

Functional Outcome Risk Score for Total Ankle Arthroplasty

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Introduction/Purpose: Postoperative functional outcomes are important measures as the orthopaedic community responds to pay-for-performance and bundled payments. Considering the 1000-fold growth of total ankle arthroplasty (TAA) procedures in the Medicare population in the past two decades, this procedure will likely undergo increasing scrutiny of quality under Medicare Access and Children's Health Insurance Program Reauthorization Act of 2015 (MACRA). While BMI, coronal plane deformity, age, and rheumatoid arthritis influence outcomes and rate of complications after TAA, there has been no single identifiable factor that predicts poor functional outcomes. The aim of this study is to identify independent patient factors that are associated with lower functional outcomes at two years after TAA and compound these predictive factors into an easily calculable score to preoperatively stratify patients undergoing modern TAA.

Methods: 134 consecutive patients (136 ankles) with a mean age of 64 years (range, 31 to 79 years) and 70 (51%) men that had undergone TAA by a single surgeon from May 2011 to May 2015 were retrospectively enrolled. In addition to 2-year functional outcomes for each patient, 22 data points were collected including preoperative range of motion; baseline functional scores; and a comprehensive health history. FAAM ADL scores at 2-years were grouped into excellent (>90 points), good (75-90), or fair (<75). Univariable analyses tested for the association between demographics, medical history, functional outcomes, and procedure factors using chi-squared tests for categorical variables and either one-way ANOVAs or Kruskal Wallis tests for continuous variables. Model coefficients from a multivariable ordinal logistic regression analysis for the significant predictors of excellent, good, or fair outcomes were used to create a summed risk score to predict inferior 2-year outcome scores.

Results: Ninety-one patients met the inclusion criteria. The only predictors associated with inferior functional outcomes were (1) baseline ADL score (2) no calcaneal osteotomy for coronal plane deformity (3) lateral or deltoid ligament reconstruction and (4) post-traumatic/chronic sprain etiology and BMI >30. From the multivariable ordinal logistic regression, baseline ADL scores less than 40 had a weight of 2 while an ADL score of 40-55 had a weight of 1. The remaining factors were weighted 3, 2, 1 for ligament reconstruction, no calcaneal osteotomy, and obese+sprain. Of the 23 patients with a calculated risk of 0-2, 18 did excellent and 2 did fair. Conversely, of the 22 patients with a calculated risk score of 4+, only 2 did excellent and 15 did fair (Table 1).

Conclusion: Over twenty baseline and surgical factors were considered when creating a clinical scoring system that compounds the effect of risk factors on postoperative foot and ankle functional outcome measures at two years. Ligament reconstruction was the highest weighted factor (3-points), which suggests soft tissue stabilization needs to be considered in conjunction with bony correction. As previous literature supports, preoperative coronal plane deformity when corrected appropriately can lead to greater likelihood for superior outcomes when compared to patients without this deformity. This novel risk score takes into account 5 easily-obtainable factors and may help to better set patient expectations prior to TAA.

Table 1: Summary of calculated risk scores and patient-reported 2-year outcomes. Proposed scoring metric also shown.

Score	Fair	Good	Excellent	Total	Grouped Risk	Fair	Good	Excellent	Total
0	0	0	4	4	0-2	2	3	18	23
1	1	2	5	8					
2	1	1	9	11					
3	10	6	7	23	3	10	6	7	23
4	7	4	2	13	4+	15	5	2	22
5	5	1	0	7					
6	1	0	0	0					
7	2	0	0	2					

Risk Factors	Weight	
BMI 30+ & post-traumatic/chronic sprain	1	
Baseline ADL: 40-55	1	
<40	2	
No calcaneal osteotomy	2	
Ligament reconstruction	3	
Summed Risk Score		