Chronic Steroid Use and 10-Year Incidence of Major Complications following Total Knee Arthroplasty

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INTRODUCTION: Systemic corticosteroids (steroids) are the mainstay of therapy for several autoimmune, lung, and rheumatologic conditions. Despite advances in biological therapies, many patients are prescribed a long course of steroids. Chronic steroid usage (>3 months of active use) is a risk factor for developing osteoporosis and bone health-related complications. The immunosuppressive action of steroids also increases the risk of infectious complications. Many of these patients undergo total knee arthroplasty (TKA) and their risk of implant, bone health, and infectious-related complications is unknown. Therefore, the purpose of this study was to compare the 10-year cumulative incidence of revision, prosthetic joint infection (PJI), and fragility fractures following TKA in patients with chronic steroid use to those without.

METHODS: A retrospective cohort analysis was conducted using a national all-payer claims database. Patients were identified using Current Procedural Terminology (CPT) and Internal Classification of Disease (ICD) 9 and 10 codes. Exclusion criteria included: patients with a history of malignancy, osteoporosis treatment, and <2-year follow up. Cohorts included patients undergoing primary TKA with chronic preoperative steroid use and patients without chronic steroid use. Primary outcomes were 10-year incidence of revision, prosthetic joint infection (PJI), fragility fracture (FF), periprosthetic fracture (PPF), and aseptic revision (AR). Kaplan Meier Analysis and a Multivariable Cox Proportional Hazards Model were used to estimate 10-year incidence and adjusted hazard ratios (HR) with corresponding 95% confidence intervals (CI).

RESULTS: A total of 611,596 patients were identified. Of these, 5,217 patients were on chronic steroids. In total, 10,000 patients were randomly sampled for data analysis from the no-steroid cohort. The steroid cohort had significantly higher incidence of osteoporosis (3.22% vs. 2.49%, p<0.010), vitamin D deficiency (28.06% vs. 12.66%, p<0.001), smoking (1.99% vs. 1.22%, p<0.001), and average CCI (2.37 vs. 1.13, p<0.001). Patients on chronic steroids had significantly higher 10-year incidence and risk of FF (HR:1.47; 95% CI:1.34-1.62; p<0.001)], revision (HR: 1.21; 95% CI: 1.05-1.40; p=0.009), and PJI (HR:1.30; 95% CI:1.01-1.69; p=0.045) when compared to control. There was no significant difference in 10-year PPF or AR between the cohorts.

DISCUSSION AND CONCLUSION: Patients prescribed chronic steroids had a higher risk of all-cause revision, PJI, and FF within 10-years following TKA when compared to the control. Due to their high risk of PJI, surgeons should ensure to optimize known modifiable PJI risk factors to reduce its incidence. Additionally, surgeons should consider preoperative bone health screening with referral for osteoporosis treatment in these patients to help reduce the incidence of fragility fractures.
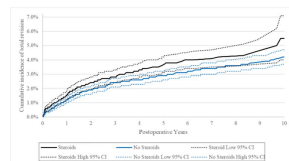
Figure 1. 10-year Kaplan Meier Curve Analysis demonstrating cumulative incidence of total revision in patients on preoperative chronic steroids versus patients not on chronic steroids. Upper and lower 95% Confidence Intervals are demonstrated as dotted lines.
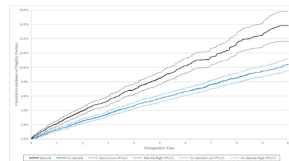

Figure 2. 10-year Kaplan Meier Curve Analysis demonstrating cumulative incidence of fragility fracture in patients on preoperative chronic steroids versus patients not on chronic steroids. Upper and lower 95% Confidence Intervals are demonstrated as dotted lines.

Figure 3. 10-year Kaplan Meier Curve Analysis demonstrating cumulative incidence of PJI in patients on preoperative chronic steroids versus patients not on chronic steroids. Upper and lower 95% Confidence Intervals are demonstrated as dotted lines.
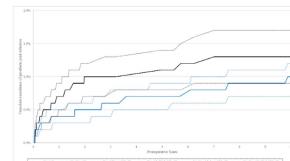
	HR	Lower 95% CI	Upper 95% CI	P-value
10Y Revision	1.210	1.047	1.399	**0.009**
10Y PPF	1.317	0.948	1.830	0.100
10Y FF	1.472	1.342	1.615	**<0.001**
10Y PJI	1.303	1.005	1.688	**0.045**
10Y ASEPTIC REVISION	1.083	0.799	1.468	0.608

Table 1. 10-Year Cox Proportional Hazards Model of Primary Outcomes.
HR = Hazard Ratio