

Original research article**FUNCTIONAL OUTCOME OF CEMENTED TOTAL KNEEARTHROPLASTY FOR PRIMARY OSTEOARTHRITIS****¹B Sreekanth Rao,²M Venkaiah,³TVG Krishna, ⁴T Zeeshan Muzahid,⁵GVS Moorthy****^{1,4}Associate Professor,Department of Orthopaedics, Bhaskar Medical College and Bhaskar General Hospital, Yenkapally, Telangana, India****²Assistant Professor,Department of Orthopaedics, Bhaskar Medical College and Bhaskar General Hospital, Yenkapally, Telangana, India****^{3,5}Professor,Department of Orthopaedics, Bhaskar Medical College and Bhaskar General Hospital, Yenkapally, Telangana, India****Corresponding Author:****Dr. M Venkaiah (venkaiah1122naveen@gmail.com)****ABSTRACT**

Introduction: Osteoarthritis is the most common osteoarticular disease in the world, and it is the primary source of months to years spent weakened with defect. The total knee replacement enhance patient outcomes in terms of pain, function, joint stiffness, instability, patellar issues. It's difficult to gauge the success of total knee replacement surgery. OBJECTIVES: 1. To investigate the functional outcome of a cemented total knee replacement in patients with primary osteoarthritis. 2. To investigate the complications of cemented total knee replacement for primary osteoarthritis. METHODS AND MATERIALS: Patients Bhaskar Medical College Yenkapally. A clinical study of 20 cases is planned to take place between July 2019 and September 2021. After clinical and radiological evaluation, patients with indications for Total Knee Arthroplasty are chosen. According to the Knee Society Clinical Scoring system, of the 24 patients evaluated in this study, 16 (80%) had Excellent results and 4 (20%) had Good results. According to the Knee Society Functional Scoring system, 14 patients (70 percent) had Excellent results, 4 patients (20 percent) had Good results, and 02 patients (10 percent) had Fair results of the 20 patients evaluated in this study. CONCLUSION: Total Knee Arthroplasty improve the patient's functional ability and ability to return to a pre-disease state, which is to have a pain-free mobile joint, as evidenced by improvements in the post-op Knee Clinical Score and Knee Functional Score.

Key Words: *cemented total knee replacement, primary osteoarthritis, functional outcome, knee society score.*

INTRODUCTION

Most arthritic knees have some degree of degeneration [1- 3]. Osteoarthritis (OA), Rheumatoid Arthritis (RA), Juvenile Rheumatoid Arthritis, Post-Traumatic Arthritis (also known as Secondary Osteoarthritis), and other types of inflammatory arthritis are the most common causes of arthritis of the knee. Osteoarthritis is considered to be the most common chronic joint condition in the world. A growing number of people are developing osteoarthritis as a result of an ageing population and an epidemic of obesity. Treatment options include nonpharmacological, pharmacological, and surgical approaches [4,5]. The most common clinical symptoms that lead to treatment are pain and function loss. Since the nineteenth century, the concept of increasing knee joint function by altering the articular surfaces has attracted considerable interest. In terms of surgical procedures, they range from soft tissue interposition to excision to surface replacement to surface replacement arthroplasty. Several different types of prostheses have been created to

meet the complex knee kinematics that have been observed in surface replacement arthroplasty.

Total knee arthroplasty (TKA) is currently recognised as a safe and effective therapeutic option for severe arthritis. There are several different systems available, each with its own set of characteristics relating to the geometry of the components, the degree of conformance of the articulating surface, and the anchoring mechanism. With the advent of these varied types of prostheses, it became necessary to conduct studies for assessing the outcome of the different prostheses. As a result, multiple scoring methods for evaluating the outcome of total knee replacement have been developed. The Knee Society Score System is subdivided into a knee score that rates only the knee joint itself and a functional score that rates the patient's ability to walk and climb stairs. It is possible to avoid the problem of declining knee scores linked with patient infirmity by using a dual rating system [5,6].

OBJECTIVES OF THE PRESENT STUDY

- 1) To study the functional outcome after cemented total knee replacement for primary osteoarthritis
- 2) To study the complications associated with cemented total knee replacement for primary osteoarthritis.

MATERIALS AND METHODS

This is a hospital-based prospective observational study that was done to analyze the functional outcome of Cemented Total Knee Arthroplasty for primary osteoarthritis. This study was conducted between the periods of July 2019 – September 2021. 20 patients who consecutively consented and underwent Posterior Cruciate Sacrificing Cemented Total Knee Arthroplasty were assessed clinically and functionally using Knee Society score⁵. The follow-up period was at 3 months, 6 months and 1 year. The study was conducted at the Department of Orthopaedics, Bhaskar Medical College, Yenkapally. Permission of study was taken from institution ethical committee. The pre- and post-operative Knee Clinical Score and Knee Functional Scores were compared using Paired t-test.

INCLUSION CRITERIA

- Age - above 40 years
- Patients with primary osteoarthritis who underwent Total Knee Arthroplasty who gave written informed consent.
- CRP - negative
- Revision Arthroplasty

EXCLUSION CRITERIA

- Patients have gross ligamentous imbalance and require constrained implants.
- Active infection
- Patient who did not give preoperative consent

PRE OPERATIVE

EVALUATION CLINICAL ASSESSMENT

- The detailed history of all patients was taken.
- All patients were reassessed clinically and functionally using the Knee Society Score⁵.
- The preoperative medical evaluations of all patients were done to prevent potential complications that can be life-threatening or limb-threatening.
- Any limb length discrepancies were noted. The presence of any hip and foot deformities were assessed.
- The extensor mechanism was assessed for any quadriceps contractures.
- The knee deformities were examined for any fixed varus or valgus deformities or the presence of any fixed flexion contracture.
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RADIOGRAPHIC ASSESSMENT

- Standard guidelines were utilized to obtain knee radiographs – standing anteroposterior view, a lateral view and a skyline view of the patella¹⁰⁹.
- Any collateral ligament laxity, subluxation of the tibia, presence of osteophytes, any bone defects in the tibia and femur and the quality of bone was assessed.
- Sizing of the femoral and tibial components was also done.

OPERATIVE PROCEDURE

All patients after thorough pre-operative evaluation were taken up for surgery by the same surgical team under general or regional anesthesia with the patient in supine position and knee flexed to 90 degrees. Tourniquet was applied at the thigh region and sterile preparation was done from thighs to toes and draped.

TOTAL KNEE REPLACEMENT COMPONENTS

There are 3 separate components of TKR:

1. Femoral component
2. Polyethylene insert
3. Tibial component

Postoperative followup

The patient's knee was immobilized in a Jones compressive bandage and a knee immobilizer immediately post operatively. The patients were started on IV antibiotics and DVT prophylaxis in the form of subcutaneous low molecular weight heparin.

- 1st post-op day, the patient was taught static quadriceps exercises.
- 2nd post op day, the dressing was debulked and wound inspected. The patient was made to walk full weight bearing within the limits of pain with the knee immobiliser and advised to continue static quadriceps exercises.
- 4th post op day, knee flexion was started and the patient was taught dynamic quadriceps exercises.
- IV antibiotics were given for the first 48 hours post-op and the switched over to oral antibiotics for the next five days.
- DVT prophylaxis was given for the first five days postoperatively.
- 12th post op day, sutures were removed and patient was advised to continue regular physiotherapy.

FOLLOWUP

The patient was assessed 6 weeks postoperatively (1 month after discharge) for any signs of post-operative infection. Once post-operative infection was ruled out clinically the patient was assessed clinically and functionally using the Knee Society Score at an interval of 3 months, 6 months and 1 year post-operative.

OBSERVATIONS AND RESULTS**Table-1: Age Distribution**

Age group	Frequency	Percent
51-55	1	4.16 %
56-60	6	25%
61-65	8	33.33 %
66-70	6	25%
71-75	3	12.5 %
Total	24	100%

The majority of the patients were from the age group of 61-65 years which accounts for 33.33% of patients in our study. The youngest patient was 54 years of age and the oldest patient was 74 years. The mean age was 63.45 years

Table-2: Gender Distribution

	Frequency	Percentage
Female	14	58.33%
Male	10	41.64 %
Total	24	100%

There was a female predominance in the ratio of 3:2 accounting for 60% of the female patients.

Table-3: Side Distribution

	Frequency	Percentage
Left	10	41.66%
Right	14	58.34 %
Total	24	100.00%

There was a predominance of right side accounting for 60 % of the patients

Table-4: Indications

Indication	Frequency	Percentage
Osteoarthritis(OA)	24	100
Total	24	100

All cases operated were for primary osteoarthritis of knee. In this study, accounting for 100% of the patients

Table-5: Knee Clinical Score

	N	Mean	Median	Mode	Standard Deviation	Minimum	Maximum
Pre-Op	24	25.71	26.2	34	7.78	14	36
Post-Op	24	95.6	96.00	97	7.01	78	95

The mean pre-op Knee Clinical Score was 26.2 in this study which improved to a mean post-op score of 95.6

Table-6: Grading Of Knee Clinical Score

	Frequency	Percentage
Excellent	16	75 %
Good	04	25 %
Poor	00	00.00%
Total	24	100.00%

According to the Knee Society Clinical Scoring system of the 24 patients assessed in this study 18 patients (75 %) had excellent results and 06 patients (25 %) had good results and none had poor results

Table-7: Knee Functional Score

	N	Mean	Median	Mode	Standard deviation	Minimum	Maximum
Pre-op	24	37.4	45.00	45	10.2	11	50
Post-op	24	82.7	90.00	90	10.23	24	90

The mean pre - op Knee Functional Score was 39.35 in this study which improved to an mean post-op score of 84.75

Table:8-Grading Of Knee Functional Score

	Frequency	Percentage
Excellent	15	62.5%
Good	06	25 %
Fair	03	12.5 %
Poor	00	00.00%
Total	24	100.00%

According to the Knee Society Functional Scoring system of the 24 patients assessed in this study 15 patients (62.5%) had Excellent, 06 patients (25%) had Good, and 03 patients (12.5%) had Fair results.

Table:9 Comparison Between Pre-op and Post-Op Knee clinical and functional scores

	Paired difference		P-value
	Mean	Standard Deviation	
PreOp KCS-Post Op KCS	67.05	5.12	<0.001
PreOp KFS-PostOp KFS	44.1	8.726	<0.001

The difference between the mean 's of pre-op KCS and post-op KCS was 67.05 (64.26 to 70.13,

95% CI). The P value was significant (<0.001) when the pre – op and post – op Knee Clinical Scores were compared. The difference between the mean's of pre – op KFS and post – op KFS was 44.10 (41.24 to 49.56, 95% CI). The P value was significant (<0.001) when the pre -op and post – op Knee Functional Scores were compared.

DISCUSSION

Total Knee Arthroplasty is generally an effective procedure and is associated with substantial functional improvement. Elderly patients who were having difficulty mobilizing because of degenerative arthritis found good relief after Total Knee Arthroplasty.

Johan et al found that following total knee arthroplasty, patients were able to reproduce joint position and improve mobility significantly. These changes may result from the retensioned capsulo-ligamentous structures and reduced pain and inflammation. The balance index also improved significantly from the preoperative to the postoperative evaluation.⁵

Gait analysis by Andriacchi and Galante, Kelman et al., and others found that individuals with PCL-retaining prostheses have a more symmetrical gait, especially during stair climbing, than do individuals with either PCL-sacrificing/PCL substituting designs. They showed decreased knee flexion during stair climbing and a tendency to lean forward in a quadriceps-sparing posture in patients with PCL-sacrificing/PCL-substituting designs. They postulated that these observations may indicate inadequate rollback of these designs or possibly the loss of a proprioceptive role of the PCL. These observations have been cited as reasons to retain the PCL.⁶

Gait analysis by Wilson et al. contradicts the conclusions of these earlier studies, however, after comparing PCL-substituting/sacrificing knees with normal controls. These earlier observations are refuted further by in vivo studies by Stiehl et al.; Victor, Banks, and Bellemans and Dennis et al., who used fluoroscopy during single-stanced deep knee bend to show a paradoxical forward translation of the femorotibial contact point during weight bearing flexion in some PCL-retaining knees; PCL-substituting/sacrificing knees studied showed more uniform femoral rollback.^{7,8}

Whether the PCL is salvaged or sacrificed at TKR has been much debated. Posterior glide and roll of the femorotibial contact region with flexion is influenced by the PCL. Isolated removal of the PCL increases the flexion gap. While it may be attractive in gaining surgical access and subsequent flexion, PCL sacrifice encourages posterior tibial subluxation. A tibial post and femoral cam, or a dish polyethylene insert with a raised anterior lip, may resurrect both stability and femorotibial rollback. Evidence suggests that using PCL-substituting/sacrificing designs increases post-operative knee flexion. This could perhaps be because of more normal kinematics. Fluoroscopic studies demonstrate increased femoral rollback using the cam-post articulation as compared with some PCL-retaining systems.⁹

Many authors argue that the PCL is diseased with various forms of arthritis and contracture and is difficult to balance reproducibly. Although intraoperative tests of PCL balance have been devised by advocates of PCL retention, such as Ritter and Scott, other investigators, including Maloney et al., have stated that it is difficult, even in a laboratory setting, to reproduce

near-normal PCL strain and function in a PCL-retaining knee arthroplasty^{10,11,12}.

However, any improvement in flexion seemed limited and not associated with improved function. Other investigators have not detected improved flexion with PCL substitution/sacrificing^{13,14,15}. The PCL may not function even when a PCL-retaining design is used⁹.

A Cochrane review¹⁶ indicated no difference in clinical outcome when the PCL was retained or resected.

In this study 24 patients who met the inclusion criteria, all the knees were operated using a Posterior Cruciate Sacrificing design.

Robert L Barrack et al. found that total knee arthroplasty with retention of the patella yielded clinical results that were comparable with those after total knee arthroplasty with patellar resurfacing¹⁷.

Robert L Barrack et al. concluded that postoperative anterior knee pain is related either to the Component design or to the details of the surgical technique, such as component rotation, rather than to whether or not the patella is resurfaced¹⁸.

Nutton concluded that knee function was not improved by patellar resurfacing when compared to a matched group of patients without resurfacing¹⁹.

In our study, patellas were not resurfaced. All patellas were circumferentially denervated with cautery and osteophytes were removed.

The Knee Society Score was used to assess the outcome of Total knee Arthroplasty. The Knee Society Score rating system was a logical outgrowth of the Hospital for Special Surgery (HSS) rating system.

The Knee Society Score system separates findings in the operated knee with findings in the patient's function. The system is subdivided into a knee clinical score that rates only the knee joint itself and a knee functional score that rates the patient's ability to walk and climb stairs. The scoring system combines a relatively objective knee clinical score that is based on the clinical parameters and a knee functional score based on how the patient perceives that knee function with specific activities.

In our study there was significant improvement of Knee Clinical Score and Knee Functional Score following Posterior Cruciate Sacrificing cemented Total Knee Arthroplasty.

In this consecutive study of 24 patients who underwent cemented Total Knee Arthroplasty using posterior or cruciate substituting design, no complications were noted postoperatively during the subsequent follow up period.

CONCLUSION

The improvement in the post-operative Knee Clinical Score and the improvement in the post-operative Knee Functional Score demonstrate that cemented total knee arthroplasty improves the functional ability of the patient and the ability of the patient to return to the pre-disease state, which is to have a pain-free mobile joint.

At two-year follow-up, an average pre-op Knee Clinical Score of 25.71 improved to an average post-op Knee Clinical Score of 95.6, and an average pre-op Knee Functional Score of 37.4 improved to an average post-op Knee Functional Score of 82.7 with the use of a cemented Posterior Cruciate Sacrificing Design.

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Conflict of

InterestNone

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