Robotic Navigational Assistance Results in Lower Need for Revision Components when Converting Unicondylar Knee Arthroplasty to Total Knee Arthroplasty

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INTRODUCTION:

The prevalence of unicondylar knee arthroplasty (UKA) has continued to increase in recent years. In the rare case of UKA failure, conversion of UKA to total knee arthroplasty (TKA) can be more challenging than primary TKA. Currently there is limited literature examining the use of robotic-assistance when converting UKA to TKA. The aim of this study is to compare the necessity for revision components (i.e., stems, cones, and constrained articulations) between manual and robotic UKA to TKA.

METHODS:

This is an IRB approved, retrospective study of 67 consecutive patients who underwent conversion from UKA to TKA at a single institution from 2015 to 2024. Robotic technology for TKA became available in 2017. Data extracted included surgical technique, reason for UKA failure, need for augments, need for stems, and use of constrained liners. Statistical analysis was performed using fisher exact test or chi square test and t test for categorical and continuous variables, respectively. Significance was set at p<0.05.

RESULTS:

Sixty-seven conversion UKA to TKA were identified. Twenty-nine (43.3%) were performed using robotic assistance. Augments were used in 8 (20.0%) manual conversions and no (0%) robotic-assisted conversions (p=0.015). Stemmed tibial components were used in 14 (36.8%) manual conversions compared to 4 (13.8%) robotic-assisted conversions (p=0.035). One manual conversion required femoral stem use, while no robotic cases required femoral stem use (p=0.567). Mean polyethylene liner thickness was smaller in the robotic-assisted group (11.10mm) than the manual group (11.87mm, p=0.049). Ten (26.3%) manual conversions compared to 4 (13.8%) robotic-assisted conversions (p=0.211) required use of varus-valgus constrained articulations.

DISCUSSION AND CONCLUSION:

Robotic-assisted conversion of UKA to TKA was associated with less use of revision-style components, including augments and stems. Thinner polyethylene liners were used with robotic-assisted conversion, suggesting more accurate resection of the tibial surface and more ability to conserve native bone. While conversion UKA to TKA is more challenging than primary TKA, our data suggests that robotic-assisted conversion reduced the need for revision components and helped with bone conservation more than manual conversion.