Prior Antibiotic Use and Odds of Revision in Total Knee and Total Hip Arthroplasty

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INTRODUCTION:

Recent evidence has shown that the gut microbiome is linked to joint health. As such, shifts in the microbiota may result in a state of dysbiosis, potentially causing joint degeneration, osteolysis, aseptic loosening of a prosthesis, and periprosthetic joint infection through the translocation of bacteria. A common cause of dysbiosis is excessive antibiotic use. In some cases, it may take up to two years for one's microbiota to return to baseline following discontinuation of antibiotic therapy. Until then, such patients may be at risk for the aforementioned complications. Currently, the relationship between antibiotic use and joint recovery following surgery has not been thoroughly explored. The purpose of this study was to investigate whether a history of increased antibiotic use is associated with a higher incidence of revision surgery following primary total knee arthroplasty (TKA) or total hip arthroplasty (THA). We hypothesize that a history of greater antibiotic use is associated with increased odds of revision surgery.

METHODS:

This retrospective study analyzed the medical records of patients who underwent a primary TKA or THA from January 2015 to January 2025 at a quaternary-care medical center. Demographic information, comorbidities, lifetime antibiotic use prior to surgery, post-operative infection status, and reoperation status data were collected. After controlling for age, sex, BMI, race, and Charlson Comorbidity Index, a multivariable logistic regression analysis was conducted.

RESULTS:

A total of 2,472 patients met inclusion criteria, including 1,909 (77%) with a history of antibiotic use and 563 (23%) without. Patients in the antibiotic group were slightly older (66 ± 10 vs. 64 ± 11 years, $p = 0.005$) and had higher Charlson Comorbidity Index scores (4.9 ± 3.3 vs. 2.8 ± 1.9, $p < 0.001$). Racial distribution also differed between groups ($p = 0.016$), with more White patients in the antibiotic group (70% vs. 63%). There were no significant differences in gender ($p = 0.800$) or BMI ($p = 0.500$). The antibiotic group had a higher proportion of total knee arthroplasty procedures (60% vs. 50%, $p < 0.001$).

Overall, antibiotic use was associated with increased odds of revision following total joint arthroplasty (OR 1.54, 95% CI 1.16–2.05, $p = 0.003$). Younger age (OR 0.989 per year, 95% CI 0.979–0.998, $p = 0.019$), male sex (OR 0.786, 95% CI 0.661–0.934, $p = 0.006$), and higher BMI (OR 1.03 per unit, 95% CI 1.02–1.04, $p < 0.001$) were also independently associated with revision.

Among patients who underwent THA, antibiotic use remained independently associated with revision (OR 2.44, 95% CI 1.12–5.46, $p = 0.026$). Younger age (OR 0.96, 95% CI 0.94–0.98, $p = 0.001$) and lower BMI (OR 0.96, 95% CI 0.94–0.99, $p = 0.007$) were also significant predictors.

In the TKA cohort, antibiotic use was associated with even higher odds of revision (OR 3.07, 95% CI 1.59–6.27, $p = 0.001$). Higher BMI was also significant (OR 1.05, 95% CI 1.03–1.07, $p< 0.001$). Age, sex, and Charlson Comorbidity Index were not associated with revision risk in this subgroup.

Finally, in a model limited to revisions caused by infection, antibiotic use remained a significant predictor (OR 2.45, 95% CI 1.06–6.02, $p = 0.041$). Other factors associated with infection-related revision included younger age (OR 0.97, 95% CI 0.94–0.99, $p = 0.016$), male sex (OR 2.30, 95% CI 1.43–3.74, $p = 0.001$), higher BMI (OR 1.08, 95% CI 1.05–1.12, $p < 0.001$), and higher Charlson Comorbidity Index (OR 1.10, 95% CI 1.02–1.18, $p = 0.011$).

DISCUSSION AND CONCLUSION:

Our study shows that greater antibiotic use is associated with increased odds of revision for TKA and THA, supporting our hypothesis. Orthopaedic surgeons may use this information to counsel their patients on such potential complications. This data may also encourage physicians to prescribe antibiotics more appropriately, especially to patients with risk factors associated with joint arthroplasty.