Original Article

Influence of bilateral sequential total knee arthroplasty on functional recovery

Rajesh N Maniar, Jayesh V Baviskar, Tushar Singhi, Parul Maniar[1], Ravi Nayak

Abstract

Background: Main concerns of patients undergoing bilateral surgery is the quantum of pain and the progress of functional recovery. We studied functional recovery in terms of pain, range of motion (ROM), SF12, WOMAC scores and a unique TUG (timed up and go) test for patients undergoing unilateral total knee arthroplasty (U/L-TKA) and sequential bilateral total knee arthroplasty (B/L-TKA).

Materials and Methods: Three groups of 77 consecutive patients (91 knees) were retrospectively compared. They were B/L TKA group (28 knees: 14 patients), Unilateral TKA group with contralateral knee nonoperated i.e., U/L-TKA group (42 knees) and Unilateral TKA with contralateral TKA already done i.e., U/L + C/L TKA group (21 knees). Patients were assessed preoperatively and on postoperative days 3, 5, 14, 42, 90 and 1 year.

Results: The WOMAC score was statistically better preoperatively in the U/L + C/L TKA group, and SF12 MCS score was statistically better preoperatively in the B/L-TKA group. The TUG test time in the B/L-TKA group was statistically longer on days 3 and 5 as compared to other groups and became comparable by day 14. The TUG score became better than the preoperative value by day 42 in the B/L-TKA group, which took 90 days in other groups.

Conclusion: The early functional recovery of bilateral TKA patient lags behind that of unilateral TKA patient for the first 5 days, becomes equal by the 14th day and remains equal till 1 year after surgery. Bilateral TKA patients regain their preoperative functional status by 6 weeks against 3 months for unilateral TKA. The operative status of the contralateral knee makes no difference to early functional recovery after unilateral TKA. With bilateral TKA, there is no difference in pain and ROM parameters.

Key words: Total knee arthroplasty, rehabilitation, timed up and go test

Introduction

In carefully selected patients, bilateral total knee arthroplasty (B./L-KA) is considered to be a safe procedure.[1-4] During the past few years, there has been an increasing frequency of patients undergoing B/L-TKA. Quantum of pain and speed of rehabilitation are two main concerns for patients considering B/L-TKA.

The frequent query is whether the pain would be twice as much in B/L-TKA as in unilateral total knee arthroplasty (U/L-TKA). Literature is divided on this issue; few studies have shown increased pain in the first two days after B/L-TKA while others show no difference in the pain between U/L and B/L-TKA.[5-8] In the long term, there is no difference between U/L-TKA and B/L-TKA with regards to function, pain or ROM attained.[5,6] Some studies have shown that patients undergoing B/L-TKA lag in rehabilitation milestones compared to their unilateral counterparts.[7,8] But, how soon they reach comparable function is as yet not clear.

The parameters compared in previous studies were pain,[5,7,8] range of motion (ROM),[5,8,9] length of stay (LOS),[5,8,10,11] active straight leg raising (SLR),[8] transfer to stick walking,[8] stair climbing.[6,10,12] Studies comparing the long term function have compared SF-36 (Short form 36), WOMAC (Western Ontario and McMaster Universities Osteoarthritis index questionnaire score), HSS (Hospital for Special Surgery) scores or similar functional scores.[6,9,12-14] An objective assessment of function in the early recovery period is lacking in most studies. We thus decided to compare the early functional recovery by evaluating a unique Timed "Up and Go" Test (TUG) test. Also, previous studies have failed to take into account the status of the opposite knee

Department of Orthopaedics, Lilavati Hospital and Research Centre, Bandra, [1]Consultant Opthalmologist, Nook Apartments, Santacruz, Mumbai, India

Address for correspondence: Dr. Rajesh N. Maniar, The Nook Apartment, 51/B, S.V. Road, Santacruz (W), Mumbai - 400 054, India. E-mail: drmaniar@jointspeciality.com

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when comparisons were made. The status of the opposite knee cannot be ignored as patients with significant OA in the opposite knee would be slower in rehabilitation as compared to patients whose opposite knee is already operated. The aims of our study were to 1) to identify approximate timelines by which the functional recovery of B/L-TKA would match their preoperative status and also the recovery of patients with U/L-TKA; 2) Assess the effect of the status of the contralateral knee in U/L-TKA on functional recovery.

Materials and Methods

Our study was undertaken with the approval of the institutional review board. This was a retrospective study where records and data of 77 consecutive patients of a single surgeon (RM) operated over a period of three months was analyzed. Subjects included were 1) patients undergoing primary TKA for osteoarthritis; 2) patients being able to walk three meters and back for TUG test; 3) history of any previous surgery (including opposite knee arthroplasty) done should be at least three months before the current surgery. Our exclusion criteria were 1) neurological diseases, 2) patients with rheumatoid arthritis (as they interfered with performance of TUG test).

Consent was obtained from all patients regarding use of their data for study and analysis purpose. Preoperative data was available as baseline measurement. Postoperative values on day 3, day 5, day 14 ± 2, day 42 ± 5, day 90 ± 7 and at 1 year ± 15 days post TKA considering the day of surgery as day 0 were considered for analysis. We also analyzed records of anthropometric, personal and clinical characteristics including age, sex, side of the limb being operated, weight and height for all participants. All surgeries were performed with computer navigation and the same PFC sigma series (Warsaw, IN) of implants and the same computer-navigated technique was used by the surgeon in all the patients. All patients were operated under spinal-epidural anesthesia. The postoperative pain management protocol remained the same in all the groups.

Outcome measures

The outcomes assessed were pain at rest and while walking on VAS scale, active ROM of the knee, TUG test values, WOMAC and SF-12 (Short form 12) scores and LOS. While in the hospital, assessments were performed by one of the authors at the same time of day, i.e., in the morning before subjecting the patient to physical therapy sessions. Further assessments were done at subsequent followup visits.

Pain score

Pain score at rest and on walking was measured using a visual analog scale (VAS) on a scale of 0 to 10.[15] Our patients were under continuous epidural analgesia for the first 48 hours and therefore we studied pain from day 3 onwards.

Range of motion evaluation

The ROM measurement was taken with a standard handheld goniometer. Its center of rotation was placed in line with the center of the knee, the fixed arm aligned with the greater trochanter and the mobile arm aligned with the lateral malleolus. ROM was measured at the edge of the bed with the patient sitting with his thighs parallel and horizontal to the floor. Two trials were performed for both measurements. If the difference was more than 5°, then a third measurement was taken and an average of the closest two measurements was taken.[16]

Timed up and go test

This functional test records the time taken by the patient to get up from a chair with armrests, walk 3 m, turn around, walk back to the chair and sit down.[17] The chair seat was 46 cm in height, and the 3-m walkway was delimited by permanent painted lines on the floor. The standardized procedure included a demonstration and a trial round preoperatively. It is easy to perform and has the unique advantage that the patient is able to perform the test in the early rehabilitative period when other objective functional scores are difficult to assess. TUG test also assigns a score based on the time taken for the activity, which can be compared with other patients and also with one self at different time periods. Though this test was primarily used to assess basic functional mobility in geriatric age group patients,[17] it has been shown to be useful in assessing functional results after total hip and knee arthroplasty.[6,18-20]

WOMAC and SF-12

WOMAC and SF-12 are two elaborate tests with several items and very often, not possible by the patient to perform in the early postoperative period.[21,22] In our study, they were both administered preoperatively and postoperatively on day 90 and at 1 year.

Length of stay

Length of stay was measured from the day of surgery, which was considered as day 0. All patients were discharged at the same time in the evening after performing their last physical therapy session.

Statistical analysis

Demographic and clinical characteristics of the subjects and baseline measurements were compared between groups by use of analysis of variance (ANOVA) for continuous variables and Chi-square tests for categorical data. Unpaired *t* test was used for further analysis if ANOVA values were

found to be significant. The nonparametric Kruskal-Wallis test was used when data was not normally distributed. The student's *t*-test was used for comparison of data within groups. We did a *post hoc* power analysis for our study. The type I error was 5% (false-positive values). The type II error (β) is 20%; therefore, the power for the study is 80% (1-β).

Results

During the three months of our study, 83 patients (97 knees) underwent primary TKA. Of these, six patients were excluded as they did not conform to our selection criteria – two patients had neurological disorder, two had rheumatoid arthritis and two patients were from outside the country hence their followup was incomplete. Thus we studied 77 patients (91 knees), spread in three groups. The first group consisted of 14 consecutive patients undergoing sequential B/L-TKA (28 knees), second group consisted of 42 consecutive patients undergoing unilateral TKA whose opposite knee was not operated U/L-TKA (42 knees) and the third group consisted of 21 patients undergoing unilateral TKA but whose opposite side had already been operated for TKA earlier U/L + C/L-TKA done (21 knees). There was no difference between the preoperative demographics [Table 1] and in the parameters of pain, ROM, TUG test and preoperative deformity between the three groups. It was noted that patients who had the opposite knee operated in the unilateral group had a statistically better WOMAC score preoperatively and patients undergoing B/L-TKA had a better mental component sub-score of SF-12.

All patients were reviewed at the designated time periods except for eight patients who were excluded at the one-year assessment. Six of these patients were from the U/L-TKA group; they underwent TKA for the opposite side before the one-year followup and were thus excluded. One patient each, from the B/L-TKA group and the U/L + C/L-TKA done group missed their 1-year followup and were excluded from the analysis [Figure 1].

Results of the postoperative parameters for the three groups are tabulated in Tables 2-6. No statistically significant difference was found in the parameters of pain [Table 2] and ROM [Table 3] amongst the groups at all assessment points. As judged by the TUG test values, patients in the bilateral group were slower on days 3 and 5 as compared to other groups. These values became comparable in the three groups from Day 14 onwards [Table 5]. Within each group, TUG test values at all assessment points were compared for each group with respect to their preoperative values [Table 4]. Bilateral group patients returned to better than preoperative TUG test values by day 42 compared to 90 days required for the other groups. Table 6 shows WOMAC with its sub-scores and SF-12 component scores. No significant difference was found between the groups in WOMAC at all time periods evaluated. SF-12 MCS was statistically better postoperatively for three months in the bilateral group.

LOS was five days for patients undergoing U/L-TKA and six days for B/L-TKA patients. LOS was longer for B/L-TKA patients in our series, as we had a fixed protocol of discharging B/L-TKA patients on Day 6 after surgery

Table 1: Preoperative demographics and comparisons between all parameters across all groups

Parameter	Bilateral (mean)	U/L-TKA (mean)	U/L+C/L TKA (mean)	Difference significant
Age (years)	66.86	67.5	65.76	No (*P*=0.8)
Sex	M:F:2:12	M:F:4:38	M:F:2:19	No (*P*=0.660)
BMI	28.64	34.94	30.44	No (*P*=0.893)
Pain at rest*	1.11	1.21	0.91	No (*P*=0.77)
Pain on walk*	6.75	6.57	5.95	No (*P*=0.216)
ROM extension	8.390	7.260	7.380	No (*P*=0.802)
ROM flexion	110.10	108.20	107.60	No (*P*=0.887)
WOMAC	49.79	49.31	34.38	Yes (*P*=0.001)
SF-12 (PCS)	32.6	30.03	33.91	No (*P*=0.155)
SF-12 (MCS)	53.5	47.09	50.63	Yes (*P*=0.046)
TUG test (in seconds)	24.51	21.15	20.55	No (*P*=0.202)

U/L-TKA=Unilateral total knee Arthroplasty, U/L-TKA+C/L TKA=Unilateral total knee Arthroplasty+Contralateral total knee Arthroplasty done, BMI=Body mass index, ROM=Range of motion, WOMAC=Western ontario and mcmaster universities osteoarthritis index questionnaire score, SF-12=Short form-12, PCS=Physical component subscore, MCS=Mental component subscore, *Pain measured on visual analogue scale

Table 2: Comparison between pain values at all time intervals

	Bilateral	U/L-TKA	U/L+C/L TKA	*P* value
Pain at rest*				
Pre operative	1.11 (1.07)	1.21 (1.84)	0.90 (1.61)	0.767
Day 3	1.54 (1.37)	1.74 (1.15)	1.05 (0.97)	0.099
Day 5	0.82 (1.22)	0.81 (0.86)	0.67 (0.73)	0.823
Day 14	0.21 (0.42)	0.17 (0.38)	0.29 (0.46)	0.555
Day 42	0.07 (0.26)	0.02 (0.15)	0.00 (0.00)	0.353
Day 90	0 (0)	0 (0)	0 (0)	0
Pain during walking*				
Pre operative	6.75 (1.40)	6.57 (1.74)	5.95 (1.66)	0.143
Day 3	5.11 (1.29)	5.24 (1.39)	4.52 (1.29)	0.133
Day 5	3.89 (1.40)	3.81 (1.40)	3.33 (1.35)	0.332
Day 14	1.71 (1.38)	2.10 (1.30)	1.95 (0.97)	0.468
Day 42	0.64 (0.78)	0.60 (0.77)	0.62 (0.74)	0.968
Day 90	0.14 (0.36)	0.17 (0.44)	0.10 (0.30)	0.787

U/L-TKA=Unilateral total knee Arthroplasty, U/L-TKA+C/L TKA=Unilateral total knee Arthroplasty+Contralateral total knee Arthroplasty done. *Pain measured on visual analogue scale. Values expressed as mean (standard deviation)

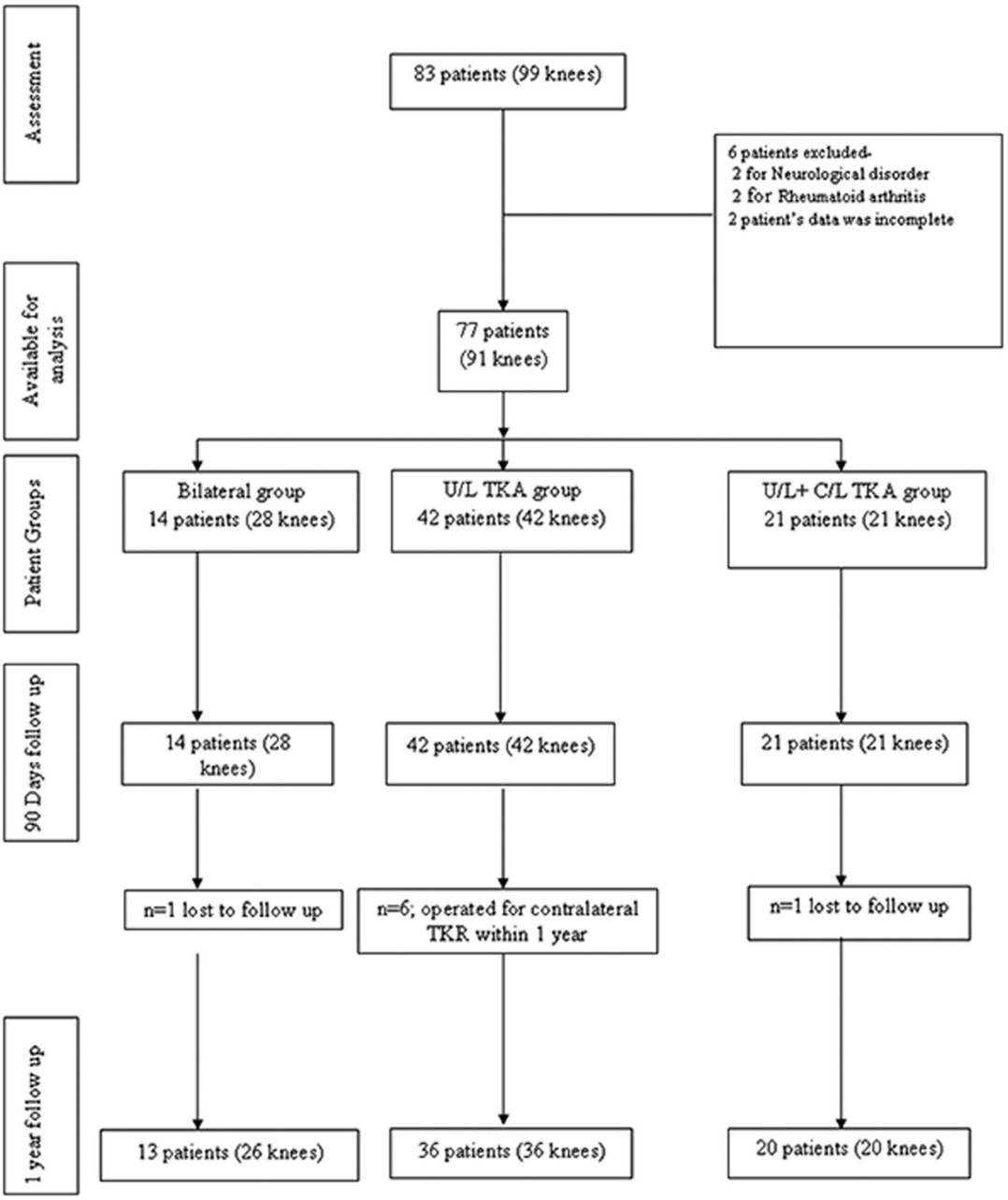

Figure 1: Flowchart of groups and their followup

(one day more than U/L-TKA patients), giving them a day more to rehabilitate for activities of daily living.

The significant findings for each parameter in the three groups, up to 1 year are as under:

Pain

Pain at rest on day 3 was higher than the preoperative pain in all three groups, which is attributed to surgical site pain, and it returned to better than the preoperative values by day 5, improving steadily thereafter. Pain on walking was better than the preoperative values on day 3 and gradually improved equally in all three groups thereafter. Pain at rest and on walking showed no significant difference between the three groups at all time intervals.

Range of motion

ROM showed no significant difference between all the three groups at all assessment points. It was by day 42 that the ROM in each group returned to the preoperative value. None of the patients in any group required knee manipulation.

Tug

TUG test values were statistically higher in the bilateral group as compared to both unilateral groups at days 3 and 5. By day 14, the values in all three groups were comparable to each other ($P = 0.19$), albeit they were still higher in bilateral group [Table 5]. On day 42 and 90, there was no statistical difference between TUG test values of all three groups. If comparison was done within each group, then the bilateral group did statistically better at day 42 as compared to preoperative values, while those in unilateral groups took 90 days for the TUG test values to be statistically better than their preoperative values [Table 4].

Table 3: Comparison between range of motion across all time intervals

	Bilateral	U/L-TKA	U/L+C/L TKA	*P* value
ROM extension*				
Pre operative	8.39 (6.39)	7.26 (7.98)	7.38 (6.82)	0.802
Day 3	3.57 (2.30)	3.57 (3.54)	4.52 (3.50)	0.492
Day 5	2.86 (2.52)	2.62 (2.76)	3.81 (3.12)	0.273
Day 14	2.14 (2.52)	1.55 (2.59)	2.14 (2.99)	0.571
Day 42	0.54 (1.57)	0.48 (1.49)	0.48 (1.50)	0.985
Day 90	0.00 (0.00)	0.12 (0.77)	0.24 (1.09)	0.537
1 yr	0	0	0	0
ROM flexion*				
Pre operative	110.11 (19.36)	108.21 (21.27)	107.62 (14.46)	0.887
Day 3	71.96 (20.43)	69.05 (14.83)	72.62 (11.14)	0.635
Day 5	86.61 (11.55)	84.52 (8.47)	87.14 (6.99)	0.486
Day 14	95.18 (10.41)	94.64 (9.46)	95.24 (5.80)	0.958
Day 42	110.71 (9.69)	110.83 (11.73)	108.10 (7.98)	0.582
Day 90	119.46 (8.75)	116.79 (11.14)	116.43 (8.82)	0.464
1 yr	123.39 (8.40)	123.54 (10.38)	121.5 (7.27)	0.696

U/L-TKA=Unilateral total knee Arthroplasty, U/L-TKA+C/L TKA=Unilateral total knee Arthroplasty+Contralateral total knee Arthroplasty done, ROM=Range of motion. *ROM measured in degrees

Table 4: Timed up and go test values comparison within group

	Day	Mean*(sd)	Pre-operative	*P* value	Inference
bilateral	3	144.59 (34.83)	24.51 (10.80)	<0.0001	TUG test values become significantly better than preop by day 42
	5	119.53 (42.12)		<0.0001	
	14	57.71 (30.44)		<0.001	
	42	20.04 (7.60)		0.0396	
	90	14.86 (3.67)		<0.0001	
U/L-TKA	3	117.82 (33.90)	21.15 (7.13)	<0.0001	TUG test values become significantly better than preop by day 90
	5	96.29 (26.52)		<0.0001	
	14	47.72 (21.29)		<0.0001	
	42	20.05 (9.48)		0.482	
	90	15.25 (5.54)		<0.0001	
U/L+C/L TKA	3	105.40 (48.93)	20.55 (8.75)	<0.0001	TUG test values become significantly better than preop by day 90
	5	83.73 (47.33)		<0.0001	
	14	46.01 (26.11)		<0.0001	
	42	18.60 (5.91)		0.166	
	90	16.33 (4.33)		<0.0122	

TUG=Timed up and go, U/L-TKA=Unilateral total knee Arthroplasty, U/L-TKA+C/L TKA=Unilateral total knee Arthroplasty+Contralateral total knee Arthroplasty done. *TUG test values expressed in seconds

WOMAC

Total WOMAC scores were statistically better preoperatively in the U/L + C/L-TKA group ($P = 0.002$). Even the pain, stiffness and physical function sub-scores were statistically better in the U/L + C/L-TKA group preoperatively. Postoperatively, at day 90 and at one year though there was no significant difference between the three groups [Table 6].

SF-12

SF-12 PCS sub-score did not show any difference preoperatively or postoperatively across all three groups. The MCS though was statistically better preoperatively as well as postoperatively in the bilateral group [Table 6].

No patient had any complication like, superficial or deep infection, wound complications, deep vein thrombosis, pulmonary embolism, cardiac complications etc., in all the three groups.

Discussion

Arthroplasty surgeons presenting surgical treatment options to patients with osteoarthritis are handicapped by the paucity of literature on early and intermediate functional outcomes following U/L-TKA and B/L-TKA surgery. The rate of recovery and regaining independence are the most important considerations while considering bilateral over unilateral surgery.

Pain and ROM are the most important factors influencing early function. We found no difference in pain at rest or on walking amongst the three groups at all assessment points. Powell *et al.* studied pain in the first 48 hours and found pain scores to be one point higher with 20% more narcotic requirement in the bilateral group, but thereafter the pain and analgesic requirement was the same.[7] Fick

Table 5: Comparison between timed up and go test values across all 3 groups

TUG test	Bilateral mean*(sd)	U/L-TKA mean*(sd)	U/L+C/L TKA mean*(sd)	*P* value
Pre op	24.51 (10.80)	21.15 (7.13)	20.55 (8.75)	0.202
Day 3	144.59 (34.83)	117.82 (33.90)	105.40 (48.93)	0.001
Day 5	119.53 (42.12)	96.29 (26.52)	83.73 (47.33)	0.003
Day 14	57.71 (30.44)	47.72 (21.29)	46.01 (26.11)	0.190
Day 42	20.04 (7.60)	20.05 (9.48)	18.60 (5.91)	0.778
Day 90	14.86 (3.67)	15.25 (5.54)	16.33 (4.33)	0.551

TUG=Timed up and go, U/L-TKA=Unilateral total knee Arthroplasty, U/L-TKA+C/L TKA=Unilateral total knee Arthroplasty+Contralateral total knee Arthroplasty done. *TUG test values expressed in seconds. Difference between bilateral versus other groups is significant on day 3 and day 5, while at all other times the difference is not significant

Table 6: Western Ontario and Mcmaster Universities osteoarthritis index questionnaire score and short form-12 comparisons preoperatively, 3 months and at 1 year

WOMAC	Bilateral*	U/L-TKA*	U/L+C/L TKA*	*P* value
Pain				
Pre op	10.43 (4.73)	10.02 (3.78)	7.29 (3.99)	0.021
Day 90	2.79 (2.75)	3.79 (2.88)	2.95 (2.38)	0.271
1 year	1 (1.13)	2.06 (2.47)	1.75 (2.17)	0.14
Stiffness				
Pre op	4.21 (2.15)	4.00 (1.85)	2.43 (1.57)	0.003
Day 90	1.57 (1.53)	1.64 (1.39)	1.29 (1.06)	0.615
1 year	0.69 (0.62)	1.41 (1.40)	1.05 (1.14)	0.053
Physical function				
Pre op	35.14 (13.76)	35.29 (11.13)	24.67 (10.43)	0.003
Day 90	8.64 (6.23)	10.95 (7.56)	9.33 (6.73)	0.373
1 year	4.53 (4.45)	7.39 (7.54)	6.3 (7.53)	0.262
Total				
Pre op	49.79 (18.86)	49.31 (15.37)	34.38 (14.51)	0.002
Day 90	13.00 (9.29)	16.62 (11.07)	13.57 (8.87)	0.281
1 year	6.23 (5.12)	10.86 (10.50)	9.1 (10.35)	0.149
SF-12				
PCS				
Pre op	32.60 (8.14)	30.03 (6.62)	33.90 (10.03)	0.155
Day 90	43.06 (6.46)	42.13 (7.14)	43.18 (8.33)	0.812
1 year	99.57 (9.98)	63.64 (7.98)	95.48 (9.77)	0.069
MCS				
Pre op	53.50 (10.01)	47.09 (9.89)	50.63 (12.21)	0.046
Day 90	56.77 (6.85)	51.42 (9.02)	51.42 (9.45)	0.026
1 year	55.55 (5.32)	52.85 (7.51)	56.64 (4.62)	0.068

WOMAC=Western ontario and mcmaster universities osteoarthritis index questionnaire score, U/L-TKA=Unilateral total knee Arthroplasty, U/L-TKA+C/L TKA=Unilateral total knee Arthroplasty+contralateral total knee Arthroplasty done, SF-12=Short form-12, PCS=Physical component subscore, MCS=Mental component subscore. *Values expressed as mean (standard deviation)

et al. studied narcotic use and found no difference except that the use of nonsteroidal anti-inflammatories and paracetamol was higher in the bilateral group, which they attributed to the longer stay in bilateral group.[5] Shetty *et al.* also observed more pain in bilateral patients on days 1 and 4, having used regional anesthesia, periarticular injections and intravenous infusion followed by oral analgesics.[8] Our first measurements for pain were on day 3, so we cannot comment on the pain experienced in the first 48 hours as has been done in the other studies. But our study corroborates the earlier studies that there is no difference in the pain experienced by B/L and U/L-TKA patients after the first 48 hours.[5,7,8]

Between the three groups, ROM values also showed no significant difference at all time intervals. None of the patients in any group required knee manipulation. For all three group patients, ROM returned to preoperative values by day 42, which further improved by three months. Bilateral patients gained ROM at the same rate as unilateral patients at all time intervals. Other studies too have not found any difference in the ROM between unilateral and bilateral cases.[5,8,9] The bilateral group had statistically significant higher TUG test scores on days 3 and 5. This is expected, as with both limbs operated, their functional recovery would be slow. By day 14, the values were still marginally higher in the bilateral group but the difference was not significant statistically. Thus, early functional recovery is slower in B/L-TKA patients up to day 5, even though they have similar pain relief and ROM as compared to U/L-TKA patients. We could find two studies in the literature, which had compared early recovery after B/L-TKA to U/L-TKA. Shetty *et al.* used active SLR and transfer to stick walking as parameters for judging early functional recovery and they concluded that there was only a 24-h delay in the ability to walk with a stick in bilateral knee patients.[8] The activities of daily living of a postoperative patient during early recovery involve sitting and standing and also walking and turning, which are not evaluated by these parameters. TUG test evaluates these parameters and that was the reason for taking it as a parameter for early functional recovery. Zeni *et al.* in their study took TUG test and stair climbing ability as parameters of functional recovery, but the first evaluation was at more than 3 weeks after surgery when there was no difference between bilateral and unilateral groups. The results of our study suggest a time duration of 2 weeks post B/L-TKA for functional recovery to become equal to recover after U/L-TKA.

TUG test values in the B/L-TKA group became better than the preoperative values by day 42 while the unilateral groups took 90 days for the same. Based on this finding, patients can be counseled regarding their recovery. As B/L-TKA patients take longer to recover, LOS was longer in our series. We had a fixed protocol of discharging B/L-TKA patients one day later than U/L-TKA patients, giving them a day more to rehabilitate for activities of daily living. They were discharged on day 6. Studies that used rehabilitation milestones as the end point for discharge show a longer LOS for bilateral TKA.[5,8,10] Studies having a fixed day discharge protocol had to shift some bilateral patients to a rehabilitation center.[11] We used two parameters for judging late functional recovery, the WOMAC and SF-12 scores. As judged by the WOMAC and SF-12 PCS scores, there was no difference in the late functional recovery between the three groups. Zeni *et al.* had used Knee Outcome Score Activities of Daily Living Scale (KOS), Medical Outcomes Survey Short Form 36 physical component summary (PCS) and TUG test to assess function and found no significant difference between their unilateral and bilateral groups

at 1 and 2 years from the surgery.[6] Ritter *et al.* found unilateral group to have consistently lower Knee Society Score than bilateral TKA group at 5, 10, 12 and 15 years post surgery, but considered this outcome to be clinically irrelevant.[14] Fick *et al.* found comparable Oxford Knee Scores preoperatively and at one-year postoperatively in unilateral and bilateral TKA patients.[5] Our study reconfirms that there is no difference in the 1-year functional recovery between unilateral and bilateral TKA.

SF-12 score showed no difference in the PCS component preoperatively as well as postoperatively at three months and one year. The MCS subcomponent though, had significantly higher values in the bilateral group preoperatively as well as at three months. This finding would suggest that mentally stronger patients opt for bilateral TKA. We could not find any other study in the literature to corroborate this finding. Zeni *et al.* too found no significant difference in SF-36 (PCS subcomponent) values in their groups of patients.[6]

We separated unilateral TKA patients into U/L TKA and U/L + C/L TKA groups as the latter had better WOMAC scores preoperatively. We hypothesized that this better function might translate into better functional recovery postoperatively, but this benefit did not seem to translate in a rapid postoperative recovery as seen by similar TUG test values to the U/L-TKA group. This could be due to the fact that with the analgesic regimen followed; the pain is well controlled in the nonoperated limb of the U/L-TKA group patients and irrespective of its arthritic status they show good function. Thus in our series, contralateral TKA made no difference to early functional recovery.

The limitations of the study include: 1. It was a retrospective study; 2. The unilateral group where the other side did not undergo TKA included some patients who required TKA of the other side and some who did not warrant arthroplasty on the other side. This could have affected the parameters for functional recovery. In day-to-day practice, one sees patients who complain of pain only on one side when in fact both the knees are severely involved as per radiological studies. So it becomes very difficult to have a division of these unilateral arthroplasty patients into two groups where one requires and the other does not require arthroplasty on the other side.

To conclude the early functional recovery of bilateral TKA patient lags behind that of unilateral TKA patient for the first 5 days, becomes equal by the 14th day and remains equal till 1 year after surgery. Bilateral TKA patients regain their preoperative functional status by 6 weeks against 3 months for unilateral TKA. The operative status of the contralateral knee makes no difference to early functional recovery after unilateral TKA. With bilateral TKA, there is no difference in pain and ROM parameters.

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