

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

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Introduction: Several studies have shown that mechanical alignment influences the outcome of total knee arthroplasty (TKA). Robotic systems have been developed to improve the precision and accuracy of achieving component position and mechanical alignment. 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 five years.

Materials & 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 40.3 and 45.6 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 5 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 $\geq \pm 3^\circ$) 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 [38] 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 5 years. However, we could not find any differences between robotic and conventional TKA in the clinical outcomes.

References

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