

Reading the Future: Predicting Who Will Benefit from Bunion Surgery

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Introduction/Purpose: Hallux valgus is a common condition of the foot with 4.4 million patients seeking care yearly for this condition. A previous study suggested specific pre-operative cut-off scores based on Patient Reported Outcomes Measurement Information System (PROMIS) physical function (PF), pain interference (PI), and depression (D) values could predict post-operative outcomes in foot and ankle surgery. Though hallux valgus correction, among other procedures, were identified as one of the most common surgeries in the previous study, specific conditions were not considered separately. The purpose of this study was to evaluate the validity of applying a published comprehensive pre-surgical PROMIS profile of PF, PI and D to patients undergoing bunionectomy surgery.

Methods: PROMIS scores were prospectively obtained from patients evaluated in a specialty foot and ankle clinic between February 2015 and November 2016. Using ICD-9/10 and CPT codes, a total of 65 patients with hallux valgus who underwent a bunionectomy by a single surgeon were identified. Those with less than two-month follow-up, multiple procedures during the follow-up period, and incomplete PROMIS assessment scores were excluded, resulting in 42 patients. Using pre-operative scores and scores at the last follow-up visit, minimally clinically important differences (MCID), receiver operating characteristic (ROC) curves, and area under the curve (AUC) were obtained to determine if pre-operative PROMIS scores predicted achieving MCID with 95% specificity or failing to achieve a MCID with 95% sensitivity. New cut-off values were then compared to the previous study.

Results: The AUC for PF ($p=0.01$) and Mood ($p=0.03$) were significant. However, PI AUC was not significant ($p=0.14$). The PF cut off for 95% specificity of exceeding MCID was 39.6 and 50.2 for 95% sensitivity for failing to achieve MCID. The D cut off for 95% specificity of exceeding MCID was 39.4 and 58.1 for 95% sensitivity for failing to achieve MCID. Patients below the 50.2 threshold ($n=27$) had significantly greater improvements on PF (2.3 95% CI 0.5 to 4.3) and PI (-3.8 95% CI -6.9 to -0.7) but not D. Patients above the 50.2 cut off ($n=15$) were significantly worse on PF (-7.3 95% CI -12.0 to -2.7) at this short follow up and were statistically unchanged on PI and D.

Conclusion: This data confirms that pre-surgical PROMIS PF and Depression scores are significant post-surgical predictors. However, cut-off scores for 95% sensitivity/specificity were one standard deviation higher for PROMIS PF (>50.2 versus previous study >42) and similar for Depression (<39.4 versus previous study <41.5) as compared to all foot and ankle surgeries. Patients meeting the new cut-off (>50.2) experienced significantly better outcomes on all PROMIS scales and patients not meeting the cut-off ($\sim 30\%$) were significantly worse. Although longer term follow-up is desirable, this short term follow up suggests a significant clinical impact of using PROMIS scores for pre-surgical decisions.

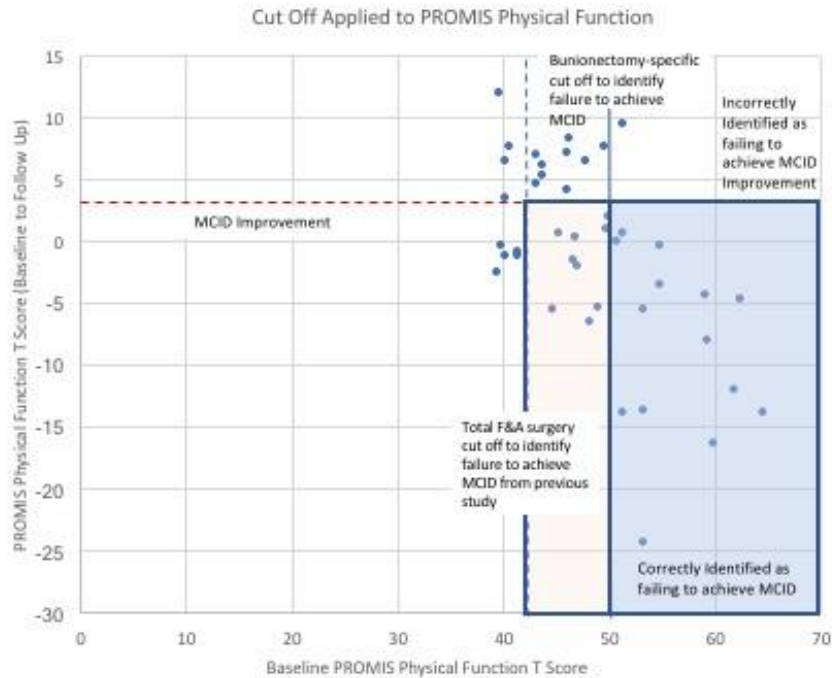


Figure 1. Correlation between the baseline PROMIS physical function (PF) and change in PROMIS PF from baseline to follow up in patients undergoing bunionectomy surgery. The Total F&A surgery cut off to identify patients failing to achieve MCID improvement of >42 (dotted line) from a previous study derived from a variety of foot and ankle surgeries, contrasts with the bunionectomy-specific cut off of >50. In addition, the number of patients potentially influenced by this cut off is high. No patients met the bunionectomy-specific cut off of 39.4 for achieving a MCID of; therefore, its significance is questionable.