National Journal of Clinical Orthopaedics

ISSN (P): 2521-3466
ISSN (E): 2521-3474

www.orthoresearchjournal.com
2023; 7(2): 36-40
Received: 20-02-2023
Accepted: 27-03-2023

Dr. Layeeq Ahmad Lone
PG Scholar, Department of Orthopaedics, Govt. Medical College Srinagar, Jammu and Kashmir, India

Dr. Imtiyaz Hussain Dar
Professor, Department of Orthopaedics, Govt. Medical College Srinagar, Jammu and Kashmir, India

Dr. Ansar Ul Haq Lone
Lecturer, Department of Orthopaedics, Govt. Medical College Srinagar, Jammu and Kashmir, India

Corresponding Author:
Dr. Layeeq Ahmad Lone
PG Scholar, Department of Orthopaedics, Govt. Medical College Srinagar, Jammu and Kashmir, India

To evaluate the functional results of total knee replacement using a rotating platform implant in symptomatic knee osteoarthritic patients

Dr. Layeeq Ahmad Lone, Dr. Imtiyaz Hussain Dar and Dr. Ansar Ul Haq Lone

DOI: https://doi.org/10.33545/orthor.2023.v7.i2a.405

Abstract
Introduction: Total Knee Arthroplasty (TKA) is now a reliable treatment for severe osteoarthritis. Total knee arthroplasty (TKA) is a dependable and universally used operation. Primarily intended to alleviate pain in patients with severe arthritis, the procedure has undergone several modifications with respect to implant designs and surgical techniques with the sole motive of providing long-term success rates. The aim of this study was to evaluate the functional results of Total Knee Replacement using rotating platform implant in patients with grade 3 and 4 knee osteoarthritis.
Materials and Methods: This prospective study consisted a total of 25 cases of total knee replacement surgery for symptomatic primary osteoarthritis of knee. The severity of OA was classified by Kellgren-Lawrence (KL) grading. Post-operative evaluation, subjective assessment of symptoms and functional as well as radiological status of the patients were assessed based on HSS score.
Results: The pain HSS scores showed improvement from the mean preoperative HSS value of 9.2 to 23. The post-operative function HSS score also showed a marked improvement over the pre-operative score. Range of motion improved from a preoperative HSS score of 12.76 to 13.88. There was some improvement in flexion contracture from preoperative to postoperative values. The instability HSS score from pre-operative to post-operative changed from a mean of 8.96 to 8.36. LDFA has increased from the mean of 82.26 to 85.56, MPTA has increased from mean of 84.98 to 86.75, PCOR has decreased from mean of 0.49 to 0.48 and Tibial slope has decreased from a mean of 8.79 to 4.87.
Conclusion: Rotating platform TKA demonstrated satisfying overall results with very few and well-controlled complications.

Keywords: Knee osteoarthritis, KL Grading, TKA, Mobile bearing, HSS Score.

Introduction
Osteoarthritis is thought to be the most prevalent chronic joint disease. Most arthritic knees presents with instability, deformity, contracture or a combination of these elements [1-3]. The incidence of osteoarthritis is rising because of the aging population and the epidemic of obesity. Pain and loss of function are the main clinical features that lead to treatment including non-pharmacological, pharmacological, and surgical approaches [4].
The concept of modifying the articular surfaces for the improvement of knee joint function has gained attention since the 19th century. Variety of surgical techniques has developed from soft tissue interposition arthroplasty to resection arthroplasty to surface replacement arthroplasty. In surface replacement arthroplasty to address the complex knee kinematics, different types of prosthesis were developed. Total Knee Arthroplasty (TKA) is now a reliable treatment for severe osteoarthritis. Total knee arthroplasty (TKA) is a dependable and universally used operation. Primarily intended to alleviate pain in patients with severe arthritis, the procedure has undergone several modifications with respect to implant designs and surgical techniques with the sole motive of providing long-term success rates of about 85% at 10- to 15-year follow-ups [5]. Initially introduced in 1978 by Install *et al*. [6].
Total knee arthroplasty (TKA) has become a successful and reproducible operation for elderly, disabled patients with knee osteoarthritis in the past 30 years. Various systems are available with specific features regarding the component's geometry, the degree of conformity of the

articulating surface and the anchoring technique.
The aim of this study was to evaluate the functional results of Total Knee Replacement using rotating platform implant in symptomatic knee osteoarthritic patients.

Materials and Methods

The present study was conducted in Government Hospital for Bone and Joint Surgery, Postgraduate Department of Orthopaedics, Government Medical College, Srinagar Kashmir. This prospective study consisted of a total of 25 cases of total knee replacement surgery for symptomatic primary osteoarthritis of knee.

Inclusion Criteria

- Age 50 to 70 years
- Either sex
- Kellgren & Lawrence Grade 3,4 OA knee.

Exclusion Criteria:

- History of recent knee infection
- Extensor mechanism dysfunction
- Pre-operative range of movement of < 80° (flexion)
- 25° fixed flexion deformity
- Previous major knee surgery
- Neurological disorders
- Rheumatoid arthritis
- Grossly unstable knees
- Mentally subnormal persons.
- Intra articular injection <3 months duration.

Table 1: Demographic characters of enrolled population

Parameters		No. of patients	Percentage
Gender	Male	9	36
	Female	16	64
Age group	50-60 Years	14	56
	61-70 Years	11	44
Side	Right	15	60
	Left	10	40
Kellgren-Lawrence (KL) grade	Grade 3	8	32
	Grade 4	17	68
Duration of surgery	60-90 Minutes	3	12
	91-120 Minutes	19	76
	121-150 Minutes	3	12
Drain output	450-549 ML	3	12
	550-649 ML	3	12
	650-749 ML	6	24
	750-849 ML	8	32
	850-950 ML	5	20
Hospital stay	1-7 Days	16	64
	8-14 Days	9	36
	15-21 Days	0	0

Patients were admitted and written informed consent was obtained preoperatively explaining the procedure, risks, benefits and rehabilitation. The preoperative assessment included History and physical examination and investigations were done. Demographic variables such as age, sex and the degree of radiological involvement were collected. The severity of OA was classified by Kellgren-Lawrence (KL) grading [7].

Table 2: Kellgren-Lawrence (KL) classification

Grade	Parameters
Grade 1	Doubtful narrowing of joint space and possible osteophytic lipping
Grade 2	Definite osteophyte with definite narrowing of joint space
Grade 3	Moderate multiple osteophytes with definite diminution of joint space, some sclerosis and possible deformity
Grade 4	Joint space greatly impaired with severe sclerosis, large osteophytes and definite degeneration

Operative Procedure

All patients received one dose of prophylactic antibiotic within 30 minutes before surgery. Surgery was done under UAAP under GA or regional anesthesia, under a tourniquet. The patient was kept in supine position and carefully prepared and draped. A standard midline skin incision measuring about 12-15 cm was made with the knee in flexion. The incision was extended from quadriceps tendon above the superior pole of the patella to below the level of the tibial tubercle. The patella was everted by incising the retinaculum and capsule by dissection to expose the knee joint completely. Anterior Fat pad was removed. Medially soft tissue sleeve was dissected from the tibial metaphysis up to midline. The ACL, PCL, medial and lateral menisci were excised. With flexion, external rotation and anterior displacement, tibia was subluxated forwards. Tibia was cut perpendicular to its mechanical axis using an extramedullary alignment device with posterior slope, and approximately 8 to 9 mm of the proximal tibia was removed, as measured from the intact compartment. Medullary canal of femur was entered about 7 to 10 mm above origin of PCL and few mm medial to the true centre of intercondylar notch. Mediolaterally the entry point was on the Whiteside's line. The canal was negotiated using an 8 mm drill after making an entry hole with a bone awl. The direction of the drill was towards the posterior and medial side of the medullary canal. Distal femoral cut was made at a valgus angle (usually 5 to 7 degrees) perpendicular to the predetermined mechanical axis of the femur. The amount of bone removed generally was the same as that to be replaced by the femoral component. The sizing of femoral component was done by attaching A/P Sizing Guide, flat onto the smoothly cut distal femur. The guide was applied so that the flat surface of the A/P Sizing Guide will be flush against the resected surface of the distal femur and the feet of the A/P Sizing Guide will be flush against the posterior condyles. Femoral finishing guide was attached to distal femur after sizing. Chamfer and box cuts were made after Anterior and posterior cuts. With knee in 90 degrees of flexion, and extension spacers were placed between finished femur and proximal tibial cut surfaces. Any residual discrepancies in the flexion and extension gaps were corrected. Patella was inspected and any osteophytes if present were removed. Circumcision of patella was done by using cautery. Femoral canal entry was plugged with a bony piece. Trial components (Both tibia and femur) were placed, the knee moved in flexion and extension to check patellar tracking. Alignment was checked. When ligamentous balancing will be satisfactory, and the extensor mechanism tracking proper, the trial components were removed. The cut bony surfaces were cleaned with a thorough normal saline wash and surfaces were dried with clean sponge. The trial tibial tray along with alignment handle was put on cut surface and fixed with two pins. Appropriate sized modular punch guide with drill bushing on drill was applied on tibial tray. The drilled area was widened.

Appropriate sized modular tray keel punch was subsequently positioned through guide and impacted with hammer until shoulder of the punch was in contact with guide. The tibial tray was gently hammered at its place. Excess cement was removed from the periphery of the component. After the tibial component is completely seated, the knee was flexed, to expose the distal femur. The femoral component was placed after completely cementing the distal-prepared femur and the implant. The femoral component was gently hammered to its place. The knee was extended carefully with a trial tibial spacer in place to ensure complete seating of the femoral prosthesis. Searching for any bone or cement debris was done, and removed, if found. Thorough joint lavage was given with normal saline to remove any bony or cement debris present inside the joint. Torniquet was removed. Wound closure was done over suction drain followed by ASD and Compression bandage and Knee brace was applied.

Fig 1: A (Skin incision), B (Proximal tibial cut), C (Sizing of femoral component), D and E (Femoral and Tibial components), F (Wound closure)

Postoperative protocol and follow-up

The patients were monitored in recovery ward for first 24 hours. Patient received parenteral antibiotics for 5 days followed by oral antibiotics. A standard AP & lateral view of knee with proximal tibia & distal femur was taken on the first post-operative day to look for sizing, alignment and cementing. Suction drain was removed after 24 hours. Static quadriceps exercise & ROM of ankle/ ankle pumps were started on first post-operative day. Active and passive ROM of knee was started on 1st post-operative day and toe touch to partial weight bearing was allowed as per tolerance starting the 2nd post-operative day with knee brace.

Patients were discharged by 5th post-operative day with the instructions to do weight bearing as tolerated and were advised to follow-up regularly. The follow-ups were done at 2 weeks, 4 weeks, 8 weeks, 12 weeks, 6 months, and a final follow-up at 9 months.

Post-operative evaluation was done on the basis of HSS score, subjective assessment of symptoms and functional as well as radiological status of the patients were assessed.

Results

In this study, there were 9 (36%) males and 16 (64%) females. The majority of the patients 14(56%) belonged to 50-60 age group and 11 patients (44%) aged 61-70 years. The mean age in our study population was 61 (range 54-70) years. In our study right side involvement was seen in 15(60%) patients whereas 10(40%) had left side involvement. The average duration of

surgery in our study was 115 minutes. The mean drain output in our study was 716.8 ml (Table 1).

The pain HSS scores showed improvement from the mean preoperative HSS value of 9.2 to 23. The post-operative function HSS score also showed a marked improvement over the pre-operative score. Range of motion improved from preoperative HSS score of 12.76 to 13.88. There was some improvement in flexion contracture from preoperative to postoperative values. The instability HSS score from pre-operative to post-operative changed from a mean of 8.96 to 8.36. There was significant improvement of total HSS score from Pre-Operative mean 56.68 to Post-Operative mean 82.6 (Table 3).

Table 3: Pre-operative and Post-operative HSS Score (N=25)

Variables	Pre-operative		Post-operative	
	Mean	Std. deviation	Mean	Std. deviation
Pain HSS Score	9.20	3.4399	23.00	5.4000
Function HSS Score	9.04	2.2449	18.46	3.0066
Range of motion HSS	12.76	1.2675	13.88	1.0924
Muscle strength HSS	8.64	1.2400	9.12	2.0622
Flexion contracture HSS	8.16	0.5530	8.56	0.9165
Instability HSS	8.96	1.0198	8.36	0.9797
Total Score HSS	56.68	5.8289	82.6	9.6263

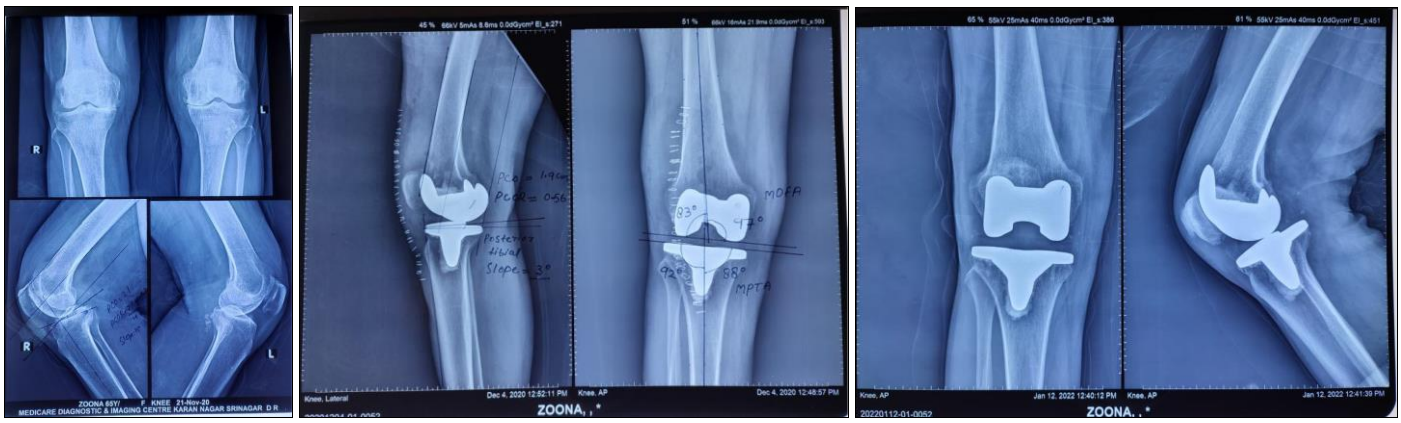
LDFA has increased from the mean of 82.26 to 85.56, MPTA has increased from mean of 84.98 to 86.75, PCOR has decreased from mean of 0.49 to 0.48 and Tibial slope has decreased from mean of 8.79 to 4.87 (Table 4).

Table 6: Radiological parameters

Parameter	Pre-operative	Post-operative
LDFA	82.26	85.56
MPTA	84.98	86.75
PCOR	0.49	O.48
TIBIAL SLOPE	8.79	4.87

Table 7: Results according to HSS Score

Grade	Score	No. of patients	Percentage
Excellent	85-100	10	40
Good	70-84	14	56
Fair	60-69	0	0
Poor	<60	1	4



A B C

Fig 2: A 58 years old female patient with Kellegran Lawerence (KL) grade 3 osteoarthritis at the left side. A (Pre-operative x-ray AP and lateral), B (Immediate post-operative AP and lateral X-ray), C (AP and lateral X-ray at final follow-up)

Discussion

Total knee replacement is the most technologically advanced solution for arthritic pain, however a search for a better functional and durable prosthesis still continues. The success of total knee arthroplasty is influenced by a complex interaction between the geometry of an implant design and the active and passive soft tissue structures that surround the articulation. This interaction, in turn, determines the stability, range of motion and interface stresses that develop.

This study was aimed to determine clinical outcomes and rotational kinematics of TKA components and mobile bearing insert during a squatting activity *in vivo* at 10 weeks and 1 year postoperatively. The mobile-bearing knee is a design based on theoretical kinematic and wear advantages. Most of available *in vitro* data such as the study by Fisher *et al*. [8, 9] show decreased wear with the mobile-bearing design. However, the decreased wear did not result in a decreased level of osteolysis and subsequent 2 RSA randomized controlled studies failed to show a difference between the 2 designs in subsidence [10, 11]. The long-term survivorship and clinical results of mobile-bearing TKA are excellent. However, a thorough review of the literature shows no difference in long-term survivorship or clinical

function when compared to conventional fixed-bearing TKA. However, most of the available literature has a scientific evidence level of III or IV. Furthermore, most of the studies in the mobile-bearing groups discussed the use of one specific type of prosthesis, called the LCS. This prosthesis has one of the longest track records and was the second mobile-bearing prosthesis introduced on the market behind the Oxford noncompartmental replacement (Biomet, Warsaw, Ind). With the development of newer mobile-bearing designs by the different manufacturers, further follow-up is needed to assure that the long-term results achieved with the LCS can be reproduced by other mobile-bearing TKA designs. We also need to design level I randomized controlled trials with long follow-ups to better compare these 2 designs and determine the superiority of one design.

In the present series, we studied 25 patients with knee osteoarthritis, all were undergone total knee arthroplasty using a Rotating platform and followed up for a period of 1 year. In our study, age ranged from 50-70 years with the majority i.e. 14 (56%) being 50-60 years followed by 11 (44%) with 61-70 years. Mean age in our study was 61, equivalent to the observations found by S. Bhan *et al*. [12]. In our study, female patients outnumbered males with 16 (64%) females versus 9 (36%) males comparable to the results in study shown by Morteza Maftah *et al*. [13].

In the previous study done by Allesandro Biatolfi *et al*. [14] the preoperative mean HSS score of 56 improved significantly to postoperative mean HSS score of 86.8 & comparable results were found in our study. In our study, the preoperative mean HSS score of 56.68 improved significantly to the postoperative mean HSS score of 82.6.

In our study, all the cases were of the osteoarthritis knee, and in all cases, we have used high flexion rotating platform knee prosthesis. In the post-operative period at 1-year follow-up, a significant increase was found in mean flexion. Flexion achieved after TKR depends upon several factors like preoperative range of motion, underlying disease-causing arthritis, type of prosthesis being used, surgical technique, postoperative rehabilitation, and motivation of the patients.

In this study, the LDFA has increased from the mean of 82.26 to 85.56, MPTA has increased from mean of 84.98 to 86.75, PCOR has decreased from mean of 0.49 to 0.48 and Tibial slope has decreased from mean of 8.79 to 4.87.

Conclusion

Rotating platform TKA demonstrated satisfying overall results with a very few and well-controlled complications. The surgical technique remains an important factor for both short-term and long-term performance of the mobile bearing TKA. Good functional outcomes will be achieved through the combination of proper surgical technique and patient factors including low BMI, more preoperative ROM of the knee, proper postoperative rehabilitation, and patient participation. For younger or higher-demand patients, mobile bearing design is suggested due to the potential for reduced polyethylene wear after a joint replacement but this may require larger studies with long follow-ups to foresee these results.

Acknowledgement

Not available

Author's Contribution

Not available

Conflict of Interest

Not available

Financial Support

Not available

References

1. Vail TP, Lang JE. Insall and Scott surgery of the knee. 4th ed. Philadelphia: Churchill Livingstone, Elsevier; 2006, 1455-1521.
2. Insall J, RANAWAT CS, SCOTT WN, Walker P. Total condylar knee replacement: preliminary report. Clinical Orthopaedics and Related Research®. 1976 Oct 1(120):149-54.
3. Kim RH, Scott WN. Operative techniques: total knee replacement. Philadelphia: Saunders-Elsevier; 2009, 91-103.
4. Bijlsma JW, Berenbaum F, Lafeber FP. Osteoarthritis: an update with relevance for clinical practice. Lancet; 2011 Jun 18; 377:2115-26.
5. Sultan PG, Most E, Schule S, Li G, Rubash HE. Optimizing flexion after total knee arthroplasty: advances in prosthetic design. Clinical Orthopaedics and Related Research®. 2003 Nov 1;416:167-73.
6. Insall J, Scott WN, Ranawat CS. The total condylar knee prosthesis. A report of two hundred and twenty cases. JBJS. 1979 Mar 1;61(2):173-80.
7. Kellgren JH, Lawrence JS. Radiological assessment of osteoarthrosis. Ann Rheum Dis 1957;16:494-502.
8. Fisher J, McEwen HM, Tipper JL, *et al*. Wear, debris, and biologic activity of cross-linked polyethylene in the knee: benefits and potential concerns. Clin Orthop Relat Res 2004;428:114.
9. Fisher J, McEwen H, Tipper J, *et al*. Wear-simulation analysis of rotating-platform mobile-bearing knees. Orthopedics 2006;29(9 Suppl):S36.
10. Henricson A, Dalen T, Nilsson KG. Mobile bearings do not improve fixation in cemented total knee arthroplasty. Clin Orthop Relat Res 2006;448:114.
11. Hansson U, Toksvig-Larsen S, Jorn LP, *et al*. Mobile vs. fixed meniscal bearing in total knee replacement: a randomized radio-stereometric study. Knee 2005;12:414.
12. Bhan S, Malhotra R, Kiran EK, Shukla S, Bijjawara M. A comparison of fixed-bearing and mobile-bearing total knee arthroplasty at a minimum follow-up of 4.5 years. J Bone Joint Surg Am 2005;87-A:2290–6.
13. Meftah M. Ranawat AS. Ranawat CS. Safety and efficacy of a rotating-platform, high-flexion knee design three- to five-year follow-up. J Arthroplasty. 2011 May 27 [Epub ahead of print).
14. Bistolfi A, Massazza G, Lee GC, Deledda D, Berchialla P, Crova M. Comparison of fixed and mobile-bearing total knee arthroplasty at a mean follow-up of 116 months. J Bone Joint Surg Am. 2013;12:e83.

How to Cite This Article
Lone LA, Dar IM, L Ansar Ul Haq. To Evaluate the Functional Results of Total Knee Replacement using Rotating Platform Implant in Symptomatic Knee Osteoarthritic Patients. National Journal of Clinical Orthopaedics. 2023;7(2):36-40.