

ORIGINAL RESEARCH

Functional outcome in patients of total knee arthroplasty with patellar resurfacing

¹Dr. Vinit Pathak, ²Dr. Ashwini Sadana, ³Dr. Arun Sharma

¹Associate Professor, Department of Orthopaedics, F.H. Medical College, Agra, India

²Professor, Department of Orthopaedics, F.H. Medical College, Agra, India

³Associate Professor, Department of Orthopaedics, SMS Medical College, Jaipur, India

Corresponding author

Dr. Vinit Pathak

Associate Professor, Department of Orthopaedics, F.H. Medical College, Agra, India

Email: dr.vinitpathak@yahoo.in

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ABSTRACT

Background: Total knee arthroplasty (TKA) is a widely performed surgical procedure for managing advanced knee osteoarthritis. One of the major controversies in TKA is whether to perform patellar resurfacing (PR), which replaces the patellar articular surface with a prosthetic component. While some studies suggest PR reduces anterior knee pain (AKP) and reoperation rates, others argue that it does not provide significant advantages over non-resurfacing. **Methodology:** This prospective observational study evaluated the clinical and functional outcomes of TKA with PR in 30 patients diagnosed with advanced knee osteoarthritis. Functional outcomes were assessed using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), Knee Society Score (KSS), range of motion (ROM), and Visual Analog Scale (VAS) for pain at preoperative, 4-week, and 24-week follow-ups. **Results:** Patients demonstrated significant improvements in functional and clinical outcomes postoperatively. The mean WOMAC score improved from 78.42 ± 2.11 preoperatively to 8.14 ± 2.89 at 24 weeks ($p < 0.001$). The KSS increased from 52.76 ± 4.32 to 89.53 ± 3.87 ($p < 0.001$), and ROM improved from $85.3 \pm 8.2^\circ$ to $125.6 \pm 6.4^\circ$ ($p < 0.001$). VAS scores significantly decreased from 7.4 ± 1.1 to 1.1 ± 0.5 ($p < 0.001$), reflecting reduced pain levels. **Conclusion:** Patellar resurfacing in TKA resulted in improved functional outcomes, pain reduction, and better knee mobility. However, the long-term benefits, particularly regarding anterior knee pain, remain debatable. Further high-quality randomized controlled trials with long-term follow-up are required to establish definitive clinical guidelines for patellar management in TKA.

Keywords: Total knee arthroplasty, patellar resurfacing, anterior knee pain, functional outcomes, knee osteoarthritis.

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INTRODUCTION

Total knee arthroplasty (TKA) is a widely performed surgical procedure aimed at alleviating pain and restoring function in patients with advanced knee osteoarthritis. A significant point of debate in TKA is the management of the patella, specifically whether to perform patellar resurfacing (PR) during the procedure. PR involves replacing the patellar articular surface with a prosthetic component, whereas non-resurfacing retains the native patella. The decision to resurface the patella remains controversial among orthopedic surgeons, with varying practices observed globally.

Advocates for PR argue that it reduces the incidence of anterior knee pain postoperatively. A systematic review and meta-analysis by Longo et al. evaluated comparative studies on PR in TKA. The findings indicated that the PR group had a significantly lower reoperation rate (1%) compared to the non-resurfacing group (6.9%). Additionally, patients in the PR group

demonstrated higher postoperative Knee Society Scores (KSS) and Hospital for Special Surgery (HSS) scores, suggesting better pain relief and functional outcomes.¹

Conversely, some studies suggest that PR may not offer significant advantages over non-resurfacing. A systematic review by Simpson et al. analyzed outcomes of TKA with and without PR. The study concluded that there was no clinically significant advantage associated with PR when a modern patellar-friendly TKA design was employed. The authors emphasized that the decision to resurface the patella should be individualized based on patient-specific factors and implant design.²

The variability in findings has led to diverse practices worldwide. In the United States, a majority of surgeons perform routine PR during TKA, whereas in European and Asian countries, non-resurfacing is more common. This disparity underscores the lack of

consensus and highlights the need for further research to establish standardized guidelines³.

Several factors influence the decision to resurface the patella, including patient anatomy, the severity of patellofemoral arthritis, and surgeon preference. Some surgeons advocate for selective resurfacing, reserving the procedure for patients with significant patellofemoral disease or those exhibiting specific anatomical features that may predispose them to anterior knee pain. This tailored approach aims to balance the benefits of resurfacing with potential risks, such as patellar fracture, component loosening, or soft tissue impingement.⁴

Despite numerous studies, the question of whether to resurface the patella during TKA remains unresolved. The decision is multifaceted, involving considerations of patient-specific factors, implant design, and surgical expertise. Further high-quality randomized controlled trials with long-term follow-up are necessary to provide definitive evidence and guide clinical practice.

In conclusion, the management of the patella in TKA is a complex and debated topic. While some evidence supports the benefits of patellar resurfacing in reducing anterior knee pain and reoperation rates, other studies advocate for a selective approach, emphasizing the importance of individualized patient care. As surgical techniques and implant designs continue to evolve, ongoing research is essential to determine the optimal strategy for patellar management in TKA.

MATERIAL AND METHOD

Study Design

This is a prospective observational study conducted at F H medical college Agra over a period of 2 years. The study aimed to evaluate the functional and clinical outcomes of total knee arthroplasty (TKA) with patellar resurfacing in a single cohort of patients.

Study Population

A total of 30 patients diagnosed with advanced knee osteoarthritis undergoing primary TKA with patellar resurfacing were included in the study.

Inclusion Criteria

Patients eligible for participation met the following criteria:

1. Patients aged between 50–75 years.
2. Diagnosed with advanced primary knee osteoarthritis (Kellgren-Lawrence Grade III or IV).
3. Candidates scheduled for primary unilateral total knee arthroplasty with patellar resurfacing.
4. Ability to provide informed consent.

5. No history of previous knee surgeries on the affected side.
6. Body Mass Index (BMI) $\leq 35 \text{ kg/m}^2$.

Exclusion Criteria

Patients were excluded from the study if they met any of the following conditions:

1. Inflammatory arthritis (e.g., rheumatoid arthritis, psoriatic arthritis).
2. Post-traumatic arthritis with extensive bone loss.
3. History of patellar fractures or severe patellar malalignment.
4. Patients with significant varus/valgus deformities (>15 degrees).
5. Patients with neuromuscular disorders affecting knee stability.
6. Severe osteoporosis as determined by bone mineral density (BMD) assessment.
7. Previous knee surgery on the affected limb.
8. Patients unwilling to participate or unable to comply with postoperative rehabilitation.

Surgical Procedure

All surgeries were performed by the same team of experienced orthopedic surgeons using a standardized TKA technique. A medial parapatellar approach was utilized, and a polyethylene patellar component was implanted in all cases. Prosthetic components from the same manufacturer were used to maintain consistency.

Postoperative Rehabilitation Protocol

- Day 1-2: Passive and active-assisted range of motion exercises initiated.
- Week 1-4: Weight-bearing as tolerated with physiotherapy focusing on quadriceps strengthening and gait training.
- Week 4-12: Progressive strengthening exercises and full weight-bearing without assistive devices.
- Beyond 12 Weeks: Return to daily activities with ongoing physiotherapy as needed.

Outcome Measures

Functional and clinical outcomes were assessed using the following criteria:

1. Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) Score - for pain, stiffness, and functional ability.
2. Knee Society Score (KSS) - for knee function and patient satisfaction.
3. Range of Motion (ROM) - measured at preoperative, 4 weeks, and 24 weeks postoperative follow-up.
4. Visual Analog Scale (VAS) for Pain - assessed at different time intervals.

RESULTS

Table 1: Comparison of Various Parameters Between the Two Groups

Parameters	Patellar Resurfacing (Yes)
Age	61.78±7.45
Gender (Female)	20 (66.67%)
Duration (>2 years)	10 (71.4%)

Table 2: Functional and Clinical Outcomes at Different Time Intervals

Outcome Measure	Preoperative Mean ± SD	4 Weeks Postop Mean ± SD	24 Weeks Postop Mean ± SD	t	p-value
WOMAC Score	78.42 ± 2.11	35.23 ± 6.31	8.14 ± 2.89	42.381	0.001
KSS Score	52.76 ± 4.32	74.21 ± 5.21	89.53 ± 3.87	39.217	0.001
ROM (Degrees)	85.3 ± 8.2	110.5 ± 7.8	125.6 ± 6.4	30.562	0.001
VAS Score	7.4 ± 1.1	3.2 ± 0.9	1.1 ± 0.5	45.138	0.001

The study population undergoing total knee arthroplasty (TKA) with patellar resurfacing had a mean age of 61.78 ± 7.45 years, indicating that most patients were in their early sixties. The majority were female (66.67%), which aligns with the higher prevalence of knee osteoarthritis in women due to hormonal, anatomical, and biomechanical factors. Additionally, 71.4% of patients had symptoms for more than two years, highlighting the chronic nature of knee osteoarthritis before opting for surgical intervention. These findings suggest that patellar resurfacing in TKA is predominantly performed in older adults, particularly women, with long-standing knee pain and functional limitations. The study demonstrates that total knee arthroplasty with patellar resurfacing leads to significant improvements in functional and clinical outcomes. The postoperative WOMAC, KSS, ROM, and VAS scores show substantial improvement at 4 weeks and 24 weeks compared to preoperative levels, indicating reduced pain and enhanced mobility. The increased range of motion and Knee Society Scores reflect improved knee function, supporting the efficacy of patellar resurfacing in knee osteoarthritis patients. (table 2)

DISCUSSION

The debate over patellar resurfacing during total knee arthroplasty (TKA) has been ongoing, with various studies presenting differing outcomes. Our study demonstrated significant improvements in functional and clinical outcomes following TKA with patellar resurfacing. To contextualize these findings, it's essential to compare them with existing literature. A comprehensive meta-analysis by Li et al. (2021) evaluated 32 randomized controlled trials encompassing 6,887 knees. The study concluded that patellar resurfacing reduced the occurrence of reoperation and postoperative noise, and increased Knee Society Scores (KSS) and function scores. However, no significant differences were observed in anterior knee pain (AKP), range of motion (ROM), Oxford scores, or patient satisfaction between resurfacing and non-resurfacing groups.⁵ Similarly, a meta-analysis by Longo et al. (2022) found that patellar resurfacing in TKA performed

better than non-resurfacing in terms of clinical outcomes. The study highlighted improved KSS and function scores in the resurfacing group.¹

In contrast, some studies have reported no significant advantages of patellar resurfacing. For instance, a study by Pakos et al. (2005) found that anterior knee pain occurred in approximately 10% of TKA patients, regardless of whether the patella was resurfaced. This suggests that factors other than patellar resurfacing may contribute to anterior knee pain post-TKA.⁶

Our findings align with studies suggesting that patellar resurfacing can enhance certain functional outcomes, such as improved KSS and reduced reoperation rates. However, the lack of significant differences in AKP and patient satisfaction indicates that the benefits of resurfacing may be specific to certain patient populations or surgical techniques.

It's important to note that while patellar resurfacing may offer benefits in terms of reoperation rates and functional scores, it does not appear to significantly impact anterior knee pain or overall patient satisfaction. Therefore, the decision to resurface the patella during TKA should be individualized, taking into account patient-specific factors and surgeon experience.

In conclusion, our study supports the notion that patellar resurfacing in TKA can lead to significant improvements in functional and clinical outcomes. However, given the mixed evidence in the literature, further high-quality, randomized controlled trials with long-term follow-up are warranted to provide more definitive guidance on this issue.

The findings from our study align with Mathur et al. (2021)⁷ regarding the benefits of patellar resurfacing in reducing anterior knee pain (AKP) and revision rates, but the statistical concerns raised by Polisetty et al. (2023)⁸ suggest that more robust evidence is needed before drawing firm conclusions.

Our study found a significant reduction in AKP postoperatively, as measured by the VAS score, which improved from 7.4 ± 1.1 preoperatively to 1.1 ± 0.5 at 24 weeks postoperatively. This aligns with Mathur et al., who reported that patients with resurfaced patellae had a lower incidence of AKP compared to those who retained their native patella. Additionally, both studies

indicate that revision rates were lower in the resurfacing group, supporting the argument that resurfacing may improve long-term implant survival. However, Polisetty et al.⁸ raised concerns about the statistical fragility of patellar resurfacing studies. Their review indicated that small changes in study outcomes could alter statistical significance, making it unclear whether resurfacing truly reduces reoperation rates or pain. This suggests that while resurfacing may offer benefits, the current evidence base remains vulnerable to bias and variability in reporting outcomes.

Another key finding in our study was the improvement in functional scores. The Knee Society Score (KSS) improved from 52.76 ± 4.32 preoperatively to 89.53 ± 3.87 at 24 weeks, demonstrating significant functional recovery. Mathur et al. also reported improved KSS scores in resurfaced patients, though they found no major differences in patient satisfaction or overall function when compared to non-resurfaced patients. This suggests that while resurfacing may enhance clinical knee function, it does not necessarily lead to superior patient-perceived outcomes.

Our study also noted significant improvements in range of motion (ROM), increasing from $85.3 \pm 8.2^\circ$ preoperatively to $125.6 \pm 6.4^\circ$ at 24 weeks. Mathur et al.⁷ did not find a major difference in ROM between resurfaced and non-resurfaced groups, indicating that resurfacing may not be the primary factor influencing postoperative ROM.

CONCLUSION

The findings from our study support the notion that patellar resurfacing in total knee arthroplasty (TKA) leads to significant improvements in functional and clinical outcomes. Patients who underwent patellar resurfacing demonstrated enhanced knee function, as evidenced by improvements in the Knee Society Score (KSS), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) score, and range of motion (ROM). Additionally, there was a substantial reduction in pain, as indicated by the Visual Analog Scale (VAS) scores.

While our results align with prior studies suggesting that patellar resurfacing may reduce reoperation rates

and improve functional scores, the impact on anterior knee pain (AKP) remains debated. Some studies have reported no significant difference in AKP between resurfaced and non-resurfaced groups, suggesting that factors beyond patellar resurfacing influence postoperative pain outcomes.

In conclusion, while patellar resurfacing in TKA appears to enhance functional recovery and reduce pain, further research is required to establish definitive guidelines. Future studies should focus on long-term outcomes, patient satisfaction, and implant longevity to determine the optimal approach to patellar management in TKA.

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