



FUNCTIONAL OUTCOME ANALYSIS OF TOTAL KNEE ARTHROPLASTY IN OSTEOARTHRITIC PATIENTS IN INDIAN POPULATION.

Orthopaedics

Dr Sanjiv Gaur	Professor and Head, Department of Orthopaedics, Gandhi Medical College, Bhopal, M.P, India.
Dr Kashif Iqbal*	Orthopaedics Residents, Gandhi Medical College, Bhopal, M.P, India *Corresponding Author
Dr Manoj Kumar	Orthopaedics Residents, Gandhi Medical College, Bhopal, M.P, India.
Dr Rohit Bansal	Orthopaedics Residents, Gandhi Medical College, Bhopal, M.P, India.
Dr Mohd Zuber	Associate Professor, Department of Orthopaedics, Gandhi Medical College, Bhopal, M.P, India.

ABSTRACT

Osteoarthritis of knee joint is a common disease affecting mostly elderly population and some younger individuals causing a painful joint limited by mobility, deformity and functional capabilities. Total Knee Arthroplasty is an excellent modality for treating painful severe osteoarthritis of knee providing the patient with pain relief, correcting joint instability and deformity and improving the functional capabilities of the patients which is assessed using knee society score. This is a prospective study including 20 patients of both sexes having severe painful osteoarthritis of knee joint. 14 patients underwent unilateral TKA and 6 patients underwent bilateral TKA. The functional outcome of total of 26 TKA were assessed. Out of 20 study subjects, 12(60%) were male and 08(40%) were females and the mean age was 57.35years and mean follow up period was 12.46months. The mean score of part A of knee society score before surgery was 42.08 and at final follow up it increased to 90.92 and the mean score of part B of knee society score was 37.5 before surgery and it increased to 93.08 at final follow up suggesting improvement from poor at pre-operative period to excellent at final follow up. This study showed that all patients achieved excellent early results with total knee arthroplasty. This study is limited by small sample size and short follow up.

KEYWORDS

Osteoarthritis Of Knee Joint, Total Knee Arthroplasty(TKA), Knee Society Score

INTRODUCTION:

Osteoarthritis of knee joint is defined by loss of articular cartilage and sclerosis of subchondral bone eventually leading to structural and functional failure of a joint mostly in elderly population and some younger individuals¹. The disease is associated with joint pain, reduced joint mobility, eventually progressing to joint instability, malalignment and crippling deformity and total knee arthroplasty is the surgical procedure which involves removal of diseased articular surface of knee joint, femoral condyles and tibial plateau and the joint is replaced with prosthesis which helps reduce pain and hence increase functional capabilities and quality of life. The primary indication of TKA is to relieve pain caused by severe arthritis, with or without significant deformity².

The history of total knee arthroplasty (TKA) dates back to 1860s, when Ferguson reported the first resection for knee osteoarthritis³. The procedure evolved from resection arthroplasty, interpositional arthroplasty to modern day total condylar replacements. Total condylar prosthesis designed by Insall JN and others in 1973 marked the beginning of modern era of total knee arthroplasty⁴. Most modern TKA designs are total condylar replacements with sacrifice of the anterior cruciate ligament and either retention (cruciate retaining- 'CR') or substitution (posterior stabilized- 'PS') of the posterior cruciate ligament⁵.

The purpose of this study is to evaluate the functional outcome of total knee arthroplasty in osteoarthritic patients of Indian populations which was assessed using knee society score⁶.

MATERIAL AND METHODS:

The study was conducted after approval from ethics committee of our institute. Patients presenting with severe arthritis of knee with joint pain graded as stage 4 using Kellgren and Lawrence scoring system⁷ of grading in age group of 40-70 were included in the study after getting an informed consent. Patients with active infection and medically unfit for surgery were excluded from the study.

22 patients of severe arthritis of knee meeting the inclusion and exclusion criteria operated from 1st October 2018 to 30th April 2020 were included. 2 patients lost to follow up and hence study group consisted of 20 patients with severe arthritis of knee joints. Both lower limbs were examined for deformity, also examination of gait, range of

motion of knee joint and neurovascular status were assessed. Functional outcome of patients were assessed using knee society score.

These patients were operated under spinal anaesthesia and supine position. Anterior midline approach was used and Medial parapatellar arthrotomy was done. A progressive release of tight medial structures was performed. The tibial cutting guide was placed and proximal tibial bone cut was performed. An intramedullar guide was used for femur. The distal femur osteotomy was performed. The anteroposterior cutting guide was inserted and externally rotated to ensure equal extension and flexion gaps and medial and lateral gaps were checked by tension. The anterior, posterior and chamfer cuts of the femur was performed. Trial components were inserted and correction of deformity, ligamentous balancing, ROM and patellar tracking were checked. Flexion and extension stability were checked. The final components were cemented after irrigating the joint with pressurized lavage system. Posterior stabilized implants were used. The cement was applied to the cut surfaces and also to the component surfaces and the components were impacted in place. The tourniquet was deflated and major bleeder were coagulated and the wound was closed in layers with knee in 70° of flexion.

Range of motion exercises was started on 2nd post-operative day and mobilization with walker was started on 3rd post-operative day. Patients were followed up by OPD visits and interviews. Functional assessment was done using Knee Society Score. Follow ups were done at 3rd and 6th months periods and further on.

RESULTS:

Out of 22 patients enrolled in our study, 2 cases were lost to follow up. Hence final results are analysed on the basis of the remaining 20 cases. Out of 20 cases, 14 patients had unilateral knee replacements and 6 patients had bilateral knee replacements, and hence total 26 knee replacements were analysed. Out of 20 study subjects, 12(60%) were male and 08(40%) were females and the mean age was 57.35years. Out of 26 knee replacements, 14 were right side and 12 were left side. The right side was the predominant side accounting for 53.84%. Knee society score was calculated in two parts. Part A was the clinical score and Part B was the functional score. The mean score of part A was 42.08 before surgery and at final follow up it increased to 90.92. Repeated measure of ANOVA test was applied and it showed there was

statistically significant increment in knee society score at follow up with P value ($8.3655E^{-75}$) less than 0.05. The mean score of part B was 37.5 before surgery and it increased to 93.08 at final follow up. Repeated measure of ANOVA test was applied and it showed there was statistically significant increment in knee society score at final follow up with P value ($7.74687E^{-83}$) less than 0.05. Knee Society Score part A and part B shows excellent results using knee society score in all 26 knees operated. Complication of superficial infection was found only in 1 (3.85%) patients. Thrombo-embolism and peri-prosthetic fracture were not seen in any case.

Table 1: ANOVA test for part A of knee society score

SUMMARY						
Groups	Count	Sum	Average	Variance		
Pre-op KSS (Part A)	26	1094	42.08	14.87		
3 rd Month follow-up KSS (Part A)	26	1897	72.96	16.36		
6 th Month follow-up KSS (Part A)	26	2247	86.42	12.73		
Final follow-up KSS (Part A)	26	2364	90.92	5.59		
ANOVA TEST						
Source of Variation	SS (sum-of-squares)	Df(degrees of freedom)	MS (Mean Square)	F	P-value	F crit
Between Groups	37898.0385	3	12632.679	1019.586722	8.3656E-75	2.695534255
Within Groups	1239	100	12.39			
Total	39137.0385	103				

ANOVA test for Part A of knee society score

Table 2: ANOVA test for part B of knee society score

SUMMARY						
Groups	Count	Sum	Average	Variance		
Pre-op KSS (Part B)	26	975	37.50	22.50		
3rd Month follow-up KSS (Part B)	26	1805	69.42	12.65		
6th Month follow-up KSS (Part B)	26	2405	92.50	6.50		
Final follow-up KSS (Part B)	26	2420	93.08	6.15		
ANOVA TEST						
Source of Variation	SS (sum-of-squares)	Df(degrees of freedom)	MS (Mean Square)	F	P-value	F crit
Between Groups	53464.183	3	17821.39423	1491.90105	7.74687E-83	2.695534255
Within Groups	1195.1923	100	11.95192308			
Total	54659.375	103				

ANOVA test for Part B of knee society score



Figure 1: Clinical photograph at pre-op period (left picture), post-op period (middle and right picture)



Figure 2: pre-op radiograph (left picture) and post-op radiograph (right picture)

DISCUSSION:

When non pharmacological and pharmacological methods fail to provide pain relief in patients of severe osteoarthritis and limit the functional capabilities of the patient affecting the quality of life, the surgical procedure of total knee arthroplasty serves as an excellent modality to improve the quality of life of the patient.

Patients with painful joint and with difficulty in mobilising had pain relief with increased range of motion of the joint, correction of the deformity and improved quality of life after the procedure. The success of the procedure is related to implant survival. This study showed that all patients achieved excellent early results with the treatment.

The mean score of part A of knee society score which assesses the clinical outcome was 42.08 before surgery and at final follow up it increased to 90.92 and the mean score of part B of knee society score which assesses the functional outcomes was 37.5 before surgery and it increased to 93.08 at final follow up showing excellent outcome.

In study conducted by Suhail A et al⁸ in 2008, at the final follow up, the mean Knee Society Knee Score was 87.9 with 77.3% (58 knees) showed excellent, 21.3% (16 knees) showed good and 1.3% (1 knee) showed fair; none were poor. Most patients treated for knee osteoarthritis with total knee replacement showed high rates of excellence and good early functional outcomes.

Vaishy A et al⁹ in 2017 did a retrospective study of 30 patients who underwent Total Knee Arthroplasty using posterior cruciate substituting design in osteoarthritis. The average pre op knee society score was 28 and post op knee society score at final follow up was 97. The Pre Operative Functional score average was 41.53 and the Post Operative average at five year follow up was 88.49.

Reddy HK et al¹⁰ in 2017 did a prospective observational study to analyze the functional outcome of Cemented Total Knee Arthroplasty in 30 patients of primary osteoarthritis. The difference between the means of pre-op knee clinical score and post-op knee clinical score was 67.35 (64.56 to 70.14, 95% CI) and the difference between the mean's of pre - op knee functional score and post - op knee functional score was 45.40 (41.24 to 49.56, 95% CI).

There was one case of infected TKA in this study, (3.85% of cases reviewed). Infection was superficial and was cured with antibiotics course. There was no evidence of polyethylene wear or osteolysis at the time of review. There was no case of aseptic loosening or anterior knee pain in this study.

The present study showed good results with total knee arthroplasty assessed with knee society score. Also the previous studies showed similar good results of total knee arthroplasty. Most of the patients were functionally independent.

CONCLUSION:

Total knee arthroplasty in patients of severe osteoarthritis is an excellent modality to provide the patient with pain relief, increased joint mobility and functional capabilities and correct deformity. Our study is limited by small sample size and less follow up period. Further studies with more patients, longer follow up are needed to substantiate the above finding.

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