Robotic-assisted Conversion of Unicompartmental Knee Arthroplasty to Total Knee Arthroplasty

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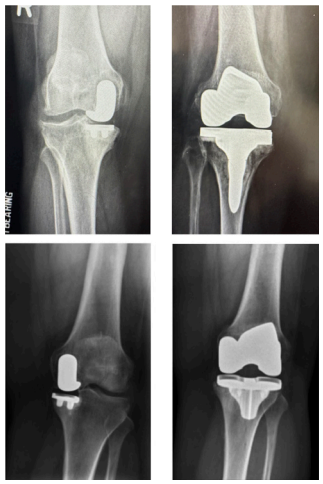
Introduction

- Unicompartmental knee arthroplasty (UKA) has been shown to be a successful treatment for isolated osteoarthritis (OA) of the knee and has been shown to have better patient-reported outcomes, faster recovery, and lower complication rates.[1–3]
- However, revision rates continue to be higher than total knee arthroplasty (TKA).4,5 UKA revisions to TKA have historically been completed using manual TKA instrumentation
- Due to improved preoperative planning and real-time implant manipulations, robotic assistance may be used to revise UKA to TKA.[6–10]
- The purpose of this study is to report (1) our surgical technique for converting UKA to TKAs utilizing robotic assistance and its evolution over time, (2) the components needed for these conversions, and (3) patient reported outcomes and complications.

Methods

This is a retrospective study that includes 44 robotic-assisted UKA conversions to TKAs (44 knees, 41 patients) who completed at least one pre- and postoperative PROM questionnaire, including Knee Injury and Osteoarthritis Outcomes Score for Joint Replacement (KOOS JR) and/or reduced Western Ontario and McMaster Universities Arthritis Index (r-WOMAC). All procedures were done by a single surgeon from 2016 through 2022. There were 37 medial UKAs, 2 lateral UKAs, and 5 patellofemoral UKAs that were converted to TKAs with robotic assistance. Mean length of follow up was 1.8 years. Medical records and surveys were reviewed for implants utilized, complications and PROMs. The mean age was 72 years (range 43.0 to 91), 15 were male (36.6%), and 21 were left knees (47.7%).

Case Examples



2017: Robotic-assisted medial UKA to TKA. Mechanical alignment with cemented tibial component with stem and medial augment

2022: Robotic-assisted medial UKA to TKA. Functional alignment with press-fit components

Results

The mean preoperative r-WOMAC and KOOS JR scores improved from 25.7 to 10.64 and 48.12 to 68.7 at one year follow up, respectively. Thirty-eight out of 44 (86.4%) UKA conversions utilized primary uncemented cruciate retaining (CR) implants. Six UKA conversions utilized cemented CR femur implants (13.6%). Four UKA conversions (9.1%) used tibial stems with medial tibial augments. The mean polyethylene thickness was 10 mm (range 9 to 16). There were 2 revisions (4.5%) for periprosthetic joint infections (PJI), one revision (2.3%) for a loose femoral implant after a traumatic fall, and one aseptic irrigation and debridement (2.3%).

Conclusion

- Patients undergoing robotic-assisted UKA to TKA revision showed to have improved reported outcomes over time with low revision and complication rates.
- Improved preoperative planning and implant placement achieved with robotic assistance gives surgeons an alternative to manually revising UKA patients.
- As our robotic-assisted surgical technique evolved over time, we utilized primary uncemented implants in the majority of cases.

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