

Does antioxidant-loaded highly crosslinked polyethylene reduce revision risk in total knee arthroplasty: A US-based cohort study

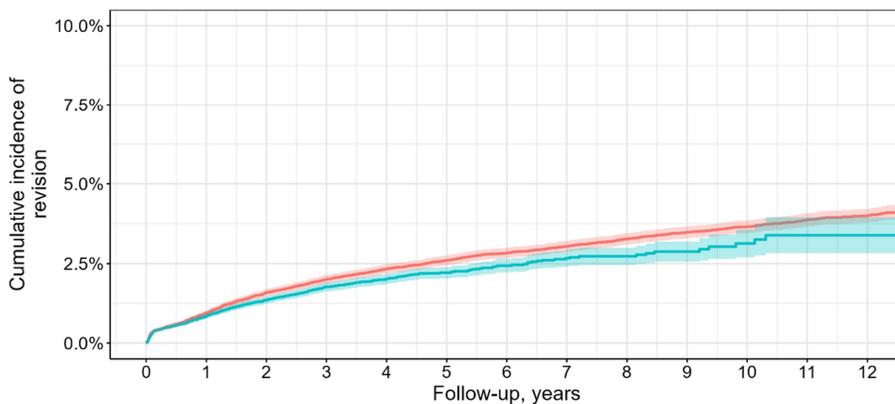
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INTRODUCTION: While use of antioxidant-loaded highly crosslinked polyethylene (HXLPE) for total knee arthroplasty (TKA) has increased over time, evidence of any benefit in survivorship over HXLPE without antioxidants is lacking. We sought to compare revision risk for HXLPE with and without antioxidants for TKA.

METHODS: Data from a US-based healthcare system’s Total Joint Replacement Registry was used to conduct a cohort study. Adult patients who underwent primary HXLPE TKA including the patella for the indication of osteoarthritis between 2001-2023 were included. To minimize confounding due to implant factors, the study sample was restricted to fixed bearing TKA using cobalt-chromium alloy bearings; only posterior stabilized or minimally stabilized designs were included. HXLPE with and without antioxidants were the treatment groups; TKA with other liners were excluded. The primary outcome was all-cause revision during follow-up; revision for aseptic reasons, wear, and loosening were secondary outcomes. Crude cumulative incidence was calculated as 1 minus the Kaplan-Meier estimate at 13-years follow-up. Multivariable Cox proportional hazards regression was used to evaluate revision risk by treatment group; age, body mass index (BMI), sex, race/ethnicity, ASA classification, bilateral procedure, cement utilization, implant stability, operative time, and average annual surgeon volume were included as covariates. Hazard ratios (HR) and 95% confidence intervals (CI) are presented. $p < 0.05$ was considered statistically significant.

RESULTS: The final study sample included 92,923 TKA: 48,846 with and 44,077 without antioxidants. At 13-years follow-up, unadjusted all-cause revision incidence was 3.4% and 4.2% for HXLPE with and without antioxidants, respectively (Figure). After confounder adjustment, a lower revision risk (HR=0.86, 95% CI=0.79-0.95) was observed for HXLPE TKA with antioxidants versus without antioxidants. However, when investigating specific revision reasons, a lower risk was observed for aseptic revision (HR=0.86, 95% CI=0.76-0.97) and wear (HR=0.41, 95% CI=0.21-0.81) with antioxidants. No difference was observed in risk of revision due to loosening between HXLPE groups (HR=0.83, 95% CI=0.63-1.08).

DISCUSSION AND CONCLUSION: When considering antioxidants added to HXLPE, we observed a lower risk in revision, primarily due to a reduction in wear. Findings from this study support the adoption of antioxidant-loaded HXLPE in TKA.



Number at risk

44077	40041	36159	30513	25065	17873	10209
48846	27485	14377	4503	2286	845	181