

# Outcomes of Primary Total Joint Arthroplasty In Patients With A History of Solid Organ Transplantation, A Single Institution Analysis

Paul Alvarez, Christian Curatolo, Miraj Desai, Azeem Tariq Malik, Matthew Pigott<sup>1</sup>

<sup>1</sup>The Ohio State University Wexner Medical Center

**INTRODUCTION:** Over the last 60 years, the field of solid organ transplantation (SOT) has seen tremendous advances in surgical technique, post-operative patient survival, graft survival, and immunosuppressive therapy regimens. Due to the increase in patient survival and effectiveness of immunosuppressive medications, there is likely to be an increase in the number of patients with a history of SOT presenting for total joint arthroplasty (TJA) as a result of degenerative joint disease (DJD) or avascular necrosis. Given the need for patients with history of SOT to take a regimen of immunosuppressive medications during the peri-operative period, there has been continued concern for adverse outcomes following primary TJA in this patient population due to a theoretical increased risk of infection and wound complications. The primary aim of this study is to evaluate clinical outcomes after primary total joint arthroplasty in patients with a history of SOT compared to matched controls.

**METHODS:** We performed a review of prospectively collected data on consecutive adult patients with a history of SOT undergoing TJA from January 2014 to January 2021. Pearson-Chi square tests were used to compare differences in baseline demographics and clinical characteristics between SOT and matched controls. Multi-variate logistic regression analyses were used to assess whether patients who had a prior SOT were at higher risk of experiencing post-operative complications, readmissions, reoperations, longer length of stay and non-home discharges after primary TJA. Results from logistic regression analyses have been reported as adjusted odds ratios (OR), along with 95% confidence intervals (CI) and p-values. For all statistical purposes, a p-value of less than 0.05 was considered statistically significant.

**RESULTS:** A total of 81 operations met inclusion criteria which were compared to 82 age matched controls without a history of SOT. The most common cause for primary TJA within the control group was DJD which composed of 71 (86.6%) patients, which was statistically significant compared to the group of patients with a history of SOT ( $p < 0.001$ ). Seventy-two (87.8%) patients within the control group had a CCI of 0-4 and 50 (61.0%) patients had a ASA score of  $> II$  which were both statistically significant compared to the group of patients with a history of SOT ( $p < 0.001$ ). Patients with a history of SOT were more likely to require a hospitalization greater than 2 days compared to the control group ( $n=63$ , 77.8% vs.  $n=16$ , 19.5%;  $p=0.011$ ), had an increased risk of hyperkalemia ( $n=15$ , 18.5% vs.  $n=1$ , 1.2%;  $p=0.049$ ), and any post-operative complication ( $n=55$ , 67.9% vs.  $n=21$ , 25.6%;  $p=0.025$ ). There was no statistically significant difference in either 30 or 90-day readmission rates or 90-day mortality between patients with a history of SOT and the control group after SOT.

**DISCUSSION AND CONCLUSION:** Patients with a history of SOT had an increased risk of experiencing hyperkalemia in the early post-operative period, longer inpatient hospital stays and non-home discharges after primary TJA when compared to patients without a history of SOT. Having a history of SOT and taking immunosuppressive medications did not increase the risk of PJI, 90-day readmission, nor 90-day mortality when compared to patients without a history of SOT. A multidisciplinary approach should be used when caring for patients with a history of SOT after primary TJA to appropriately monitor and treat various post-operative complications including electrolyte derangements and acute kidney injury which can be more prevalent in this population. Despite the increased risk of acute post-operative complications and longer hospital stays, primary TJA has been shown to be a safe and effective option for treatment of DJD or AVN in patients with a history of SOT when completed at a large tertiary care center.

	Solid Organ Transplant Patients	Control Group	P-Value
Total Number of Patients	68	77	-
Age, in years Mean [SD]	57.56 [11.59]	59.16 [9.66]	0.813
Gender			<b>0.010</b>
Male	49 (69.5%)	33 (40.2%)	
Female	32 (39.5%)	49 (59.8%)	
Race			0.125
White	56 (69.1%)	65 (79.3%)	
Asian	1 (1.2%)	0 (0%)	
Black/African-American	24 (29.6%)	15 (18.3%)	
Other	0 (0%)	2 (2.4%)	
BMI, in kg/m <sup>2</sup> Mean [SD]	31.35 [6.91]	32.95 [6.65]	0.582
Type of TJA			0.473
THA	47 (58.0%)	43 (52.4%)	
TKA	34 (42.0%)	39 (47.6%)	
Indication of TJA			<b>&lt;0.001</b>
DDD	45 (55.6%)	71 (86.6%)	
AVN	26 (32.1%)	2 (2.4%)	
Fracture	4 (4.9%)	1 (1.2%)	
Other	6 (7.4%)	8 (9.8%)	
Smoking			<b>0.028</b>
Never	35 (43.2%)	39 (47.6%)	
Former	46 (56.8%)	37 (45.1%)	
Current	0 (0%)	6 (7.3%)	
Charlson Comorbidity Index (CCI)			<b>&lt;0.001</b>
0-4	36 (44.4%)	72 (87.8%)	
>4	45 (55.6%)	10 (12.2%)	
ASA Grade			<b>&lt;0.001</b>
I-II	2 (2.5%)	31 (37.8%)	
>II	78 (96.3%)	50 (61.0%)	
Unknown	1 (1.2%)	1 (1.2%)	
Transplant Type			<b>&lt;0.001</b>
Renal	51 (63.0%)	0 (0%)	
Liver	5 (6.2%)	0 (0%)	
Heart	12 (14.8%)	0 (0%)	
Lung	9 (11.1%)	0 (0%)	
Other	4 (4.9%)	0 (0%)	
No. of transplant meds			<b>&lt;0.001</b>
Not transplant	0 (0%)	82 (100%)	
0-2	55 (67.9%)	0 (0%)	
>2	26 (32.1%)	0 (0%)	

**Table 1:** Baseline demographic and clinical characteristics between solid organ transplant (SOT) and control groups.

	Solid Organ Transplant Patients	Control Group	Adjusted OR [95% CI]	P-value
Any Complication	55 (67.9%)	21 (25.6%)	4.77 [1.22-18.65]	0.025
Acute coronary syndrome	3 (3.7%)	0 (0%)	--*	0.999
Atrial Fibrillation	9 (11.1%)	1 (1.2%)	--*	0.996
Anemia	17 (21.0%)	1 (1.2%)	--*	0.997
DVT	4 (4.9%)	1 (1.2%)	462.9 [0.04-∞]	0.201
PJI	2 (2.5%)	2 (2.4%)	--*	0.998
Fracture	0 (0%)	1 (1.2%)	--*	0.997
Urinary retention	13 (16.0%)	4 (4.9%)	3.05 [0.36-25.9]	0.308
UTI	5 (6.2%)	4 (4.9%)	--*	0.995
Fever	11 (13.6%)	2 (2.4%)	8.98 [0.39-206.1]	0.170
Dislocation	2 (2.5%)	1 (1.2%)	--*	1.000
AKI	30 (37.0%)	4 (4.9%)	4.90 [0.69-34.99]	0.113
Pneumonia	4 (4.9%)	0 (0%)	--*	0.994
Hyperkalemia	15 (18.5%)	1 (1.2%)	14.17 [1.01-198.6]	<b>0.049</b>
Hyponatremia	17 (21.0%)	8 (9.8%)	3.95 [0.67-23.25]	0.129
30-day readmission	14 (17.3%)	5 (6.1%)	0.95 [0.12-7.61]	0.964
90-day readmission	17 (21.0%)	6 (7.3%)	0.40 [0.05-3.13]	0.385
Length of stay >2 days	63 (77.8%)	16 (19.5%)	7.05 [1.57-31.71]	<b>0.011</b>
Need for additional surgery within 90 days	1 (1.2%)	8 (9.8%)	--*	0.998
90-day mortality	2 (2.5%)	0 (0%)	--*	0.995
Non-Home Discharge	32 (40.0%)	4 (4.9%)	4.39 [0.72-26.71]	0.108

**Table 2:** Adjusted post-operative outcomes between SOT and Non-SOT groups.