Robotic Total Hip Arthroplasty Achieves MCID Faster than Manual Total Hip Arthroplasty

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INTRODUCTION: Despite the increasing utilization of robotic-assisted total hip arthroplasty (rTHA), there is significant debate regarding their comparative effectiveness in achieving optimal patient outcomes compared to manual THA (mTHA). Additionally, there is a paucity of literature on the recovery timeline with respect to patient-reported outcome measures (PROMs) for rTHA versus mTHA. The aim of this investigation was to compare time to MCID between rTHA and mTHA across the PROMIS Global Physical, PROMIS Physical Function-10a (PF-10a), and Hip injury and Osteoarthritis Outcome Score-Physical Function Short-form (HOOS-PS) outcome domains. We hypothesized that patients would achieve MCID more quickly across all three domains after rTHA compared to mTHA.

A retrospective study of patients who underwent rTHA and mTHA at a large, tertiary-care, academic medical center between 2019 and 2022. Propensity-score matching (PSM) between cohorts was based on age, sex, body mass index, and Charlson Comorbidity Index. Patient-reported outcomes were evaluated using preoperative and postoperative scores of PROMIS Global Physical, PROMIS PF-10a, and HOOS-PS. Time to achieve MCID was assessed using survival curves with and without interval-censoring, and statistical comparisons were performed using log-rank and weighted log-rank tests.

RESULTS:

censoring (D-F).

After PSM, 341 rTHAs and 1,023 mTHAs were included. Patients with rTHA demonstrated significantly faster median times than mTHA for achieving MCID without interval-censoring for PROMIS Global Physical (3.1 vs. 3.5 months, P < 0.001) and HOOS-PS (1.5 vs. 3.3 months, P < 0.001), with similar times for PROMIS PF-10a (5.8 vs. 5.0 months, P=0.83) (Figure 1). Interestingly, when considering interval-censoring, rTHA continued to achieve MCID significantly faster for HOOS-PS (0.667-0.672 vs. 1.000-1.006 months, P < 0.001), while showing similar times for PROMIS Global Physical (0.233-0.239 vs. 0.700-0.706 months, P=0.18) and PROMIS PF-10a (1.600-1.606 vs. 3.033-3.039 months, P=0.73) compared to mTHA.

DISCUSSION AND CONCLUSION: Using time to achieve MCID methodology, rTHA achieved MCID significantly faster than mTHA indicating expedited patient recovery and achieving meaningful clinical milestones earlier after surgery. Future studies evaluating the long-term outcomes of rTHA are needed to evaluate the true effectiveness of robotics in THA.

