

Functional Outcome of Rotating Platform of Total Knee Arthroplasty - A Prospective Study

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Abstract: ***Aim:** The aim of this study was to determine the functional outcome of rotating-platform total knee replacement system. **Patients and Methods:** 40 patients were randomised to receive rotating-platform PFC Sigma total knee replacement. Range of movement (ROM) and Knee Society score (KSS) were assessed independently before and one year after surgery. Weight-bearing X-rays were taken immediately and one year post surgery to determine the incidence of osteolysis and loosening. **RESULTS:** At a mean follow-up of 12 months there was statistically significant difference in mean ROM and KSS scores. Mean flexion achieved postoperatively was 135° from mean preoperative flexion of 100°. Thirty five patients were able to sit cross legged and 90% were able to kneel. There was no evidence of osteolysis or loosening in the group and no revision for infection or implant failure. **Conclusion:** This study shows that there is good postoperative flexion, functional outcome and good short term survivorship of implants.*

1. Introduction

Total knee arthroplasty (TKA) has become a successful and reproducible operation for elderly, disabled patients with knee osteoarthritis in the past 30 years. Based on the initial success, the indications to TKA were expanded to younger and more active patients. The introduction of the mobile-bearing polyethylene surfaces reflects the efforts to minimize wear while dealing with complex function and kinematics(1-4). Long-term survivorship of TKA is related to wear of the bearing surface and is well described in the orthopaedic literature. The wear pattern in TKA differs from that in total hip arthroplasty in that delaminating and pitting from the shear force results in larger particles. However, substantial submicron polyethylene debris is still generated that can result in osteolysis. This can lead to loosening and failure of the implant. In spite of good long-term survival, engineers and orthopaedic surgeons have long sought a "better" knee design with longer survivorship.

The design of the mobile-bearing knee was intended to take advantage of the decreased stress seen in conforming designs reducing therefore polyethylene wear while reducing stress on the implant and lowering the risk of tibial component loosening. In addition, the mobile design was felt to more closely recreate native knee kinematics.

Total knee arthroplasty (TKA) is very effective for the treatment of severe osteoarthritis of the knee joint. Many good to excellent results have been reported. Nevertheless, surgeons continue to modify the knee prosthesis design in an attempt to improve the results. Therefore, mobile bearing tibial components of different designs were introduced. Theoretically they were meant to reduce wear (5); thus, increasing longevity. They also were designed to improve function by attempting to make the kinematics more similar to the native knee (6). The hypothesis, however, was to determine whether patients receiving a rotating platform implant had a better functional outcome than those who received the fixed bearing designs.

The purpose of this study is to present an evidence-based review of functional outcome of mobile –bearing TKA by their survivorship and clinical outcomes.

2. Aims and Objectives

The objective of the study is to know the functional outcome of rotating platforms of total knee arthroplasty

Aim of the present study is to assess the following in patients undergoing total knee arthroplasty with rotating platforms.

- 1) To assess the post operative range of movements in the group
- 2) To assess the objective knee score of the group pre and post operatively
- 3) To assess the functional knee score of the group pre and post operatively

3. Methodology

Patients were included if they were suitable for treatment with either a fixed- or mobile-bearing of a total knee replacement system and had given written informed consent. The present study will be carried out in YENEPOYA MEDICAL COLLEGE HOSPITAL after obtaining the Ethical committee clearance of the hospital. A structured, pre-prepared case Proforma will be used to enter the clinical history, physical examination findings and investigations findings. Those who will meet the inclusion and exclusion criteria will be included in the study.

Sample size of 40 patients were taken

Inclusion criteria

All patients who are fit to undergo total knee arthroplasty like advanced stages of osteoarthritis and rheumatoid arthritis in age group of 50-70 years

Exclusion Criteria

Patients with rheumatoid arthritis and patients undergoing revision arthroplasty, requiring tibial component

augmentation or a femoral component augmentation or a constrained prosthesis were excluded from the study.

4. Observation and Results

‘N’ indicates number of patients in each group

Percentages of sex in the group

Table 1: Percentage of sex in the group

Gender	Frequency	Percent
1. Male	6	30.0
2. Female	14	70.0
Total	20	100.0

In this group there were 6 males (30%) and 14 females (70%).

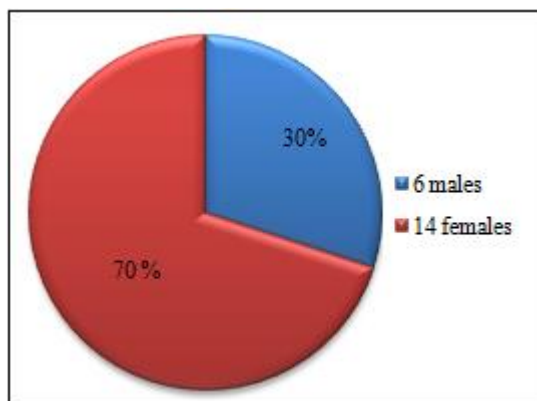


Figure 1: Gender distribution

Table 2: Statistics of age in the Group

Descriptive Statistics					
Age A	N	Minimum	Maximum	Mean	Std. Deviation
Age	20	52	74	63.75	6.138
Valid N (list wise)	20				

The mean age was 63.75 ± 6.138 years.

Table 3: Percentage of Knee side in group

Knee side	Frequency	Percent
B/L	9	45
LT	3	15
RT	8	40
Total	20	100

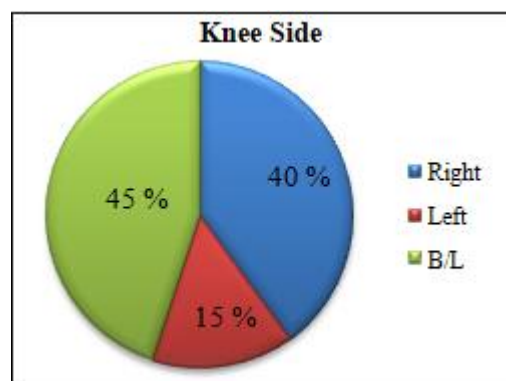


Figure 1: Percentage of Knee side

5. Statistics

Table 4: Statistics of the group

	Post_op_ROM_3M	Post_6M	Post_op_1Y	Knee_score_3M	Knee_score_6M	Post_op_knee_1year	Fun_score_3M	Fun_score_6M	Fun_score_1yr
N Valid	20	20	20	20	20	20	20	20	20
missing	0	0	0	0	0	0	0	0	0
Mean	95.00	108.50	120.50	64.00	69.65	73.90	72.00	84.00	94.50
Median	95.00	110.00	120.00	61.00	69.00	74.00	70.00	85.00	90.00
Minimum	80	100	110	46	54	58	55	70	90
Maximum	110	120	130	77	78	85	80	90	100
Percentiles	25	90.00	100.00	59.00	66.00	70.75	70.00	80.00	90.00
	50	95.00	110.00	61.00	69.00	74.00	70.00	85.00	90.00
	75	100.00	117.50	130.00	70.00	75.00	78.00	80.00	100.00
IQR	10	17.50	17.5	11	9	7.25	10	10	10

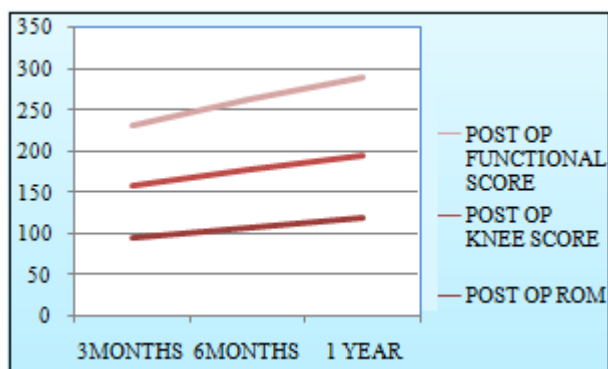


Figure 3: Mean range of Postop functional scores

The mean post operative range of movements were significantly improved for the follow-up at every 3months with the mean ROM of 130° achieved at 1year follow-up.

The ROM has significantly improved from 90° at 3rd month follow-up to 130° at 1year follow-up. The mean KSS knee and functional score were gradually improved in post operatively in 3rd, 6th and 1year follow-up compared to the pre operative KSS score. The KSS Knee score corresponds to the patient’s objective score and hence there is an improvement in the objective score and patient’s were relieved of symptoms.

6. Discussion

The mobile-bearing prostheses involving 40 total knee arthroplasties were studied in terms of performance and survival, with overall revision rates of approximately 1% per year.

The purpose of this study was to analyze the individual performance of mobile bearing knee replacements in an identical clinical setting by eliminating variables such as age, weight, and activity level.

All surgeries were performed by the senior surgeon. The clinical evaluation was done by patients blinded to the type of implant in a particular knee. Patient-related bias was thus minimized.

The clinical results shows the improvement in flexion range and survival rate of the mobile-bearing knees. Excellent or good results were obtained in 90% (thirty six) of the forty patients.

Dislocation (7) is a potential complication with any mobile bearing Knee replacement and the LCS prosthesis is no exception. One patient had a patellar tendon rupture following history of fall. There is no spin off or dislocation (8) of the knee in rotating platform knees.

The lack of statistical power is a potential drawback of this study, owing to the small number of patients evaluated and short term study

7. Conclusion

Clinical and radiological follow-up was performed at 1, 3, 6 months and 1year after the operation. Pre-operative and follow-up ratings according to Knee Society Scoring system were obtained for all the patients. In addition, a visual analogue scale was used to specially assess the severity of the pain. We observed that the post operative range of motion and the Knee society functional(9) score were improved significantly.

This design is able to achieve satisfactory results in terms of kneeling and sitting cross-legged. Proper patient selection and standard and precise surgical technique are important factors in achieving good functional outcome and better survivorship of this implant.

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