

Original Research Article

Outcomes of total knee arthroplasty in arthritis using functional knee score

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ABSTRACT

Background: Knee being a major weight bearing joint, arthritis of the knee is a common problem. Over time various conservative measures have been used to alleviate the arthritic pain, but complete pain relief has rarely been achieved. Total Knee Arthroplasty has an established place in the treatment of knee arthritis and is an effective surgical modality that provides immediate pain relief and enhances quality of life. Though most patients were satisfied by the immediate outcome of the surgery, further detailed interrogation revealed concern and inability to perform activities they previously used to do, thus arising the need for an objective method to measure the true outcome.

Methods: There are very few established objective scoring methods to evaluate the outcome following a Total Knee Arthroplasty. In our study, we have used the 'Functional Knee Score' for the 30 patients with arthritis who underwent TKA using the midvastus approach under tourniquet cover.

Results: The majority of the patients were from the age group of 61-70 years which accounts for 36.7% of patients in our study. The mean functional new knee society score preoperatively was 39.90 standard deviation of 3.055 which improved to 80.77 with standard deviation of 6.263 postoperatively, $p < 0.001$.

Conclusions: Using knee society functional score, 10 patients had excellent results, 16 had a good result, 4 patients had fair result.

Keywords: Total knee arthroplasty, Midvastus, Knee society functional score

INTRODUCTION

Total knee replacement is an active surgical intervention that is used mainly for patients with arthritis. It is an effective surgical modality that improves patients quality of life, reduces pain and increases functional capability. The main indications for performing Total Knee Replacement are joint pain and functional limitation.¹

Current research with total knee replacement is directed to improve patient quality of life. The desire to achieve greater knee motion and strength motivates researchers to further enhance knee replacements so as to be equal to normal knee. Total Knee Arthroplasty (TKA) is typically

an extremely successful method of restoring pain-free function and providing good long-term outcomes for patients with end-stage knee disease.²

In 1989, The Knee Society Clinical Rating System 6 was developed as a simple, but objective scoring system to rate the knee and patient's functional abilities such as walking and stair climbing before and after TKA. The new Knee Society Scoring System is both physician and patient derived. The functional component of the new score was developed on the basis of comprehensive inventories of the activities and observations of 101 patients at five major knee arthroplasty centers who completed a 120-item survey, which was ultimately

condensed down to the current assessment. Our aim is to study the functional outcome in Primary Total Knee Arthroplasty pre-operatively and postoperatively using the Functional Knee Society Score.

METHODS

The present study has been conducted in Department of Orthopaedics at a medical college and tertiary health care centre. It is a prospective and retrospective study conducted from August 2014 to December 2016 involving 30 patients meeting the eligibility criteria.

The detailed clinical history, complete general, systemic examination, local examination and preoperative investigation findings and preoperative knee society functional score was noted in a predesigned proforma.

After undergoing primary total knee arthroplasty in arthritic patients the functional outcome using knee society functional scoring scale was assessed at post-operative interval of 6 weeks, 3 months, 6 months and 12 months respectively.

The study participant was informed to report to health facility as and when required apart from scheduled visit. The data has been analysed by an appropriate statistical software.

Inclusion criteria

Inclusion criteria were patients with painful osteoarthritis affecting daily living activities; patients age >50 years; patients with osteoarthritis with or without deformities; secondary traumatic arthritis.

Exclusion criteria

Exclusion criteria were patients with sepsis of the knee joint; revision total knee arthroplasty.

Pre-operative evaluation

Clinical assessment

Detailed history of all patients was taken. All patients were assessed clinically and functionally score of new knee society functional score. The preoperative medical evaluation of all patients was done to prevent potential complications that can be life-threatening or limb-threatening. Any limb length discrepancies were noted. Presence of any hip and foot deformities was assessed. The extensor mechanism was assessed for any quadriceps contractures. The knee deformities were examined for any fixed varus or valgus deformities or presence of any fixed flexion contracture.

Radiographic assessment

Standard guidelines were utilized to get knee radiographs:

- Standing anteroposterior view
- Lateral view
- Skyline view of the patella.

Any collateral ligament laxity, subluxation of tibia, presence of osteophytes, any bone defects in the tibia and femur and the quality of bone is assessed.

Total knee arthroplasty components

There are 3 separate components of TKA:

- Femoral component
- Polyethylene insert
- Tibial component

Operative procedure

Patient will be given suitable anaesthesia. Patient in supine position, scrubbing, painting and draping done. Anterior midline incision with knee in flexion. The standard retinacular incision is a medial parapatellar retinacular approach. Extend knee and evert patella to allow release of lateral patellofemoral plica, then flex knee and remove ACL, anterior horns of medial and lateral meniscii and osteophytes. Make distal femoral cut at a valgus angle (5-7⁰) perpendicular to predetermined axis of femur. Femoral component rotation determined by transepicondylar axis, AP axis, posterior femoral condyles and cut surface of proximal tibia. Cut tibia perpendicular to its mechanical axis with cutting block oriented by intramedullary or extramedullary cutting guide. Ligamentous balancing done, varus/valgus deformity corrected, flexion contracture corrected. Peripheral tibial defects corrected with bone grafting. Clean cut bone surface with pulsatile lavage irrigation. Tibial tray implanted first, then femoral and patellar components with PMMA cement. Carefully search for any bone/cement components. Wound closed in layers and dressing done under all aseptic precaution. Initially compressive dressing and knee immobilizer used.

Post-operative protocol

After adequate quadriceps strength Range of motion exercises performed postoperatively. The patient's knee was immobilised in a Jones compressive bandage and long knee brace immediately post operatively. The patients were given linezolid 600 mg i.v. and piptaz (Piperacillin and Tazobactam) 4.5 gm i.v. for 2 days.

On 1st post op day, patient was taught static quadriceps exercises.

On 2nd post op day, patient was made to walk full weight bearing within the limits of pain, advised to continue static quadriceps exercises and dynamic quadriceps exercises. On 3rd post op day, drain removed.

14th post op day, sutures were removed and patient was advised to continue regular physiotherapy.

The patient assessed for the functional outcome using knee society functional scoring scale at post-operative interval of 6 weeks, 3 months, 6 months and 12 months.

Statistical analysis

Statistical analysis was performed using unpaired “t” Test, Student T test and Chi square test and Annova P test. A ‘p’ value of <0.05 was considered as statistically significant. All statistical calculations were done using computer programs Microsoft Excel version 7 (Microsoft Corporation, NY, USA) and SPSS software version 2.

RESULTS

Table 1: Age distribution.

Age group (years)	Frequency	Percentage (%)
41-50	7	23.3
51-60	7	23.3
61-70	11	36.7
71-80	5	16.7
Total	30	100.0

The majority of the patients were from the age group of 61-70 years which accounts for 36.7% of patients in our study. The youngest patient was 45 years of age and the oldest patient was of 75 years.

Table 2: Gender distribution.

Sex	Frequency	Percentage (%)
Female	24	80.0
Male	6	20.0

There was a female predominance of 80% as compared to 20% males.

Table 6: Deformity.

Deformity	Preop		6 week		3months		6 months		12 months	
	No	%	No	%	No	%	No	%	No	%
Varus	23	76.67	0	0	0	0	0	0	0	0
Valgus	5	16.67	0	0	0	0	0	0	0	0
Flexion	2	6.66	2	6.66	0	0	0	0	0	0
Recurvatum	0	0	0	0	0	0	0	0	0	0
No deformity	0	0	28	93.34	30	100	30	100	30	100
Total	30	100	30	100	30	100	30	100	30	100

There were 23 patients with varus deformity, 5 patients with valgus deformity & 2 patients with flexion deformity.

Table 3: Side distribution.

Side	Frequency	Percentage (%)
Bilateral	4	13.3
Left	15	50.0
Right	11	36.7

13.3% of the cases were bilateral, while in 50% of the patients only the left side was involved.

Table 4: Comorbidity.

Comorbidities	Frequency	Percentage (%)
HTN	9	30.00
HTN and DM	2	6.67
HTN and RA	1	3.33
DM	1	3.33
RA	1	3.33
No comorbidities	16	53.33

In our study there was 30% of patients who were hypertensive, 6.67% where both hypertensive and diabetic, 3.33% hypertensive as well as rheumatoid arthritis, 3.33% diabetic, 3.33% rheumatoid arthritis.

Table 5: BMI.

BMI	Sex			
	Female	Male	Total	
Obese Grade 1	Count	20	2	22
	%	83.3	33.3	73.3
Overweight	Count	4	4	8
	%	16.7	66.7	26.7
Total	Count	24	6	30
	%	80.0	20.0	100.0

In our study, 73.3% patients are obese grade 1 and 26.7 % are overweight.

The mean functional new knee society score preoperatively was 39.90 standard deviation of 3.055 which improved to 80.77 with standard deviation of 6.263 postoperatively at 12 month, which is significant ($p < 0.001$) (Table 7).

Table 7: Functional knee society score.

KSS	Pre Op		Post Op	
	No	%	No	%
Excellent	0	0	10	33.3
Good	0	0.0	16	53.3
Fair	0	0.0	4	13.3
Poor	30	100.0	0	0.0
Total	30	100.0	30	100.0

Using pooled out data chi square =60.00 p value = 0.001 HS

Table 8: Knee society functional score- grading.

85-100	Excellent
84-70	Good
69-60	Fair
<60	Poor

In patients with severe functional disabilities the functional score may actually be a negative number. In these cases the score will default to zero.

Table 9: Knee society score statistics.

		Mean	N	SD	Std. error mean
Pair 1	Preop KSS value	39.90	30	3.055	0.558
	KSS value at 12 month	80.77	30	6.263	1.143

In our study, there is improvement in KSS postoperative patient compare to preoperative patient as well as improvement in range of motion. Using new knee society functional score, 10 patients had excellent results, 16 had good result, and 4 had fair result.

Table 10: Range of motion.

ROM flexion		
PREOP	Frequency	Percentage (%)
≤60	2	6.6
61-75	10	33.3
76-90	10	33.3
>90	8	26.7
Total	30	100.0

In comparison to preoperative range of motion, there is significant increase in post-operative range of motion.

DISCUSSION

Total Knee Arthroplasty is an excellent tool for pain relief and functional rehabilitation. The result of the procedure depends on the longevity of implant. After total knee arthroplasty, elderly who had difficulty in mobilizing limb and pain had significant relief. There

was significant improvement in pain and quality of life following Total Knee arthroplasty. A varied number of implant were available, we used posterior stabilized fixed prosthesis. Evidence suggests that using PCL-substituting designs increases post-operative knee flexion. This could perhaps be because of more normal kinematics. As per fluoroscopic studies, an increased femoral rollback was observed using the cam-post articulation as compared with some PCL-retaining systems.

Clark et al noted increased flexion with PCL substitution at two years after surgery.³ A recent meta-analysis concluded that there was an improvement in flexion of 8° in PCL-substituted designs compared with PCL retention.⁴ In our study, all 30 patients were operated using a Posterior cruciate substituting design.

Using new knee society functional score 10 patients had excellent result, 16 had good result and 4 had fair result.

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

The New Knee Society Knee Scoring System has been put forward to better characterize the expectations, satisfaction, and physical activities of the younger patients undergoing TKA. It provides sufficient flexibility and depth to consider the diverse lifestyles and activities of our current patients.

There were 23 patients with varus deformity, 5 patients with valgus deformity and 2 patients with flexion deformity. Varus and valgus corrected intraoperative only and flexion postoperatively over time with physiotherapy.

Güçlü et al evaluated the midterm results of Total Knee Arthroplasty in degenerative knee joint diseases with severe deformity. Pre and postoperative assessments were made according to the Knee Society clinical scoring system. The mean follow-up was 53 months (range 24 to 96 months) found that Total Knee Arthroplasty performed in degenerative knee joint diseases with severe deformity significantly improves patients' complaints and functional results.⁵

In our study, there was improvement in range of motion postoperatively as compare to preoperative.

Shi et al retrospectively analyzed the influence of preoperative range of motion (ROM) and maximal flexion degree on the early clinical outcome of Total Knee Arthroplasty (TKA). From January 2000 to December 2003, 97 knees of 65 patients that were underwent total knee arthroplasty with Scorpio posterior stabilized knee prosthesis were reviewed, found that, preoperative range of motion of knee influence on the early clinical outcome of total knee arthroplasty, knees that have good preoperative ROM have better clinical

outcomes postoperatively than those with poor preoperative ROM.⁶ In our study, 2 patients have flexion deformity which improved over 6 month of postoperative period.

Guan et al analyzed on an early clinical outcome of total knee arthroplasty (TKA) for the knees with different degrees of flexion-contracture deformities. The curative effect is mainly determined by the surgeon's good operational skills, rich clinical experience, a familiarity with the prosthesis, and it is not influenced by severity of the knee flexion-contracture deformity. The knee ROM after TKA, which has a "toward middle ROM" phenomenon, is influenced by many clinical factors. It is very important for the patient to do physiotherapy as early as possible after surgery.⁷

In our study, functional outcome was found to be excellent in 10 patients, good in 16 patients and fair in four patients. Senan et al assessed the clinical functional and radiological outcome of total knee replacement in 35 knees. 26 patients with 35 symptomatic knees who underwent total knee replacements during the period May 1999 to May 2003 were included in the study. Mean duration of follow up was 32 months or 2.8 years maximum follow up being 50 months and minimum 12 months. Using the Knee Society clinical and functional rating system a preoperative and post-operative score was assigned to each patient on the basis of clinical and functional criteria assessed through questionnaires and personal interviews. Outcome as assessed by functional scores showed that 9 cases had excellent results, 12 good, 2 fair and 12 bad functional results The Knee Society Score provides a good method of assessing clinical and functional results in Total Knee Arthroplasty.⁸

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Ethical approval: The study was approved by the institutional ethics committee

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