

Post Traumatic Avascular Necrosis of the Talus Treated with Total TALECTOMY and 3D Printed Total Talus Implant

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Purpose

This report shows clinical precedent for the treatment of talar avascular necrosis with a total talemectomy and implantation of a 3D printed total talus implant with a total ankle tibial component in a 40 year old obese female with a history of traumatic ankle injury.

Literature Review

While total talus replacement is considered a new technique, there are a handful of reports available. Taniguchi et al¹ reported favorable results in 8 out of 14 patients after a mean follow up of 83 months using a second generation prosthesis which partially replaces the talus. In their report, they discussed that the third generation prosthesis which totally replaces the talus is the current recommendation which has been associated with better outcomes. Anghong et al reviewed 4 cases of total talar prosthesis with significant improvement in the VAS-FS, (SF)-36, and increased ankle dorsiflexion, plantarflexion, inversion, and eversion². Ando et al. reported a single case of a 72 year old female who underwent a total talus replacement with a custom made prosthesis with excellent outcomes at a 2 year follow up. The AOFAS score increased from 45-90 postoperatively with an increase in dorsiflexion from 0-20° and plantarflexion from 20-40°³.

Case Study

This patient sustained a right talar body fracture in a motor vehicle accident in 2016. At the time of injury, the patient was treated at another facility with application of an external fixator which remained in place for 1 month without any noted complications. The patient then underwent removal of external fixation and open reduction internal fixation with bone graft with suboptimal reduction. In 2018, the patient presented to our office with severe, persistent ankle pain and difficulty ambulating.

Figure 1: AP and lateral radiographs of the initial talar fracture.



Figure 2: AP and lateral radiographs approximately 2 years status post talar ORIF.



Figure 3: Sagittal CT showing sclerosis and cysts in talar dome



Figure 4: .AP and lateral radiographs at 1 year follow up



Pre-operative x-rays revealed all hardware in place but a CT scan showed evidence of avascular necrosis of the talar body as well as arthritic changes at the ankle joint, subtalar joint and talonavicular joint. The CT also revealed osteopenic bone quality to the foot and ankle likely secondary to disuse. This CT scan was utilized for pre-operative planning and fabrication of a 3D printed talar implant.

After a lengthy multidisciplinary discussion regarding her options, taking into account the patient's age and desired activity level, the patient chose to proceed with the reconstructive procedure. The patient underwent open talemectomy with implantation of 3D printed talus implantation of tibial ankle arthroplasty component, medial and lateral malleolar osteotomies and a gastrocnemius recession. At the patient's one year follow up, x-rays show the prosthesis is stable with no signs of any hardware failure.

Analysis & Discussion

Avascular necrosis of the talus, most commonly secondary a talar fracture, can be a cause of significant disability that is difficult to treat. The diagnosis of avascular necrosis can be a challenge, but the surgeon should anticipate it in traumatic cases with significantly displaced body fragment. Numerous procedures have been described for the treatment of talar avascular necrosis including core decompression, bone grafting, and tibio-talar-calcaneal arthrodesis⁴. Total talus replacement with custom made prosthesis has shown promising results. Total or subtotal avascular necrosis have historically been treated with arthrodesis, which has been associated with long recovery periods, loss of function, nonunions and shortening of the limb³. Total talus replacement has the advantage of maintaining ankle, subtalar and talonavicular joint motion while also maintaining ankle height and addressing arthritic deformities in adjacent tarsal joints³.

References

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