

Lateral Talus Stress Fracture Non-union Treated with Open Reduction, Bone Grafting and Internal Fixation: A Case Report

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ABSTRACT

A 68-year-old gentleman was referred by his general practitioner to the Foot and Ankle elective clinics of the Department of Trauma and Orthopaedics of the Lister Hospital, for investigation of ongoing right ankle pain and persistent swelling. Radiographs revealed mild to moderate degenerative changes of the ankle, but no obvious injury, so an MRI scan was organised which surprisingly, revealed an old non united longitudinal anterolateral talar fracture with 5mm displacement. Since the fracture was not involving the weightbearing surfaces of the ankle joint, the chosen treatment was open reduction, bone grafting and internal fixation. The surface was prepared with osteotomes and penetrated with 2mm drill. P28 DMB allograft was applied and the fracture was fixed with two 3.5mm PT headless compression screws, perpendicular to the fracture site. 6 weeks later, the check x-rays were satisfactory with early signs of healing and the patient was allowed to mobilise. Consequently, the patient regained full and pain-free range of motion and was able to fully weight-bear with comfort. He had incredibly good outcome at the time of the last follow-up appointment in spite of his delayed presentation and treatment.

Keywords: Talus non-union, Operative Reconstruction .

BACKGROUND

Fractures of the talus account for less than 1% of all fractures seen in Orthopaedic units (Buyukkusu *et al*, 2019). However, talar body fractures account for up to 38% of all talus fractures according to some series (Buyukkusu *et al*, 2019).

Most of the talar fractures are minor marginal or avulsion fractures, which do not cause significant morbidity (Bulut G *et al*, 2018), but the more significant talar body fractures have a higher risk of avascular necrosis due to the precarious blood supply

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(Hama *et al.*, 2018). The mechanism of injury to the talus is due to axial compression in hyper-plantar flexion. This can be associated with fall from height, sporting or industrial accidents which causes hyperdorsiflexion of the talus resulting in compression of the talar head or body against the anterior edge of the distal tibia (Biz *et al.*, 2019).

Talar body non-unions/malunions have the tendency to occur most frequently as a result of a surgical reduction of a misdiagnosed or neglected fracture. Trauma of low-energy character is an uncommon cause of talar fractures Majeed *et al.*, (2018). There are seven cases reported by Young *et.al* (2016), caused by minor injuries such as twisting movements

or tripping down the stairs, wrongly diagnosed as injuries of the ankle joint ligaments. This can also happen following relatively minor trauma like falling from heights in the paediatric population (Byrne *et al.*, 2012).

As per Zwipp and Rammelt modified classification, non-unions/malunions without or with partial avascular necrosis present in an active patient with no arthritis or asymptomatic arthritis are considerable candidates for operative reconstruction. Delayed diagnosis and management of this type of injury can lead to potentially poor outcomes, with long term morbidity and loss of quality of life leading to patient dissatisfaction (Majeed *et al.*, 2018).

Table 1: Classification of post-traumatic deformities as per Zwipp and Rammelt, of the talus and options for surgical treatment. Avascular necrosis is partial, if less than one third of the talar body is affected.

Type	Features	Treatment options	
		Active, reliable patient, non -symptomatic arthritis	Noncompliant patient, comorbidities, arthritis
I	Malunion and/or joint displacement	Osteotomy, secondary reconstruction and internal fixation with joint preservation	Corrective fusion of the affected joints
II	Non-union with displacement		
III	Types I/II with partial avascular necrosis		
IV	Types I/II with complete avascular necrosis	Necrectomy, (vascularised) bone grafting, corrective fusion	
V	Types I/II with septic avascular necrosis	Radical debridement, bone grafting, corrective fusion	

CASE PRESENTATION

In 2019, a 68-year-old gentleman was referred by his general practitioner to the Foot and Ankle elective Orthopaedic clinic at the Lister Hospital for investigation of ongoing right ankle pain and persistent swelling. The patient was troubled with the above for several months and could not remember any definite incident of trauma prior to the onset of his symptoms. His inflammatory and rheumatoid

factors were both negative to any pathologies. A mildly raised urate level was treated with Allopurinol but without any significant effect on his symptoms. On the contrary, the pain was progressively becoming more troublesome.

Further discussions with the patient did not reveal any history of trauma apart from a twisting injury of the ankle 12 years previously and another one of

INVESTIGATIONS

similar mechanism several months before the onset of the current symptoms. On examination, the tenderness was located over the anterolateral aspect of the ankle and at the extremes of movement. The subtalar and midfoot joint movements were preserved and normal, but a positive anterior drawer test was present with some pain over the lateral ligament complex.

Initial radiographs revealed mild to moderate degenerative changes of the right ankle, but no obvious injury (Figs 1a & 1b), so an MRI scan was organised which surprisingly, revealed an old non united longitudinal anterolateral talar body fracture with 5mm displacement (Fig 2a & b). A CT scan was further done to fully characterise the fracture and help with surgical planning (Figure 3a & b).

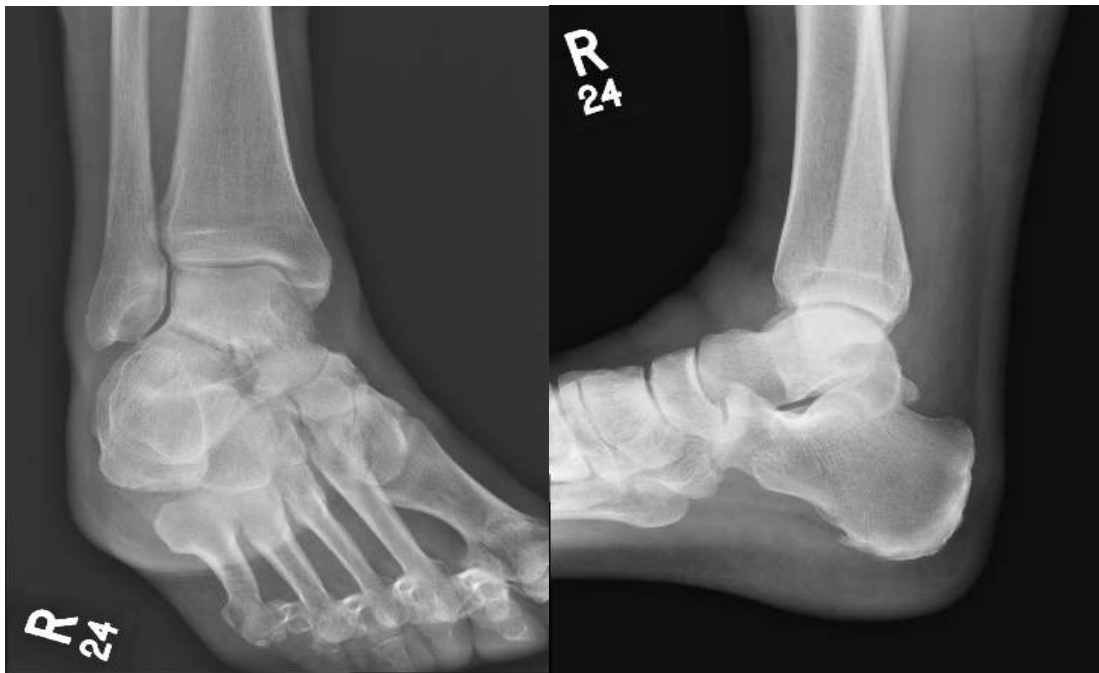


Fig. 1a & 1b: X-ray of Right Ankle (AP & Lateral) showing mild to moderate degenerative changes.



Fig. 2a & 2b MRI: Old non united longitudinal anterolateral talar body fracture with 5mm displacement extending into the posterior subtalar joint inferiorly and tibiotalar joint superiorly and tibiofibular joint laterally.



Fig 3a & 3b, CT scan: Old non united longitudinal anterolateral talar body fracture with 5mm displacement extending into the posterior subtalar joint. 7mm osseous body seen in the sinus tarsi and few tiny osseous bodies in the anterolateral recess. Moderate degree of OA.

TREATMENT

A discussion on the surgical management options was carried out, along with the patient and a joint decision was made not to proceed to an ankle fusion at this stage as the fracture was not involving the weightbearing surfaces of the ankle joint. Rather, he was offered open reduction, bone grafting and internal fixation, which was considered the best option for him.

Under general anaesthetic and tourniquet, the talus and the non-union were exposed through anterolateral approach. The surface was prepared

with osteotomes and penetrated with 2mm drill (Figs 4a-c). P28 DMB allograft was applied and the fracture was fixed with two 3.5mm PT headless compression screws, directed perpendicularly to the fracture site.

The intra-operative images revealed satisfactory reduction and fixation of the fracture (Figs 5a-c), and the patient was placed into a below knee back-slab and advised non-weight bearing for six to eight weeks to protect the fixation and allow time for healing of the fracture.



Fig 4a, 4b & 4c: Intra-operative exposure of non-union and stable fixation with the aid of K-wires



Fig 5a & 5b: Intra-operative fluoroscopy of fixation and post-operative imaging of stable fixation

Outcome and follow-up

In the 2-week follow-up, the patient reported significant improvement in his pain. His wound was healed nicely, and he was provided with a full cast with further non-weightbearing instructions for another six weeks. At the six-week follow-up, the check x-rays were satisfactory with early signs of healing and no collapse of the fracture (Figs 6a & b), therefore his plaster was removed and converted to a

walking boot so that he could start early range of movement (ROM) exercises, by taking off the boot. In a further follow-up, the patient had regained full and painless range of motion and was able to fully weight bear without any discomfort. He was pleased with the outcome of his surgery and was able to return to his job as a construction site supervisor.



Fig 6a & 6b: showing AP and Lateral radiographs at six week post-operatively.

DISCUSSION

Non-union of a talus body fracture is rare but does cause significant pain during weight-bearing, and fractures of the talar body in general are rare, but have a very bad outcome, because of the higher risk of avascular necrosis than talar neck fractures (Ebraheim et al, 2008). Just like our case, the delayed presentation is an associating factor as the above

pathology can usually be connected to initially misdiagnosed ankle ligament injury. Furthermore, isolated and undisplaced fractures can be overlooked and lead to delayed treatment. Potentially invisible to the routine x-ray, but this injury can often be picked up with computed tomography and magnetic resonance imaging and this is suggested for ongoing

bony suspected pain (Majeed et al, 2018).

The fracture described in the present report is a Type I as per Zwipp and Rammelt modified classification with no elements of avascular necrosis and therefore the good functional outcome which was achieved post-operatively can be ascribed to the above. We have demonstrated that open reduction internal fixation with the aid of P28 DMB allograft is a good treatment for this unique case of non-union in an undisplaced talus body fracture in an adult patient, with a good outcome (Huang et al, 2005). Our patient was able to go back to his usual leisure and work activities, and he remained asymptomatic at the final follow-up.

This case has a lot of educational and training value, because the diagnosis was initially missed due to a combination of factors, which include delayed presentation, unreliable history from the patient and the presence of atypical symptoms. However, we were able to detect the fracture and made a diagnosis using a combination of CT and MRI scans, which should be the workhorse of any investigations in the foot and ankle clinics. It is important to mention that the initial plain radiographs were not able to detect the ongoing fracture, which is not surprising. These fractures are difficult to detect on plain x-rays because of their anatomical location, the shape of the ankle joint as well as the overhang of the anterior and posterior parts of the distal tibia (Ebraheim et al, 2008).

Also, the case further illustrates, how unreliable plain x-rays can be in diagnosing non-unions or delayed unions involving the talus and other anatomical areas in the foot. Finally, in spite of the delayed presentation, the patient had proper surgical fixation and bone grafting of the fracture, and had an excellent recovery as well as good functional outcome, without developing avascular necrosis or non-union of the talus, which has a tenuous blood supply. We are also

aware of other treatment modalities, such as sub-talar and pantalar fusion, depending on the duration of symptoms, level of arthritis, number of joints involved, presence of avascular necrosis or non-union (Biz et al, 2019).

CONCLUSION

We have therefore, demonstrated the value of a thorough clinical assessment and investigation when a patient presents with vague symptoms or atypical symptoms involving foot and ankle pathology or trauma (Huang et al 2005). There are only a handful of studies and case reports regarding talar body fractures in the general Orthopaedic literature, compared to the more common fractures of the talar neck, and so we hope that we have added some knowledge and new information regarding the management of this difficult and often missed injury, which has a significant life limiting or life changing effect on individuals especially in young adults, leading to loss of productivity (Ebraheim et al, 2008).

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