Risk Factors for Perioperative Nerve Injury Related to Total Knee Arthroplasty

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INTRODUCTION:

While Total Knee Arthroplasty (TKA) is widely considered a reliable surgical intervention, the potential for nerve injury exists, which could result in significant patient distress and legal repercussions. Previous studies that investigated risk factors for nerve injury during TKA have been constrained by the scope of institutional records or limited cohort sizes. This current study aims to utilize a large, nationwide database to identify distinct risk factors associated with perioperative nerve injury related to TKA.

METHODS:

The PearlDiver 2020 to 2021 M161 database was analyzed to examine cases of adult TKA. Our institutional review board (IRB) deemed research using this dataset exempt from review. Cases of nerve injury documented within 90 days following TKA were identified. Factors such as patient age, sex, body mass index (BMI), Elixhauser Comorbidity Index (ECI), fracture indication, and type of surgery (primary or revision case) were evaluated for their association with nerve injury using multivariate analysis.

RESULTS:

From a cohort of 1,513,308 TKA cases, nerve injury was identified for 4,329 (0.29%). Independent risk factors for nerve injury, arranged by descending odds ratio (OR), were identified through multivariate analysis as: revision procedure (OR: 1.71), female sex (OR: 1.31), ECI ≥ 5 (OR: 1.25), and younger age (OR: 1.02 per decade decrease) ($p<0.05$ for each). Pertinent negatives for associations with nerve injury by multivariate analysis included underweight BMI (<20), and fracture indication. Individuals with a morbidly obese BMI status (≥35) had a decreased risk of nerve injury (OR: 0.81, $p=0.003$).

DISCUSSION:

Nerve injury following TKA was found to be low at 0.29%. Independent factors associated with this adverse outcome were defined, with revision procedures presenting the greatest risk. While postoperative outcomes vary based on individual clinical situations, these identified risk factors may be helpful for risk stratification and patient counselling.

SIGNIFIANCE/CLINICAL RELEVANCE:

The considerable patient numbers in this current analysis of a large national administrative database affords greater statistical power to further examine risk factors for nerve injury after TKA. These risk factors, derived from the largest cohort to date, can inform clinical decision making and enhance patient safety.

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IMAGES AND TABLES:

Table 1: Univariate and Multivariate analysis of risk factors for nerve injury 90-days after TKA

Variable	No Nerve Injury	%	Nerve Injury	%	p-value	Multivariate Odds Ratio with 95% CI		p-value
Total	1,513,308	99.71	4,329	0.29				
Age (Per Decade Decrease)	65.88 ± 8.72		64.45 ± 8.67		**<0.001**	1.02	(1.02, 1.02)	**<0.001**
Sex					**<0.001**			
Male	562,885	37.20	1,327	30.65		REF		
Female	950,420	62.80	3,002	69.35		1.31	(1.23, 1.40)	**<0.001**
BMI					**<0.001**			
< 20	15,504	1.02	63	1.46		1.01	(0.70, 1.40)	0.973
20-34	65,922	4.36	238	5.5		REF		
≥ 35 (Morbid Obesity)	510,246	33.72	1,696	39.18		0.81	(0.71, 0.93)	**0.003**
ECI								
0	126,308	8.35	312	7.21		REF		
1-2	367,789	24.30	992	22.92		1.09	(0.96, 1.24)	0.183
3-4	402,848	26.62	1,112	25.69		1.09	(0.96, 1.24)	0.170
>=5	157,398	10.40	502	11.6		1.25	(1.08, 1.44)	**0.003**
Fracture Indication					**<0.001**			0.082
No Fracture	1,492,859	98.65	4,245	98.06		REF		
Fracture	20,449	1.35	84	1.94		1.21	(0.97, 1.50)	
Revision Surgery					**<0.001**			**<0.001**
Non-Revision Case	1,393,446	92.08	3,748	86.58		REF		
Revision Case	119,862	7.92	581	13.42		1.71	(1.56, 1.86)	

BMI, Body Mass Index
ECI, Elixhauser Comorbidity Index
Bold p-value = statistical significance at p<0.05

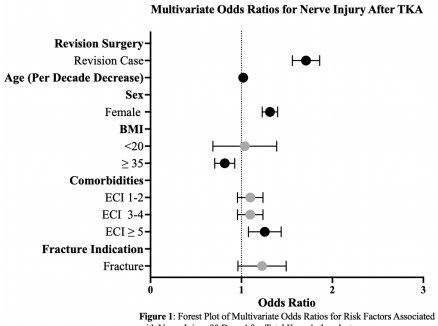

Figure 1: Forest Plot of Multivariate Odds Ratios for Risk Factors Associated with Nerve Injury 90 Days After Total Knee Arthroplasty