World Academy of Science, Engineering and Technology
International Journal of Health and Medical Engineering
Vol:18, No:11, 2024

Comparing Implications of Manual and ROSA-assisted Total Knee Replacements on Patients and Physicians: A Scoping Review

Authors : Bassem M. Darwish, Robert H. Ablove

Abstract : Introduction: Total knee arthroscopy (TKA) is a commonly performed procedure in patients with end-stage osteoarthritis and inaccuracy of component alignment in TKA has been shown to have many adverse post-operative outcomes such as accelerated implant wear, reduced functional outcomes, and shorter overall implant survival. Robotic surgical systems have been introduced to try and improve joint alignment and functional outcomes in knee arthroscopy, one recent iteration is the ROSA knee system, released to the market in 2019. The objective of this scoping review is to map the available evidence, identify the current types of evidence, and identify knowledge gaps to guide future studies on patient outcomes following ROSA-assisted total knee arthroplasties. Methods: An electronic search was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) extension for scoping reviews. Search terms included ROSA, knee arthroscopy, osteoarthritis, robotic, and malalignment. Types of study participants included patients with osteoarthritis, ages 18 and older, male or female, who received manual TKA (mTKA) or ROSA-assisted TKA (rTKA), and human patients or cadavers. Published, peer-reviewed controlled trials, observational studies, and case series were included. Case reports were not included in article review. Resulting articles were first screened based on title and abstract. Articles meeting inclusion criteria based on title and abstract review then underwent full-text review by the same reviewer. Results: This scoping review identified 11 total studies, 3 prospective observational studies, and 8 retrospective observational studies - a total of 970 rTKA patients and 1745 mTKA patients. There were no case series or randomized controlled trials comparing rTKA and mTKA. Patient-centered outcomes showed promise for rTKA, where it frequently showed significantly favorable functional outcomes, measured via KOOS-JR, VAS, KSS, OKS, FJS, and PROMIS scores, at various times postoperatively. However, there was much discrepancy about which score yielded significance at which postoperative follow-up. Complication rates, reoperation rates, and LOS were very similar between mTKA and rTKA groups. Studies also showed rTKA had more accurate joint alignment within the 0 ± 3o corridor and had significantly higher rates of achieving postoperative joint angles similar to the preoperative plan. Finally, there was major agreement that rTKA cases take significantly longer time at the start, however, there is a rapid learning curve. Once past the learning curve, rTKA cases are performed in a similar time to mTKA and reduced physician stress and strain. Conclusion: The ROSA knee system represents a promising option for the management of osteoarthritis via total knee arthroscopy. The studies reviewed in this paper favor the patient-centered function outcomes, joint alignments, and physician health implications of the ROSA knee system to conventional total knee arthroscopy. Further study is warranted, however, to better understand recovery periods, longer-term functional outcomes, operative fatigue, and reduction in radiation exposure.

Keywords : arthroplasty, knee, robotics, malalignment
Conference Title : ICOT 2024 : International Conference on Orthopaedics and Trauma
Conference Location : San Francisco, United States
Conference Dates : November 04-05, 2024