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A Minimal Clinically Important Difference in Robotic-Assisted TKA vs. Standard Manual TKA

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Introduction: Robotic-assisted total knee arthroplasty (R-TKA) has theoretic soft-tissue and alignment advantages that remain of current debate. The purpose of this study was to determine whether R-TKA showed evidence of improvement in minimal clinically important differences (MCID) in early (<4 weeks) and intermittent (4-8 month) patient-reported outcomes compared to manual total knee arthroplasty (M-TKA).

Methods: A prospectively collected database was reviewed from a three-surgeon cohort of 1,158 consecutive patients undergoing R-TKA or M-TKA over a 2-year period at a tertiary medical center (259 R-TKA, 899 M-TKA). Primary outcomes consisted of Knee Injury and Osteoarthritis Outcome Score (KOOS-JR) and Patient-Reported Outcomes Measurement Information System (PROMIS) Global Health Measures of Physical Health (PH) and Mental Health (MH). Statistical analysis included MCID via the distribution method and chi-square analysis to evaluate postoperative MCID.

Results: The initial analysis demonstrated similar preoperative condition and short-term outcomes. Early 4-week outcomes yielded similar PROMIS MCID achievement (PH 33.2% vs. 36.0%; p=0.44 and MH 23.6% vs. 26.7%; p=0.35) for R-TKA and M-TKA respectively, but statistically significant improvement favoring the M-TKA for KOOS-JR (62.3% vs. 70.1%; p=0.03). Achievement of MCID at the 6-month point illustrated no differences. Mean comparison at the mid-year point favored R-TKA for PROMIS-MH (54.8 vs. 51.6; p= 0.01), but no difference in KOOS-JR or PROMIS-PH.

Conclusions: R-TKA demonstrated comparable improvement to M-TKA. It was less likely to surpass MCID in KOOS-JR at the first postoperative visit with similar results in both PROMIS global health domains. This conflicting data was further highlighted with no difference in KOOS-JR or PROMIS-PH at mid-year follow-up but favored R-TKA in PROMIS-MH. Confounding variables such as surgeon technique, implant fixation, and responsiveness of an outcome measure may be as important as simply what tools are used in surgery. Such granular data should be sought out in future studies with larger volume.

Notes