MAK HILL Publications Research Journal of Medical Sciences

Research Article
doi: 10.36478/makrjms.2023.899.902

Evaluation of the Functional Outcome of Total Knee Arthroplasty PCL Retaining

[1]Supantha Panja, [2]Rakesh Sarkar, [3]Saptadeep Das and [4]Arnab Kumar Saha

[1]Department of Orthopaedics, Santiniketan Medical College, India
[2,4]Department of Orthopaedics, Calcutta Medical Research Institute (CMRI), India
[3]Department of Orthopaedics, KPC Medical College, India

ABSTRACT

The rebuilding of the knee joint is known as a knee arthroplasty. It is a generally safe procedure with predictable results that is more frequently referred to as a complete knee replacement. Total knee arthroplasty (TKA) should be considered for patients with symptomatic osteoarthritis in at least two of the three compartments of the knee who have not responded to conservative therapy. The purpose of the study is to use the WOMAC questionnaire, functional knee score and knee society knee scoring to compare the functional results of patients who had their PCL kept vs. those who had it removed. This research was a prospective comparison research. Santiniketan medical college, Bolpur, department of orthopaedics did this study from January 2021 to September 2022. The research involved 40 patients in total. The cruciate sacrificing prosthesis had a better functional outcome as evidenced by the cruciate sacrificing prosthesi's substantial p-value difference (p = 0.0001) in its favor. All patients greatly improved, according to the functional knee society, with the CS group's FKS at 107.89 and the CR group's at 108.04 (p = 0.9449). The difference was not statistically significant. The WOMAC score also saw a significant improvement. There were 30.8 in the CS groups and 35.6 in the CR groups. A statistical analysis showed that cruciate sacrificing prostheses had a statistically significant (p = 0.0001) benefit. Because of the continuing flexion deformity in the cruciate retaining group, total knee arthroplasty in patients who had their posterior cruciate ligament sacrificed had higher functional success than the maintaining group. Our choice of the single implant offered by the program-deep dished cruciate retaining prosthesis for all 20 patients constituted one of the study's limitations. More follow-up is required because our study only included a limited number of patients over a brief period of time.

OPEN ACCESS

Key Words
Total knee arthroplasty, PCL, functional knee score, knee society knee scoring

Corresponding Author
Arnab Kumar Saha,
Department of Orthopaedics, Calcutta Medical Research Institute (CMRI), India

Author Designation
[1-4]Doctor

Received: 3 August 2023
Accepted: 10 August 2023
Published: 15 August 2023

Citation: Supantha Panja, Rakesh Sarkar, Saptadeep Das and Arnab Kumar Saha, 2023. Evaluation of the Functional Outcome of Total Knee Arthroplasty PCL Retaining. Res. J. Med. Sci., 17: 899-902, doi: 10.36478/makrjms.2023.899.902

INTRODUCTION

There is debate concerning the posterior cruciate ligament's function in total knee replacement surgery. Theoretically, PCL retention might result in femoral rollback, which expands the range of flexion and prevents posterior translation. By reducing shear stresses at the attachment surfaces, this reduces loosening and excessive polyethylene wear.

The rebuilding of the knee joint is known as a knee arthroplasty. It is a generally safe procedure with predictable results that is more frequently referred to as a complete knee replacement. Total knee arthroplasty (TKA) should be considered for patients with symptomatic osteoarthritis in at least two of the three compartments of the knee who have not responded to conservative therapy. Partial knee arthroplasty (PKA) is a fantastic therapy option for those who have symptomatic osteoarthritis in one compartment of the knee and have not responded to conservative treatment[1]. Any procedure's main objective is to reduce chronic pain while simultaneously boosting functional status.

The initial implants used in TKA were made of ivory and attached to the bone using colophony and plaster of Paris in the middle to late 1800s. The 1930s saw the introduction of metal implants as a replacement for this ineffective device. A hinged prosthesis was created in the 1950s to replace the femur and tibia as well as the ligaments that stabilize the knee. The lack of replication of the knee joint's normal kinematics led to a high failure rate and unfavorable long-term prognosis, despite the good outcomes. Later, a prosthesis that mimicked the distal femur's form, retained the collateral and cruciate ligaments and rested on a tibial plastic bearing took its place. Since, this ground breaking prosthesis was developed in the 1970s, the design has changed to put more of an emphasis on imitating the knee joint's natural structure and function. The lifespan of the knee replacement has been significantly extended by developments in anchoring techniques and bearing surface wear characteristics[2].

Total knee replacement (TKR) has a success rate of more than 90%[3], with several studies citing success rates of more than 95% after 10 years[4]. The causes of failure in TKR have been discussed, including an assessment of the involvement of the posterior cruciate ligament (PCL) in an effort to better improve the surgery. While some studies demonstrated benefits in proprioception and kinematics when the PCL was retained[5-7], others found less consistent outcomes. Similar inconsistent findings have been seen in studies on PCL recession[8]. The effectiveness of each strategy has been examined in survival evaluations but the body of research as a whole hasn't been able to favor one approach over the others[9]. Two investigations employing a cruciate-retaining prosthesis found that if the ligaments are balanced overall, the PCL may not play a dominant role. In the first study, 129 knees were tracked for 4.8 years (from 4.7 to 6.0), in the second, 211 knees were tracked for 3.5 years (from 1.0-6.5)[8].

MATERIALS AND METHODS

Study design: Prospectively compared study.

Study period: January 2021 to September 2022.

Study place: Santiniketan medical college, Bolpur. Department of Orthopaedics.

Sample size: 40 patients.

Inclusion criteria: Total knee arthroplasty is performed in our institution for osteoarthritis and rheumatoid arthritis. This comprises both varus and valgus knees:

- Rheumatoid arthritis and osteoarthritis
- Age >50 years
- Kellegran and Lawrence score grade 3 and 4

Exclusion criteria:

- Age <50 years
- Degenerative alterations are minimal (KL I and II)
- Unhealthy skin conditions
- Post traumatic arthritis
- Varicose veins
- Medically ineligible

RESULTS AND DISCUSSIONS

Total knee replacement is a surgical procedure that replaces the weight-bearing surfaces of the knee joint to lessen discomfort and disability. Although, it is also beneficial in treating rheumatoid arthritis and psoriatic arthritis, it is most frequently used to treat osteoarthritis. People who have considerable deformity from trauma, advanced rheumatoid arthritis, or long-term osteoarthritis may require more difficult and dangerous surgery (Table 1-3).

The first knee replacement procedure was carried out by Leslie Gordon Percival Shires who also published his early research in the Journal of bone and joint Surgery in 1954. Shiers revealed his invention rather than filing a patent, which encouraged other surgeons to build on his initial idea. After John Charnley's hip replacement became a success in the 1960s, efforts were undertaken to create knee replacements. North American pioneers Leonard Marmor and Frank H. Gunston. Unicompartmental procedures were possible because to Marmor's design, although it wasn't always reliable. In the 1970s, both John Insall's Condylar Knee design and the "Geometric"

Table 1: Distribution of mean total knee score type

Scores	Type	No.	Mean	Standard deviation	S.E of mean	p-value	Significance
TKS	CS	30	95.9	8.672	3.36	<0.0001	HS
	CR	10	80.0	9.421	4.53		

Table 2: Distribution of mean functional knee score type

Scores	Type	No.	Mean	Standard deviation	S.E of mean	p-value	Significance
FKS	CS	30	107.89	5. 578	2.05	0.9449	NS
	CR	10	108.04	6.854	2.62		

Table 3: Distribution of mean and WOMAC score

Scores	Type	No.	Mean	Standard deviation	S.E of mean	p-value	Significance
WOMAC	CS	30	30.8	1.58	1.245	<0.0001	HS
	CR	10	35.6	2.58	1.89		

design became widely used. In an effort to address the issues of wear, loosening and reduced range of motion, knee replacement has a long history of innovation.

The most frequent cause of a complete knee replacement is osteoarthritis. Clinical osteoarthriti's onset and development have been correlated with a variety of factors. Hereditary factors, age, gender, obesity, job and incorrect joint loading from knelt, squat and cross-legged sitting are a few of them.

Our TKR recipients with osteoarthritis were on average, 68 years old. Compared to the population statistics for the west, it is much greater. Out of 60% of our patients had BMIs that were within the healthy range of 25 kg m^{-2}.

The practice of kneeling, stooping and cross-legged sitting by individuals in this part of the globe explains why osteoarthritis manifests early in adults with normal BMI ranges.

At the time of their initial presentation, 58% of our patients had grade IV osteoarthritis with complete obliteration of joint space.

The Western ontario and McMaster OA Index (WOMAC), The hospital for special surgery rating system knee injury and osteoarthritis outcome score (KOOS) and the oxford 12-item Knee questionnaire are among the scoring systems used to assess the effectiveness of total knee arthroplasty.

Functional outcome: When the functional result was examined, it was found that the knee scores and functional knee scores of all patients in both groups had significantly improved. Patients with sacrificed cruciate ligaments had functional knee scores of 99.6 and an average knee score of 85.8, whereas patients with maintained posterior cruciate ligaments had an average knee score of 75.6 and a functional score of 91.6.

Pain: Following a statistical analysis of the knee society pain score, the results are as follows. The pain scores of every patient in both groups dramatically decreased from their pre-operative levels.

Range of movements: There was no statistically significant difference between the CR and CS groups, despite the fact that all of our patients had flexions between 100 and 1100.

The average pain score for each patient increased significantly, going from 47-62.6 in the CS group against 47 in the CR group. For all pain score variables (walking, climbing), a statistical analysis showed a significant difference in p-value favoring the cruciate sacrifice group, suggesting that they improved in pain score more.

The cruciate sacrificing prosthesis had a better functional outcome as evidenced by the cruciate sacrificing prosthesi's substantial p-value difference (p = 0.0001) in its favor.

All patients greatly improved, according to the functional knee society, with the CS group's FKS at 107.89 and the CR group's at 108.04 (p = 0.9449). The difference was not statistically significant.

The WOMAC Score also saw a considerable improvement. In the CS groups, it was 30.8, while in the CR groups, it was 35.6. Statistics showed a difference in favor of cruciate-sacrificing prostheses that was statistically significant (p = 0.0001).

CONCLUSION

Due to the persistent flexion deformity in the cruciate retaining group, total knee arthroplasty in patients who had their posterior cruciate ligament sacrificed had higher functional success than the maintaining group. In India, where knee replacement surgery is done when osteoarthritis is already advanced, sacrificing the constrictive posterior cruciate ligament performs better than retaining it. One drawback of our investigation was the use of deep dished cruciate retaining prosthesis on all 20 patients. (The only implant available under the program). Finally, greater follow-up is necessary because our study only included a small number of patients over a brief period of time.

REFERENCES

1. Naziri, Q., P.J. Mixa, D.P. Murray, R. Abraham, B.A. Zikria, A. Sastry and P.D. Patel, 2018. Robotic-assisted and computer-navigated unicompartmental knee arthroplasties: A systematic review. Surg. Technol. Int., 32: 271-278.

2. Stilling, M., I. Mechlenburg, C.F. Jepsen, L. Rømer, O. Rahbek, K. Søballe and F. Madsen, 2019. Superior fixation and less periprosthetic stress-shielding of tibial components with a finned stem versus an i-beam block stem: A randomized rsa and dxa study with minimum 5 year's follow-up. Acta. Orthop. A., 90: 165-171.
3. Ali, M.S. and S.R. Mangaleshkar, 2006. Uncemented rotating-platform total knee arthroplasty: A 4-year to 12-year follow-up. J. Arthroplasty., 21: 80-84.
4. Lachiewicz, P.F. and E.S. Soileau, 2006. Ten-year survival and clinical results of constrained components in primary total knee arthroplasty. J. Arthroplasty., 21: 803-808.
5. Laskin, R.S. and H.M.O'Flynn, 1997. The insall award. Total knee replacement with posterior cruciate ligament retention in rheumatoid arthritis. Problems and complications. Clin. Orthop. Relat. Res., 345: 24-28.
6. Warren, P.J., T.K. Olanlokun, A.G. Cobb and G. Bentley, 1993. Proprioception after knee arthroplasty. The influence of prosthetic design. Clin. Orthop. Relat. Res., 297: 182-127.
7. Komistek, R.D., M.R. Mahfouz, K.C. Bertin, A. Rosenberg and W. Kennedy, 2008. In vivo determination of total knee arthroplasty kinematics: A multicenter analysis of an asymmetrical posterior cruciate retaining total knee arthroplasty. J. Arthroplasty., 23: 41-50.
8. Straw, R., S. Kulkarni, S. Attfield and T.J. Wilton, 2003. Posterior cruciate ligament at total knee replacement. Essential, beneficial or a hindrance? J. Bone. Joint. Surg. Br., 85: 671-674.
9. Jacobs, W.C.H., D.J. Clement and A.B. Wymenga, 2005. Retention versus removal of the posterior cruciate ligament in total knee replacement: A systematic literature review within the cochrane framework. Acta. Orthop. A., 76: 757-768.