Robotic-assisted unicompartmental knee arthroplasties with a minimum of 2-year follow-up

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Introduction: Unicompartmental knee arthroplasty (UKA) has seen renewed interest in recent years and is a viable option for patients with limited degenerative disease of the knee as an alternative to total knee arthroplasty. However, the minimally invasive UKA procedure is challenging, and accurate component alignment is vital to long-term survival. Robotic-assisted UKA allows for greater accuracy of component placement and dynamic intraoperative ligament balancing which may improve clinical patient outcomes. The purpose of this study was to analyze the clinical outcomes in a large, consecutive cohort of patients that underwent robotic-assisted UKA at a single institution with a minimum follow-up of 2 years. The study hypothesis was that robotic-assisted UKA improves patient outcomes by decreasing the rate of revision in comparison to conventional UKA.

Materials and Methods: A search of the institutional joint registry was performed to identify patients that underwent robotic-assisted UKA beginning in August 2008. The patients’ electronic medical record was analyzed for surgical indication, age at surgery, body mass index (BMI), and American Society of Anesthesiology Physical Status Classification System (ASA). Patient comorbidities were evaluated using the Charlson comorbidity index. Length of surgery and length of hospitalization were assessed and clinical outcomes were evaluated using the Oxford Knee Score. In addition to postoperative follow-up assessments in clinic, patients without recent follow-up were contacted by telephone to capture the overall revision rate and time to revision.

Results: A total number of 481 patients were identified who underwent robotic-assisted UKA with a mean follow-up of 35 months (range, 24 to 53 months). Patients had a mean age of 64 years (range, 30 to 90 years) and a mean BMI of 32.2 (range, 18 to 56). The median ASA score was 3, and the median Charlson comorbidity index was 0 (304 patients). A total number of 147 patients had a score of 1-2, 20 patients a score of 3-4, and 6 patients had scores greater or equal to 5. The mean length of surgery was 64 minutes (range, 25 to 152 minutes), and the mean time of hospitalization was 1.7 days (range, 0.5 to 9.0 days). At final follow-up, the mean Oxford Knee Score was 37.2 (range, 2 to 48). There were 25 revisions to total knee arthroplasty (5.2%) and 3 revisions of the tibial component (0.6%).

Discussion and Conclusion: The findings of this study revealed that robotic-assisted UKA provided pain relief and functional outcomes at mid-term follow-up. The combined revision rate of robotic-assisted UKA at mid-term follow-up was similar or lower (5.8%) compared to revision rates of conventional UKA (approximately 6% to 8%) in national registries assessing conventional UKA (Australia, New Zealand, Norway, UK). UKA remains a technically challenging procedures that relies on accurate placement of components to avoid failure. Proper patient selection in combination with robotic-assisted UKA may decrease the revision rates encountered with early UKA systems. The improved accuracy of component positioning and dynamic soft-tissue balancing associated with robotic-assisted UKA may improve implant longevity and improve patient outcomes.

References