

OssDsign Catalyst Performance as Bone Void Filler to Augment Total Ankle Arthroplasty in a Patient with Post Traumatic Ankle Arthritis

Richard Lamour¹ and SM Czop^{2*}

¹Olympia Orthopaedic Associates PLLC, USA

²OssDsign, Inc. Columbia MD 21044, USA

*Corresponding author: SM Czop, OssDsign, Inc. Columbia MD 21044, USA

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ABSTRACT

Total Ankle Arthroplasty procedures are becoming more common in properly selected patients. Despite four generations of design improvements, the failure rate over the long term remains stubbornly higher than rates reported in hip and knee arthroplasty. One of the major causes of failure remains aseptic loosening of the implant. Newer generations of synthetic bone grafts with osteogenic properties may have advantages over traditional autograft and allograft and exhibit better handling characteristics. The following case describes the use of a modern generation style TAR in a patient with prior ankle surgery where removal of previous instrumentation led the surgeon to choose Catalyst Bone Graft as a bone void filler to address issues of bone quality and possibly enhance bony ingrowth to the TAR device surfaces. CT scans at the three months follow-up showed Catalyst Bone Graft demonstrated excellent bony ingrowth in and around the implant surfaces setting the stage for further research with this bone graft in larger series of TAR cases with longer follow-up.

Keywords: Synthetic Bone Graft; Nano-Si-Ap; Foot and Ankle; Fusion; Silicate Calcium Phosphate

Abbreviations: TAR: Total Ankle Replacement; ADLs – Activities of Daily Living; ROM: Range of Motion

Introduction

Total ankle replacement (TAR) has evolved substantially in recent years, and the number of these procedures has steadily increased since its inception [1]. Four generations of TAR implant device designs have resulted in various improvements and enhancements which have increased surgical indications and implant survival over longer follow-up periods [1-3]. Despite these advances in materials and designs the rate of implant failure remains higher than those reported in hip and knee replacement, with aseptic loosening remaining a prominent cause of implant failure over time in TAR [4,5]. Autogenous or allogenic bone may be used in cases where previous trauma and hardware removal may result in bone defect or affect bone quality [6]. Next generation synthetic bone grafts may be better alternatives due to their physical and chemical characteristics which have been carefully designed to stimulate bone growth in challenging environments [7]. The synthetic bone graft used in this case (OssD-

sign Catalyst® Bone Graft) was selected based on its handling and performance characteristics specifically to address issues related to the patient's prior trauma and medical history [7-10].

Case Description

The patient is a 66-year-old female (BMI-24) presenting with disabling pain due to post-traumatic ankle arthritis from an ankle fracture and repair surgery which occurred 30 years earlier. The pain has progressed over the years to the point where the patient is no longer able to perform ADLs. Her right ankle alignment is normal. Past surgical incisions both lateral and medial are well healed. There is tenderness of the anterior ankle joint line, with limited ROM 5 degrees dorsiflexion and 10 degrees plantarflexion. She exhibits an antalgic gait (pain causing pronounced limp) despite no ankle instability. Past medical history includes hypertension and hypothyroidism. It was determined that surgery would be necessary for symptom relief and the patient was a suitable candidate for TAR (Figure 1). The surgery

consisted of removal of previous hardware from the tibia and prophylactic fixation of the medial malleolus, then implantation of a modern generation style TAR (Paragon 28 Apex3D, Biomet Inc. Warsaw, IN). Catalyst Bone Graft (approximately 2 cc's) was applied as a bone void filler to the ingrowth/ongrowth surfaces to improve bony incorpora-

tion and healing (Figures 2a & 2b). At three months follow-up the patient progresses clinically as expected with physical therapy, and both coronal and sagittal CT scans show excellent bony ingrowth through and around the entire tibia and talus implant surfaces (Figure 3).

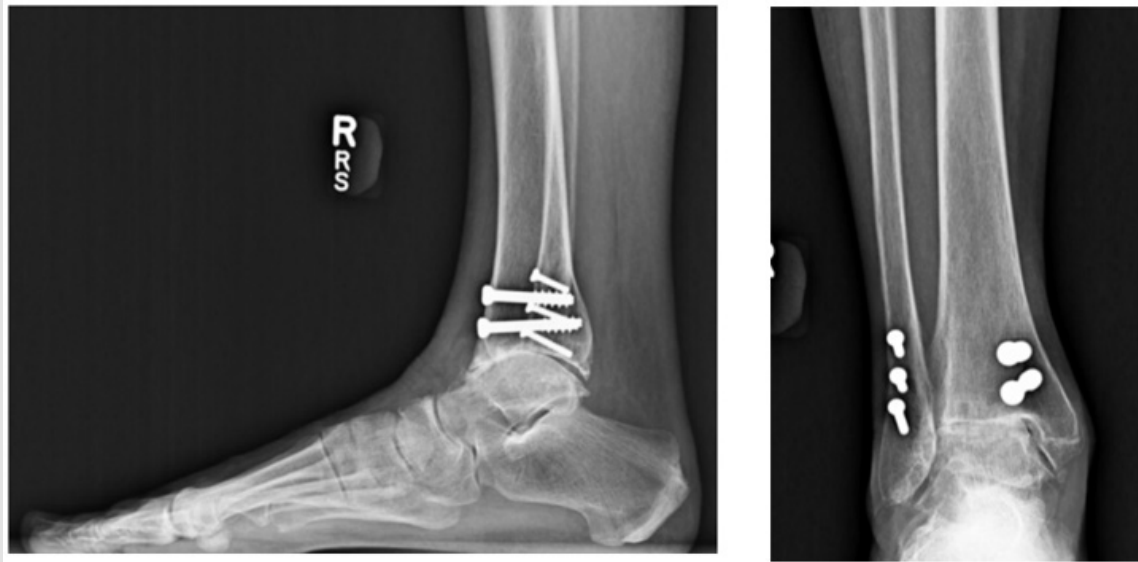


Figure 1: Pre-Operative X-rays show previous ankle fracture repair fixation and subsequent post traumatic arthritis.

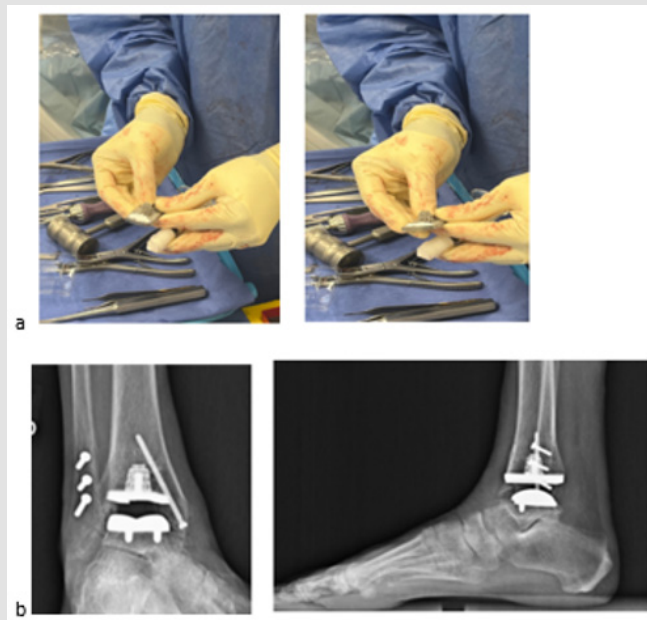


Figure 2:

- a. Catalyst bone grafting of ankle replacement as bone void filler placed on ingrowth/ongrowth surfaces.
- b. Post-Op X-Rays.

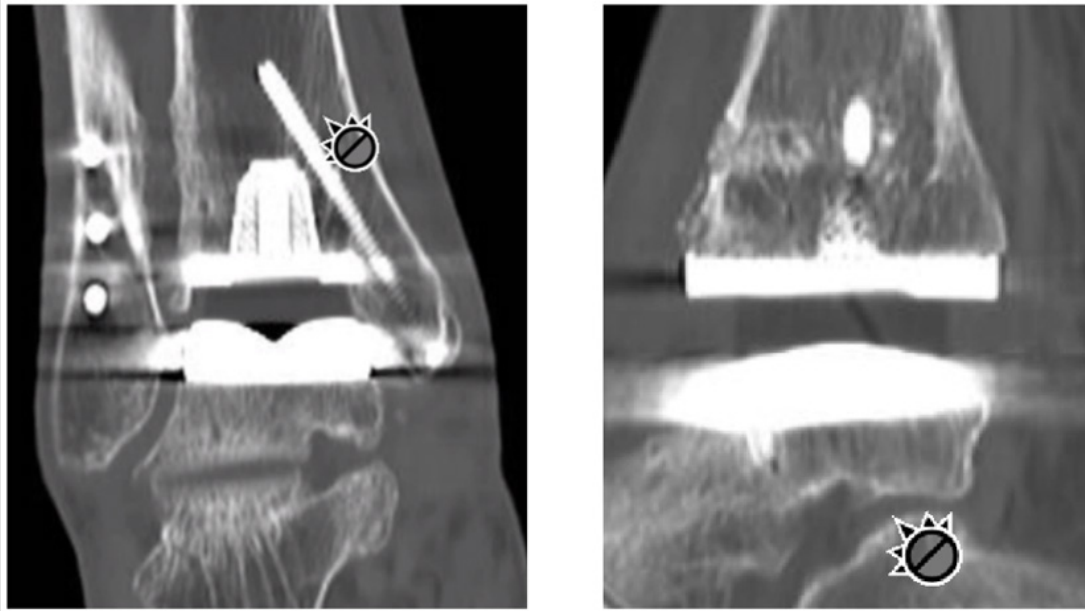


Figure 3: Coronal and Sagittal CT scans taken at 3 months follow-up confirms excellent early bony ingrowth through the entire tibia and talus implant surfaces.

Discussion

The rationale for the use of Catalyst Bone Graft for this patient, in addition to its ease of handling for the surgeon, was related to its mechanism of action, which includes both endochondral and intramembranous ossification [8]. Endochondral ossification is particularly advantageous when vascularization, extensive rapid bone formation, and mechanical strength are needed [11]. The early bony ingrowth in this TAR case is both interesting and encouraging. This case sets the stage for further research with long term follow-up using Catalyst Bone Graft as a bone void filler in TAR procedures for predictable and rapid healing as well as possible enhancement of the attachment of the implant to the patient's native bone.

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SM Czop. Biomed J Sci & Tech Res



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