

The Association between Osteoporosis History and Postoperative Patient Outcomes in Individuals Aged 65 and Older who Underwent Elective Total Hip Arthroplasty between 2019 to 2022 in the American Joint Replacement Registry

Hsu Chih Chien, Kyle Mullen, Patrick Donnelly, Tzu-Chieh Lin¹, Xiaodong Li², David G Lewallen³, Mary Oates², Min Kim¹
¹Herald Biotechnology Co., Ltd., ²Amgen, ³Mayo Clinic

INTRODUCTION: Osteoporosis (OP) is a skeletal disorder characterized by compromised bone strength, which increases fracture risk. Published results from single center healthcare systems or commercially insured populations have shown that OP is associated with worse postoperative outcomes. There is limited information on the consequences of OP and postoperative outcomes among patients who underwent orthopaedic surgeries among a nationally representative population of US residents who were 65 years and older. The objective of this study was to characterize the burden of OP and its related clinical conditions in men and women, 65 years and older, who underwent total hip arthroplasty (THA), to determine whether OP history is one of the clinical factors associated with worse patient outcomes after the primary THA.

METHODS:

Data source

American Joint Replacement Registry (AJRR) linked to US Medicare claims data.

Study participants

The study included individuals who met the following criteria: 1) aged 65 years and older, 2) underwent elective primary THA, reported to AJRR between April 2019 and March 2022, and 3) had at least 365 days of continuous enrollment within Medicare prior to the index surgery. Individuals with a history of Paget's disease or metastatic cancer prior to the index procedure were excluded.

Covariates and outcomes

Baseline characteristics and surgical outcomes among eligible individuals with and without OP history was reported. OP history was defined by either having a diagnosis of OP, prior fracture, or use of an injectable OP medication (romosozumab, denosumab, and zoledronic acid; oral and self-administrative OP medication use were not available in the data source) using all available history prior to the primary elective THA. Study endpoints included 1) operative time, 2) 90-day all-cause revision, 3) 90-day fracture, 4) 90-day mortality, and 5) 1-year mortality. The outcomes were reported for men and women separately.

Analytical approaches

For baseline characteristics, counts and percentages were provided for dichotomous and polychotomous variables. To account for within-subject correlation of multiple outcomes (a single subject may contribute multiple index surgeries in the analysis), repeated measure analysis of variance (ANOVA) was implemented to estimate differences in operative time between individuals with and without OP history and the association between OP and postoperative outcomes was evaluated using generalized estimating equations (GEE) multivariate logistic regression models, controlling for age and Charlson Comorbidity Index (CCI). The Mantel-Haenszel (M-H) method was implemented to provide a pooled odds ratio across cement stem fixation status in men and women.

RESULTS:

This study included 150,356 elective THA procedures from 142,571 eligible individuals. In total, 59,060 procedures were in men and 91,296 were in women. A total of 1,249 procedures (2.1%) were from men with OP; 5,698 (6.2%) procedures were from women with OP. Selected patient characteristics are shown in Table 1.

The operative time was longer among both men and women with OP (men OP: 117.8±62.5, men non-OP: 86.3±35.3 minutes, differences=30.3, 95% confidence interval [CI]=27.6-33.2 minutes; women OP: 97.3±47.4, women non-OP: 83.6±34.0 minutes, differences=10.1 [95% CI=8.6-11.6] minutes). Within 90 days after the primary procedure, more fractures and deaths were observed among women with OP vs. without OP (90-day fracture, 1.2% vs. 0.5%; 90-day mortality, 0.8% vs. 0.1%). Women who underwent elective THA with OP were twice (adjusted odds ratio [aOR]=2.0 [95% CI=1.3-2.9]) and 50% (aOR=1.5 [95% CI=1.1-1.9]) more likely to have a fracture and revision surgery within 90 days of procedure, respectively, compared to those without OP. Women with OP also were more likely to die within 90 day (aOR=3.0 [95% CI=1.9-4.9]) and 1 year (aOR=1.2 [95% CI=1.1-1.2]). Men who underwent elective THA with OP were approximately five times more likely to die within 90 days (90-day mortality: aOR=5.3 [95% CI=3.1-9.0]) and within 1 year of the procedure (1-year mortality aOR=4.9 [95% CI=2.9-8.3]), compared to men without OP.

DISCUSSION AND CONCLUSION: Among this large, nationally representative cohort of elder men and women who underwent elective THA in the US, OP was associated with longer procedure times and a significantly higher risk for fracture, revision surgery, and mortality within 90 days post-surgery. A higher 1-year mortality risk was observed in both men and women with OP compared to those without. Our findings suggest that patients who undergo elective THA might

benefit from optimal preoperative diagnosis and medical management of OP. Further research is required to determine if available treatment options for OP can reduce the risk of these negative health outcomes for affected patients.