International Journal of Orthopedics: Research & Therapy

Case Report

Management of Talar Avascular Necrosis by Subtalar Fusion and Grafting Resulting in Increased Blood Flow – Case Report and Review of Literature-

Noman Shakeel Niazi*, Ahmed Aljawadi, Amirul Islam and Anand Pillai

Manchester University Foundation Trust, UK

***Address for Correspondence:** Noman Shakeel Niazi, Manchester University Foundation Trust, UK, Tel: +44-074-928-088-44; ORCID ID: orcid.org/0000-0003-1731-7584; E-mail: noman.niazi@mft.nhs.uk/ nomanniazi@gmail.com

Submitted: 21 April 2020; **Approved:** 23 April 2020; **Published:** 24 April 2020

Cite this article: Niazi NS, Aljawadi A, Islam A, Pillai A. Management of Talar Avascular Necrosis by Subtalar Fusion and Grafting Resulting in Increased Blood Flow – Case Report and Review of Literature. Int J Ortho Res Ther. 2020;4(1): 004-006.

Keywords: Traumatic avascular necrosis of talus; Subtalar dislocation; Subtalar arthrodesis

INTRODUCTION

Avascular Necrosis (AVN) of talus is challenging to treat because of precarious blood supply. Most cases (75%) of talar AVN are traumatically induced in association with talar body and talar neck fractures [1]. Subtalar dislocation is a rare injury, which accounts approximately 1% of all dislocations and is associated with associated injuries [2]. The purpose of this study is to report a unique case of talar avascular necrosis after subtalar dislocation which was managed by subtalar fusion and grafting resulting in reperfusion of talus.

CASE REPORT

44 years old gentleman had fracture dislocation of subtalar joint 3 years ago when he fell from 4 meters height while intoxicated. He was initially managed non operatively. He was referred to foot and ankle team with history of pain in subtalar joint which was temporarily relieved with subtalar joint steroid injections. His MRI scan was organized to rule out AVN of talus and extend of chondral damage. MR Scan (Figure 1) and radiographs (Figure 2) confirmed the avascular necrosis of talar dome and head with involvement grade 3 to 4 chondral loss in subtalar joint. We did subtalar arthrodesis with preshaped biofoam titanium wedges (Figure 3) and autologous bone graft. The implant comes is various sizes and appropriate size was used according to size of void. There were no intra operative or post-operative complications. He was put on weight bearing for 6 weeks in cast and partial weight bearing in walking boot for 4 weeks. CT scan at 3 months confirmed consolidation at fusion site and vascularity of talus was restored. Radiographs at 6 months after surgery showed revascularization of talus and incorporation of subtalar fusion (Figure 4).

DISCUSSION

Subtalar dislocations are most often associated with a high-energy injury mechanism, such as motor vehicle/motorcycle accidents and falls form a height in younger males [3,4]. Frequency of radiographic evidence of subtalar arthritis after subtalar dislocation ranges from 25% [5] to 89% [3]. Posttraumatic arthritis and arthrosis of the subtalar and ankle joints are often secondary to AVN [6]. The progression of post traumatic degenerative changes in the ankle and subtalar joints is very common, often requires surgical intervention. Our reported patient developed avascular necrosis and subtalar arthritis after subtalar dislocation.

Poor outcome is very common in managing AVN of talus. There is no consensus with regard to the ideal treatment strategy of AVN. Different modalities have been utilized in literature for the treatment of talar AVN depending upon the extent of osteonecrosis. In atraumatic AVN of talus, non-operative management [6] and core decompression have been used satisfactorily [7]. In late stage and traumatic cases when structural changes already occurred, arthrodesis is considered an ideal salvage option [7,8]. Although there are many published treatments for posttraumatic AVN of the talus, critical outcome studies are still lacking. There is no evidence in the literature that surgical measures improve the AVN once it has developed [1]. Talectomy has been considered a poor option to treat AVN of talus [9,10]. Subtalar arthrodesis has been attempted in the past to promote revascularization of necrotic talus. McKeever [11] recommended subtalar arthrodesis to hasten revascularization of talus but was not supported by subsequent authors [1,12]. Study by Pennal [12] mentioned 3 cases of whom open reduction and early subtalar fusion was done and all of them had poor results with no signs of revascularization.

Figure 1: MRI images showing AVN of talus and subtalar arthritic changes.

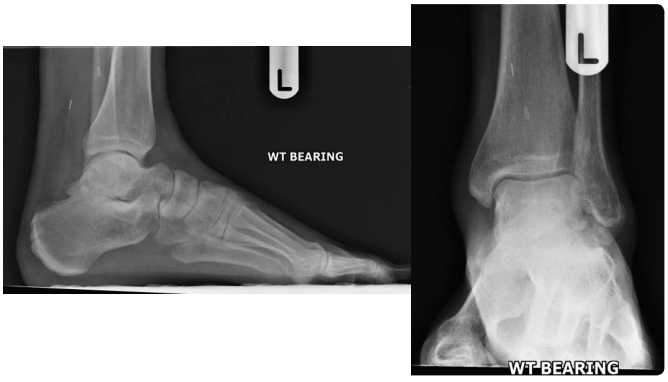

Figure 2: Weight bearing radiographs of Left ankle showing avascular necrosis of talus.

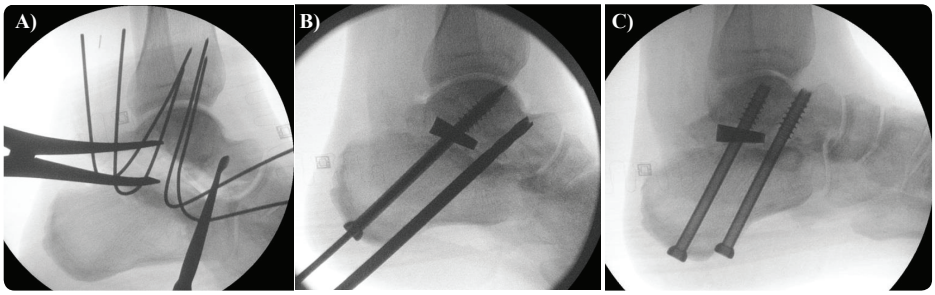

Figure 3: Radiographs of operative technique: a. Distraction of subtalar joint using laminar spreader b. Titanium wedge and 2 cancellaous (cannulated) screws c. Final fluoroscopic image .

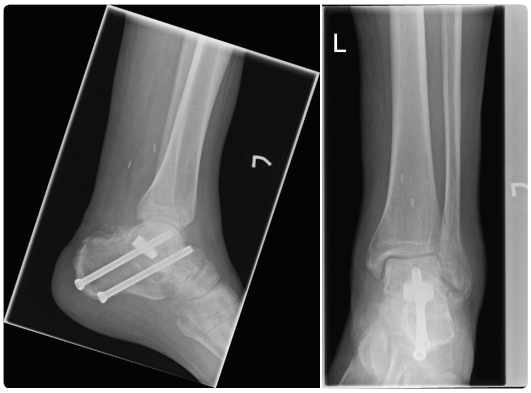

Figure 4: Radiographs taken 6 months after surgery showing revascularization of talus and incorporation of subtalar fusion.

Harnroongroj and Vanadurongwan [13] used stainless steel custom made talar body prosthesis to treat AVN of talus, avoiding talectomy and arthrodesis. They showed good results but having drawbacks of technical difficulties in obtaining exact shape and size of prosthesis and biomaterial concerns. Tonogai, et al. [14] in 2017 successfully treated 2 cases of idiopathic talar AVN managed with custom made alumina ceramic.

We successfully treated the late stage of avascular necrosis of talus associated with subtalar arthritis by subtalar fusion using pre shaped porous titanium wedges. It provides immediate structural support to maintain hindfoot height and prevention of collapse. Titanium material has been used successfully in procedures of foot in different studies [15,16]. The trabecular titanium wedge-shaped materials are capable of mimicking the structure of the cancellous bone and are able to promote osseointegration and maintain height and shape [16].

CONCLUSION

This unique technique enabled revascularization of talus in post-traumatic AVN and is not mentioned in literature. This unique technique can be used in cases where there is extensive AVN but no collapse. More work need to be done using longer follow-up studies with larger patient numbers to draw definitive conclusions.

REFERENCES

1. Adelaar RS, Madrian JR. Avascular necrosis of the talus. Orthop Clin North Am. 2004; 35: 383-395. **PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/15271547
2. Perugia D, Basile A, Massoni C, Gumina S, Rossi F, Ferretti A. Conservative treatment of subtalar dislocations. Int Orthop. 2002; 26: 56-60. **PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/11954852
3. Bibbo C, Anderson RB, Davis WH. Injury characteristics and the clinical outcome of subtalar dislocations: A clinical and radiographic analysis of 25 cases. Foot Ankle Int. 2003; 24: 158-163. **PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/12627624
4. Wagner R, Blattert TR, Weckbach A. Talar dislocations. Injury. 2004; 35: SB36-SB45. **PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/15315877
5. Zimmer TJ, Johnson KA. Subtalar dislocations. Clin Orthop. 1989; 238: 190-194. https://bit.ly/2x1wrsm
6. Canale ST. Fractures of the neck of the talus. Orthopedics. 1990; 13: 1105-1115. **PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/2251228
7. Gross CE, Houghom B, Chahal J, Holmes GB. Treatments for avascular necrosis of the talus a systematic review. Foot Ankle Spec. 2014; 7: 387-397. **PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/24686904
8. Tenenbaum S, Stockton KG, Bariteau JT, Brodsky JW. Salvage of avascular necrosis of the talus by combined ankle and hindfoot arthrodesis without structural bone graft. Foot Ankle Int. 2015; 36: 282-287. **PubMed**: https://www.ncbi.nlm.nih.gov/pubmed/25377390
9. Hawkins LG. Fractures of the neck of the talus. J Bone Joint Surg Am. 1970; 52: 991-1002. **PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/5479485
10. Canale ST, Kelly Jr FB. Fractures of the neck of the talus. Long-term evaluation of seventy-one cases. J Bone Joint Surg Am. 1978; 60: 143-156. **PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/417084
11. McKeever FM. Treatment of complications of fractures and dislocations of the talus. Clin Orthop Relat Res. 1963; 30: 45-52. **PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/5889006
12. Pennal GF. Fractures of the talus. Clin Orthop 1963; 30: 53-63. **PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/5889007
13. Harnroongroj T, Vanadurongwan V. The talar body prosthesis. J Bone Joint Surg Am. 1997; 79: 1313-1321. **PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/9314393
14. Tonogai I, Hamada D, Yamasaki Y, Wada K, Takasago T, Tsutsui T, et al. Custom-made alumina ceramic total talar prosthesis for idiopathic aseptic necrosis of the talus: Report of two cases. Case Rep Orthop. 2017; 2017: 8290804. https://bit.ly/3eMX8Sy
15. Matthews M, Cook EA, Cook J, Johnson L, Karthas T, Collier B, et al. Long-term outcomes of corrective osteotomies using porous titanium wedges for flexible flatfoot deformity correction. J Foot Ankle Surg. 2018; 57: 924-930. **PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/29891128
16. Bridgforth AB, Burrus MT, Park JS. Varus deformity of the distal tibia from physeal growth arrest treated using a titanium metal porous wedge. Foot & Ankle Specialist. 2016; 9: 452-456. **PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/26644031