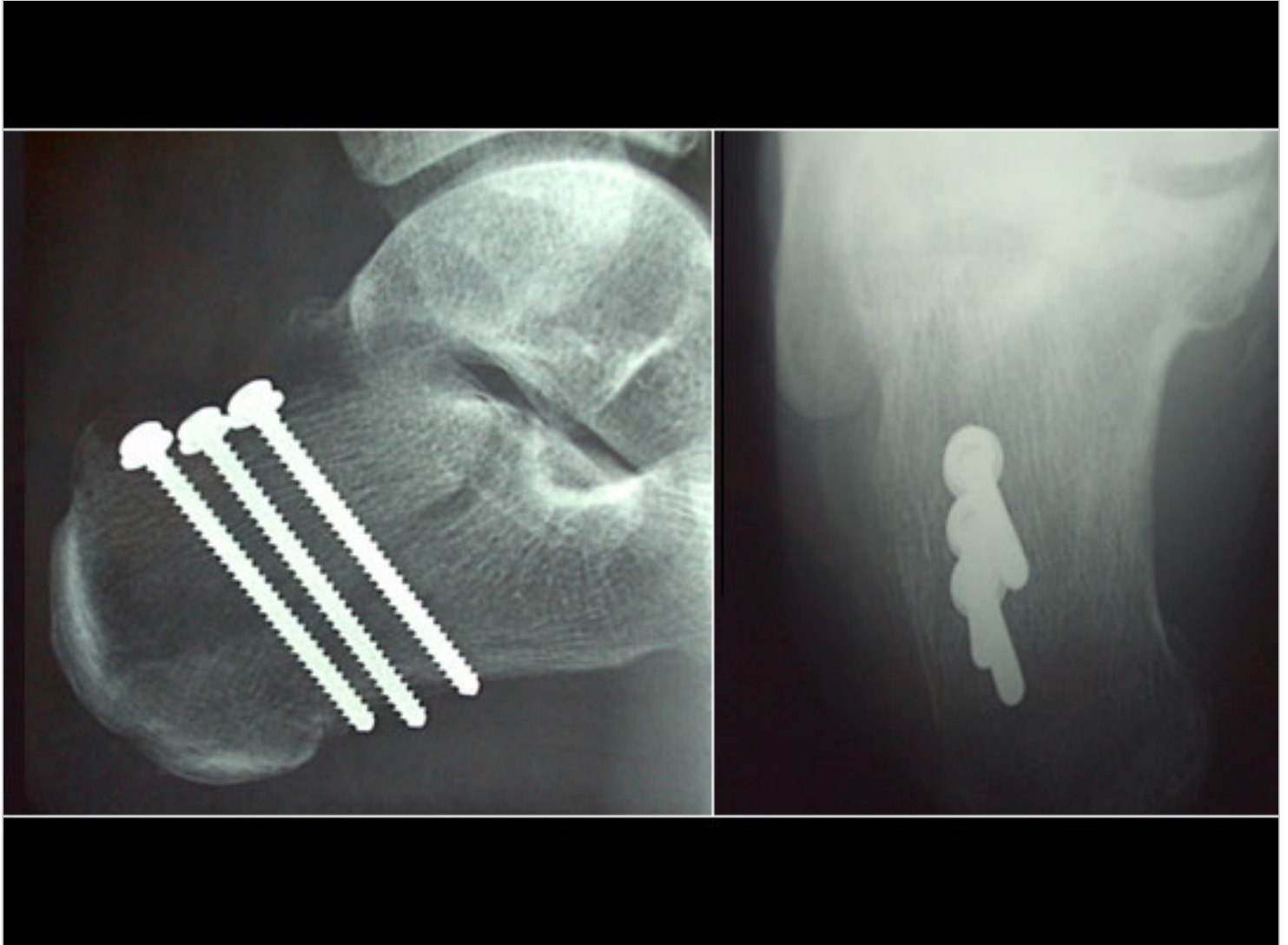


With the small posterior incision, the dorsal tuberosity can be seen and the fracture visualized. A large clamp is placed through the incision with one arm on the top of the tuber, and the other sharp tongue through the heel pad.

By carefully closing the clamp, the fracture is reapproximated and reduced. The quality of the reduction is confirmed under the image intensifier.

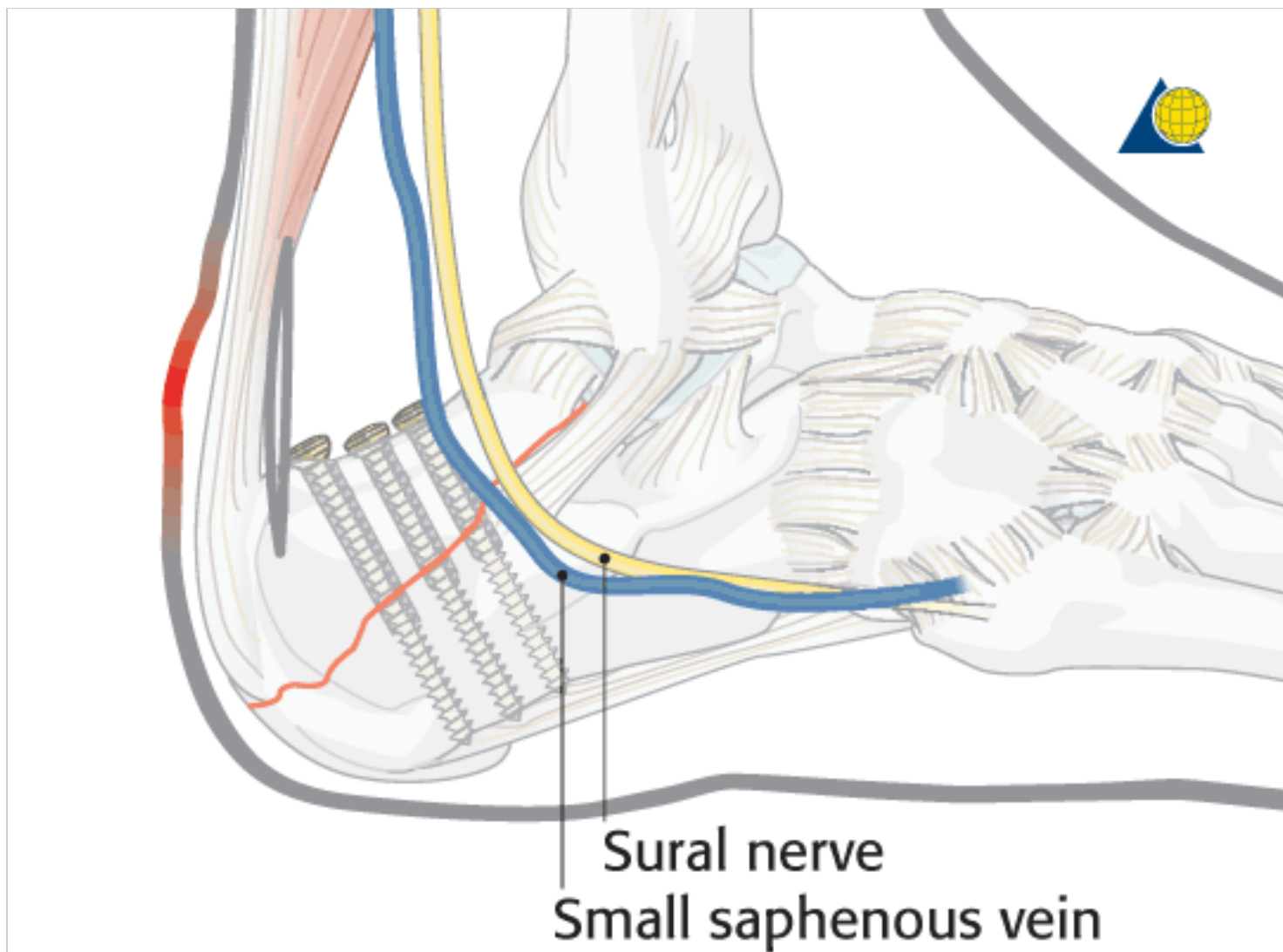
In reducing the fracture, one must make certain that when the fragments are reapproximated, the subtalar joint is reduced anatomically. This must be checked carefully with the image intensifier.

### **Cortical lag screw placement**



With image intensification and the fracture reduced, lag screws are placed perpendicular to the fracture line in standard fashion.





Two or three cortical lag screws are preferred and must be bicortical, using the thick plantar surface of the calcaneal tuberosity for effective purchase. These screws should be just anterior to the weight-bearing portion of the tuberosity with their plantar purchase.

Addition of washers may assist in weaker porotic bone, if necessary.

### Appendix

#### Note

##### Urgent reduction

If the patient is medically safe for surgery, then immediate operative reduction is indicated to avoid this fracture to penetrate soft tissues by skin necrosis.

#### Shortcuts

**All Approaches**

**All Reductions & Fixations**

#### Decision support

**Assessment of calcaneal fractures**

**Decision making in trauma surgery**

**Further reading**

**Surgical anatomy of the calcaneus**

**Soft-tissue principles**

**Screw principles**

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