

Radiological study of total knee arthroplasty using robot-assisted and conventional manual method in severe varus deformity

YOON SH, LEE CT, HUR JH, KWON OM, TRABISH M, PARK JS, LEE HJ

Department of Orthopedic Surgery, Lee Chun Tek Hospital, Suwon, Korea

osman1973@hanmail.net

Disclosure: The authors did not receive any outside funding or grants in support of their research for or preparation of this work. Neither they nor a member of their immediate families received payments or other benefits or a commitment or agreement to provide such benefits from a commercial entity. No commercial entity paid or directed, or agreed to pay or direct, any benefits to any research fund, foundation, division, center, clinical practice, or other charitable or nonprofit organization with which the authors, or a member of their immediate families, are affiliated or associated.

Introduction: The success of total knee arthroplasty depends on many factors, including the preoperative condition of the patient, the design and materials of the components and surgical techniques. It is important to position the femoral and tibial components accurately and to balance the soft tissues. Malpositioning of the component can lead to failures due to aseptic loosening, instability, polyethylene wear and dislocation of the patella. In order to improve post-operative alignment, computer-aid systems have been developed for total knee arthroplasty. Many clinical and experimental studies of these systems have shown that the accuracy of implanted components can be improved in spite of the increase in costs and operating time. This may not, however, improve the outcome in the short-term. Restoration of the normal mechanical axis of the knee and balancing of the surrounding soft tissues have been shown to have an important bearing on the final outcome of knee replacement operations. In severely deformed knees, whether varus or valgus, these goals may be difficult to achieve. We compared the radiologic results of the mechanical axis and implant position of Total Knee Arthroplasty using a robot-assisted method with conventional manually implanted method in severe varus deformed knee.

Materials & Methods: A data set of 50 consecutive cases that were performed from January 2007 to December 2010 using the robot assisted TKA (Group A) were compared with a data set of 50 consecutive cases from the same period that were done using conventional manual TKA (Group B). All cases had a preoperative mechanical varus deformity $>20^\circ$ and one brand of implant was used on all cases. The diagnosis was primary osteoarthritis in all knees. The operations were performed by one-senior author with the same robot system, ROBODOC (ISS Inc., CA, USA) along with the ORTHODOC (ISS Inc., CA, USA) planning computer. The radiological evaluations included mechanical axis, implant position (α , β , γ , δ angle) according to the system of American Knee Society.

Results: There was a significant difference in the postoperative α , β , γ angle and mechanical axis between two group ($p < 0.05$) tended to have more postoperative varus mechanical alignment in conventional manual TKA group than robot-assisted TKA group. We think that robot-assisted TKA is helpful in excessive varus knee in aspect of not only mechanical alignment and implant position but also long term clinical results and implant longevity. However, a long term followup evaluation will be necessary and complications in robot system.