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Dr. Rameshwar Kumar
Assistant Professor,
Department of Orthopaedics,
Saraswathi Institute of Medical
Sciences, Hapur, Uttar Pradesh,
India

Results and outcomes of total knee replacement in osteoarthritis patients

Dr. Rameshwar Kumar

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Abstract

Aim: The outcomes of total knee replacement (TKR) surgical procedures are predictable. The purpose of this observational study was to assess the efficacy of total knee replacements in patients with osteoarthritis of the knee.

Materials and methods: We selected 25 individuals (25 knees) who provided informed consent and met our criteria from the outdoor clinic to participate in the study. The participants were assessed preoperatively and postoperatively at the six-month follow-up using the Knee Society Score (KSS). The resulting data were subsequently analyzed.

Results: We observed that the mean knee society score increased from 22.7 to 79 and the mean functional score rose from 34 to 77.3 during the course of our study. Severe pain prompted the majority of study participants to undergo total joint arthroplasty; pain relief was identified as the most crucial long-term outcome for patients, and this finding correlates with patient satisfaction. The rate of complications was 5%. The knee society score exhibited a substantial increase subsequent to total knee replacement in comparison to the scores obtained prior to the procedure.

Conclusion: Based on our findings, total knee replacement is a dependable and risk-free therapeutic approach that can be executed with outcomes comparable to those reported in other international studies.

Keywords: Total knee replacement, osteoarthritis, outcomes

Introduction

The scientific progress has resulted in an extended human lifespan, thereby contributing to the growth of the geriatric demographic [1]. There has been a notable rise in the prevalence of osteoarthritis and body mass index (BMI) in our nation. These factors, when coupled with cross-legged seating and squatting, significantly contribute to joint degeneration [2]. Osteoarthritis is a chronic joint disorder characterized by capsular fibrosis and progressive cartilage at the joint margins undergoing disintegration and softening, accompanied by the development of new cartilage and bone (Osteophytes). OA is the most prevalent form of joint disease. Although men and women are equally susceptible to the disease, women experience a greater number of affected joints. According to radiographic surveys, the prevalence increases from 1% among individuals under the age of 30 to more than 50% among those aged 60 and older [4].

The management of end-stage knee osteoarthritis and other incapacitating knee conditions has been fundamentally transformed by total knee replacement, a surgical procedure that is widely utilized and firmly established [5, 6]. In general, TKR is efficacious in the alleviation of pain and enhancement of knee function [7]. Knee replacement offers a viable solution to address every aspect of arthritis [8]. Knee replacements are regarded by patients as one of the most fruitful Orthopaedics procedures, generating tremendous contentment. Historically, numerous techniques were employed in the treatment of knee arthritis, yielding suboptimal outcomes. The employed techniques included analgesics, heat, physiotherapy, osteotomies, and arthrodesis, all of which yielded less than ideal outcomes. Replacement procedures produce the most effective pain alleviation and enhanced functional outcome compared to all other methods [3].

This study aimed to present data on the results and outcomes of total knee replacement in osteoarthritis patients.

Corresponding Author:
Dr. Rameshwar Kumar
Assistant Professor,
Department of Orthopaedics,
Saraswathi Institute of Medical
Sciences, Hapur, Uttar Pradesh,
India

Materials and Methods

Patients who were diagnosed with osteoarthritis of the knee joint and subsequently underwent total knee arthroplasty comprised the subjects of this prospective study. We selected 25 individuals (25 knees) who provided informed consent and met our criteria from the outdoor clinic to participate in the study. Twenty of the twenty-five patients were female, while five were male.

Inclusion and exclusion criteria

All patients who were 50 years of age or older, sought treatment at our institute for degenerative arthritis of the knee joints, and had undergone a minimum of six months of trial conservative therapy without pain relief were eligible to undergo TKR. Patients who were deemed unsuitable for surgery due to local or systemic infectious conditions, joint abnormalities and referred pain from spinal pathologies, neuropathic arthritis, or comorbid conditions were excluded from our study. Written informed assent was obtained from every patient who took part in the research

Pre-operative evaluation

A comprehensive physical examination, a detailed clinical history and an accurate evaluation of the patient's current ambulatory status and needs comprised the initial patient assessment. Initially, analgesics and physiotherapy consisting of static quadriceps strengthening exercises were administered to the patients.

Pre-operative planning

Routine blood tests, including infection markers such as the complete and differential count, ESR, and CRP, were performed in addition to obtaining plain radiographs. The radiographs were thoroughly documented and assessed for varus/valgus angulation of each knee. The Q angles of both knees were ascertained, and the valgus cut angle was calculated using a weight-bearing radiograph of the entire limb.

Surgical technique

A midline skin incision was performed while under tourniquet control, and subsequently, a medial parapatellar approach was employed to aid in the eversion of the patella. Prior to performing a posterior cruciate substituting TKR, the ACL, PCL, and both menisci were severed. Ligament normalization was conducted prior to the resection of the bone. A distal femoral incision was made at a 5° angle of valgus to the anatomical axis and in a sagittal plane perpendicular direction. Then, anterior-posterior and chamfer incisions, peg perforations, a femoral notch incision, and a tibial notch incision were performed. A 90-degree tibial incision was performed along the long axis, with a 7-degree posterior slant, and sizing was performed. Gaps in extension and flexion were evaluated. Following this trial, implants were inserted and their stability was evaluated. Then, cement was used to secure the original implantation in their proper dimensions. Patella resurfacing was performed, and the ranawat method was utilized to secure the knee joint. The knee was immobilized postoperatively using a Jones compression bandage and knee immobilizer, and radiographs were obtained for postoperative evaluation. The patient was instructed to maintain stable quadriceps exercises. On the third day following the operation, the patient was instructed to walk using a walker. The incision was examined on the second postoperative day, during which

the epidural catheter and drain (if present) were removed, and knee flexion was initiated. Ten days after epidural catheter removal, low molecular weight heparin (enoxaparin 40 mg once s/c) was administered for prophylaxis against deep vein thrombosis. The intravenous antibiotics were substituted for oral antibiotics on the fourteenth postoperative day, and continued for an additional fourteen days. Following the removal of sutures/ staples on the 14th postoperative day, the patient was discharged.

Subjects were evaluated preoperatively and postoperatively on follow up at 14 days, 1 month, 2 month, 3 month & 6 months, on their recovery and progress using Knee society score.

Results

A total of 25 total knee replacements done on 25 patients were included in the study. Out of these 25 patients, 20 were females and 5 were males.

Table 1: Distribution of patients according to Age, gender, occupation, deformity, side distribution and grade of osteoarthritis

Age Distribution	%
51-55	4(16%)
56-60	5(20%)
61-65	6(24%)
66-70	8(32%)
Above 70	2(8%)
Gender (%)	
male	5(20%)
females	20(80%)
Occupation (%)	
Unemployed	2(8%)
Agriculture	3(12%)
Housewife	20(80%)
Deformity (%)	
Varus	24(96%)
Valgus	1(4%)
Side Distribution (%)	
right	11(44%)
left	13(52%)
bilateral	1(4%)
Stage of Arthritis	
Grade OA (%)	
Grade 3	8(32%)
Grade 4	17(68%)

Four participants in our study were aged fifty-one to fifty-five years, five were aged fifty-six to sixty years, six were aged sixty-one to sixty-five years, eight were aged sixty-six to seventy years, and two were over the age of seventy. Twenty (80%) of the twenty-five cases examined were female, while five (20%) were male. Twenty cases (80%) of the twenty-five knees examined belonged to housewives with light domestic duties. Three individuals (12%) belonged to the agrarian class, while two were unemployed. Pre-operatively, one knee had valgus deformity and twenty-four knees underwent surgery had varus deformity. In the course of our research, eleven participants underwent right knee replacements, while fourteen underwent left knee replacements. Although one patient presented with bilateral osteoarthritis, the joint exhibiting the most severe symptoms and degeneration was surgically treated. The arthritic knees in our study were classified according to the Kellgren and Lawrence system of grading osteoarthritis of the knee. Out of the 25 knee replacements performed, grade IV severity was observed in 17 knees and grade III severity was observed in 8.

Table 2: Pre & Post-Operative Comparison of Knee Society Scores

Knee society score	Mean	SD
Pre op clinical score	22.7	21.4
Post op clinical score	79	6.4
Pre op functional score	34	16.5
Post op functional score	77.3	5.4

Mean clinical knee score was 22.7 preoperatively and 79 postoperatively and mean functional score was 34 preoperatively and 77.3 postoperatively.

Table 3: Associated Comorbid Conditions

Comorbidities	Frequency	Percent
None	4	16%
diabetes	5	20%
Hypertension	2	8%
CAD	4	16%
Diabetes and hypertension	6	24%
Diabetes, hypertension and CAD	4	16%
Total	25	100%

Four patients were diagnosed with coronary artery disease, two patients were found to have hypertension alone, six patients had diabetes mellitus type II exclusively, six patients had both diabetes mellitus and hypertension, and four patients were found to have a combination of all three. Complication: 1 patient had superficial wound infection which was treated with superficial debridement and antibiotics for 1 month and responded well.

Discussion

In Orthopaedics, the domain of adult joint reconstruction has been at the center of evolving trends and shifting concepts. Our objective was to assess the functional prognosis of these total knee arthroplasty-treated patients who had been diagnosed with osteoarthritis of the knee.

The aims of our research were to evaluate the prognosis of patients who underwent total knee replacement for osteoarthritis using a suitable scoring system at 14 days, 1 month, 3 months, and 6 months after the procedure.

Throughout the duration of our research, it became evident that the extent of pain experienced by the participants influenced their decision to undergo arthroplasty to a greater extent than movement restriction. Murray DW *et al.* [9] discovered a correlation between patient satisfaction and the intensity of pain, as well as a predictive significance for subsequent revisions. The patients anticipated full alleviation of pain, autonomy in utilizing the ambulance and toilet, capability to ascend staircases, access to public transportation, and prompt resumption of daily activities.

The good to outstanding outcomes observed in both males and females of our study group are consistent with the findings of numerous studies examining the relationship between gender and total knee arthroplasty outcomes. Ritter MA *et al.* [4] and Volkmann ER *et al.* [10] have determined that functional outcomes following total knee replacement surgeries are comparable for both sexes.

In our study, the mean age of males undergoing total knee arthroplasty was approximately 57.6 years, while the mean age of females was 53.1 years. This discrepancy can be attributed to the accelerated progression of arthritis in females after menopause, which has been demonstrated to be caused by estrogen withdrawal, as further supported by the findings of Jennie McKee *et al.* [11]. The data reveals that 80% of females and 20% of males underwent total knee arthroplasty. This

disparity serves as a direct indication of the prevalence and severity of osteoarthritis among females in the community.

Varus malalignment was identified as the most prevalent deformity among the 25 knee replacements analyzed in our study (96 percent), significantly higher than the incidence of 53–76 percent reported by Cahue S *et al.* in their numerous studies on varus valgus malalignment in the progression of patellofemoral arthritis and Osteoarthrosis of the knee joint.

Three patients (12%) belonged to the agricultural community and engaged in activities that necessitated physical labor on farms. It was recommended that they engage in moderate agricultural activities and refrain from performing strenuous manual labor while undergoing rehabilitation. The mean time required for them to recommence their modified level of agricultural activity was determined to be three to four months, which aligns with the results reported by Ohio State University [12].

The commonest comorbidity associated with patients undergoing total knee arthroplasty in our study was found to be diabetes and hypertension both (24%) followed by Diabetes mellitus (20%). Our results were in accordance with Sikorski JM *et al.* [13].

We noted that our patients manifested severe arthritis at a later stage, with 68% in stage IV and 32% in stage III, as classified by the Kellgren [14] and Lawrence system of knee osteoarthritis grading. Ellis HB *et al.* [15] discovered that individuals residing in socioeconomically disadvantaged regions exhibit a propensity for presenting with health-related issues belatedly and in a delayed manner.

The mean knee society scores in our study were found to be similar to the means of other studies conducted in other locations; the mean clinical knee score was 22.7 prior to the procedure and 79 afterward, while the mean functional score was 34 before the procedure and 77.3 afterward. According to a study by Li PLS *et al.* [16], the average ROM before surgery was 88, and it increased to 100 after surgery. An additional investigation conducted by Nutton RW *et al.* [17] revealed that the average ROM experienced a rise from 126 preoperatively to 136 postoperatively. The range of motion attained subsequent to total knee arthroplasty in our investigation was found to be similar to the outcomes reported in other studies conducted in different locations.

One patient in our investigation developed an infection during the follow-up period of one month. As prescribed, he underwent comprehensive joint lavage with prosthesis retention and six weeks of postoperative antibiotic therapy. Following recovery from the acute infection, the patient presented with residual deformity and a limited range of motion in the affected knee.

Patients in our study group encountered several drawbacks, including a lack of awareness regarding the severity of the disease, difficulty identifying symptoms, reliance on traditional remedies, and a reluctance or absence of interest in seeking institutional treatment. Furthermore, it is important to consider additional limitations that motivated patients may have, including a brief hospital stay and a reduced frequency of post-operative follow-up appointments.

Conclusion

In summary, we assert that total knee replacement is a dependable and risk-free therapeutic approach that can yield outcomes comparable to those observed in other international studies, contingent upon the presence of sufficient expertise and diligent patient follow-up to identify potential complications in their nascent stages.

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