The Association Between Preoperative INR Values and Postoperative Outcomes Including Mortality in Geriatric Femoral Neck Fractures Treated With Hemiarthroplasty

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INTRODUCTION:
A common clinical dilemma arises when a geriatric patient with a femoral neck fracture presents with an elevated international normalized ratio (INR). The benefits of proceeding to the operating room promptly conflict with the concern of bleeding risk and postoperative complications. While prior studies have evaluated the association between preoperative INR and postoperative complications and mortality, these were larger database studies with inherent limitations and a lack of granularity. We hypothesized that an increasing preoperative INR would be associated with increased rates of 90-day mortality and other postoperative complications in patients undergoing hemiarthroplasty for femoral neck fracture.
METHODS:
Our institutional total joint registry (TJR) was used to identify 2338 patients (2440 hips) that underwent hemiarthroplasty for femoral neck fracture (OTA 31B) between 2000 and 2019. Patients were excluded for pathologic fracture, age < 55 years, confounding blood dyscrasias, concurrent operations, or lack of a documented preoperative INR within 72 hours of surgery. This left 1556 patients (1616 hips) included in our study. Patient demographics, comorbidities, operative details, and postoperative complications were recorded. The 90-day, 30-day, and in-hospital mortality and complication rates were estimated using Kaplan-Meier survival methods. The Cox proportional hazards regression analyses were performed to examine the association of preoperative INR with mortality and postoperative complications while adjusting for potential confounders including age, sex, Charlson Comorbidity Index (CCI), diagnosis of dementia, dialysis, time to surgery > 2 days, preoperative vitamin K, intraoperative tranexamic acid, and preoperative hemoglobin, among others. Post-operative blood transfusion was assessed using logistic regression.
RESULTS:
The overall 90-day mortality rate was 16.3% (95% CI: 14.3 – 18.3%). After adjusting for confounders, the association of preoperative INR and death within 90-days postoperative was not statistically significant (HR: 1.3; 95% CI: 0.9 – 1.7; p=0.15). Preoperative dementia (HR: 1.9; 95% CI: 1.4 – 2.6; p<0.0001), CCI (HR: 1.1; 95% CI: 1.05 – 1.2; p<0.001), and age per decade (HR: 1.4; 95% CI: 1.1 – 2.3; p=0.003) were significantly associated with 90-day mortality. Additionally, INR was not statistically associated with 30-day mortality (HR: 0.65; 95% CI: 0.4 – 1.1; p=0.11) nor in-hospital mortality (HR: 1.2; 95% CI: 0.7 – 1.9; p=0.5). INR was associated with postoperative transfusion (OR: 1.4; 1.03 – 1.8; p=0.031) as was a preoperative hemoglobin < 10 g/dL (OR: 13.7; 8.4 – 23.3; p<0.0001). On multivariate analysis, INR was significantly associated with superficial wound infection (HR: 2.0; 95% CI: 1.1 – 3.7; p=0.02) and non-infected wound complications (HR: 1.6; 95% CI: 1.1 – 2.4; p=0.007). Based on spline line analysis, superficial infection complications may increase between an INR of 1.8 and 2.4.
DISCUSSION AND CONCLUSION:
When controlling for potential confounding variables, preoperative INR does not appear to be statistically associated with 90-day, 30-day, or in-hospital mortality following hemiarthroplasty for geriatric femoral neck fracture. Underlying medical conditions causing a patient to be on anticoagulation and/or present with an elevated INR may contribute to postoperative mortality more so than the elevated INR itself. However, INR is associated with superficial wound complications. The association between INR and superficial wound infection becomes statistically significant with an INR between approximately 1.8 and 2.4.