Robotic-Assisted Total Knee Arthroplasty is Associated with Improved Quality of Life and Increased Patient Satisfaction One Year after Surgery

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INTRODUCTION:

Approximately 15–20% of patients undergoing conventional total knee arthroplasty (cTKA) report dissatisfaction one year after surgery. Robotic-assisted TKA (raTKA) provides greater precision in bone resection and ligament balancing, which may improve patient outcomes and satisfaction. The purpose of this study was to evaluate the impact of raTKA on quality of life (QOL) and satisfaction compared to cTKA at one year after surgery.

METHODS:

Patients undergoing unilateral primary raTKA and cTKA at a single institution were prospectively enrolled. The Knee Injury and Osteoarthritis Outcome Score-12 (KOOS-12) was collected preoperatively and at one year postoperatively. Patient satisfaction was assessed at one year using the International Society of Arthroplasty Registries (ISAR) satisfaction scale that was validated by the Swedish Arthroplasty Registry. To control for baseline differences, a multivariate regression model with 95% CI was used to assess the association between surgical technique (raTKA vs. cTKA) and KOOS-12 QOL score improvement from baseline to 1-year after surgery. Satisfaction rates between the raTKA and cTKA groups were also compared, and differences were analyzed using multivariate logistic regression analysis.

RESULTS:

A total of 1,154 including 941 consecutive cTKA patients and 213 consecutive raTKA patients were included. KOOS-12 QOL improvement was predicted to be 5.0 points higher in the raTKA group compared to the cTKA group using multivariate regression analysis (**Table 1**). Among patients under 75 years of age, raTKA was significantly associated with higher satisfaction (93.5% satisfied in the raTKA group vs. 84.6% in the cTKA group) (**Table 2**). Multivariate regression analysis further showed that raTKA patients are 3.2 times more likely to be satisfied when compared to cTKA patients (Odds Ratio = 3.2, 95% CI (1.22-8.47); P = 0.018) (**Table 3**).

DISCUSSION AND CONCLUSION:

Robotic-assisted TKA is associated with greater improvements in quality of life and higher satisfaction compared to conventional TKA at one year after primary TKA. These findings suggest potential benefits of robotic assistance in enhancing TKA outcomes. Further large-scale, multi-center studies are warranted to validate the generalizability of these findings.

Variable	Coefficient	P-value	95% Confidence Limits	
Age in years	0.24	0.0182	0.04	0.44
Female	1.99	0.2041	-1.08	5.05
BMI	0.33	0.031	0.03	0.62
Back Pain: None (Reference)				
Mild	-3.70	0.1172	-7.38	-0.02
Moderate	-4.10		-8.57	0.37
Severe	-4.16		-11.76	3.44
Pain in non-surgical Knee: None (Reference)				
Mild	-4.40	0.0319	-7.76	-1.03
Moderate	-6.36		-12.35	-0.37
Severe	-7.05		-9.92	7.81
Charlson Comorbidity Index: 0 (Reference)				
1	-1.17	0.819	-4.82	2.49
2 to 5	-1.98		-6.68	2.73
>=6	0.16		-6.10	6.41
MCS - Global Mental Health Score	0.12	0.0958	-0.02	0.27
Baseline KOOS-12 QOL Score	-0.86	<.0001	-0.94	-0.77
Robotic Assistance TKA	**5.03**	**0.0182**	0.86	9.19

12-month Satisfaction	cTKA		raTKA		P-value
	N	%	N	%	
Age < 55					
Satisfied	27	87.1	5	83.33	0.805
Not Satisfied	4	12.9	1	16.67	
Age < 65					
Satisfied	216	83.72	36	92.31	0.1633
Not Satisfied	42	16.28	3	7.69	
Age < 75					
Satisfied	473	84.62	100	93.46	0.0156
Not Satisfied	86	15.38	7	6.54	
Age < 85					
Satisfied	602	84.67	126	91.3	0.0413
Not Satisfied	109	15.33	12	8.7	

Variable	Odds Ratio	P-value	95% Confidence Limits	
Age in years	1.01	0.635	0.96	1.06
Female	0.97	0.893	0.59	1.58
BMI	1.05	0.048	1.00	1.10
Race: White (Reference)				
Black or African American	0.96	0.490	0.26	3.52
Asian	0.12		0.01	1.97
Other	1.32		0.28	6.14
Back Pain: None (Reference)				
Mild	1.11	0.473	0.61	2.03
Moderate	0.69		0.35	1.34
Severe	0.58		0.20	1.65
Pain in non-surgical Knee: None (Reference)				
Mild	0.87	0.941	0.51	1.49
Moderate	1.09		0.43	2.74
Severe	0.90		0.26	3.09
Charlson Comorbidity Index: 0 (Reference)				
1	1.41	0.530	0.75	2.65
2 to 5	0.77		0.37	1.59
>=6	1.23		0.40	3.80
Education: < High School (Reference)				
High School/Some College	0.21	0.501	0.02	2.11
>= College Graduate	0.23		0.02	2.41
Other	0.62		0.03	13.15
Health Insurance: Medicare (Reference)				
Private	0.96	0.688	0.53	1.73
Medicaid	1.09		0.29	4.16
Other	0.58		0.23	1.47
MCS - Global Mental Health Score	1.00	0.699	0.98	1.03
Baseline KOOS-12 QOL Score	1.00	0.741	0.98	1.01
Robotic Assistance TKA	3.21	**0.018**	1.22	8.47