# Body Mass Index and Functional Status are the Strongest Predictors of Postoperative Infections Following Total Hip Arthroplasty

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[1]Research

INTRODUCTION: Postoperative infections following total hip arthroplasty (THA) are strongly associated with increased risk of morbidity and elevated healthcare costs. Identifying both modifiable and non-modifiable risk factors is essential to optimizing patient outcomes. This study aimed to determine the most significant predictors of superficial, deep, and organ space infections within 30 days following THA.

METHODS:

The American College of Surgeons National Surgical Quality Improvement Program (NSQIP) database was queried to identify patients who underwent primary THA (CPT code 27130) between 2017 and 2021. Univariate analyses were performed to identify associations between patient characteristics and postoperative infections. Variables demonstrating statistical significance were entered into multivariate logistic regression models for each infection type.

Three types of infections were studied: superficial infections, deep infections, and organ space infections. A superficial incisional surgical site infection (SSI) is defined by specific criteria, including purulent drainage, a positive culture, or the presence of pain or tenderness, swelling, redness, warmth, and wound dehiscence (unless a culture is negative). A deep incisional surgical site infection (DSI) is defined as an infection occurring within 30 days of surgery that involves the deep soft tissues, such as muscle and fascia. It requires one of the following criteria to be met: purulent drainage from the deep incision, spontaneous or deliberate incision opening accompanied by specific signs and symptoms or evidence of infection identified through direct examination, reoperation, or histopathology. An organ-space surgical site infection (OSI) is defined as an infection involving any part of the anatomy (other than the incision) that was opened or manipulated during surgery. This specifically includes infections in internal organs or spaces within the body, distinct from superficial or incisional SSIs.

RESULTS:

Among 199,967 THA cases, 1,543 (0.77%) had superficial surgical site infections (SSI), 316 (0.16%) had deep incisional infections (DSI), and 679 (0.34%) developed organ space infections (OSI).

**Univariate Analysis:**

**SSI** was significantly associated with female sex, non-independent functional status, elevated BMI, steroid use, hypoalbuminemia, diabetes, COPD, CHF, and smoking (all $P < 0.001$).

**DSI** was significantly associated with non-independent functional status, elevated BMI, diabetes, smoking, COPD, CHF, AKI, and steroid use ($P < 0.01$).

**OSI** was significantly associated with older age, male sex, non-independent functional status, elevated BMI, diabetes, smoking, COPD, CHF, steroid use, and hypoalbuminemia ($P < 0.05$).

**Multivariate Analysis:**

**SSI:** BMI was the strongest independent predictor. Each unit increase in BMI conferred a 6.6% increased odds of SSI. Additional predictors included COPD (OR 1.68), non-independent functional status (OR 1.47), steroid use (OR 1.55), CHF (OR 1.77), smoking (OR 1.28), and hypoalbuminemia. Female sex increased odds by 20%. Diabetes was not significant in the final model.

**DSI:** Non-independent functional status was the strongest predictor (OR 6.7), followed by AKI (OR 6.9), CHF (OR 4.7), diabetes (OR 2.2), COPD (OR 1.6), steroid use (OR 1.9), and BMI.

**OSI:** Functional status again emerged as the strongest factor (OR 1.81). Each unit increase in BMI increased OSI odds by 8%. Other significant predictors included smoking (OR 1.71), COPD (OR 1.73), diabetes (OR 1.27), CHF (OR 1.34), and hypoalbuminemia. Age conferred a 5.3% increase in OSI odds per decade. Sex was not significant in the multivariate OSI model.

DISCUSSION AND CONCLUSION: Elevated BMI and non-independent functional status are the most robust predictors of postoperative infections following THA. These factors were consistently associated with increased risk across all infection types. Additional modifiable risk factors include smoking, steroid use, and hypoalbuminemia, while comorbidities such as diabetes, COPD, and CHF also significantly contribute. These findings highlight the importance of preoperative optimization in reducing infectious complications after THA.