Penn Medicine

CLINICAL BRIEFING™

Department of Orthopaedic Surgery • Penn Foot and Ankle Service

Total Ankle Replacement with the STAR™ Ankle System

Orthopaedic surgeons at Penn Medicine are implanting the Scandinavian Total Ankle Replacement (STAR™ Ankle*) system for the treatment of end-stage tibiotalar arthritis as a result of trauma or rheumatoid disease. Penn Medicine is currently the only place in the Philadelphia region offering the STAR system for total ankle replacement.

Total ankle replacement was originally developed in the 1970s as an alternative to tibiotalar arthrodesis (ankle fusion). Early implant designs led to high failure rates, however, and thereafter, ankle fusion became the established gold standard for the treatment of end-stage ankle arthritis.

Renewed interest in total ankle replacement occurred when long-term studies determined that ankle fusion contributes to the development of advanced symptomatic hindfoot arthritis and increasing functional limitations. Improvements in design, materials and surgical technique followed, and total ankle replacement is today a viable alternative to ankle fusion for the treatment of ankle arthritis.

The STAR ankle system in use at Penn is designed to maintain a normal range of motion for the ankle. It is currently the only three piece, mobile bearing, non-constrained, uncemented device approved by the Food and Drug Administration for total ankle replacement for the treatment of ankle arthritis.

The system is comprised of two cobalt chromium alloy interfaces coated with titanium. The upper interface is attached to the tibia and is a flat planar surface, permitting internal and external rotation and translation in the antero-posterior and mediallateral directions. The second interface is attached to the talus and is shaped like a cylinder, allowing plantarflexion-dorsiflexion motion. A polyethylene mobile bearing is situated between the metal parts. An advantage of the mobile bearing is that the flat upper surface allows some rotation, thus reducing stress at the prosthesis–bone interface.

Reference

Saltzman CL, Mann RA, Ahrens JE, et al. Prospective Controlled Trial of STAR Total Ankle Replacement Versus Ankle Fusion: Initial Results. *Foot Ankle Int.* 2009;30:579-596.

*The Star™ Ankle System is a trademark of Small Bone Innovations, Inc., Morrisville, PA.

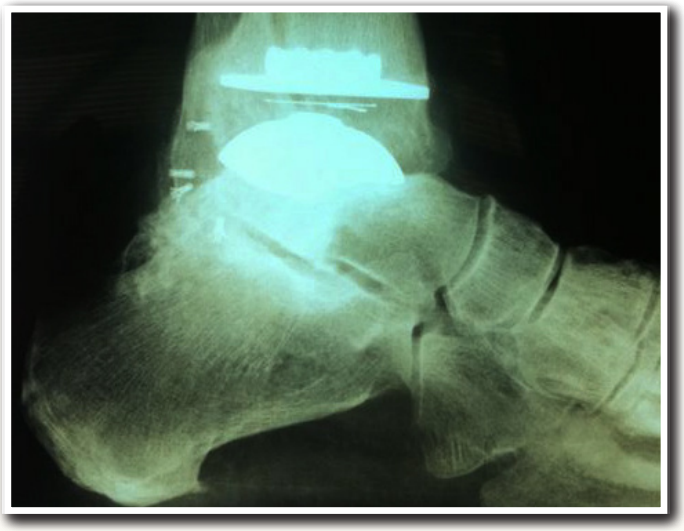

Figure 1: Lateral view of the STAR ankle system three-part mobile bearing prosthesis.

Case Study

Mr. R, a 62-year-old patient, was referred to the Department of Orthopaedic Surgery at Penn for evaluation of degenerative osteoarthritis in his left ankle. Mr. R had pain of increasing severity even at rest and was using a cane at presentation. His medical history included NSAIDs and cortisone treatment. Following a consultation, Mr. R opted to have total ankle replacement surgery in the hope that he could retain some mobility in his ankle.

The STAR arthroplasty procedure was conducted through an anterior 15 cm to 20 cm approach to the ankle joint through the extensor retinaculum above the extensor hallucis longus tendon. Following the removal of 5 to 8 mm of the distal articular surface at the dome of the tibial plafond and 4 to 6 mm of the superior dome of the talus, 2 to 3 mm was resected from the medial and lateral talus. Anterior and posterior chamfer cuts were then made to create a truncated pyramidal shaped surface for seating of the talar component. A vertical slot was created in the central aspect of the talus to receive the fin of the talar prosthesis and a prosthesis placed and impacted onto the prepared talar surface.

(Case Study continued on back page.)

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(Case Study continued from front page.)

To accommodate the barrels of the tibial component, two holes were drilled from anterior to posterior at the edge of the prepared distal tibial surface. A gouge was then used to connect the holes with the prepared flat surface of the distal tibia and a tibial component inserted. A polyethylene trial spacer of appropriate size was then selected and inserted. Mr. R's lower leg and ankle were then immobilized in a below knee cast.

Mr. R recovered well from his surgery and was discharged on post-operative day four. During the next two weeks, he was permitted minimal weightbearing on his left ankle. This was followed by two weeks of 50% weightbearing and two weeks of full weightbearing in the cast, after which the cast was removed. At one year post-surgery, Mr. R has regained full mobility.

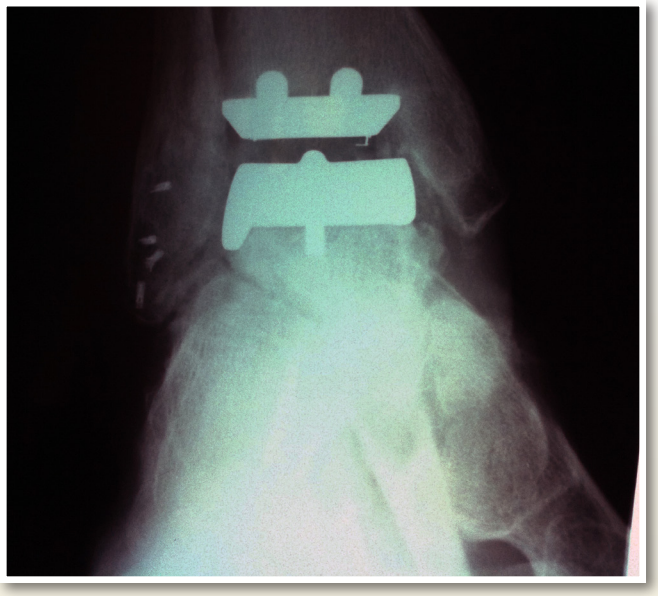

Figure 2: AP view of the STAR ankle system.

Access

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Faculty Team

Penn Orthopaedics Foot & Ankle Service offers comprehensive, state-of-the-art surgical and non-surgical treatment for all routine foot and ankle disorders including bunions, hammertoes, and the most complex reconstructive procedures for deformities secondary to trauma, tendon injury, rheumatoid disease, and diabetes. Penn's foot and ankle team is the only practice in the area performing the STAR total ankle replacement for ankle arthritis.

Performing Total Ankle Replacement at Penn Medicine

Keith L. Wapner, MD
Chief, Foot and Ankle Service
Clinical Professor of Orthopaedic Surgery

Keith L. Wapner, MD, specializes in total ankle replacement surgery and the treatment of tendon injuries, rheumatoid arthritis, bunions, and diabetes. He completed a residency in orthopaedic surgery at the University of Pennsylvania School of Medicine, and fellowships in joint replacement surgery at the Ohio State University, and foot and ankle reconstruction at the University of California, San Francisco. A past president of the American Orthopaedic Foot & Ankle Society, Dr. Wapner is a paid consultant to Small Bone Innovations, Wright Medical Technology and MemoMetal Technologies. He receives institutional support from EBI and Hanger Orthopedic Group.

Penn Foot and Ankle Service

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