Preoperative Anemia as a Risk Factor for Postoperative Complications Following Open Reduction Internal Fixation of Distal Radius Fractures

Alexander R. Garcia, BS1, Kenny Ling, MD2, Samer Al-Humadi, MD2, David Komatsu, PhD2, Edward D. Wang, MD2
1Renaissance School of Medicine at Stony Brook University, Stony Brook, NY, USA; 2Department of Orthopaedics and Rehabilitation, Stony Brook University, Stony Brook, NY, USA. alexander.garcia@stonybrookmedicine.edu

Disclosures: Alexander R. Garcia (N), Kenny Ling (N), Samer Al-Humadi (N), David Komatsu (N), Edward D. Wang (N)

INTRODUCTION: The incidence of distal radius fractures (DRF) in the United States is over 640,000 cases per year and is projected to increase. The overall prevalence of anemia in the United States increased from 5.71% in 2005 to 6.86% in 2018. Therefore, preoperative anemia may be an important risk factor to consider prior to surgical fixation of a distal radius fracture. The purpose of this study was to investigate preoperative anemia and its association with short-term complications following surgical treatment of distal radius fractures.

METHODS: The American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) database was queried for all patients who underwent open reduction internal fixation (ORIF) of DRF between 2015 and 2020. The initial pool of patients was divided into cohorts based on preoperative hematocrit. Multivariate logistic regression, adjusted for all significantly associated patient demographics and comorbidities, was used to identify associations between preoperative anemia and postoperative complications following ORIF of DRF.

RESULTS SECTION: A total of 22,923 patients who underwent ORIF of DRF were identified in NSQIP from 2015 to 2020. Of the 12,068 patients remaining after exclusion criteria, 9,616 (79.7%) patients were included in the normal cohort, 2,238 (18.5%) patients were included in the mild anemia cohort, and 214 (1.8%) patients were included in the severe anemia cohort. Compared to the reference cohort, patients with any anemia were independently associated with higher rates of reintubation (OR 6.51, 95% CI 1.29-32.80; p = 0.023), blood transfusion (OR 11.83, 95% CI 3.95-35.45; p < 0.001), septic shock (OR 10.76, 95% CI 1.19-97.02; p = 0.034), readmission (OR 2.10, 95% CI 1.60-2.76; p < 0.001), non-home discharge (OR 2.22, 95% CI 1.84-2.68; p < 0.001), and mortality (OR 2.70, 1.03-7.07; p = 0.043).

DISCUSSION: We hypothesized that preoperative anemia is associated with non-home discharge. Preoperative anemia, both mild and severe, were clinically significant predictors for postoperative complications within 30-days following ORIF of DRF. Severe anemia was associated with higher rates of blood transfusion, non-home discharge, and mortality compared to mild anemia. A major limitation is that NSQIP inherently excludes cases performed for trauma, which likely excludes cases of DRF ORIF in poly-trauma patients. While this does not allow us to investigate a certain portion of DRF cases, it may be beneficial to our analysis, as anemia is much more difficult to control in a poly-trauma setting. The NSQIP database only allows us to investigate postoperative complications within 30 days of the procedure only.

SIGNIFICANCE/CLINICAL RELEVANCE: Distal Radius fractures occur largely in elderly populations that may be at higher risk for preoperative anemia. By analyzing complications with preoperative anemia surgeons can better determine patients at increased risk of complications.

Level of Evidence: Level III; Retrospective Cohort Comparison; Prognosis Study

Keywords: distal radius fracture, open reduction internal fixation, preoperative anemia, postoperative complication

Table 1: Preoperative hematocrit in patients with distal radius fractures and incidence of anemia at admission and discharge. Bold values indicate statistical significance with p < 0.05.

Table 2: Univariate analysis of 30-day postoperative complications in patients with normal, mild, and severe anemia. Bold values indicate statistical significance with p < 0.05.

Table 3: Multivariate analysis of 30-day postoperative complications in patients with preoperative anemia, adjusted for significantly associated patient demographics and comorbidities. Bold values indicate statistical significance with p < 0.05.

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