

ORIGINAL RESEARCH

Outcome analysis of patients who underwent bilateral total knee arthroplasty done in single stage Vs double stage-comparative study

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ABSTRACT

Introduction: Patients undergoing Total Knee Replacement (TKR) is increasing for the past few years. The safety and efficacy of bilateral simultaneous TKR has been an area of concern to most of the Orthopaedic surgeon. We used the Modified Enhanced Recovery for this study to evaluate the functional results to assess the early complications including mortality occurring after surgery. **Materials and Methods:** This is a prospective study of 100 knees (25 bilateral simultaneous TKR and 50 single knees) were included, managed between March 2016-February 2023. Preoperative, Intraoperative and Postoperative variables were analyzed at 2 weeks, 4 weeks, 90 days, 6 months and at 2 years. **Results:** Average age of participants was 64.5 years. Preop oxford knee score improved from 17.75 to 46 in two years. Average blood loss was 340 ml and total operative time was 168 minutes, patients stayed 5.8 days in hospital, no readmission/ infection. Two patients had deep vein thrombosis and four patient had urinary tract infection, most of the patients needed blood transfusion. Higher VAS and OKS preoperatively correlated for postoperative improvement. **Conclusion:** Bilateral simultaneous TKR yields decreased hospital stay, improvement in OKS, VAS score, one time anaesthesia risk, one-time hospital admission and lesser follow-up visits and has cheaper cost of surgery, fast recovery and decrease in overall morbidities. Hence, it could be chosen in prudently selected patients with bilateral knee osteoarthritis.

Keywords: Total Knee Replacement, mortality, morbidity, post-surgical, osteoarthritis knee

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INTRODUCTION

Total Knee Arthroplasty remains gold standard treatment method for reducing the pain and deformity and also for improving quality of life in osteoarthritis patients.^{1,2} Nevertheless, the safety and efficacy of performing simultaneous bilateral total knee replacement is a real concern. Age of the patient, stress for the patient and surgeon, duration of surgery, anaesthesia risk, co-morbidities, cost of surgery, perioperative and post-operative complications in patients undergoing this surgery influence the final outcome significantly. There is lack of universal consensus whether this Bilateral total knee replacement can be done simultaneously in previous days, but for the past few years there is an overwhelming increase of single staged bilateral total knee replacement. Enhanced

Surgical Recovery (ERS) protocols for safe surgical practices in various surgical specialties are evolving now.^{3,4,5} With existing myths and inhibition among surgeons, because of the question of patient safety and perioperative morbidity and mortality in performing this surgery.^{6,7,8} This study focused on performing this surgery in selected target population adapting to modified Enhanced Surgical Recovery (ERS) and evaluating its outcomes after surgery.^{9,10}

MATERIALS AND METHODS

This is a study of 100 cases of primary osteoarthritis knee of which 25 cases underwent simultaneous bilateral total knee replacement (Total 50 knees) and other 50 cases of single knee, admitted in the Department of Orthopaedics, Kilpauk Medical

College and Thoothukudi Medical College, Tamilnadu, India. They were divided into two groups- group A and group B.

Study design: Prospective study

Study Period: March 2016- February 2023

Study Population: 50 cases

INCLUSION CRITERIA

1. Age 55- 75 years
2. Both sexes
3. Those willing for surgery
4. Classification used: Kellegren Lawrence Scoring system.
5. Primary osteoarthritis

EXCLUSION CRITERIA

1. Morbidly obese individuals (BMI >40)
2. Preexisting post-polio deformity
3. Revision TKRs
4. Malunited intraarticular fracture patients

PREOPERATIVE EVALUATION

All patients selected were clearly explained about the purpose of this study and written informed consent to be a participant was obtained. All participants were pre-operatively evaluated thoroughly and carefully using ASA (American Society of Anesthesiologists).¹¹ Physical status classification system, their preexisting co-morbidities and their regular medications and Body Mass Index (BMI) were taken into consideration, pre-operative pain score assessment with Visual Analogue Scoring (VAS) system was recorded.^{12,13,14}

All participants of the study were subjected to thorough clinical examination of both knees and general systemic examination, followed by Scannogram X-Rays of both lower limbs and Weight bearing Anteroposterior and Lateral radiographs of individual knee joints. The severity of Osteoarthritis was graded by Kellegren Lawrence Scoring system.¹⁵ Herewith, we describe our modified Enhanced Recovery focused technique for bilateral simultaneous TKR.

PRE-OPERATIVE PROTOCOL

Patients were admitted on the day before surgery, Blood sugar optimization done by using insulin, blood pressure control done in consultation with intensivist. Pre-operative Physiotherapy- static quadriceps and hamstring

exercise were taught and counselling given. Both limbs were given a chlorhexidine wash twice before shifting to Operation theatre.

Aneasthetic premedication given on Pre op night:

1. Tablet Pantoprazole 40 mg
2. Tablet. Paracetamol 1g sustained release
3. Sterile Foleys catheterization done.

Injection Tranexamic acid 500 mg in 500 ml Normal saline 1 hour before surgery was given to all participants. Antibiotic prophylaxis using intravenous Injection of Ceftriaxone 1G with Sulbactam 500 mg and Injection Amikacin 500 mg ½ hour before knife time, after test dose.

SURGICAL PROCEDURE

All cases were done under Epidural +spinal anesthesia. Both limbs were simultaneously prepared and draped. By medial parapatellar approach knee joint was exposed. Distal femoral proximal tibia and chamfer cuts made. Appropriate size trial implants selected and same size original implants was placed. After checking the movements and stability tibial poly was placed. We used an analgesic, hemostasis achieved meticulously and the second knee was exposed simultaneously while closure was being done by first surgical assistant doctor in the first operated knee, thereby reducing the operative time. Drains were kept routinely.

POST-OPERATIVE PERIOD

Single dose Epidural top up Inj 0.25 mg Bupivacaine 4 ml+ Distilled water 4 ml 8 hours after surgery. Injectable antibiotics continued upto five days. Bed to chair mobilization done on postoperative day 1 morning followed by mobilization with walker under supervision of physical therapist. Dressing changed on the post op day 2 and drain removed. Removal of urinary catheter on POD 2 after clamping and gaining bladder sensation.

RESULTS

All case was analyzed thoroughly.

1. Based on age group:

All cases included were in the age group of 58- 73 years. Mean age was 64.5 years

2. Based on gender distribution:

Females were the predominant participants, the diversification of sex ratio being 33 females and 17 males of which 20 females and 5 males underwent bilateral knee replacement (Chart 1).

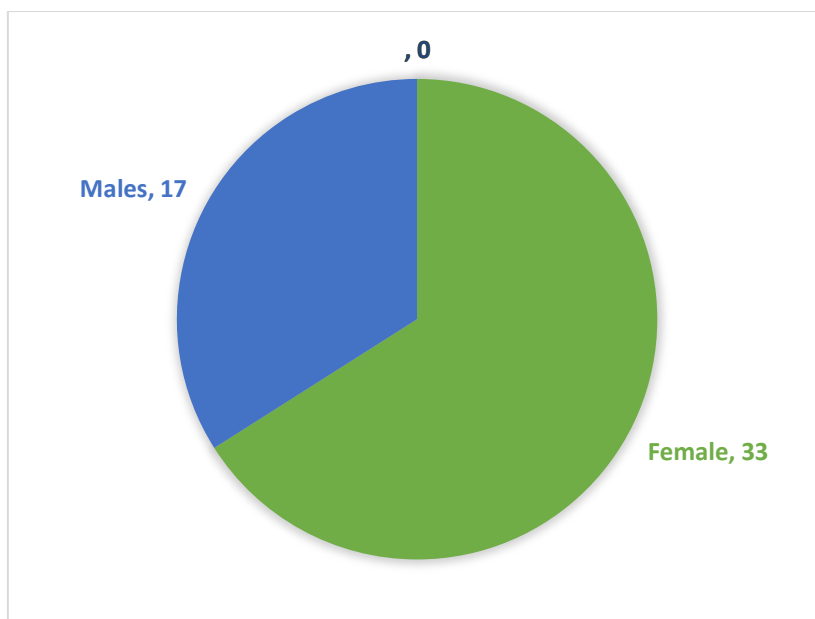


Chart 1- showing gender distribution

3. Implants used:

In our study we used cruciate retaining in 72 cases and cruciate substitution in 28 cases.

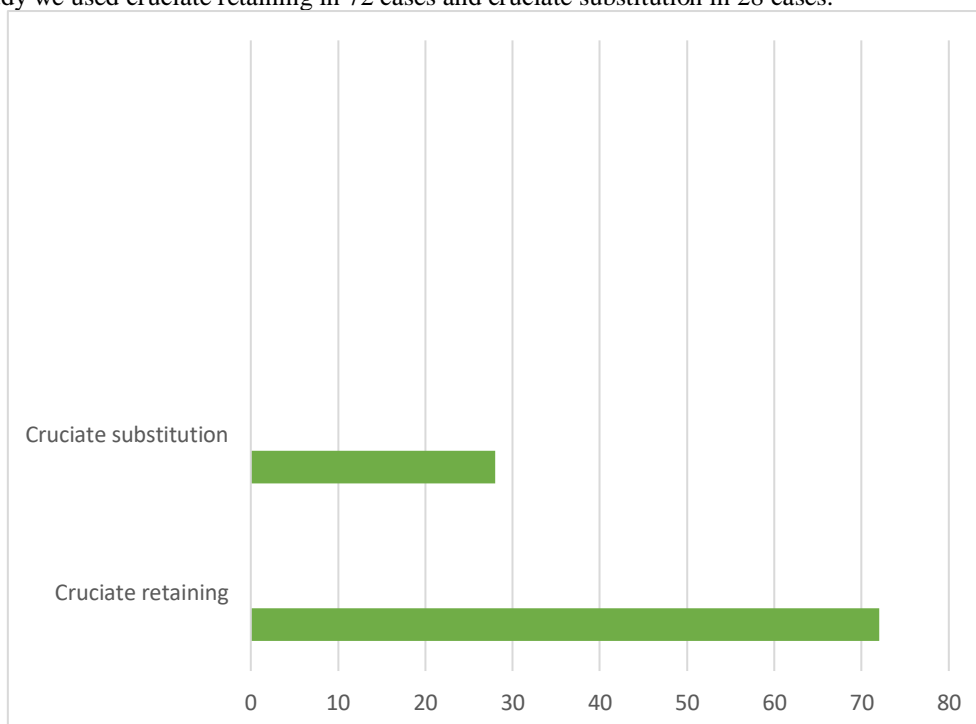


Chart 2 – showing the implants used

4. Surgical blood loss:

Average blood loss during surgery was 340 ml.

5. Blood transfusion:

Patients who underwent bilateral total knee replacement required blood transfusion ranging from 2-3 units of compatible blood.

6. Operative time duration:

Total surgical duration was more in patients who underwent bilateral total knee replacement than in single knees.

7. Hospital stay:

Patients required 5-8 days of hospital stay and mean duration was 5.8 days (chart 3).

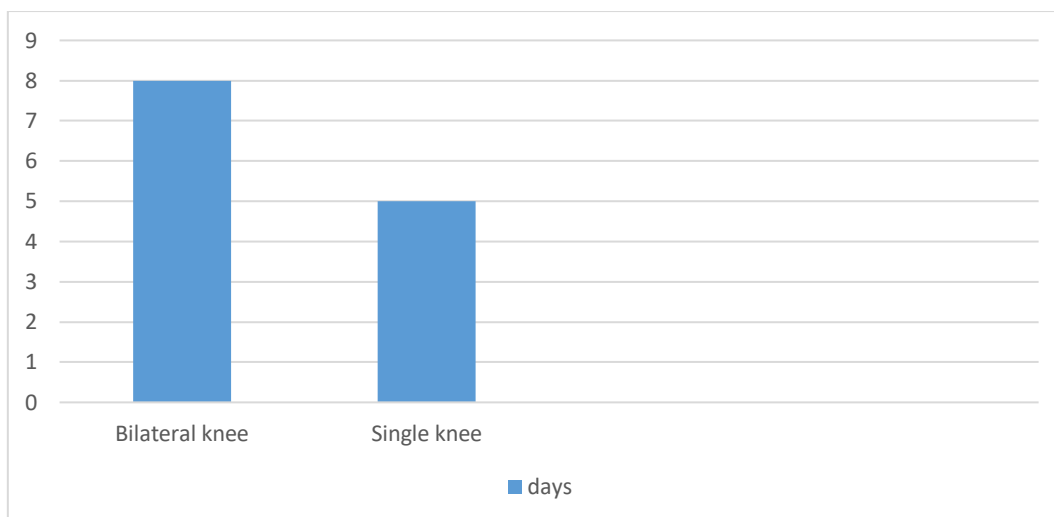


Chart 3- showing duration of hospital stay

8. Complications:

We observed few complications in our study (Table 1). Knee stiffness recovered gradually and there was no restriction of daily activities.

Complications	Number of knees	Treatment given
Surgical site Infection	Nil	--
Urinary tract infection	4	Settled after catheter removal
Knee stiffness	7	Improved with Knee mobilization
Deep vein thrombosis	2	Enoxaparin given
Death	Nil	--

Table 1 – showing the types of complications observed

9. Scoring system:

Preop and postop Oxford knee score (patient based outcome score) and VAS (Visual Analog scale) score was recorded and there was good improvement in both the scores (Table 2).

	Preop	Immediate postop	4 weeks	3 months	2 years	p- value
Oxford knee score	17.75	32	38	40	46	0.035
VAS score	8.25	5.2	4.8	4	2.1	0.043

Table 2 – showing the outcome scores

DISCUSSION

A shorter hospital stay was observed with single sitting bilateral primary TKA using the modified Enhanced Recovery protocols without an increase in complications or a degradation of the clinical outcome. It calls for a coordinated strategy and adherence to clinical pathways that are regularly evaluated and revised.

Boyer suggested in their study¹⁶ that, patients had a higher frequency of discharge to a rehabilitation centre after simultaneous BTKA and a lower frequency of discharge to their homes than those after staged BTKA. However, prior research by Lombardi et al. 2001,¹⁷ Bullock et al. 2003,¹⁸ Cushner et al. 2005¹⁹ indicated that more over one-third of simultaneous BTKA participants were discharged to inpatient rehabilitation, whereas in our study none required readmission to a hospital facility, this can be attributed to adapting to enhanced recovery protocols(ERS) and dedicated preop and post-operative physical therapy.

In our study the mean age was 62.5 years and mean BMI 30.5, accounting for the clustering in Obese category (53%) followed by Overweight category accounting for 35% and only 12% ideal body weight participants.^{20,21} We looked for association between various early complications and BMI, However BMI didn't influence any such complications as such.

Bohm had discussed in their article²² that, except for the comparison between the pulmonary embolism rates in the simultaneous and staged groups, which did not reach statistical significance (p = 0.1), the cardiac complication rate and pulmonary embolism rate were higher in the simultaneous bilateral group than in the other 2 groups. These variations are usually in line with some metaanalysis that found that simultaneous. It is difficult to interpret from the literature a clear knowledge of the real variations in mortality risk across the three groups (unilateral TKA, staged BTKA, and simultaneous BTKA).

The remaining literature is made up of either large retrospective studies that were subject to the same types of selection bias as our work, small prospective

series that were underpowered, or meta-analyses that included these flawed studies because there haven't been any adequately powered prospective studies. Thromboprophylaxis with LMWH is found safe and recommended for all cases who undergo simultaneous bilateral TKR

Fung et al²³ in 2012 had found that the time of ability to perform an active straight leg raise and to actively reach 90 degrees' knee flexion, as well as ROM of the knee at the 15th postoperative day, was better in Trial Group than those in Control Group. There were no significant differences in postoperative wound healing, infection, blood pressure, heart rate, rash, respiratory depression, urine retention and DVT between the two groups. The occurrence of nausea and vomiting in Trial Group was lower than that of Control Group.

Kumar et al in 2018, have published that Orthopedic Enhanced Recovery After Surgery (ERAS) programmes use a multidisciplinary approach to speed up function recovery, lessen pain, increase patient comfort and satisfaction, decrease surgical procedure complications, shorten hospital stays, and save money.²⁴ Total knee arthroplasty patients have different ERAS pathways than patients who have intracavitary surgery; they are more concerned with optimizing systemic and local analgesics and striking a balance between the best pain control and a speed-up return to ambulation than they are with fluid homeostasis and gut motility.

CONCLUSION

To conclude, adhering to modified Enhanced Recovery, with good genuine preoperative counselling, when offered this option of simultaneous bilateral TKR, most patients find this procedure safe and prefer over the staged TKR but the patient acceptance should also be considered. Degree of deformity, type of implant didn't have any influence on morbidity and mortality. Bilateral simultaneous TKR yields fewer days of hospitalization, noteworthy improvement in Oxford knee Score, VAS score, one time anaesthesia risk, single hospitalization and fewer follow-up visits.

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