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Evaluation of outcome in arthritic patients undergoing total knee arthroplasty using knee society score in South Indian population-A prospective clinical study

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Abstract

Introduction: This study aims to evaluate pre-and postoperative functional outcomes in patients with arthritis undergoing Total Knee Arthroplasty using Knee Society Score.

Materials and Method: This study included 28 cases (30 knees) who underwent primary total knee replacement at JSS Hospital between September 2014 to May 2016. Patients were evaluated using knee society score at regular follow-up. The follow-up included immediate post-op, at 1 month, at 3months and at 6 months.

Results: In our study, all the 30 knees had poor knee score of <60 preoperatively, postoperatively after 6 months 7 knees had an excellent score (80- 100) and 16 knees with good score (70-79), 5 with fair score (60-69) and 2 with poor score (<60).

Preoperatively all patients had a poor functional score (< 60), postoperatively 15 patients had an excellent score (80-100), 4 patients with a good score (70-79), 6 patients had a fair score (60-69) and 5 patients had a poor score (<60). The KSS and FSS scores were however not significantly different after 3 and 6 months. Pre-operatively all of our patients had moderate to severe pain, post- operatively 21 knees had no pain and 21 knees had mild pain. Preoperative average Flexion of 78 degrees was increased to 106.33 degrees postoperatively.

Conclusion: Total Knee Arthroplasty is an excellent method for patients with knee arthritis in providing pain-free mobile joint and improving the functional ability significantly, thereby lifting their quality of life significantly.

Keywords: TKA, KSS, Arthritic knee, Osteoarthritis.

Introduction

Osteoarthritis (OA) is the most common type of arthritis. Pain and functional impairment is the major symptom associated with osteoarthritis and the main reason for patients to seek medical care. However, a fraction of patients does not get pain relief and functional outcomes even 6 months after surgery. Rates of ongoing knee pain and functional impairment following TKR vary considerably in the literature, ranging from 14% to 44% of individuals reporting persistent pain[(1)] and from 20% to 50% of individual reporting functional impairment in the first 12 to 24months following surgery.[(2)] The pain relief following TKR depends on age at which the surgery is done,[(3)] the disease for which it is indicated,[(4)] and associated co-morbidities.[(5)]

The need of the study is to evaluate the benefits of Total Knee Arthroplasty in different parameters like age, sex, disease and associated co- morbidities, by using Knee Society scoring system which involves both subjective as well as objective analysis of improvement, since there is varying percentage in functional outcome following TKR for Osteoarthritis of knee joint in the literature.

Materials and Method

On approval from the JSS ethical committee for the protocol of the study, 28 patients were prospectively chosen, with Arthritis of knee and admitted to JSS hospital for undergoing Total Knee Replacement. Patients with previous unicompartmental replacement, patients with high tibial osteotomy of same knee, patients with major neurological and psychological illness were excluded from the study.

Surgery was performed under spinal anaesthesia (with or without epidural anaesthesia). The patient was positioned supine with the operating leg in flexion. An antibiotic dose of cefoperazone-sulbactam 1.5g IV was just given before application of the tourniquet. The part was painted with betadine solution and Sterile stockinet was used to drape the limb exposing only the operating area. A standard midline approach was used from upper pole of patella till tibial tuberosity. Deeper anteromedial dissection was followed for arthrotomy. Medial, lateral, posterior soft tissue releases, either minimal or extensive was done for soft tissue balancing and correction of deformities. Tibial and femoral osteophytes were excised. Tibial sectioning was done using extramedullary cutting. Femoral section was done with appropriate femoral rotation with reference to the epicondylar line or White slide line. Tibial defects were managed by autologous posterior condylar grafts with screws or with wedge augmentation. The alignment and soft tissue balance were checked in extension and flexion. Trial components were assembled for proper fit and checked for soft tissue tension and balancing in flexion and extension. Circumpatellar electrocautery in all knees and removal of osteophytes from patella without patellar resurfacing was done. Patellar tracking was noticed normal in all. Cementing of components was done by using one packet of bone cement. Tourniquet was released, hemostasis was achieved by cauterisation.

The drain was kept, the wound was closed in layers. Antibiotics continued for 5 days.

Postoperatively following standard protocol was followed for all the patients.

Day-1: Static Quadriceps strengthening exercises and active straight leg raising as permitted by the pain.

Day-2: Drain was removed on day 2 or on day 3, whenever collection was less then 50ml/24 hours.

Day-3: Active and passive assisted flexion as tolerated by the patient using continuous passive motion machine and less than $90^{0.}$

Day- 4 to 5: Ambulation was encouraged with help of walker

Day 7 to 10: Active and passive assisted flexion as tolerated by patient using continuous passive motion machine as tolerated by patient i.e. more than 90 degree

Day-9: Active exercises were encouraged including extension. By the time sutures were removed (12-14 days) patients were encouraged to have good muscle strength and knee control.

Day 20- Patient was encouraged to ascend and descend stairs.

Immediate post-operative and follow-up clinical radiological evaluation was done at regular intervals. The final evaluation was done using KSS scoring system. All cases were photographically documented. The follow-up period was at 10 days, 1 month, 3 months, and 6 months.

Results

In our study, we had 8 males and 20 female patients, out of which 21 knees (70%) had osteoarthritis and 9 knees (30%) had rheumatoid arthritis. Mean age in our study was 63.3 years which included 13 patients below 60 years, 9 patients between 61-70 years and 6 patients above 71 years. 16(57%) patients were homemaker by occupation, 5 patients (18%) were employees, 3 patients (11%) were farmers and 4 patients (4%) were teacher, nun, self-employed and daily laborer respectively. 13 patients underwent TKR for right knee and 13 underwent TKR for left knee and 2 patients underwent Bilateral TKR.

Mean pre-op KSS score came out to be 26.76 (22.31-31.16), KSS assessed in immediate postoperative came out to be 37.8(34.115-41.48), KSS after 1 month was 59.20(54.05-64.35), KSS after 3 months was 70.87(67.53-74.20), and KSS after 6 months of surgery was 74.20 (71.17-77.28. the scores were significant when compared with each other (P<0.0001, repeated measure ANOVA, significant in all combinations). KSS Scores was excellent in 7 knees (23.3%), good in knees 16(53.3%), fair in 5 knees (16.7%) and poor in 2 knees (6.7%).

Mean pre-op FSS score was 21.80 (17.15- 26.44), immediate post-op FSS was 25.16 (20.90- 29.42), FSS after 1 month was 53.66 (48.01- 59.32), FSS after 3 months was 69.50 (64.01- 74.98), and FSS after 6 months was 72.33(67.43- 77.23). All the scores are significant except the pre-op score and immediate post-op score. FSS Scores were excellent in 15 knees (50%), good in 6 knees (20%), fair in 4 knees (13.3%) and poor in 5 knees (16.7%).

Mean pre-op ROM was 78 degrees (68.67- 87.32), immediate post op KSS was 87.32(83.85- 96.47), ROM after 1 month was 101.83 (97.49- 97.49), ROM after 3 months was 106(102.12- 109.87), and ROM after 6 months was 106.33(102.32- 110.34). All ROM are significant ROM after 3 months and 6 months (P<0.0001, repeated measure ANOVA).

There was no significant difference between the KSS scores of OA and RA (p=0.2, Chi-square test). There was again no significant difference in FSS scores of OA and RA (p=0.7, Chi-square test)

One of our patients sustained a per-operative lateral tibial condyle fracture. It was managed with a Cannulated Cancellous screw. Active and passive ROM exercises were started in the immediate postoperative period. However, she was asked not to bear weight for 1 month and a separate rehabilitation protocol was followed. X-ray was taken 10 weeks later, which showed union at the fracture site and the patient was allowed to bear weight. Superficial wound infection was encountered in 2 patients and 1 had delayed wound healing.

Table 1: Showing distribution of arthritis in various occupations

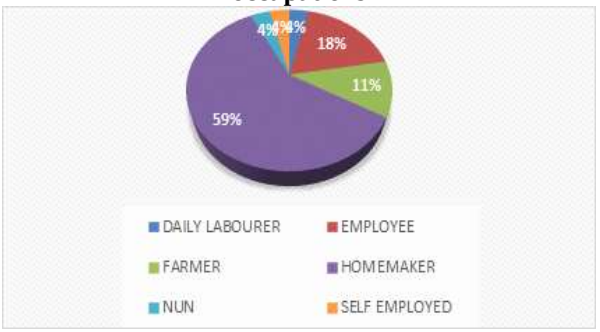

Table 2: Showing KSS of patient's pre-op, post-op, after 1 month, 3 months and 6 months follow-up

KSS	Mean	SD	95% Confidence Interval	
			Lower Bound	Upper Bound
Preop KSS	26.767	11.77	22.371	31.163
Postop KSS	37.800	9.87	34.115	41.485
KSS After 1 M	59.200	13.80	54.047	64.353
KSS After 3 M	70.867	8.92	67.536	74.197
KSS After 6M	74.200	8.26	71.117	77.283

Table 3: Showing FSS of patients pre-op, post-op, after 1 month, 3 months and 6 months follow-up

FSS	Mean	SD	95% Confidence Interval	
			Lower Bound	Upper Bound
Preop FSS	21.800	12.44	17.154	26.446
Postop FSS	25.167	11.41	20.907	29.427
FSS at 1M	53.667	15.14	48.014	59.320
FSS at 3M	69.500	14.70	64.011	74.989
FSS at 6M	72.333	13.11	67.437	77.230

Table 4: Showing ROM of patient's pre-op, post-op, after 1 month, 3 months and 6 months follow-up

ROM	Mean	SD	95% Confidence Interval	
			Lower Bound	Upper Bound
Pre-op ROM	78.000	24.97	68.676	87.324
Post op ROM	90.167	16.89	83.859	96.474
ROM after 1 M	101.833	11.63	97.490	106.177
ROM after 3 M	106.000	10.37	102.127	109.873
ROM after 6 M	106.333	10.74	102.322	110.345

Fig. 1: At 6 months follow-up after TKR

Fig. 2: Showing pre and post-operative x-ray of the same patient

Discussion

In our study, we evaluated 28 patients (30 knees) who underwent total knee replacement at JSS Hospital during the period September 2014-May 2016.

We had 20 (70.37%) of female patients and 8(29.63%) of male patients which was similar to the results when compared with studies from, Victor et al,[6] Ching et al,[7] Hiroshi et al,[8] Frank et al,[9] Hanusch et al,[10] McCalden et al,[11] Santiago A et al.[12] All of these studies had a female preponderance.

Age distribution of Arthritic knee in our patients came out be slightly on younger side with, Age <60 years were 14 knees, 10 knees from age group 61-70 years, and 6 knees accounted for >71 years, giving us a mean age of 63.3±9. 4years.Studies from Victor et al, Hiroshi et al, Hanusch et al, McCalden et al et al and had older patients than Ching et al patient group and similar to Frank et al and Santiago et al.

In our study, Pre-operative knee society score for pain was 23.7 and the postoperative score was 74.2, which showed a significant improvement. These results are comparable with the results of other studies where victor et al showed a significant improvement in the case of pain scores from 14.1 preoperatively to significant improvement of 49.3 postoperatively and Hanusch et al also showed a significant improvement of 6.9 preoperatively to 42.6 postoperatively.

Average Range of movement in our study pre-operatively was 0 to 78 degrees of flexion and average postoperative range of movement was 0 to 106.3 degrees of flexion. With a difference of 28.3 degrees (21.76%) of flexion from pre-op to post-op. These results are comparable with other studies. They are nearly similar with the postoperative flexion achieved in studies done by Victor et al, Ching et al, and McCalden et al, but we have achieved less flexion when compared with Frank et al, and Hiroshi et al. Our patients had more flexion when compared with the study of Hanusch et al.

Most of the indications in our study belong to primary Osteoarthritis (21 knees) and rheumatoid arthritis (9 knees). Ching et al reported that there were 152 knees diagnosed with OA, and 3 with RA and 2 with osteonecrosis. MC Calden et al had 147 knees diagnosed with OA in a total of 160 knees. When compared with other studies the patients diagnosed with RA was on the higher side (30%).

In our study, 2 patients (7.2%) underwent bilateral Total Knee Replacement, 13 patients to right knees (46.4) and 13 (46.4) patients to left knees. Santiago et al in a total of 412 patients they performed 29 bilateral and 383 unilateral patients. Ching et al in a total of 137 patients with operated 157 knees had 20 patients who underwent bilateral TKA and 117 patients who underwent unilateral TKA.

We had 9 patients without any associated conditions, 14 patients with Hypertension, 4 patients with obesity, 12 with DM, 7 patients with ischemic heart disease, 2 patients with COPD, 1 with Bronchial

Asthma. Santiago et al reported out of 412 patients 297(72%) of patients had CVS related problems, 217(53%) had problems related to the musculoskeletal system, 58(14%) of patients had problems of the respiratory system. Kristensen et al.[12] reported no significant correlation between Body Mass Index with residual pain or radiolucency score.

We had two knees with FFD >20degrees, 1 knees with FFD of 16-20 degree, 2 knees with FFD of 11- 15 degrees, 5 knees with FFD of 5-10 degree preoperatively. Post-operatively 27 knees did not have FFD, 2 knees had FFD of 11-15 degree and 1 knee had FFD of 5- 10 degree, with a significant P value of < 0.001. Results of other studies, Wine Maker M. et al[13] has observed 72% of patients with FFD had difficulty in kneeling post op and 38% had difficulty in stair climbing as compared to 44% and 26% respectively for non-stiff knees.

Two knees had an extension lag of > 20^0, 5 knees had an extension lag of 10-20^0 and 16 knees with extension lag of <10^0 preoperatively. Postoperatively 5 knees had an extension lag of <10^0 and 1 knees with an extension lag of 15^0. Ching et al showed a significant extension lag of 6.8^0 pre-operatively to an improvement of 1^0 postoperatively.

Hanusch et al showed improvement of extension lag of 5.2^0 pre-operatively to 0.7^0 postoperatively.

Preoperatively we had 3 knees with 16-20^0 of varus, 17 knees with varus of 11-15^0, 16 knees with 5-10^0 of varus, 4 knees with 0-4^0 of varus, 1 knees with >20^0 of valgus. Post-operatively we had 28 knees with normal valgus of 5-10^0 and 2 knee with valgus of 11-15^0. Ching et al showed an average alignment of 7.6 in 146 knees and average valgus alignment of 12.2 in 11 knees pre-operatively and post-operative average valgus alignment was 6.9 degrees and radiologically found an average femorotibial valgus angle of 7.3^0 postoperatively.

We had 3 patients who were housebound, 14 patients who could walk < 5 blocks and 11 patients with walking ability of 5 – 10 blocks preoperatively. Postoperatively 9 patients could walk an unlimited distance, 10 patients > 10 blocks and 9 patients 5- 10 blocks, with a significant P value of<0001. Singh et al[14] in their study concluded that moderate-severe degree activity limitation pre-op was 69.7% and post –op was24.2%.

Pre-operatively no patients were able to walk stairs up and down normally, 11 patients up with rail and unable to walk down, 15 patients were able to walk stairs up and down with rail and 2 patients were unable to walk up and down stairs. Postoperatively 5 patients had normal up and down of stairs, 12 patients had normal up and down with rails and 8 patients had up and down with rails, 3 patients up with rails and couldn't climb down. P value is <0001 which is significant. Singh et al, in their study, showed moderate-severe degree activity limitation in stair climbing from 84.6 pre-operatively to 39.1 at 6 months post-op.

Preoperatively 16 patients were using a cane and 7 patients were using a walker and 5 patients without any support. Postoperatively 14 patients are using a cane, 6 using a walker and 8 patients without any support.

In our study, Average KSS pre-operatively was 26.767 and post-operative average KSS was 74.20 after 6 months. Postoperatively 7 knees had an excellent KSS score and 16 knees had a good KSS score, 5 knees had a fair score and 2 patients had poor results. These results are comparable with the studies done by Victor et al, Ching et al, Frank et al, Hanusch et al, McCalden et al where they also indicated a significant improvement in KSS.

In our study, 30 knees had poor functional score pre-operatively. Postoperatively 15 patients had an excellent score (80-100), 6 patients with a good score (70-79), 4 patients had a fair score (60-69) and 5 patients poor score (<60). A preoperative mean score of 20.67 increased to 70.48 after 6 months' post op with the P value of <0001, indicating a significant improvement in functional score following total knee replacement. These results are comparable with the studies of Victor et al, Ching et al, Frank et al, Hanusch et al, Santiago A et al where they also showed a significant improvement in functional KSS score.

In our study, average preoperative knee score in primary osteoarthritis knees were 27 and postoperative knee score in Osteoarthritis knees were 73.95. In Rheumatoid Arthritis knees 26.22 was average preoperative knee score and postoperative knee score were 74.78 which showed a slightly better knee score in Rheumatoid arthritis group than Osteoarthritis group (Table 2).

In our study, average preoperative functional score in osteoarthritis knees is 20.67 and postoperative functional score in Osteoarthritis knees were 70.48. In Rheumatoid Arthritis knees, 24.44 was average preoperative functional score and postoperative functional score were 76.67 which showed a slightly better functional score in rheumatoid arthritis group than osteoarthritis group of patients (Table 3).

In our study, we encountered 1 patient with delayed wound healing post-operatively which healed with regular dressings in 20 days. Out of these, 1 patient had hypothyroidism and 1 patient had diabetes. 2 patients had superficial infections and 1 patient with a pre-operative fracture of lateral tibial condyle which. John P. Meehan et al. concluded that compared with staged-bilateral total Knee arthroplasty, simultaneous-bilateral total knee arthroplasty was associated with a notable reduction in the incidence of peri-prosthetic knee infection and mechanical failure. Because infection is now recognised as the leading cause of revision knee arthroplasty.

Conclusion

Our study clearly demonstrates that total knee replacement is a reliable procedure, where Normal

Biomechanics of knee is restored by maintaining the mechanical axis, thereby providing a good pain relief and excellent improvement in range of motion, gives good function and corrects the deformities. Most of the functional recovery and range of movements are attained by the third month after Total knee replacement.

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