Patients who Underwent Either Robotic or Manual Medial Unicompartmental Knee Arthroplasty Experience Excellent Postoperative Outcomes

Nickelas Huffman, Benjamin Edward Jevnikar, Shujaa T Khan[1], Ignacio Pasqualini, Yuxuan Jin, Peter Andrew Surace, Trevor G Murray, Matthew Edward Deren[1], Nicolas Santiago Piuzzi
[1]Cleveland Clinic

INTRODUCTION: In the field of total knee arthroplasty (TKA), robotic assisted (RA) surgeries have demonstrated advantages such as reduced postoperative pain, shorter length of stay, and significant improvements in patient-reported outcome measures (PROMs). Few studies compare the outcomes of RA medial unicompartmental knee arthroplasty (mUKA) to manual mUKA. Therefore, the current study compared outcomes for RA and manual mUKA in terms of 1) hospital resource utilization; and 2) patient-reported outcome measures (PROMs), achievement of minimal clinically important difference (MCID), and patient acceptable symptom state (PASS) at 1-year postoperative.

METHODS: In a retrospective study, 941 primary, elective mUKA procedures occurred between January 2016 and December 2022 with preoperative and 1-year postoperative PROM data complete; 143 of the patients had undergone RA mUKA and 798 of the patients had undergone manual mUKA. Hospital resource utilization outcomes included length of stay (LOS), discharge disposition (DD), 90-day hospital readmission, 90-day emergency department (ED) visit, and 1-year reoperation. The PROMs included the Knee disability and Osteoarthritis Outcome Score for Pain (KOOS Pain), KOOS Physical Function Shortform (KOOS PS), and KOOS for Joint Replacement (KOOS JR). PROMs were administered at baseline and 1-year postoperative. MCID thresholds for this cohort of patients were 7.70 for KOOS Pain delta (1 year minus baseline), 7.39 for KOOS PS delta, and 6.23 for KOOS JR delta. PASS thresholds for this cohort were ≥76.39 for KOOS Pain, ≥69.25 for KOOS PS, and ≥69.49 for KOOS JR. Between group comparisons were made using Wilcoxon rank sum tests for continuous variables, and Chi-square or Fisher's exact tests for categorical variables. Demographic variables, including age, sex, body mass index, race, education, smoking status, area deprivation index, Charlson comorbidity index, insurance, patient-reported outcome measure (PROM) phenotype, type of anesthesia, hospital location, and narx score were all adjusted for in the linear regression models. All tests were two-sided, with a Type I error rate of 0.05.

RESULTS: Patients who underwent RA mUKA experienced a significantly longer operating time ($p<0.001$) and a significantly greater LOS ($p=0.008$) (**Table 1**), but further analysis identified hospital as a confounder associated with varying LOS (**Tables 2A and 2B**). Overall, ≥81% of all patients expressed satisfaction with their mUKA at 1-year postoperatively, and achievement of MCID was ≥82% for all patients for all KOOS outcomes (**Table 3**). Upon multivariate logistic regression, RA mUKA was not a predictor of any of the following: failure to achieve MCID for KOOS Pain ($p=0.184$), KOOS PS ($p=0.26$), or KOOS JR ($p=0.157$) (**Table 4**), failure to answer 'Yes' to the PASS satisfaction question ($p=0.766$) (**Table 5**), or failure to achieve PASS thresholds for KOOS Pain ($p=0.718$), KOOS PS ($p=0.859$), or KOOS JR ($p=0.855$) (**Table 6**).

DISCUSSION AND CONCLUSION: Overall, patients who underwent mUKA demonstrated excellent outcomes and low reoperation rates, regardless of RA or manual procedure. Thus, mUKA in appropriately selected patients appears to be an efficacious procedure, and future studies should aim to obtain larger cohorts and identify any potential differences between RA and manual mUKA procedures.