

CURRENT PROBLEM CASE

H.-J. Trnka · R. Zettl · P. Ritschl

Fracture of the anterior superior process of the calcaneus: an often misdiagnosed fracture

Received: 21 November 1996

Abstract Fracture of the anterior superior process of the calcaneus has been considered an unusual injury. Following a sudden twist there is immediate pain on the outer aspect of the mid-portion of the foot and discomfort on weight-bearing. Three mechanisms of injury have been reported to cause the fracture. The diagnosis is often missed, and prolonged disability and local pain at the calcaneocuboid joint deserve further consideration. Oblique X-rays of the foot are helpful to visualize the fracture. Type III fractures may cause cartilage lesions and arthrosis; therefore, one should not wait long before excision or refixation of the fragment.

Introduction

Historically fracture of the anterior superior process of the calcaneus has been considered an unusual injury. The first descriptions in the literature were published in 1931 [3]. Three mechanisms of injury have been reported to cause the fracture. That favored by most authors is avulsion of the anterior superior process of the calcaneus due to inversion and plantar flexion. The other two are shear mechanisms due to forceful abduction of the forefoot with the calcaneus fixed to the ground and strong dorsiflexion of the foot on the ankle. The typical history is that following a sudden twist there is immediate pain on the outer aspect of the mid-portion of the foot and discomfort on weight-bearing [5]. The pain is well localized to an area distal to the sinus tarsi at the calcaneocuboid joint. The usual X-rays after injuries around the ankle are antero-posterior and lateral views. The small size of the fragment can easily be overlooked on these views [3, 7]. Degan et al. [4] described a classification based on the fracture line and the size of the fragment (type I, undisplaced fracture; type II, displaced fracture without involvement of the ar-

ticular surface; type III, large displaced fragment that involves the calcaneocuboid joint).

Case report

A 32-year-old woman sustained a twisting injury as she tripped over the curb. There was immediately severe pain, swelling and hematoma anterior to the lateral malleolus. Clinical examination showed no laxity of the ankle joint, and on antero/posterior (AP) and lateral X-rays of the ankle, no pathology was seen. Four days later, due to the fact that the distal part of the subtalar joint was extremely painful, the patient was put into a plaster boot for 2 weeks. Despite intensive physiotherapy there was no improvement of the pain for the next 10 months. Several times lateral and anteroposterior (AP) X-rays of the ankle, talus and subtalar joint, and functional X-rays of the ankle joint were performed, and no pathology was detected. At this point a Watson-Jones procedure of chronic instability of the lateral ankle joint was done. Following surgery, again intensive physiotherapy was undertaken, but the patient's pain and discomfort did not resolve. As ultimate therapy the patient was now told to contact a psychiatrist, but she decided to get a second opinion and came to our department.

At clinical examination the patient presented with severe pain over the dorsal part of the calcaneocuboid joint. Oblique view X-rays by angling the central beam 20 deg cephalad and 20 deg posterior were obtained (Figs. 1, 2). A small fragment, 1 × 1 cm in size, was detected and classified as a type III fracture [4] and non-union of the processus anterior of the calcaneus. After injection of 5 ml lidocaine near the fragment, the symptoms were relieved. We therefore planned resection of the fragment.

Under tourniquet control, an incision from the sinus tarsi distal to the calcaneocuboid joint was made. The muscle belly of the extensor digitorum brevis was detached. The calcaneocuboid joint was identified, and at its dorsal aspect fragment surrounded by scar tissue was located (Fig. 3). The cartilage of the calcaneocuboid joint was inspected, and lesions were found. The fragment was freed from its surrounding and removed (Fig. 4). After skin closure a short leg cast was applied for 2 weeks. Following cast removal the patient was allowed full weight-bearing. She reported immediately after cast removal that the severe pain had disappeared.

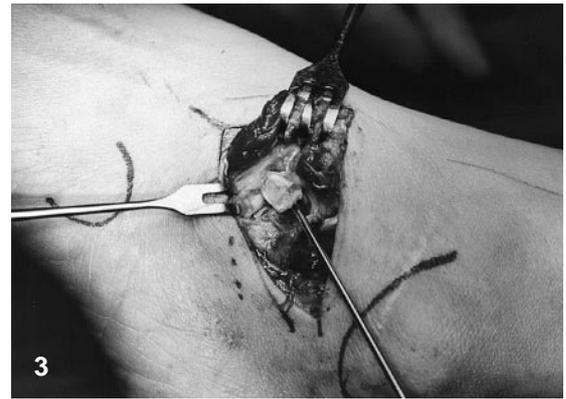
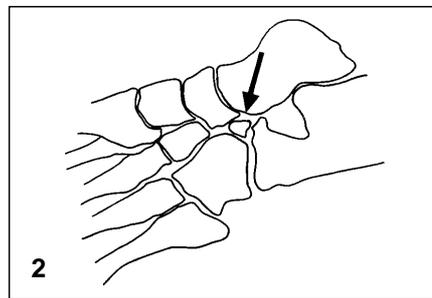
At the latest follow-up 12 months after surgery, she reported that the original pain had resolved, but after exercises and intensive walking she suffered discomfort at the calcaneocuboid joint. X-rays revealed arthrosis of the joint. By using solid shoes with a hard sole, the symptoms were prevented.

Fig.1 Patient, 32 years old, 2 years after injury. Oblique view X-rays by angling the central beam 30 deg cephalad and 20 deg posterior of the left foot

Fig.2 Drawing of the X-ray, fragment visible at the anterior superior process of the calcaneus

Fig.3 Intraoperative picture, the fragment at the tip of the K-wire

Fig.4 Postoperative X-ray: the fragment is removed



Discussion

The number of reported cases of fractures of the anterior process of the calcaneus is small and the true incidence cannot be determined because the diagnosis is often missed. Reports in the literature vary from 3% to 23% of all fractures of the calcaneus. After inversion-adduction injury mechanism, it is often misdiagnosed as ankle sprain. However, an accurate clinical examination will reveal the point of maximum tenderness about 1 cm inferior and 2 cm anterior to the anterior talofibular ligament. This finding should allow the examiner to distinguish ankle sprain from fracture of the anterior process of the calcaneus [6].

Also, during radiological evaluation after inversion-adduction injuries, one should pay attention not only to the ankle joint, but also more distally to the calcaneocuboid joint. On AP X-rays the fracture cannot be seen, and lateral X-rays will also fail to show it. Oblique X-rays of the foot are helpful to visualize the fracture [4, 5]. In 1953 Backman and Johnson [1] suggested using X-rays with the central beam directed 10 to 15 deg superior and posterior to the middle of the foot.

There is a great deal of controversy concerning the appropriate treatment [1, 4, 6]. Usually non-operative treatments are advocated for at least several months; these methods include Ace-bandage wrap and crutches for 2 weeks, short-walking cast for 4 weeks or non-weight-

bearing for 8 weeks. The patients should be asymptomatic after this treatment whether the fracture has united or not. For persisting symptoms steroid injections, oral analgetics and limitation of activity are the next treatment steps. If they also fail and if local injection with lidocaine relieves the symptoms, surgical intervention is advocated.

The decision of whether excision or open reduction and internal fixation of the fragment is indicated should be made after careful exposure of the fracture. Anatomical refixation of intra-articular fractures is the optimal solution for these injuries. Rowe et al. and Hunt report satisfactory results following open reduction and internal fixation, but the fragments were large enough to be fixed. In most cases open reduction and internal fixation are not possible due to the size of the fragment. In these cases simple excision should be the treatment of choice.

In our case the patient had a type III non-united fracture of the anterior process of the calcaneus misdiagnosed for 24 months. The danger in delayed treatment of type III fractures is that the fragment is squeezed in the calcaneocuboid joint and destroys the joint cartilage. At surgery we found cartilage lesions of the calcaneocuboid joint. Twelve months after surgery the patient was asymptomatic at the original fragment site, but she suffered from discomfort of the progredient arthrosis.

References

1. Backman S, Johnson SR (1953) Torsion of the foot causing fracture of the anterior calcaneal process. *Acta Chir Scand* 105: 460–466
2. Bradford CH, Larsen L (1951) Sprain-fractures of the anterior lip of os calcis. *N Engl J Med* 244: 970–972
3. Dachtler HW (1931) Fractures of the anterior superior portion of the calcis due to indirect violence. *Am J Roentgenol* 25: 629–631
4. Degan TJ, Morrey BF, Braun DP (1982) Surgical excision for anterior-process fractures of the calcaneus. *J Bone Joint Surg [Am]* 64: 519–524
5. Gellmann M (1951) Fractures of the anterior process of the calcaneus. *J Bone Joint Surg [Am]* 33: 382–386
6. Green W (1956) Fractures of the anterior-superior beak of the os calcis. *NY State J Med*, pp 3515–3517
7. Levine J, Kenin A, Spinner M (1959) Non-union of a fracture of the anterior superior process of the calcaneus. *J Bone Joint Surg [Am]* 41: 178–180