

Robot-assisted Total Knee Arthroplasty with Minimum Follow-up Nine years Compared with Conventional Total Knee Arthroplasty

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INTRODUCTION

Among many factors that influence the outcomes of Total Knee Arthroplasties (TKAs), the mechanical alignment has played major roles for the success of TKA, the survival rates of the implants, and patient functionality. Most, but not all, studies 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. Robot-assisted TKA has been developed to improve improves the accuracy and precision of component implantation and mechanical axis (MA) alignment. 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 long-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 nine years. We hypothesized that robot- assisted TKA would lead to a more accurate leg alignment and component implantation, and thus, improve radiological and clinical outcomes.

Materials and Methods

Between January 2003 and December 2004, A total of 98 primary TKA procedures were compared: 49 using a robotic-assisted procedure and 49 using conventional manual techniques. The cohorts were followed for 121.2 and 119.5 months on average, respectively. 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 postoperative nine years. 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. 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, 3 for femoral sagittal inclination, 3 for tibial coronal inclination, and 4 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 nine years. However, we could not find any differences between robotic and conventional TKA in the clinical outcomes.

Reference

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