CASE REPORT

Anterior subtalar dislocation with comminuted fracture of the anterior calcaneal process

Siu Hung Kenneth Hui,¹ Tun Hing Lui²¹PYNEH, Hong Kong, Hong Kong²Department of Orthopaedics and Traumatology, North District Hospital, Hong Kong, Hong Kong

Correspondence to

Dr Tun Hing Lui,
luithderek@yahoo.co.uk

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SUMMARY

Anterior subtalar dislocation is a very rare injury. We report a case of an 81-year-old woman who had her right foot injured during a motor vehicle accident. Radiographs showed anterior subtalar dislocation with comminuted fracture of the anterior calcaneal process. The dislocation was closely reduced and protected by a short leg cast. One year postinjury, the patient had only mild pain when walking on uneven ground. There was mild tenderness over the lateral heel. Subtalar motion was mildly painful. There was no pain with ankle motion.

BACKGROUND

Subtalar dislocation involves simultaneous disruption of the talocalcaneal and talonavicular joints. It is a relatively rare injury, accounting for approximately 1% of all dislocations.¹ It can occur in a medial, lateral, anterior or posterior direction, with medial being the most common.² This injury often results from high-energy trauma such as a road traffic accident or fall from a height.

Pure anterior subtalar dislocation is very rare, with few cases being reported in the past. This article describes a case of anterior subtalar dislocation associated with fracture of the anterior calcaneal process, which was treated by close reduction and cast immobilisation.

CASE PRESENTATION

An 81-year-old woman sustained a right foot injury during a motor vehicle accident. This injury happened when she tried to get into the back seat of a private car from the right side—the car unexpectedly moved, and its rear wheel hit against the posteromedial side of the patient's right heel. There was no other associated injury. She could walk unaided before this accident. Clinically, her right ankle and heel were swollen, without any pronation or supination deformity of the foot. A skin crease was noticed over the medial heel, with apparent shortening of the heel (figure 1). There was no associated open wound and no neurovascular compromise.

INVESTIGATIONS

Radiographs of the right foot showed an anterior subtalar dislocation with fracture of the anterior calcaneal process (figure 2).

DIFFERENTIAL DIAGNOSIS

Differential diagnosis should include other more common fractures or soft tissue injuries of the hind

foot, for example, calcaneal fracture, talar fracture, ankle fracture and ligamentous or tendinous injuries.

TREATMENT

Close reduction was performed under sedation in the ward. Traction force was applied to the foot with the knee flexed and the ankle plantarflexed. The subtalar joint was reduced and remained stable. The ankle was immobilised at neutral position, with a gutter splint. Postreduction radiograph (figure 3) and computed tomogram (figure 4) showed the subtalar joint was reduced and there was a comminuted anterior calcaneal process fracture. A short leg cast was applied after the foot swelling subsided. The patient was advised on non-weight-bearing walking.

The cast was taken off and changed to an ankle-foot-orthosis 6 weeks later. She started partial weight walking for another 6 weeks, then resumed full weight-bearing walking.

OUTCOME AND FOLLOW-UP

Radiographs taken 12 months after the injury showed the fracture healed and the subtalar joint remained located (figure 5). CT showed intra-articular malunion of the anterior calcaneal process (figure 6). The patient only had mild pain when she walked on uneven ground. There was mild tenderness over the lateral heel. Subtalar motion was mildly painful. There was no pain with ankle motion.

DISCUSSION

A subtalar dislocation is a very uncommon injury, and accounts for approximately 1–2% of all joint dislocations.¹ It was first described by Judey⁴ and

Figure 1 There was a skin crease over the medial side of the heel, with apparent shortening of the heel (A) and no obvious medial or lateral displacement of the foot (B).

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Figure 2 Injury films show anterior subtalar dislocation with comminuted fracture of the anterior calcaneal process. The talonavicular joint was subluxed. (A) Lateral view; (B) oblique view; (C) dorsoplantar view.

Dufaurest³ in 1811. In 1852, Broca⁵ categorised subtalar dislocations into three types: medial, lateral and posterior, depending on the direction of dislocation. The first reported case of anterior subtalar dislocation was described by Malgaigne and Burger⁶ in 1856.

Pure anterior subtalar dislocations are even rarer. In 1964, Grantham⁷ reviewed 225 cases of subtalar dislocation reported in the literature, and 6 were anterior dislocations, accounting for 3% of cases. Zimmer and Johnson,² in 1989, summarised eight series of 115 cases of subtalar dislocation—only about 1% of them were anterior dislocations. Because of its rarity, other more common fractures and soft tissue injuries should be considered. Concerning the mechanism of direct contusion injury, calcaneal fracture is high on the list of differential diagnosis in this case. Other fractures of the ankle and hind foot, for example, Pott's fracture and talar fracture, should also be on the list. Besides fractures, soft tissue injuries should also be included on the list. The impact over the posteromedial heel can cause eversion sprain of the hind foot. Medial ligamentous and tendinous injuries can occur. Radiograph is usually sufficient to confirm the diagnosis of subtalar dislocation.

Because anterior subtalar dislocations are commonly associated with medial or lateral subtalar displacement of the foot, an anteroposterior radiograph is necessary for the diagnosis of pure anterior subtalar dislocations. Inokuchi *et al*⁸ proposed that anterior subtalar dislocation can be diagnosed if the foot is mainly displaced forward and the posterior subtalar facet of the talus stranded on the calcaneal tuber, even if there is slight lateral displacement of the foot in the anteroposterior view.

In subtalar dislocations, the talonavicular joint is dislocated together with the subtalar joint. In this case, the talonavicular joint was subluxed instead of dislocated. This is because the comminuted fracture of the anterior calcaneal process led to shortening of the lateral column. This allowed anterior dislocation of the subtalar joint without the need of concomitant talonavicular dislocation. The lack of frank dislocation of the talonavicular joint also explained the pure anterior subtalar dislocation in this case, without medial or lateral displacement of the foot.

Various mechanisms of injury have been proposed. Kanda *et al*⁹ believe that anterior subtalar dislocation can be caused by forceful foot supination and ankle dorsiflexion when a patient

Figure 3 Postclosed reduction lateral radiograph shows the reduced subtalar joint.

Figure 4 Postclosed reduction CT shows the reduced subtalar joint with comminuted intra-articular fracture of the anterior calcaneal process involving the sustentaculum tali. (A) Coronal view; (B) transverse view; (C) sagittal view.

Figure 5 Radiographs taken 1 year after the injury show the healed fracture, and locate the subtalar and talonavicular joints. (A) Lateral view; (B) oblique view; (C) dorsoplantar view.

falls from a height. Tabib *et al*¹⁰ reported that the dislocation followed a direct rear impact over the posterior aspect of heel after a fall injury. Chuo *et al*¹¹ reported that anterior subtalar dislocation occurred when the patient withdrew the trapped foot. In our case, the mechanism of injury was similar to that reported by Tabib *et al*.

Treatment of anterior subtalar dislocation includes close reduction by posterior traction force to the foot with the knee in a flexed position and the foot in plantarflexion to relax the triceps surae. This is followed by 4–6 weeks of immobilisation with a short leg cast. Open reduction is seldom required and only indicated if there is interposition of tendon or bone fragments blocking the reduction. The case reported by Chuo *et al*¹¹ required open reduction because of posterior tibialis tendon incarceration. Theoretically, open reduction and internal

fixation of the anterior calcaneal fracture was indicated in this case in order to restore the articular congruity of the calcaneocuboid joint. This would help to reduce the risk of late complication of post-traumatic osteoarthritis of the calcaneocuboid joint. However, because of the technical difficulty in fixation of a comminuted intra-articular fracture in an osteoporotic bone, and the low functional demand of the patient, the fracture was treated non-operatively. In view of the intra-articular incongruity of the calcaneal facet and the non-union of the sustentaculum fragment, as showed in the computed tomogram (figure 6), lateral complication of flatfoot deformity and osteoarthritis of the calcaneocuboid joint are expected. In addition to these, post-traumatic degeneration of the talonavicular and subtalar joints can also occur. Longer follow-up of the patient is needed to monitor the occurrence of late complications.

Figure 6 CT taken 1 year after the injury. Sagittal (A), coronal (B) and transverse (C) show the subtalar joint with intra-articular malunion of the anterior calcaneal facet. (D) Non-union of the sustentaculum tali.

Learning points

- ▶ Anterior subtalar dislocation is a rare type of subtalar dislocation.
- ▶ An anterior calcaneal process fracture can shorten the lateral foot column leading to anterior subtalar dislocation without frank talonavicular dislocation.
- ▶ Closed reduction and cast immobilisation are in the first line of treatment in subtalar dislocation.

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Competing interests None declared.

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