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Intraoperative & immediate post-operative outcome of unilateral versus sequential bilateral total knee Arthroplasty

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Abstract

Background: The primary objectives of TKA are often pain relief. Present study was conducted to compare the intra & post-operative outcomes of unilateral versus sequential bilateral total knee Arthroplasty (TKA) for the treatment of primary knee end stage Osteoarthritis.

Material and methods: This retrospective study included 120 patients with primary Osteoarthritis from January 2019 to December 2020 at L.N.Medical College & J.K. Hospital, Bhopal, M.P.,India.

Results: Out of 60 subjects of unilateral TKA, duration of surgery was 50±10 min. Need for transfusion was in 3 subjects.

Out of 60 subjects of sequential bilateral TKA, duration of surgery was 110±10 min. Need for transfusion was in 10 subjects.

Requirement of Analgesia was significantly more in subjects with sequential bilateral TKA group for higher analgesia rate, extension of epidural requirement & more Inj. PCM & Tramadol dose.

Hospital stay was average 5 days in both groups.

Out of 60 subjects of unilateral TKA, myocardial infection was seen in 1(1.7%) subject, superficial infection in 5(8.3%) subjects, deep infection in 2 (3.3%)subjects, deep vein thrombosis in 3 (5%)subjects, urinary infection in 6 (10%) subject.

Out of 60 subjects of sequential bilateral TKA, myocardial infection was seen in 1 (1.7%) subject, superficial infection in 8 (1(3.3%)3.3%)subjects, deep infection in 4 (6.7%)subjects, deep Vein thrombosis in 6 (10%) subjects, urinary infection in 8 (13.3%)subjects.

Conclusion: Sequential bilateral TKA is the best option for patient with symptomatic bilateral knees.

Keywords: Total knee Arthroplasty, Primary Osteoarthritis, Sequential, bilateral, unilateral

Introduction

Patients with OA experience significantly greater pain and functional deficits during normal daily activities. It leads to a loss of productivity and worsening quality of life.[1]

Many conservative treatment modalities are available for the management of mild-to-moderate OA. But end-stage arthritis of the knee is best managed with total knee Arthroplasty (TKA).[2]

Total knee replacement (TKA) is currently the procedure of choice in advanced stages of OA as there is considerable reduction in pain, improvement in function and Quality of life (QOL) and low rate of comorbidity.[2]

Most patients exhibit degenerative changes in both their knees so they need bilateral TKR.[3]

In recent years, TKA is experiencing unprecedented development. The collaboration between surgeons and engineers produced many developments in the design of the prosthesis, from the traditional resurfacing prostheses to the constrained prostheses and meniscal bearing prostheses.[4]

Preoperative patient education programs are taken to improve patient compliance and outcomes. Patient education about proper self-care, rehabilitation and consultation with psychologists, physiotherapists, and physicians is done.[5]

The advantages of having a simultaneous procedure include reduced cost, exposure to the risk of only one anesthetic, earlier return to baseline functionality and convenience for the patient.[6]

However, having a simultaneous TKA causes a stress response and the response is directly related to the proportion of anesthetics. Previous studies have investigated differences in responses to staged bilateral and simultaneous bilateral TKA in terms of short-term discomfort, morbidity and mortality, and cost-effectiveness. There is no evidence-based guideline regarding the optimal choice between simultaneous vs. staggered vs. staged bilateral TKA.7

Routinely resurfacing of the patella allows better stair climbing, raising from a chair and avoids a later rescue procedure for persistent anterior knee pain.[8]

The goal of TKA is to provide a stable painless knee with adequate ROM for daily activities.[9]

This study is mainly performed to compare unilateral versus sequential bilateral TKA. Intraoperative & immediate postoperative outcomes are assessed.

Aims and Objectives

-To compare the intaoperative & immediate post operative outcomes of unilateral versus sequential bilateral total knee Arthroplasty (TKA) for the treatment of Primary Knee end stage Osteoarthritis.

Material & methods

This retrospective observational study included 120 patients undergoing TKA in the department of Orthopedics from January 2019 to December 2020 at L.N.Medical College & J.K. Hospital, Bhopal, M.P.,India. They were divided into two groups. Group 1 operated with unilateral TKA and group for sequential bilateral TKA under single anesthetic procedure and by the same surgeon and the same anesthetist. Details of patients were obtained from medical records.

Inclusion criteria

-Patients with severe end stage bilateral symptomatic knee osteoarthritis of either sex between 50-80 years

-Patients with low risk of anesthesia i.e. ASA grade 1 and 2

Exclusion criteria

-Age less than 50 years & with pre-operative Hb less than 10

Patients with ASA grade 3 and 4, Significant cardiac co morbidities

-Previous history of thromboembolism

-Uncontrolled diabetes, -Malignant hypertension

-Chronic obstructive Airway disease of high grade

-Previous knee infection

-Revision TKA, -Known Rheumatoid Arthritis of knee

The data was collected from medical records. Data was statistically analyzed using (SPSS STATA version 10.1, 2011.

Results

Table 1: Age distribution of study subjects

Age distribution	No. of study subjects of Unilateral TKA n=60	No. of study subjects of bilateral TKA n=60
50-60 years	9 (15%)	04 (6.7%)
60-70 years	33 (55%)	39 (65%)
70-80 years	18 (30%)	17 (28.3%)

In present study, out of 120 subjects, 60 who had unilateral TKA, 9 (15%) were in 50-60 years age group, 33 (55%) were in 60-70 years age group while 18 (30%) were in 70-80 years age group. (Table 1)

Out of 60 subjects who had sequential bilateral TKA, 4 (6.7%) were in 50-60 years age group, 39 (65%) were in 60-70 years age group while 17 (28.3%) were in 70-80 years age group.

Thus, age distribution of subjects was comparable p=0.294 & majority in 60-70 years age group. (Table 1)

Table 2: Sex distribution of study subjects n=120

Sex distribution	No. of study subjects of Unilateral TKA n=60	No. of study subjects of bilateral TKA n=60
Males	22 (36.7%)	24 (40%)
Females	38 (63.3%)	36 (60%)

In present study, out of 120 subjects, 60 who had unilateral TKA, 22 (36.7%) were males & 38 (63.3%) were females.

Out of 60 subjects, 60 who had sequential bilateral TKA, 24 (40%) were males & 36 (60%)were females.

Female dominance was observed but gender distribution was similar in both the groups. (p=0.707) (Table 2)

Table 3: Intra-operative parameters

Intra-operative parameters	Study subjects of bilateral TKA n=60	Study subjects of sequential bilateral TKA n=60	P value
Duration of surgery	50±10 min	110±10 min	0.0496 significant
Need for transfusion	3	10	0.0398 significant
Fall in Hb	1.5±0.5 gm%	1.7±0.6 gm%	0.0001 significant

In present study, out of 120 subjects, 60 who had unilateral TKA, duration of surgery was 50±10 min. Need for transfusion was there in 3 subjects. Mean fall in hemoglobin level was 1.5±0.5 gm%.

In present study, out of 120 subjects, 60 who had sequential bilateral TKA, duration of surgery was 110±10 min. Need for transfusion was there in 10 subjects. Mean fall in hemoglobin level was 1.7±0.5 gm%.

Intra-operative parameters liked duration of surgery need for transfusion & fall in Hb were statistically highly significant in sequential bilateral TKA group than unilateral TKA group.

But these parameters were for both the knees. So for each knee less time & less blood loss was there. (Table 3)

Table 4: Requirement of Analgesia in study subjects

Requirement of Analgesia	No. of study subjects of unilateral TKA n=60	No. of study subjects of bilateral TKA n=60	P value
Higher analgesia rate	5 (8.3%)	16 (26.7%)	0.0082 significant
Extension of epidural needed	0 (0%)	8 (13.3%)	0.0034 significant
More Inj. PCM & Tramadol dose	2 (3.3%)	12 (20%)	0.0045 significant
Oral pain killers needed	4 (6.7%)	7 (11.7%)	0.3426 Not significant

In present study, out of 120 subjects, 60 who had unilateral TKA, higher analgesia rate was required in 5 (8.3%) subjects, extension of epidural was not needed in any subject, more amount of Inj. PCM & Tramadol dose was required in 2 (3.3%) subjects while Oral pain killers were needed in 4 (6.7%) subjects.

In present study, out of 120 subjects, 60 who had sequential bilateral TKA, higher analgesia rate was required in 16 (26.7%) subjects, extension of epidural was needed in 8 (13.3%) subjects, more amount of Inj. PCM & Tramadol dose was required in 12 (20%) subjects while Oral pain killers were needed in 7 (3.3%) subjects. (Table 4)

Requirement of Analgesia was found significantly more in subjects with sequential bilateral TKA group than unilateral TKA group for three parameters namely higher analgesia rate, extension of epidural requirement & more Inj. PCM & Tramadol dose requirement. But there was no significant difference in the requirement of oral pain killers in two groups. (Table 4)

Table 5: Post-operative mobilization & hospital stay of study subjects

Post-operative mobilization & hospital stay	No. of study subjects of unilateral TKA	No. of study subjects of bilateral TKA
Mobilization	1st postoperative day	3rd postoperative day
Hospital stay	5 days	7-8 days

In present study, out of 120 subjects, 60 who had unilateral TKA, good post-operative mobilization was seen in 40 subjects. Hospital stay was average 5 days.

In present study, out of 120 subjects, 60 who had sequential bilateral TKA, good post-operative

mobilization was seen in 45 subjects. Hospital stay was average 7-8 days. (Table 5)

Table 6: Post-operative Complications in study subjects n=120

Post-operative Complications	No. of study subjects of unilateral TKA n=60	No. of study subjects of bilateral TKA n=60	P value
Myocardial infection	1 (1.7%)	1 (1.7%)	1.0 Not significant
Pulmonary embolism	0	0	
Cerebro vascular accidents	0	0	
Deep infection	2 (3.3%)	4 (6.7%)	0.4022 Not significant
Superficial infection	5 (8.3%)	8 (13.3%)	0.3782 Not significant
Deep Vein thrombosis	3 (5%)	6 (10%)	0.2985 Not significant
Urinary infection	6 (10%)	8 (13.3%)	0.5695 Not significant

In present study, out of 120 subjects, 60 who had unilateral TKA, myocardial infection was seen in 1(1.7%) subject, superficial infection was seen in 5(8.3%) subjects, deep infection was seen in 2 (3.3%)subjects, deep vein thrombosis was seen in 3 (5%)subjects, urinary infection was seen in 6 (10%) subject, pulmonary embolism & cerebrovascular accidents in none of the subjects.

In present study, out of 120 subjects, 60 who had sequential bilateral TKA, myocardial infection was seen in 1 (1.7%) subject, superficial infection was seen in 8 (1(3.3%) 3.3%)subjects, deep infection was seen in 4 (6.7%)subjects, Deep Vein thrombosis was seen in 6 (10%) subjects, urinary infection was seen in 8 (13.3%)subjects, pulmonary embolism & cerebrovascular accidents in none of the subjects.

There was no statistically significant difference (p value >0.0005) in all parameters of post-operative complications in sequential bilateral TKA group and unilateral TKA group. (Table 6)

Discussion

In present study, out of 120 subjects, 60 who had unilateral TKA, 9 (15%) were in 50-60 years age group, 33 (55%) were in 60-70 years age group while 18 (30%) were in 70-80 years age group. Out of 120 subjects, 60 who had sequential bilateral TKA, 4 (6.7%) were in 5060 years age group, 39 (65%) were in 60-70 years age group while 17 (28.3%) were in 70-80 years age group.

Thus, age distribution of subjects was comparable p=0.294. (Table 1)

Kumar MM et al found that mean age was 65.2 years (range, 45-80 years). [10]

In present study, out of 60 subjects of unilateral TKA, 22 (36.7%) were males & 38 (63.3%) were females. Out of 60 subjects of sequential bilateral TKA, 24 (40%) were males & 36 (60%) were females.

Though female dominance was observed but gender distribution was found similar in both the groups. (p=0.707) (Table 2)

Kumar MM et al found that in their study, 66 were females and 29 males. 25 cases were performed as bilateral procedures.[10]

In present study, Intra-operative parameters like duration of surgery, need for transfusion & fall in Hb were statistically highly significant in sequential bilateral TKA group than unilateral TKA group. But these parameters were for both the knees. Less blood loss was there. (Table 3)

Sharma RK et al found that mean surgical time in Group A (simultaneous bilateral TKA) and Group B (staged bilateral TKA) were 208.17 and 217.3 minutes, respectively. This difference was not statistically significant (p value 0.7485). [11]

Sharma RK et al found that mean blood loss in group A was 765.5 ml and in Group B was 1090.8 ml. This difference was statistically significant (p value <0.001). The average blood transfusion rate for Group A and Group B were 39.4 % and 18.1%, respectively. This difference was statistically significant (p value <0.0001). In this study, [11]

Steimle JA et al found that duration of surgery was similar between the two groups. 99 minutes for standard and 102.2 minutes for PSI.[12]

Steimle JA et al found that intraoperative blood loss was slightly less for standard instrumentation i.e. 253.8 mL versus PSI, 275 mL. The change in hemoglobin from preoperative to postoperative day 1 and 2 was similar i.e. 3.14 and 1.31for standard instrumentation and 3.07 and 1.14 for PSI, respectively. 48.39% of the PSI group did not require 1 transfusion. 38.78% of the standard group and 45.16% of the PSI group required 2 units of PRBCs. 10.20% of the standard group required >2 units of PRBCs, while only 3.23% of the PSI group required >2 units of PRBCs.[12]

In present study, requirement of Analgesia was found significantly more in subjects with sequential bilateral TKA group than unilateral TKA group for three parameters namely higher analgesia rate, extension of epidural requirement & more Inj. PCM & Tramadol dose requirement. But there was no significant difference in the requirement of oral pain killers in two groups. (Table 4)

Steimle JA et al found that mean morphine milligram equivalent was identical between the two groups from surgery to 48 hours postoperatively. The MME for the 48 hours postoperatively for the standard group was 68.7 mg and was 66.1 for the PSI group.[12]

In present study, out of 60 subjects of unilateral TKA, good post-operative mobilization was seen in 40 subjects. Out of 120 subjects, 60 who had sequential bilateral TKA, good post-operative mobilization was seen in 45 subjects. (Table 5)

Pushkarma VA et al found that range of motion in study subjects was better in staggered group specially in second knee compared to first one.[13]

In present study, out of 60 subjects of unilateral TKA, myocardial infection was seen in 1(1.7%) subject, superficial infection was seen in 5(8.3%) subjects, deep infection was seen in 2 (3.3%)subjects, deep vein thrombosis was seen in 3 (5%)subjects, urinary infection was seen in 6 (10%) subject, pulmonary embolism & cerebrovascular accidents in none of the subjects. Out of 120 subjects, 60 who had sequential bilateral TKA, myocardial infection was seen in 1 (1.7%) subject, superficial infection was seen in 8 (1(3.3%)3.3%)subjects, deep infection was seen in 4

(6.7%)subjects, deep Vein thrombosis was seen in 6 (10%) subjects, urinary infection was seen in 8 (13.3%)subjects, pulmonary embolism & cerebrovascular accidents in none of the subjects.

There was no statistically significant difference (p value >0.0005) in all parameters of post operative complications in both groups. (Table 6)

Pushkarma VA et al found the complication rate higher in a simultaneous group with 11%. Re-admission rate was higher in a simultaneous group with 9%. In staggered and staged TKA, it was 5%.[13]

Conclusion

The duration of surgery in bilateral TKAs is higher as compared to unilateral TKR. But per knee duration is lower. The average hospital stay & post-operative complications for both the groups were found similar. Sequential bilateral TKA is equally safe & effective in comparison with unilateral TKA. Hence patient can get operated for both knees within the time taken for a single knee without extra complications.

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