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CASE REPORT

Non-operative management of a talar body fracture in a skeletally immature patient

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We present the case of an 11-year-old girl who presented to our Emergency Department having fallen from a height of 8.5 meters. Amongst the sustained injuries was a comminuted fracture of the body of the talus. This was managed conservatively with an excellent outcome. We discuss the case with reference to the literature in this field, particularly highlighting comparisons between cases from patients with mature bone and those with immature bone.

Keywords : talus ; fracture ; child.

INTRODUCTION

The forces required to sustain a fracture of the talus are relatively high and therefore these injuries are uncommon. Immature bone is much less brittle than its adult counterpart and as a result it is able to sustain higher forces before fractures occur (*4*).

Fracture of the talus is through the neck in about half of all cases. Fracture through the talar body requires sudden dorsiflexion on a partially plantar flexed foot (*9*). The usual mechanism is due to a fall from a height.

We present the case of a fracture of the body of the talus in a child, its subsequent management, outcome and a discussion of the management. To our knowledge there are very few cases of talar body fracture reported in a patient before reaching skeletal maturity.

CASE REPORT

An 11-year-old girl fell approximately 8.5 meters from a railway bridge wall. She presented to our Accident and Emergency Department, via paramedic ambulance. It was noted that she had pain and swelling in both ankles and her right distal radius. There was no previous medical history. Radiographs revealed a Salter-Harris type IV fracture of the left distal tibia, a buckle fracture of the right distal radius and a right sided talar injury (fig 1) which was difficult to define on plain radiographs. Her immediate treatment involved the use of plaster of Paris backslabs with the ankles in 90° of dorsiflexion and elevation of the injured limbs. Control radiographs were taken including a focused radiograph on the right talus (fig 2). The focused radiograph showed that there was a

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Fig. 1. — Mortice view and lateral radiograph of right ankle showing talar fracture.

Fig. 2. — Focused lateral radiograph of right talus showing fracture.

fracture of the right talus, but it was difficult to determine much more information from this film.

A computerised tomography (CT) scan was performed on the day of admission. One of the images from the right ankle can be seen in figure 3. The CT scan clearly demonstrated the fracture to be comminuted and extending through the body of the talus into the talocrural joint. The fracture involved

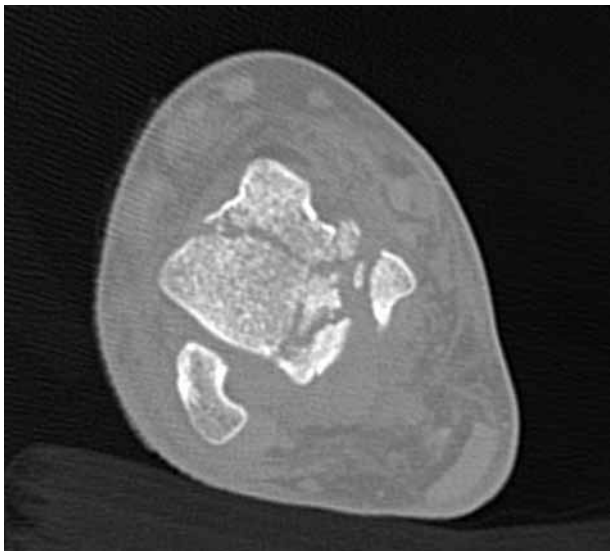

Fig. 3. — Transverse CT scan image of the injured talus. The fracture is comminuted and extends through the dome of the talus, but there is no gross displacement of the fracture fragments.

the posterior and medial aspects of the body of the talus.

Due to the level of comminution it was considered that there was little that could be achieved operatively to improve the outcome. The fragments of the talar fracture were only minimally displaced, so provided the fragments united it was hoped that it would have a reasonable outcome.

The patient was taken to the operating theatre that evening for treatment of the other ankle injury and the fractured radius. Whilst under general anaesthesia the opportunity was taken to place the right ankle (the talar injured side) in an improved quality backslab, with the ankle dorsiflexed to 90° and a stirrup was used for reinforcement. Image intensification was used following application of the new plaster to ensure that there had been no gross displacement of any fracture fragment. Elevation of the injured limbs was maintained on the ward.

The right ankle plaster slab was completed to a full below-knee plaster two days later when the risk from swelling had reduced. She was kept in plaster for 8 weeks during which time she was not allowed to weight bear and had regular reviews with radiographs in our fracture clinic. She was then taken

Fig. 4. — Mortise view and lateral radiograph after skeletal maturity.

out of plaster and physiotherapy was commenced. The patient was kept non-weight bearing for a further 2 weeks, before being allowed to weight bear.

At follow-up at 4 months she had no functional problems on the right side, and at her latest review 26 months post injury she remains asymptomatic (fig 4).

On the other side (left) the distal tibial injury required open reduction and internal fixation with two screws. At four-month follow-up she had mild pain, "intermittent discomfort" in the left ankle after standing or walking for long periods of time. She was also noted to have a slight degree of stiffness of the subtalar joint on this side. This pain remains an intermittent discomfort.

The distal radius fracture was manipulated at the same time as the ankles were treated and placed in a moulded plaster of Paris cast. She has regained normal function of the hand and wrist.

DISCUSSION

Our patient had a sagittal shearing fracture or type C as defined by Sneppen *et al* (*7*). These authors found that fractures that involved the lateral or posterior aspects of the talar body are more likely to develop long-term problems. This is thought to be due to development of incongruence of the talocrural joint or to avascular necrosis. Clearly this is less likely to be a problem when the fracture is minimally displaced or undisplaced. Sneppen *et al* (*7*) advocated anatomical reduction with internal fixation when these types of fractures are displaced. In our case there was only minimal displacement, but severe comminution and therefore conservative management was chosen. The final result of a completely asymptomatic foot and ankle appears remarkable and is in contrast to the other side. At least part of this impressive outcome should be attributed to her youth.

Talar fractures in children are rare because the talus is predominantly made up of cartilage, giving it much greater resilience than that of the adult (*4*). Most of these will be in the neck of the talus, as in the skeletally mature patients, although proportionally far fewer (*8*). The authors have found only sparse reports of talar body fracture in children. Cases involving the talar body which were undisplaced have been managed conservatively in the past with excellent outcomes (*3*). The concern with talar fractures in any age group is that of avascular necrosis and consequent osteoarthritis. In cases of displaced fracture of the talar body the risk of avascular necrosis has been reported to be about 27% for both adults and children (*5*). Published results where fixation has been used show high incidences of both early and late complications, with osteonecrosis in 10 out of 26 cases and full talar body collapse in 5 of those 10 (*10*). In the series published by Jensen *et al* (*3*) there was a single case of a child that had a displaced talar body fracture successfully treated with percutaneous wires. This technique may offer major advantages over standard open techniques, but no series have been published at present.

The risk of avascular necrosis is thought to be related with disruption of the vascular supply to the talus and the fracture fragments. These fragments are more likely to lose their vascularity in displaced fractures. Talar neck fractures have a very variable avascular necrosis rate, anywhere between 2% and 91% (*6*). The rates of avascular necrosis in other fractures of the talus remain to be quantified. Despite the talus having a rich network of arterial supply the body fracture presents a significant incidence of avascular necrosis, the coronal split type

more so than the sagittal. In a displaced sagittal fracture the remaining vascular supply is from the deltoid branches entering medially (*9*). Cadaveric experiments have shown that even in minimally displaced fractures of the neck of the talus there can be considerable interruption of even the large arteries in the area around the talus (*6*).

All the previous reports concerning talar fractures of all types recommend early active exercise without weight bearing. This reduces the incidence of bone atrophy due to disuse and of contractures, both of which may promote osteoarthritis (*2*). For our patient it may have been better to have mobilised her earlier. Despite this she has had an excellent outcome. Once again this may be due to the more forgiving nature of the joints in the skeletally immature.

A major difficulty in the management of these patients remains the diagnosis. Forty-seven percent of patients with chronic instability of the ankle show evidence of previous talar osteochondral fracture on magnetic resonance imaging, which had not been previously diagnosed (*1*). Therefore it is likely that a significant number of talar injuries are going undiagnosed. The clinical signs are variable but can include localised tenderness at the site of the fracture, which can be associated with a decreased range of motion, and in more severe cases effusion and crepitus (*9*). However it is important to note that there may be little or even no signs. If there is any doubt at time of presentation as to whether there is a talar fracture further imaging is recommended.

CONCLUSION

Talar body injuries are rare, particularly in children. These injuries can be difficult to diagnose and a CT scan or magnetic resonance imaging scans may be required. If already diagnosed, a CT scan is advised as this will clarify the nature of the injury. A minimally or undisplaced fracture of the talus is less likely to undergo avascular necrosis than a displaced fracture. Even with optimal treatment, avascular necrosis may still occur. Therefore an appropriate length of follow-up is required.

The authors advocate the use of non-operative management in cases where the fracture is minimally displaced or undisplaced ; in cases were there is displacement the patient should undergo anatomical reduction and internal fixation. The fracture should be immobilised initially for comfort, but should be mobilised early without weight bearing. The patient should remain non-weight bearing until there is good radiological evidence of union. The remarkable outcome of our case must be noted, reminding readers that young patients often exceed expectations even in cases of severe injury.

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