HIV Status and Postoperative Outcomes in Total Joint Replacement: A Multi-Center Propensity-Matched Cohort Study

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INTRODUCTION:

Advancements in antiretroviral therapy (ART) have significantly improved the life expectancy of individuals living with human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS), leading to an aging population that increasingly faces age-related comorbidities, including degenerative joint diseases. As a result, total joint reconstruction (TJR) procedures of the hip, knee, and shoulder are being performed at rising rates. These procedures offer substantial improvements in quality of life and functional mobility. While current research exists regarding post-operative outcomes of HIV positive patients compared to non-HIV patients, further insight into postoperative prosthetic joint complications is needed. This study aims to assess and compare survival, complication risks, and post-operative conditions among HIV-positive and HIV-negative TJR patients.

METHODS:

A retrospective cohort study was conducted using TriNetX, a multi-institutional database of electronic health records including 101 healthcare organizations (HCOs). Two cohorts were identified: (1) patients who underwent total joint arthroplasty with an HIV/AIDS diagnosis (n = 2,588) before surgery, and (2) patients who underwent the same procedures without an HIV/AIDS diagnosis (n = 588,903). Propensity score matching (PSM) was applied to balance baseline characteristics (age, gender, race, HTN, etc.), yielding 2,566 patients in each cohort for comparison. Primary outcomes included survival analysis, risk of periprosthetic fractures, joint instability, sepsis, anemia, and other complications.

RESULTS:

Kaplan-Meier survival analysis revealed a significantly lower survival probability in the HIV cohort (69.22%) compared to the non-HIV cohort (80.91%) ($p < 0.001$). HIV-positive patients had a higher risk of periprosthetic joint infection (Risk Ratio [RR] = 1.177; 95% confidence interval [CI]: 1.031-1.345; $p = 0.016$), periprosthetic fractures ([RR] = 2.00; 95% CI: 1.253-3.192; $p = 0.003$), development of a DVT/PE (RR = 1.404; 95% CI: 1.148- 1.717; $p = 0.001$), and sepsis (RR = 1.610; 95% CI: 1.294-2.002; $p = 0.0001$). Post-operative pain risks (RR = 1.056; 95% CI: 0.855- 1.312; $p = 0.601$), bone spur formation (RR= 1; 95% CI: 0.417-2.398; $p = 1$), and post-operative infection (RR = 0.947; 95% CI: 0.714-1.257; $p = 0.708$) were comparable between groups. Joint instability (RR = 1.365; 95% CI: 0.991–1.881; $p = 0.056$) demonstrated a notable difference; however, it did not reach statistical significance. The risk of anemia was notably higher in the HIV group (RR = 1.147; 95% CI: 1.038-1.268; $p = 0.007$), with a significant difference in median survival days (4,144 vs. 4,700, $p = 0.030$).

DISCUSSION AND CONCLUSION: HIV-positive patients undergoing TJR experience increased risks of periprosthetic fractures, DVT/PE, sepsis, and anemia, with a lower overall survival probability compared to non-HIV patients. Risks related to postoperative pain, joint instability, and infection were comparable between groups, however, increased rates of systemic complications in the HIV positive cohort suggest greater susceptibility to adverse surgical outcomes. Optimizing perioperative care for HIV-positive patients is crucial, including preoperative hematologic optimization, close monitoring for thromboembolic events, proactive management of infection, and strategies to mitigate fracture while optimizing postoperative success. Adherence to HIV treatment and CD4 counts may hypothetically influence postoperative outcome. Future research is needed to investigate the impact of CD4 count on post-TJR complications and refine surgical protocols for improved outcomes in this high-risk population.