

Do Pain and Patient-Reported Outcome Measures Vary by Preoperative Physical Activity Levels in Total Hip Arthroplasty Patients?

David Anthony Crawford¹, Krishna Raj Tripuraneni, Roberta E Redfern, Mike Anderson², David C. Vanandel², Jason Michael Cholewa, Adolph V Lombardi¹

¹JIS Orthopedics, ²Zimmer Biomet

INTRODUCTION:

Physical activity (PA) is suggested to reduce osteoarthritis pain; however, patients may avoid PA due to the same associated joint pain. Effects of preoperative PA on functional outcomes have been heterogenous, with few reports demonstrating positive impacts of pre-rehabilitation programs. Our goal was to investigate pain and patient-reported outcomes as a function of preoperative PA levels as measured in continuously collected step counts in patients undergoing total hip arthroplasty (THA).

METHODS:

This study was a secondary data analysis of a large multicenter prospective observational cohort study investigating a smartphone-based care management platform for self-directed rehabilitation following arthroplasty. Patients were provided a smartwatch for objective, passive collection of steps preoperatively through up to one year following the procedure. Patients were eligible for inclusion in this analysis if at least 90 days of follow-up data were available following THA and were categorized based on average preoperative step counts according to quartiles (low: 0-25th percentile, medium: 25th-75th, and high: 75th-100th percentile). Steps counts, numeric pain ratings, HOOS JR, and EQ5D5L scores were compared preoperatively and at 1- and 3-months postoperatively according to activity groupings.

RESULTS:

A total of 1,612 THA patients were included, with median average daily step count equal to 5,151.5 (interquartile range 3,058.8 – 6,694.0). Patients in the high PA group presented with the lowest preoperative numeric pain scores (5.59 vs. 6.08 and 6.36, $p < 0.0001$) and highest level of function as measured by the HOOS JR (56.23 ± 5.59 vs. 52.65 ± 6.08 vs. 50.13 ± 6.36 , $p < 0.05$). Preoperative EQ5D5L index scores also varied between all activity levels. Low and medium PA groups exceeded preoperative step counts by 3 months postoperative (211% and 124%, respectively), whereas high activity patients reached on average 96% of their preoperative average steps ($p < 0.0001$). Patient reported pain 3 months postoperative was similar between activity levels; however, change in pain from pre-procedural levels was greatest in the medium PA group (4.49 points), differing significantly only from the high PA group (4.01-point reduction). Change in EQ5D5L index scores differed among all PA levels at 1 and 3 months ($p < 0.0001$), where largest improvements were appreciated by those with low PA preoperatively. Patients in the low and medium PA groups demonstrated greater improvements in function at 3 months (29.6 and 29.2 versus 27.8-point increase), though not clinically significant. Patient satisfaction at 3 months was similar between all groups.

DISCUSSION AND CONCLUSION:

We observed no differences in postoperative pain despite varying levels of preoperative activity. However, we did demonstrate greater improvements in objective activity, patient-reported function, and health status in those with low preoperative PA in comparison to high activity patients.