Evaluating Recovery Following Total Ankle Arthroplasty Using a Smartphone Mobile Application

Austin Sanders, BA, Grace Kunas, BA, Kara Fields, MS, Constantine Demetracopoulos, MD, Jonathan Deland, MD, Scott Ellis, MD, Stephen Lyman, PhD

Category: Ankle, Ankle Arthritis

Keywords: Outcomes, total ankle replacement, mobility, smartphone application, pain assessment, total ankle arthroplasty, mobile technology

Introduction/Purpose: The use of smartphone applications to assist with medical care is increasing. An important aspect of total ankle arthroplasty is to allow patients to remain active and mobile following their surgery while decreasing discomfort. To our knowledge, no other studies have quantitatively and qualitatively assessed post-operative mobility following total ankle arthroplasty. The goals of the present study were to assess the reliability of a mobile health application to measure step counts, to correlate mobility with pain and functional assessments, and to determine average walking ability following total ankle arthroplasty.

Methods: A smartphone app, Moves, used a pedometer to record the number of steps taken daily. The device was chosen because it is a free application and is compatible with both iPhone and Android. Patients were identified through the OR schedule and called one month prior to surgery. After obtaining consent, patients completed an online consent form, an online pre-operative survey and downloaded the Moves application to their smartphone. Mobility data was gathered for the month prior to surgery and from post-operative months 3-9. Beginning at 3 months post-operatively, patients completed a weekly online survey until 6 months post-operatively, which was then completed biweekly until study completion at 9 months post-operatively. The correlation of step count with pain and quality of life scores as reported through the Foot and Ankle Outcome Score (FAOS) and pain as reported by the Numeric Rating Scale (NRS) were assessed via Spearman’s rank correlation coefficients.

Results: 46 patients (23 female and 23 males) were enrolled with a mean age of 63.6 years (range 33.0 to 78.9). Maximum daily step count increased from a median (1st quartile, 3rd quartile) 4348 (2737, 7253) steps pre-operatively to 4411 (3237, 9614) steps post-operatively, with patients continuing to increase their step count at 9 months post-operatively. Step count showed weak correlation with FAOS pain scores (rs=0.21 [95% CI: 0.08, 0.33]), FAOS QOL scores (rs=0.11 [95% CI: -0.02, 0.24]), and NRS pain scores (rs=-0.27 [95% CI: -0.38, -0.14]).

Conclusion: Using mobile technology following total ankle arthroplasty may be useful for patients to quantitatively assess their recovery; however, this application fails to correlate increased ambulation with qualitative assessments such as pain and quality of life. While improved pain and quality of life scores only showed weak correlations with increased ambulation, it is important to note that pain improved despite increasing ambulation in the post-operative period. In addition, it may be that differences in functional outcomes do not appear until beyond 9 months as step count has not yet plateaued at that point.