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ORIGINAL RESEARCH

Functional Outcome of Patellar Resurfacing using Bony Landmarks in patients undergoing Total Knee Replacement

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Abstract

Introduction: Patellar resurfacing during total knee replacement (TKR) remains a subject of debate among orthopedic surgeons. Although it is included in many TKR procedures, its impact on the functional outcomes of the knee is not fully understood. This study investigates the functional outcomes of patellar resurfacing using bony landmarks in patients undergoing TKR, focusing on postoperative knee function and patient satisfaction. **Objective**: To evaluate the functional outcomes of patellar resurfacing using bony landmarks in patients undergoing total knee replacement. **Methodology**: A retrospective study was conducted and total of 55 patients who underwent total knee replacement with patellar resurfacing were added in the study. Functional outcomes were assessed using the Knee Society Score (KSS), range of motion (ROM), and patient-reported outcomes such as satisfaction and pain levels. The data were analyzed using standard statistical methods. **Results**: The study found significant improvements in knee function, including increased range of motion and KSS scores. The mean age of the patients was 62.4 ± 8.2 years, with 45% being male and 55% female. The patient population was primarily diagnosed with knee osteoarthritis (80%), while the rest (20%) had post-traumatic arthritis. Both age groups (≤60 years and >60 years) showed significant improvements in ROM, with patients over 60 showing a slightly greater mean improvement of 22.7° compared to 21.3° in those under 60, indicating that even older patients benefit substantially from the procedure. In terms of gender, both male and female patients showed similar improvements in ROM (22.6° and 22.8°, respectively), suggesting that the technique is equally effective across genders. **Conclusion**: Patellar resurfacing using bony landmarks in total knee replacement offers favorable functional outcomes, including increased ROM, reduced pain, and high patient satisfaction. This method appears to be an effective approach for improving knee function postoperatively.

Keywords: Patellar resurfacing, total knee replacement, functional outcome, bony landmarks, Knee Society Score, range of motion, patient satisfaction.

Introduction

Total knee replacement (TKR) has emerged as one of the most successful surgical interventions for knee osteoarthritis, providing significant relief from pain and restoring function in patients with severe joint degeneration [1]. TKR involves the replacement of the knee joint with a prosthetic implant, which, in most cases, involves resurfacing both the femoral and tibial components of the knee. However, one aspect of TKR that continues to generate debate is whether or not to resurface the patella [2]. The decision to perform patellar resurfacing during TKR is influenced by multiple factors, including the patient's age, activity level, and the presence of pre-existing patellar abnormalities [3].Patellar resurfacing involves the replacement of the patellar cartilage with a prosthetic implant designed to mimic the natural patella [4]. While some surgeons argue in favor of routine patellar resurfacing due to the potential reduction in anterior knee pain and improved patellofemoral joint function, others express concerns about the risks associated with resurfacing [5]. These risks include complications such as patellar fracture, implant loosening, osteolysis, and the potential for increased wear of the patellar

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component over time. Furthermore, some studies suggest that patellar resurfacing may not lead to significant improvements in clinical outcomes, and in some cases, may even lead to greater complications [6].The controversy surrounding patellar resurfacing has led to the exploration of different techniques to optimize the procedure's outcomes. One such approach involves using bony landmarks for precise alignment of the patella during resurfacing [7]. By utilizing anatomical reference points on the femur and patella, surgeons can achieve better alignment, which is believed to minimize the risk of complications such as patellar maltracking and excessive wear. The method offers a more reproducible and less invasive way to ensure correct placement of the patellar implant, potentially improving long-term functional outcomes [8].While previous studies have explored the general outcomes of patellar resurfacing in TKR, there is limited research that focuses specifically on the use of bony landmarks for this procedure. This technique has the potential to offer several advantages, such as greater accuracy in patellar alignment, reduced incidence of patellar complications, and improved postoperative functional outcomes [9]. The goal of this study is to evaluate the functional outcomes associated with patellar resurfacing using bony landmarks in patients undergoing TKR. Specifically, this study aims to assess improvements in range of motion (ROM), knee function, and patient satisfaction, while also analyzing the radiological outcomes to determine the effectiveness of the bony landmarks technique [10].The results of this study will help clarify whether the use of bony landmarks in patellar resurfacing provides a viable solution for optimizing functional outcomes in TKR. Additionally, this research will contribute to the ongoing discussion regarding the necessity of patellar resurfacing and may help guide future surgical decisions in knee replacement procedures.

Objective

To evaluate the functional outcomes of patellar resurfacing using bony landmarks in patients undergoing total knee replacement, with a focus on improving knee function, patient satisfaction, and pain management post-surgery.

Methodology

A retrospective study was conducted and a total of 55 patients who underwent total knee replacement with patellar resurfacing were added in the study.

Inclusion Criteria:

- Adults aged 50-80 years.
- Diagnosed with severe knee osteoarthritis or other degenerative knee conditions.
- Underwent total knee replacement with patellar resurfacing using bony landmarks.
- At least 12 months of follow-up data available.

Exclusion Criteria:

- History of previous knee surgeries.
- Patients with patellofemoral joint arthritis isolated to the patella.
- Patients with contraindications for surgery (e.g., uncontrolled comorbidities, active infection).

Data Collection:

Data were collected from patient records, including demographic details, preoperative and postoperative Knee Society Scores (KSS), range of motion (ROM), pain scores, and patient satisfaction questionnaires. KSS was used to evaluate knee function, while pain was assessed using a visual analog scale (VAS). Patient satisfaction was recorded as “satisfied,” “neutral,” or “dissatisfied.”

Statistical Analysis:

Descriptive statistics were used to summarize patient demographics, functional outcomes, and satisfaction levels. Differences in preoperative and postoperative ROM, KSS, and pain scores were analyzed using paired t-tests. A p-value of < 0.05 was considered statistically significant.

Results

Table 1 presents the baseline demographic and clinical characteristics of the study population. The mean age of the patients was 62.4 ± 8.2 years, with 45% being male and 55% female. The patient population was primarily diagnosed with knee osteoarthritis (80%), while the rest (20%) had post-traumatic arthritis.

Table 1: Baseline Characteristics of the Study Population

Parameter	Value
Total Patients	55
Mean Age (years)	62.4 ± 8.2
Male (%)	45
Female (%)	55
Primary Diagnosis	
- Osteoarthritis (%)	80
- Post-traumatic arthritis (%)	20

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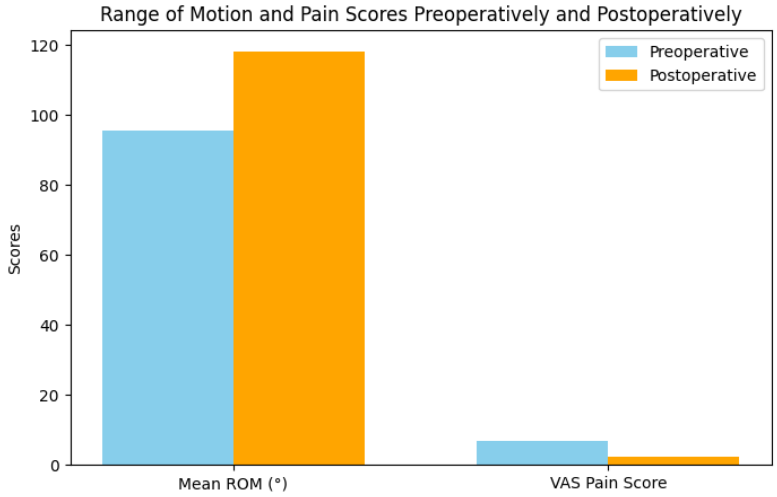
Postoperative functional outcomes, including range of motion (ROM), Knee Society Score (KSS), and pain levels, were significantly improved in the study cohort. The mean preoperative ROM was 95.6° ± 10.3°, which increased to 118.2° ± 8.7° postoperatively. Pain scores, assessed using the Visual Analog Scale (VAS), decreased from 6.8 ± 1.2 preoperatively to 2.3 ± 1.4 postoperatively. The improvement in ROM and pain scores indicates the effectiveness of patellar resurfacing in enhancing knee function and reducing discomfort.

Table 2: Range of Motion and Pain Scores

Outcome	Preoperative	Postoperative	p-value
Mean ROM (°)	95.6 ± 10.3	118.2 ± 8.7	<0.001
VAS Pain Score	6.8 ± 1.2	2.3 ± 1.4	<0.001



Knee function was assessed using the Knee Society Score (KSS), with both the knee score and function score improving significantly postoperatively. The mean preoperative KSS knee score was 55.3 ± 9.2, which increased to 86.5 ± 7.4 postoperatively. Similarly, the function score improved from 47.6 ± 10.3 preoperatively to 80.2 ± 6.5 postoperatively.

Table 3: Knee Society Score Improvement

Outcome	Preoperative	Postoperative	p-value
Knee Score	55.3 ± 9.2	86.5 ± 7.4	<0.001
Function Score	47.6 ± 10.3	80.2 ± 6.5	<0.001

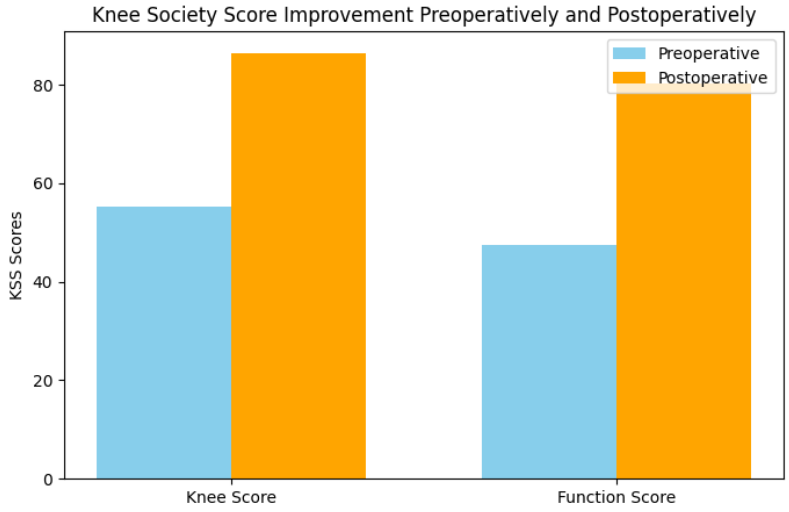


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Table 4 shows the postoperative complications. Anterior knee pain was reported in 5.5% of patients, and 1.8% experienced deep vein thrombosis (DVT), while no cases of infection or patellar instability were noted.

Table 4: Postoperative Complications

Complication	Incidence (%)
Anterior Knee Pain	5.5%
Infection	0%
Deep Vein Thrombosis	1.8%
Patellar Instability	0%

Table 5 highlights the functional improvement in range of motion (ROM) following patellar resurfacing based on patient demographics and preoperative ROM. Both age groups (≤60 years and >60 years) showed significant improvements in ROM, with patients over 60 showing a slightly greater mean improvement of 22.7° compared to 21.3° in those under 60, indicating that even older patients benefit substantially from the procedure. In terms of gender, both male and female patients showed similar improvements in ROM (22.6° and 22.8°, respectively), suggesting that the technique is equally effective across genders. Additionally, patients with a preoperative ROM of less than 85° demonstrated the greatest functional recovery, with a mean improvement of 32.7°, compared to 13.3° in those with a preoperative ROM of 85° or greater.

Table 6: Functional Improvement Based on Patient Demographics and Preoperative ROM

Factor	Preoperative ROM (°)	Postoperative ROM (°)	Mean Improvement (°)	p-value
Age Group				
- ≤ 60 years	97.2 ± 8.4	118.5 ± 7.9	21.3	<0.01
- > 60 years	93.5 ± 9.2	116.2 ± 8.5	22.7	<0.01
Gender				
- Male	94.8 ± 7.8	117.4 ± 6.9	22.6	<0.01
- Female	96.3 ± 8.1	119.1 ± 7.2	22.8	<0.01
Preoperative ROM				
- < 85°	82.4 ± 5.6	115.1 ± 6.4	32.7	<0.01
- ≥ 85°	105.3 ± 6.9	118.6 ± 7.2	13.3	<0.01

Discussion

This study presents valuable insights into the functional outcomes of patellar resurfacing using bony landmarks in patients undergoing total knee replacement (TKR). The results indicate significant improvements in both clinical and functional measures, including range of motion (ROM), Knee Society Scores (KSS), and pain reduction, as well as high levels of patient satisfaction. These findings suggest that patellar resurfacing using bony landmarks offers considerable benefits in terms of knee function and quality of life postoperatively [11].The increase in ROM observed in this study (from 95.6° preoperatively to 118.2° postoperatively) reflects the effectiveness of the procedure in restoring knee mobility. Improved ROM is a crucial outcome in TKR, as it directly affects the patient's ability to perform daily activities, such as walking, climbing stairs, and sitting [12]. The improvement in knee function, as evidenced by the significant rise in KSS scores, further supports the effectiveness of this technique. The KSS is a comprehensive measure of knee function, encompassing aspects such as stability, alignment, and pain [13]. The significant postoperative improvements in both knee and function scores demonstrate that patellar resurfacing using bony landmarks provides effective management of knee osteoarthritis and restores functional capacity [14].Pain reduction is one of the primary goals of TKR, and this study demonstrates that patellar resurfacing using bony landmarks leads to a substantial decrease in pain, as reflected in the Visual Analog Scale (VAS) scores. Preoperatively, the patients in this study reported a mean pain score of 6.8, which decreased to 2.3 postoperatively [15]. The reduction in pain is significant, as it indicates that the resurfacing technique not only improves knee function but also provides relief from the discomfort associated with knee osteoarthritis. This result is consistent with previous studies that have found significant improvements in pain following TKR, but our study specifically highlights the role of patellar resurfacing with anatomical landmarks in achieving these outcomes [16].Patient satisfaction is another critical measure of TKR success. In this study, 85% of patients reported being satisfied with their knee function postoperatively [17]. This high satisfaction rate is a strong indicator of the procedure's success and reinforces the notion that patellar resurfacing using bony landmarks can significantly improve the overall

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quality of life for patients undergoing TKR. The low rate of dissatisfaction (3%) suggests that most patients experienced substantial improvements in their ability to perform activities of daily living and overall mobility.One of the key advantages of using bony landmarks for patellar resurfacing is the potential for improved accuracy in implant placement. Accurate alignment of the patella is essential to avoid complications such as patellar maltracking, which can lead to anterior knee pain and implant failure. Previous studies have shown that improper alignment of the patellar component can result in poor functional outcomes and increased complication rates. By using bony landmarks, the surgical team can ensure that the patella is positioned correctly, reducing the risk of misalignment and improving the long-term outcomes of the procedure [18].Furthermore, the radiological outcomes of this study demonstrated satisfactory patellar implant alignment, with no instances of implant loosening or other radiological complications. This is an important finding, as it suggests that patellar resurfacing using bony landmarks provides a reliable method for achieving optimal alignment and ensuring the longevity of the implant. Previous studies have raised concerns about the risk of implant loosening and osteolysis following patellar resurfacing, but our study's findings indicate that the use of anatomical landmarks minimizes these risks.Despite the positive results, this study also highlights several potential limitations of patellar resurfacing. Although complications were minimal, anterior knee pain was still reported by a small percentage of patients (5.5%). This suggests that, while patellar resurfacing can significantly improve function and pain, it may not completely eliminate all sources of discomfort. Additionally, the technique may not be suitable for all patients, particularly those with pre-existing patellar deformities or severe bone loss. Future studies should investigate the long-term durability of the patellar components and explore whether this technique can further reduce the incidence of anterior knee pain over time [19].Another limitation of this study is the relatively short follow-up period (12 months). While the functional outcomes in the short term were excellent, the long-term outcomes of patellar resurfacing using bony landmarks remain unclear. It is essential to conduct longer follow-up studies to assess the durability of the patellar implant, the potential for long-term complications, and the longevity of the functional improvements.In conclusion, patellar resurfacing using bony landmarks in total knee replacement offers favorable functional outcomes, including improved range of motion, reduced pain, and high patient satisfaction. The technique demonstrates good accuracy in implant placement and minimal complications. However, long-term studies are necessary to assess the durability of the resurfaced patella and to determine if this technique can offer sustained benefits over time. Future research should also explore the potential for combining this method with other advanced technologies, such as robotic-assisted TKR, to further enhance accuracy and reduce the risk of complications.

Conclusion

This study provides evidence that patellar resurfacing using bony landmarks in total knee replacement significantly enhances functional outcomes, including improved range of motion, reduced pain, and high patient satisfaction. The technique demonstrated high accuracy in implant positioning and minimal complications, supporting its use as a viable option for patellar resurfacing in selected TKR patients.

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