Short-Term Outcomes of a New Semi-Constrained Total Ankle Replacement System in 15 Patients

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Purpose

Osteoarthritis of the tibiotalar joint, whether primary or post-traumatic, is a common pathologic condition encountered by the foot and ankle surgeon. This progressive condition is most debilitating by patients' subjective pain, lack of motion, swelling, as well as potential for paresthesias secondary to the exostosis and enthesophyte formation. Historically ankle arthrodesis has been shown to be the gold standard, however as ankle arthroplasty technology improves and experience climbs the role or replacement is a viable option with similar satisfactory results and reoperation/complication rates are similar. The purpose of this study was to evaluate the short-term outcomes of a new semi-constrained total ankle replacement system.

Methodology

Fifteen patients were consecutively enrolled in the study. Inclusion criteria were those patients who had the semi-constrained total ankle replacement system. Primary outcome measures are range of motion (ROM), complications, AOFAS, VAS, and FFI scores. Scores were collected pre-operatively, as well as post-operatively at 6 weeks, 3 months, 6 months, 12 months,18 months, and 24 months. ROM was measured using radiography measuring the ankle joint in maximum plantarflexion (PF) and dorsiflexion (DF). All patients had the same post-op protocol starting with 7 days NWB in a splint, 20 days NWB in a cast divided into two 10-day intervals. Finally, 7 days in a below-knee weight bearing cast. Physical therapy commenced at approximately week 5 or 6. Some patient's post-op protocol varied depending on swelling. Patient demographics are summarized in Table 1. Furthermore, serial weight bearing radiographs are taken beginning at 6-weeks. This is to assess end range of motion in dorsiflexion and plantarflexion compared to their pre-operative status.

Demographics	
# of patients (n)	15
Male	7
Mean Age (years)	63 ± 8.8
Mean BMI (kg/m²)	27.6 ± 8.3
Average Follow-up (months)	9.3 ± 6.4
Laterality, R	12
Post-traumatic arthritis	12
Primary osteoarthritis	3
Diabetes	0
Smoker	0

Table 1: Patient demographics

Fig. 1-1A: Inserting tibia component, making sure to protect talar

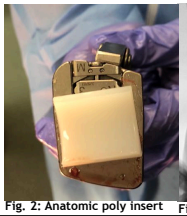

Fig. 2: Anatomic poly insert

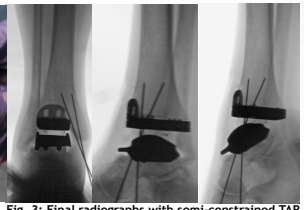

Fig. 3: Final radiographs with semi-constrained TAR

Surgical Technique

All total ankle arthroplasty procedures begin with a standard anterior ankle incision between the tibialis anterior (TA) and extensor hallucis longus (EHL) tendons down to retinaculum. The retinaculum is incised. The neurovascular bundle is retracted laterally and TA tendon medially. A periosteal incision is made and the ankle joint exposed. Prophylactic medial malleolar screws are placed to prevent stress fracture. The tibial cutting block is positioned and confirmed under fluoroscopy. Tibial resection ensues. Hintermann distractor placed medially to distract ankle joint. Remove remaining tibial cut. Apply talar cutting block. Make sure block is as distal as possible and ankle at 90°. Fix ankle with medial and lateral pins. Resect talar dome. Assess size of tibial component. Resect posterior, medial, and lateral talus. Ensure there is at least 2mm margin medially and 1-3mm laterally. Ream anterior talus. Trial both the tibia and talus. Once sizes confirmed, the anterior talus must be cut utilizing power rasp. Drill peg holes for talar component. Implant talar component. While protecting the talar surface using retrograde insertion of the trial inlay, insert the tibia component (Fig 1-1A). Insert trial inlay to verify the relative anterior/posterior position of the talar and tibial components. Insert appropriately-sized poly. The inserted poly fits individual patient anatomy (Fig. 2). Confirm range of motion of fluoroscopy (Fig 3).

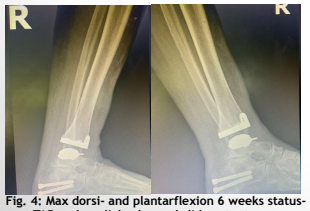

Fig. 4: Max dorsi- and plantarflexion 6 weeks status-post TAR and medial calcaneal slide osteotomy

Results	Pre op	6 weeks	3 months	6 months	12 months	18 months	24 months	Procedure Again?	
AOFAS	46.2	81.0	85.8	87.7	88.8	97	97	Yes	No
VAS	7.7	1.3	1.0	0.2	1.8	0.3	0	15	0
FFI	72.6	25.7	11.4	8.4	10.1	1.0	0.4		

Table 1: Outcomes; AOFAS: American Orthopedic Foot and Ankle Score, VAS: Visual Analog Scale, FFI: Foot Function Index

Results

Fifteen consecutive patients were enrolled in the study. Seven (46.7%) patients were male. Mean age was 63 ± 8.8 (range 26 to 81) years. Mean BMI was 27.6 ± 8.3 (range 19.3 to 41.1) kg/m². The mean follow-up was 9.3 ± 6.4 (range 2 to 21.3) months. 12 (80%) ankle replacements were performed on the right side. The most common indication for replacement was post-traumatic arthritis (80%), with primary osteoarthritis being the next most common (20%). There were no diabetic, smoking, or workers compensation patients. Mean pre-op AOFAS, VAS, and FFI scores were 46.2, 7.7, and 72.6, respectively. Of the data, three patients have followed up at an average of 20.8 months. Their mean pre-op AOFAS, VAS, and FFI scores are 44.3, respectively. Their latest mean AOFAS, VAS, and FFI scores are 98, 0.3, and 0.97, respectively. In this short time, 100% of the patients said they would have the procedure done again. There have been no major complications reported. The results are summarized in Table 2. Post-operative weight bearing maximum dorsiflexion and plantarflexion radiographs are taken beginning at 6-weeks. Figure 4 shows a patient who underwent ankle replacement surgery with concomitant medial calcaneal slide osteotomy.

Analysis & Discussion

Our short-term outcomes of this semi-constrained total ankle replacement system show promising results. It is the author's opinion that this system extremely reproducible and one of the easier systems to use. This system allows for a smaller incision which in turn leads to quicker healing times and decreased complication rates. Furthermore, those patients who had additional procedures or staged operations did not alter outcomes. Interestingly, these patients have progressed similar to those patients who had a primary TAR. Our study is limited secondary to a small patient population as well as lack of long-term data. Research is concurrently be conducted in order to improve results.