

Does Traumatic Brain Injury Increase Opioid Utilization after Primary Total Knee Arthroplasty?

Bill Young¹, Derek Amanatullah¹, Dhruv Shankar², Cameron Sabet³, Amelia Leopold, Navin Fernando², Nicholas Hernandez²
¹Stanford University School of Medicine, Stanford, CA, ²University of Washington School of Medicine, Seattle, WA, ³Georgetown School of Medicine, Washington D.C.
younbil@stanford.edu

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INTRODUCTION: Traumatic brain injury (TBI) is a common neurological injury with widespread systemic effects, leading to increased pain and opioid utilization. Opioid consumption is a common postoperative marker for pain control and recovery following a total knee arthroplasty (TKA). In this study, we investigated how a prior TBI affects perioperative opioid utilization in patients undergoing a TKA as well as the risk of prolonged opioid usage.

METHODS: Using an administrative claims database, we identified patients undergoing a primary TKA from 2010 to 2022. Following inclusion and exclusion criteria, we then subclassified these patients into those who had a prior TBI or not. Our primary outcome was perioperative opioid utilization, defined as any opioid prescription between 30 days before and after index surgery. Our secondary outcome was persistent opioid usage, which was defined as continued opioid prescriptions 90 days to 180 days after surgery. Multivariate regression models were used to assess the risk of persistent opioid usage based on TBI history, adjusting for demographics and comorbidities. Covariates were chosen based on demographic characteristics that differed significantly between the two cohorts, and included age, sex, geographical region, insurance plan, BMI, service location, and Elixhauser comorbidity index. We stratified TBI as a risk factor by year of diagnosis, categorizing patients into those with a prior TBI within 1 year before surgery, 1-3 years, 3-5 years, and 5+ years. We also adjusted for preoperative opioid usage and a prior diagnosis of depression or mood/anxiety disorders.

RESULTS: The final cohorts were a TBI cohort of 127,369 patients and a control cohort of 1,116,605 patients. Patients with a prior TBI had greater perioperative opioid utilization compared to patients without, with 987.5 vs 896.7 MMEs ($p < 0.001$) (**Table 1**). The TBI cohort also showed greater rates of persistent opioid usage compared to the control cohort: 22,258 patients (17.5%) vs 162,214 patients (14.5%) ($p < 0.001$). In the multivariate regression analysis, an earlier diagnosis of a TBI was associated with persistent opioid usage. Among the TBI cohorts, a prior diagnosis of a TBI within 1 year before a TKA was associated with the greatest risk of persistent opioid usage (OR 1.22, 95% CI: 1.17-1.26, $p < 0.001$).

DISCUSSION: This study found that patients with a history of TBI had significantly higher opioid prescriptions during the perioperative period, with greater mean total opioid consumption than non-TBI patients. Furthermore, the analysis indicated that TBI was a significant predictor of persistent opioid use, which was defined as having an opioid prescription filled between 90 and 180 days after surgery. The results suggest that both recent and remote TBI diagnoses increase the risk of higher and prolonged opioid use after TKA.

SIGNIFICANCE/CLINICAL RELEVANCE: In light of the current opioid epidemic and risk of chronic opioid abuse, it is incumbent upon orthopaedic surgeons to consider multimodal analgesic solutions for TBI patients undergoing TKA instead of purely relying on opioids.

Table 1. Amounts of opioids used between 30 days before and after knee surgery, and persistent opioid use

Outcome	TBI	Control	p-value
Total MMEs per patient, mean (SEM)	987.5 (5.4)	896.7 (1.1)	<.001
n, % persistent opioid use	22,258 (17.5)	162,214 (14.5)	<.001
Number needed to harm	33.3		

MME = Morphine Milligram Equivalent