Robotic-assisted UKA is Associated with Worse Outcomes than Conventional UKA when Performed by High-volume Surgeons

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ABSTRACT

INTRODUCTION: The use of robotic-assisted unicompartmental knee arthroplasty (R-UKA) has increased, but its impact on outcomes relative to conventional UKA (C-UKA) across different surgeon volumes remains unclear.

METHODS: Patients undergoing R-UKA and C-UKA by high-volume (HV, >34 UKAs/year) and low-volume (LV, <15 UKAs/year) surgeons were identified from the PearlDiver M170-Ortho database. Matched cohorts (4:1) compared HV-C-UKA to HV-R-UKA and LV-C-UKA to LV-R-UKA. Multivariable logistic regression assessed 90-day adverse events (AEs), readmissions, and 10-year implant-related AEs.

RESULTS: Among 2,681 HV-R-UKA and 10,663 HV-C-UKA patients, HV-R-UKA had higher odds of 90-day minor AEs (odds ratio [OR] 1.26, p=0.026), transfusion (OR 2.34, p=0.016), dehiscence (OR 2.36, p<0.001), readmission (OR 1.46, p=0.002), and 10-year revision (OR 1.22, p=0.002).
Among 3,559 LV-R-UKA and 14,141 LV-C-UKA patients, LV-R-UKA had higher odds of 90-day minor AEs (OR 1.26, p=0.005), dehiscence (OR 1.78, p<0.001), and readmission (OR 1.30, p=0.004).

DISCUSSION: This is the first study comparing R-UKA and C-UKA outcomes stratified by surgeon volume. R-UKA had inferior 90-day outcomes among low-volume surgeons and both inferior 90-day outcomes and higher 10-year revision rates among high-volume surgeons. These findings suggest that robotic assistance may hinder experienced surgeons' outcomes and should be considered with caution.

SIGNIFICANCE/CLINICAL RELEVANCE: This study provides important evidence that robotic-assisted UKA may be associated with worse short- and long-term outcomes compared to conventional techniques, particularly among high-volume surgeons. As robotic technology becomes more widely adopted, these findings highlight the need to critically assess its impact on outcomes and consider surgeon experience when implementing new surgical tools.

Figure 1: HV-R-UKA Relative to HV-C-UKA

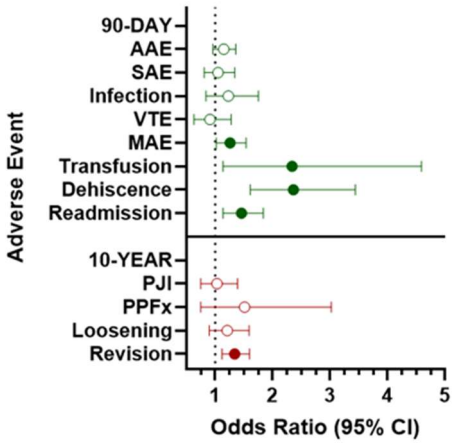

Figure 2: LV-R-UKA Relative to LV-C-UKA