

Metal Allergy and Implant Survivorship in Total Hip and Knee Arthroplasty: A Retrospective Cohort Analysis

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INTRODUCTION:

Implants used in total hip (THA) and knee (TKA) arthroplasty can contain metals with allergenic properties, but it remains unclear if patients with prior metal allergy have worse implant outcomes. The purpose of this study was to determine if a pre-operative diagnosis of metal allergy was associated with poor implant survivorship.

METHODS:

A retrospective cohort analysis was performed using PearlDiver, an all-payer claims database. A cohort of 1,559 patients undergoing TKA and 524 patients undergoing THA with a prior diagnosis of metal allergy were matched to 6,189 and 2,075 controls propensity-score matched by age, sex, Charlson-comorbidity-index. Using these cohorts, we analyzed the cumulative incidence of revision up to five years after the index procedure using Kaplan-Meier survival analysis and calculated hazard ratios (HR) using Cox proportional hazard modeling.

RESULTS:

Compared to matched controls, patients with metal allergy patients showed higher cumulative incidences of all-cause revision for TKA (13.1% vs. 3.7%; HR: 4.0; 95% CI: 3.2-5.1; $P < .001$). They were more likely to require revision due to periprosthetic joint infection (PJI) (HR: 4.1; 95% CI: 2.8 - 6.0; $P < .001$) and mechanical loosening (HR: 5.0; 95% CI: 3.8 - 6.5; $P < .001$). Patients with metal allergy patients undergoing THA did not show significantly higher all-cause revision rates (4.8% vs. 3.0%; HR: 1.6; 95% CI: 0.9 – 2.6; $P = .085$) or mechanical loosening (HR: 1.3; 95% CI: 0.5 – 3.7; $P = .59$) but had a higher risk of revision due to PJI (HR: 3.2; 95% CI: 1.3 - 7.9; $P = 0.011$).

DISCUSSION AND CONCLUSION:

Patients with metal allergy demonstrated higher rates of all-cause revision and revision due to PJI, and mechanical loosening compared to matched controls following TKA while only higher rates of revision due to PJI were seen following THA. Future research needs to elucidate the role of prior metal allergy on surgical outcomes for more personalized patient care.

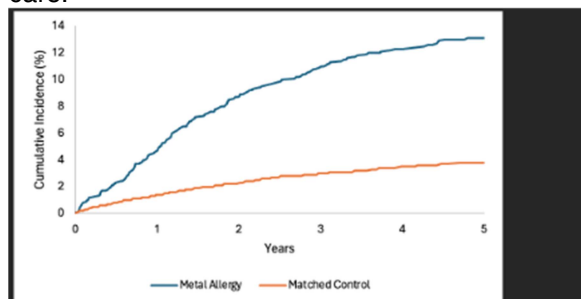


Figure 1: Cumulative incidence of all-cause knee revision with prior metal allergy compared to matched control.

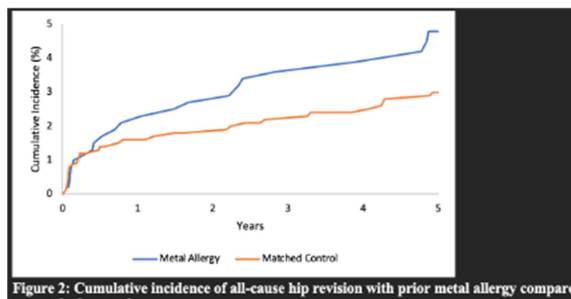


Figure 2: Cumulative incidence of all-cause hip revision with prior metal allergy compared to matched control