International Journal of Research in Orthopaedics
Chitragar DD et al. Int J Res Orthop. 2026 Jan;12(1):110-115
http://www.ijoro.org

DOI: https://dx.doi.org/10.18203/issn.2455-4510.IntJResOrthop20254213

Original Research Article

Functional and radiological outcome of patella resurfacing vs non-resurfacing in total knee replacement

Deepak D. Chitragar*, Sathish Devadoss, Annamalai Devadoss, Prathit Patel

Department of Orthopaedics, Devadoss Multispecialty Hospital, Madurai, Tamil Nadu, India

Received: 24 August 2025
Revised: 06 October 2025
Accepted: 07 November 2025

***Correspondence:**
Dr. Deepak D. Chitragar,
E-mail: drdeeppak@gmail.com

ABSTRACT

Background: The knee joint is crucial for gait and mobility and osteoarthritis remains its most common debilitating condition. Total knee replacement (TKR) is the standard treatment, though controversy persists regarding patellar resurfacing. While anterior knee pain (AKP) is a leading source of dissatisfaction after TKR, resurfacing carries risks such as subluxation, fracture and loosening. The debate continues, particularly in populations with differing anatomy and lifestyle. To compare functional and radiological outcomes of TKR with versus without patellar resurfacing in a South Indian population.

Methods: This prospective comparative study was conducted at IORAS, Madurai, between August 2018 and July 2020. Out of 200 TKRs, 110 patients met inclusion criteria and were evenly divided into two groups: one underwent TKR with patellar resurfacing and the other without. All surgeries were performed by the same surgeon using the Posterior Stabilized Insall Burstein II knee system. Outcome measures included Knee Society Score (pain and function), Feller patellar score and radiographic patellar tilt, with follow-up at one year.

Results: At one year, no statistically significant differences were observed between resurfacing and non-resurfacing groups across pain, function, patellar scores or patellar tilt angles ($p>0.05$).

Conclusions: Patellar resurfacing offered no short-term advantage over non-resurfacing in terms of functional or radiological outcomes. Given the complexity of pain perception and lifestyle variability, further long-term studies are warranted. Each TKR case remains unique and modifying a single surgical variable is unlikely to change outcomes significantly.

Keywords: Feller patellar score, Knee society score, Patellar resurfacing, Total knee replacement

INTRODUCTION

The knee joint plays an important role in locomotion and gait of human body.[1] Diseases like osteoarthritis knee leads to painful, unstable joint with decrease range of motion.[2] Prosthetic replacement of the condylar articular surfaces is an established procedure and is the definitive treatment for osteoarthritis knee. There is still controversy about the ideal treatment for patello-femoral joint arthritis, i.e., whether to resurface patella or not. AKP is a common cause for patient dissatisfaction, reportedly seen in up to 5%–47% of cases post-primary TKR.[3,4] Early designs of total knee arthroplasties retained the patella. AKP being a predominant symptom directed many surgeons to resurface the patella. Patellar resurfacing has their own complications, namely, subluxation, dislocation, loosening, patellar fracture, rupture of quadriceps tendon or patellar tendon and patellar clunk.[5-7] One of the controversial topics among arthroplasty surgeons is resurfacing of the patella. Three basic strategies have evolved as always resurface patella, never resurface and selectively resurface patella.[8] Proponents of selective resurfacing patella base their decisions on patient-related and prosthesis-related factors of preoperative weight,

AKP, deformity, radiographic changes, quality of the remaining patello-femoral cartilage, intraoperative tracking and the feasibility of patella-resurfacing.[9,10] A meta-analysis of 1223 knees showed 14% reduction in AKP following patellar resurfacing in primary TKA.[11] Four meta-analyses of RCT comparing patellar resurfacing versus non-resurfacing have concluded that patellar resurfacing reduces the risk of reoperation, however, no reduction in AKP or change in functional outcome was noted.[12-15] In the scenario like these where various studies have produced the contradictory results, we feel there is a need of a study comparing patella resurfacing with non-resurfacing in terms of functional and radiological outcome in south Indian population where life style as well as size of knee joint and patella significantly differ than their western counterpart.

The present study compares the functional and radiological outcomes of patella resurfacing and non-resurfacing, in 110 TKA operated by using identical implants applying Knee Society scoring system and Feller patellar score.[16,17] Radiological assessment is made using patellar tilt angle.[18]

METHODS

This prospective comparative study conducted in IORAS DEVADOSS HOSPITAL, Madurai, Tamilnadu from August 2018 to December 2020. During the course of the Study period, approximately 200 TKR procedures were conducted. Out of those cases, 110 eligible cases satisfying the Inclusion criteria like tricompartmental arthritis and Exclusion criteria like age, old HTO, patellar injury etc. and willing to participate in this Study were selected.110 patients undergoing TKR were allocated to two groups. In one of the groups, 55 TKA with patellar resurfacing and in the other same number without patellar resurfacing was performed by same surgeon by keeping all other variables same by using Posterior Stabilized Insall Burstein II knee system with modified DOME shaped patellar implant. Pre-operatively each patient was evaluated clinically and radiologically. Detailed history, clinical examination and radiological examination were carried out in all patients. All selected patients underwent standard basic steps of joint replacement by single surgeon in this institute. The study was approved by the Institutional Ethics Committee.

Postoperative protocol

All patients received three doses of first-generation cephalosporin perioperatively with one dose preoperatively and two doses postoperatively. Patient-controlled analgesia for pain management and low-molecular-weight heparin with venous foot pumps for DVT prophylaxis was given. All patients were subjected to same rehabilitation protocol with an active range of motion exercises and mobilization with walker started on the first postoperative day. Patients were assessed clinically at 2 weeks, 6 weeks, 3 months, 6 months, 1 year and yearly thereafter, with respect to the improvement of function and range of motion, AKP and ability to climb stairs. Any problems related to femoral articulation and complications of patellar replacement such as the loosening of patellar component, patellar fracture, dislocation, subluxation, rupture of patellar tendon or quadriceps were noted. Knee function was assessed using Knee Society Score (KSS), MSMCS, Feller patellar score. Radiological assessment was made at 1 year using congruence angle and patellar tilt angle (Figure 1).

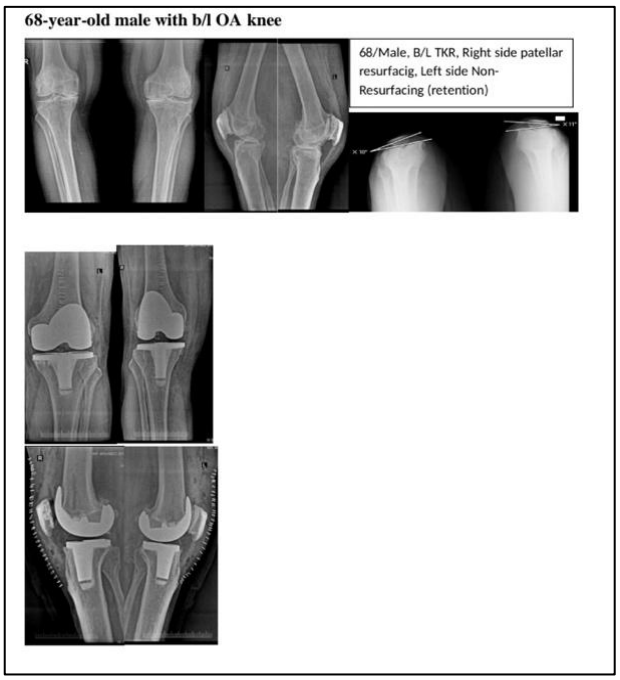

Figure 1: Calculation of patellar tilt angle in axial view at 1year follow up.

Statistical study tool

The information collected regarding all the selected cases was recorded in a Master Chart. Data analysis was done with the help of computers using SPSS statistical package-Version 17. Using this software range, frequencies, percentages, means, standard deviations, chi square and 'p' values were calculated. Student's 't' test was used to test the significance of difference between quantitative variables and Yate's and Fisher's chi square tests for qualitative variables. A 'p' value less than 0.05 denotes significant relationship. To find the correlation between the variables, Excel software was used.

RESULTS

Both the groups were similar in baseline characteristics such as age, preoperative mechanical alignment indices and male/female ratio (Table 1). All patients were followed up for a minimum of 1 year with an average follow up of 19 months (range 12–25 months) and no patient lost to follow up. Mean follow up in resurfacing group was 18.8 months (range 12–24 months) and in no

resurfacing group was 19.2 months (range 12–25 months). One-one incident of lateral patellar dislocation was reported in both non-resurfacing groups as well as resurfacing groups (Figure 2). One case of post operative DVT was reported in resurfacing group while one case of deep infection non resurfacing group.

Pain

The pain was measured using Knee Society pain score, Feller patellar score (Table 2). Mean knee society pain score in resurfacing group was 49 and in non-resurfacing group was 48 (p=0.141). Feller patellar score in resurfacing group was 25.97 and in non-resurfacing, group was 24.90 (p=0.186), which is statistically insignificant. AKP on stair climbing was present in 7 knees in 5 patients in patellar resurfacing group and in 9 knees in 6 patients in no resurfacing group which was statistically not significant (p>0.05). All the patients with AKP were managed conservatively and did not require any surgical intervention.

Functional outcome

Mean knee society functional score in resurfacing group was 33.67 and in non-resurfacing group was 34.93 (p=0.187). No statistically significant difference (p=0.234) was observed in the two groups using Modified Samsung Medical center functional score (resurfacing group −5.75 and in non-resurfacing group−5.25).

Radiological outcome

Mean congruence angle in resurfacing group was −12.83° and in non-resurfacing group was −12.383° (p=0.917). There is no significant difference (p=0.873) in mean patellar tilt angle in resurfacing (8.07) and non-resurfacing group (7.97).

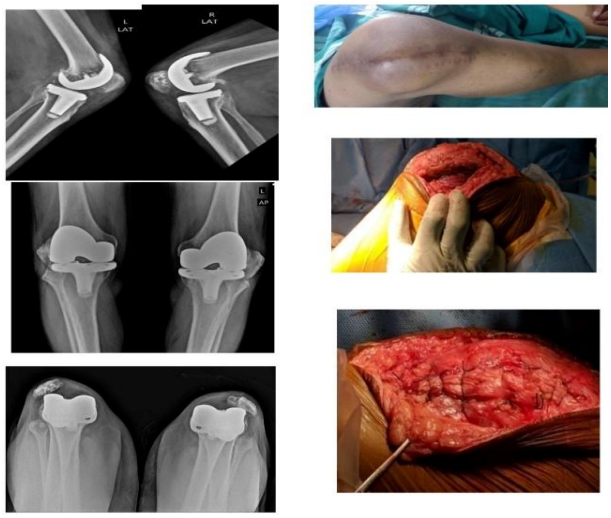

Figure 2: Case of patellar dislocation each in resurfacing and non resurfacing group treated with double breasting of medial tissues.

Table 1: Baseline characteristics.

Characteristics	Patella Non-resurfaced	Patella resurfaced
Number of knees	55	55
Mean age in year (SD)	62.3 (4.6)	62.9 (4.8)
Male: Female	27/24	26/27
Preoperative alignment varus	54	52
Mean tibiofemoral angle (range)	10.1^0 (2.26)	9.7^0 (3.24)
Valgus	6	8
Mean tibiofemoral angle (range)	5.8^0 (2.11)	6.1^0 (2.12)

Table 2: Feller patellar score.

Characteristics	Patella non resurfacing group	Patella resurfacing group
Mean age	62.3	62.9
Sex	27/M, 24/F	26/M, 27/F
Mean varus angle	10.8	10.2
Mean valgus angle	6	5.1
Mean pre op KSS (pain)	43.1	43.5
Mean pre op KSS (Function)	44.9	44.8
Mean Preop Feller patellar score	17.7	18.3
Mean Preop patellar tilt angle	8.1	8.4
Mean KSS (Pain) at one year	87.4	86.7
Mean KSS (Function) at one year	80.3	79.3
Mean Feller patellar score at one year	23.5	23.3
Mean patellar tilt angle at one year	6.9	6.8

DISCUSSION

There is still controversy about the ideal treatment for - femoral joint arthritis, i.e., whether to resurface patella or not. AKP is a common cause for patient dissatisfaction, reportedly seen in up to 5%–47% of cases post-primary TKR. Early designs of TKR retained the patella. AKP being a predominant symptom directed many surgeons to resurface the patella. Patellar resurfacing has their own complications, subluxation, dislocation, loosening, patellar fracture, rupture of quadriceps tendon or patellar tendon and patellar clunk. A meta-analysis of 1223 knees showed 14% reduction in AKP following patellar resurfacing in primary TKA. A RCT of 1715 patients showed no significant difference in functional outcomes between patellar resurfacing or non-resurfacing, using the Oxford knee score. Four meta-analyses of RCT comparing the same. They have concluded that patellar resurfacing reduces the risk of reoperation, however, no reduction in AKP or change in functional outcome was noted. In the scenario like these where various studies have produced the contradictory results. The study compares patella resurfacing with non-resurfacing in terms of functional and radiological outcome in south Indian population where life style as well as size of knee joint and patella significantly differ than their western counterpart.

Comparing our study with few of standard studies, our study was relatively short-term study. Our focus was on more of overall functional outcome rather than only AKP unlike many of the previous studies. We used modified Dome shaped patella with on lay technique with fixed bearing high flexed knee system having patellar friendly femoral component. Except one study done by Partio and Wirz all other studies with modified Dome shaped patellar implant failed to show any significant difference between both groups. Many studies with Dome shaped patella found Resurfacing better and that can be explained by non-patellar friendly femoral component that goes with it to accommodate the non-anatomical shape of patellar implant. Rate of post operative AKP was very low in our study comparing other standard studies as our study was relatively short-term study.

Patella resurfacing or retention

The major conundrum here is that whether resurfacing provide enough benefits to outweigh the risks associated with it. Can resurfacing improve femoral function (e.g., stair climbing ability). Can it improve the AKP. Can it make difference in patients' overall satisfaction? Is it financially viable?

Resurfacing strategies

Three different schools exist: always to resurface, never to resurface, or to selectively resurface. The school of resurfacing claim reduced postoperative AKP, better patient satisfaction, low complication rate and also procedure is relatively inexpensive and not time consuming.[19] According to some studies, it helps in minor degrees of maltracking.[20,21] Although we did not find any correlation with requirement of lateral release. The articulation between cartilage and metal is un-physiologic and exposure to high compressive forces can cause cartilage damage. Although patellofemoral complications after primary resurfacing have come down 4% to 5% with latest designs.[22] We had one patella related complication (lateral patella dislocation) in each group (Figure 2) and it was due to problem with quadriceps in both cases rather than resurfacing or non-resurfacing. Primary resurfacing is also economical.[23] As secondary resurfacing is out of question. Supporters of always to resurface‖ believe that primary resurfacing offers both cost and health utility advantages, given the high costs of a revision surgery and that fewer than half the patients appear to benefit from SR.[24]

Clinicians in support of patellar retention argue that clinical results are similar and that patellar resurfacing is not needed.[25] Some would say that shorter operating time, conservation of patella, reduced patellar osteonecrosis, more physiologic patellofemoral kinematics, no question of patellar implant failure are all indicators for retention.[26,27] It also avoids extra polyethylene particulate debris and associated problems. It also avoids the intraoperative and postoperative complications associated with patellar resurfacing. School of never to resurface‖ argues that that no conclusive evidence exists that patellae articulating with a metallic surface creates any problem.[28,29] However it also advocates the femoral components of anatomically shaped trochlear configuration in order to reduce the incidence of postsurgical AKP.[30,31]

Selective patellar resurfacing

The aim here is to improve clinical outcome with patellar resurfacing and to avoid unnecessary resurfacing.[32,33] 10 years survival rates of 90% to 98% have been reported by some authors 33 Selective patellar resurfacing was first advocated by Scott and Reilly in 1980.[34] Although they recommended routine resurfacing in all patients with rheumatoid arthritis, the proposed selective resurfacing in patients with osteoarthritis who present with a deformed patella, absent retro patellar cartilage and imperfect patellar tracking. Their idea was based on the belief that advanced patella wear would lead to poor outcome. Now the decision is based on a number of factors.

Patellar retention is favored in patients below the age of 65, who are not affected by rheumatoid or crystalline disease, whose retro patellar cartilage is reasonably well preserved, who have no significant anatomic abnormality (e.g., adequate patellofemoral congruence, normally shaped patella of adequate thickness), normal patellar mechanics (e.g., central patellar tracking) and do not suffer localized AKP.[35] The decision to resurface is generally based on the presence of preoperative patellofemoral symptoms (e.g., localized AKP), radiologic evidence of

patellofemoral arthritis, the intraoperative assessment of the state of the retro patellar cartilage and patellar tracking.[36] Few would argue about the indication of primary resurfacing in patients with symptomatic patellofemoral disease in which patellar degeneration is coupled with preexisting AKP. Primary resurfacing in the presence of full thickness cartilage damage irrespective of preexisting AKP, even though evidence to support such action is not unequivocal.[37] Some uncertainty exists about the indication of patellar resurfacing is also favored in patients affected by inflammatory arthropathies. Sledge and Ewald suggested that failure to resurface the patellar in rheumatoid arthritis may allow continued release of sequestered antigen from the retained cartilage, resulting in recurrent inflammation.[38] However, concerns about an ongoing inflammatory process have remained largely theoretical and although various studies have re commended routine resurfacing on all patients with rheumatoid arthritis, others have failed to notice any ill effects despite patellar retention.[25,39]

Short term study with short follow up, chances of observer bias as no blinding was done in small cohort. Post operative rehabilitation after discharge was greatly variable among patients.

CONCLUSION

The findings of this study indicate no clear advantage to routine patellar resurfacing in primary total knee arthroplasty for osteoarthritis, as clinical outcomes, patient satisfaction, revision rates and complication rates do not significantly differ between resurfacing and non-resurfacing groups. Given the multifactorial and subjective nature of anterior knee pain, altering a single surgical variable rarely leads to consistent improvements. Present data do not support the systematic resurfacing of the patella in osteoarthritic knees, underscoring the need for further research using advanced analytics to clarify these findings.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Drake RL, Vogl WA, Mitchell AW. Gray's Atlas der Anatomie: Deutsche Bearbeitung von Lars Bräuer. Else Health Sci. 2021;4:864.
2. Adam R. F, Noble J.Primary total knee arthroplasty in the elderly, J. Arthroplasty 9 : 495, 1994.
3. Barrack RL, Wolfe MW. Patellar resurfacing in total knee arthroplasty. J Am Acad Orthop Surg. 2000;8:75-82.
4. Patel K, Raut V. Patella in total knee arthroplasty: To resurface or not to – A cohort study of staged bilateral total knee arthroplasty. Int Orthop. 2011;35:349-53.
5. Gomes LS, Bechtold JE, Gustilo RB. Patellar prosthesis positioning in total knee arthroplasty. A roentgenographic study. Clin Orthop Relat Res. 1988;(236):72-81.
6. Rosenberg AG. Management of the failed metal-backed patella. Orthopedics. 1996;19:813-5.
7. Rand JA. Extensor mechanism complications following total knee arthroplasty. J Bone Jt Surg. 2004;86:2062-72
8. Calvisi V, Camillieri G, Lupparelli S. Resurfacing versus nonresurfacing the patella in total knee arthroplasty: A critical appraisal of the available evidence. Arch Orthop Trauma Surg. 2009;129:1261-70.
9. Nizard RS, Biau D, Porcher R, Ravaud P, Bizot P, Hannouche D, et al. A meta-analysis of patellar replacement in total knee arthroplasty. Clin Orthop Relat Res. 2005;432:196-203.
10. Kim BS, Reitman RD, Schai PA, Scott RD. Selective patellar nonresurfacing in total knee arthroplasty. 10 year results. Clin Orthop Relat Res. 1999;367:81-8.
11. Pakos EE, Ntzani EE, Trikalinos TA. Patellar resurfacing in total knee arthroplasty. A meta-analysis. J Bone Joint Surg Am. 2005;87:1438-45.
12. Fu Y, Wang G, Fu Q. Patellar resurfacing in total knee arthroplasty for osteoarthritis: A meta- analysis. Knee Surg Sports Traumatol Arthrosc. 2011;19:1460-6.
13. He JY, Jiang LS, Dai LY. Is patellar resurfacing superior than nonresurfacing in total knee arthroplasty. A meta-analysis of randomized trials. Knee. 2011;18:137-44.
14. Pavlou G, Meyer C, Leonidou A, As-Sultany M, West R, Tsiridis E, et al. Patellar resurfacing in total knee arthroplasty: Does design matter? A meta-analysis of 7075 cases. J Bone Joint Surg Am. 2011;93:1301-9.
15. Chen K, Li G, Fu D, Yuan C, Zhang Q, Cai Z, et al. Patellar resurfacing versus nonresurfacing in total knee arthroplasty: A meta-analysis of randomised controlled trials. Int Orthop. 2013;37:1075-83.
16. Insall JN, Dorr LD, Scott RD, Scott WN. Rationale of the knee society clinical rating system. Clin Orthop Relat Res. 1989;248:13-4.
17. Feller JA, Bartlett RJ, Lang DM. Patellar resurfacing versus retention in total knee arthroplasty. J Bone Joint Surg Br. 1996;78:226-8.
18. Grelsamer RP, Bazos AN, Proctor CS. Radiographic analysis of patellar tilt. J Bone Joint Surg. 1993;75(5):822-4.
19. Waters TS, Bentley G. Patellar resurfacing in total knee arthroplasty. J Bone Joint Surg Am. 2003;85:212–7.
20. Newman JH, Ackroyd CE, Shah NA. Should the patella be resurfaced during total knee replacement. Knee. 2000;7:17–23.
21. Campbell DG, Duncan WW, Ashworth M. Patellar resurfacing in total knee arthroplasty: a ten-year randomised prospective trial. J Bone Joint Surg Br. 2006;88:734-9.

22. Barrack RL, Bertot AJ, Wolfe MW. Patellar resurfacing in total knee arthroplasty. A prospective, randomised, double-blind study with f ive to seven years of follow-up. J Bone Joint Surg Am. 2001;83:1376-81.
23. Murray DW, MacLennan GS, Breeman S. A randomized controlled trial of the clinical effectiveness and cost-effectiveness of different knee prostheses: the Knee Arthroplasty Trial (KAT). Health Technol. 2014;18:1-235.
24. Keating EM, Faris PM, Meding JB. Comparison of the midvastusmuscle-splitting approach with the median parapatellar approach in total knee arthroplasty. J Arthroplasty. 1999;14:29-32.
25. Lygre SH, Espehaug B, Havelin LI. Does patella resurfacing really matter. Pain and function in 972 patients after primary total knee arthroplasty. Acta Orthop. 2010;81:99-107.
26. Abraham W, Buchanan JR, Daubert H. Should the patella be resurfaced in total knee arthroplasty. Efficacy of patellar resurfacing. Clin Orthop. 1988;236:128–34.
27. Keblish PA, Varma AK, Greenwald AS. Patellar resurfacing or retention in total knee arthroplasty. A prospective study of patients with bilateral replacement. J Bone Joint Surg Am. 1994;76:930–7.
28. Levani J-P, McLeod HC, Freeman MAR: Why not resurface the patella. J Bone Joint Surg Br. 1983;65:448-51.
29. Thompson NW, Ruiz AL, Breslin E. Total knee arthroplasty without patellar resurfacing in isolated patellofemoral osteoarthritis. J Arthroplasty. 2001;16:607–12.
30. Bourne RB, Burnett RSJ. The consequences of not resurfacing the patella. Clin Orthop. 2004;428:166–9.
31. Smith AJ, Wood DJ, Li MG. Total knee replacement with and without Patellar resurfacing: a prospective, randomised trial using the Profix total knee system. J Bone Joint Surg Br. 2008;90:43-9.
32. Kim BS, Reitman RD, Schai PA. Selective patellar no resurfacing in total knee arthroplasty. 10 year results. Clin Orthop. 1999;367:81–8.
33. Hasegawa M, Ohashi T. Long-term clinical results and radiographic changes in the nonresurfaced patella after total knee arthroplasty: 78 knees followed for mean 12 years. Acta Orthop Scand. 2002;71:539-45.
34. Scott RD, Reilly DT: Pros and cons of patellar resurfacing in total knee replacement. Orthop Trans. 1980;4:328.
35. Scuderi GR, Insall JN, Scott NW. Patellofemoral pain after total knee arthroplasty. J Am Acad Orthop Surg. 1994;2:239-246.
36. Newman JH, Ackroyd CE, Shah NA, et al. Should the patella be resurfaced during total knee replacement. Knee. 2000;7:17-23.
37. Thompson NW, Ruiz AL, Breslin E. Total knee arthroplasty without patellar resurfacing in isolated patellofemoral osteoarthritis. J Arthroplasty. 2001;16:607–12.
38. Sledge CB, Ewald FC. Total knee arthroplasty experience at the Robert Breck Brigham Hospital. Clin Orthop. 1979;145:74-84.
39. Usman MA, Yurianto H, Rahmansyah N, Anwar SFZ. Functional outcome and cost effectiveness of patellar resurfacing and non-resurfacing in total knee arthroplasty: systematic review and meta-analysis. J Orthop Surg Res. 2025;20;20(1):492.

Cite this article as: Chitragar DD, Devadoss S, Devadoss A, Patel P. Functional and radiological outcome of patella resurfacing vs non-resurfacing in total knee replacement. Int J Res Orthop 2026;12:110-5.