3D Printed Partial Talar Replacement for a Large Osteochondral Lesion of the Talar Shoulder in a Young Patient

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Statement of Purpose

Shoulder lesions of the talus remain a challenge to treat when attempting joint salvage procedures largely due to lack of structural support. This case study documents the success of utilizing a patient-specific 3D printed cobalt chrome partial talar replacement as an alternative to structural allografts for large shoulder osteochondral talar lesions in attempt to avoid concerns of delamination, fragmentation, resorption, and even disease transmission from allografts.

Case Study

A 23 year old patient who failed microfracture with cartilage allografting 1 year prior for large osteochondral lesion of the talar shoulder **(Fig 1.)** secondary to traumatic event is included in this study. Due to the young age and high activity of the patient, joint salvage procedure was preferred by both the physician and patient to include a partial talar replacement.

Procedures

Medial malleolar osteotomy and Additive 3D patient-specific partial talar replacement **(Fig. 2)**. As described by Van Bergan, optimal placement for metallic focal resurfacing implants should be slightly recessed 0.5mm **(Fig. 3).** Too recessed will result in decrease stability and higher risk of collapse, and too proud will significantly increase adjacent cartilage stress.

Results

Complete relief of pain and return to activity at 14 month follow-up in a young, active patient. AOFAS score improved from 43 to 80, and the ACFAS score improved from 37 to 75 at 1-year post-operatively **(Fig. 4).**

Figure 1. Pre-operative CT images

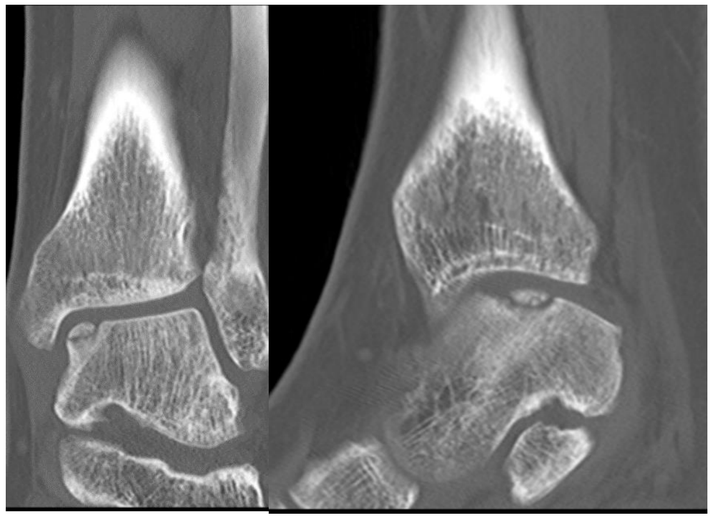

Figure 2. Arthroscopic image of implant to tibial plafond articulation

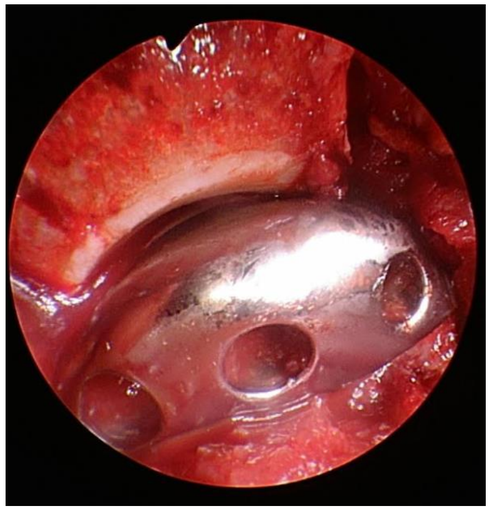

Figure 3. 0.5mm recessed implant

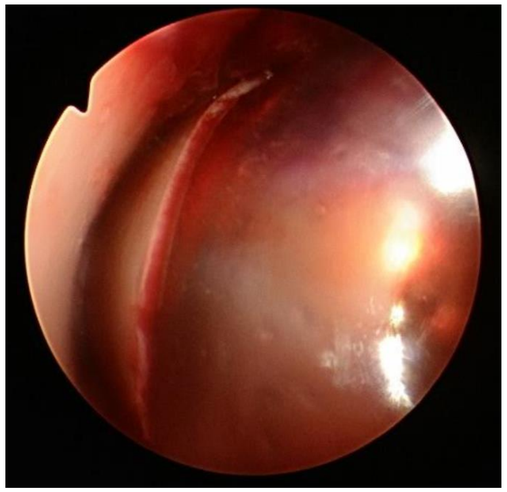

Figure 4. 1-year post-operatively

Discussion

Traditionally, structural fresh or fresh-frozen allograft osteochondral transplantation has been favored for osteochondral lesions that are uncontained and involve the shoulder. Furthermore, hemi-talus allografts have been described to reconstruct the native architecture of the talar dome when the shoulder lesion extends either anterior or posteriorly. However, concerns for allograft transplantation includes poor graft incorporation, subsidence, resorption, and delamination of the cartilaginous surface. Although poor graft incorporation and subsidence of 3D printed partial talar replacements still remains, concerns for the others do not. Longer-term follow-up is needed, however the use of 3D printed partial talar replacement could become the primary procedure of choice for talar shoulder lesions and further delay arthrodesis in the young. In our young patient, the 3D printed partial talar implant had excellent results at 14 month follow-up.

References

1. Ando Y et al. Total Talar Replacement for Idiopathic Necrosis of the Talus: A Case Report. The Journal of Foot & Ankle Surgery 2016;55(1292-1296)
2. Giannini S et al. Custom-Made Total Talonavicular Replacement in a Professional Rock Climber. Th Journal of Foot & Ankle Surgery 2016;55(1271-1275)
3. Orr JD et al. Results and Functional Outcomes of Structural Fresh Osteochondral Allograft Transfer for Treatment of Osteochondral Lesions of the Talus in a Highly Active Population. Foot & Ankle Specialist 2016;10:2(125-132)
4. Robbin J et al. Osteochondral Autologous Transfer and Bulk Allograft for Biological Resurfacing of Large Osteochondral Lesions of the Talus. Techniques in Foot & Ankle Surgery 2015;14:1(28-37)
5. Van Bergen C et al. Teritiary Osteochondral Defect of the Talus Treated by a Novel Contoured Metal Implant. Knee Surgery Sports Traumatology Arthroscopy. 2011; 19:6 (999-1003)

Financial Disclosures

None