

Extruded talus treated with reimplantation and primary tibiototalcalcaneal arthrodesis

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ABSTRACT

Extruded talus is a rare serious result from a high-energy injury to a supinated and plantar flexed foot. Treatment remains controversial with a lack of congruent evidence for talar reimplantation. A 34-year-old woman was involved in a road traffic accident at 40 mph. Imaging revealed a left talus extruded anterolaterally with a talar neck fracture. Additional injuries included right acetabular fracture, transverse process fractures and rib fractures, which were treated conservatively. The talus was reimplanted and the talar neck fixed with a cortical screw. A hindfoot nail was used to fuse the calcaneus, talus and tibia. Follow-up at two years showed solid tibiototalcalcaneal fusion, with no evidence of avascular development, and the patient was fully weight bearing without pain. We believe this is the first published case of successful primary tibiototalcalcaneal fusion for extruded talus injuries.

KEYWORDS

Extruded talus – Internal fixation – Primary tibiototalcalcaneal arthrodesis – Talus neck fracture – Talus reimplantation

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Introduction

Extruded talus is a rare but serious injury that can lead to significant long lasting morbidity. Extruded talus usually results from a high-energy injury and is mechanically caused by an extreme load on a supinated and plantar flexed foot. Such injuries are associated with severe soft tissue damage, talar blood supply disruption and surrounding bone fractures, accounting for approximately 2–3% of all major talar injuries.¹

Appropriate treatment remains controversial, with some clinicians advocating reimplantation of the talus despite the high risk of complications, which include deep infection, avascular necrosis, osteoarthritis and bone resorption.² There is a lack of congruent evidence for talar reimplantation, given the high primary repair complication rates and difficulties in long-term outcome assessment.

This report highlights a case of extruded talus and its successful management, which involved talar reimplantation and tibiototalcalcaneal arthrodesis, and a review of the existing literature. We believe this to be the first published case using primary tibiototalcalcaneal arthrodesis for these injuries.

Case history

A 34-year-old woman was involved in a road traffic accident involving a head on collision with another car at

approximately 40 mph. She was the passenger and was wearing a seatbelt. Her medical history included obesity (body mass index 36) and mild asthma. She was subsequently admitted to a major trauma centre and primarily managed following the Advanced Trauma Life Support® protocol.

Plain radiography demonstrated an open talar fracture dislocation of the left ankle (Fig 1). Additional injuries identified on computed tomography included minimally displaced right acetabular fracture, stable transverse process fractures to C6 and L1–L5 and multiple rib fractures. The left talus was extruded and had dislocated anterolaterally (Fig 2). It was associated with a talar neck fracture (Hawkins III), with the distal segment still in place. There was no neurovascular compromise to the foot. Her open fractures were managed following the British Orthopaedic Association standards for trauma guidance and antibiotics and a tetanus booster were administered.

After initial stabilisation, the patient was taken to theatre, where she underwent surgical debridement and washout of her wounds. The talus was reimplanted and the talar neck was fixed with a cortical screw. A thorough assessment of the talus revealed only a small attachment of soft tissue to the bone, confirming the extruded nature of the injury. The talar articular surface was damaged and sheared off by extrusion but the remaining chondral surfaces were prepared as part of the debridement and intention to fuse. A Hindfoot nail was used to fuse the calcaneus, talus and tibia

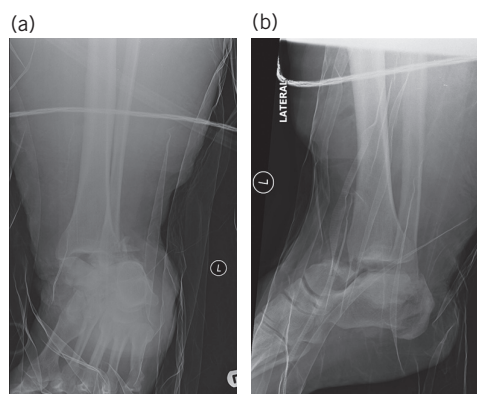


Figure 1 Plain radiographs showing talus fracture dislocation sustained from initial road traffic accident injury: a) anteroposterior view; b) lateral view.

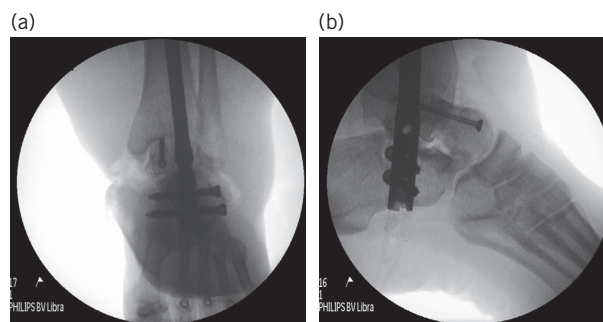


Figure 3 Intraoperative fluoroscopy images. Talar reimplantation was conducted in theatre with cortical screw fixation of talar neck. A Hindfoot nail was used posteriorly to fuse calcaneus, talus and tibia: a) anteroposterior view; b) Lateral view.



Figure 2 Ankle showing extruded talus and soft tissue damage.

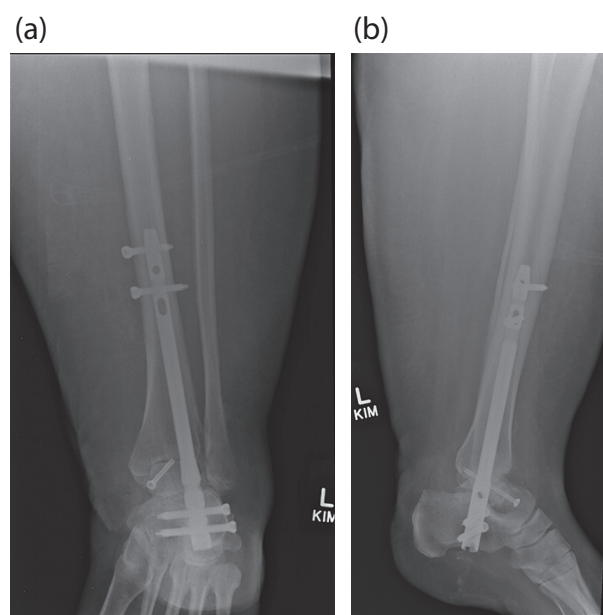


Figure 4 Plain radiographs on discharge six weeks post-surgical intervention. No evidence of avascular necrosis of the talus and fixation remains as was achieved intraoperatively: a) anteroposterior view; b) lateral view.

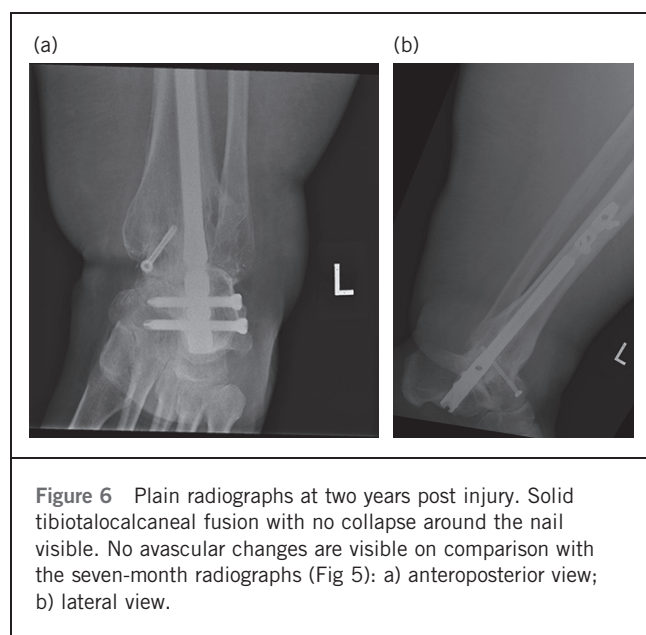
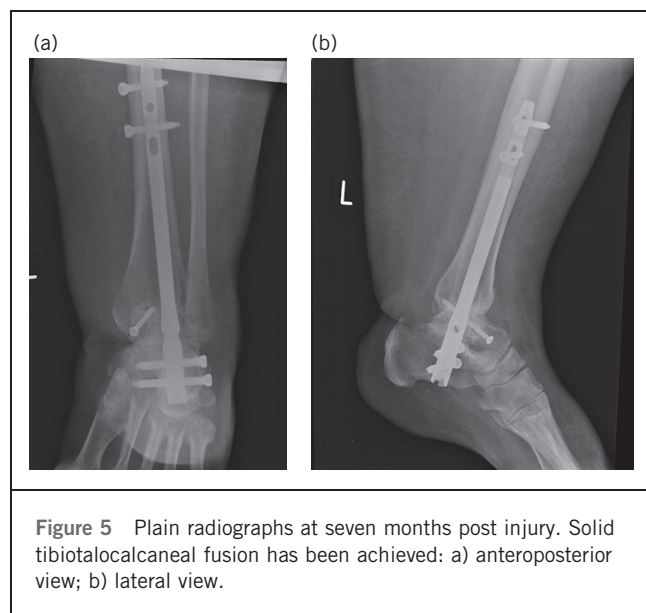
primarily (Fig 5). The wound was treated solely by secondary intention and V.A.C.® dressing. Her acetabular fractures were treated with skeletal traction and bed rest and the spinous process fractures were also treated conservatively.

After three weeks, the patient was repatriated to a local hospital and underwent further rehabilitation for another three and a half weeks before discharge. Her wounds healed very well, with satisfactory radiographs (Fig 4) and she was mobilising partially weight bearing on discharge. At seven months post injury, she was doing remarkably well. Her fusion had healed solidly and she was walking fully weight bearing on her left side without pain. She also found this side easier to mobilise on as a consequence of the right acetabular fracture. Her plain radiographs appeared satisfactory (Fig 5). Two years post-operatively, she was still weight

bearing painlessly with no new changes around the nail to suggest development of avascular necrosis (Fig 6).

Discussion

The talus has no muscular attachments, making it vulnerable to dislocation. Complete talus extrusion is usually the result of high-energy injuries, which results in a high



proportion of extruded tali being open. Most of these injuries are associated with concomitant talus fracture.

Complications include infection and osteonecrosis of the talus, especially when associated with a concomitant fracture of the talar neck. Weston and colleagues conducted a systematic review of total talar dislocation and identified infection development in 10 of 86 cases.⁵ Smith and colleagues also found low infection rates in talus reimplantation after traumatic total dislocations with only 1 late infection from 27 patients.⁴

The talus receives blood supply from the anterior and posterior tibial vessels, as well as perforating peroneal vessels

and interosseous supply.⁵ Complete talar dislocation leads to sequential failure of these supplies and therefore to a theoretical risk of avascular necrosis. However, some authors have shown good results with reimplantation of extruded tali.⁴ Early reports advocated primary talectomy, because of the high risk of avascular necrosis associated with talar fractures. However, discarding the talus adversely affects hind-foot function and treatment should be focused on maximising function.²

Avascular necrosis can occur anywhere between six months to two years after injury, with estimated rates of 26%,⁵ although reports have shown successful reimplantation with no signs of avascular necrosis for at least four months at follow-up.^{2,4}

Post-traumatic osteoarthritis is another reported complication, with literature suggesting osteoarthritis development in 16% of open talar injuries. It is important to note that this would include patients who had not sustained an associated fracture to the talus.⁶

Management of complete talar extrusion is extremely complex and, given its rarity, it is no surprise that there are no agreed protocols. The literature suggests a progression away from primary talectomy to preservation of the talus to maximise function. Some authors have supported the notion of reimplanting the talus even if there is a risk of collapse, as this can be useful bone stock for secondary procedures should these prove to be necessary.⁴ Thorough wound management is important to remove contaminated material. The risks of long-term complications need to be explained to the patient.

We believe that this is the first published case of using primary tibiotalocalcaneal arthrodesis for the treatment of these injuries. Given the risk of avascular necrosis and postoperative arthritis leading to secondary procedures, we considered it prudent to use the above method to treat this patient and we consider that it is a replicable strategy. Careful wound management, including debridement and closure and anatomical reduction, are imperative to avoid complications.

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