Influenza Infection has Higher Risk of Postoperative Complications Compared to COVID-19 in Total Knee Arthroplasty Patients

Majd Marrache[1], Jad Jack Lawand[2], Anirudh Buddhiraju[3], Vishal Hegde, Harpal Singh Khanuja
[1]Johns Hopkins Medical Institute, [2]University of Texas Medical Branch, [3]The Johns Hopkins University School of Medicine

INTRODUCTION:

Several studies have highlighted the negative impact of COVID-19 on postoperative outcomes following total knee arthroplasty (TKA). However, recent literature indicates a substantial decrease in mortality and complications associated with COVID-19 infections, attributed to changes in the virus, improvements in clinical care, and increased population immunity. Our study aimed to compare the clinical outcomes of patients undergoing TKA who contract influenza to those who contract COVID-19.

METHODS:

The TrinetX research network was utilized to identify patients who underwent primary total knee arthroplasty (TKA) from January 2020 to March 2024, across 89 organizations. Two comparison groups were formed based on whether they acquired a viral infection either 30 days before or after the index THA. These groups included patients who contracted Influenza and those who contracted COVID-19. To ensure comparability, a 1:1 propensity score matching was conducted, accounting for demographic and comorbidity differences between the groups shown in Table 1. The study analyzed 90-day medical and implant complications

RESULTS:

The Influenza and COVID-19 cohorts comprised 3,979 and 5,379 patients, respectively. 3,890 matched pairs of patients were included from each cohort as shown in Table 1. Compared to COVID-19 patients, Patients who contracted Influenza in the perioperative time period had significantly higher risk of Sepsis (2.9 vs 1.2%, p<0.001), Myocardial infarction (1.6 vs 0.6%, p<0.001), Pulmonary embolism (3.0 vs 1.0%, p<0.001), Liver failure (2.6 vs 1.1%, p<0.001), deep vein thrombosis (2.0% vs 1.0%),wound complications (2.2 vs 1.3% p=0.002) and all cause revision surgery (1.6 vs 1.0%, p=0.02). There was no significant difference in rate of periprosthetic fracture, arthrofibrosis and osteolysis. The full list of analysis is available in Tables 2 and 3.

DISCUSSION AND CONCLUSION:

This study demonstrated significantly higher risk of postoperative complications among TKA patients who contract Influenza in the perioperative period compared to those who contract COVID-19. Although our focus has substantially shifted towards management and prevention of COVID-19 over the past several years, the findings of this study underscore the need for heightened vigilance regarding influenza infection in TKA patients.

Table 1: Demographic Characteristics Before and After 1:1 Propensity Matching in Patients with COVID-19 vs. Influenza Within 30 Days of Total Knee Arthroplasty

Demographic Characteristics Pre and Post 1:1 Propensity Matching

Variable	Cohort	Unmatched Patients (Mean ± SD)	% of Cohort Unmatched	P-Value	Matched Patients (Mean ± SD)	% of Matched Cohort	P-Value
Age at Index	Influenza	3979 (68.0 ± 10.7)	100%	<0.001	3890 (68.1 ± 10.5)	100%	0.203
	Covid19	5379 (68.7 ± 9.5)	100%		3890 (68.4 ± 9.9)	100%	
White	Influenza	3,027	76.10%	0.255	2,999	77.1%	0.265
	Covid19	4,037	75.10%		3,040	78.1%	
Unknown Race	Influenza	349	8.80%	<0.001	288	7.4%	0.931
	Covid19	335	6.20%		286	7.4%	
Female	Influenza	2,259	56.80%	0.001	2,246	57.7%	0.909
	Covid19	3,236	60.20%		2,251	57.9%	
Not Hispanic or Latino	Influenza	3,194	80.30%	0.027	3,171	81.5%	0.393
	Covid19	4,415	82.10%		3,200	82.3%	
Hispanic or Latino	Influenza	260	6.5%	0.624	256	6.6%	0.82
	Covid19	338	6.3%		261	6.7%	
Black or African American	Influenza	330	8.3%	0.001	330	8.5%	0.484
	Covid19	559	10.4%		313	8.00%	
Male	Influenza	1,487	37.40%	0.395	1,472	37.80%	0.87
	Covid19	1,964	36.50%		1,465	37.70%	
Asian	Influenza	103	2.60%	0.002	103	2.60%	0.667
	Covid19	201	3.70%		97	2.50%	
Co-Morbidities Data							
Hypertensive diseases	Influenza	2,854	71.20%	<0.001	2,689	70.40%	0.158
	Covid19	3,582	66.60%		2,745	71.80%	
Diabetes mellitus	Influenza	1,202	30.20%	<0.001	1,100	28.80%	0.82
	Covid19	1,288	23.90%		1,091	28.60%	
Osteoporosis without current pathological fracture	Influenza	507	12.70%	0.125	470	12.30%	0.755
	Covid19	629	11.70%		479	12.50%	
Osteoporosis with current pathological fracture	Influenza	51	1.30%	0.035	41	1.10%	0.826
	Covid19	45	0.80%		43	1.10%	
Other diseases of liver	Influenza	467	11.70%	0.005	415	10.90%	0.798
	Covid19	534	9.90%		422	11.00%	
Heart failure	Influenza	467	11.70%	<0.001	396	10.40%	0.763
	Covid19	428	8.00%		388	10.20%	
Chronic kidney disease (CKD)	Influenza	665	16.70%	<0.001	591	15.50%	0.727

Table 2: Medical Complications Within 30 Days of Surgery in Patients Diagnosed with Influenza or COVID-19

Medical Complications							
Complication	Cohort	Number of patients	Number of Outcomes	% Outcomes	Risk Ratio	95% CI	P-value
Sepsis	Influenza	3,821	109	2.90%	2.37	(1.684, 3.335)	<0.001
	COVID19	3,821	46	1.20%			
MI	Influenza	3,821	62	1.60%	2.70	(1.674, 4.341)	<0.001
	COVID19	3,821	23	0.60%			
Liver Failure	Influenza	3,890	102	2.60%	2.37	(1.666, 3.378)	<0.001
	COVID19	3,890	43	1.10%			
Stroke	Influenza	3,821	41	1.10%	1.66	(0.650, 1.538)	1.00
	COVID19	3,821	41	1.10%			
DVT	Influenza	3,821	73	1.90%	1.66	(1.144, 2.405)	<0.001
	COVID19	3,821	44	1.20%			
PE	Influenza	3,821	113	3.00%	3.05	(2.113, 4.415)	<0.001
	COVID19	3,821	37	1.00%			
Infection	Influenza	3,821	54	1.40%	1.32	(0.880, 1.972)	0.18
	COVID19	3,821	41	1.10%			
Wound disruption	Influenza	3,821	82	2.10%	1.55	(1.098, 2.179)	0.01
	COVID19	3,821	53	1.40%			

Table 3: Mechanical Complications Within 30 Days of Surgery in Patients Diagnosed with Influenza or COVID-19

Mechanical Complications							
Complication	Cohort	Number of patients	Number of Outcomes	% Outcomes	Risk Ratio	95% CI	P-Value
Periprosthetic Fracture	Influenza	3,781	16	0.40%	0.89	(0.454, 1.741)	0.73
	COVID19	3,783	18	0.50%			
PJI	Influenza	3,702	61	0.016	1.43	(0.973, 2.112)	0.07
	COVID19	3,741	43	0.011			
Revision TKA	Influenza	3,748	60	0.016	1.63	(1.084, 2.446)	0.02
	COVID19	3,763	37	0.01			
TKA Arthrofibrosis	Influenza	3,692	177	0.048	0.94	(0.767, 1.144)	0.52
	COVID19	3,692	189	0.051			