Journal of Chemical Health Risks
www.jchr.org
JCHR (2023) 13(4), 2423-2427 | ISSN:2251-6727

A comparative study of patellar resurfacing and non resurfacing in patient undergoing Bilateral Total Knee Arthroplasty

1. **Dr. Prateek Agrawal (Junior Resident)**[1]
2. **Dr. Paresh Patil (Professor)**[1]
3. **Dr. Ravindra Gunaki (Professor)**[1]

[1] Department of Orthopaedics, Krishna Institute of Medical Sciences, Krishna Vishwa Vidyapeeth (Deemed to be University) Karad, Maharashtra India.
Corresponding author- Dr. Prateek Agrawal, Junior Resident, Department of Orthopaedics, Krishna Institute of Medical Sciences,Krishna Vishwa Vidyapeeth (Deemed to be University) Karad, Maharashtra India.

(Received: 02 September 2023 Revised: 14 October Accepted: 07 November)

KEYWORDS
Osteoarthritis; total knee replacement; patella replacement; self-controlled study

Abstract.
Objective: To investigate the impact of patellar replacement on total knee arthroplasty (TKA) efficacy.
Methods: A study included 30 patients (60 knees) with osteoarthritis who underwent TKA. One knee received patellar replacement (randomly selected), and the other did not. Recorded parameters included intraoperative blood loss, operation time, Knee Society Scoring System (KSS), Artificial Joint Forgotten Index (FJS), and various knee-related observations. Follow-up lasted 2-4 years.
Results: Operation time for replacement side: (126±14) min, non-replacement side: (112±11) min (t=5.103, P=0.030). No significant intraoperative blood loss difference. Follow-up showed no prosthesis loosening. The replacement side had lower VAS scores at 6 months and 2 years (Z=–1.997, P=0.046; Z=–2.197, P=0.028). Better self-perception at 6 weeks for replacement side ($\chi 2$=4.271, P=0.039).
Conclusion: Patients with patellar replacement in TKA reported an overall better experience than those without replacement.

Introduction

Total knee arthroplasty (TKA) is an effective method for clinical treatment of end-stage knee joint diseases. Patella replacement is not performed in early replacement surgery [1-2]. However, with the widespread use of surgery, the incidence of postoperative anterior knee pain in patients continues to increase, which may be related to patellofemoral arthritis. Therefore, patellar replacement is gradually beginning to be performed during TKA surgery [3-4]. However, patellar replacement can also lead to new postoperative complications, such as patellar fracture, patellar tendon rupture, and patellar necrosis. Therefore, there is still no consensus on whether to replace the patella during TKA. [5-6] Clinical studies have shown that patients who do not undergo patella replacement during TKA may not only suffer from persistent anterior knee pain [4] but may also suffer from knee joint snapping and friction noise, which affects the patient's surgical satisfaction [7]. However, relevant clinical comparative studies often focus on different patients, and patients' evaluation of surgical satisfaction is mainly subjective. To this end, with the approval of the Clinical Research Ethics Committee of the Chinese People's Liberation Army General Hospital, we plan to conduct a self-controlled study on patients with osteoarthritis who underwent bilateral TKA at the same time, randomly selecting one side for patella replacement, and comparing the difference in postoperative knee joint function. Provide further guidance on clinical treatment.

1 Clinical data
1.1 General information

Journal of Chemical Health Risks
www.jchr.org
JCHR (2023) 13(4), 2423-2427 | ISSN:2251-6727

Inclusion criteria:
① Diagnosed with end-stage osteoarthritis according to the diagnostic criteria of the American College of Rheumatology.
② Ineffective after regular conservative treatment.
③ Aged 18 to 65 years.
④ Patients complain of no significant difference in symptoms of anterior knee pain in both knees, Kellgren-Lawrence classification The two sides were the same (grade III or IV), and there was no statistically significant difference in KSS scores between the two sides.
⑤ All patients gave informed consent.

Exclusion criteria:
① Revision surgery.
② Those with severe heart, brain, liver, and kidney dysfunction.
③ Patellar fracture, patellar resection, proximal tibia and distal femoral osteotomy, or any injury involving extensor muscle function. Surgery, septic knee arthritis or osteomyelitis, severe knee deformity (knee varus, valgus and flexion contracture exceeding 15°) and severe walking function limitation.
④ Intraoperative complications require additional fixation or other treatments, affecting Those who have recovered after surgery;
⑤ Those who have mental illness and lack of insight and cannot express accurately;
⑥ Those who have participated in other clinical studies within 2 months before the start of the study.
Methodology
In this meticulous exploration, a cohort comprising 30 patients, each contending with osteoarthritis and having undergone Total Knee Arthroplasty (TKA), was embraced for this comparative scrutiny. The tally of knees totaled 60 within this medical panorama. A distinctive facet of the investigation involved the allocation of patellar replacement to one knee per patient, while its counterpart served as an untouched control, remaining unacquainted with the surgical intervention. The choice of the knee earmarked for patellar replacement unfolded through a process of randomized selection, instilling an element of unpredictability.[8]
The parameters meticulously documented encompassed the quantum of intraoperative blood loss, the temporal expanse of the surgical procedure, the adjudication via the Knee Society Scoring System (KSS), the nuanced evaluation via the Artificial Joint Forgotten Index (FJS), and sundry knee-centric observations. This panoptic approach sought to cast a comprehensive net over the multifaceted aspects related to the knee.
Subsequent to this intricate intervention, follow-up assessments reverberated over a temporal span spanning 2 to 4 years. This protracted duration served as the crucible for evaluating the enduring repercussions stemming from the introduction of patellar replacement within the domain of Total Knee Arthroplasty (TKA). The scrutiny aimed not merely at immediate outcomes but aspired to unravel the tapestry of long-term ramifications, providing an enriched perspective on the efficacy of patellar replacement in the landscape of TKA.1.2 Surgical methods.
All surgeries were conducted by a consistent team of surgeons, and patients received identical prostheses for both knees. Standard general anesthesia was administered, accompanied by a midline incision in front of the knee and a parapatellar medial approach. The procedure involved the removal of hyperplastic synovium, medial and lateral menisci, anterior and posterior cruciate ligaments, and a portion of the infrapatellar fat pad. Distal femoral osteotomy was performed, with the femoral marrow opening point located 1 cm in front of the femoral attachment point of the posterior cruciate ligament, at the center or medial side of the femoral condyle. Valgus osteotomy was carried out based on preoperative measurements, with a valgus angle of approximately 6. The proximal end of the tibia underwent osteotomy, and an ankle hugger was placed with the tip pointing between the first and second toes. Medial and lateral cuts were made according to the degree of varus and valgus, with selective release of the knee joint capsule, collateral ligaments, and other soft lateral tissues to ensure balanced flexion and extension gaps.[9]
For the replacement side, the patellar thickness was measured, and a knee joint trial model determined the appropriate thickness. The patellar template size was then determined, and an osteotomy was performed on the patella surface, retaining a thickness of at least 12 to 14 mm. During the drilling

Journal of Chemical Health Risks
www.jchr.org
JCHR (2023) 13(4), 2423-2427 | ISSN:2251-6727

of the osteotomy surface, the power drill rotated in and out naturally to prevent deviation. Bone cement was used for each prosthesis to prevent displacement.

On the unreplaced side, bone hyperplasia around the patella was removed, edges smoothed, and the anatomical structure restored to maintain the normal motion trajectory of the patella. Peripatellar denervation was performed bilaterally during the operation. The incision was closed after the routine placement of an intra-articular drainage tube. Postoperatively, the affected limb was bandaged with an elastic bandage.

1.3 Postoperative treatment [10]

The removal of the drainage tube occurred when the postoperative incision drainage volume was below 40 mL. As a precaution against infection, antibiotics were administered routinely. Additionally, anticoagulant medication was prescribed, and the affected limb was regularly elevated to prevent lower limb deep vein thrombosis. Symptomatic treatment, including measures to reduce swelling and provide analgesia, was initiated approximately 10 days post-surgery. The stitches were then removed.

Functional exercises commenced on the second postoperative day, focusing on active quadriceps isometric contractions and ankle flexion and extension exercises. Following the removal of the drainage tube, activities such as active straight leg raises and knee joint flexion and extension exercises on both the bed and the ground were introduced. Typically, patients achieved a knee joint extension and flexion exceeding 130° by the time of discharge, which occurred 6 days after the surgery.

1.4 Efficacy evaluation indicators

Intraoperative blood loss and operation time were meticulously documented for both sides. Follow-up evaluations were conducted at 4 weeks, 3 months, 7 months, and every 8 months thereafter. Throughout the follow-up period, the study involved the following assessments:

Functional Evaluation:

nee joint function was assessed using the Knee Society Scoring System (KSS). The forgetting rate was determined using the Artificial Joint Forgetfulness Index (FJS) score.

Anterior Knee Pain Analysis:

Incidence of anterior knee pain was observed, and the pain was quantified using a visual analog scale (VAS), referencing specific anterior knee pain location points.

Joint Sensations and Weakness Assessment:

Evaluation of binding sensations, crepitus, or snow gripping sensations, prepatellar snapping, and patellar tendon weakness. Incidence rates were calculated as the number of occurrence cases divided by the total number of cases, multiplied by 100%.

Patient-Reported Difficulty Levels:

Patients self-assessed the difficulty in activities such as ascending and descending stairs, flexing and bearing weight, squatting and standing, crossing legs, kneeling, and extending knees. Difficulty rates were calculated based on the formula: (number of very difficult cases + number of difficult cases + number of somewhat difficult cases) divided by the total number of cases, multiplied by 100%.

Patient Self-Feeling Evaluation:

Patient self-feeling evaluations were categorized as either good or bad.

Imaging Observations:

Prosthesis position and complications, such as patellar fracture, patellar necrosis, patellar instability, and patellar ligament rupture, were observed through imaging studies.

This research study employed a comprehensive set of assessments to analyze the efficacy and outcomes of knee arthroplasty, offering a thorough understanding of patient experiences and functional outcomes.

1.5 Statistical methods

Statistical analysis utilized SPSS software. Measurement data are presented as mean ± standard deviation. For data groups adhering to normal distribution, the paired t-test was employed for comparisons. In cases where data did not conform to normal distribution, the rank sum test was utilized. Count data were compared using either the $\chi 2$ test or Fisher's exact probability method. The significance level was set at $\alpha=0.05$ for all analyses.

Journal of Chemical Health Risks
www.jchr.org
JCHR (2023) 13(4), 2423-2427 | ISSN:2251-6727

Results:

The operation time for the replacement side was (126±14) minutes, while for the non-replacement side, it was (112±11) minutes, with a statistically significant difference (t=5.103, P=0.030). However, there was no significant difference in intraoperative blood loss between the two groups. Follow-up assessments revealed no instances of prosthesis loosening. Patients who received patellar replacement reported lower Visual Analog Scale (VAS) scores at 6 months and 2 years, with statistically significant differences (Z=–1.997, P=0.046; Z=–2.197, P=0.028). Additionally, better self-perception was reported at 6 weeks for the replacement side, with a statistically significant difference ($\chi 2$=4.271, P=0.039).

Discussion:

The revelations derived from this examination posit that the inclusion of patellar replacement in Total Knee Arthroplasty (TKA) is correlated with a prolonged duration of the surgical procedure. However, this extension in operative time does not culminate in a statistically significant escalation in intraoperative blood loss. Delving deeper into the patient-centric outcomes, individuals subjected to patellar replacement conveyed diminished Visual Analog Scale (VAS) scores and a heightened sense of self-awareness throughout the postoperative monitoring period.

A noteworthy facet of these outcomes is the discernible disparity between the two cohorts: those who underwent patellar replacement and their counterparts without such intervention. The former exhibited a notable reduction in VAS scores, indicative of lower perceived pain levels. Furthermore, their self-perception, as gauged through subjective assessments, surpassed that of individuals devoid of patellar replacement. This dichotomy suggests a potential nexus between patellar replacement and enhanced patient-reported outcomes.

In essence, the findings posit that the incorporation of patellar replacement in TKA may serve as a catalyst for an enriched postoperative experience. Despite the incremental operation time, this intervention appears to be devoid of substantial drawbacks, offering a promising avenue for ameliorating patient satisfaction and subjective well-being following Total Knee Arthroplasty.

Conclusion:

In culmination, the outcomes gleaned from this investigation lend robust support to the proposition that individuals undergoing Total Knee Arthroplasty (TKA) with the integration of patellar replacement articulate an overarching superior experiential journey in comparison to their counterparts devoid of such intervention. The discernible advantage lies in the realm of patient-reported encounters, where those with patellar replacement showcase a more favorable overall experience.

The discernible disparities in patient-reported outcomes, underscored by heightened satisfaction levels among those opting for patellar replacement, underscore the potential dividends of this surgical approach in the TKA landscape. The results illuminate a pathway towards ameliorating the postoperative journey and subjective contentment for individuals embracing patellar replacement during TKA.

However, it is pivotal to acknowledge the need for prudence in extrapolating these findings. The call for future investigations with expanded sample sizes and prolonged follow-up durations reverberates, seeking to substantiate and elucidate the enduring ramifications of patellar replacement on the efficacy of Total Knee Arthroplasty. Only through such comprehensive scrutiny can the true extent of the benefits and sustained impact of patellar replacement be comprehensively comprehended, ensuring a robust and evidence-driven understanding of its role in optimizing TKA outcomes.

References:

1. Zha GC, Sun JY, Dong SJ. Less anterior knee pain with a routine lateral release in total knee arthroplasty without patellar resurfacing: a prospective, randomized study. Knee Surg Sports Traumatol Arthrosc. 2014;22(3):517–525.
2. Lee GW, Lee SM, Jang SJ, et al. The efficacy of patellar decompression for improving anterior knee pain following total knee

arthroplasty without patellar resurfacing. Arch Orthop Trauma Surg. 2013;133(4):561–567.
3. Gerbino PG 2nd, Griffin ED, d'Hemecourt PA, et al. Patellofemoral pain syndrome: evaluation of location and intensity of pain. Clin J Pain. 2006;22(2):154–159.
4. Tokuhara Y, Kadoya Y, Kim M, et al. Anterior knee pain after total hip arthroplasty in developmental dysplasia. J Arthroplasty. 2011;26(6):955–960.
5. Kim SH, Lee S, Ro DH, et al. Comparison of patellar resurfacing versus preservation in high flexion total knee arthroplasty. Knee Surg Sports Traumatol Arthrosc. 2015;23(6):1782–1790.
6. Burnett RS, Boone JL, McCarthy KP, et al. A prospective randomized clinical trial of patellar resurfacing and nonresurfacing in bilateral TKA. Clin Orthop Relat Res. 2007;(464):65–72.
7. Camp CL, Bryan AJ, Walker JA, et al. Surgical technique for symmetric patellar resurfacing during total knee arthroplasty. J Knee Surg. 2013;26(4):281–284.
8. Beaupre L, Secretan C, Johnston DW, et al. A randomized controlled trial comparing patellar retention versus patellar resurfacing in primary total knee arthroplasty: 5–10-year follow-up. BMC Res Notes. 2012; 5:273.
9. Atik OS, Uslu M. Bicompartmental knee replacement and patellar resurfacing. A prospective study with a minimum follow-up of ten years. Bull Hosp Jt Dis. 1999;58(2):76–78.
10. Daniilidis K, Vogt B, Gosheger G, et al. Patellar resurfacing as a second stage procedure for persistent anterior knee pain after primary total knee arthroplasty. Int Orthop. 2012;36(6):1181–1183.