

## Comparison of Simultaneous Bilateral versus Unilateral Total Knee Replacement on Pain Levels and Functional Recovery

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Received: 07-06-2023 / Revised: 13-07-2023 / Accepted: 14-08-2023

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Conflict of interest: Nil

### Abstract:

**Introduction:** In patients with advanced knee osteoarthritis, total knee replacement is a frequent surgical surgery to reduce pain, restore function, and enhance quality of life. The goal of the current research was to compare simultaneous bilateral versus unilateral total knee replacement on pain intensity and recovery of function.

**Material & Methods:** The current study included sixty patients who had total knee replacements (30 bilateral and 30 unilateral). The subjects were hospitalized for a period of five to seven days. Similar inpatient and outpatient physiotherapy sessions were given to group members. The lower extremity functional scale and the visual analogue scale were used, respectively, to measure pain severity at baseline, day 7, and day 30 postoperatively. The data were examined using repeated measures analysis of variance.

**Results:** At 30 days after surgery, both groups demonstrated a statistically significant decrease in pain intensity and an improvement in functional capacity ( $p < 0.001$ ). However, at 30 days after surgery, there was no statistically significant difference between bilateral and unilateral total knee replacements in terms of pain relief and improvement in functional ability ( $p > 0.05$ ).

**Conclusion:** The use of simultaneous bilateral total knee replacement in patients with bilateral knee osteoarthritis is suggested since its costs and rehabilitation process could be lessened compared to staged bilateral total knee replacement. Simultaneous bilateral total knee replacement was associated with a similar reduction in pain intensity and recovery of function compared to unilateral total knee replacement.

**Keywords:** Bilateral, Function, Pain, Total Knee Arthroplasty, Unilateral.

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### Introduction

Total knee arthroplasty (TKA) has shown to be a highly effective operation for patients who suffer from incapacitating pain from degenerative joint disease.[1-3] Degenerative changes can happen simultaneously in both knees, and patients frequently experience symptoms that call for bilateral knee arthroplasty. Patients who require bilateral knee arthroplasty might have the procedure either simultaneously under one anesthesia or in a stepwise unilateral approach.[4,5] The safety and effectiveness of performing simultaneous bilateral TKA on carefully chosen patients have been extensively studied in the literature.[6-8] The mortality risks, complication rates, transfusion rates, and financial concerns of unilateral vs. bilateral TKA have all been sufficiently characterized in this same body of literature.[9,10]

A few studies also looked at variations in pain and bodily function after simultaneous or staged bilateral TKR. Another study offers positive results with regard to pain and physical function following staged bilateral TKR,[11] while one study reports functional improvements following simultaneous bilateral TKR.[12] The absence of control groups, however, reduces the external validity of the findings in these investigations.

Numerous studies have contrasted the functional recovery following simultaneous bilateral TKR with that following unilateral TKR. For instance, Hart et al.'s[13] report on reduced postoperative complications did not show a correlation with increased readmissions over unilateral TKR. Similar to this, Borges et al.[14] found no difference in costs or problems between simultaneous bilateral and

unilateral TKR surgery. Furthermore, March et al.[15] contrasted simultaneous bilateral and unilateral TKR in terms of functional recovery and general health. They discovered that the simultaneous bilateral TKR group had greater functional recovery and overall health.

Contrarily, those who participated in simultaneous bilateral TKR were substantially younger than those who participated in unilateral TKR. While a prior study found that simultaneous bilateral TKR patients had considerably better postoperative functional results,[16] a more recent investigation found no differences in functional recovery between simultaneous bilateral and unilateral TKR.[17] Hence the present study will be done to compare the simultaneous bilateral versus unilateral total knee replacement on pain levels and functional recovery.

**Material & Methods**

The present comparative study was done among 60 patients who visited to Department of Orthopedics for total knee replacement during the one year duration of study. The study involves two types of surgical procedures: simultaneous bilateral versus unilateral TKR) on pain and physical function. The patients were divided into two groups of 30 patients in each group. Group I underwent bilateral TKR and group II underwent unilateral TKR. Ethical permission was obtained from the institutional ethical committee before commencement of study.

Inclusion criteria were as follows: (a) patients with end stage primary OA, (b) bilateral symptomatic knee OA, and (c) patients undergone first time for simultaneous bilateral or unilateral TKR. Exclusion criteria was: patients with cardiopulmonary comorbidities and systemic illness such as chronic obstructive pulmonary disease, diabetes mellitus, cerebrovascular disease, peripheral vascular disease or active coronary artery disease.

Similar outpatient (one session, five days a week for three weeks) and inpatient (30 min, two sessions per day for five to seven days as necessary) physiotherapy treatments were given to participants in both groups. Sessions of inpatient physiotherapy included gait training with a walker, mobility exercises, range of motion exercises, and strength

training of the lower extremities (such as the hamstrings, quadriceps, and glutei muscles). Strengthening exercises for the gluteus, quadriceps, and hamstrings are part of outpatient physiotherapy sessions, along with gait training and walking reeducation.

Visual analogue scale (VAS) and lower extremity functional scale (LEFS) were used, respectively, to measure pain intensity and function capability at baseline, day 7, and day 30 following surgery. In order to evaluate both acute and chronic pain, the VAS is a viable and reliable outcome measure [18]. For patients having knee or hip arthroplasty, the 20-item LEFS is a valid and reliable functional outcome to measure lower-extremity function [19]. A 5-point Likert scale, the LEFS ranges from 0 to 4. Between 0 to 80 points total are available; a higher score denotes a greater functional capacity.

Utilizing IBM SPSS Statistics 23, data was examined. Using repeated measure ANOVA, it was determined whether simultaneous bilateral TKR improved pain and functional ratings more than unilateral TKR over the course of one month. Three factors for time (0 day versus 7 day versus 30 day) and two variables for group (simultaneous bilateral versus unilateral TKR) were employed. For statistical significance, a value of p less than 0.05 was taken into account.

**Results**

Table 1 shows demographic data of participants like age , gender, weight. Mean age was 60.9 (SD, 8.1) and 66.5 (SD, 7.9) years in simultaneous bilateral TKR and unilateral TKR group, respectively. In both the groups female patients (65%, 66%) were more as compared to male patients (35%, 34%). The results were non-significant (p>0.05). Table 2 shows comparison of VAS and LEFS scores at postoperative days among the two groups. Both groups showed a significant reduction of pain intensity and improvement in the functional capacity following TKR at 30 days post-operatively (p < 0.001). However, there was a non-significant difference noted between simultaneous bilateral versus unilateral TKR on reduction of pain intensity and improvement in the functional capacity at 30 days postoperatively (p>0.05).

**Table 1: Showing patients characteristics**

Variable	Simultaneous bilateral TKR (N=30)	Unilateral TKR (N=30)	P value
Age	60.9(8.1)	66.5(7.9)	0.073
Male	35%	34%	0.951
Female	65%	66%	
Weight	92.5(7.3)	95.1(6.3)	0.017

**Table 2: Showing comparison of VAS and LEFS scores in two groups**

Variable		Simultaneous bilateral TKR (N=30)	Unilateral TKR (N=30)	P value
VAS	Day 0	8.7 (1.0)	8.6 (1.1)	0.867
	Day 7	4.4 (1.3)	4.5 (1.3)	
	Day 30	2.1 (1.2)	2.0 (1.3)	
	Change	5.7	5.8	0.511
	P value (intra group)	<0.001		
LEFS	Day 0	15.2 (11.2)	18.2 (10.1)	0.445
	Day 7	27.3 (10.3)	31.2 (11.4)	
	Day 30	54.6 (13.6)	55.4 (14.2)	
	Change	-38.3	-35.3	0.767
	P value (intra group)	<0.001		

**Discussion**

The current study was done to compare simultaneous bilateral versus unilateral TKR on pain intensity and recovery of function. Results of the current study showed that both groups showed a significant pain relief & improved function after TKR. There was no significant difference noted between simultaneous bilateral versus unilateral TKR on pain intensity and recovery of function.

According to certain research, simultaneous bilateral TKR surgery shortens recovery time and has the same risk of postoperative problems as unilateral TKR.[20,21] Additionally, patients having bilateral TKR receive functional outcomes that are comparable to or better than those of patients undergoing unilateral TKR without incurring any increased medical costs.[22,23] While other studies found statistically insignificant differences in pain relief and functional recovery following bilateral versus unilateral TKR,[24] many studies found that patients undergoing bilateral TKR experienced more postoperative complications and paid more for rehabilitation.[25-26]

Bilateral simultaneous unicompartmental knee arthroplasty has recently been shown to result in a greater functional recovery at 6 months post-operatively than unilateral TKR, according to a study.[27,28] However, since there were so many methodological variations between the earlier study and the present one, a direct comparison could not be performed. First, the current study contrasted bilateral simultaneous TKR with unilateral TKR, whereas a prior study compared bilateral simultaneous unicompartmental knee arthroplasty with unilateral TKR. Second, whereas the present study evaluated outcomes at 1 month following surgery, a previous study did so at 6 months.

The most popular and effective surgical procedure to relieve pain and enhance function in patients with advanced osteoarthritis is TKR.[20,21] Before deciding on surgical intervention, a number of criteria should be taken into account, including the patient's age, severity, symptom duration, pre-operative medical status, and unilateral or bilateral

involvement.[28] Rheumatoid arthritis, OA, and traumatic arthritis are the most frequent causes of TKR.[28]

It has been advised that patients have simultaneous bilateral TKR surgery to reduce the risk of problems, extend rehabilitation, lengthen hospital stays, increase blood transfusions, and increase the number of uncomfortable postoperative days.[28] However, it has been demonstrated that these parameters are much better in patients who have phased arthroplasty surgery.[29] Although a number of studies suggested that patients undergoing simultaneous bilateral TKR surgery frequently have postoperative medical issues,[30,31] other research found comparable rates of difficulties.[32,33]

It is commonly known that TKR helps people with knee OA feel less pain and function better physically. Similar to earlier investigations, the current study found that both simultaneous bilateral or unilateral TKR groups experienced less intense pain and increased physical function. Statistics and clinical analysis showed that the changes in pain severity and physical function were bigger than the previously reported least clinically relevant difference.[34,35]

There are various potential weaknesses in the current study. A subjective self-report functional measure called LEFS was used in the current investigation to evaluate physical function. Wide-ranging physical function could be evaluated using an objective outcome metric. To learn more about functional recovery in this population, for instance, various performance-based outcome measures like the timed up and go test and the stair ascending test could be applied. Furthermore, the current study only evaluated function and discomfort. Future research should take into account additional significant outcome indicators such as ambulation, muscle strength, mobility, range of motion, and quality of life. Because the scope of this study was limited to concurrent bilateral or unilateral TKR in patients with end-stage OA, it may have limited the applicability of its findings to other kinds of replacement operations.

**Conclusion**

The use of simultaneous bilateral TKR in patients with bilateral knee osteoarthritis is suggested since its costs and recovery time could be shortened compared to bilateral staged TKR. Simultaneous bilateral TKR was associated with similar reduction of pain intensity and recovery of function compared to unilateral TKR.

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