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Original Research Article

Outcome of total knee replacement in osteoarthritis

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Abstract

Background and Objectives: To investigate and assess the functional results of complete knee replacement surgery. To determine whether or not there has been an improvement in post-operative pain relief. The knee joint's degree of stability as well as its range of motion to investigate the risks and potential problems of total knee replacement surgery. The pre-operative Knee Clinical Score will be compared to the post-operative Knee Clinical Score. The pre-operative Knee Functional Score will be compared to the post-operative Knee Functional Score. In order to evaluate the radiological results of the total knee replacement procedure. Research will be conducted to investigate the connection between the Knee Clinical Score and the Knee Functional Score.
Methods: A total of 20 patients who had total knee replacements were included in this prospective analysis. Cases were selected based on certain criteria, both for inclusion and disqualification. At each patient's scheduled follow-up appointment, the Knee Society Score was applied to assess their condition. Within the participants of our study, there were a total of 20 female patients and 10 male patients. Indications were 15 cases of OA and 1 case of RA. The duration of the follow-up period was typically twenty weeks.
Results: In the course of our research, prior to surgery, every one of our patients experienced moderate to severe pain; but, following surgery, 16 of the patients only experienced mild discomfort. Following surgery, the patient's average flexion, which was 75 degrees preoperatively, increased to 94 degrees. Before surgery, each of the 15 knees received a knee score of less than 60, but after surgery, some of the knees received an exceptional score (80 to 100), while the other knees received a good score (72-79). Prior to surgery, 10 patients had a functional score that was below 60, and two patients had a functional score that was between 60 and 69. Postoperatively, 20 patients had a score that was considered to be outstanding (85-100), 10 patients had a score that was considered to be good (72-79), 6 patients had a score that was considered to be acceptable (61-69), and 2 patients had a score that was considered to be poor (60).
Conclusion: The surgical method known as total knee arthroplasty is now widely practiced and well-established. The functional outcome of the surgery is impressive, long-lasting, and gratifying, and patient acceptability is very high.

Keywords: Knee replacement, knee score, osteoarthritis, knee, arthroplasty

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Introduction

Embryologically, the knee joint develops from the leg bud at 28 days, and the femur, tibia, and fibula form by 37 days. Within 45 days of the creation of the patella, cruciate ligaments, and menisci, the knee joint develops from blastemal cells. The knee joint is the body's biggest and most intricate joint. A gliding joint connects the patella to the patellar surface of the femur, and two condylar joints connect the medial and lateral condyles of the femur to the corresponding condyles of the tibia. Keep in mind that the joint does not directly involve the fibula. The rounded femoral condyles are located above, the tibial condyles and cartilaginous menisci are located below, and the patella and lower end of the femur are articulated in front. Hyaline cartilage covers the articular surfaces of the femur, tibia, and patella [1-5].

Total knee replacement as we know it now dates back around three and a half decades. Since the 19th century, there has been interest in modifying the articular surfaces to improve knee joint function. Verneuil proposed the use of soft tissues in 1860 to replace the articular surface of a joint. Following that, a variety of materials including pig bladder, nylon, fascia lata, prepatellar bursa, and cellophane were utilised for this purpose, but the results were unsatisfactory. Ferguson completely resected the knee joint in 1860, creating new subchondral surfaces that made the knee joint mobile. Campbell reported the effective interposition of a metallic femoral mould in 1940, encouraged by the relative success of hip cup arthroplasty, but later outcomes were found to be dismal. Parallel to the idea of interposition arthroplasty and later surface replacement, a second line of development in knee arthroplasty took place [6-10].

The complex knee joint is prone to rheumatoid-like arthropathies, post-traumatic arthritis, and age-related degeneration, all of which can lead to significant impairment and negatively impact both general health and quality of life in relation to health. Total knee arthroplasty is the most effective treatment for the aforementioned disease. 40% of people over 50 have knee arthritis, and 80% of them require arthroplasty due to discomfort, instability, and limited range of motion. Rheumatoid arthritis affects about 7 million people in India; its prevalence is 0.75 percent. The incidence of knee arthritis caused by age-related deterioration and post-traumatic arthritis has increased along with the average life expectancy (69.25 years) and the frequency of traffic accidents, as has the number of patients receiving TKR [11-16].

Better designed prostheses with nearly normal function are the outcome of the interaction between biomechanical studies and clinical experience. The knee arthroplasty has come to be recognised as the best method for treating incapacitating arthritis. Total knee arthroplasty aims to stabilise the knee joint, relieve pain, and increase range of motion [17-22].

Aims and Objectives

To investigate and assess the functional results of complete knee replacement surgery. To evaluate the degree to which post-operative pain is relieved, the degree to which the joint's stability and mobility are improved, and the degree to which any abnormalities have been corrected. To investigate the risks and potential problems of total knee replacement surgery.

Study duration

Cases that meet the inclusion criteria and are admitted to a medical college or hospital between June 2020 to May 2022 and fall within the scope of the study will be included.

Materials and Methods

We conducted a prospective study on the functional outcome of twenty knees that had total

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knee replacement surgery using a cemented posterior stabilising design at a medical college and hospital between the years 2020 and 2022.The study focused on the knees' ability to function normally after the procedure. The size of the sample, which is determined to be twenty, was determined based on previous studies as well as an estimate of the number of cases that were available during the time period in question that satisfied the inclusion and exclusion criteria [23-26].

Inclusion criteria

a) Subjects who have grade 3 and grade 4 (Kellgren Lawrence grading system) osteoarthritis of the knee with severe intractable pain and are undergoing unilateral total knee replacement
b) Subjects who have grade 3 and grade 4 (Kellgren Lawrence grading system) osteoarthritis of the knee
c) Subjects who have grade Patients that are willing to provide their consent before undergoing surgery
d) In patients with fully developed skeletons

Exclusion criteria

a) Patients who have septic arthritis of the knee joint;
b) Patients who have skin lesions local to the area
c) Comorbid disease status like:
1. Peripheral vascular disease
2. Malignancy
3. Diabetes that is not under control, severe COPD, severe cardiovascular illness, nephropathies, etc.
a) Joint pain caused by neuropathy.
b) Disorders of the neuromuscular system and joints that are paralysed.
c) Osteoporosis in its most severe form g). Bone shortage and deformities of a severe nature.

A conventional midline approach was taken with the knee bent at the point of flexion. After that, an even deeper anteromedial dissection was performed in preparation for the arthrotomy. For the purposes of soft tissue balancing and the correction of abnormalities, a medial, lateral, and posterior soft tissue release that was either limited or extensive was performed. Osteophytes in both the tibia and the femur were removed. When performing the femoral section, the appropriate femoral rotation was used, and the white slide line or epic ondylarline was used as a reference point. The extramedullary method of cutting was utilised when sectioning the tibia. We have made the ultimate sacrifice by crucifixing both of our knees. Autologous posterior condylar grafts with screws were used to address the tibial deficiencies that were present.
In both extension and flexion, the alignment as well as the balance of the soft tissues was evaluated. The trial components were put together to ensure a good fit, and then examined for tension in the soft tissue, as well as for balance in flexion and extension. The patellar tracking appeared normal in all of the patients. For the purpose of cementing the components together, one package of antibiotic-impregnated bone cement was utilized. After the tourniquet was removed, the bleeding was stopped by cauterising the wound. The wound was stitched up in stages. After surgery, antibiotic treatment was continued for a total of 2 days. The standard postoperative regimen was followed in order to grow the quadriceps, which helped increase range of motion and allowed for early weight bearing ambulation. At the end of two weeks, the sutures will be removed. Immediate clinical radiological evaluation following the

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operation, as well as follow-up evaluation at regular intervals, was performed. The KSS grading method was utilised for the final review that took place. Every incident was captured on camera for record-keeping purposes. The follow-up period was for a total of two weeks, three months, and six months [27-32].

Statistical analysis

To carry out the statistical analysis, the user will make use of version 20 of the SPSS programme, which stands for the Statistical Package for the Social Sciences. The data was entered into the spreadsheet created in excel. Calculated descriptive statistics of the explanatory and outcome variables included the mean, standard deviation, frequency, and proportions for quantitative variables, respectively, while these measures were used for qualitative variables. Comparing the quantitative variables at the pre-op and post-op time periods required the application of inferential statistics such as the Paired t test. The level of relevance will be at a level 5 from now on [33-38].

Clinical Photographs

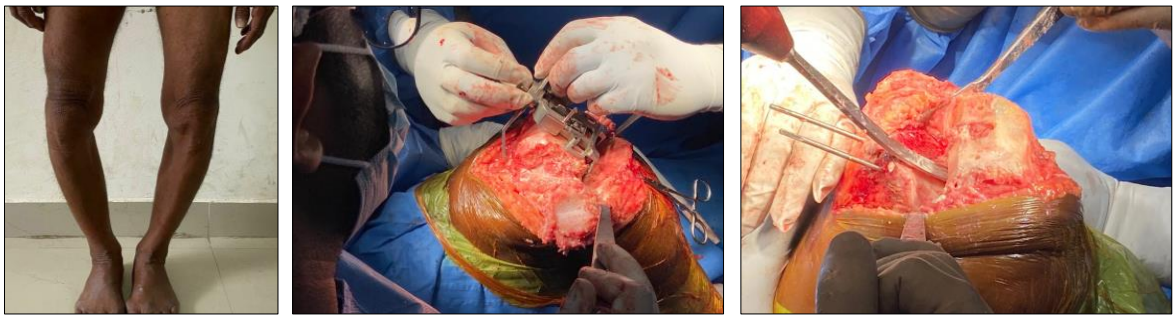

Fig 1: Anterior Femoral cut and knee replacement

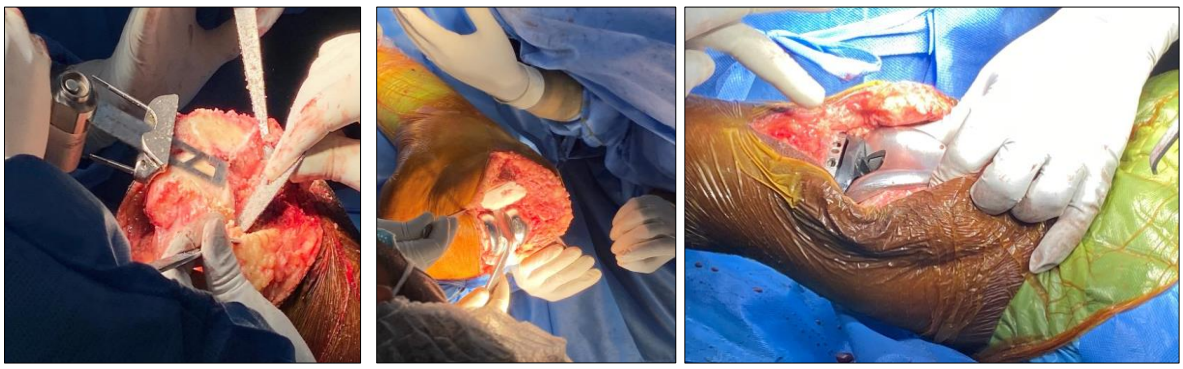

Fig 2: Knee Replacement

Fig 3: Pre-operative Radiographs

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Follow up

Fig 4: Post-operative Photograph

Results

Table 1: Showing distribution of the subjects based on age groups

Age groups	Frequency	Percent
44 to 50 yrs.	5	25.00
55 to 60 yrs.	5	25.00
61 to 65 yrs.	6	30.00
> 65 yrs.	4	20.00
Total	20	100.00

Table 2: Showing distribution of the subjects based on gender

Gender	Frequency	Percent
Females	15	80.00
Males	5	20.00
Total	20	100.00

Table 3: Showing distribution of the subjects based on associated conditions

Associated conditions	Frequency	Percent
DM	3	15.0
HTN	3	15.0
HTN, Obesity	2	10.0
NIL	7	35.0
Obesity	5	25.0
Total	20	100.0

Table 4: Showing distribution of the subjects based on in dictations

Indications	Frequency	Percent
OA	19	95.0
RA	1	5.0
Total	20	100.0

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Discussion

In our study titled "functional outcome following primary total knee arthroplasty," we examined twenty patients who had total knee replacement surgery at a medical college or hospital between June 2020 and May 2022. The patients' surgeries took place between the months of June 2020 and May 2022. The majority of the indications that we found in our research were related to osteoarthritis (19 knees) and rheumatoid arthritis (1 knee). 20 patients underwent unilateral Total Knee Replacement surgery, with 11 patients undergoing surgery on their right knees (55%) and 9 patients undergoing surgery on their left knees (45%). Patients older than 40 years old were included in our study; there were 4 cases in the age group 44-50 years, 6 instances in the age range 55-60 years, 7 cases in the age range 61-65 years, and 3 cases more than 65 years old. According to our findings, the average age is 59.85 years. There were a total of 18 female patients (90%) and only 2 male patients (10%). We had 7 patients who did not have any related disorders, 3 patients who were diagnosed with hypertension, 5 patients who were obese, 2 patients who were obese and also diagnosed with hypertension, and 3 patients who were diagnosed with diabetes. Before surgery, 18 knees were in excruciating agony, while only 2 knees had moderate pain. After surgery, however, only 2 knees experienced no pain, while the remaining 18 knees had only slight discomfort. The similarities between our findings and those of other studies were striking. The pre-operative average range of movement was 69.65 degrees of flexion, and the post-operative average range of movement was 90.55 degrees of flexion, with a P value of 0.035, which indicates that there is a significant difference between the two ranges of movement. According to the findings of earlier research, Kelly G. Vince et al. reported a preoperative mean range of motion (ROM) of 88 degrees (range: 45-122 degrees), and they found a postoperative ROM of 91.2 degrees (range 52- 125 degrees). 36 of the knees exhibited A-P instability preoperatively ranging from 5mm to 10mm, however after surgery, 18 of the knees showed no A-P instability, and the remaining 2 knees had A-P instability ranging from 5mm to 10mm. 2 knees had M-L instability measuring between 10 and 14 millimetres, 9 knees had M-L instability measuring between 6 and 9 millimetres, and 9 knees did not have M-L instability. Preoperatively, 6 knees exhibited M-L instability of 6-9mm, but postoperatively, 13 knees did not have any M-L instability, resulting in a P value of 0.056, which is statistically significant.

Preoperatively, we had 2 knees with FFD of > 20 degrees, 1 knee with FFD of 16-20 degrees, 2 knees with FFD of 11-15 degrees, and 7 knees with FFD of 5-10 degrees. After surgery, 16 knees did not have FFD, and 4 knees had FFD of 5- 10 degrees, which was a significant difference with a P value of 0.006. Before surgery, one knee had an extension lag of 10–20 degrees, while the other nine knees had an extension lag of less than 10 degrees. After surgery, all ten knees had an extension lag of less than 10 degrees. Post-operatively, we had all 20 knees with normal valgus of 5-10 degree, with a significant P value of 0.00. Douglas had one knee with 15 degrees of varus, four knees with varus of 14 degrees, three knees with degree of 13 varus, six knees with 12 degrees of varus, two knees with 11 degrees of varus, and one knee with more than 20 degrees of valgus. Before surgery, we had one knee with more than 20 degrees of valgu. We had one patient who was unable to leave their home, 12 patients who were able to walk less than five blocks, and seven patients who were able to travel between five and ten blocks prior to surgery. Following surgery, 19 patients were able to walk more than 10 blocks, while only one patient could walk between 5 and 10 blocks, yielding a significant P value of 0.000. Both the preoperative and postoperative cores for the stairs were 12.75, while the postoperative core was 30. Five patients had normal up and down with rails after surgery, while the remaining fifteen patients had up and down with rails. The 0.000 P value indicates that the finding is significant.

Postoperatively, eight patients are using canes while one patient is using a walker, whereas

before surgery, twelve patients were using canes and three patients were using walkers. At the time of the preoperative examination, each of the 20 knees had a score of less than 60. Subsequently, 11 of the knees had an outstanding score (ranging from 80 to 100), whereas 7 of the knees had a good score (ranging from 70 to 79). This resulted in a P value of 0.000, indicating a significant improvement in the knee score. The preoperative mean score of 31.45 increased to 79.50 postoperatively with a P value of 0.000, demonstrating a considerable improvement in the knees core following total knee replacement. According to the findings of our research, the average post-operative knee score for patients younger than 60 years old was 79.8, whereas the average post-operative knee score for patients older than 60 years old was 79.2. When we analysed the outcomes of both groups, we found that there was no statistically significant difference between them. The postoperative functional score for patients younger than 60 years old was 69, while the postoperative score for patients older than 60 years old was 69.5. In the course of our research, none of the patients experienced any difficulties.

Conclusion

Knee replacement surgery, particularly total knee replacement, has become an effective treatment for a wide variety of knee conditions. In other words, it has its own learning curve, despite the fact that precision instrumentation seems to have simplified the surgery. The replacement surgeon needs to comprehend the complexities of the procedure in order to repeat the same results as that of experienced surgeons. One must keep in mind at all times that TKA is the beginning of the problem for a surgeon and not the conclusion of the problem. It is necessary for him to have a complete understanding of all of the complications that are linked with the procedure, including his readiness for revision arthroplasty. The true difficulty of the operation is in addressing the knee issues that young people commonly have.
Despite the limitations of the technique and technology used in our study of evaluation of functional outcome following primary total knee arthroplasty, the results of the series demonstrate that total knee replacement is reliable, provides pain relief, increases range of motion, and provides good function. In spite of the fact that we have 85–90% good to exceptional early findings, our long term survivorship results still need to be monitored.

Conflict of interest: None.

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