

Preoperative Labs as a Predictor of PJI in Morbidly Obese Patients Undergoing TJA

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INTRODUCTION: Obesity is a global public health crisis that represents a unique challenge for arthroplasty surgeons. Certain preoperative labs, such as low albumin and hemoglobin, have previously been identified as risk factors for PJI. Our study's aim is to identify preoperative lab values that may serve as predictors of PJI amongst total hip (THA) and total knee arthroplasty (TKA) patients with a body mass index (BMI) ≥ 40 kg/m².

METHODS: Using the Premier Healthcare Database, all patients with a BMI ≥ 40 who underwent primary elective TKA or THA with preoperative labs were identified. Demographics and comorbidities were compared between the patients who developed a PJI and those who had a PJI-free postoperative course using T-tests and Chi-square analysis. Various preoperative lab values were identified, including neutrophil, monocyte, total lymphocyte count, leukocyte, neutrophil-lymphocyte ratio (NLR), monocyte-lymphocyte ratio (MLR), platelet-lymphocyte ratio (PLR), systemic immune-inflammation index (SII), platelet, albumin, albumin-globulin ratio (A/G ratio), hemoglobin, and hemoglobin A1C (HgbA1C). These lab values were individually categorized using predefined clinical thresholds supported by clinical guidelines or medical literature. Univariate regression was performed to look at the association between individual lab values and PJI. A multivariable model was then created and performance was assessed using the area under the curve (AUC), AIC, and BIC.

RESULTS: In total, 6,780 arthroplasty patients were identified of which 76.67% were TKA and 23.33% were THA. Of these patients, 47 developed PJI within 90 days of TKA or THA. Using univariate logistic regression, total lymphocyte count (TLC <1,500, OR: 0.43, 95%-CI: 0.21-0.90, p=0.024), NLR (NLR>3.31, OR: 2.40, 95%-CI: 1.13-5.11, p=0.023), PLR (PLR>182.30, OR: 4.12, 95%-CI: 2.02-8.39, p<0.001), SII (SII>776.20, OR: 2.49, 95%-CI: 1.20-5.17, p=0.014), platelet (Plt<150,000 or >400,00, OR: 2.92, 95%-CI: 1.29-6.59, p=0.01), and hemoglobin (Hgb<12 for female and <13 for male, OR: 0.37, 95%-CI: 0.20-0.72 p= 0.003) were significantly associated with PJI. Our final multivariable model showed a significant association between PJI development and preoperative PLR (aOR: 4.80, 95%-CI: 2.12-10.89, p<0.001), NLR (aOR: 2.32, 95%-CI: 1.01-5.32, p= 0.047), and hemoglobin (aOR: 0.41, 95%-CI: 0.17-0.97, p= 0.043). SII approached significance as well (aOR: 2.23, 95%-CI: 0.99-5.01, p= 0.053).

DISCUSSION: This study identifies preoperative labs that may help risk-stratify BMI ≥ 40 patients based on PJI risk. Elevated PLR and NLR, and decreased hemoglobin were found to be significantly associated with PJI amongst patients with a BMI ≥ 40 kg/m². Patients with a clinically defined elevated PLR were found to have a 4-fold increased risk of developing PJI compared to patients who had a normal PLR. Similarly, patients had an approximately 2.3-fold increased risk of PJI if they had clinically elevated NLR and an increased risk of PJI if they were anemic. Limitations of this study include its retrospective nature and a small sample size of PJI patients.

SIGNIFICANCE/CLINICAL RELEVANCE: Morbidly obese patients represent a unique challenge to arthroplasty surgeons due to the heightened risk of postoperative complications, one of the most feared being PJI.

TABLES:

Lab Value	Clinical Threshold	No PJI	PJI	Univariate Regression			Multivariate Regression		
		% of N with Lab Value meeting Clinical threshold	% of N with Lab Value meeting Clinical Threshold	OR	P-Value	95%-CI	aOR	P-Value	95%-CI
Neutrophil	>7,000 (high)	8.89%	10.34%	1.18	0.78	0.36-3.92	N/A	N/A	N/A
Monocyte	>800 (high)	17.84%	16.13%	0.89	0.80	0.34-2.31	N/A	N/A	N/A
Lymphocyte	<1500 (low)	24.70%	45.16%	0.43	0.024	0.21-0.90	0.52	0.12	0.22-1.20
Leukocyte	>11,000 (high)	6.99%	6.82%	0.97	0.96	0.30-3.15	N/A	N/A	N/A
NLR	>3.31 (high)	20.27%	37.93%	2.40	0.023	1.13-5.11	2.32	0.047	1.01-5.32
MLR	>.38 (high)	27.01%	35.48%	1.49	0.29	0.71-3.11	N/A	N/A	N/A
PLR	>182.3 (high)	16.66%	45.16%	4.12	0.00	2.02-8.39	4.80	0.00	2.12-10.89
SII	>776.2 (high)	27.26%	48.28%	2.49	0.014	1.20-5.17	2.23	0.053	0.99-5.01
PLT	<150,000 or >400,000	6.09%	15.91%	2.92	0.01	1.29-6.59	2.44	0.12	0.79-7.55
Albumin	<3.5 (low)	10.90%	18.75%	0.53	0.18	0.22-1.30	N/A	N/A	N/A
A/G ratio	<1 (low)	23.31%	36.00%	0.54	0.14	0.24-1.23	N/A	N/A	N/A
Hemoglobin	<12 for female <13 for male (low)	16.27%	34.15%	0.37	0.003	0.20-0.72	0.41	0.043	0.17-0.97
HgbA1c	>7.7 (high)	7.98%	13.33%	1.77	0.45	0.40-7.95	N/A	N/A	N/A