

Neuraxial Anesthesia Has Lower Risk of Reoperation After Total Knee Arthroplasty

David H Mai, ABDULLAH UDDIN, Bruce Zhang<sup>1</sup>, Tanveer Singh, Peter K Twining, Lara Passfall<sup>2</sup>, Jack Jing Zhou, Qais Naziri<sup>3</sup>, Aditya V Maheshwari<sup>4</sup>

<sup>1</sup>SUNY Downstate, <sup>2</sup>NYU Langone Orthopedic Hospital, <sup>3</sup>SUNY DOWNSTATE MEDICAL CENTER, <sup>4</sup>SUNY Downstate Medical Center

INTRODUCTION:

Total knee arthroplasty is among the most common surgical procedures performed in the United States. Reoperation is both a burden to the patient and healthcare system. This study sought to assess the relationship between neuraxial anesthesia (NA) on 30-day reoperation among patients who underwent primary total knee arthroplasty (TKA).

METHODS:

A retrospective cohort study was performed using the National Surgical Quality Improvement Program (NSQIP) database of primary TKA occurring between 2012 and 2020. The primary exposure was anesthesia modality (NA versus general anesthesia [GA]). NA was defined as epidural or spinal anesthesia. The primary outcome was reoperation within 30 days of surgical admission. Potential confounders included basic demographics (age, sex, race, ethnicity), baseline health status (preoperative functional status, ASA classification, BMI, smoking, diabetes, chronic immunosuppression), and procedure characteristics (admission source, procedural setting, operative time, and wound classification). Univariate analyses were performed to assess for differences between cohorts. Multivariable regression analysis that adjusted for confounding was performed to identify the risk of anesthesia modality on 30-day reoperation following TKA.

RESULTS:

Over the study period, there were 370,361 cases of TKA, of which 178,384 (48.16%) received NA. Many patients in both cohorts had age 65-74 years, female sex, White race, non-Hispanic ethnicity, independent functional status, obesity, no smoking, no diabetes, no chronic immunosuppression, admission from home, and inpatient setting. In contrast, a higher proportion of patients who received NA versus GA had ASA class 3 versus 2, respectively. On multivariable regression analysis, patients who received NA versus GA had 0.90 times lower odds (95% CI 0.83 to 0.96; *p*=0.003) of reoperation within 30 days following TKA.

DISCUSSION AND CONCLUSION:

Compared to patients who received GA, those who received NA for TKA had a lower risk of 30-day reoperation following surgery. Further research into ideal candidates for nexuraxial anesthesia may optimize outcomes and reduce reoperations.

Table 1: Univariate Analysis of Patients Undergoing Total Knee Arthroplasty with Neuraxial or General Anesthesia

	Neuraxial N = 178384 (48.16%)	General N = 191977 (51.83%)	p-value <sup>a</sup>
Age Group			<0.001
18-44	16,277 (9.1%)	21,218 (11.1%)	
45-64	50,919 (28.5%)	58,764 (30.6%)	
65-74	72,040 (40.4%)	72,988 (38.0%)	
75-84	36,114 (20.2%)	34,691 (18.1%)	
85	5,014 (2.8%)	4,329 (2.3%)	
Sex			0.003
Female	109,176 (61%)	118,422 (62%)	
Male	69,208 (39%)	73,555 (38%)	
Race			<0.001
White	118,819 (66%)	152,568 (80%)	
American Indian or Alaska Native	228 (0.1%)	1,257 (0.7%)	
Asian	4,367 (2.4%)	3,891 (2.0%)	
Black or African American	10,482 (5.9%)	15,541 (8.1%)	
Native Hawaiian or Pacific Islander	568 (0.3%)	657 (0.3%)	
Other	22 (<0.1%)	10 (<0.1%)	
Ethnicity			<0.001
Non-Hispanic	126,763 (71%)	163,144 (85%)	
Hispanic	4,127 (2.3%)	13,987 (7.3%)	
Unknown	41,753 (23.4%)	15,539 (8.2%)	
Functional Status Prior to Surgery			<0.001
Dependent	1,541 (0.9%)	2,586 (1.4%)	
Independent	176,843 (99%)	189,383 (99%)	
ASA Classification			<0.001
1-No Fracture	7,491 (4.2%)	4,918 (2.6%)	
2-Mild Disrupt	85,874 (48%)	91,351 (48%)	
3-Severe Disrupt	99,707 (56%)	79,744 (42%)	
4-3 Life Threat/Moribund	3,567 (2.0%)	2,409 (1.2%)	
BMI Category			<0.001
Normal	17,813 (10.0%)	16,177 (8.4%)	
Obese	108,842 (61%)	126,519 (66%)	
Overweight	50,540 (28%)	48,644 (25%)	
Underweight	1,189 (0.7%)	920 (0.5%)	
Smoking Status			<0.001
Diabetes			<0.001
No	147,862 (83%)	154,669 (81%)	
Insulin	7,099 (4.0%)	9,271 (4.8%)	
Non-Insulin	23,513 (13%)	28,037 (15%)	
Immunosuppressive Therapy			<0.001
None	5,793 (3.2%)	7,306 (3.8%)	
Admission Origin			<0.001
Home	177,557 (100%)	191,129 (100%)	
Institution	385 (0.2%)	657 (0.3%)	
Setting			<0.001
Inpatient	154,569 (87%)	172,989 (90%)	
Outpatient	23,815 (13%)	18,907 (10%)	
Operative Time in Minutes Mean (SD)	88 (24)	96 (40)	<0.001
Wound Classification			<0.001
1-Clean	177,229 (100%)	190,919 (99%)	
2-Clean/Contaminated	596 (0.3%)	761 (0.4%)	
3-Contaminated	190 (<0.1%)	154 (<0.1%)	
4-Dirty/Infected	45 (<0.1%)	142 (<0.1%)	
Reoperation	1,493 (0.8%)	2,866 (1.5%)	<0.001

<sup>a</sup>Fisher's Chi-Squared Test; Fisher's Exact Test; Wilcoxon Rank-Sum Test

Table 2: Adjusted Multivariable Regression of Neuraxial Anesthesia and Reoperation

	OR <sup>a</sup>	95% CI <sup>b</sup>	p-value
General	---	---	
Neuraxial	0.90	0.83-0.96	0.003

<sup>a</sup>Odds Ratio    <sup>b</sup> Confidence Interval