

Functional Outcome of Total Knee Arthroplasty in Osteoarthritis Knee - A prospective study of 30 knees

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Citation this Article: Khajotia B.L., Kumar Rajat, Lohiya Ramprakash, Tanwar Sanjay, “Functional Outcome of Total Knee Arthroplasty in Osteoarthritis Knee - A prospective study of 30 knees”, IJMSIR- May - 2023, Vol – 8, Issue - 3, P. No. 21 – 27.

Type of Publication: Case Study

Conflicts of Interest: Nil

Abstract

Purpose: To study Functional outcome of total knee arthroplasty in osteoarthritis knee and to determine complication.

Materials and methods: This study was conducted on consecutively selected 25 cases of osteoarthritis of knee joint in which 5 had bilateral knee osteoarthritis so total 30 knees were considered who undergone the procedure. The total follow up period was 6 months. Final Outcome was assessed with help of Knee society Score.

Results: Functional outcome was assessed with Knee Society Function Score at 6 months post operatively and compared with pre-operative score. Preoperative knee society functional score was 18.17 which was improved to 76 after Total Knee Arthroplasty.

Conclusion: The result of this study may help to counsel patients to undergo total knee replacement in indicated cases in the under-developed country with low

socioeconomic status for long-term benefit and cost effectiveness.

Keywords: Total Knee Arthroplasty, Knee Society Score.

Introduction

Osteoarthritis (OA) is the most common form of arthritis, affecting approximately 15% of the population^{1, 2}. The Johnston County cohort reported prevalence rates of 17% for symptomatic knee OA^{3,4}. Osteoarthritis usually has no known cause and is referred to as primary osteoarthritis. When the underlying cause is present such as previous trauma or injury, the condition is referred to as secondary osteoarthritis. Pain is the most prominent symptom of OA and most often is the reason patients seek medical help.

Osteoarthritis (OA) is a chronic degenerative joint disease of dynamic pathology with multifactorial etiology. It involves progressive softening and loss of articular cartilage, subchondral bone sclerosis, cyst

formation and the development of osteophytes. OA of the knee accounts for more dependence in walking, stair climbing and other lower-extremity tasks than any other disease.⁵

Subjective osteoarthritis pain can be measured and is presently the best criterion for evaluating potential therapies. Age is one of the strongest predictors of OA⁶. Females are associated with a higher prevalence and severity of OA and are more often affected with hand, foot and knee OA than men⁷. A recent meta-analysis⁸ found that a dose-response relationship exists between obesity and the risk of knee OA. Repetitive joint use has been associated with an increased risk of OA.

Treatment options for osteoarthritis are ranging from lifestyle modification, weight reduction, NSAIDs (oral and Topical), intra-articular steroids and hyaluronic acids to surgical interventions like arthroscopic joint lavage, high tibial osteotomy and arthroplasty (partial or complete). Total knee arthroplasty operations are well-documented and effective treatments to decrease pain and improve function in patients with end-stage arthritis of the knee joint⁹. Moreover, knee arthroplasty has been shown to be effective both clinically and in terms of cost effectiveness¹⁰⁻¹¹.

Materials And Methods

This study was carried out in the department of Orthopaedics, Sardar Patel Medical College, Bikaner, after getting permission from the Institutional Ethical Committee. This study was conducted on consecutively selected 25 cases of osteoarthritis of knee joint in which 5 had bilateral knee osteoarthritis so total 30 knees were considered who undergone the procedure. between the November 2020 to November 2022. The follow up was 6 months. Final Outcome was assessed with help of Knee society Score.

Design of Study: This is a prospective, observational study.

Inclusion Criteria

1. Osteoarthritis knee between 50 to 70 years Age group.
2. Garde III and Grade IV according to Kellgren-Lawrence Classification.
3. Intact both collateral ligaments
4. Subjects must understand risks and benefits of the protocol and be able to give informed consent.

Exclusion Criteria

1. Infective Osteoarthritis
2. Active Infections at other sites distant from the joint
3. Revision Total Knee Arthroplasty
4. Neuromuscular disease.
5. Patient having rheumatic disorder
6. Patient not willing for surgery.

Clinical Examination

Preoperative through clinically examination of all patients was done and general physical examination and local examination was as under Pain, Range of motion, Stability, Flexion contractures, Extension lag, Alignment, walking ability, Stairs climbing, Use of support.

Pre-Operative Evaluation Clinical Assessment

Patients attending OPD of Orthopaedics department were randomly chosen according to the inclusion criteria. Once the patient was admitted detailed history, routine investigations (CBC, Blood sugar, RFT, LFT, ESR, CRP quantitative, RA Factor, HbA1C, HIV, HBsAg, HCV, ECG) thorough clinical examination and radiological examination was done.

Radiological Classification of Osteoarthritis

Many classification systems are available for osteoarthritis but the radiological grading system of **Kellgren & Lawrence**¹² has generally been used for most studies.

Pre operative evaluation and planning

The patients were evaluated preoperatively by using the knee society score. The anteroposterior radiographs or a scannogram including hip knee and ankle was obtained so that the whole lower limb could appear in continuity.

Mechanical axis of femur, Anatomical axis of femur, Anatomical axis of tibia are drawn on radiographs.

The template supplied by the implant manufactures is used to decide the angle of distal femoral cut so that the postoperative tibiofemoral angle (TFA) remains between 5-9° valgus.

Implant

The implant used in all our cases was **LPS-FLEX knee** (Legacy posterior substituting) by Zimmer, which is claimed to be able to give high flexion (>130°). As per manufacturers it is designed to safely accommodate high flexion activities up to 155° for the person who had both the ability and desire to perform high flexion activities.

Surgical technique

All patients were taken up for surgery under epidural or spinal anaesthesia after thorough pre-op evaluation. Patient was in supine position with knee flexed to 90 degree and sterile preparation done from thighs to toes and draped. Pneumatic tourniquet was applied at the thigh region.

The anterior midline incision was used. Skin incision extends from 4 cm above the patella to 4 cm below the patella.

Medial parapatellar approach was used as this approach can be easily extended or converted to a more extensive traditional approach when additional exposure be necessary. Arthrotomy was performed about 1–2cm above the superior pole of the patella, and extended to the level of the tibial tubercle. Fat pad excision done to facilitate exposure and to improve patellar mobility. Medial and lateral menisci, anterior cruciate is cut, PCL

substituted. Loose bodies and osteophytes are removed and patella everted for adequate visualization. The patella was dislocated laterally and the intra-medullary femoral alignment guide was inserted one cm anterior to attachment of PCL on femoral condyle, into the medullary canal of the femur. The rotational alignment of the intramedullary guide was aligned according to the posterior condylar axis of the femoral condyle. Distal femoral cut was made at a 3° external rotation to the posterior condylar axis so as to balance the flexion and extension gaps. The distal anteroposterior femoral cutting guide was now placed at an angle determined while doing the pre-operative planning. This was followed by the anterior and posterior femoral cuts.

After making the femoral cuts, the extramedullary tibial alignment guide was placed. The proximal tibial cut was made at 5mm from the articular surface perpendicular to the mechanical axis of tibia. The flexion and extension gaps were then stabilized by placing the spacer blocks. At the same time, the alignment of the lower limb was checked in valgus by using the alignment rod. This was followed by making the femoral chamfer cuts and the patella was circumcised, we haven't replaced patella in any of our case. At this stage, the soft tissue balancing procedures were performed to balance the coronal plane instability and deformity as well as the flexion contracture. Just before placing the implants, the trial implants were placed and final alignment and stability checked. Finally, all the bony surfaces were washed thoroughly with pulse lavage and dried. This is followed by putting the appropriate implants along with the acrylic cement. The incision was closed in 3 layers over suction drains and a compression with posterior splint is applied with the knee slight flexion. In bilateral simultaneous surgery two sets of instrumentation were used.



Fig.1: skin incision extending from superior pole of patella to tibial tubercle



Fig. 2: Final view after Femoral And Tibial Cuts



Fig.3: Trial Components Reduction

Post-Operative Management

The wound was inspected on the 3rd post-operative day. At the same time, the drain was also removed and active range of motion exercises were started. On the 7th day, mobilization with walker. On 14th day, stitches were removed. Mobilization with walker was continued for 4weeks. Thereafter, the type of support to be used is left to be decided by the patient, according to his/her degree of comfort.

Follow-UP

All the patients were followed up in the OPD after every 4weeks. At every visit clinical evaluation was done using the knee society score. Preoperative and postoperative evaluation is done on the basis of criteria given by Insall.

Results

Maximum 40% cases were of 66-70 yr age group for Osteoarthritis Knee whereas minimum 12% cases were in 51 – 55 yr age group. The mean age of study population was 66.5 ± 5.5 years. We observed that 52% female had osteoarthritis and 48% male had osteoarthritis knee.

Table 1: Sex wise Distribution

Sex	Number of patients	Percentage
Male	12	48
Female	13	52

As per BMI 52% patients were fall in healthy weight range followed by 48% patients who comes in overweight range. Left knee Osteoarthritis found in 53.33% and had right knee osteoarthritis in 46.66%. We operated 83.33% patients with Grade IV according to Kellgren- Lawrence Classification and 16.66 patients with grade III. Knee Society pain score mean was 20.33 pre operative whereas 44 postoperatively. Pre-operatively Knee society knee range of motion score was 12.97 which improved with intervention to 25. We assessed all patients for flexion contracture pre and post operatively. 5 patients had flexion contracture pre-operative and all patients achieved no flexion contracture after total knee arthroplasty. 16 patients had extension lag pre-operative and after total knee arthroplasty only 2 patients had extension lag which was <10 degree.

All patients had varus malalignment and most of them had 11-15 degrees varus. Post-operative 9 patients had only 0-4 degrees varus and 20 patients had 5-10 degrees varus.

Table 2: Knee Society Knee Score

Grading Knee Society Score	Number	%
Excellent (80-100)	22	73.33
Good (70-79)	4	13.33
Fair (60-69)	4	13.33
Poor (<60)	0	0

All patients were assessed pre and 6 months post operatively by Knee Society Knee Score. Preoperative knee society score was 41.07 which was improved to 95.97 after Total Knee Arthroplasty.

Table 3: Knee Society Function Score.

Function score	Mean
Preoperative	18.17
6 Months Post operative	76

Functional outcome was assessed with Knee Society Function Score at 6 months post operatively and compared with pre-operative score. Preoperative knee society functional score was 18.17 which was improved to 76 after Total Knee Arthroplasty.

All patients were assessed at 6 months post operative by Knee Society Score and 73.33% patients had excellent results followed by 13.33% had good and 13.33% fair results.

Table 3: Final Assessment Grading Knee Society Score

Knee score	Mean
Preoperative	41.07
6 Months Post operative	90.97

Discussion

Maximum 40% cases were of 66-70 yr age group for Osteoarthritis Knee whereas minimum 12% cases were in 51 – 55 yr age group. The mean age of study population was 66.5 ± 5.5 yr. Similarly Navaneeth P. K. et al.¹³

(2022) found that the patient ages ranged from 45-75 years. Also Rangga Rawung et al.¹⁴ (2019) found that the Most of the patients are in the elderly category of age (≥60 years old) (78.13%). We observed that 52% female had osteoarthritis and 48% male had osteoarthritis knee. Similarly, Navaneeth P. K. et al.¹³ (2022) sample consisted of thirty osteoarthritic patients with 8 males and 22 were females. Also Ranga Rawung et al.¹⁴ (2019) disease showed a higher prevalence in women (78.13%) than in men (21.87%). Also SMJ Mortazavi et al.¹⁵ (2016) included all males 83 patients and 103 knees. Left knee Osteoarthritis found in 53.33% and had right knee osteoarthritis in 46.66%. Similarly Navaneeth P. K. et al.¹³ (2022) found that among 30 patients, 14 involved the right side, and 16 involved the left knee joint. Also S. M. J. Mortazavi et al.¹⁵ (2016) found that twenty patients (24.1%) underwent bilateral simultaneous TKA.

All patients were assessed pre and 6 months post operatively by Knee Society Knee Score. Preoperative knee society score was 41.07 which was improved to 95.97 after Total Knee Arthroplasty. Similarly Jose et al.¹⁶ (2022) they found that, Preoperatively, our overall mean Knee Clinical was 30.9 which improved to 87.7 postoperatively with the significant P < 0.001. Also Umang Shihora et al.¹⁷ (2017) found that the mean preoperative knee clinical score (KCS) was 49.40±13.79 which was increased to a postoperative score of 86.08±5.64 at the end of 6 month.

Functional outcome was assessed with Knee Society Function Score at 6 months post operatively and compared with pre-operative score. Preoperative knee society functional score was 18.17 which was improved to 76 after Total Knee Arthroplasty. Similarly, Navaneeth P. K. et al.¹³ (2022) found that the mean pre-operative knee functional score was 16.83 which was improved to post operative 71.17 following total knee arthroplasty.

Also Manoj Kandel et al.¹⁸ (2021) found that the mean preoperative knee functional score (KFS) was 55.86 ± 2.25 which increased to a postoperative score of 77.00 ± 1.67 at the end of 6 months.

All patients were assessed at 6 months post operative by Knee Society Score and 73.33% patients had excellent results followed by 13.33% had good and 13.33% fair results. Similarly, Jose et al.¹⁶ (2022) in their study shows that we have 80% of excellent and 15% good results following total knee replacement. Also Navaneeth P. K. et al.¹³ (2022) in their study 8 had excellent (27%), 16 good (53%), 5 fair (17%) and 1 poor (3%) results were found according to knee functional score. Also, Venkatesan AS et al (2020) At the end of 6 months, 76.7% of participants were satisfied with their outcome and Pathik Vala et al.¹⁹ (2017) found that 16 patients (53%) had Excellent, 11 patients (37%) had Good, 2 patients (7%) had Fair and 1 patient (3%) poor results.

Only 2 patients had suture line redness and superficial infection which was managed with IV antibiotics and alternate day dressing. 1 patient had peri-prosthetic fracture which was managed Conservative with long knee brace. Similarly, Mortazavi et al.¹⁵ (2016) found that two cases had wound infection and one case of hematoma.

Conclusion

Treatment with total knee arthroplasty provides greater pain relief and functional improvement within few months as reflected by the improvement in the post-operative knee clinical score and functional score.

Limitations

1. Sufficient sample size is required to prove the influence of various patient related factors on the pre and postoperative scores.

3. Use of the Knee society and Functional scoring system should be made mandatory for all preoperative patients and at subsequent visits to outpatient department.

4. Long term follow up of these patients is required to determine survival of the prosthesis, aseptic loosening, need for revision arthroplasty and the incidence of delayed deep-seated infection.

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