

# Comparison of Bilateral and Unilateral Total Knee Arthroplasty in Iranian Hospital, Dubai

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## Abstract

**Background:** There have been many studies in the literature on the advantages and disadvantages of bilateral versus staged or unilateral knee arthroplasty. In this study, the results of bilateral and unilateral total knee arthroplasty cases during the past 3 years were compared.

**Methods:** The records of all cases undergoing total knee arthroplasty between March 2005 and February 2008 were studied retrospectively. There have been 62 patients (105 knees) operated, from seven different countries. Among these cases, 43 cases had bilateral TKA, from which 36 patients underwent simultaneous intervention, four patients had staged TKA with one-week gap and three cases were staged with one-year gap between interventions.

**Results:** Except for two cases of postoperative delirium (probably due to transient fat emboli) and three cases of transient renal impairment, there had been no complications in the simultaneous bilateral cases. The need of blood transfusion was significantly higher in simultaneous cases (1.7 unit/patient) compared to unilateral cases (0.6 unit/patient).

**Conclusion:** There were no major problems with the simultaneous bilateral total knee arthroplasty. In the case of bilateral varus deformity, the postoperative rehabilitation was easier and the patients were more satisfied. Moreover, considering the fact that most of our patients came from various countries, simultaneous total knee replacement effectively reduced the hospitalization costs and related expenses.

**Keywords:** Total knee arthroplasty; Simultaneous; Staged; Unilateral; Bilateral

## Introduction

Due to the growth of elderly population, the incidence of osteoarthritis and joint replacement has increased recently. The goal of total knee arthroplasty (TKA) is to relieve the pain, restore the function and provide stability. This is achieved by implanting a durable and predictable prosthetic design with anticipated long-term success. Arthropathy of the knee is often bilateral. It is a common practice to treat bilateral procedures with an interval of several weeks to months although simultaneous procedure has gained more popularity these days.<sup>1</sup> Approximately one-third of all patients with primary unilateral knee arthroplasty also suffer symptomatic disease on the opposite joint. Bi-

lateral total knee arthroplasty can offer long-term relief for patients who suffer from pain and functional limitations in both knees.

## Materials and Methods

From March 2005 until February 2008, 62 patients (105 knees) underwent total knee arthroplasty.

All the procedures were performed by a single specialist and the pre- and post-operative protocols were identical. In simultaneous bilateral TKA, one instrumentation set was used. The implant used mostly was posterior stabilized (PS) SCORPIO- FLEX (Stryker). In cases with less deformity and pathology on one side, cruciate retaining (CR) was used. Resurfacing the patella was not routinely done. However, in two cases, we had to resurface the patella due to severe patellofemoral joint mal-alignment.

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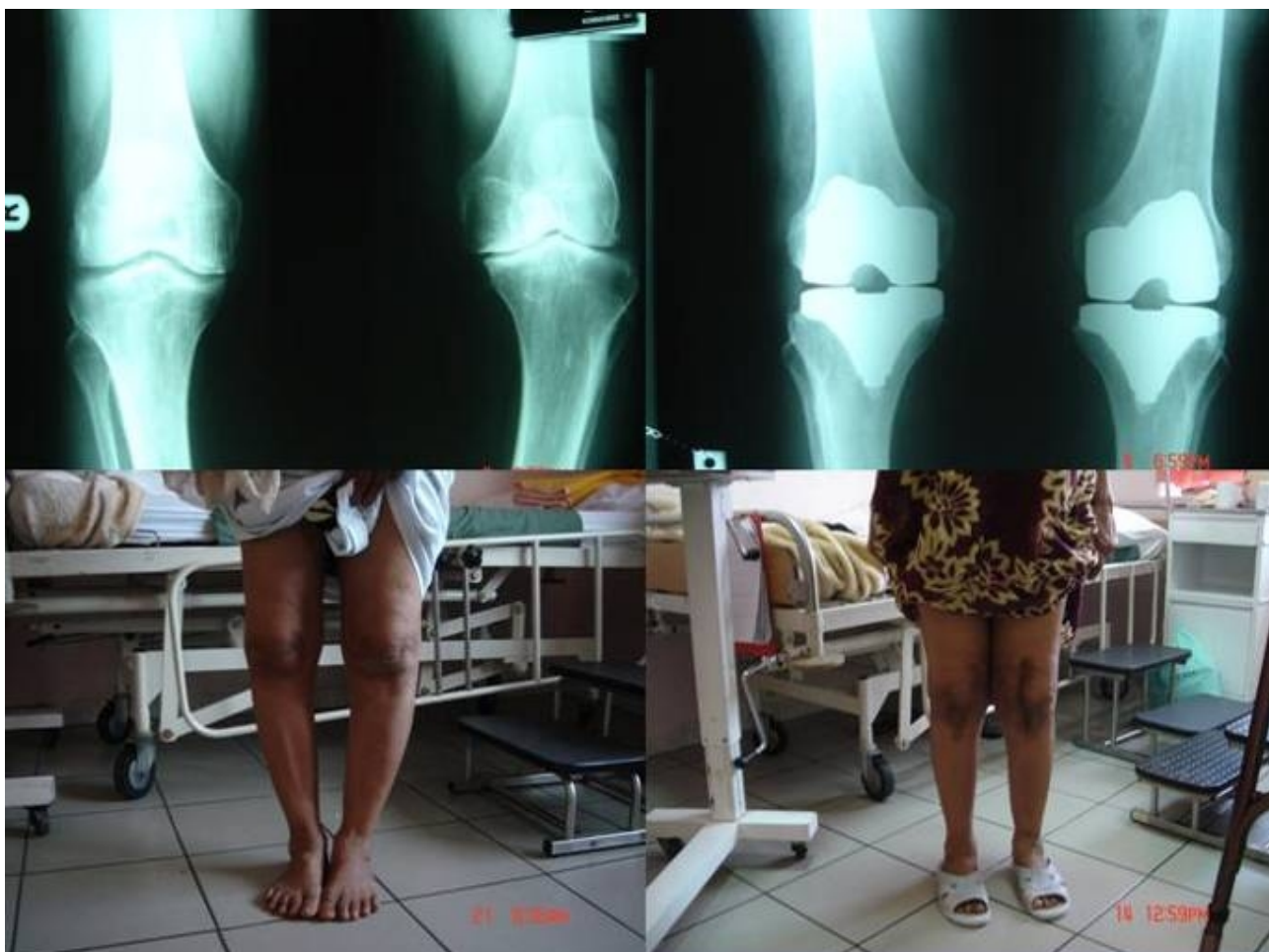
The criteria for simultaneous operation were general fitness and willingness of the patient especially in bilateral deformity cases (Figures 1-3). T test was used to compare the two means and p value less than 0.05 was considered significant.

### Results

Among these 62 patients, there were 34 females and 28 males. The mean age of the patients was 65 years (ranging from minimum 52 to 88 years old). Twenty-four patients were from Africa and 38 from the Middle East. Nineteen patients had unilateral TKA and the other 43 had bilateral TKA, simultaneous or staged. There had been no complications

in the simultaneous bilateral cases except for two cases of postoperative delirium due probably to transient fat emboli and three cases of renal impairment, which improved with prompt rehydration. This problem did not occur in unilateral or staged cases. The one knee that got infected was the first side in a simultaneous bilateral TKA. The need for blood transfusion was significantly higher in simultaneous procedure, 1.7 unit/patient, compared to unilateral or staged operation, 0.06 unit/patient ( $P<0.001$ ).

The sum of direct expenses for simultaneous bilateral cases was about 30% less than that for two individual admissions; considering the indirect expenses (like visa, hotel, flight, etc.) for the patient who came from abroad which was near 50% less.



**Fig 1:** A 62-year-old woman from Yemen who underwent a bilateral simultaneous TKA using Scorpio-Flex PS. As you notice, the varus deformity is effectively corrected.



**Fig 2:** A 72-year-old Iranian man who had difficulty in standing and walking. Postoperative images show effective correction of the deformity.



**Fig 3:** This 75-year-old man from Somalia could not stand without aid. After the operation, the patient can stand by his own and the varus deformity is effectively corrected.

## Discussion

As bilateral varus deformity is very common in this region, a unilateral TKA can not correct the gait and the resultant limb length discrepancy (LLD) makes their gait even worse. Therefore, in this situation bilateral simultaneous or staged procedure is advised. Compared with the staged procedures with an interval months apart, our patients benefited from coming into the hospital and being discharged only once. Moreover, rehabilitation after the first procedure is not held up by existing deformity of the opposite side awaiting a second procedure. Our findings support the practice of simultaneous or staged sequential arthroplasty with a short interval during one hospital admission.

Hospital stay is a major contributing factor in the overall costs of joint replacement. Considering that most of our patients came from nearby countries, the indirect expenses including visa, hotel and flights made simultaneous bilateral TKA a very attractive choice.

Medline reviews of other studies revealed that staged bilateral TKA had generally better results than simultaneous and unilateral TKA too. This might be due to the fact that in staged cases, the second knee will be operated only if both the patient and the surgeon were satisfied with the results of the first intervention. Another fact is that the more recent the study, the more bilateral TKA is advised.

Barret and Al studied 122,385 cases retrospectively with a TKA in 2000 cases all over the USA (level of evidence 3). They noticed that the rate of pulmonary emboli in the first 3 months postoperation was higher in simultaneous (1.44%) than in unilateral (0.81%) interventions. Moreover, the sum of the risks in two staged operations may be equal or exceed the risk of simultaneous operations.<sup>2</sup>

In terms of perioperative complications, Bullock *et al.* found that after bilateral arthroplasties, the rates of complications, including myocardial infarction, postoperative confusion, and the need for intensive monitoring were higher. However, the thirty-day and one-year mortality rates and the risks of pulmonary embolism, infection, and deep venous thrombosis were similar for both the unilateral and bilateral procedures.<sup>3</sup>

Hutchinson *et al.* compared simultaneous with staged or unilateral TKA on a series of 1304 patients (1867 knees). The bilateral cases had a significantly higher rate of complications than unilateral ones, especially thromboembolic problems, but with no added mortality. Among bilateral cases, simultaneous ones had no increased risk over the staged procedures. The

author recommends simultaneous bilateral TKA as it is a safe and successful procedure.<sup>4</sup>

In several studies, the rate of postoperative complications in primary unilateral TKA has been compared with the complications encountered in simultaneous and staged bilateral TKA.

Christopher *et al.* in his retrospective study on 332 TKA from Iowa Hospital found that in simultaneous and staged cases there were 2.5 times more complications than the in the staggered ones (within the same hospital admission but at 4-7 days interval). The major complications were death, return to operating room, myocardial infarction, pulmonary emboli; the minor complications were represented by postoperative confusion, acute delirium atrial fibrillation, deep vein thrombosis and urinary tract infection.<sup>5</sup>

In their studies, Lombardi *et al.*, Lane *et al.*, Nancy *et al.*, and Soundry *et al.* similar results were observed revealing a higher rate of postoperative complications in simultaneous procedures than in primary unilateral TKA cases.<sup>6-9</sup>

Nancy *et al.* compared 98 bilateral and 98 unilateral TKA after matching the age, sex, and medical condition in patients older than 80 years of age. Considering that elderly patients may not have the reserve to manage the fluid shifts that occur after bilateral procedure, and that the embolic load after a bilateral procedure may be responsible for the higher incidence of acute delirium, a staged procedure might be considered in elderly patients particularly in those with demonstrable preexisting cardiac dysfunction. Still, on patients over 80 years old, age itself is a very strong risk factor regardless of unilateral or bilateral operation. Therefore, a staged procedure might be considered in elderly patients.<sup>8</sup>

In his study, Foster *et al.* compared simultaneous bilateral TKA with staged at one-week interval and bilateral cases with two separate hospital admissions. All of the operations were done by one doctor using the same type of implant. There has been a noticeably lower rate of complications and good clinical outcomes in all groups at a mean follow-up of four years. The group staged at a one-week interval had the least blood loss ( $P=0.004$ ).<sup>10</sup>

Although the general more recent studies recommend simultaneous bilateral procedure, there are studies that confirm the higher risk of serious cardiac complications, pulmonary complication and mortality in simultaneous bilateral total knee replacement than in unilateral or staged bilateral arthroplasty.<sup>11</sup> Simultaneous bilateral TKA subjects patients to more difficult and

painful functional recovery and increased risk of hemodynamic complications than staged bilateral TKA.<sup>11</sup>

Hashimi *et al.* compared the staged procedures and stated that staged sequential arthroplasty with 7 days interval during one hospital admission is more efficient as it facilitates earlier rehabilitation without higher complication rates, and shorter hospital stays.<sup>1</sup>

Decision of bilateral TKA depends on patient preference through informed choice. We did not have any major complication in bilateral TKA. In the case of bilateral varus deformity, the postoperative rehabilitation was easier and the patients were more satisfied. In addition, taking into account that most of our

patients came from various countries, simultaneous total knee arthroplasty or staggered procedure performed four to seven days apart during a single hospitalization effectively reduced the hospitalization costs and related expenses.

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