Obesity Plus Protein-Calorie Malnutrition Increases Risk of 90-Day Postoperative Complications Following Total Joint Arthroplasty: A Propensity-Matched Analysis

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INTRODUCTION: Both obesity, as defined by body mass index (BMI) > 30 kg/m^2, and malnutrition are well-known risk factors for postoperative complications following total joint arthroplasty (TJA).[1-3] Historically, these two nutritional states have been thought to be mutually exclusive, but an emerging body of evidence supports the theory of paradoxical malnutrition in which patients have both an elevated BMI and a macro or micronutrient deficiency.[4] While previous studies have utilized serum albumin concentration as a proxy for nutritional status, the literature currently recommends against this practice as serum albumin levels can be influenced by chronic inflammation.[5,6] To the best of our knowledge, this is the first study of the topic that utilizes a formal diagnosis of malnutrition to define paradoxical malnutrition. The purpose of this study is to investigate postoperative outcomes following primary and revision TJA in obese patients with protein-calorie malnutrition.

METHODS: This study utilized a global deidentified electronic medical record database to identify adults > 18 years who underwent primary or revision total knee arthroplasty (TKA) or total hip arthroplasty (THA) between January 1, 2010, and January 1, 2025. The study group included patients BMI > 30kg/m^2 diagnosed with mild to moderate protein-calorie malnutrition within 90 days before TJA compared to a control group comprised of patients BMI > 30kg/m^2 without protein calorie malnutrition. Patients with severe protein-calorie malnutrition were excluded from the analysis. Cohorts were propensity-matched based on baseline demographic characteristics and comorbidities. Primary outcomes were evaluated at 90 days following index procedure utilizing risk ratios (RR) and 95% confidence intervals (CI). P-value < 0.05 denotes statistical significance.

RESULTS SECTION: There were 254 matched pairs. The study group consisted of 58.7% female and 34.6% male, at a mean age of 67.0 ± 11.0 years old. Within 90 days postoperatively, obesity plus protein-calorie malnutrition was associated with increased risk of venous thromboembolism (RR 2.538, 95% CI 1.369, 4.708), acute renal failure (RR 5.200, 95% CI 2.704, 10.001), sepsis (RR 2.900, 95% CI 1.444, 5.825), readmission (RR 4.826, 95% CI 3.190, 7.301), TJA implant complications (RR 2.056, 95% CI 1.203, 3.512), and deep surgical site infection (RR 7.500, 95% CI 3.969, 14.174).

DISCUSSION: Paradoxical malnutrition is associated with significant postoperative complications within 90 days following total joint arthroplasty. These results suggest that a more nuanced approach to TJA preoperative clearance is warranted that accounts for both BMI and nutritional status. Further, this study underscores the need for validated assessment nutritional assessment tools for patients with obesity. Limitations of this study include its retrospective design which precludes causal claims, residual confounding due to variables not included in the propensity score such as surgeon experience, surgical technique, or perioperative parenteral nutrition, and heterogeneity regarding the criteria used to diagnosis protein-calorie malnutrition.

SIGNIFICANCE/CLINICAL RELEVANCE: Malnutrition in patients with obesity may confer substantially elevated risk of postoperative complications following total joint arthroplasty.

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