Total Ankle Arthroplasty in Elderly Patients: A Matched-Cohort Study

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INTRODUCTION: Total ankle arthroplasty (TAA) is a safe and effective method for treating ankle arthritis, and utilization is increasing. Given the historical teaching practice of reserving TAA for low demand patients, recent publications have focused on outcomes of the procedure in young and middle-aged patients. However, there remains a paucity of literature discussing outcomes for elderly patients undergoing TAA. This is important given the potential concerns of bone quality, soft tissue quality, and the challenges of functional recovery in elderly patients. The aim of the present study was to evaluate clinical, radiographic, and patient-reported outcomes of TAA in patients ≥75-years-old in comparison to a matched cohort of younger patients (<75-years-old).

METHODS:

This is a single-institution retrospective matched-cohort study of primary TAA patients (2015-2021) ≥75-years-old. Demographic, clinical, radiographic, and patient-reported outcomes (PROMIS scores) were collected. A control group of patients <75-years-old was identified utilizing Mahalanobis Distance Matching in a 2:1 ratio using the nearest-neighbor method without replacement. Matching criteria included ± 3 units of preoperative PROMIS physical function, ± 2 years of surgical year, and exact matches for stemmed implant use and ipsilateral hindfoot fusion. Clinical outcomes were assessed using Fisher's exact test, with p-values adjusted for false discovery rate of 5%; differences between cohorts in PROMIS 1-year and 2-year postoperative outcomes were assessed using Mann Whitney U test and a paired t-test was used to evaluate changes in PROMIS scores from preoperative to 1-year postoperative, preoperative to 2-years postoperative, and 1-year postoperative to 2-years postoperative within each cohort.

RESULTS:

52 patients were included in the ≥75 cohort (median age of 78 years (range: 75-88 years), 17 (32.7%) females, median BMI of 27.2 kg/m^2). 104 patients were included in the matched control group (<75-years-old) (median age of 63 years (range: 25-74 years), 45 (43.3%) females, median BMI of 29.0 kg/m^2). There were no differences between study and control groups preoperatively, at 1-year postoperatively, and at 2-years postoperatively for each PROMIS domain (P>0.05 for all) (**Figure**). However, both cohorts showed significant improvements in all PROMIS domains from preoperative to 1-year postoperative and preoperative to 2-years postoperative (except for Depression from preoperative to 2-years postoperative in the <75-year-old cohort) (**Table 1**). Neither cohorts showed significant improvements in any PROMIS domain between 1-year postoperative to 2-years postoperative. Rates of postoperative complications, reoperations, and revisions were not significantly different between the control and the matched groups (P>0.05 for all) (**Table 2**).

DISCUSSION AND CONCLUSION:

TAA is a viable option for elderly patients with end-stage ankle OA, conferring similar clinical, radiographic, and patient-reported outcomes when compared with their younger counterparts. The lack of difference in patient-reported outcomes across each time point between cohorts suggests no difference in patient recovery timeline and that patients of older age experience the same degree of self-reported improvement following TAA. These findings can be beneficial for adequate patient education, establishment of postoperative expectations, and clinical decision-making for elderly patients with end-stage ankle OA. Longer term follow-up is required to determine if age affects survivorship of the TAA prosthesis.

Figure. Box plots displaying PROMIS scores preoperatively, at 1-year postoperative, and at 2-year postoperative for the following PROMIS domains: Physical Function, Pain Interference, Pain Intensity, Global Physical Health, Global Mental Health, and Depression. Scores are reported as a T-score between 0 and 100 with 50 representing the US population average. Higher scores reflect a greater lived experience of that domain or symptom by the patient. Mann Whitney U test was used to assess differences between the ≥75 and <75 cohorts.

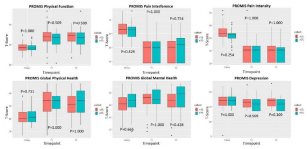

Table 1. Changes in PROMIS scores over time for the two cohorts of patients: patients ≥75 years of age and patients <75 years of age.

	Patients ≥75 Years Old	p-value	Patients <75 Years Old	p-value
PROMIS Change from Preoperative to 1-Year Postoperative				
Physical Function	8.8 ± 6.7	<0.001	10.4 ± 7.4	<0.001
Pain Interference	-13.7 ± 8.5	<0.001	-14.8 ± 9.3	<0.001
Pain Intensity	-14.2 ± 8.4	<0.001	-16.1 ± 9.4	<0.001
Global Physical Health	10.3 ± 6.9	<0.001	11.3 ± 9.2	<0.001
Global Mental Health	2.5 ± 5.9	0.006	3.9 ± 7.1	<0.001
Depression	-3.8 ± 5.9	<0.001	-2.2 ± 8.7	0.016
PROMIS Change from Preoperative to 2-Years Postoperative				
Physical Function	8.7 ± 8.8	<0.001	10.6 ± 6.5	<0.001
Pain Interference	-11.5 ± 9.3	<0.001	-14.9 ± 9.9	<0.001
Pain Intensity	-12.9 ± 8.3	<0.001	-16.0 ± 9.0	<0.001
Global Physical Health	9.6 ± 9.2	<0.001	10.3 ± 9.0	<0.001
Global Mental Health	3.0 ± 8.7	0.026	2.8 ± 8.1	0.001
Depression	-4.0 ± 7.0	0.001	-1.2 ± 8.8	0.183
PROMIS Change from 1-Year Postoperative to 2-Years Postoperative				
Physical Function	0.2 ± 7.0	0.878	0.2 ± 5.0	0.704
Pain Interference	1.9 ± 7.8	0.130	-0.4 ± 7.0	0.603
Pain Intensity	0.8 ± 7.0	0.464	-0.1 ± 7.1	0.933
Global Physical Health	-1.9 ± 6.2	0.068	-0.5 ± 6.9	0.464
Global Mental Health	-0.7 ± 6.0	0.478	-1.0 ± 6.3	0.145
Depression	0.1 ± 6.9	0.966	0.9 ± 5.8	0.137

Table 2. Complications, reoperations, and revisions for the two cohorts of patients: patients ≥75 years of age and patients <75 years of age. Values are expressed as median and the interquartile range (IQR) for continuous variables, and frequencies with percentages for categorical variables.

	Patients ≥75 Years Old (n=52)	Patients <75 Years Old (n=104)	Adjusted p-value
Intraoperative Complications (n, %)	0 (0.0%)	1 (1.0%)	1.000
Wound Complications (n, %)	2 (3.8%)	7 (6.7%)	1.000
Other Complications* (n, %)	3 (5.8%)	13 (12.7%)	0.601
Reoperations (n, %)	4 (7.7%)	10 (9.6%)	1.000
Gutter Impingement	0	4	
Fracture	0	1	
Infection	2	1	
Malalignment/Deformity	0	3	
Wound Complication	0	1	
Calcaneofibular Impingement	1	0	
Painful Hardware	1	0	
Revisions (n, %)	0 (0.0%)	4 (3.8%)	1.000
Tibial Failure	0	3	
Tibial and Talar Failure	0	1	

*Other complications included second metatarsal stress fracture, peroneal tendon subluxation, subtalar osteoarthritis, calcaneal stress fracture, gutter impingement, Complex Regional Pain Syndrome, medial malleolar stress fracture, and first tarsometatarsal fibrous union.