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Talar neck non-union in an athlete successfully treated with a synthetic bone graft: A case report

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ABSTRACT

Talar neck non-union is a rare complication of talar neck fractures. No guidelines are currently available for the proper management of this complication; thus, it can be hard for orthopaedic surgeons to successfully treat. Here we are reporting a case of talar neck non-union occurring in a 22-year-old male patient after a road traffic accident and presented to our institution 10 months after the initial injury. The non-union was managed surgically with an open reduction and internal fixation with the use of a synthetic bone graft to fill the defects. The patient regained full function and remained without complications after 7 years of follow up.

Introduction

Talus fractures are rare and account for less than 1% of all fractures [1]. About 50% of all talus fractures occur in the talar neck [2]. The talus is extremely important in maintaining normal function of the foot [3] and such injuries have a devastating outcome as they are associated with a high risk to develop complications [4]. Talar neck non-union is a rare complication of such fractures and has an incidence of less than 5% of all talar neck fractures [5]. Due to the rarity of this complication and the limited blood supply of the talus it can be challenging for surgeons to manage. Here we report a case of a talar neck non-union that we managed surgically after 10 months of the initial injury with an open reduction and internal fixation with a synthetic bone graft and retained full functionality.

Case presentation

A twenty-two-year-old male kickboxer presented to our institution with a chief complaint of being unable to bear weight on his right foot after being involved in a road traffic accident on September 12th, 2011. He was treated at another institution with cast application to his foot as a management for his foot injury. Since then, the patient noticed a progressive deformity, instability, pain and complete inability to bear weight on his foot. He needed to use walking aids to ambulate. He presented to our clinic 10 months after the initial injury. The patient is medically free with a history of an exploratory laparotomy following his road traffic accident and no known drug allergies. On physical examination the foot was locked in inversion and the range of motion was decreased in all planes of motion in the ankle, subtalar and talonavicular joints.

An x-ray, CT scan and MRI of his foot were done and revealed a displaced fracture in the talar neck with established non-union of

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Fig. 1. The preoperative images of the patient.



Fig. 2. Post-operative x-ray.

the displaced fragments and no signs of avascular necrosis (Fig. 1). The nature of the injury, the surgical treatment and the expected complications were discussed with the patient. The decision was to go for surgery which was done on July 25th, 2012.

Surgical approach

Patient was placed in a supine position and surgery was performed under general anaesthesia. A medial skin incision centred over the talar neck reaching to the medial malleolus and the curved proximal to the medial malleolus vertically. This extension proximally was to prepare to a medial malleolus osteotomy which was not needed in this particular case. Tibialis posterior tendon was protected



Fig. 3. Clinical examination of the patient at last follow up.

and the capsule was incised longitudinally exposing the fracture site. Callus and granulation tissue were debrided from both ends of the fracture site. Refreshment of the fracture site showed good bleeding bone from both ends of the fracture site and the decision was made not to proceed to iliac crest bone graft. Reduction of the fracture site was done which was checked by intraoperative x-rays. Fixation with 2 cannulated 5.0 mm partially threaded screws with washers was accomplished. The screws were inserted from the medial side and directed toward the talus body. The gaps developed after refreshment and fixation were filled with small quantities of a synthetic bone graft (BCP Bicalphos granules®, Medtronic, USA). Wound closure and dressing were done. A below knee cast was applied (Fig. 2).

Post-operative management

The patient was allowed to ambulate the first day post-operatively without putting weight on the operated side. The patient was discharged on the second day post operatively. A below knee cast was applied for 6 weeks followed by 6 weeks of non-weight bearing out of the cast. Extensive physiotherapy was done for the patient in our hospital 3 times a week for three months starting after three months postoperatively after obtaining initial x-ray evidence of healing. The patient was followed up serially with the last follow up



Fig. 4. The last x-ray 7.5 years post-operatively.

7.5 years after the surgery. Physical examination on last follow up, showed no swelling or tenderness to palpation and the patient retained 100% range of motion of his ankle and subtalar joint (Fig. 3) and was fully weight bearing on his foot. The patient was able to return to competitive participation in kickboxing and his injury didn't prevent him from progression to a higher level than what he used to be before the injury at the last follow up on February 13th, 2020. X-rays showed complete consolidation of the fracture with no evidence of avascular necrosis (Fig. 4).

Discussion

The talus is an extremely important bone for the integrity of the foot. It forms part of the ankle, talonavicular and subtalar joints. An injury to the talus can disrupt any of these joints causing a significant loss of function [6]. Fractures of the talus are rare and account for less than 1% of all fractures [1,2]. Due to the rarity of such fractures, there is limited data regarding their management and outcomes [7]. This can make it difficult for surgeons to deal with these injuries [8].

Nearly half of all talus fractures occur in the talar neck [2]. Injuries to the talar neck occur most commonly due to high energy trauma that leads to forceful dorsiflexion of the foot [9]. Up to 50% of these patients present with multiple fractures and injuries, thus the diagnosis of a talar neck fracture can be missed due to other major injuries [10]. Talar neck fracture can easily disrupt the tenuous blood supply of the talar body and is associated with a high risk of developing complications [3,4]. Common complications of talar neck fractures are osteoarthritis, avascular necrosis and malunions [11,12]. Variable results are seen in the literature regarding the incidence of talar neck non-union but it's agreed that it accounts for less than 5% of all talar neck fractures [11]. Halvorson et al. [11] conducted a systematic review that included 943 talar neck fractures. In their analysis, they concluded that data in the literature regarding talar neck non-union are not enough to draw conclusions regarding the clinical outcomes and prognosis of this complication, this is because most of the studies did not agree on a single definition for non-union. Furthermore, most studies included did not correlate talar neck non-union with the operative procedure done and functional outcomes of this complication. Due to this, no guidelines are currently present to guide orthopaedic surgeons on how to deal with this complication and most data in the literature regarding the management of talar neck non-union are confined to case series or case reports [13–15].

Multiple surgical techniques were reported in the literature regarding the management of talar neck non-union; Miguez et al. [16] reported a successful treatment of a talar neck non-union 8 months after initial injury with an indirect approach to place a corticocancellous graft and achieved union. Rockett et al. [17] published a case of a displaced talar neck fracture that led to a talar neck non-union with no avascular necrosis as our case. However, they used iliac bone graft to treat the non-union and did triple arthrodesis to correct the resultant deformity of the non-union. Two major differences were noted between our cases. First, we managed our case without triple arthrodesis, this will avoid the loss of function caused by this approach [18]. Secondly, we used a synthetic graft instead of an iliac crest graft to fill the defect caused by the non-union and the surgical debridement. Advantages of using synthetic grafts are many; other than being inexpensive, easy and decreasing the operative time, they avoid the need of a second surgical incision which can cause more morbidity to the patient [19–22]. To the best of our knowledge there are no case reported in the literature in which a synthetic graft was used in the treatment of a talar neck non-union. Open reduction and internal fixation with plate, k wires or screw also was reported in literature [15].

Talar neck non-union is a rare complication of talar neck fractures. Due to the rarity of such injuries there are limited data in the literature and no guidelines that can guide orthopaedic surgeons to successfully manage. We reported a case of a talar neck non-union that was successfully treated with a synthetic bone graft, an approach that was not reported before in the literature. We believe the surgical decision should be individualized and in properly selected group of patients open reduction and internal fixation with screws and using synthetic bone graft could be a valid option.

CRediT authorship contribution statement

All authors have contributed equally in research design acquisition, analysis of data, drafting the paper and revised it critically. All authors have read and approved the final submitted manuscript.

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