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Postoperative Complications of Patellar Resurfacing In Total Knee Replacement

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Abstract

Objective: TKR followed by patellar resurfacing has been shown of great advantage in literature. This study is done To review post-operative complications among patients, after being treated with patellar resurfacing in total knee repair

Method: Prospective continuous study at Orthopaedic Surgery PAEC General Hospital, Islamabad for 6 months Selected sample size is n=58 by simple random sampling(non-probability) Inclusion criteria: Patients under the age group of 18-70 years old of both genders undergone TKR followed by patellar resurfacing, arthritis undergone TKR followed by patellar resurfacing & patellar resurfacing after trauma. Exclusion criteria: Patients undergone TKR with comorbid; diabetes, congestive heart disease, hypertension, neuropathological diseases & renal disorders.& unwilling to participate.

Results: The mean age of participants was 44.32 (S.D=3.5) Mean BMI was 29.4 (S.D=3.2). males were 16 while 42 females went under surgery. There was no association seen between BMI and post-op complications Average follow-up was 98 days (58-144). Co-relation between TKR and patellar resurfacing, there was no variation. Among fifty-eight patients patellar fracture, patellar matlracking, aseptic loosening,. Patellar osteonecrosis, polythene wear, Dislocation following total knee arthroplasty, and other hardware mal-function, Overstuffing of the PFJ in postoperative TKA was seen among three people 5.2% of individuals

Conclusion: To reduce the danger of additional difficulties, patellar resurfacing must be performed with a high level of accuracy and precision since it is just as crucial as tibiofemoral replacement

Keywords: Aseptic, total knee replacement, patella.

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1. Introduction

When treating advanced knee joint arthritis, total knee arthroplasty (TKA) is a common treatment that, even at long-term follow-up (FOLLOW-UP), assures positive and long-lasting results. At a rate of 40–58%, anterior knee pain, dislocation, maltracking, and subluxation were all associated with early designs that lacked a patellar replacement. The patellofemoral joint (PFJ) was blamed for these problems, and patellectomy and soft-tissue realignment were the early treatments.[1]

Moreover, individuals with rheumatoid arthritis reported an even greater prevalence of postoperative discomfort. New implants have been created as a result of this amount of evidence. An anterior flange was added to the femoral component to replace part of the PF. This change did not result in better clinical or follow-up results. Tricompartmental replacements that permitted patellar resurfacing were thereafter introduced. Patellofemoral resurfacing issues started to be recorded, and concerns were raised even though many surgeons encouraged regular resurfacing.[1] Complication rates in the first series varied from 4% to 50%, making them the second-most common reason for revision (behind infection). The extensor mechanism ruptured, and there was a patellar fracture, osteonecrosis, patellar polyethene (PE) wear, aseptic loosening, instability, dislocation, overstuffing, and patellar clunk syndrome. The growing incidence of extensor problems, which have a significant influence on the quality of life, has advised a more cautious technique with selective resurfacing The true requirements for resurfacing are rheumatoid arthritis, inflammatory arthritis, severely damaging post-foot joint (PFJ), patella maltracking, and incongruence of the patella and femoral components. Moreover, resurfacing an exceptionally tiny patella is typically not recommended.[2] Keeping the original patella can help to reduce issues after resurfacing treatments. Despite improved designs of current prostheses, persistent anterior knee.

discomfort following TKA remains a common reason for early revision surgery. In certain cases, selective patella resurfacing may not alleviate symptoms.

The best way to handle the patella in TKA is still debatable. Certain surgeons choose routine resurfacing in light of the data showing a higher incidence of post-patellar revision and anterior knee

pain in patients with patellar-retaining implants. Others frequently choose to keep the original patella in place to avoid the potentially fatal effects of patellar resurfacing, which include fracture, loosening, instability, and damage to the patella tendon.[3]

There is also a subset of "occasional resurfacers" who decide whether or not to resurface based on certain pre- and post-operative criteria. The inadequate evidence on this topic has resulted in these disparate approaches. Most series are varied in terms of prosthetic designs, manufacturer indications, patient typology, outcomes instruments, and FOLLOW-UP length, making decisive assertions impossible. When the patella is not resurfaced, there is a propensity for a greater midterm re-operation rate for anterior knee pain.

The rationale of this study is to fill the void of knowledge about the complications after patellar knee replacement after total knee repair. A literature review has suggested international studies about this particular component, yet there is a lack of evidence-based research in the prospective domain at the local level in Pakistan.

2. Materials & Methods

A Prospective continuous study was conducted at Orthopedic Surgery PAEC General Hospital, Islamabad for 6 months for the estimated population size of 300 patients 6 months sample size was drawn. Patients under the age group of 18-70 years old of both genders (male, and female) who have undergone TKR followed by patellar resurfacing arthritis and TKR followed by patellar resurfacing after trauma were included in the study.

Patients undergone TKR with comorbid; diabetes, congestive heart disease, hypertension, neuropathological diseases & renal disorders and those who did not give consent were excluded from the study. After getting approval from the ethical review board, the study was conducted on n=58 participants. These participants were asked to sign a consent form and availability assurance letter for 6 months duration after post-op total knee replacement surgery with patellar resurfacing (follow-ups) All patients who followed uplfill inclusion criteria were taken. Patients were selected by non-probability simple random sampling. Each patient was taken for radiographs and MRI scans. Assessment charts were filled. All complications Patellar fracture, Patellar maltracking, Aseptic loosening (AL), Patellar osteonecrosis, Patellar polyethene (PE) wear, Dislocation following total knee arthroplasty polyethene wear, and other hardware Malfunction, Overstuffing of the PFJ in postoperative TKA, Rupture of the extensor mechanism &Patellar clunk syndrome were charted on assessment performance during the period of 6-months.

Randomized Clinical Trials			
Two-sided significance level(1-alpha):			95
Power (1-beta, % chance of detecting):			80
The ratio of sample size, Unexposed/Exposed:			1
Percent of Unexposed with Outcome:			5
Percent of Exposed with Outcome:			34
Odds Ratio:			10
Risk/Prevalence Ratio:			6.9
Risk/Prevalence difference:			29
	Kelsey	**Fleiss**	**Fleiss with CC**
Sample Size - Exposed	29	28	34
Sample Size-Nonexposed	29	28	34
Total sample size:	58	56	68
References			
Kelsey et al., Methods in Observational Epidemiology 2nd Edition, Table 12-15			
Fleiss, Statistical Methods for Rates and Proportions, formulas 3.18 &3.19			
CC = continuity correction			
Results are rounded up to the nearest integer.			

Selected sample size is n=58, α=0.05%,Confidence interval=95%,S.D=1.96.

Sampling Technique: simple random sampling(non-probability).

Patients were called for follow-up visits after initially 2 weeks post-op, then 4 weeks then 6 weeks followed by a final visit after 12 weeks. On every visit, there was a physical examination, followed by radiographs & MRI if any complication was seen (as per need).

Data was collected and entered into SPSS version 23. Data variables of complications were measured in frequencies. These variables were co-related with TKR followed by patellar resurfacing. A T-test was applied if needed and means were compared. The standard deviation of all variables was defined individually. In the end, frequencies were taken out and assessed with the level of significance,

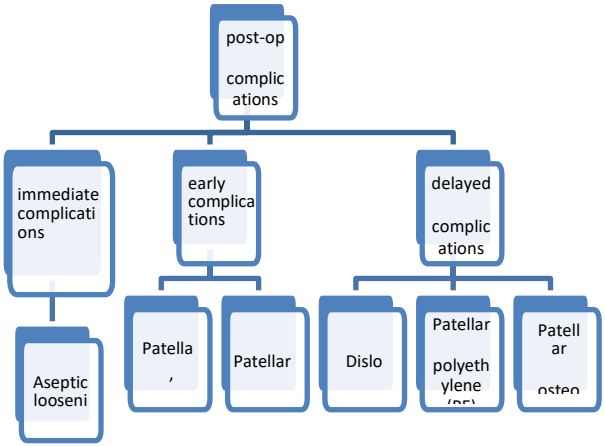

Figure 1: Flow chart showing post-op complications after TKR

3. Results

The mean age of participants was 44.32 (S.D=±3.5) Mean BMI was 29.4 (S.D=±3.2). males were 16 while 42 females went under surgery. The mean BSR of participants was 7.0mmol/L (S.D=±0.5mmol/L) There was no association seen between BMI and post-op complications. average follow-up was 98 days (58-144). Correlation between TKR and patellar resurfacing, there was no variation seen among these variables.

Among fifty-eight patients patellar fracture was seen among three people 5.2% of individuals. Patellar tracking was seen in three people 5.2% of individuals. aseptic loosening was seen in three people 5.2% of individuals. patellar osteonecrosis was three people 5.2% of individuals. patellar polythene wear was among three people 5.2% of individuals. Dislocation following total knee arthroplasty polyethylene wear, and other hardware malfunction, Overstuffing of the PFJ in postoperative TKA was seen among three people 5.2% individuals. Table 1

Table 1: Age, Bmi & Bsri Means And Standard Deviations

	Means With Standard Deviation
Age	44.32 (S.D=±3.5 years)
BMI	29.4 (S.D=±3.2)
BSR	7.0mmol/L(S.D=±0.5mmol/L)

Table 2 CT patellar tracking and appropriate component alignment were shown by the scan. In such circumstances, strengthening the quadriceps was suggested as a conservative course of therapy. Patellar thickness was more than the 26–28 mm threshold range in four instances. In five cases (5.2%), patellar maltracking or instability was noted. Three examples of internal rotation of the femoral component >5° (to the transepicondylar axis) were seen in both dynamic and static CT scans. After that, the femoral component underwent further modification. In the latter two instances, there was increasing lateral tilt and lateral patella displacement but no discernible major component malalignment. Secondary lateral retinacular release and medial capsule reconstruction were used in these situations. Three patients experienced aseptic laxity of the patella 6 months following initial replacement; tantalum-based patellar revision surgery was then carried out.

Table 2: Post-op-complication frequencies and percentages

Post-op complications	Frequencies	Percentages
Patellar fracture	3	5.2
Patellar maltracking	3	5.2
Aseptic loosening (al),	3	5.2
Patellar osteonecrosis,	3	5.2
Patellar polyethylene (pe) wear,	3	5.2
Dislocation following total knee arthroplasty&, overstuffing of the pfj in postoperative tka	3	5.2

4. Discussion

There is ongoing debate on the best patella management strategy in TKR. Some surgeons advocate for routine resurfacing due to data showing a higher incidence of later patellar revision and anterior knee pain with patellar-retaining implants.[4] To avoid the major negative consequences of patellar resurfacing, such as fracture, loosening, instability, and damage to the patella tendon, others frequently leave the original patella in place.[5] Additionally, there is a subset of people known as "occasional resurfaces" who decide whether or not to resurface based on a variety of preoperative and intraoperative factors.[6] These many methods are a result of the few available information. Conclusive assertions cannot be made since the majority of studies are varied in terms of prosthetic designs, manufacturer indications,[7] patient typology, outcomes tools,[8] and follow-up length. When the patella is not resurfaced, there is a tendency in the midterm follow-up series towards a greater re-operation rate for anterior knee discomfort.[9] However, both groups have shown comparable levels of satisfaction and follow functional results. Both groups seem to preserve similar results in the limited longer-term investigations. Recent randomized controlled studies on the subject were published, however they did not enable firm findings. The outcomes and complication rates of 60 bilateral TKAs with only one side having the patella resurfaced were compared by Patel.[10] At the last follow-up (4.5

years), he discovered that the resurfaced side had much higher scores than the resurfaced side.

On the side where the patellofemoral problems were repaired, no revision was required. For their ongoing anterior knee discomfort, four individuals needed follow-up rather than resurfacing the native patella. To improve patellofemoral follow-up function and alleviate anterior knee discomfort, he advised patellar resurfacing. In a group of 277 patients having TKA, Seo,[11] conducted patellar resurfacing at random Follow-up functional and X-ray outcomes, as well as complication rates, were comparable in both groups at an average follow-up of 74.6 months. He concluded that the patellar cartilage defect that was earlier thought to be a significant factor in patellar resurfacing did not affect the clinical and radiological results. 38 patients with non-inflammatory arthritis were randomly assigned by Beaupre either patellar resurfacing or patellar retention. At five to 10 years after surgery, he discovered no appreciable difference between groups in the outcomes related to the knee. Additionally, revision rates matched those reported in previous research. These inconsistent findings might be the result of several complicating factors, including the surgeon's training, the prosthetic device's design, the retained patella's degree of degeneration, and the preoperative extensor mechanism imbalance. However, the most recent meta-analyses enable more exact results. The Pilling study showed that most knee scoring systems, infection rates, patient satisfaction, and anterior knee discomfort were not significantly impacted by patellar resurfacing, but that the knee society score performed better when resurfacing was necessary.[12] He concluded that patients with patellar resurfacing and patellar retention experienced similar levels of anterior knee discomfort and satisfaction.[20] Patients who got resurfacing, however, had a much lower likelihood of needing another procedure. The current evidence suggests that patellar resurfacing lowers the likelihood of re-operation, according to Chen's meta-analysis.[14] Additionally, this choice was linked to better knee society score at long-term follow-up (around 5 years). The advantage of patellar resurfacing was minimal about other factors, such as anterior knee discomfort, patient satisfaction, or radiologic results.[15]

Additionally, this choice was linked to better knee society score,[16] at long-term follow-up (around 5 years). The advantage of patellar resurfacing was minimal in terms of other factors, such as anterior knee discomfort, patient satisfaction, or radiologic results Despite the facts at hand, after choosing to have the patella resurfaced, there are a few things to take into account. The causes of patellar resurfacing failures are complex and include poor patient selection (based on age and body mass index (BMI)), poor surgical technique, and poor implant design (dome, anatomic, mobile bearing) However, surgical mishandling or misinterpretation of this joint is the most frequent cause of patellar problems and early patellar failure.[17]

Soft-tissue impingement, disruption of the extensor mechanism, postoperative maltracking and turbulence, patellar fracture, PE wear, component separation and disassociation, and patellar fracture are possible patellar issues. Patellar fractures are typically quite uncommon;[18] incidences have been found to range from 0.68% to 5.2%.[19] The strain and tensile strength on the resurfaced patella might rise by up to 30% and 40%, respectively. Chronic osteopenia and the subsequent reduction in bone thickness may increase the risk of follow-up future fractures. Combining the surgery with a lateral retinacular release, which might devascularize the extensor mechanism, may enhance the risk Due to this, trauma is frequently not connected to patellar fractures.[20,21] Technical mistakes including patellar maltracking or implant misalignment, as well as excessive or asymmetric patellar-bone excision, have also been linked to the condition. The heat necrosis during cement polymerization, patient characteristics (male gender, obesity with a BMI >30 kg/m2, knee flexion >95°, and elevated activity level), and implant design (patellar component > 37 mm in diameter, inlay patellar design, large central fixation peg, and posterior-stabilizing implants) are other factors that have been identified. According to reports, patellar laxity occurs in 0.6% to 4.8% of instances Following the discontinuation of metal-backed patellae, which were linked to high rates of wear and loosening, this rate fell off considerably in the early 1990s. Obesity increases the rate of loosening by 6.3 times, lateral release increases it by

3.8 times, joint-line elevation increases it by 2.2 times, and postoperative flexion of more than 100 degrees increases it by 2.1 times. Contributing factors have been identified as inadequate implant fixation (small pegs), asymmetric patellar resection, poor bone, stock, patellar maltracking secondary osteonecrosis, and osteolysis.

Due to the poor PFJ mechanics, wear is a prevalent issue following patellar resurfacing. Even in cases when the yield strength of ultrahigh molecular weight polyethene is exceeded, catastrophic wear or component breakage is rather rare. (UHMWPE).

All of these issues must be avoided since they might have a disastrous effect on the patient's function and necessitate follow-up after patellar revision, patellectomy, or extensor mechanism transplant. Our findings are consistent with those in the literature. Even in people who have had their knees resurfaced, anterior knee discomfort is rather prevalent and most likely has a multifactorial aetiology. Patella maltracking was the most frequent difficulty other than this issue. In 50% of the instances, component malpositioning was a contributing factor. As a result of enhanced implant shape and the creation of new PE buttons, patellar loosening is now less common. In our study, we found that the mean age of participants was 44.32 years, with a standard deviation (SD) of ±3.5, indicating a relatively consistent age distribution within our cohort. Similarly, the mean BMI was 29.4 with an SD of ±3.2, suggesting a moderate level of obesity among our participants. Notably, out of the total participants, there were 16 males and 42 females who underwent surgery, highlighting a higher prevalence of TKR among females in our study. We also observed that the mean blood sugar level (BSR) of participants was 7.0 mmol/L with an SD of ±0.5 mmol/L, indicating stable preoperative glucose levels in our cohort. Interestingly, our analysis did not reveal a significant association between BMI and postoperative complications, suggesting that obesity may not be a major risk factor for adverse outcomes in the context of our study. During the average follow-up period of 98 days (range: 58- 144 days), we closely monitored short-term outcomes post-surgery. It's noteworthy that we did not find any variation between TKR and patellar resurfacing, indicating that the addition of patellar resurfacing did not significantly impact the outcomes we assessed. Among the

complications we observed, including patellar fracture, maltracking, aseptic loosening, osteonecrosis, polyethene wear, dislocation, and hardware malfunction, each was noted in 5.2% of individuals. These findings underscore the importance of vigilant postoperative monitoring and tailored management strategies to address these potential complications effectively. Our imaging findings from CT scans revealed appropriate component alignment and patellar tracking in most cases. However, we also encountered cases of patellar maltracking, femoral component rotation, and aseptic laxity, which required further intervention such as quadriceps strengthening, component modification, retinacular release, and revision surgery using tantalum-based implants.

5. Conclusion

The management of the patella during TKA is a hot topic. Less risk of reoperation was seen in recent meta-analyses following patellar resurfacing. Even if better KSS appeared at the long-term FU, native patella retention was still the better option. Complications of the patella and extensor mechanisms are uncommon but potentially fatal situations. They include patellar fractures, wear and loosening, and misalignment or disruption of the extensor mechanism. The majority of surgeons' positions on the matter are supported by the results of this series, which align with those found in the literature. To reduce the danger of additional difficulties, patellar resurfacing must be performed with a high level of accuracy and precision since it is just as crucial as tibiofemoral replacement.

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U.U.S, S.N.J, S.I, H.M.N, Q.M.G, M.N.K - Critical Review
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