

## The relationship between hypoalbuminemia and the risk of postoperative complications after carpal tunnel and cubital tunnel release <br class="Apple-interchange-newline">

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**INTRODUCTION:** Preoperative hypoalbuminemia has been identified as a marker for malnourishment and is associated with various postoperative complications. Few studies have explored the effect of malnourishment on postoperative complications following hand surgery, and fewer have explored the association between hypoalbuminemia and postoperative complications for more than 30 days post-surgery. This study evaluates the association between hypoalbuminemia and postoperative complications for up to one year following carpal tunnel release (CTR) or cubital tunnel release with or without transposition (CuTR). We hypothesized that patients with low serum albumin levels (<3.5g/dL) would have a higher risk of postoperative complications than patients with normal serum albumin levels (>3.5g/dL).

### **METHODS:**

In this retrospective study, *Current Procedural Terminology* (CPT) and *International Classification of Diseases, Tenth Revision* (ICD-10) codes (CPT: 29848, 64721, 64718; ICD10CM: G56.0, G65.2) were used to identify 42,764 adult patients (≥ 18 years old) in the TrinetX database (across 75 healthcare organizations) who underwent CTR/CuTR. Serum albumin was recorded within 3 months prior to CTR/CuTR, and patients were grouped into a normal (≥3.50g/dL) or low (<3.50g/dL) albumin group. Propensity score matching (PSM) was used to control for demographic characteristics and existing comorbidities including, but not limited to, chronic and acute cardiovascular, cerebrovascular, pulmonary, renal, and immune system disorders, type 1 and type 2 diabetes mellitus, and malignant neoplasms of different organs. Chi-squared tests were used to analyze differences in the risk of 32 different postoperative complications between both groups at 30 days, 6 months, and 1 year post-surgery. Significance level was set at  $\alpha = 0.05$ .

**RESULTS:** After PSM, a total of 6,816 patients were identified: 3,408 with normal albumin and 3,408 with low albumin levels. The mean age of patients in the low and normal albumin groups were 58.9 (SD: 15.6) and 58.7 (SD: 15.1), respectively. Post-operative wound dehiscence, superficial or deep surgical site infections, synovial fistula, infective tenosynovitis, complex regional pain syndrome, flexor tendon rupture, chronic postprocedural pain, postoperative cerebrovascular accidents, hemarthrosis, effusion, hemorrhage/hematoma/seroma, line infection, emergency airway, pulmonary embolism, ventilator associated pneumonia, acute liver failure, cardiac complications, and mortality were not significantly associated with albumin levels at any of the time points specified. At 30 days post-surgery, a higher proportion of patients with hypoalbuminemia developed acute kidney failure (3.1% vs 1.6%,  $p < 0.001$ ); pneumonia (2.6% vs 1.8%,  $p = 0.032$ ); urinary tract infection (2.0% vs 1.4%,  $p = 0.048$ ); ventilator use (1.1% vs 0.4%,  $p = 0.001$ ); acute respiratory failure (1.9% vs 0.6%,  $p < 0.001$ ); acute thrombus (2.6% vs 1.5%,  $p = 0.002$ ); sepsis (1.8% vs 0.8%,  $p < 0.001$ ); readmission (7.1% vs 3.9%,  $p < 0.001$ ); ED visit (8.4% vs 7.0%,  $p = 0.036$ ); and pyogenic arthritis of the wrist, elbow, or hand (0.9% vs 0.4%,  $p = 0.004$ ) compared to patients in the normal albumin group. The risk of neuroma formation was higher among patients in the normal albumin group compared to patients with hypoalbuminemia, albeit with low incidence (0% vs 0.3%,  $p = 0.002$ ). The higher risks of sepsis (2.0% vs 1.3%,  $p = 0.021$ ), readmission (8.6% vs 6.6%,  $p = 0.002$ ), and ED visit (15.3%, 12.9%,  $p = 0.004$ ) associated with hypoalbuminemia remained significant for up to 6 months post-surgery; however, only the risk of readmission remained significant for up to 1-year post-surgery (12.4% vs 10.9%,  $p = 0.041$ ). The risk of trigger finger was significant only at the 1-year mark, with a higher risk observed in patients with normal albumin levels (2.9% vs 4.2%,  $p = 0.042$ ).

### **DISCUSSION AND CONCLUSION:**

Our findings suggest that low albumin is not associated with outcomes that may dissuade or delay CTR/CuTR. However, the incidence of acute respiratory failure, sepsis, ED visits, and readmission was significantly increased among patients in the low albumin group compared to those in the normal albumin group for up to 6-months post-operation. This suggests that preoperative malnourishment, indicated by low serum albumin level, is associated with the risk of sepsis, ED visit, and readmission at 30 days and 6 months after CTR/CuTR. Attending patients' nutritional status before surgery, while considering the time sensitive nature of carpal tunnel syndrome and cubital tunnel syndrome, offers a manageable and cost-effective intervention to mitigate adverse post-operative outcomes.