



## Functional outcomes of simultaneous bilateral versus unilateral total knee arthroplasty.

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**ABSTRACT... Objectives:** The purpose of this study was to analyze whether SBTKA provides equivalent reduction in pain and functional outcome as comparable with unilateral surgeries (UTKA). **Study Design:** Cross sectional study. **Setting:** Ghurki Trust Teaching Hospital, Lahore, Pakistan. **Period:** January 2013 and July 2016. **Material & Methods.** 637 TKAs in 386 consecutive patients, who underwent total knee arthroplasty for bilateral knee osteoarthritis between Patients were split into 2 groups: those who underwent unilateral TKA (n=135) and those who underwent simultaneous bilateral TKA (n=251). Knee range of motion, Knee Society Scores (KSS) and knee function scores were obtained preoperatively and 2 or more years postoperatively. **Results:** Mean±SD flexion was 111.6°± 8.6° for patients in the bilateral group and 110.8°± 9.02° for patients in the unilateral group (p=0.34). Mean±SD KSS was 86.4 ± 9.3 in the bilateral group and 85.34 ± 10.5 in the unilateral group (p=0.236). Mean±SD function score was 83.4± 5.4 in the bilateral group and 80.90 ± 7.2 in the unilateral group (p<0.0001). **Conclusion:** In properly selected patients deemed fit for bilateral knee surgery, SBTKA provides significantly better functional outcomes compared to UTKA.

**Key words:** Functional Outcome Pakistan, Simultaneous Bilateral Total Knee Arthroplasty, Unilateral.

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## INTRODUCTION

Over the past several decades, total knee arthroplasty (TKA) has proved to be an effective intervention that improves quality of life, reduces pain and increases functional capacity in patients with end stage knee arthritis. Knee arthritis typically involves both knees and patients have the option of undergoing replacement simultaneously or in a staged manner.<sup>1,2</sup> Simultaneous bilateral TKA offers advantages of reduced hospital stay and cost of procedure as well as better functional outcome and earlier rehabilitation without additional risk of peri-operative surgical complications.<sup>3-5</sup> Conversely, opponents of SBTKA argue that the procedure has higher risk deep venous thrombosis, pulmonary embolism and death as well as difficulty in rehabilitation compared to staged bilateral TKA.<sup>6</sup> It has been hypothesized SBTKA is a lengthy surgery and could potentially result in technical errors in second operated knee.<sup>7</sup> When given the option,

the majority of patients will opt for SBTKA.<sup>8,9</sup>

The functional outcomes of total knee arthroplasty are assessed and reported using a variety of scoring systems including SF-36 Health Survey, Oxford Knee Score (OKS), Western Ontario and McMaster University Osteoarthritis Index (WOMAC) and Knee Society Score (KSS). Originally introduced in 1989, the Knee Society Score has been the most popular method of tracking and reporting outcomes after total knee arthroplasty worldwide. To overcome the challenges of validity of original scoring system in contemporary practice, Knee society embarked on completely revamping it in 2011. The objective knee score, completed by the surgeon, includes an assessment of alignment, ligament stability, and range of motion. The functional component of the score is a patient-rated survey of satisfaction related to standard activities of daily living, patient-specific sports and recreational activities.<sup>10</sup>

In the absence of level 1 prospective data, multiple meta-analysis and consensus groups have failed to draw strong recommendations regarding the indications, safety, and utility of simultaneous bilateral TKA.<sup>8,11</sup> The purpose of this study was to analyze and compare SBTKA and UTKA in terms of post-operative pain and functional outcomes in terms of Knee Society Scores.

## MATERIAL & METHODS

This study is a retrospective review of 637 total knee arthroplasties in 386 patients operated at our institute between January 2013 and December 2016. Only patients with primary osteoarthritis and minimum 2 years follow-up were included. Exclusion criteria was defined as patients with inflammatory or posttraumatic arthritis, valgus knees and previous surgery around knee joint.

For comparison patients were split into 2 groups: 135 UTKAs and 251 SBTKAs. All patients had their knee range of motion, Knee society scores and knee function scores measured preoperatively and at 2 years follow-up. Age, knee range of motion, knee society scores and function scores were shown as mean  $\pm$  standard deviation and compared between groups using independent sample t-test.

### Surgical Technique

All the surgeries were done under epidural anesthesia. Traditional medial parapatellar approach under tourniquet control was used for exposure. An intramedullary guide was used in cuttings for femoral surfaces, and an extramedullary guide for tibial surfaces. A posterior cruciate ligament– substituting prosthesis (NexGen Legacy; Zimmer, Warsaw, Indiana) was used in all cases. Second knee was started after closure and dressing of first knee. Same post-operative rehab protocol was employed for all patients.

## RESULTS

Our study included 229 (59.3%) women and 157 (40.7%) men with a mean age of  $61.2 \pm 7.9$  years. The groups did not differ in baseline characteristics like age, body mass index, preoperative range of motion, Knee society score or function score.

Mean  $\pm$  SD flexion was  $111.6^\circ \pm 8.6^\circ$  for patients in the bilateral group and  $110.8^\circ \pm 9.02^\circ$  for patients in the unilateral group ( $p=0.34$ ). Mean  $\pm$  SD KSS was  $86.4 \pm 9.3$  in the bilateral group and  $85.34 \pm 10.5$  in the unilateral group ( $p=0.236$ ). Mean  $\pm$  SD function score was  $83.4 \pm 5.4$  in the bilateral group and  $80.90 \pm 7.2$  in the unilateral group ( $p<0.0001$ ).

	UTKA (n=135)	SBTKA (n=251)	
Range of motion	$110.8 \pm 9.02$	$111.6 \pm 8.6$	0.34
KSS-Objective score	$85.34 \pm 10.5$	$86.4 \pm 9.3$	0.236
KSS-Function score	$80.9 \pm 7.2$	$83.4 \pm 5.4$	0.0001

**Table-I. Comparison of functional outcomes after simultaneous bilateral and unilateral total knee arthroplasty.**

## DISCUSSION

Simultaneous bilateral TKA is a controversial topic amongst orthopedic community. The utility of SBTKA versus UTKA should be assessed objectively in terms of its cost, complications, and outcome.<sup>9</sup> Cost of procedure plays a decisive role in patient's decision making process whilst choosing SBTKA versus UTKA. In multiple studies, cost of SBTKA has been reported to be lower than staged UTKA due to single anesthesia, single hospital admission and lesser number of days in hospital.<sup>1,12</sup> Another significant contribution to total cost of procedure comes from the cost of postoperative rehabilitation of two knees separately which is far higher in staged UTKA.<sup>9</sup> From a developing nation's perspective, where patients themselves are primary payers of medicare services, cost-effectiveness of SBTKA has a unique appeal for patients.

Complications associated with TKA form the second important aspect of surgery. In their meta-analysis comparing staged bilateral vs. unilateral vs. simultaneous bilateral TKA, Restrepo et al.<sup>11</sup> Reported a higher risk of mortality, cardiac and pulmonary complications and deep venous thrombosis in SBTKA patients. With regards to DVT, aforementioned findings by Restrepo et al.<sup>11</sup>

have been refuted by Soudry et al.<sup>13</sup> and Bullock et al.<sup>14</sup> In all the published literature, the post-operative mortality from bilateral TKA in all studies has been extremely low, ranging from 0.96% in SBTKA to 0.35% in UTKA.<sup>15</sup> In SBTKA group, higher risk of mortality is reported in older patients with pre-existing cardiopulmonary disease.<sup>16</sup> Therefore a careful selection of patients for SBTKA is warranted. Other investigators such as Yoon et al.<sup>17</sup> and Ritter et al.<sup>12</sup> have found no difference in the complication rates between the two groups. However, several authors have reported higher intraoperative blood loss to be associated with SBTKA.<sup>5,9</sup> In our study, transfusion need was 1.5-fold greater in the SBTKA group.

Third most important aspect of surgery is comparison of SBTKA and UTKA in terms of functional outcome. The results of this study have not only shown a statistically insignificant difference between the two groups (SBTKA vs. UTKA) in terms of postoperative pain, as represented by KSS ( $P=0.236$ ) but also a higher functional outcome associated with simultaneous bilateral TKA ( $83.4\pm 5.4$  vs.  $80.9\pm 7.2$ ,  $p<0.0001$ ). Literature review on comparison of functional outcomes between UTKA and SBTKA yielded support for all three possibilities; from one extreme of UTKA giving higher functionality compared to SBTKA<sup>3,8,11</sup>, to the 2 procedures having no difference<sup>4,8,11,18,19</sup> and to the other extreme of SBTKA superiority over UTKA.<sup>8,9,20</sup>

## CONCLUSION

Although conclusions from our study are limited by retrospective design and short follow-up, we recommend that in properly selected patients deemed fit for bilateral knee surgery, SBTKA provides significantly better functional outcomes compared to UTKA.






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## REFERENCES

- Borges JHS, Lobo Junior P, Dias DM, Silva M, Freitas A, Araujo T. **Cost and safety evaluation of simultaneous bilateral total knee arthroplasty versus unilateral knee.** Rev Bras Ortop (Sao Paulo). 2019; 54(6):709-13.
- Huang YH, Lin C, Yang JH, Lin LC, Mou CY, Chiang KT, et al. **No difference in the functional improvements between unilateral and bilateral total knee replacements.** BMC musculoskeletal disorders. 2018; 19(1):87.
- Haddad B, Khan W, Mehta V, Mbubaegbu C, Qamar A. **Bilateral simultaneous total knee arthroplasty: A patient-matched retrospective observational study.** The open orthopaedics journal. 2015; 9:499-503.
- Latifi R, Thomsen MG, Kallelose T, Husted H, Troelsen A. **Knee awareness and functionality after simultaneous bilateral vs unilateral total knee arthroplasty.** World journal of orthopedics. 2016; 7(3):195-201.
- Hart A, Antoniou J, Brin YS, Huk OL, Zukor DJ, Bergeron SG. **Simultaneous bilateral versus unilateral total knee arthroplasty: A comparison of 30-day readmission rates and major complications.** The Journal of arthroplasty. 2016; 31(1):31-5.
- Bohm ER, Molodianovitch K, Dragan A, Zhu N, Webster G, Masri B, et al. **Outcomes of unilateral and bilateral total knee arthroplasty in 238,373 patients.** Acta orthopaedica. 2016; 87 Suppl 1:24-30.
- Seo JG, Lee BH, Moon YW, Chang MJ, Park SH. **Disparate postoperative results in the first and second knees on simultaneous bilateral total knee arthroplasty.** The Journal of arthroplasty. 2014; 29(12):2331-6.
- Ritter MA, Harty LD, Davis KE, Meding JB, Berend M. **Simultaneous bilateral, staged bilateral, and unilateral total knee arthroplasty. A survival analysis.** The Journal of bone and joint surgery American volume. 2003; 85-a(8):1532-7.
- Bagsby D, Pierson JL. **Functional outcomes of simultaneous bilateral versus unilateral total knee arthroplasty.** Orthopedics. 2015; 38(1):e43-7.
- Scuderi GR, Bourne RB, Noble PC, Benjamin JB, Lonner JH, Scott WN. **The new Knee Society Knee Scoring System.** Clinical orthopaedics and related research. 2012; 470(1):3-19.
- Restrepo C, Parvizi J, Dietrich T, Einhorn TA. **Safety of simultaneous bilateral total knee arthroplasty. A meta-analysis.** The Journal of bone and joint surgery American volume. 2007; 89(6):1220-6.
- Ritter MA, Harty LD. **Debate: Simultaneous bilateral knee replacements: the outcomes justify its use.** Clinical orthopaedics and related research. 2004(428):84-6.

13. Soudry M, Binazzi R, Insall JN, Nordstrom TJ, Pellicci PM, Goulet JA. **Successive bilateral total knee replacement.** The Journal of bone and joint surgery American volume. 1985; 67(4):573-6.
14. Bullock DP, Sporer SM, Shirreffs TG, Jr. **Comparison of simultaneous bilateral with unilateral total knee arthroplasty in terms of perioperative complications.** The Journal of bone and joint surgery American volume. 2003; 85-a(10):1981-6.
15. Oakes DA, Hanssen AD. **Bilateral total knee replacement using the same anesthetic is not justified by assessment of the risks.** Clinical orthopaedics and related research. 2004(428):87-91.
16. Kim YH, Choi YW, Kim JS. **Simultaneous bilateral sequential total knee replacement is as safe as unilateral total knee replacement.** The Journal of bone and joint surgery British volume. 2009; 91(1):64-8.
17. Yoon HS, Han CD, Yang IH. **Comparison of simultaneous bilateral and staged bilateral total knee arthroplasty in terms of perioperative complications.** The Journal of arthroplasty. 2010; 25(2):179-85.
18. Maniar RN, Baviskar JV, Singhi T, Maniar P, Nayak R. **Influence of bilateral sequential total knee arthroplasty on functional recovery.** Indian journal of orthopaedics. 2013; 47(1):23-30.
19. Ekinci Y, Oner M, Karaman I, Kafadar IH, Mutlu M, Argun M. **Comparison of simultaneous bilateral with unilateral total knee arthroplasty.** Acta orthopaedica et traumatologica turcica. 2014; 48(2):127-35.
20. Lim JB, Chou AC, Chong HC, Lo NN, Chia SL, Tay KJ, et al. **Are patients more satisfied and have better functional outcome after bilateral total knee arthroplasty as compared to total hip arthroplasty and unilateral total knee arthroplasty surgery? A two-year follow-up study.** Acta orthopaedica Belgica. 2015; 81(4):682-9.

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Sr. #	Author(s) Full Name	Contribution to the paper	Author(s) Signature
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2	Saad Ilyas	Data analysis, literature search and manuscript writing.	
3	Umair Nadeem	Literature search, manuscript writing.	
4	Ashfaq Ahmad	Literature search, manuscript writing.	
5	Shahzad Javed	Study design, manuscript editing and approval.	
6	Amer Aziz	Study design, manuscript editing and approval.	