

Limb alignment and position of the components in bilateral total knee replacement with robotic and conventionally manual support (a prospective, randomized study)

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Introduction: Computer assisted navigation systems have developed to help surgeons improve alignment accuracy, and have been shown to reduce some alignment errors. However, navigated TKA still depends on the use of cutting blocks and oscillating jigs which could result in inferior bone resection. To further improve the accuracy of implant selection, position and alignment as well as bone resection, robotic systems for TKA have been developed. Only few data exist concerning outcomes after total knee arthroplasty (TKA) using a surgical robotic system. We conducted this study to evaluate the clinical and radiographical results in robotic-assisted implantation of TKAs compared with conventionally manual implantation in bilateral knees. **Material and Method:** Bilateral sequential total knee replacement with a Zimmer NexGen prosthesis (Zimmer, Warsaw, Indiana) was carried out in 30 patients. One knee was replaced using a robotic-assisted implantation (ROBOT side) and the other conventionally manual implantation (CON side). There were 30 women with a mean age of 67.8 years (50 to 80). The mean follow-up was 2.3 years (2 to 3). The radiographic measurement with regard to the change of mechanical axis, and the inclination of the femoral and tibial components were assessed. Outliers were defined as $> 3^\circ$ of optimum. Also we evaluated clinical results with the range of motion (ROM), Hospital for Special Surgery (HSS) scores, and Western Ontario and McMaster University (WOMAC) scores. **Results:** The operating and tourniquet times were longer in the ROBOT side ($p < 0.001$). There were no significant pre- or post-operative differences between the functional knee scores of the two groups ($p = 0.288$ and $p = 0.429$, respectively). Mean mechanical axes were not significantly different in the two groups ($p = 0.815$). However, there were more outliers in the CON side (8) than in the ROBOT side (1) ($p = 0.013$). In the coronal alignment of the femoral component, the CON side (8) had more outliers than the ROBOT side (1) ($p = 0.013$) and the CON side (3) also had more outliers than the ROBOT side (0) in the sagittal alignment of the femoral component ($p = 0.043$). In terms of outliers for coronal and sagittal tibial alignment, the CON side (1 and 4) had more outliers than the ROBOT side (0 and 2). **Discussion:** Use of a surgical robot system in TKAs provides good clinical and radiographical results at least 2 years follow-up. Robotic-assisted total knee replacement resulted in more accurate orientation and alignment of the components than that achieved by conventional total knee replacement. A clear advantage of robot-assisted TKA seems to be ability to execute a highly precise preoperative planning and intraoperative procedures which result in excellent alignment. But current disadvantages such as increased operating times and inability of adjusting the preoperative planning during the procedure have to be resolved in the future.