Periprosthetic Joint Infection Mortality Following Total Knee Arthroplasty Surpasses 5-Year Rates for Common Cancers: A Meta-Analysis of 79,764 Patients

Michael Steven Ramos, Brian Benyamini, Varun Kompala, Shujaa T Khan[1], Alison K Klika[1], Kyle Kunze, Peter Andrew Surace, Anabelle Visperas[1], Nicolas Santiago Piuzzi

[1]Cleveland Clinic

INTRODUCTION: Periprosthetic joint infection (PJI) after total knee arthroplasty (TKA) is a well-recognized complication in the orthopaedic surgical community. Many studies have demonstrated the significant morbidity and increased mortality associated with PJI. Despite this, PJI as a serious healthcare problem remains underappreciated; therefore, there is a need for a quantitative analysis evaluating the published rates of PJI-associated mortality after TKA. The purpose of this study was to report overall pooled incidences of mortality due to PJI after TKA. Through this study, we aimed to raise awareness of PJI in the medical community at large.

METHODS: Ovid MEDLINE, Embase, Cochrane Library, SCOPUS, Web of Science, and Cumulative Index to Nursing and Allied Health Literature databases were searched from the time of inception through December 2023. Full-length, original articles reporting on PJI-related mortality after primary TKA were included. Articles with oncologic, infectious, or traumatic indications for TKA were excluded. Additionally, articles with >5% of patients treated with amputation or resection arthroplasty only were excluded. Overall mortality incidences over time and by treatment (debridement, antibiotics, and implant retention (DAIR), 1-stage and 2-stage revision) were collected. For overall mortality, a meta-analysis of proportions with inverse-variance proportion models using Freeman-Tukey Double-Arscine Transformations and Dersimonian-Laerd random-effects estimators was constructed. Random-effects comparative proportional subgroup analyses investigated potential associations between treatment and mortality. A two-tailed p-value less than 0.05 was considered statistically significant.

RESULTS: A total of 79,764 patients with PJI after primary TKA from 31 studies were included. Overall mortality was 11.5% (95% CI:6.9-17.1%) at a mean follow-up of 46.9 months (range, 1-204 months). (Figure 1) PJI mortality at 3, 12, and 24 months after TKA was 4.1%, 7.0%, and 4.6%, respectively. (Figure 2) Pooled analysis demonstrated significant differences (p<0.0001) in mortality between PJI treatments: DAIR: 7.3% (95% CI:1.2-17.1%); 1-stage revision: 0.6% (95% CI:0-3.4%); and 2-stage revision: 12% (95% CI:8.6-15.8%). (Figure 3) Differences in incidences of mortality between DAIR and 2-stage revision at 3 months (2.7% vs. 3.9%, p=0.44) (Figure 4) and 12 months (5.0% vs. 4.6%, p=0.91) (Figure 5) were not significantly different.

DISCUSSION AND CONCLUSION: This is the largest study to assess PJI mortality following TKA over time and after treatment. Rates differed depending on whether patients were treated with DAIR, 1-stage or 2-stage revisions; however, DAIR and 2-stage revision demonstrated similar mortality at 3 and 12 months. Overall, PJI is a devastating complication after TKA, with an overall mortality rate (11.5%) at 4 years higher than the 5-year mortality rates of common cancers such as breast and prostate.

Figure 1: Pooled incidence of PJI-associated mortality after primary TKA

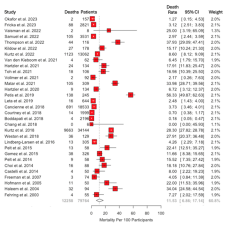

Figure 2: Pooled incidences of PJI-associated mortality after TKA by timepoint

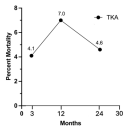

Figure 3: Pooled incidences of PJI-associated mortality after TKA by treatment

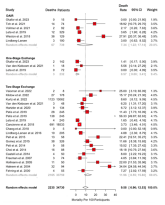

Figure 4: Pooled incidences of PJI-associated mortality after TKA following DAIR and 2-stage revision at 3 months

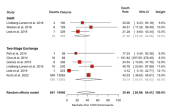

Figure 5: Pooled incidences of PJI-associated mortality after TKA following DAIR and 2-stage revision at 12 months