Does Traumatic Brain Injury Increase Surgical and Medical Complications After Total Knee Arthroplasty?

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Disclosures: N/A

INTRODUCTION: Traumatic brain injuries (TBI) are a common neurological injury and have a wide range of systemic effects, including impaired cognition and fatigue. However, it is unknown how these systemic effects may influence surgical recovery following a total knee arthroplasty (TKA). The purpose of this study was to determine whether a past diagnosis of TBI was associated with increased rates of revision procedures at 90 days and 365 days following TKA, and whether the time elapsed from TBI diagnosis to TKA influenced this risk. The study also aimed to determine whether a past diagnosis of TBI was associated with increased rates of medical complications at 90 days and 365 days following TKA, and whether the time elapsed from TBI diagnosis to TKA influenced this risk. It was hypothesized that prior TBI diagnosis would be associated with higher rates of medical and surgical complications and revision surgery following TKA given the baseline poorer functional status and multiple comorbidities associated with TBI patients.

METHODS: Using the PearlDiver database, we examined adult patients undergoing a primary TKA, excluding those with a hip infection, hip fracture, or incomplete demographic information. Patients were also categorized into those with a diagnosis of TBI within 1 year before the index surgery, 1-3 years before, 3-5 years before, or ≥5 years before. We examined the incidence of postoperative complications, including revision surgery, acute kidney injury (AKI), pulmonary embolism (PE), pneumonia, and urinary tract infection (UTI). Multivariate regression models were used to assess the risk of 90- and 365-day complications based on prior TBI diagnosis, controlling for demographic variables, including age, gender, sex, geographical region, insurance plan, Elixhauser comorbidity index, and BMI.

RESULTS: Our final cohorts included 81,586 (10.5%) patients with a prior TBI diagnosis and 697,562 (89.5%) patients without. We found that a prior diagnosis of a TBI was associated with greater rates of 90- and 365-day revision surgery and certain medical complications, including AKI, PE, pneumonia, and UTI ($p<0.001$). In the multivariable regression analysis, the association between prior diagnosis of a TBI and greater risk of 90-day medical complications persisted. This was greatest among patients with a 1-year history of a TBI. For 365-day medical complications, prior TBI was associated with a greater risk of revision surgery, AKI, pulmonary embolism, pneumonia, and UTI ($p<0.05$ for all).

DISCUSSION: Our findings highlight a prior TBI diagnosis as a potential risk factor for increased surgical and medical complications following a TKA. Further research is needed to explore the impact of a TBI on the physiological post-TKA state to inform preoperative interventions and reduce the risk of TBI-related adverse events.

SIGNIFICANCE/CLINICAL RELEVANCE: These findings highlight an opportunity to improve preoperative counseling for patients who have a TBI, and encourage surgeons to remain aware of these potential challenges to ensure safe postoperative outcomes. Further research should explore the mechanisms surrounding these findings in order to better characterize the clinical relevance of these findings, and ultimately optimize recovery for TBI patients and inform clinical practice guidelines.