Does Aseptic Revision Risk Differ for Total Knee Arthroplasty Patients with and without a Prior Arthroplasty?

Heather Ann Prentice¹, Priscilla Hannah Chan², Robert S Namba, Ronald Anthony Navarro, Nithin C Reddy, Mark T Dillon³, Liz Paxton

¹Kaiser Permanente, ²Kaiser, ³The Permanente Medical Group

INTRODUCTION: Multiple arthroplasties, of different joints, in a single patient are not uncommon. While prior studies have determined the contralateral joint is the most common subsequent arthroplasty, an understanding of the outcome of having different arthroplasty procedures in a patient is lacking. In the present study, we sought to evaluate the risk of aseptic total knee arthroplasty (TKA) revision in patients with and without a history of arthroplasty of a different major joint.

METHODS:
We conducted a matched cohort study using data from our integrated health system’s total knee, hip, and shoulder arthroplasty registries. A total of 133,762 patients who underwent primary TKA for the diagnosis of osteoarthritis were identified (2009-2018). There were two exposure groups of interest: 1) TKA patients with a prior history of primary arthroplasty of a different joint (specifically hip, shoulder, and/or contralateral knee) and 2) TKA patients with a prior history of aseptic revision in a different joint (hip, shoulder, and/or contralateral knee).

For the first exposure group, TKA patients without a prior arthroplasty history were 2:1 matched using nearest neighbor match based on the following covariates: age, sex, body mass index, American Society of Anesthesia classification, number of Elixhauser comorbidities present, implant mobility, implant stability, cement viscosity, and operative year.

For the second exposure group, TKA patients with a history of a primary arthroplasty in a different joint but who have not undergone a revision procedure were 2:1 matched based on the same covariates specified above, as well as location of the prior primary procedure (e.g., 2 TKA patients with a history of primary hip arthroplasty without a revision were matched to 1 TKA patient with a history of primary hip that then went on to be aseptically revised).

Cox proportional-hazards regression was used to evaluate the risk for aseptic knee revision following the TKA procedure between the matched groups. Hazard ratios (HR) and 95% confidence intervals (CI) are presented; tests were two-sided and a p <0.05 was the significance threshold.

RESULTS:
A total of 33,838 (25.3%) had a history of a primary arthroplasty and 1,112 (0.8%) had a history of an aseptic revision in a different joint; 67,558 TKA patients with no arthroplasty history and 2,224 TKA patients without revision history were matched, respectively.

Figure 1 presents the TKA cumulative aseptic knee revision probabilities by arthroplasty history. Patients with prior arthroplasty in a different major joint had lower aseptic knee revision risk (HR=0.88, 95% CI=0.79-0.99) compared to patients with no other arthroplasty history.

Figure 2 presents the TKA cumulative aseptic knee revision probabilities by aseptic revision history. Those with prior aseptic revision in a different major joint had higher risk of aseptic knee revision (HR=3.08, 95% CI=1.84-5.13) compared to patients with no revision surgery history. When stratifying by location of the prior revision, the higher knee revision risk observed was for those with a prior contralateral knee revision (HR=4.40, 95% CI=2.13-9.09); no association was observed for those with a prior hip revision (HR=2.18, 95% CI=0.91-5.23) and no knee revisions were observed in those with a prior shoulder revision.

DISCUSSION AND CONCLUSION: We observed a lower knee revision risk in patients who had a prior arthroplasty compared to those with no prior procedure, however, patients with an aseptic revision history had a higher knee revision risk compared to those with a revision history. Patient activity levels may contribute to some of the observed findings; those who have had multiple major joints replaced might be less active than those undergoing a single arthroplasty, leading to a lower revision risk. The finding that patients with a prior contralateral knee revision had over a four-fold higher risk of aseptic failure in the index knee warrants close surveillance. Scar tissue formation leading to stiffness and ligamentous laxity resulting in knee instability may be similar in a given patient. This work confirms observations of survivorship of total joint arthroplasty procedures several decades earlier and can serve as a building block for further investigation and understanding of the impact of multiple arthroplasty procedures in individual patients.
Figure 1. Cumulative aseptic knee revision probability following primary total knee arthroplasty in patients with and without a history of a primary arthroplasty in a different major joint.

Figure 2. Cumulative aseptic knee revision probability following primary total knee arthroplasty in patients with a history of a primary arthroplasty in a different major joint, with and without a history of aseptic revision in the prior joint.