MAK HILL Publications Research Journal of Medical Science

Research Article
doi: 10.59218/makrjms.2024.1.84.88

OPEN ACCESS

Key Words
Total knee replacement, primary osteoarthritis, functional outcome, knee society score

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Received: 4 October 2023
Accepted: 28 October 2023
Published: 29 October 2023

Citation: Puneet Kumar Acharya, Surendra Singh Parmar, Rajkumar Arya, Dharm Pal and Aishwarya Rai, 2024. Evaluation of Clinical Outcome of Total Knee Replacement in Arthritic Patients- An Observational Study. Res. J. Med. Sci., 18: 84-88, doi: 10.59218/makrjms.2024.1.84.88

Evaluation of Clinical Outcome of Total Knee Replacement in Arthritic Patients- An Observational Study

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ABSTRACT
The efficacy of total knee arthroplasty in alleviating pain, restoring physical functionality and enhancing the quality of life for those suffering from severe knee osteoarthritis is now firmly established. The primary objectives of rehabilitation are to alleviate pain and enhance functional recovery, particularly by attaining a satisfactory range of motion (ROM) for activities such as stair climbing and walking. This study is a prospective observational study conducted in a hospital setting to examine the functional result of Cemented Total Knee Arthroplasty for primary osteoarthritis. The study was conducted from February 2020 through July 2021. A total of 20 patients who gave their consent and underwent sequential Total Knee Arthroplasty were clinically and functionally evaluated using the Knee Society score. According to the Knee Society Clinical Scoring system of the 20 patients assessed in this study 16 patients (80%) had Excellent and 4 patients (20 %) had good results. According to the Knee Society Functional Scoring system of the 20 patients assessed in this study 14 patients (70%) had Excellent, 4 patients (20%) had Good and 02 patients (10%) had Fair results. Total Knee Arthroplasty improves the functional ability of the patient and the ability of the patient to get back to pre-disease state, which is to have a pain free mobile joint, as reflected by the improvement in the post-op Knee Clinical Score and Knee Functional Score.

INTRODUCTION

Some degree of contracture, deformity, or instability, or a combination of these, can be observed in most arthritic knees[1,2,3]. The primary causes of knee arthritis encompass Osteoarthritis (OA), Rheumatoid Arthritis (RA), Juvenile Rheumatoid Arthritis, Post-Traumatic Arthritis or Secondary Osteoarthritis, as well as various forms of inflammatory arthritis.

Osteoarthritis is considered the most common chronic degenerative joint disease. The prevalence of osteoarthritis is increasing because to the demographic shift towards an aging population and the widespread occurrence of obesity. The primary clinical manifestations that necessitate treatment are pain and impaired functionality, which can be addressed through a variety of techniques including non-pharmacological, pharmacological and surgical interventions[4].

The notion of enhancing knee joint functionality by alterations to the articular surfaces has garnered interest since the 19th century. The surgical approaches have ranged from soft tissue interposition arthroplasty to resection arthroplasty to surface replacement arthroplasty. Various types of prostheses have been developed for surface replacement arthroplasty to specifically target the intricate knee kinematics. TKA has been a dependable remedy for advanced arthritis. There are different systems available that have special qualities related to the shape of the components, the level of matching of the moving surface and the method of attachment. Given the emergence of several forms of prostheses, it became imperative to perform research to evaluate the results of various prostheses. Consequently, many scoring systems were developed to evaluate the results of total knee replacement.

The Knee Society Score System is separated into a knee score, which evaluates the knee joint alone and a functional score, which assesses the patient's capacity to walk and ascend stairs. The dual rating approach resolves the issue of decreasing knee ratings linked to patient frailty[5].

MATERIAL AND METHODS

This study is a prospective observational analysis conducted in a hospital setting to examine the functional outcome of Cemented Total Knee Arthroplasty for primary osteoarthritis. The study was conducted from February 2020 through July 2021. A total of 20 patients who gave their consent and underwent sequential Total Knee Arthroplasty were clinically and functionally evaluated using the Knee Society score 5. The follow-up period was at 3 months, 6 months and 1 year. The research was carried out at the Department of Orthopedics, Index Medical College and Hospital in Indore. A paired t-test was used to compare the pre- and post-operative Knee Clinical Score and Knee Functional Scores (Knee society score). Patients diagnosed with primary or secondary arthritis, specifically those with grade 3 or 4 according to the Kellgren Lawrence grading system, who did not experience pain relief after six months of conservative treatment were included in the study. Additionally, patients with angular knee deformity, knee stiffness, decreased range of motion and a willingness to give consent for surgery and participate in the study were also included. On the other hand, patients with sepsis in the knee joint or elsewhere in the body, local skin lesions, previous knee joint implants, or those unwilling to provide written consent for the study were excluded.

A comprehensive medical history was obtained for each patient. All patients had thorough clinical and functional evaluations using the Knee Society Score5. Preoperative medical examinations were conducted to mitigate the risk of life-threatening or limb-threatening complications. Observations were made regarding any disparities in limb lengths. An evaluation was conducted to determine the presence of any abnormalities in the hip and foot. The extensor mechanism was evaluated for any quadriceps contractures, while the knee deformities were inspected for any permanent varus or valgus deformities or the existence of any fixed flexion contracture.

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, patient was taught static quadriceps exercises
- 2nd post op day, the dressing was debulked and wound inspected

Patient was made to walk full weight bearing within the limits of pain with the knee immobiliser and advised to continue static quadriceps exercises and knee flexion was started and patient was taught dynamic quadriceps exercises.

- IV antibiotics were given for the first 48 hrs post op and the switched over to oral antibiotics for the next five days
- 5th post operative day-Discharge
- DVT prophylaxis was given for the first 5 days post operatively
- 12th post op day, patient called fir suture removal and patient was advised to continue regular physiotherapy

The patient was assessed 6 weeks post operatively (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.

RESULTS

The majority of the patients were from the age group of 61-65 years which accounts for 35% 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, There was a female predominance in the ratio of 3: 2 accounting for 60% the female patients, right side accounting for 60 % of the patients All cases operated were for primary osteoarthritis of knee (Table 1).

The majority of the patients were from the age group of 61-65 years which accounts for 35 % 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, There was a female predominance in the ratio of 3: 2 accounting for 60% the female patients, right side accounting for 60 % of the patients All cases operated were for primary osteoarthritis of knee (Table 2).

The mean pre - op Knee Clinical Score was 26.75 in this study which improved to a mean post – op score of 94.1 (Table 3).

According to the Knee Society Clinical Scoring system of the 20 patients assessed in this study 16 patients (80%) had excellent results and 04 patients (20%) had good results and none had poor results (Table 4).

Table 1: Demographic and clinical profile of patients

Particular	Sub-particular	Frequency	Percentage
Age group	51-55	1	5
	56-60	5	25
	61-65	7	35
	66-70	5	25
	71-75	2	10
Gender distribution	Female	12	60
	Male	08	40
Side distribution	Left	08	40
	Right	12	60
Indications	Osteoarthritis (OA)	20	100

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 5).

Based on the evaluation conducted in this study, it was found that out of the 20 patients tested, 14 patients (70%) achieved Excellent outcomes, 04 patients (20%) achieved Good outcomes and 02 patients (10%) achieved Fair outcomes, as per the Knee Society Functional Scoring method (Table 6).

There was a statistically significant difference observed in the means of pre-operative KCS and post-operative KCS, with a mean difference of 67.35 (95% CI: 64.56 to 70.14). The statistical analysis revealed that the P value was found to be statistically significant at a level of less than 0.001, indicating a significant difference between the pre-operative and post-operative Knee Clinical Scores. There was a significant disparity of 45.40 (41.24 to 49.56, 95%CI) between the means of pre-operative KFS and post-operative KFS. The statistical analysis revealed a significant p-value (<0.001) when comparing the pre-operative and post-operative Knee Functional Scores.

DISCUSSION

The goal of this study was to evaluate the clinical and functional results following total knee arthroplasty (TKA) using the knee society score. Furthermore, the study sought to examine any possible correlation between the knee functional score and knee clinical score. Currently, total knee arthroplasty is widely recognized as an effective treatment for persons with arthritic knee problems. This technique has substantial advantages, such as reducing knee pain, restoring knee stability within an appropriate range of movement and greatly improving functional capacities. Significant advancements have been achieved in the formulation and quality of metals, polymers and ceramics used in the production of prostheses, leading to improved longevity. Like other modern medical approaches, an escalating number of people are benefiting from the advantages of total knee arthroplasty (TKA). The progress in the design of knee implants and surgical techniques for total knee replacement has resulted in favorable results in terms of pain alleviation and the formation of a secure joint. Elderly patients with

Table 2: Knee clinical score

	N	Mean	Median	Mode	Standard deviation	Minimum	Maximum
Pre-Op	20	26.75	27.50	36	8.51	15	39
Post-Op	20	94.1	97.00	98	6.56	80	99

Table 3: Grading of knee clinical score

Parameters	Frequency	Percentage
Excellent	16	80
Good	04	20
Poor	00	00.0
Total	20	100.00

Table 4: Knee functional score

	N	Mean	Median	Mode	Standard deviation	Minimum	Maximum
Pre-op	20	39.35	45.00	45	10.10	20	50
Post-op	20	84.75	90.00	90	10.19	60	90

Table 5: Grading of knee functional score

Parameters	Frequency	Percentage
Excellent	14	70
Good	04	20
Fair	02	10
Poor	00	00.0
Total	20	100.00

Table 6: Comparison between pre-op and post-op knee clinical and functional scores

	Paired difference		
	Mean	Standard deviation	p-value
Pre Op KCS-Post Op KCS	67.35	5.96	<0.001
Pre Op KFS-Post Op KFS	45.40	8.896	<0.001

degenerative arthritis experienced a notable enhancement in their mobility after undergoing total knee arthroplasty. Total knee arthroplasty significantly reduced joint pain, improved mobility, corrected deformity and boosted the patients' quality of life. The efficacy of the posterior cruciate replacement design has been proven as a result of the wide array of implant designs that are accessible. Approximately 35% of the total patient population under assessment falls within the age category of 61 to 65 years. The study encompassed individuals ranging in age from 54 to 74 years. The mean age of the patients was computed to be 63.45 years. This discovery is consistent with the investigation conducted by Wood et al. The user's text is enclosed in tags. The Knee Society Score is utilized to assess the overall outcome of total knee arthroplasty. The knee society score rating system can be viewed as a logical continuation of the rating system devised by the Hospital for Special Surgery. In this study, we performed a comprehensive assessment of the patients, using the KSS score to evaluate their clinical and functional status. The results of our study showed a significant improvement in both KCS and KFS scores at the 3, 6 and 12-month follow-up assessments, compared to the initial preoperative measurement.

An evident association was observed between KFS (Keratoconus Family Study) and KCS (Keratoconus Severity) over all time intervals. In their study, Farahini et al. observed a significant improvement in the knee society score. The results of our research align with the study conducted by Yaratapalli et al, which likewise shown an increase in the Knee Society score after total knee arthroplasty (TKA). The study conducted by Buz-Swanik et al. revealed that most patients who underwent total knee arthroplasty were able to properly reproduce joint position. Moreover, a significant improvement in mobility was observed after the procedure. These alterations may occur due to the constricting of the ligamentous tissues surrounding the capsule, resulting in a reduction of discomfort and inflammation. An evident improvement in the balance index was noticed after the surgical treatment. The experimental group that was administered the posterior stabilized prosthesis exhibited a greater degree of precision in replicating the location of the joint while extending the knee from a flexed state. Preserving the posterior cruciate ligament does not appear to significantly affect proprioception and balance in comparison to those with a posterior stabilized full knee design. The user's input is the number 18. The study conducted by Barrack et al. found that the clinical results of total knee arthroplasty with patella retention were comparable to those seen with total knee arthroplasty with patellar resurfacing[7]. The study conducted by Barrack et al. found that the occurrence of postoperative anterior knee soreness can be ascribed to either the design of the components used or the specific surgical strategy employed, such as component rotation. However, whether or not patella resurfacing is done does not seem to have a substantial impact in this matter[8]. The research conducted by Wood *et al*. discovered that total knee arthroplasty with patellar resurfacing resulted in fewer positive clinical results when compared to total knee arthroplasty with patellar retention. When patellar resurfacing is performed alongside total knee arthroplasty, it leads to a significant limitation in knee extension. This constraint was discovered to have a significant association with the development of anterior knee pain subsequent to the surgical procedure[9]. In this study, it was decided not to do patellar resurfacing. The denervation treatment was conducted on all patellas in a circumferential way.

Our investigation found that all patients were free from anterior knee pain. Moreover, the results suggested that the efficacy of Rehabilitation in the Home (RITH) and Hospital-based rehabilitation were predominantly comparable, however the hospital-based cohort exhibited superior enhancement in knee extension and strength. In order to understand the root reason of this discrepancy, it is crucial to acknowledge that the first evaluation already took into consideration the variations between the two groups. Significantly, the hospital patients began their rehabilitation treatment at a later stage, which may account for their increased muscle atrophy and restricted extension. Given the idea that RITH therapy can enhance the therapeutic connection, patient motivation and patient and family involvement in rehabilitation, it is reasonable to expect that RITH may also positively influence performance and overall rehabilitation outcomes.

By efficiently coordinating the rehabilitation process among multiple disciplines and prioritizing the

encouragement of patient involvement, it is feasible to enhance the consistency and quality of patients' engagement.

Initially, both cohorts of patients encountered significant levels of discomfort, restricted joint mobility and functional impairment. After undergoing the rehabilitation program, both groups experienced significant improvements in pain levels, range of motion for flexion and extension, muscle strength, impairment, balance and walking abilities as compared to their original values. The extent of enhancement after physical treatment was similar in both groups for the majority of outcome measures. Nevertheless, a significant difference was noted in the degree of enhancement in knee extension range of motion (ROM) and muscular strength in the affected knee, with rehabilitation conducted in a hospital setting showing a positive result.

CONCLUSION

Total Knee Arthroplasty (TKA) improves the functional capacity and mobility of patients, allowing them to regain their previous state of health without joint pain. The positive outcome is demonstrated by the significant improvements found in the post-operative Knee Clinical Score and Knee Functional Score. The study assessed the results of Total Knee Arthroplasty implants over an 18-month duration.

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