Does Prior Knee Arthroscopy Delay Clinically Significant Improvement Timelines Following Unicompartmental Knee Arthroplasty and Primary Total Knee Arthroplasty? *Findings from a Propensity Score Matched Analysis of Time to Achieve Minimal Clinically Important Difference in 1,625 Procedures*

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INTRODUCTION:

Previous literature has suggested that prior knee arthroscopy before total knee arthroplasty (TKA) may lead to worse postoperative patient-reported outcome measures (PROMs). However, it is unclear whether the same association may be found in unicompartmental knee arthroplasty (UKA). Moreover, no previous investigation has utilized a Time to Achieve Minimal Clinically Important Difference (MCID) analysis. Whereas a conventional MCID study reports the percentage of MCID achievement, a Time to Achieve MCID analysis compares the median number of months postoperatively when patients achieve MCID. In this manner, Time to Achieve MCID analyses compare patient-centered clinically significant improvement timelines, offering surgeons and patients valuable insights on postoperative recovery trajectories. This analysis compared Time to Achieve MCID between patients with prior knee arthroscopy to a matched cohort of patients with no prior history of knee arthroscopy for both UKA and primary TKA.

METHODS:

This was a retrospective analysis of a prospectively-maintained multi-institutional arthroplasty registry. A total of 55 UKA patients had undergone prior arthroscopy within 1 year prior to the procedure, while 51 UKA patients had undergone prior arthroscopy between 1 and 2 years before the procedure. A total of 136 primary TKA patients had undergone prior arthroscopy within 1 year prior to the procedure, while 83 had undergone prior arthroscopy between 1 and 2 years before the procedure. We performed a 1:4 propensity score match based on age, sex, body mass index, and Charlson Comorbidity Index to identify UKA and primary TKA patients with similar characteristics, but no prior history of knee arthroscopy. **Figure 1** represents a study flow diagram, depicting selection of cases for final inclusion in the present analysis. Patients completed the Knee Osteoarthritis Outcome Score Physical Function Shortform (KOOS-PS) preoperatively, and at multiple timepoints postoperatively (approximately 1 month, 2 months, 4 months, 6 months, 9 months, 1 year, and 2 years after surgery).

Survival curves with interval-censoring were utilized to determine median time to achieve MCID for UKA and primary TKA patients. Interval censoring is a statistical technique in survival analysis that accounts for variations in questionnaire completion timelines, enabling robust inferences of when MCID achievement most likely occurred, even if it was an unknown timepoint between two assessments. To analyze the interval-censored data, a non-parametric maximum likelihood estimator was fitted to the dataset, with the Sun, Finkelstein, and generalized Wilcoxon Mann Whitney scores used.

RESULTS:

Prior arthroscopy before UKA was not associated with delayed Time to Achieve MCID, whether within 1-2 years before UKA (3.31-3.37 vs. 1.67-1.84 months; $p = 0.77$) or within 1 year before UKA (3.03-3.04 vs. 3.03-3.04 months; $p = 0.82$) (**Table 1**).

Prior arthroscopy within 1-2 years before TKA was not associated with delayed Time to Achieve MCID in TKA (3.03-3.04 vs. 2.37-2.41; $p = 0.93$) (**Table 1**). However, prior arthroscopy within 1 year before TKA was associated with delayed Time to Achieve MCID (2.07-2.17 vs. 0.96-0.97 months; $p = 0.015$) (**Figure 2**).

DISCUSSION AND CONCLUSION:

Prior arthroscopy delays clinically significant improvement timelines in primary TKA, yet the impact diminishes after 1-year. Prior arthroscopy was not found to delay time to achieve MCID in UKA. This suggests that TKA patients who recently underwent knee arthroscopy within 1 year will have delayed postoperative clinically significant improvement timelines. However, UKA patients who recently underwent arthroscopy will not exhibit prolonged recovery trajectories.

TKA patients who recently underwent arthroscopy experience a preoperative disruption to their joint anatomy which may impact their postoperative recovery and rehabilitation timelines. This may possibly explain their delayed Time to Achieve MCID. By contrast, the reduced invasiveness of UKA and the conservation of more native knee may somewhat mitigate this impact. This is one possible interpretation of the lack of association between recent arthroscopy and Time to Achieve MCID in UKA.

Arthroplasty surgeons can be aware that the impact of prior arthroscopy on patient-centered recovery timelines may be more clinically relevant for primary TKA, than for UKA. These findings can guide clinical decision-making, surgical scheduling, and patient counseling.

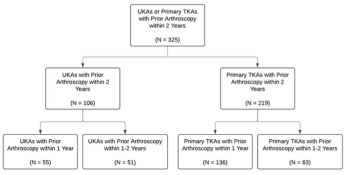

Figure 1. Study flow diagram indicating selection of cohorts of interest, stratified by procedure type and arthroscopy timing. Four cohorts were investigated: 1) UKAs with prior arthroscopy within 1 year; 2) UKAs with prior arthroscopy within 1-2 years; 3) Primary TKAs with prior arthroscopy within 1 year; 4) Primary TKAs with prior arthroscopy within 1-2 years. All four cohort were propensity score matched 1:4 to procedures with no prior history of arthroscopy.

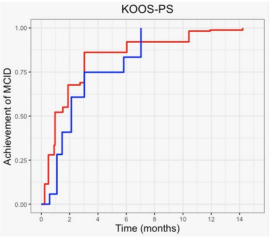

Figure 2. Survival Curve with Interval-Censoring, depicting Time to Achieve Minimal Clinically Important Difference (MCID), comparing Primary TKA patients with prior arthroscopy within 1-year (blue line) and patients with no prior history of arthroscopy (red line). Prior arthroscopy within 1-year delays clinically significant improvement in primary TKA.

Table 1. Median Times to Achievement of the KOOS-PS MCID in UKA and Primary TKA patients with interval-censoring, comparing patients with and without prior arthroscopy.

	Prior Arthroscopy Patients		**Propensity-Score Matched Patients with No Prior Arthroscopy**		
Characteristic	Lower Range (months)	Upper Range (months)	Lower Range (months)	Upper Range (months)	*P*-value
UKA					
Prior Arthroscopy within 1-Year	3.03	3.04	3.03	3.04	0.82
Prior Arthroscopy within 1-2 Years	3.31	3.37	1.67	1.84	0.77
TKA					
Prior Arthroscopy within 1-Year	2.07	2.17	0.96	0.97	**0.015**
Prior Arthroscopy within 1-2 Years	3.03	3.04	2.37	2.41	0.93