

Inconsistent Reporting of Key Parameters in Robotic-Assisted Total Knee Arthroplasty Literature: A Systematic Review

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INTRODUCTION: As robotic-assisted total knee arthroplasty (RATKA) grows in popularity, it is crucial for authors to report technical procedural details for reproducibility and outcome assessment. This study aimed to assess the adequacy of reporting RATKA methods, with a focus on alignment and balancing philosophies; hypothesizing that current RATKA literature may be variant and insufficient in reporting.

METHODS: Studies from the top 50 orthopedic journals, by impact factor, were identified by “robot” and “total knee arthroplasty” keywords on March 10th, 2025, via the PubMed database. Included articles documented primary RATKA patients’ outcomes based on patient-reported, surgical, medical, or radiographic data. Upon review, 134 articles met inclusion criteria. Collected data included reporting different categories across three domains: technology, technique, and surgeon. Categories in the technology domain included the robotic system, robotic software version, and implant. The technique domain included alignment philosophy, coronal and sagittal alignment boundaries, and specific quantitative soft tissue balancing goals (flexion-extension and mediolateral compartment measurements). The surgeon domain included surgeon experience and volume.

RESULTS: Six articles (4.5%) reported on every category of the technology domain. Robotic system was reported in 97.0% of articles, robotic software version in 4.5%, and implant in 89.6%. Thirty-two articles (23.9%) reported all categories of the technique domain. Alignment philosophy was reported in 79.1% of articles, coronal boundaries in 68.7%. sagittal boundaries in 42.5%, and soft tissue quantitative goals in 47.8% (Figure 1A-C). Seventeen articles (12.7%) reported both categories of the surgeon domain, with experience and volume reported in 50.0% and 16.4% of articles, respectively.

DISCUSSION: Several fundamental aspects of RATKA technique and utilization are not consistently reported in the literature. As RATKA is increasingly used to execute novel, patient-specific techniques, it is vital for researchers and clinicians to transparently report these details for comparative research and reproducibility of study results.

SIGNIFICANCE/CLINICAL RELEVANCE: A fundamental lack of reporting key variables exists within RATKA literature, and this may lead to misrepresentation in outcomes or synthesized results. More transparency regarding these aspects will improve generalizability and allow for granular assessments of patient-specific RATKA approaches.

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IMAGES:

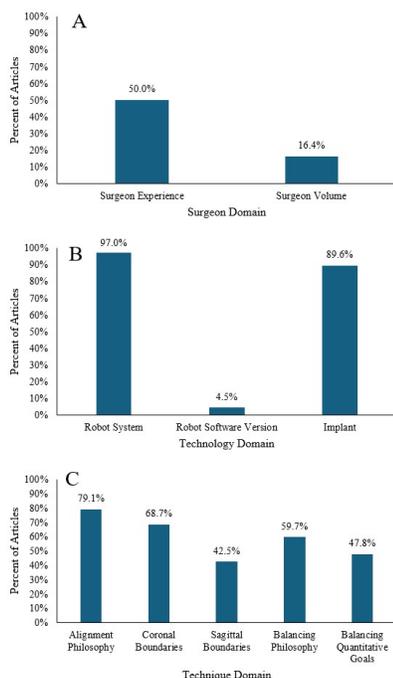


Figure 1A-C. 1A: Reporting Frequency of the Surgeon Domain Assessed. 1B: Reporting Frequency of the Surgeon Domain Assessed. 1C: Reporting Frequency of the Technique Domain Assessed.