



FUNCTIONAL SUCCESS IN TOTAL KNEE ARTHROPLASTY – DOES OBESITY HOLD THE KEY: A FOLLOW-UP STUDY

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ABSTRACT

Aim: To assess the functional outcome and its determinants among patients having undergone unilateral total knee arthroplasty (TKA). **Method:** A total of 36 patients having undergone unilateral TKA with a minimum follow-up period of 2 years (24 months) were enrolled. Demographic profile, BMI, activity profile, history of systemic illness, preoperative flexion contracture, side involved and time since arthroplasty was noted. Functional outcome was noted for walking, stair climbing and walking aid use items of Knee Society Score. Scores <60, 60-69, 70-79 and >80 were considered as poor, fair, good and excellent outcomes. Statistical analysis was done using SPSS 18.0 software. Chi-square and Independent samples 't'-tests were used. Binary logistic regression was done for multivariate analysis. **Results:** Mean age of patients was 63.42±9.71 years (Range 47-78 years). Majority were males (52.8%). Mean BMI of patients was 29.28±3.23 kg/m². Mean follow-up duration was 62.28±19.24 months (Range 26-87 months). Excellent, good and fair outcomes were noted in 4 (11.1%), 14 (38.9%) and 18 (50.0%) patients respectively. On univariate analysis body mass index (p=0.019), activity level (p=0.019) and systemic illness (p=0.019) showed a significant association with outcome. However, on multivariate analysis only BMI was found to be significantly associated with outcome (OR=0.687; 95% CI=0.492-960) (p=0.028). **Conclusion:** Among unilateral TKA patients obesity (BMI) holds the key to determine the direction of functional outcomes on follow-up.

KEYWORDS : Total knee arthroplasty, Functional Outcome, Knee Society Score, Obesity.

INTRODUCTION

Total knee arthroplasty (TKA) is a very popular method for management of end-stage degenerative osteoarthritis. In advanced nations like the United States of America more than half million TKA procedures were being carried out each year in the year 2008, which is expected to go up to 3.48 million procedures each year by the year 2030¹. India too is witnessing an increasing trend in TKA procedures with more than 120,000 such procedures being performed annually². Total knee arthroplasty promises alleviation of pain, restoration of function and improvement in overall quality of life of affected patients³. Despite its growing popularity, there is still hesitation regarding its use with respect to its success over a longer duration. One of the reasons for assessing long-term functional outcome is the fact that often the patients having a good functional outcome do not turn up for follow-up as they do not face any complications or inconvenience in its use⁴. Being a relatively newly popularized treatment modality, there is lack of long-term studies focusing primarily on the functional outcome of patients having undergone TKA. Moreover, there is little information regarding the factors that affect the functional outcome in these patients. Keeping in view these gaps in knowledge, the present study was carried out to assess the functional outcome of TKA recipients in a metropolitan city in Central India with a minimum follow-up period of two years.

MATERIAL AND METHOD

The present study was carried out in a multispecialty hospital. Records of patients having undergone total knee arthroplasty procedure during the past ten years were traced. Patients having undergone unilateral TKA for degenerative osteoarthritis with a minimum follow-up period of two years were included. Those having undergone revision arthroplasty, failed implant or developing complications like deep vein thrombosis, post-prosthesis fracture infection etc. were excluded from the study.

A total of 69 records were retrieved. Demographic profile (age and sex), BMI, activity profile, history of systemic illness, preoperative flexion contracture, side involved and time since arthroplasty was noted.

Contact details of all these patients were obtained and they were contacted telephonically to appear for a follow-up / report the functional outcome telephonically. A total of 41

patients responded, however, a total of 5 patients were excluded from the study owing to non-fulfilment of inclusion and exclusion criteria. Finally a total of 36 patients were assessed for functional outcome.

Functional outcome was noted in terms of Knee Society Scale for functional outcome that includes three functions – walking, stair climbing and walking aids use⁵. Scores <60, 60-69, 70-79 and ≥80 were considered as poor, fair, good and excellent outcomes⁶.

Data Analysis: The data so collected was analysed using SPSS 18.0 software. Chi-square and Independent samples 't'-tests were used. Binary logistic regression was done for multivariate analysis.

RESULTS

Age of patients enrolled in the study ranged from 47 to 78 years. Mean age of patients was 63.42±9.71 years. Majority of patients were males (52.8%). Sex-ratio (M:F) of study was 1.12. Body mass index (BMI) ranged from 23.1 to 33.7 kg/m². Average BMI of patients was 29.28±3.23 kg/m². Majority of patients had a sedentary activity profile (52.8%). A total of 17 (47.2%) patients had a history of systemic illness (diabetic/hypertension/ cardiovascular/ respiratory / GI disorder). Preoperative flexion contracture was reported to be ≤10° by 15 (41.7%) patients. Left side (58.3%) was more commonly involved than right side. Follow-up duration ranged from 26 to 87 months. Mean follow-up period was 62.28±19.24 months (Table 1).

Table 1: Demographic Profile and Clinical Characteristics of Patients (n=36)

SN	Characteristics	Statistics
1.	Mean age ± SD (Range)	63.42 ± 9.71 (47-78)
2.	Sex Male Female	19 (52.8%) 17 (47.2%)
3.	Mean Body mass index (BMI) ± SD (kg/m ²)	29.28 ± 3.23 (23.1-33.7)
4.	Activity Level Moderate Sedentary	17 (47.2%) 19 (52.8%)

5.	Systemic illness (Diabetes/Hypertension/ Cardiovascular/Respiratory/GI disorder)	17 (47.2%)
6.	Preoperative flexion contracture <10o >20o	15 (41.7%) 21 (58.3%)
7.	Side Left Right	21 (58.3%) 15 (41.7%)
8.	Mean follow up period ±SD (Range) in months	62.28±19.24 (26-87)

Functional outcome was fair, good and excellent in 4 (11.1%), 14 (38.9%) and 18 (50%) patients. None of the patients had poor outcome (Table 2).

Table 2: Distribution of cases according to Knee Society Functional Score

SN	Functional outcome	KSS Functional score range	No. of patients	Percentage
1.	Poor	<60	-	-
2.	Fair	60-69	4	11.1
3.	Good	70-79	14	38.9
4.	Excellent	80-100	18	50.0

On univariate analysis, excellent outcome did not show a significant association with age, sex, preoperative flexion contracture, side involved and follow-up period (p>0.05). However, lower mean BMI, moderate activity and absence of systemic illness showed a significant association with excellent functional outcome (p<0.05) (Table 3).

Table 3: Factors Affecting Functional Outcome in Knee Arthroplasty patients

SN	Variable	Excellent outcome (n=18)		Fair/Good outcome (n=18)		Statistical significance	
		No.	%	No.	%	x ² /t	'p'
1.	Mean age ±SD	62.33±9.21		64.50±10.34		t=0.664;	p=0.511
2.	Sex Male Female	11 7	61.1 38.9	8 10	44.4 55.6	1.003	0.317
3.	Mean Body mass index (BMI) ±SD (kg/m ²)	28.14±3.42		30.43±2.61		t=2.247;	p=0.031
4.	Activity Level Moderate Sedentary	12 6	66.7 33.3	5 13	27.8 72.2	5.461	0.019
5.	Systemic illness (Diabetes/Hypertension/ Cardiovascular disease)	5	27.8	12	68.7	5.461	0.019
6.	Preoperative flexion contracture <10o >20o	8 10	44.4 55.6	7 11	38.9 61.1	0.114	0.735
7.	Side Left Right	11 7	61.1 38.9	10 8	55.6 44.4	0.114	0.735
8.	Mean follow up period ±SD in months	61.67±20.3		62.89±18.62		t=0.188;	p=0.852

On multivariate analysis, where excellent outcome was kept as a dependent variable on independent variables age, sex, BMI, activity level, systemic illness, preoperative flexion contracture, side of involvement and follow-up duration, only

BMI emerged to be significantly associated with dependent variable (OR=0.687; 95% CI=0.492-0.960; p=0.028) (Table 4).

Table 4: Multivariate Logistic Regression (Dependent variable = Excellent Functional Outcome)

SN	Variable	Unadj. Odds ratio ±SE	Adj. Odds ratio (95% CI)	'p' value
1.	Age	-0.03±0.07	0.975 (0.856-1.112)	0.709
2.	Male sex	-0.49±1.15	0.612 (0.064-5.885)	0.671
3.	BMI	-0.38±0.17	0.687 (0.492-960)	0.028
4.	Moderate activity	1.55±0.98	4.721 (0.688-32.396)	0.114
5.	Systemic illness	-1.77±1.43	0.170 (0.010-2.790)	0.215
6.	Preoperative flexion contracture <10o	-0.64±1.02	0.528 (0.072-3.859)	0.529
7.	Left side	1.22±1.15	3.391 (0.360-31.963)	0.286
8.	Follow-up duration 27	-0.005±0.0	0.995 (0.945-1.049)	0.865
9.	Constant	12.83±7.34		0.081

DISCUSSION

In present study, we observed excellent outcomes in half the study population (50%) but did not see poor outcome in any of the patients. Good to excellent functional outcomes were seen in 32/36 (88.9%) of patients. Good to excellent outcomes in long-term have been reported in nearly 90% of cases in large series from west⁷⁻¹⁰. Some series from India comprising of patients having a shorter follow-up have also reported good to excellent outcomes in 75-90% of cases^{11,12,13}.

In present study, on univariate analysis, only excellent outcome did not show a significant association with age, sex, preoperative flexion contracture, side involved and follow-up period. The factors affecting outcome on univariate analysis were body mass index, activity level and presence of systemic illness. Compared to present study, Jain et al. found a significant association of preoperative flexion deformity with post-operative functional outcome. In another study, Yadav et al.¹¹ found a significant association of functional outcomes with sex, age and type of arthritis. In present study, we did not find any association of functional outcomes with sex and age. As far as type of arthritis was concerned, we did not document it in our study and hence are not in a position to comment over that. However, Jeyaraman and Chaudhary¹² in their study similar to our study did not find a significant association of age with functional outcome. But unlike present study where BMI was found to be a significant factor associated with functional outcome in both univariate as well as multivariate analysis, they did not find it to be significant. Higher BMI is reported to be significantly associated with a post-operative flexion contracture^{15,16} which might contribute to a poor functional outcome. A recent review reported that preoperative diagnoses of depression and anxiety, liver disease, hypoalbuminemia, vitamin D deficiency, and diabetes mellitus are associated with increased risk of postoperative complications and could also affect the functional outcomes⁷.

As such, the study in general shows that TKA has a good functional outcome irrespective of the demographic profile of patient and other disease related characteristics. One of the limitations of present study was absence of more specific data related with post-surgical activity profile and health status of the patients. There is limited data from India regarding the post-operative follow-up data of functional outcome at a longer follow-up. Further studies to augment the literature are recommended.

CONCLUSION

Functional outcome of TKA patients with a minimum of two

years follow-up was good to excellent in nearly 90% of cases which is comparable to that reported in western studies. Body mass index emerged as a significant factor affecting the functional outcome in these patients.

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