

Robotic-Assisted 1.5-Stage Revision Knee Arthroplasty for the Management of Periprosthetic Joint Infection

Kevin Chang, Aleksandra Qilleri, Alexandra Carmen Echevarria, Jonathan Danoff

INTRODUCTION: Conventional 1.5-stage exchange total knee arthroplasty (1.5-TKR) for management of periprosthetic joint infection (PJI) is gaining interest over traditional 2-stage surgery. A robotic-assisted 1.5-TKR (1.5-RATKR) technique has recently been published. The purpose of this study is to evaluate the ability of conventional and robotic 1.5-TKR to cure PJI and also to compare the short-term outcomes of 1.5-RATKR and conventional 1.5-TKR. We hypothesize that 1.5-RATKR will show faster return of physical function, measured in knee range of motion and time to ambulation.

METHODS: This is a retrospective case-control study reviewing all 1.5-TKR performed for PJI by a single surgeon between 2017-2023. 1.5-TKR performed before 2022 were compared to 1.5-RATKR performed after 2022. Data collected included patient demographics, surgical and implant data, in-hospital physical therapy (PT) progress, and outcomes through minimum of 2 years.

RESULTS:

Twenty-three cases for PJI (10 1.5-TKR and 13 1.5-RATKR) were included with average age 73.3 years. 100% of cases showed PJI eradication of the diagnosed infecting organism. Both 1.5-RATKR and 1.5-TKR showed similar rates of physical therapy clearance by postoperative day 2 (15.4% vs 10%, $p=1.0$), hospital length of stay (4.9 days \pm 1.7 vs. 6.3 days \pm 4.2, $p=0.29$), and 2-week knee flexion past 90 degrees (83% vs 80%, $p=1.0$), respectively. There were no pin site complications in the 1.5-RATKR cohort. Despite infection eradication, a novel infection occurred in one 1.5-RATKR patient after 2.5 years and in one 1.5-TKR patient after one year. One 1.5-TKR required reoperation at 2 years for anterior knee pain from an unresurfaced patella and one required superficial wound irrigation and debridement with implant retention within 90 days for superficial wound dehiscence. No patients required revision for implant failure secondary to loosening.

DISCUSSION AND CONCLUSION: 1.5-TKR and 1.5-RATKR are viable PJI management techniques, with 100% eradication of infection and similar short-term outcomes. Robotic-assisted techniques may offer intraoperative benefits without additional complications. The ability to perform one surgical intervention versus the traditional 2-stage operation for the eradication has excellent 2-year outcomes and deserves further investigation for long term implant viability.