Blood Transfusion in the Age of Tranexamic Acid - Who Needs a Type and Screen before Total Knee Arthroplasty?

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INTRODUCTION:

Modern surgical protocols including use of tranexamic acid (TXA) have reduced – but not eliminated – blood transfusions surrounding total knee arthroplasty (TKA). Identifying risk factors for transfusion remains important for risk reduction and type and screen (T&S) optimization.

METHODS:

We retrospectively reviewed 7,254 patients who underwent primary, unilateral TKA and 307 patients who underwent primary bilateral TKA between January 2014 and January 2023, received TXA, and had preoperative hemoglobin (Hgb) values. We compared demographics, baseline Hgb levels and surgical details between patients who were and were not transfused. Data was analyzed utilizing multivariate regression and receiver operating characteristic (ROC) analysis.

RESULTS:

A total of 172 unilateral TKA patients (2.4%) received a perioperative transfusion, with 170 (2.3%) receiving postoperative transfusions and two (0.03%) receiving intraoperative transfusions. Twenty-six bilateral TKA patients (8.5%) received a postoperative transfusion with no documented intraoperative transfusions. Univariate analysis demonstrated that older patients, patients with ASA class >II, patients with lower preoperative Hgb levels and patients with greater estimated blood loss (EBL) were at increased risk of transfusion. For unilateral TKA, risk of transfusion demonstrated an inverse correlation with preoperative Hgb levels, a bimodal association with BMI and a direct correlation with ASA class and EBL on multivariate testing. ROC analysis demonstrated an optimal Hgb cutoff of 12.1 g/dL (AUC 72.4%, 95% CI 68.3%-76.5%) for predicting transfusion following TKA. Overall transfusion rate below a preoperative Hgb of 12.1 g/dL was 6.6%, compared to a rate of 1.4% above this threshold. Below 11 g/dL, transfusion rates were high at 11.1%, while between 11 and 12 g/dL, perioperative transfusion rate was 4.6%.

DISCUSSION AND CONCLUSION:

Blood transfusion is rare in unilateral TKA when preoperative Hgb is >12.1 g/dL, challenging the need for universal T&S. Conversely, patients with Hgb <11.0 g/dL and bilateral TKA patients remain at substantial risk for transfusion. Between Hgb 11 and 12 g/dL, patient demographics and EBL may help predict transfusion risk and need for T&S.