Revision of an Oregon Total Ankle Prosthesis 37 years later

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Purpose and Literature Review

The Oregon Ankle Prosthesis was a 1st generation, semi constrained, ball and socket device that was introduced in 1972 by Dr. Groth. The talar component was made of stainless steel and cylindrical in nature to reproduce the natural articular surface of the talus. The tibial tray was carbon reinforced polyethylene and came in varying sizes. Both components were cemented in place after joint resection and preparation. This implant was unique from other devices available at that time in that it attempted to accommodate for the medial and lateral articulations to prevent potential source of impingement. According to analysis by the designer, the implant provided good stability, and allowed enough rotation to accommodate for the torque applied on the cemented surfaces. The only long-term survivorship data on this implant was a retrospective review of performed by the designing surgeon. It identified 71 patients from 1975 to 1985 with an average follow up of 6.5 years. ***In these cases, 19 patients had to undergo 25 secondary procedures.*** This was a result of these implants being biomechanically limited and accommodating motion only in one plane. This case study presents our approach to a revision of a 1st generation total ankle prosthesis that was implanted 37 years ago. [1-2]

Photo1.

Photo 2.

Photo 3.

Photo 4. 

PHOTO 1, 2, & 3: AP, Lateral and Oblique pre-op radiographs demonstrating the 37 year old implanted Oregon Ankle Implant. The radiographs display the hypertrophic bone formation, secondary mid foot arthritis and a relatively well maintained Oregon Ankle Implant.

PHOTO 4. A weight bearing clinical pre-op clinical photo

Case Study and Procedure

A 69y male presented for evaluation for chronic left ankle pain and stiffness. He related that in 1980 he sustained an ankle fracture and subsequently underwent ORIF. After approximately 3 months he underwent a hardware removal procedure with and total ankle arthroplasty. Until the last few years the implant had been highly successful allowing him to perform all of his activities of daily living. His chief complaint now is daily discomfort to the affected ankle, with severely limited motion not allowing him to accommodate for uneven ground, especially while hunting. Treatment options were discussed with the patient including, conservative bracing, surgical revision total ankle replacement, or ankle arthrodesis. Given the patients good experience with the Oregon Ankle Implant, activity level, high functional status, and good health, it was desired by the patient as well as our recommendation to proceed with revision and insertion of a new implant. Pre-operative x-rays, CT imaging, and non invasive vascular studies were all performed. CT imaging was obtained to assess periarticular bone quality given cystic appearance of the bone on plain films. Non-invasive vascular studies were performed given the patients age and history of trauma and showed adequate perfusion to the limb and foot. Surgical revision and insertion of a revisional ankle implant was performed through an anterior approach. Extensive heterotrophic bone formation was encountered during the procedure and was resected. The poly showed signs of age and minimal fragmentation, it was split with an osteotome to ease removal. Insertion of the revisional implant was complicated by a medial malleolar fracture, which was subsequently repaired intra-operatively.

Photo 5.

Photo 6.

Photo 7.

Photo 8.

Photo 9.

Photo 10.

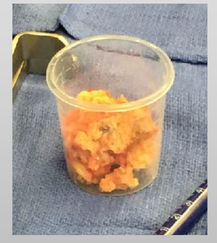

Photo 11.

Photo 12.

PHOTO 5 & 6: Demonstration of an intra-op lateral projection while resecting the hypertrophic bone. The AP view illustrates the bone loss with resection of the hypertrophic bone and removal of the Oregon Ankle Implant.

PHOTO 7 & 8: Intra-operative views demonstrating implantation of a revision total ankle implant.

PHOTO 9 & 10: One year post-operative views with a revision total ankle implant.

PHOTO 11 & 12. Illustration of the amount of hypertrophic bone resected at the time of removal of the Oregon Total Ankle Implant. A view of the Oregon Total Ankle Implant once removed from the patient.

Results

Patient was placed in a univalve below the knee cast and was kept non weight bearing for 2 weeks followed by a fiberglass blow the knee case for 2 additional weeks. Post operative weeks 4-6 the patient was partial weight bearing in a CAM boot with crutches. Stitches were removed at 6 weeks and no wound complications were noted. Patient transitioned to normal shoe gear and was cleared for physical therapy 3 times per week for 8 weeks. At last follow up the patient is ambulating in normal shoe gear with no assistive device. He has returned to daily activities as desired and is pain free at 6 month follow up.

Discussion

Several indications for re-operation or revision of ankle implants have been described. They include, uncontrolled pain, aseptic loosening of the components, mal-position, hypertrophic bone growth surround the implant, or non-union and subsidence. Options for total ankle implant revision include re-operation, re-implantation, or arthrodesis.[3]

In this case, we describe surgical revision of a 1st generation implant that was sparingly used. Given the patient's past experience & satisfaction of the Oregon ankle implant, activity level and postoperative goals, the patient desired a revision total ankle replacement. It has been shown that fusion can lead to adjacent joint arthritis, and in this case the overall foot structure was rectus.[4] It was likely in this rectus position because of the long-term success of his implant. Additionally, the original surgeons technique has to be acknowledged.

A variety of new total ankle implants are readily available, including some that are ideal for revision of previous failed implants. Each has their own set of benefits and pitfalls. Surgeon experience with implants has also been shown to increase patient outcomes. Thorough clinical, biomechanical, and radiographic examination is paramount in order to proceed with revision. Staged procedure may also be a necessity depending on each patient's clinical history and deformity.[3]

As implant designs continue to evolve, new options become available for salvage or conversion. An advanced understanding of ankle joint biomechanics, and experience with a multitude of implants aids in surgeons being able to successfully perform these procedures.

References

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4. Kwon, Dae Gyu, et al. "Arthroplasty versus arthrodesis for end-stage ankle arthritis: decision analysis using Markov model." *International orthopaedics* 35.11 (2011): 1647.