72 Foot injury

72.1 Conservative treatment

Because feet are usually hidden inside shoes, injuries to them tend to be neglected, especially in diabetics or where there is a peripheral neuropathy. You can treat most foot injuries conservatively, and only a few need manipulation. A calcaneal body fracture is the most important. If you have no X-ray facility, or diagnosis is difficult, proceed as follows:

If there is any obvious displacement of the foot bones, correct it as best you can and then apply a short leg walking cast (72-1), taking care to mould its sole to both the longitudinal and transverse arches of the foot. Keep the patient in bed until the pain subsides and then start walking with crutches. If you cannot hold any reduction in PoP, fix it with K-wires (58.6)

If there is no obvious displacement, fit a short leg walking cast as above.

If the pain is severe and there is only a minor injury, or the radiograph shows no pathology, a short leg walking cast will usually also help.

DON'T FORGET TO REDUCE SEVERE DISPLACEMENT

ADAPTED SHORT LEG WALKING CAST

Fig 72-1 A SHORT LEG WALKING CAST. Make sure you mould it to the patient's foot arches. *Kindly contributed by Benjamin Mbindyo.*

72.2 Talo-navicular dislocation

The joint between the talus and the navicular is often strained, and occasionally dislocates, sometimes in association with a dislocation of the forefoot. After some violent injury, the foot is turned inwards and displaced under the talus, which remains in its normal place in the ankle joint. The displacement of the front of the foot from around the talus forms a swelling on the dorsum of the ankle, which quickly presses on the skin causing it to slough (72-2A).

There is great pain, and the extreme inversion of the foot makes the diagnosis obvious. Occasionally, the foot is displaced laterally instead of medially. Sometimes the cuboid and the calcaneal head are fractured also. You will see these best after you have reduced the talo-navicular dislocation, but even if present, they do not alter the treatment.

TALO-NAVICULAR DISLOCATION
(GRADE 1.4)
Reduce the dislocation quickly before the skin over the talar head becomes necrotic. Use ketamine & move the foot back into position, If the foot remains unstable, fix it with a K-wire (58.6). Splint the ankle, raise it apply a crepe bandage, and keep the patient in bed until the swilling subsides. Then apply a cast with a walking heel, and start walking using crutches. Teach walking without a limp. Remove the cast at 3-8wks.

72.3 Talar dome fracture

In this injury, the patient twists the foot inwards, and shears a small fragment off the upper surface of the talus. An AP radiograph shows a small triangular fragment, like a loose body, at the upper lateral talar angle. As the foot returns to its normal position, this fragment may turn upside down, and then needs removal.

N.B. **If the fragment is the right way up,** no intervention is needed.

EXCISION OF A TALAR LOOSE BODY
(GRADE 2.5)
Make an antero-lateral incision just lateral to the long foot extensors to avoid the superficial peroneal nerve, and extract the loose bone.
Fit a short leg walking cast for 10-14days, after which you should encourage walking without a limp, as soon as possible.

72.4 Talar body fracture

This rare injury results from a fall from a height onto the heels which crushes the talar articular surface. The ankle becomes swollen & painful.

If the talar fracture is comminuted, try to mould the fragments by active movement. As soon as moving the ankle without too much pain is possible, allow walking with crutches, without weight-bearing for 3months. If it becomes too painful, an arthrodesis is needed.

TALAR INJURIES

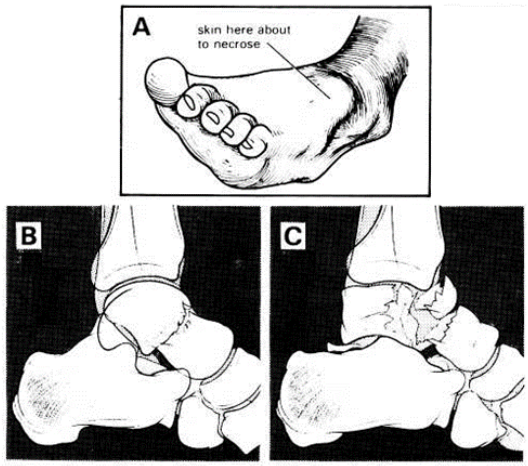

Fig. 72-2 SOME TALAR FRACTURES A, the dislocated talo-navicular joint forms a swelling on the dorsum of the ankle, risking skin damage. B, an undisplaced talar neck fracture (no angulation). C, a comminuted talar body fracture.

72.5 Talar neck fracture

This rare fracture is the result of forced dorsiflexion of the foot, and may injure the soft tissues severely. The fracture line runs through the talar neck in a coronal plane just in front of the anterior tibial margin.

There are several varieties:

(1) no displacement,

(2) angulation of the fragments so that the posterior half of the talus is plantarflexed, whilst its anterior half is dorsiflexed.

(3) displacement of the posterior half of the talus out of its mortice, with the anterior half still in place.

DIAGNOSIS

You can easily spot lateral displacement, but miss an angulation deformity on a lateral radiograph; so examine the posterior half of the subtaloid joint carefully: if its 2 articular surfaces are not parallel, the fragments have angulated at the fracture line.

If there is no angulation, apply a short leg walking cast from below-knee to toes, with the foot in neutral position. Get the patient up and teach walking with weight-bearing; at 3months, you can remove the cast.

ANGULATED TALAR NECK FRACTURE REDUCTION (GRADE 1.5)

If there is angulation, try to reduce the fracture by forcibly plantarflexing the foot (72-3) under ketamine. Place a canvas sling round the distal thigh (72-3C1) and flex the knee to 90^0. Grasp the heel with one hand and the forefoot with the other (72-3C3). external fixation may be possible. Pull the foot forward into full dorsiflexion (72-3C4), and at the same time strongly evert the foot (72-3D5): this will unlock the *sustentaculum tali.* Then, while your assistant, using the thumbs, presses on either side of the Achilles tendon (72-3E6), plantarflex the foot (72-3E7); a crunching noise indicates your reduction is successful.

Confirm reduction by a check radiograph. If it is successful, apply a cast from below-knee to toes, holding the foot in *equinus.* Keep the patient in bed, and encourage daily muscle exercises within the cast. Leave it for 5-6wks, and then replace it by another cast with the foot in neutral position for a further 5-6wks.

REDUCTION OF AN ANGULATED TALAR NECK FRACTURE

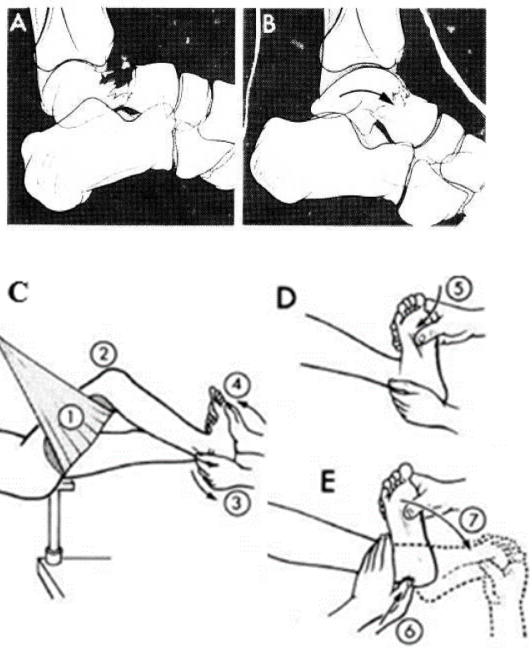

Fig. 72-3 REDUCING AN ANGULAR TALAR NECK FRACTURE. A, fracture before reduction. B, the way in which reduction occurs. C,D,E the method of reduction. *After de Palma AF, Management of Fractures and Dislocations, An Atlas, WB Saunders, 2nd ed 1970 with kind permission.*

If you have not been able to reduce the fracture, external fixation may be possible.

If there is forward displacement, forcibly plantarflex the foot & push it backwards. Apply a cast in *equinus,* as above.

If there is backward displacement, insert a Steinmann pin through the calcaneus (70.7), & exert traction to create space between it and the tibia, so that you can push the posterior talar fragment into the ankle mortice. Then apply a cast in *equinus* as above.

If reduction fails, an open reduction is necessary.

If, some months later, the foot is still painful & part of the talus looks dense on a radiograph, this is a sign of aseptic necrosis. This is common, and may eventually require an arthrodesis

SIGN OF A FRACTURED CALCANEUM

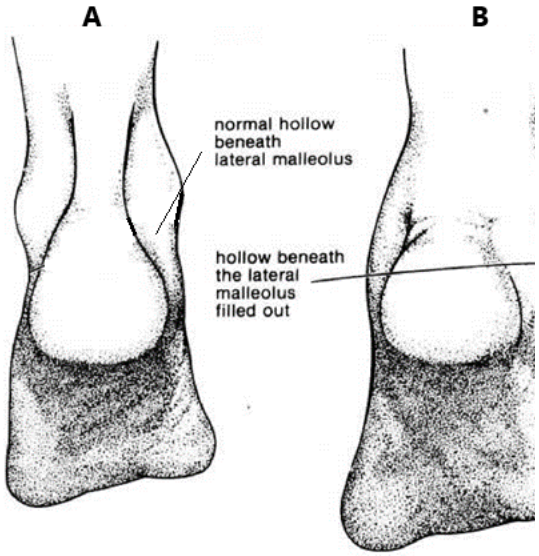

Fig. 72-4 SIGN OF A FRACTURED CALCANEUM. A, normal. B, filling out of the normal hollow below the lateral malleolus. *Kindly contributed by Peter Bewes.*

72.6 Calcaneal body fracture

This common fracture results from a fall onto the foot, usually from only quite a small height. Sometimes, both left & right fracture, and *also the spine*. So, *always Xray the vertebral spine also!* (54.10).

CALCANEAL FRACTURES

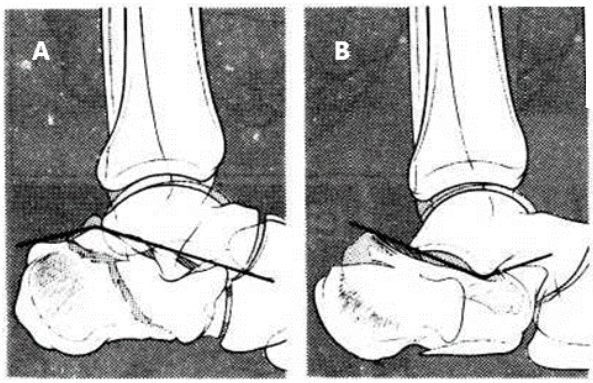

Fig. 72-5 CALCANEAL BODY FRACTURES. A, with mild displacement. B, with angulation & severe displacement. *After Perkins G. Orthopaedics. Athlone, London 1967 with kind permission.*

Although the foot may look normal, there are always 2 signs:
(1) The injured calcaneum looks wider, and the hollow beneath the lateral malleolus disappears (72-4B).
(2) There is no movement in the subtalar joint; although the ankle can move through about half its normal range of plantar- & dorsi-flexion, everting the heel on the ankle is painful.
The fracture lines may not be easy to see on a radiograph, so take a lateral & special axial view, and look for widening of the calcaneum. Fractures take many forms & vary from small cracks to extensive fragments; however you treat them all the same way.

TREATMENT
Don't try to reduce this fracture! Instead, compress the swollen ankle with a tight crepe bandage. Advise 3days of bedrest, until the pain is bearable and putting the foot onto the ground is not too painful. Then, without full weight-bearing, with much encouragement & careful supervision, encourage active movements of the hip, knee, ankle & toes for 3wks. Follow this by active exercises with partial weight-bearing using crutches. Cycling is very useful. Early on, all such activity will be painful, so administer enough analgesia. Total recovery may take 2yrs.

If the fracture is bilateral, early mobilization will obviously be more difficult and take longer.

CAUTION!
If you have to apply a cast to ease the pain, or to allow out-patient treatment, leave it on only for a few days.
N.B. some patients will have disability which warrants a subtalar arthrodesis later, but *don't recommend this before 12 months!*

72.7 Other calcaneal fractures

These are all quite minor injuries. They are not Easy to diagnose, but since you can treat them all by active movements, this is unimportant.
(a) Calcaneal tuberosity fracture features either a fragment prised from the posterior calcaneal angle (visible on a lateral view), or a vertical fracture (seen on an axial view).
(b) *Sustentaculum tali* fracture is difficult to see on a radiograph. Displacement is slight, and no reduction is necessary.
(c) Anterior calcaneal fracture occurs when the foot inverts severely, or in a subtaloid dislocation. A small fragment comes off the upper surface of the bone.

72.8 Navicular & cuboid fracture

When the foot is crushed, the navicular or cuboid, or the metatarsals may fracture, or the midtarsal joint dislocate. These may all occur singly or together, and are serious injuries.

REDUCTION MIDTARSAL DISLOCATION (GRADE 1.4)
Under ketamine, try to manipulate the bones into a good position, especially those of the subtalar joint.
If you succeed, apply a short leg walking cast (70.2) with the foot in neutral position. Keep it raised until the swelling subsides. Then encourage walking with crutches, starting with partial weight-bearing. After 3wks, remove the cast. Check to see if pain & swelling have diminished enough to start walking full weight-bearing with crutches.

72.9 Tarso-metatarsal fracture-dislocation

This is difficult to see on a radiograph, but at the bases of the metatarsals, multiple fractures with little displacement is the norm. This is a severe injury and osteoarthritis often follows, sometimes needing an arthrodesis.

If there is severe displacement of the tarso-metatarsal joint, try to hold the broken bones in place with a well-moulded cast, holding the forefoot in plantarflexion. After 1wk, change this to a short leg walking cast & encourage walking.
External or internal fixation may be necessary (GRADE 3.1); make dorsal incisions between the 1st & 2nd & between the 3rd & 4th toes.

Pass a K-wire through the distal ends of the metatarsals, hold it in a tensioner, and use it to help manipulate the distal part of the foot to hold it in good position with crossed K-wires.

72.10 Crush metatarsal fracture

Any crush injury to the forefoot is serious, and can be disabling. The metatarsals usually fracture at the neck; there may be an open wound. Diagnosis is hard without a radiograph. These fractures are difficult to reduce; remember that the 1st mt is a weight-bearing bone!

If there is little or no displacement, the bones heal without reduction. When walking is possible, apply a tight crepe bandage & encourage walking. You may need a below-knee walking cast for 3wks otherwise.
N.B. if the bones heal in a grossly displaced position, the foot may be painful permanently.

If there is obvious gross displacement, reduce the fracture as best you can, apply a below-knee walking cast (70-2) & elevate the foot (70-1). Take care to mould the sole to both longitudinal & transverse arches of the foot (72-1). If you fail to correct the displacement, external or internal fixation is needed.

METATARSAL FRACTURES

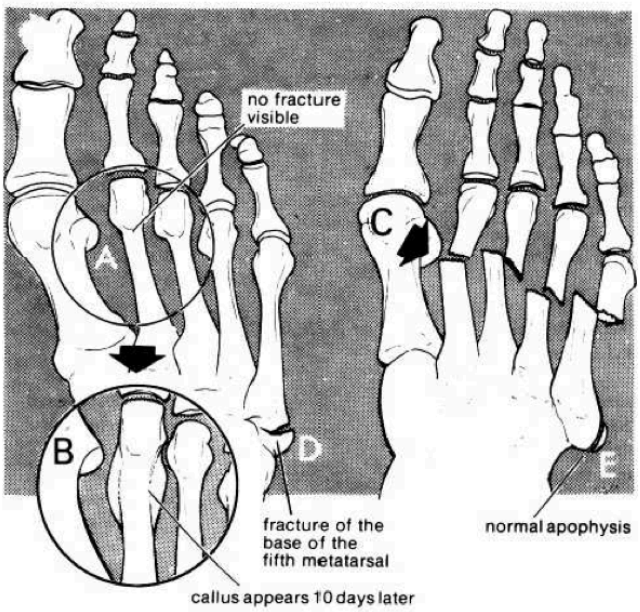

Fig. 72-6 METATARSAL FRACTURES. A, a March fracture with no immediately visible sign. B, the callus appearing 10days later. C, severely fractured metatarsals. D, fracture of the 5th mt base. E, comparing it with the normal apophysis.

If intense pain & swelling, marked stiffness, & warm smooth glossy skin, with bone rarefaction on radiographs, this is Sudek's atrophy (whose cause is unknown), but may persist for several years. Try to keep encouraging walking as bone rarefaction will deteriorate otherwise!

72.11 Fatigue (march) fracture

Without any history of injury, a metatarsal, usually the 2nd, fractures spontaneously. There is localized pain, particularly at night, and tenderness over the fracture site. At first, the radiograph shows only a fine transverse crack, or nothing at all. But after 10days, a mass of callus appears, which you might confuse with a sarcoma, as in the tibia (70.8). So, strap the front part of the foot, and avoid stress on the fracture site!

72.12 5th mt base fracture

Severe twisting of the front half of the foot tears a fragment bone from the base of the 5th metatarsal. Don't confuse this fracture with an ununited apophysis, which has a characteristic smooth comma shape, and is usually bilateral.
If you are in doubt, X-ray the other foot.
A history of spraining the foot or ankle is typical, but the lateral malleolus is not tender, and there is no tenderness over the front of the calcaneus. Instead, there is marked tenderness over and underneath the prominence formed by the base of the 5th metatarsal.
This is a painful injury, so fit a below-knee walking cast for 2wks, or longer if necessary.

72.13 Fracture of the toe phalanges

A weight falling onto the toes sometimes breaks them. Reduction is unnecessary, but it may be advisable to evacuate a painful subungual haematoma (65.4). These fractures are not serious and always unite. Splint the injured toe with zinc oxide strapping to the adjacent normal toe. Pad it with a little cotton wool to absorb moisture. As soon as the shoe can be worn, discharge the patient. A metal stiffener driven down between the layers of the sole of the shoe will help return to work sooner.