The Bloody Truth: Preoperative Anemia Associated with Infection following Total Knee Arthroplasty

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INTRODUCTION:

Patient optimization prior to total knee arthroplasty (TKA) has been shown to minimize postoperative complications and decrease readmissions. During presurgical testing, patients are often found to have preexisting anemia. Although this is a manageable medical condition, anemia may play a role as a risk factor for complications following TKA. The objective of this study is to evaluate whether anemia plays a role in the development of infection or readmission following TKA.

METHODS:

A prospectively collected institutional database from a multicenter healthcare system was queried with ICD-10 codes and manually reviewed for all patients undergoing primary TKA between March 2020 and December 2020. Patient demographics, comorbidities, and infection data were collected. Univariate and multivariate analyses were performed to compare patients with and without a preoperative diagnosis of anemia. Anemia was defined as hemoglobin less than 13.5g/100mL in men and less than 12.5g/100mL in women. Periprosthetic joint infections (PJIs) were defined based on MSIS criteria, and superficial surgical site infections (SSIs) were defined as any infection that did not meet MSIS criteria.

RESULTS:

Of the 2,511 patients that underwent TKA, 338 patients were diagnosed with preoperative anemia (13.5%). Univariate analysis showed that patients with anemia were 3.0x more likely to develop an infection (p=0.02), and 3.4x more likely to be readmitted to the hospital (p<0.001). Multivariate analysis demonstrated that those with anemia were 3.2x more likely to develop an infection (p=0.03).

DISCUSSION AND CONCLUSION:

Our study demonstrates that patients with anemia are at an increased risk of infection and readmission following TKA. The decision for preoperative blood transfusion must be considered carefully in patients with anemia to mitigate these risks. Due to the variety of conditions that can cause anemia, surgeons and hematologists must retain an open line of communication to determine the goal threshold of preoperative hemoglobin to successfully optimize these patients.

Table 1. Univariate analysis of demographics and comorbidities

	Infection (*n* = 19)	No Infection (*n* = 2,492)	*p*-value
Age (years)	63.0 ± 7.2	66.8 ± 9.0	0.07
BMI (kg/m²)	31.8 ± 6.3	32.2 ± 6.4	0.78
Sex Male Female	11 (58%) 8 (42%)	924 (37.1%) 1,568 (62.9%)	0.06
Obesity	6 (31.5%)	808 (32.4%)	0.94
Anemia	6 (31.5%)	332 (13.2%)	**0.02**
Renal Failure	1 (5.3%)	183 (7.3%)	0.59
Malnutrition	1 (5.3%)	6 (0.2%)	**0.05**
Diabetes	2 (10.6%)	462 (18.5%)	0.29
MI	0 (0.0%)	23 (0.9%)	0.67
PVD	0 (0.0%)	28 (1.1%)	0.64
CVA	0 (0.0%)	32 (1.3%)	0.62
CKD	0 (0.0%)	20 (0.8%)	0.70
COPD	0 (0.0%)	57 (2.3%)	0.51
Peptic Ulcer Disease	0 (0.0%)	18 (0.7%)	0.71
Rheumatoid Arthritis	0 (0.0%)	56 (2.2%)	0.51
Smoking	8 (42.1)	787 (31.6%)	0.33
Anxiety	6 (31.6%)	293 (11.8%)	**0.01**
Depression	5 (26.3%)	252 (10.1%)	**0.02**
ESRD	0 (0.0%)	3 (0.1%)	0.88
Hypertension	12 (63.2%)	1,104 (44.3%)	0.10
Hyperlipidemia	10 (52.6%)	796 (31.9%)	**0.05**
Preoperative COVID	0 (0.0%)	29 (0.9%)	0.64
Postoperative COVID	0 (0.0%)	10 (0.3%)	0.78

Table 2. Univariate analysis of anemia.

Anemia	YES (n = 338)	NO (n = 2,173)	OR	95% CI	*p*-value
Infection overall	6 (1.8%)	13 (0.6%)	3.0	[1.13, 7.96]	**0.02**
Superficial surgical site infection	2 (0.6%)	3 (0.1%)	4.31	[0.72, 25.87]	0.14
Periprosthetic joint infection	3 (0.9%)	9 (0.4%)	2.15	[0.58, 8.0]	0.21
Hospital readmission	17 (5.0%)	33 (1.5%)	3.44	[1.89, 6.25]	**<0.001**

Table 3. Multivariate analysis for infection.

	OR	95% CI	*p*-value
Anemia	3.17	[1.13, 8.91]	**0.03**