# Does Preoperative Bisphosphonates Use Impact the Risk of Periprosthetic Fracture Following Total Hip Arthroplasty?

Rodnell Busigó Torres[1], James Minwoo Hong, HANISH KODALI, Jashvant Poeran[2], Brett Hayden, Darwin D Chen[3], Calin Stefan Moucha[4]
[1]Icahn School of Medicine At Mount Sinai, [2]Hospital For Special Surgery, Department of Anesth, [3]Mount Sinai Hospital, [4]The Mount Sinai Hospital

INTRODUCTION:
Total hip arthroplasty (THA) is one of the most commonly performed orthopedic procedures, significantly improving the quality of life for patients with severe hip osteoarthritis. Despite its success, THA can lead to complications such as aseptic loosening, infection, dislocation, and periprosthetic fracture (PPF), necessitating revision surgeries. Bisphosphonates (BPs) are widely used to prevent bone density loss and fractures in osteoporotic patients, a common demographic among THA candidates. While the impact of postoperative BP therapy on THA outcomes has been studied, the effects of preoperative BP use remain underexplored. This study investigates whether preoperative BP use influences surgical outcomes, including readmissions, periprosthetic fractures, and revisions, following THA.
METHODS:
This retrospective cohort study utilized the Merative MarketScan database, covering the period from January 2016 to December 2021, and included data from 121,583 THA patients. Preoperative BP use was defined as at least six months of BP therapy within the year before THA. The primary outcomes assessed were 30-day all-cause readmission, 30-day readmission due to periprosthetic fracture, and revision THA within 30 days postoperatively. A 1:5 propensity-score matched analysis was performed, matching each patient who used BPs preoperatively to five patients who did not. Adjusted odds ratios (ORs) and 95% confidence intervals (CIs) were reported to evaluate the association between preoperative BP use and the outcomes of interest.
RESULTS:
Among 121,583 THA patients, 1,574 (1.3%) used BPs preoperatively. Preoperative BP users were generally older (median age 70 vs. 61) and had a higher comorbidity burden (CCI ≥ 3 in 5.5% vs. 4.4%) compared to non-users. Patient demographics are summarized in Table 1. Propensity score matching resulted in a cohort of 9,436 patients (1,574 BP users and 7,862 non-users). Post-matching, no significant differences were found in 30-day all-cause readmissions (11.9% for BP users vs. 12.7% for non-users, OR 0.93, 95% CI 0.79-1.10, p=0.374), periprosthetic fracture readmissions (0.5% for BP users vs. 0.7% for non-users, OR 1.18, 95% CI 0.54-2.55, p=0.680), or revision rates within 30 days (1.5% for BP users vs. 1.2% for non-users, OR 1.23, 95% CI 0.77-1.94, p=0.385).
DISCUSSION AND CONCLUSION:
This study found no significant association between preoperative BP use and adverse surgical outcomes, including, all-cause readmissions, periprosthetic fractures, and revision rates within 30 days following THA. These findings suggest that preoperative BP use does not negatively impact short-term outcomes in THA patients. Further research, including basic science studies, is necessary to understand the underlying mechanisms and to develop evidence-based guidelines for BP use in orthopedic surgery. This study provides valuable insights for clinicians and patients, aiding in making informed decisions about BP therapy before undergoing THA.

**Table 1: Demographics of Patients with and without Preoperative Bisphosphonate Use (Unmatched and Matched Cohort)**

| | Unmatched Cohort | | | Matched Cohort | | |
|---|---|---|---|---|---|---|
| | Preoperative BP Use (n = 1,574) | No Preoperative BP Use (n=120,009) | SD | Preoperative BP Use (n = 1,574) | No Preoperative BP Use (n = 7,862) | SD |
| Median Age (IQR) | 70 (62, 79) | 61 (55, 69) | 0.691 | 70 (62, 79) | 70 (62, 79) | 0.019 |
| Sex | | | 0.043 | | | 0.057 |
| Male | 148 (9.4%) | 57,564 (48.0%) | | 148 (9.4%) | 613 (7.8%) | |
| Female | 1,426 (90.6%) | 62,445 (52.0%) | | 1,426 (90.6%) | 7,249 (92.2%) | |
| Charlson Comorbidity Index | | | 0.218 | | | 0.037 |
| 0 | 987 (62.7%) | 87,262 (72.7%) | | 987 (62.7%) | 5,112 (65.0%) | |
| 1 | 367 (23.3%) | 20,357 (17.0%) | | 367 (23.3%) | 1,693 (21.5%) | |
| 2 | 134 (8.5%) | 7,102 (5.9%) | | 134 (8.5%) | 666 (8.5%) | |
| ≥3 | 86 (5.5%) | 5,288 (4.4%) | | 86 (5.5%) | 391 (5.0%) | |
| Osteoarthritis | 1,143 (72.6%) | 103,778 (86.5%) | 0.349 | 1,143 (72.6%) | 5,811 (73.9%) | 0.029 |
| Obesity | 140 (8.9%) | 19,619 (16.3%) | 0.226 | 140 (8.9%) | 725 (9.2%) | 0.011 |
| Osteoporosis | 496 (34.8%) | 3,348 (3.1%) | 0.882 | 496 (34.8%) | 2,359 (33.1%) | 0.035 |
| Procedure Year | | | | | | |
| 2016 | 380 (24.1%) | 24,902 (20.6%) | 0.081 | 380 (24.1%) | 1,850 (23.5%) | 0.014 |
| 2017 | 329 (20.9%) | 22,171 (18.5%) | | 329 (20.9%) | 1,594 (20.3%) | |
| 2018 | 230 (14.6%) | 18,957 (15.8%) | | 230 (14.6%) | 1,126 (14.3%) | |
| 2019 | 238 (15.1%) | 20,663 (17.2%) | | 238 (15.1%) | 1,254 (16.0%) | |
| 2020 | 194 (12.3%) | 16,666 (13.9%) | | 194 (12.3%) | 972 (12.4%) | |
| 2021 | 203 (12.9%) | 16,650 (13.9%) | | 203 (12.9%) | 1,066 (13.6%) | |
| Region | | | 0.110 | | | 0.036 |
| Northeast | 254 (16.1%) | 23,297 (19.4%) | | 254 (16.1%) | 1,329 (16.9%) | |
| Midwest | 532 (33.8%) | 36,222 (30.2%) | | 532 (33.8%) | 2,704 (34.4%) | |
| West | 554 (35.2%) | 44,725 (37.3%) | | 554 (35.2%) | 2,790 (35.5%) | |
| South | 234 (14.9%) | 15,775 (13.1%) | | 234 (14.9%) | 1,039 (13.2%) | |

*BP = Bisphosphonate, IQR = interquartile range, SD = standardized difference