Robotic-assisted total knee arthroplasty with minimum follow-up 7 years compared with conventional total knee arthroplasty

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Introduction: Several factors influence outcome after total knee arthroplasty (TKA) such as patient, and implant characteristics, surgical technique, and the restoration of limb alignment. Among them, mechanical alignment have played major roles in the success of TKA, the survival rates of the implants, and patient functionality. Most, but not all, tudies have shown that alignment of the mechanical axis in the coronal plane within a range of 3° varus/valgus is associated with improved long-term function and increased survival rates. Robotic systems have been developed to improve the accuracy of implant selection and placement, alignment, and bone resection during TKA. Several studies have evaluated the outcomes of robotic-assisted TKA, but a few studies conducted to date has compared the outcomes of TKAs using a robot-assisted and a conventional procedure in mid-term follow-up. This prospective randomized controlled study was designed to compare both radiological and clinical outcomes of robotic-assisted and conventional TKA at a minimum follow-up of seven years. We hypothesized that robot assisted TKA would lead to a better leg alignment and component orientation, and thus, improve clinical and radiological outcomes.

Materials and Methods: A total of 100 primary TKA procedures were compared: 50 using a robotic-assisted procedure and 50 using conventional manual techniques. The cohorts were followed for 94.3 and 95.6 months, respectively. All follow-up evaluations were performed by two independent blinded evaluators who had no direct involvement in the surgical procedures to reduce bias. Radiographic assessments of the patients were performed preoperatively and at final follow-up and made according to the Knee Society Roentgenographic Evaluation System (KSRES) which included measurements of the coronal mechanical axis and sagittal and coronal inclinations of femoral and tibial components. The radiographic measurements were made using a PACS (Picture Archiving and Communication System).Clinical assessments were performed preoperatively, and at a final follow-up date that was a minimum of 7 year post-operative. The clinical results included ranges of motion (ROM), Hospital for Special Surgery (HSS) scores, Western Ontario and McMaster University (WOMAC) scores (for pain and function)

Results: The radiographic results showed no statistical differences when comparing the means of the two groups. The main goal of both TKA surgeries was to restore the mechanical axis alignment to neutral (0°). When considering outliers (defined as error $\geq \pm 3°$) for the mechanical axis, femoral coronal and sagittal inclinations, and tibial coronal and sagittal inclinations, the ROBODOC group had zero outliers for all measurements except for one in tibial sagittal inclination. On the other hand, the conventional group had 12 outliers for mechanical axis, 2 for femoral coronal inclination, 2 for femoral sagittal inclination, 3 for tibial coronal inclination, and 3 for tibial sagittal inclination. However, there were no statistically significant differences between groups for ROM, HSS, or WOMAC scores at the final follow-up.

Conclusion: The results of this study support previous work and demonstrate that the ROBODOC-assisted implantation of TKA results in better radiographic outcomes and better ligament balance with

equivalent safety when compared to conventional TKA at a minimum follow-up of 7 years. However, we could not find any differences between robotic and conventional TKA in the clinical outcomes.