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Joseph O. Ehiorobo M.D.

Advisor(s): Danielle Casagrande M.D.

Co-author(s): Vinay Bijoor, Ariel Homayoonfar, Steven Burekhovich, David H. Mai, Alexander Tejani, Rose Park, Carl Paulino, Clifford Voigt, Barbara Freeman, Aden Malik, Danielle Casagrande

Serum Albumin May Predict Bleeding Transfusion Among Patients Undergoing Total Shoulder Arthroplasty

Introduction: Serum albumin is a low-cost marker of nutritional status and organ function. Prior studies have cited its role in predicting adverse surgical outcomes. This study assessed the relationship between preoperative albumin levels and bleeding transfusion in total shoulder arthroplasty (TSA).

Methods: A retrospective cohort study was performed using the National Surgical Quality Improvement Program (NSQIP) database (2012-2021). Adults (≥ 18 years) were categorized into four cohorts based on preoperative albumin: severe hypoalbuminemia (<3 mg/dL), mild hypoalbuminemia (3-3.49 mg/dL), normal albumin (3.5-4.49 mg/dL), and hyperalbuminemia (≥ 4.5 mg/dL). The primary outcome was bleeding transfusion, defined as transfusion of ≥ 1 unit within 72 hours postoperatively. Confounders included demographics (age, sex, race, ethnicity), baseline health (functional status, ASA class, BMI, smoking, diabetes, immunosuppression), and procedure characteristics (admission origin, setting, anesthesia, transfusion, emergency status). Univariate and multivariable regression analyses were performed.

Results: Among 18,044 TSA cases, 13,744 had normal albumin, 1,055 mild hypoalbuminemia, 248 severe hypoalbuminemia, and 2,997 hyperalbuminemia. Most in the hypoalbuminemia and normal albumin groups were aged 70–79 years, female, White, non-Hispanic, ASA class 3, and functionally independent. The hyperalbuminemia cohort had more males, ASA class <3 , and was younger (60–69 years). [Table 1].

On multivariable regression, compared to normal albumin, severe (OR 4.43, 95% CI 2.86–6.70; $p<0.001$) and mild hypoalbuminemia (OR 2.17, 95% CI 1.59–2.94; $p<0.001$) were associated with higher bleeding transfusion risk. Hyperalbuminemia (OR 0.48, 95% CI 0.29–0.75; $p=0.002$) was associated with lower risk. [Table 2].

Conclusion: Severe and mild hypoalbuminemia increased bleeding transfusion risk in TSA. Optimizing preoperative albumin levels and perioperative support strategies may improve outcomes.