The Effect of Extended Oral Antibiotic Prophylaxis on Post-Operative Outcomes in Total Knee Arthroplasty: A Matched-Cohort Retrospective Analysis

Sagie Haziza, MD[1]; Michael Greenberg, BS[2]; Jack Spagnuola, BS[2]; Roman Duchnycz, MBS[2]; Thaddeus Harbaugh, BS[2]; Zuhdi E. Abdo, MD[1]
[1]Rutgers New Jersey Medical School Department of Orthopaedic Surgery, Newark, NJ, [2]Rutgers New Jersey Medical School, Newark, NJ
Presenting Author: mdg215@njms.rutgers.edu

Disclosures: The authors declare no conflicts of interest.

INTRODUCTION: Prosthetic joint infection (PJI) following total knee arthroplasty (TKA) remains a serious complication which represents a significant burden to patients via healthcare costs. While perioperative antibiotic prophylaxis has been widely implemented in an attempt to reduce PJI rates, the efficacy of an extended oral antibiotic prophylaxis (EOAP) regimen postoperatively remains a debated topic among arthroplasty surgeons, with a lack of consensus on an appropriate protocol for both standard-risk and high-risk patients. Though previous studies on this subject have yielded varying conclusions, they are limited by their sample size and single-institution methodology. This study aimed to investigate the effect of EOAP on rates of PJI after primary TKA in both general and standard-risk populations using a database with a large sample size and propensity-matched cohorts.

METHODS: A retrospective cohort analysis was conducted using the TriNetX database to identify patients from 68 large healthcare organizations undergoing primary TKA. Current Procedural Terminology (CPT) codes were used to identify patients at least 18 years of age undergoing TKA with a minimum of 90 days of follow-up. International Classification of Diseases (ICD) codes were used to exclude patients with a pre-existing diagnosis of malignancy, or history of femur or tibia fracture. Patients were stratified into two cohorts: those prescribed additional prophylactic oral antibiotics beyond postoperative day 1 (EOAP-exposed) and those not prescribed additional antibiotics between postoperative day 1-90 (non-EOAP exposed). Patients were then propensity score matched based on age, sex, and various medical comorbidities prior to outcomes analysis. A subgroup analysis of standard-risk patients was also performed, excluding patients with diabetes mellitus, chronic kidney disease, and liver disease. ICD-10 codes were used to define primary outcomes within 90 days of TKA and included PJI and superficial skin infection, with all-cause revision as a secondary outcome. Measures of association analyses were performed for each outcome, and cumulative risk was quantified using Kaplan-Meier curve analysis. The log-rank test was used to compare survival curves, and a Bonferroni correction was applied to adjust p-values, with a significance threshold of $p<0.05$.

RESULTS: Propensity score-matching yielded two well-balanced cohorts of 17,184 EOAP-exposed and non-EOAP exposed patients, respectively. At 90 days postoperatively, the antibiotic group presented with a significantly higher rate of PJI (1.90% vs. 0.32%, $p<0.0001$), superficial skin infection (0.30% vs. 0.09%, $p<0.0001$), and revision surgery (0.72% vs. 0.22%, $p<0.0001$) compared to the no-antibiotic group. Kaplan-Meier analysis supported a significantly reduced infection-free survival in the antibiotic-exposed group for PJI ($p<0.0001$), superficial infection ($p<0.0001$), and revision ($p<0.0001$). The subgroup analysis yielded two well-balanced cohorts of 8,753 patients each. At 90-days postoperatively, the antibiotic group still demonstrated a significantly higher rate of PJI (1.34% vs. 0.22%, $p<0.0001$), superficial infection (0.27% vs. 0.11%, $p=0.0162$), and revision (0.61% vs. 0.21%, $p<0.0001$). Kaplan-Meier analysis showed a significantly higher rate of PJI ($p<0.0001$), superficial infection ($p=0.0004$), and revision ($p<0.0001$) in the antibiotic group compared to the no-antibiotic group.

DISCUSSION: EOAP significantly increased the risk of PJI, superficial infection, and revision surgery, supported by Kaplan-Meier analysis. A subgroup analysis limited to standard-risk patients upheld these results. These results contradict the current understanding of EOAP, which is generally assumed to deter infection rates. A significant limitation of this investigation is that TriNetX database includes both inpatient and outpatient data, meaning same-day TKA patients that received appropriate, not extended, oral antibiotic prescriptions may have been included in the EAOP-exposed cohort. Other limitations include the retrospective nature of the study and the lack of granularity afforded by ICD codes in determining the dosage, time course, and adherence of each patient.

SIGNIFICANCE/CLINICAL RELEVANCE: The results of this study imply that in patients undergoing primary TKA, EOAP may significantly increase the risk of PJI, superficial skin infection, and revision surgery. Future prospective studies are needed to provide more insight into the ultimate role of EOAP in patient care.

IMAGES AND TABLES:

Table 1: Risk Analysis Results - General Population

Outcome, n (%)	EOAP (n=17,184)	No-EOAP (n=17,184)	p-value	Log-Rank p-value
PJI	326 (1.90%)	55 (0.32%)	<0.0001*	<0.0001*
Superficial Skin Infection	51 (0.30%)	15 (0.09%)	<0.0001*	<0.0001*
Revision Surgery	123 (0.72%)	37 (0.22%)	<0.0001*	<0.0001*

Table 2: Risk Analysis Results – Standard Risk Population

Outcome, n (%)	EOAP (n=8.753)	No-EOAP (n=8,753)	p-value	Log-Rank p-value
PJI	117 (1.34%)	19 (0.22%)	<0.0001*	<0.0001*
Superficial Skin Infection	24 (0.27%)	≤10 (0.11%)	0.0122*	0.0003*
Revision Surgery	53 (0.61%)	18 (0.21%)	<0.0001*	<0.0001*