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Original Research Article

ASSESSMENT OF THE FUNCTIONAL RESULTS OF TOTAL KNEE ARTHROPLASTY WITH PCL RETENTION VS. SACRIFICE

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ABSTRACT

Background: There is some debate concerning the posterior cruciate ligament's function in knee replacement surgeries. In theory, the range of motion can be increased and posterior translation can be prevented by femoral rollback, which is achieved by preserving the PCL. Our hospital's Primary Total Knee Replacement procedure is the focus of this prospective comparison of functional outcomes. The ligament was preserved in cases where the knee was used as a sacrifice.

Materials and Methods: Total 25 patients were participated in this study. This study was conducted at the Department of Orthopedics, Kamineni Institute of Medical Sciences, Narketpally, Telangana, India between November 2022 to October 2023. After and before surgery, patients were evaluated using a scoring system that was developed using the WOMAC Score, the Knee Society Knee Score, and the Functional Knee Score.

Results: Clinical and functional knee scores improved significantly for all patients in both groups, according to the functional outcome analysis. With a total Knee Score of 85.80 for the PS group and 75.60 for the CR group, statistical analysis showed a statistically significant difference in the p-value favouring the Cruciate Sacrificing Prosthesis, indicating that it has better functional outcomes. A functional knee score of 99.6 for the CS group and 91.6 for the CR group indicated that all patients had a significant improvement. Based on statistical analysis, no significant difference was found.

Conclusion: The functional prognosis after total knee arthroplasty was better in patients who had the posterior cruciate ligament sacrificed than in the maintaining group. This difference is likely due to the fact that the flexion deformity persists in the retaining group.

Keywords: Knee Society knee score, posterior cruciate ligament, total knee replacement.

INTRODUCTION

The significance of the Posterior cruciate ligament in total knee replacement is a subject of debate. According to theoretical suggestions, PCL retention can potentially result in femoral rollback, leading to an increased range of flexion and preventing posterior translation. Consequently, this decreases the occurrence of loosening and excessive polyethylene wear by reducing the shear forces at the attachment surfaces.[1-3]

We performed a prospective study to evaluate the differences between removing and preserving the posterior cruciate ligament (PCL) using a conventional PCL-retaining cemented total knee replacement. We analysed the functional result by measuring functional knee scores and WOMAC ratings. The knee is a sophisticated synovial hinge

joint that articulates the femur and tibia, facilitating movement between the upper and lower leg bones. The joint is the largest synovial joint in the human body.[4,5]

The knee comprises two articulations: one between the femur and tibia, and another between the femur and patella. The knee is a very flexible hinge joint that allows for bending and straightening of the leg, as well as a little amount of inward and outward twisting. Despite the lack of fundamental changes in the form of the knee joint over thousands of years, it remains susceptible to both sudden damage and the onset of osteoarthritis. Among the joints that bear weight, it experiences the highest degree of deterioration. The knee ligaments, in conjunction with the muscles and tendons, are the primary structures responsible for maintaining knee stability. Larson has categorised the structures surrounding the knee into three groups: Osseous structures, Extra-Articular structures, and Intra-Articular structures.[6-8]

The objective of this study is to directly compare the functional results of Primary Total Knee Replacement performed at our hospital between patients in whom the Posterior cruciate ligament was preserved and those in whom it was removed, using the Knee Society Knee Scoring, Functional Knee Score, and WOMAC Questionnaire.

MATERIAL AND METHODS

Total 25 patients were participated in this study. This study was conducted at the Department of Orthopedics, Kamineni Institute of Medical Sciences, Narketpally, Telangana, India between November 2022 to October 2023. After and before surgery, patients were evaluated using a scoring system that was developed using the WOMAC Score, the Knee Society Knee Score, and the Functional Knee Score.

Inclusion Criteria

- Rheumatoid arthritis and osteoarthritis;
- Age greater than fifty;
- Kellgren and Lawrence score

Exclusion Criteria

- Under 50 years old
- Arthritis following a severe event
- Varicose veins
- Medically unfit.

RESULTS

The research included all 25 instances that had frequent follow-up, with follow-up ranging from three months on average to eighteen months on average.

Table 1 shows the distribution of the participants by gender, with 13 males and 12 females. [Table 1]

Table 2 displays the various indications of the study, including 22 individuals with Osteoarthritis and 3 patients with Rheumatoid Arthritis. [Table 2]

Table 3 displays the distribution of patients' sides, with 8 patients having the right side affected and 15 patients having the left side affected out of the total 25 patients included in this study. [Table 3]

Out of the 25 patients who were chosen, 13 had varus deformities and 12 had valgus deformities, as shown in Table 4.

Patients are measured for height and weight before surgery, and their Body Mass Index is computed and graded in accordance with World Health Organisation standards. Scoring system created by the WOMAC Score and Functional. Both before and after surgery, participants were evaluated using Knee Scores. There is a maximum of 96 points for the WOMAC Score, and 100 points for the knee and functional scores combined.

All patients undergoing knee replacement surgery had a full-length radiograph obtained before the procedure, beginning at the hip and ending at the ankle. A pre-operative mechanical axis was drawn and the amount of varus or valgus deformity was quantified. Prior to surgery, all patients had their comorbid illnesses managed and examined extensively. The cutoff for pre-operative haemoglobin level was 12 gms%. Before surgery, we made sure there were no known skin conditions or varicose veins. Four separate surgical teams completed all twenty-five cases at different points over the research period.

A pneumatic tourniquet was used to control all of the cases. Anaesthetic administered by spinal or epidural, at the discretion of the anesthesiologist. In every instance, the surgeon made an incision in the front midline and then used a medial parapatellar arthrotomy to expose the retina. Depending on the severity of the ailment, the table was used to execute procedures such as ligament balancing and bone cutting. In one instance, the bone defect measured more than 1 cm. A bone graft was utilised to bridge the space, which was harvested from the distal femoral bone cut. Although most patients had their PCL removed after surgery, five with mild abnormalities and no flexion contracture before the procedure were able to keep it. All five patients who had PCL retained received a prosthesis that would hold their PCL in place. The identical company supplied the implants for each of the twenty cases. Each of the twenty cases involved the application of bone cement.

DISCUSSION

The purpose of a total knee replacement surgery is to alleviate disability and discomfort by replacing the knee's weight-bearing surfaces. Osteoarthritis, rheumatoid arthritis, and psoriatic arthritis are the most prevalent knee illnesses that require this procedure. Surgery may be more complex and risky for individuals with severe deformities caused by advanced rheumatoid arthritis, trauma, or long-term osteoarthritis.[9,10]

In 1954, the Journal of Bone and Joint Surgery published the original papers written by Leslie Gordon Percival Shiers, the man credited as the pioneer of knee replacement surgery.[11] Rather than seek a patent for his innovation, Shiers took his surgical demonstrations across the globe, encouraging other surgeons to refine his method. Many people tried to develop knee replacements after John Charnley's success with hip replacement in the 1960s. Along with Leonard Marmor, Frank H. Gunston was a pioneer in North America. Unicompartmental procedures were made possible by Marmor's design, but it wasn't always durable. The "Geometric" style and the Condylar Knee, created by John Insall, were popular in the 1970s. Over the years, knee replacement technology has evolved in an effort to mitigate complications such loosening, wear, and limited mobility.[12-15]

Osteoarthritis is the leading cause of total knee replacement. Clinical osteoarthritis can develop and worsen due to a number of different things. Abnormal loading of the joint, such as in kneeling, squatting, or cross-legged seating, as well as age, sex, obesity, and occupation are among these causes. Our osteoarthritis patients who underwent TKR had a mean age of 58. As compared to what is known about the western population, it is far higher. The normal range of body mass index is less than 25 kg/m2, which is met by 50% of our patients.[16-18]

Because people in this region often sit cross-legged, kneel, or squat, even those with normal body mass index (BMI) tend to develop osteoarthritis at a younger age. Grade IV osteoarthritis, characterised by total joint space obliteration, was present in 58% of our patients upon initial presentation. The American Knee Society Score, the Function Knee Society rating, the Western Ontario and McMaster OA index, the Hospital for Special Surgery Rating System Knee injury and Osteoarthritis Outcome Score, and others are popular rating systems for evaluating the success of total knee arthroplasty.[19-21]

Pre- and post-operative evaluations were conducted on all 25 patients who participated in our study. Depending on whether the cruciate ligament was preserved or sacrificed, patients were split into two groups after the operation.[22,23] The Functional Knee Score, the Knee Society Score, and the WOMAC questionnaire score were used to assess the functional result. Both groups' participants showed statistically significant improvements in knee scores and functional knee scores when looking at the functional outcome. In the group that had the posterior cruciate ligament preserved had a functional knee score of 91.6 and a knee score of 75.6, whereas the group that had the cruciate ligament sacrificed had a functional knee score of 99.6 and an average knee score of 85.8.[24,26]

To find out how much agreement there was, the findings were statistically examined using the SSPS-17 software. For discrete variables, the chi-square test was used, and for continuous variables, the t-test was employed. Bivariate correlation was also used. When we statistically examined the knee society score for pain, we found the following values, and all patients in the study, regardless of group, showed significant improvement compared to their pre-operative levels.[26-28]

CONCLUSION

Patients who had their posterior cruciate ligament sacrificed had better functional outcomes after total knee arthroplasty than those whose ligaments were retained. This is likely because the flexion deformity in the cruciate retaining group lasted longer. Sacrificing the constricted posterior cruciate ligament yields better results than keeping it in the Indian context of knee replacement surgery for advanced osteoarthritis. Our use of deep-dished cruciate-retaining prostheses for all 25 patients constituted a limitation of the study. Lastly, additional follow-up is required because our study only included a limited number of patients and had a short duration.

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Conflict of Interest

None.

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