

# Fractures of the leg bones

Fractures of the bones of the foot include fractures of the heel bone, ankle bone, other tarsal bones, metatarsal bones, and toe joints. Other foot injuries can be dislocations of the talus and other tarsal bones.

## Fractures of the calcaneus

The calcaneus breaks quite often due to the predominance of cancellous bone tissue. Fractures of the calcaneus account for 2% of all fractures.<sup>[1]</sup> Fractures of the calcaneus are usually caused by an impact on the heel when jumping from a great height. This injury is often associated with fractures of the lumbar vertebrae and other bones of the leg.

### Essex-Lopresti classification

- Type I – *extra-articular* fractures
- Type II – *intra-articular* fractures, which are divided into *articular-depressed* and *lingual* type



Fracture of the heel bone.

### Clinical picture and diagnosis

The limb cannot be loaded due to **extreme pain**, the talocrural joint can only be moved very limitedly. Everything is accompanied by massive swelling, sometimes even compartment syndrome. Hematoma and bullae form at the site of injury. The diagnosis is carried out using an X-ray examination, the calcaneus is scanned in the **axial and anteroposterior projection**. CT scans and 3D reconstructions are also performed.

### Treatment

For non-dislocated fractures and extra-articular displaced fractures, the leg is immobilized with a modeling plaster. This is a **conservative** therapy. Intra-articular fractures are treated **with surgery**. The calcaneus is stabilized with a screw, fan of Kirschner wires, or an external fixator. During surgery, the calcaneus is also repositioned and remodeled.

## Fractures of the ankle bone

Fractures of the head, neck and body, or the posterior or lateral process, occur in the *talus*. Fractures of this bone account for less than 1% of all fractures.<sup>[1]</sup>

### Neck fractures

The neck of the talus breaks against the tibia during a height impact when **the leg is violently dorsiflexed**. Dislocation of fragments sometimes occurs due to shearing forces. The leg is extremely painful, swollen and cannot be used to move. **An X-ray** is used for diagnosis. **Specifically, anteroposterior, lateral, and oblique dorsoplantar** images are performed. If there was no dislocation of the fragments, plaster fixation is used for treatment. Dislocated fractures should be repaired as quickly as possible, then fixed with plaster and checked with an X-ray.

### Fractures of the body

The body of the ankle bone breaks by transferring the energy, which is created when **the foot hits the ground violently**, from the tibia to the talus. *In many cases, comminuted fractures occur.*

Clinical signs include pain, deformity, swelling, hematoma, and limited mobility.

Non-dislocated fractures are treated conservatively. Dislocated fractures are stabilized by osteosynthesis.

## Fractures of other tarsal bones

In addition to the calcaneus and talus, the tarsal bones include *the os cuboideum, os naviculare, and ossa cuneiformia*. Fractures of these bones are usually caused **by a direct** mechanism. Due to the strong *interosseous ligaments*, fragment dislocation usually does not occur.

### Clinical picture and diagnosis

The leg is painful, swelling occurs and a hematoma forms. The diagnosis is confirmed by X-ray images.

### Treatment

Non-dislocated fractures are fixed with a modeling plaster, so they are treated conservatively. Dislocated fractures must be re-set, fixed with crossed Kirschner wires to adjacent bones.

## Fractures of the metatarsal bones

They are usually caused by a direct mechanism – running over or falling a heavy object on the leg. Specific fractures are *fractures of the base of the V. metatarsus*, which are caused by the tension of the tendon of the fibularis brevis muscle, and the so-called *marching (fatigue) fractures* of the II., III. and IV. metatarsus.

### Clinical picture

Fractures are accompanied by pain and swelling.

### Treatment

Non-dislocated fractures are treated conservatively. Dislocated fractures are solved by transfixation with Kirschner wires, or they are stabilized with small plates. The base of the V. metatarsus is fixed intramedullary with a screw.

## Fractures of the finger joints

These fractures occur similarly to fractures of the metatarsal bones by a direct mechanism.

### Treatment

For fractures *of the base joint of the thumb*, fixation with Kirschner wires or a small plate is used. Other fractures of the finger joints are treated only with patch fixation.

## Dislocation of the ankle bone

- **Subtalar dislocation** – The position *of the tibiotalar joint* does not change, only dislocation occurs in *the subtalar* and possibly also in *the talonavicular joint*. Depending on which direction the foot is against the ankle bone, it is an *anterior, posterior, medial or lateral peritalar luxation*.
- **Complete (double) dislocation** – Dislocation occurs in *the lower and upper ankle joint*. There will be a complete interruption of the vascular supply to the thallus. It may be an open wound.

### Clinical picture and diagnosis

The leg is painful and its shape is greatly deformed. Diagnosis is made by X-ray examination.

### Treatment

Urgent reduction of luxations is performed. The leg is then immobilized with a cast.

## Luxation of other tarsal bones

Most often, dislocations occur in *the Chopart and Lisfranc joints*. *Isolated luxation of the navicular bone* also occurs quite often.

### Luxation in the Chopart joint

In most cases, conservative therapy is used for luxations in the Chopart joint, reduction is ideally performed under general anesthesia. This is followed by plaster fixation, which immobilizes the joint.

### Dislocation in the Lisfranc joint

Complete and partial dislocations and dislocation fractures occur in the Lisfranc joint. Treatment is based on early reduction and subsequent plaster fixation. If the joint is unstable, it is transfixed with Kirschner wires.

### Isolated dislocation of the navicular bone

A complete isolated dislocation of the os naviculare is also called *an enucleation*. It occurs during a violent plantar flexion of the leg. In this injury, **the navicular bone can be felt**, it protrudes above the surrounding bones. Early reduction and plaster fixation are performed.



Fracture of the navicular bone.



Fracture of the base of the V. metatarsus.

## Links

## Reference

1. VIŠŇA, Petr – HOCH, Jiří. *Traumatology of adults*. 1. edition. Maxdorf, 2004. 157 pp. pp. 114-116. ISBN 80-7345-034-8.

## References

- KOUDELA, Karel. *Ortopedická traumatologie*. 1. edition. Karolinum, 2002. 147 pp. ISBN 80-246-0392-6.
- VIŠŇA, Petr – HOCH, Jiří. *Traumatologie dospělých : učebnice pro lékařské fakulty*. 1. edition. Maxdorf, 2004. 157 pp. ISBN 80-7345-034-8.

## Související články

- Ossa Tarsi
- Ossa metatarsi
- Finger bones
- Leg joints
- Types of fractures and their dislocations