Joint Diseases and Related Surgery

Jt Dis Relat Surg
2025;36(1):214-215

CONTROVERSIAL ISSUES AND CURRENT CONCEPTS

Does the use of robotic technology in knee arthroplasty provide superior clinical outcomes?

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Total knee arthroplasty (TKA) is an extremely successful surgical procedure[1,2] and continues to evolve as we attempt new techniques and improve outcomes of the patient's robotic surgery in total joint arthroplasty is one of them.[3] Members of the European Knee Society (EKS) recently took part in an online questionnaire on robot-assisted TKA.[3] The majority of respondents still perform conventional TKA (54%), while only a small portion perform robot-assisted TKA (27%) or other technology-assisted TKA (19%). Although there is consensus that robotic assistance has a positive impact on accuracy of bone cuts and alignment, no consensus on its impact on other peri- or postoperative outcomes. Finally, the associated cost of robot-assisted TKA remains the main barrier to its uptake.

A systematic review of comparative studies supports that robotic-assisted TKA (rTKA) offers benefits in accuracy, precision and alignment correction with lower outliers and reduced errors in coronal and sagittal planes.[4] Patients' satisfaction in robotic systems (rTKA) is increased in the early postoperative time with improved clinical outcomes compared to conventional manual (CM-TKA). Short-to-mid-term survival and complication rates did not show significant difference among the two groups. Therefore, further high-quality long-term studies and randomized-controlled studies comparing modern robotic systems (RS) and CM-TKA are needed to validate the relationship between improved accuracy and implant survival, complication rates, functional outcomes and cost-effectiveness.

A survey results suggest that public understanding of RS is limited, with clear disparities in perceptions of RS among the general public compared to medical professionals.[5] The numerous misconceptions regarding control, safety and the level of human intervention form a significant barrier to the widespread acceptance of RS, which is still relatively novel and unfamiliar to the public despite its introduction to the NHS over two decades ago.

Recent advances in navigation and robotics may provide a useful tool to assist the surgeon in planning the operation and increasing the accuracy of intraoperative placement of implants. Unicompartmental knee arthroplasty is one of the surgeries ideally suited for this type of technology, since it utilizes a relatively small implant and requires complex surgical planning and challenging bone preparation.[6] A study showed that Microplasty® instrumentation was associated with comparable implant positioning compared to a tactile-based navigated robotic instrumentation in experienced hands.[6] In another study examining whether rTKA had more favorable knee-specific outcomes, improved fulfilment of expectations, health-related quality of life (HRQoL), and patient satisfaction compared to

Received: November 25, 2024
Accepted: November 25, 2024
Published online: December 09, 2024

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Citation: Atik OŞ, Hatipoğlu MY. Does the use of robotic technology in knee arthroplasty provide superior clinical outcomes?. Jt Dis Relat Surg 2025;36(1):214-215. doi: 10.52312/jdrs.2025.57927.

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manual TKA (mTKA).[7] Patients undergoing rTKA had a clinically meaningful greater improvement in their knee pain over the first 12 months, and were more likely to have fulfilment of their expectation of daytime pain relief compared to patients undergoing mTKA. However, rTKA was not associated with a clinically significant greater knee-specific function or HRQoL, according to current definitions.

In conclusion, for a better evaluation of the utility of robotic TKA, further well-designed, prospective, controlled studies with long-term follow up are warranted.

Data Sharing Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Author Contributions: All authors contributed equally to this article.

Conflict of Interest: The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding: The authors received no financial support for the research and/or authorship of this article.

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