

The Downside of Height: Tall Stature Associated with Increased Complications after Total Hip Arthroplasty, A Propensity-Matched Analysis

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INTRODUCTION: Patient-specific factors such as sex, age, and body mass index (BMI) are well-established predictors of outcomes following total hip arthroplasty (THA). With the increasing annual rates of THA, an increased number of patients fall into subgroup phenotypic variations not previously studied in detail. While BMI has been widely studied, height—an independent anthropometric measure—has received less attention despite its potential influence on hip biomechanics. Taller individuals may experience distinct mechanical loading and implant stress. Thus, this study aims to investigate whether tall height is associated with an increased risk of complications following THA.

METHODS: This retrospective cohort study used data from the TriNetX Research Network to identify 157,286 patients who underwent THA from 2010-2025. The International Classification of Diseases, Ninth and Tenth Revisions (ICD-9 and ICD-10) procedure codes were utilized to identify patients undergoing primary, elective THA. Patients with osteoarthritis at least 18 years old with two or more years of follow-up were included. After excluding trauma, infection, malignancy, inflammatory disease, ligamentous instability, or syndromes associated with tall stature, patients were stratified into two sex-specific cohorts based on height. Propensity score matching (PSM) was used to match cohorts 1:1 based on demographics and Charlson Comorbidity Index pairing patients with heights at or above the 95th percentile (13,337 total) with “normal” heights, defined as within one standard deviation of the mean (143,949 total). Multivariable logistic regression was used to compare risks of postoperative complications at 90 days and 2 years. Risk ratios and 95% confidence intervals were calculated in the TriNetX research environment.

RESULTS: Balanced matches were achieved comparing 10,266 tall females and 6,034 tall males to an equal number of controls. Compared to control cohort, both tall males and females had increased risk of mechanical complications (Relative Risk [RRFemale]:1.34; 95% Confidence Interval [CI]:1.13, 1.58;p<0.001; RRMale:1.53; 95% CI:1.26, 1.85; p<0.001), revisions (RRFemale:1.31;95% CI:1.07,1.59;p<0.01; RRMale:1.45; 95% CI:1.16, 1.82; p<0.001), and periprosthetic joint infections (RRFemale:1.25; 95% CI:1.01, 1.56; p<0.05; RRMale:1.52; 95% CI: 1.21, 1.92 p<0.001).

DISCUSSION AND CONCLUSION:

Tall height is associated with a significantly increased risk of 2-year postoperative complications following THA. These findings suggest that height may be an underrecognized risk factor, as BMI alone may not fully capture the biomechanical demands imposed by taller body habitus. Unlike weight, height contributes to longer lever arms, increased joint reaction forces, and distinct gait mechanics, which may all contribute to higher implant stress, accelerated wear, or increased risk of loosening.

While there has been a growing push for more personalized templating and use of CT scans and robotics during surgery for more personalized arthroplastic care, height-specific considerations remain understudied in implant design, surgical technique, and postoperative protocols. The results of this study suggest that patients at the extremes of body size may experience different mechanical environments that could influence long-term outcomes.

Importantly, these findings should not restrict access to care or alter surgical indications based on height alone. Rather, they highlight the need for further investigation into the underlying biomechanical mechanisms at play and suggest a potential opportunity to inform future implant development, refine surgical planning, and optimize outcomes for patients who fall outside the average anthropometric norms.

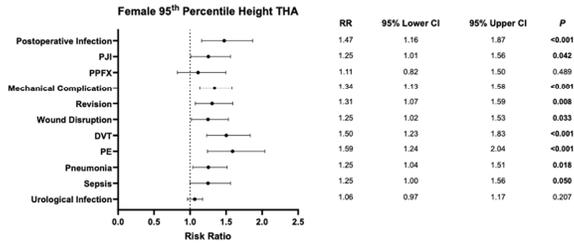


Figure 1: Relative risk of postoperative complications following THA in female patients > 95th percentile of Height compared to patients within one standard deviation of the mean. Abbreviations: PJI, periprosthetic joint infection; PPFX, periprosthetic fracture; DVT, deep vein thrombosis; PE, pulmonary embolism.

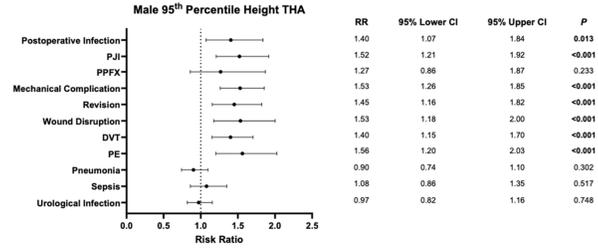


Figure 2: Relative risk of postoperative complications following THA in male patients > 95th percentile of height compared to patients within one standard deviation of the mean. Abbreviations: PJI, periprosthetic joint infection; PPFX, periprosthetic fracture; DVT, deep vein thrombosis; PE, pulmonary embolism.