

Evaluating the Impact of Anemia: Is this Patient Population at Increased Risk for Complications and Prolonged Hospital Stay following Patellofemoral Arthroplasty?

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INTRODUCTION: Anemia is considered a modifiable risk factor in arthroplasty and has been shown to be associated with postoperative complications and mortality. Following primary total knee arthroplasty and revision total knee arthroplasty, anemia has been shown to increase the risk of mortality, pulmonary, cardiac, renal, urinary tract infections, bleeding requiring transfusion, extended length of stay, and reoperation. Patellofemoral arthroplasty (PFA) is a treatment option for isolated patellofemoral osteoarthritis. Since isolated patellofemoral arthritis is relatively uncommon, the existing literature surrounding PFA remains limited. To date, anemia's effects on outcomes following PFA has yet to be elucidated. Therefore, the purpose of this study is to evaluate the clinical impact of anemia on outcomes following PFA.

METHODS:

Current procedural terminology (CPT) code 27438 was utilized to identify patients undergoing PFA in the National Surgical Quality Improvement Program (NSQIP) database from the years 2007 to 2019. Based on World Health Organization definitions of anemia, these patients were categorized into 2 cohorts: non-anemia (hematocrit >36% for women, > 39% for men) and anemia (hematocrit \leq 36% for women, \leq 39% for men). In this analysis, baseline demographics and comorbidities were compared between the 2 cohorts. Postoperative outcomes assessed included superficial surgical site infections, deep surgical site infections, organ space infections, wound dehiscence, pneumonia, unplanned reintubation, pulmonary embolism, urinary tract infection, renal failure, blood transfusion requirement, deep vein thrombosis, sepsis, myocardial infarction, extended length of hospital stay greater than 3 days, readmission, reoperation, and mortality. Bivariate and multivariate analyses were performed with significance set at a P-value < 0.05.

RESULTS: In total, 1,506 patients underwent PFA and had their hematocrit levels recorded. A total of 1,314 patients (87.3%) did not have anemia and 192 (12.7%) were anemic. Compared to patients without anemia, anemic patients were more likely to be older (P = 0.013), Black (P < 0.001), and have an American Society of Anesthesiologists classification of III or IV (P = 0.047) (Table 1). Patients with anemia were also more likely to have hypertension (P < 0.001), diabetes (P < 0.001), and require preoperative transfusion (P = 0.009) (Table 2). Following adjustment on multivariable regression analysis to control for the baseline differences in demographics and comorbidities between the 2 cohorts, anemic patients had an increased risk of bleeding requiring transfusion (Odds ratio [OR] 3.93; P < 0.001), extended length of stay (OR 1.55; P = 0.023), hospital readmission (OR 2.48; P = 0.034), and reoperation (OR 3.12; P = 0.011) compared to those who did not have anemia (Table 3).

DISCUSSION AND CONCLUSION: Our study showed the increased odds of complications for anemic patients following PFA. Although PFA remains a relatively infrequent procedure due to the fact that isolated patellofemoral arthritis is fairly uncommon, surgeons should be cognizant of anemic patients and their increased risk of postoperative complication development following this surgical procedure. Specifically, the increased risk of prolonged hospital stay, readmission, and reoperation in this patient population can have substantial healthcare expenditure for both the hospital and the patient. By involving a multidisciplinary team preoperatively and ensuring appropriate postoperative care, patient outcomes can be optimized, which can reduce the financial burden for all parties involved.

Table 1. Baseline Demographics and Clinical Characteristics Among Patelofemoral Arthroplasty Patients

Demographics	Not Anemic	Anemia	P-value*
Total patients, n	1,314	392	
Sex, n (%)			0.258 [†]
Female	869 (66.1)	119 (30.2)	
Male	445 (33.9)	173 (43.8)	
Race, n (%)			<0.001 [†]
White	944 (61.3)	124 (31.8)	
Black	113 (8.7)	42 (10.9)	
Hispanic	89 (6.9)	13 (3.4)	
Native American	1 (0.1)	4 (1.0)	
Asian	22 (1.7)	1 (0.3)	
Native Hawaiian	1 (0.1)	0 (0.0)	
ASA, n (%)			0.047 [†]
I or II	694 (53.0)	17 (4.3)	
III or IV	616 (47.0)	101 (25.7)	
Smoker, n (%)	12 (0.9)	25 (6.4)	0.929 [†]
Dependent functional status, n (%)	21 (1.6)	6 (1.5)	0.155 [†]
Mean age, yrs (SD)	62.47 (12.19)	64.81 (12.48)	0.013 ^{**}
Mean BMI (SD)	32.37 (7.42)	33.00 (7.77)	0.234 ^{**}

*Pearson's chi-squared test

[†]Analysis of variance

^{**}Holding z-squash significance p<0.05

ASA, American Society of Anesthesiologists; SD, standard deviation; BMI, body mass index.

Table 2. Comorbidities and Intraoperative Variables Among Patelofemoral Arthroplasty Patients

Comorbidities	Not Anemic	Anemia	P-value*
Total patients, n	1,314	392	
COPD, n (%)	37 (2.8)	8 (4.2)	0.304
CHF, n (%)	3 (0.2)	1 (0.3)	0.462
Hypertension, n (%)	771 (58.7)	138 (35.2)	<0.001
Diabetes, n (%)	1 (0.1)	0 (0.0)	0.702
Diabetes mellitus, n (%)	203 (15.6)	54 (13.8)	<0.001
Weight loss, n (%)	3 (0.2)	1 (0.3)	0.462
Stroke, n (%)	29 (2.2)	6 (1.5)	0.304
Bleeding disorder, n (%)	21 (1.6)	2 (1.0)	0.557
Preoperative transfusion, n (%)	0 (0.0)	1 (0.3)	0.009
Diapers, n (%)			0.728
Moderate exertion	42 (3.2)	8 (4.2)	
At rest	1 (0.1)	0 (0.0)	
Anesthesia type, n (%)			0.228
General	459 (35.3)	100 (25.5)	
Neuraxial	527 (40.3)	96 (24.5)	
Regional	41 (3.1)	7 (1.8)	
MAC	48 (3.6)	1 (0.3)	

*Pearson's chi-squared test

[†]Holding z-squash significance p<0.05

COPD, chronic obstructive pulmonary disease; CHF, congestive heart failure; MAC, monitored anesthetic care.

Table 3. Multivariate Analysis of Postoperative Complications of Patients Following Patelofemoral Arthroplasty

Complication	Anemia Versus Not Anemia	Odds Ratio	95% CI	P-Value
Transfusion Requirement (≥3 days)	3,930	2,512	6,150	<0.001
Extended Length of Stay	1,952	1,063	2,204	0.023
Reoperation	2,476	1,073	5,714	0.034
Readmission	3,120	1,304	7,463	0.011

Holding z-squash significance p<0.05

CI, confidence interval.