The Effects of Hypoalbuminemia on Complications and Increased Resource Utilization in Obese Patients

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INTRODUCTION: Total joint arthroplasty (TJA) is a highly effective and successful surgery however, poor nutritional status has been associated with worse surgical outcomes and implant failure. In orthopaedics, nutrition status is typically evaluated using transferrin, total lymphocyte count (TLC), and serum albumin. When albumin levels fall below 3.0 g/dL, the body's wound healing ability becomes impaired. Typically, malnutrition is associated with low BMI. However, many patients with malnutrition can be obese, another known risk factor for poor outcomes after TJA. The goals of this study were to investigate the relationship between the malnourishment represented through albumin levels of obese patients with BMI > 35 kg/m2 and likelihood of postoperative complication.

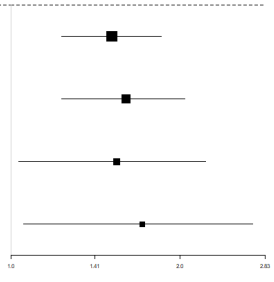
METHODS: A retrospective review of 79,784 patients undergoing primary THA or TKA from 2016 to 2020 in the ACS-NSQIP national database was performed. Patients with an albumin of less than 3.5 g/dL were considered low albumin and those with greater than or equal to 3.5 g/dL were considered normal albumin. Univariate analysis was used to determine demographic and comorbidity differences between those with and without low albumin. Complications of interest included return to operating room, superficial infection, deep wound infection, wound dehiscence, pneumonia, pulmonary embolism, deep vein thrombosis, renal failure, urinary tract infection, stroke, cardiac arrest and myocardial infarction. Prolonged length of stay was considered any stay greater than the 75th percentile which was calculated to be 3 days. Increased resource utilization was categorized as having a length of stay greater than 3 days, or a non-home discharge or an unplanned readmission. Patients were considered to have had a complication if they experienced any one of the complications of interest. Multivariate logistic regression examined albumin as a predictor of increased resource utilization and complications after controlling for age, race, ASA, diabetes, CHF, ESRD, dyspnea, HTN, COPD, anemia smoking and sepsis.

RESULTS: Of the 79,784 patients, 4.96% patients had low albumin. Those with low albumin were nearly 1.5 years older, on average, than those with normal albumin (64.79 vs. 63.35; p<0.001) and were more likely to be black (17.5% vs. 12.5%; p<0.001) and female (72,5% vs. 63.3%; p<0.001) and had an overall increased comorbidity burden as shown by percent of patients with ASA greater than 3 (79.7% vs. 67.4%; p<0.001). After risk adjustment, those with low albumin and a BMI of 35 to 40 had 1.82 increased risk of increased resource utilization (p<0.001) and 1.51 increased risk of complication (p<0.001) , BMI 40 to 45 had 1.39 increased risk of increased resource utilization (p<0.001) and 1.60 increased risk of complication (p<0.001), BMI 45 to 50 had 1.28 increased risk of increased resource utilization (p=0.018) and 1.54 increased risk of complication (p=0.027) and BMI 50+ with had 1.73 increased risk of increased resource utilization (p<0.001) and 1.71 increased risk of complication (p=0.026).

DISCUSSION AND CONCLUSION: Our results demonstrated the prevalence of malnutrition as represented by albumin levels <3.5 g/dL increases as a patients BMI increases. Further, hypoalbuminemia was associated with increased resource utilization and increased complication rates in all obese patients. Therefore, we suggest screening albumin levels in obese patients preoperatively to give surgeons the best opportunity to optimize a patient's nutrition before undergoing their surgery.

Low Albumin as Predictor of Complication by BMI

BMI	OR	Lower 95% CI	Upper 95% CI	P-Value
35 to 40	1.51	1.23	1.85	<0.001
40 to 45	1.60	1.23	2.04	<0.001
45 to 50	1.54	1.03	2.22	0.027
50+	1.71	1.05	2.69	0.026



Low Albumin as Predictor of Resource Utliization by BMI

BMI	OR	Lower 95% CI	Upper 95% CI	P-Value
35 to 40	1.82	1.64	2.00	<0.001
40 to 45	1.39	1.22	1.58	<0.001
45 to 50	1.28	1.04	1.58	0.018
50+	1.73	1.33	2.26	<0.001