Study of the Functional Outcome of Total Knee Arthroplasty in Kathmandu Medical College

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ABSTRACT

Background

Total knee arthroplasty is a surgery done for correction of the biomechanics of the knee joint by altering the articular surface which is damaged in degenerative diseases like osteoarthritis. The aim of this study is to study the functional outcome of total knee arthroplasty in Nepalese patients.

Method

A prospective observational study was carried out in 20 patients undergoing primary total knee arthroplasty in Kathmandu Medical College Teaching Hospital from September 2017 to September 2019. The status of the knee was assessed prior to the operation and 6 months following the surgery by using Knee Clinical Score (KCS) and the score was graded as excellent, good, fair and poor.

Result

The average knee clinical score in the patients increased from 26.10 ± 5.89 to 76.30 ± 5.18 at 6 months following the surgery. The average knee functional score was 30.25 ± 6.97 prior to the surgery which increased to 77.25 ± 6.17 after the surgery. All the patients were graded to have poor knee functional and clinical grades prior to the operation. After the surgery 50% patients had excellent, 40% patients had good and 10% patients had fair Knee clinical grade while 60% patients had excellent, 35% patients had good functional outcome and 5% had fair Knee functional grade.

Conclusion

Total Knee Arthroplasty is a reliable surgical option for patients with severe osteoarthritis and this surgery can provide good to excellent functional outcome in most of the patients.

KEY WORDS

Functional outcome, Knee clinical score, Total knee arthroplasty, TKR

INTRODUCTION

Osteoarthritis is one of the most common chronic joint disease prevalent in Nepal.[1] Knee joint is one of the most commonly involved joint in osteoarthritis.[2] The prevalence of knee osteoarthritis is gradually increasing due to increase in the ageing and obese population.[3,4] Pain in the knees and loss of function are the major reasons why the patient seek medical attention. These problems can be addressed either pharmacologically or surgically.

Pharmacological methods have satisfactory role in early osteoarthritis. It has been found to have limited role in patient with severe osteoarthritis with alteration in the knee biomechanics.[5]

The concept of altering the articular surface of the knee joint to improve the functional status has been discussed and practiced since the 19th century but gained popularity since the 1950s. The surgical technique for the articular reconstruction ranges from soft tissue interposition to total knee arthroplasty.[6] Total knee arthroplasty has been proven to be one of the most cost effective surgical methods to restore functionality of the arthritic knee and relieve the pain of the patient. Various studies have shown the effectiveness of total knee replacement in improving the functional status and correcting the deformity in the patients having degenerative arthritis.[7,8]

The functional outcome in a patient with total knee arthroplasty can be assessed by the Knee Society Score (KSS). It consists of 2 subsets; the knee clinical score and the knee functional score. It is assessed in terms of percentage with higher percentage denoting a better functional status.[9]

The aim of this study is to measure the functional outcome of total knee arthroplasty in terms of the Knee clinical score in Nepalese population operated in Kathmandu Medical College.

METHODS

A prospective, observational study was conducted from September 2017 to September 2019 among the patient undergoing total knee arthroplasty in Kathmandu Medical College Teaching Hospital, Sinamangal. The study was approved by the institutional review committee of Kathmandu Medical College and the patients were enrolled in the study only after obtaining a written consent.

Inclusion and exclusion criteria

All patients undergoing primary TKA for degenerative arthritis of knee over 50 years of age were included in the study. The patients with any history of previous knee infection, peri-prosthetic fractures, associated neurovascular disorder of lower limb and patient undergoing revision arthroplasty were excluded from the study.

Preoperative investigations

A total of 20 patients were included in the study. Along with the routine blood investigations the pre-operative investigations included blood, urine, axillary, nasal and groin swab cultures. X-ray of the both knees were then taken in AP and lateral . The preoperative assessment was done by the operating surgeon and recorded in the proforma.

Operative procedure

The operation was done under spinal anesthesia (or as decided by the anesthesiologist). All the surgeries were conducted using pneumatic tourniquet applied to the thigh. The tourniquet pressure ranged from 250 - 300 mm of Hg depending upon the systolic blood pressure. A midline skin incision was given. It was then followed by a medial parapatellar approach and the patella was everted. ACL, PCL and both the menisci were removed to perform a posterior cruciate substituting TKR. Soft tissue balancing was confirmed prior to bone resection. Then a distal femoral cut was given at around 50 of valgus to the anatomical axis and perpendicularly in the sagittal plane. This was followed by anterior-posterior and chamfer cuts, femoral notch cut, peg holes and tibial notch cut. The tibial cut was given at 90^0 to the long axis and less than 5^0 of posterior sloping and sizing was done. Extension and flexion gaps were checked. Trial components were placed and soft tissue balancing and stability of the joint was checked. Then the appropriate size original implants (Johnson and Johnson) were implanted using PMMA. The soft tissues were closed in layers over a vacuum sealed drain.

Post-operative protocol

The patients were then allowed to bear weight on the operated limb as early as the pain permitted. The patients were encouraged to do knee range of motion exercises after the drain was removed. Postoperatively the physiotherapy was focused on the quadriceps and hamstring strengthening exercises.

The patients were discharged after the surgical wound was dry, which usually took three to five days following surgery. They were then followed up in OPD at 2 weeks for suture removal and then on the 3rd week, 6th week and 6 month postoperative period. During the 6th month follow up period the functional status of the knee was assessed in every patients using the knee society score (KSS).

RESULTS

Out of the total 20 patients all followed up at 6 months follow up. Six patients (30%) were male while 14 patients (70%) were female. The mean age of the patient enrolled in the study was 64.15 ± 8.05 years. The mean age of the male patient was 69.33 ± 9.50 years, and female patient was 61.92 ± 6.50 years. The study population had almost equal number of the patients in each of the age group. There

were 7 patients (35%) in the age group of 51-60, 7 patients (35%) in the age group of 61-70 years and 6 patients (30%) in the age group of 71-80 years.

The Knee Society Score was calculated in the patients prior to the operation and at six month following the operation. It was calculated in the patients as the knee clinical score and the knee functional score. Independent T-test was used to find out the difference in the mean. The mean preoperative knee clinical score in the patient was 26.10 ± 5.89 while the mean preoperative knee functional score in the patient was 30.25 ± 6.97. At 6 month follow up the knee clinical score increased to 76.30 ± 5.18 while the knee functional score increased to 77.25 ± 6.17. There was a significant statistical difference between the preoperative and the postoperative scores ($p<0.05$).

In all the patients in our study, the preoperative knee grade was poor (KSS < 60). After the 6 month following the surgery the knee clinical grade was excellent (KSS score 80-100) in 10 cases, good (KSS score 70-79) in 8 cases and fair (KSS score 60-69) in 2 cases and knee functional grade was excellent (KSS score 80-100) in 13 cases, good (KSS score 70-79) in 7 cases and fair (KSS score 60-69) in 1 case.

The total arc of flexion and extension range of motion of the knee was recorded in the patients prior to operation and then 6 months following the operation. We found that the average preoperative range of motion of the affected knee was 69.25 ± 14.89 degrees. The average postoperative range of motion at 6 months was 110.75 ± 10.79 degrees. The postoperative range of motion in the affected knee was significantly greater than the preoperative range of motion at the same knee ($p<0.05$).

Three out of the twenty patients had superficial surgical site infection. Two of those patients underwent debridement and lavage while the remaining one patient responded well to change of antibiotics. In these three patients oral antibiotic was continued till the CRP was normalized and no clinical signs of infection was present. Four patients had incomplete extension (5 degree extension lag) at 6 months follow up which was later corrected with continuing physiotherapy. Anterior knee pain was present in four out of the twenty patients at the 6 months follow up. Pain was relieved in two patients after analgesics and physiotherapy but was persistent in two patients.

DISCUSSION

Medical management is found to be effective only in the treatment of early osteoarthritis.[5] In patients with advanced osteoarthritis, surgery is indicated for the pain relief and improvement in the functional outcome. Total knee arthroplasty is a well-established surgical treatment method and its benefit to the patient has been documented in various literatures.

We conducted a prospective observational study to assess the functional outcome of the patients at 6 month following total knee arthroplasty. The average age of the patients included in our study was 64.15 ± 8.05 years. The mean age in our study was similar to that of the study by Hooper et al. (67 years), Pourmoghaddam et al. (68 years).[10,11] As most of the patients in our study group were females we believe that perimenopausal osteoporosis is one of the risk factor for osteoarthritis in the female population and many require TKA by the time they reach the age of 70 years.

The knee society scoring system has been used to assess the functional outcome in patient following TKA by many researchers. It is widely used because of its simplicity and ease in assessing both the patient oriented and clinician oriented functional status after TKA. The knee clinical score in our study (both preoperative and postoperative) was similar to the study done by Arun et al.[12] Our result is also similar to that of the study by Shihora et al., Kim et al. and Kim et al.[13-15] The summary of the comparison of the results in these different studies are presented in the table no 1.

Table 1.

	Preop knee clinical score	Post op knee clinical score	Pre op knee functional score	Post op knee functional score
Arun et al.[12]	29.0	83.4	35.0	83.5
Shihora et al.[13]	49.4	86.0	32.75	84.4
Kim et al.[14]	30.9	94.2	44.9	84.7
Kim et al.[15]	35.3	94	44.2	83
Current study	26.1	76.3	30.25	77.25

The knee clinical grading in our study was also similar to that of the result by various authors. The results has been summarized in table 2.

Table 2.

	Knee clinical grade (%)				Knee functional grade (%)			
	Excellent	Good	Fair	Poor	Excellent	Good	Fair	Poor
Suhail et al.[16]	77.3	21.3	1.3	-	64	29.3	6.7	-
Williams et al.[17]	92	1.6	6.4	-				-
Arun et al.[12]	70	26.7	3.3	-	80	16.7	3.3	-
Shihora et al.[13]	80	12.5	2.5	-	75	15	7.5	2.5
Current study	50	40	10	-	60	35	5	-

Though the number of patients having excellent result in our study appears to be slightly less than that of the other studies, the patient with good to excellent outcome in our study is close to 90% of the total operated patient which we feel is the desired result following the operation.

Our study population had a similar improvement in the range of motion following the surgery as in comparison to the other studies. At the end of 6 months the knee range of motion was significantly better in the knee then prior to the operation. The findings of our result has been compared with the findings of other study and has been summarized in table no 3.

The finding of our study is similar to the study done in Indian population but is different from the other studies done outside of south Asia. The patients in our part of the world usually present late, only after severe limitation in the range of movement. It is because of this reason the patient has limited post-operative range of motion. We feel that if the patients present early during the course of disease process the post-operative range of motion will be better and the patient in turn will have a better functional outcome. But this is an entirely different aspect not dealt in this study. The main limitation of the study is that very few patients were recruited. The surgery was performed by a single surgeon hence there is chance for biasness and the cost effectiveness of TKA in Nepalese context has not been taken into consideration.

Table 3.

	Preop Flexion extension arc (degrees)	Post op Flexion extension arc (degrees)
Li et al.[18]	88	100
Nutton et al.[19]	126	136
Kim et al.[14]	117.3	134.7
Williams et al.[17]	99	115.5
Arun et al.[12]	56.2	111
Current study	69.25	110.75

CONCLUSION

Total knee arthroplasty is associated with a good to excellent clinical and functional outcome in most of the patients. It is a very reliable surgical option for the treatment of osteoarthritis. As the study has very few study population we recommend a multicenter study with a significantly large study population to verify the findings of our study.

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