

COMPARISON OF PATELLAR RESURFACING VERSUS NONRESURFACING IN TOTAL KNEE ARTHROPLASTY

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OBJECTIVES: To determine whether resurfacing the patellar component during total knee replacement (TKR) influences the clinical outcome.

DESIGN: A retrospective study of data gathered prospectively during the recovery course of patients who underwent TKR with or without patellar resurfacing.

SETTING: Victoria General Hospital, Halifax, NS.

PATIENTS: One hundred and eighty-five patients operated on between 1992 and 1995. The inclusion criteria were (a) osteoarthritis, (b) replacement carried out by 2 independent surgeons, (c) no comorbid illness such as rheumatoid arthritis, cancer or infection, (d) pre- and postoperative attendance at the assessment clinics.

INTERVENTION: TKR with (45) or without (140) patellar replacement.

MAIN OUTCOME MEASURES: Range of motion (ROM), pain assessment, Hospital Severity Score (HSS) and complications.

RESULTS: There was no statistical difference between the 2 groups with respect to ROM, pain, HSS and complications postoperatively.

CONCLUSIONS: Resurfacing the patella during TKR does not seem to influence the clinical outcome with respect to ROM, pain and overall complications. The decision should be based on individual criteria, depending on the preoperative and intraoperative findings. Randomized clinical trials assessing ROM, pain, complications and cost-effectiveness with long-term follow-up are necessary to further investigate this controversial issue.

OBJECTIFS : Déterminer si le resurfaçage de la rotule au cours d'une arthroplastie totale du genou (ATG) a une incidence sur le résultat clinique.

CONCEPTION : Étude rétrospective de données réunies prospectivement au cours du rétablissement des patients qui ont subi une ATG avec ou sans resurfaçage de la rotule.

CONTEXTE : Hôpital général Victoria, Halifax (N.-É.).

PATIENTS : Cent quatre-vingt-cinq patients qui ont subi une intervention entre 1992 et 1995. Les critères d'inclusion étaient les suivants : a) ostéoarthrite, b) arthroplastie effectuée par deux chirurgiens indépendants, c) aucune comorbidité comme l'arthrite rhumatismale, le cancer ou l'infection, d) participation aux cliniques d'évaluation avant et après l'intervention.

INTERVENTION : ATG avec (45) ou sans (140) remplacement de la rotule.

PRINCIPALES MESURES DE RÉSULTATS : Amplitude articulaire, évaluation de la douleur, indice de gravité de l'hôpital (IGH) et complications.

RÉSULTATS : Il n'y avait pas de différence statistique entre les deux groupes en ce qui a trait à l'amplitude du mouvement, à la douleur, à l'IGH et aux complications postopératoires.

CONCLUSIONS : Le resurfaçage de la rotule au cours de l'ATG ne semble pas avoir d'effet sur le résultat clinique en ce qui a trait à l'amplitude du mouvement, à la douleur et aux complications générales. La décision devrait reposer sur des critères individuels et sur les résultats préopératoires et intraopératoires. Des essais cliniques randomisés visant à évaluer l'amplitude du mouvement, la douleur, les complications et l'efficacité des coûts avec suivi de longue durée s'imposent pour étudier plus à fond cette question controversée.

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Total knee replacement (TKR) is a common, cost-effective procedure performed by most orthopedic surgeons.^{1,2} Ideally, TKR provides excellent pain relief and adequate functional capability in patients suffering from various musculoskeletal disorders such as osteoarthritis and rheumatoid arthritis. Although the designs and operative procedures have undergone many changes, the essence of TKR is replacement of the tibial and femoral components.² Replacement of the patellar component is, however, very controversial and not routinely performed.³⁻⁵ Although patellar resurfacing is common in patients with rheumatoid arthritis, the indications for resurfacing the osteoarthritic knee are not universally accepted. Some surgeons routinely resurface the patella,⁶ whereas others advocate selective resurfacing.⁷⁻⁹

There are guidelines to help the surgeon decide about resurfacing the patella.^{4,5,10} Selective resurfacing should be done in patients with inflammatory arthritis, patients with preoperative symptoms attributed to the patellofemoral joint, patients who demonstrate patellar subluxation-dislocation, patients with preoperative or intraoperative evidence of a dysmorphic or incongruous patellofemoral articulation, or grade III or worse⁵ chondromalacia and elderly patient with low demand and a shorter life span.

The rate of patellar complications after total knee arthroplasty varies in the literature.^{8,11,12} Complications that have been reported include fractures, tracking abnormalities, subluxations and dislocations, osteonecrosis, malalignment, chronic pain, loosening and failure of the component.^{3,10} The decision to resurface the patella should ideally be guided by the clinical outcome based on the relief of symptoms, the restoration of function, the incidence of complications and the cost-effectiveness of the pro-

cedure. The purpose of this study was to compare the clinical outcomes of TKR, based on relief of pain, adequate ROM and incidence of complications, with and without patellar resurfacing.

METHODS

One hundred and forty-five consecutive patients underwent TKR between January 1992 and November 1994 at the Victoria General Hospital in Halifax. No patients who had primary TKR were excluded from the study. The information was collected prospectively but reviewed retrospectively. The Genesis knee system (Smith & Nephew Inc., Mississauga, Ont.) was used and data collected by 1 of 2 independent surgeons and categorized as group 1 (no patellar resurfacing, 45 patients) and group 2 (patellar resurfacing, 140 patients). For inclusion into the study, each patient was required to attend a preoperative office visit followed by periodic yearly assessments. Only primary TKR performed on patients for osteoarthritis was included in the study. The patients were not randomized and the patellofemoral disease treated was of the same severity in both groups. Allocation to a group was by surgeon preference not the degree of arthritis of the patellofemoral joint. Patients with any comorbid disease or infection were excluded. The mean age in group 1 was 65.8 years (range from 35 to 84 years), and in group 2 it was 68.1 years (range from 31 to 87 years). The average weight in group 1 was 83.8 kg (range from 51 to 131 kg), and in group 2 it was 84.3 kg (range from 45 to 196 kg). Thirty-three percent of group 1 patients were male compared with 46% group 2 patients. No patient was excluded from treatment. The degree of arthritis of the patellofemoral joint was felt to be the same in both groups. In group 2 patients, a Genesis one biconvex all-

polycentric patella was inserted. This was done by the inset method of reaming and sizing.⁵ Postoperatively patients in both groups had the same treatment protocol, which consisted of the following: compression dressing for 36 to 48 hours; physiotherapy and continuous passive movement, beginning at 36 to 48 hours; hospital discharge at 5 to 6 days or when 90° of motion was realized; antibiotic therapy for 48 hours; warfarin administration during the hospital stay; and acetylsalicylic acid, 325 mg twice daily for 6 weeks.

Assessment was based on the demographic data, a knee rating scale from the Hospital for Special Surgery (HSS),¹³ which allots 100 points to a normal knee: 30 points for pain, 22 points for function, 18 points for ROM, 10 points for muscle strength, 10 points for flexion deformity and 10 points for stability. A score of 85 to 100 is considered excellent, 70 to 84 good, 60 to 69 fair and less than 60 poor. Pain was categorized as none (15), mild (10), moderate (5) or severe (0). Clinical ROM was assessed during each preoperative and postoperative visit, and postoperative complications were reported. Intraoperative and postoperative treatments were similar in both groups.

The results were analysed by Student's *t*-test. A probability value of less than 0.05 was considered significant.

RESULTS

All patients were followed up prospectively, and no patients were lost to follow-up. The study, however, was done retrospectively. It is of note that no merchant or skyline views were obtained for these patients.

Demographically the patients in both groups were similar with respect to age, weight and sex ($p > 0.05$), thus a similar patient population was identified for our study purpose (Fig. 1, Table I).

Preoperative findings

The mean (and standard deviation) pain score in group 1 was 1.25 (2.39) compared with 0.56 (1.75) in group 2. This represents a moderate to severe pain level for both groups. Preoperative ROM in group 1 was 100.7° (16.2°) versus 104.8° (16.5°) for group 2. Both groups scored poorly on the overall HSS, with group 1 achieving a mean (and standard deviation) of 56.0 (13.4) versus 54.8 (12.7) for group 2. There was no significant difference in preoperative pain, ROM or HSS between groups ($p > 0.05$).

Postoperative findings

At 1 year postoperatively, group 1 reported a mean (and standard deviation) pain score of 11.7 (4.2) an ROM of 99.9° (11.8°), an HSS of 83.5 (16.9) and a complication rate of 6.7%. Group 2 reported a mean (and standard deviation) pain score of 12.4 (3.4), an ROM of 99.9° (15.7°), a HSS of 87.8 (9.01) and a complication rate of 6.9%. There was no significant difference ($p > 0.05$) between groups with respect to pain level, ROM, HSS and complication rate at this follow-up interval.

By the second postoperative year, group 1 reported a mean (and standard deviation) pain score of 14.6 (1.3), an ROM of 107.8° (10.2°), an HSS of 91 (7.4) and a complication rate of 7.7%. Group 2 showed a pain score of 12.9 (3.2), an ROM of 105°

(9.5°), an HSS of 89.1 (9.5) and a complication rate of 7.8%. Again there was no significant difference ($p > 0.05$) between groups with respect to pain level, ROM, HSS or complication rate.

In both groups there was a significant improvement in pain and overall HSS ($p < 0.05$) after TKR between 1 and 2 years postoperative (Figs. 2 and 3). The ROM, however, showed no improvement at 1 year but slight improvement at 2 years (Figs. 2 and 3). This improvement, however, was not significant ($p > 0.05$).

Complications

There were no intraoperative complications. In group 1, 1 patient required arthroplasty revision and 2 patients had a fall, leading to a feeling of knee instability. In group 2, 5 patients had a fall. One patient suffered deep vein thrombosis and another had phlebitis. There were no patellar fractures, subluxation–dislocation, major patellofemoral pain, loosening or failure of components. There were no intraoperative or postoperative complications that were considered to be related to operative technique.

Radiologic findings

No special views were obtained of the patella postoperatively. Therefore, no comments can be made regarding radiologic tracking of the patella. Clinically, the patients did not require revision or bracing. No merchant

views were obtained. For each patient an anteroposterior and lateral view of the patella was obtained and evaluated at each visit. There were no cases of polywear, loosening or erosion at this early follow-up review.

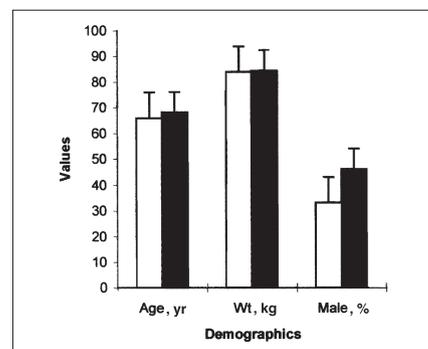


FIG. 1. Demographic features of patients who underwent total knee replacement without (group 1, white bar) or with (group 2, black bar) patellar resurfacing.

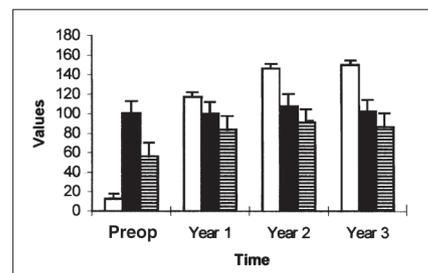


FIG. 2. Preoperative versus postoperative values for pain (white bar, values are 10⁻¹), range of motion (black bar) and Hospital Severity Score (horizontally hatched bar) in patients who underwent total knee replacement without patellar resurfacing.

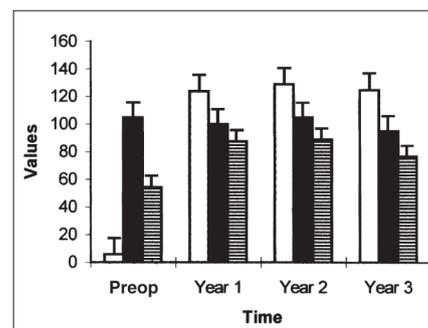


FIG. 3. Preoperative versus postoperative values for pain (white bar, values are 10⁻¹), range of motion (black bar) and Hospital Severity Score (horizontally hatched bar) in patients who underwent total knee replacement with patellar resurfacing.

Table I

Demographic Characteristics of 145 Patients Who Underwent Total Knee Replacement Without (Group 1) and With (Group 2) Patellar Resurfacing

Characteristic*	Group 1, n = 45	Group 2, n = 140
Age, yr	65.8 (9.43)	68.1 (8.74)
Weight, kg	83.8 (18.2)	84.3 (16.6)
Sex (M/F), %	33/67	46/54
Knee operated on (L/R), %	50/50	54/46

*Values are given as means (and standard deviation).

DISCUSSION

TKR has evolved to become a very successful treatment for patients with advanced arthritis and other knee disorders.^{1,2,14} The primary indications for TKR are pain and deformity. Despite the success of the procedure, persistent patellofemoral pain and dysfunction frequently compromise the outcome of knee replacements. Replacement of the patella was introduced as a solution to this problem.^{3,4,15} Unfortunately, complications such as fractures, patellar subluxation–dislocation, component loosening and osteonecrosis have limited routine patellar resurfacing. Considerable controversy exists regarding the need for patellar resurfacing in TKR.^{4,5,10,12} The purpose of this study was to compare the clinical outcomes in patients after TKR without patellar replacement (group 1) and with patellar replacement (group 2). These groups of patients were treated by different surgeons who used their usual surgical technique. Preoperatively, both groups were similar with respect to age and weight.

The results of the study suggest that patients do well with or without patellar resurfacing. In both groups there was a significant reduction in pain after surgery. Overall knee pain decreased from moderate or severe preoperatively to mild or none postoperatively in both groups, and there was no difference between groups.

In both groups, postoperative ROM was increased at 1 year postoperatively. During the second year, as has been seen clinically in the past, there was a slight improvement in ROM.

Overall the HSS score improved dramatically in both groups from a preoperative level of poor to one of excellent at 1 and 2 years. This represents the overall success of TKR. Patients show increased satisfaction, improved mobility and generally better quality of life.^{1,2,14}

The complication rate was similar in the 2 groups. The rate represented the overall problems experienced by the patients and not just patella-specific complications. There were no patellar fractures, subluxations–dislocations, component loosening or osteonecrosis. Further follow-up is necessary to document if any long-term complications will arise.

Overall, we found no difference between patients who underwent patellar replacement and those who did not, suggesting that the indications for patellar replacement should be critically reviewed. The literature suggests that patellar resurfacing should be considered in patients with rheumatoid arthritis, patients with preoperative patellofemoral pain, elderly, low-demand patients, and intraoperatively demonstrated advanced changes to the patella.¹⁰ Picetti and colleagues⁸ also added that patient height more than 160 cm and weight more than 60 kg be considered a relative indication to resurface the patella. Our investigations indicate that the surgeon should take a selective approach toward patellar resurfacing using the guidelines suggested. Further randomized clinical trials are necessary to refine these guidelines and help resolve this important issue.

References

1. Harris WH, Sledge CB. Total hip and total knee replacement. *N Engl J Med* 1990;323:725-807.
2. Quinet RJ, Winters EG. Total joint replacement of the hip and knee. *Med Clin North Am* 1992;76:1235-51.
3. Boyd AD, Ewald FC, Thomas WH, Poss R, Sledge CB. Long-term complications after total knee arthroplasty with or without resurfacing of the patella. *J Bone Joint Surg [Am]* 1993; 75:674-81.
4. Enis JE, Gardner R, Robledo MA, Latta L, Smith R. A comparison of

- patellar resurfacing versus non-resurfacing in bilateral total knee arthroplasty. *Clin Orthop* 1990;260:38-42.
5. Vince KG, McPherson EJ. The patella in total knee arthroplasty. *Orthop Clin North Am* 1992;23:675-86.
6. Ranawat CS. The patellofemoral joint in total condylar knee arthroplasty. Pros and cons based on five- to ten-year follow-up observations. *Clin Orthop* 1986;205:93-9
7. Brick GW, Scott RD. The patellofemoral component of total knee arthroplasty. *Clin Orthop* 1988;231: 163-78.
8. Picetti GD, McGann WA, Welch RB. The patellofemoral joint after total knee arthroplasty without patellar resurfacing. *J Bone Joint Surg [Am]* 1990;72:1379-82.
9. Soudry M, Mestriner LA, Binazzi R, Insall JN. Total knee arthroplasty without patellar resurfacing. *Clin Orthop* 1986;205:166-70.
10. Levitsky KA, Harris WJ, McManus J, Scott RD. Total knee arthroplasty without patellar resurfacing: clinical outcomes and long-term follow-up evaluation. *Clin Orthop* 1993;286: 116-21.
11. Levai JP, McLeod HC, Freeman MA. Why not resurface the patella? *J Bone Joint Surg [Br]* 1983;65(4):448-51.
12. Abraham W, Buchanan JR, Daubert H, Greer RB, Keefer J. Should the patella be resurfaced in total knee arthroplasty? Efficacy of patellar resurfacing. *Clin Orthop* 1988;236:128-34.
13. Insall JN, Ranawat CS, Aglietti P, Shine J. A comparison of four models of total knee-replacement prostheses. *J Bone Joint Surg [Am]* 1976;58(6): 754-65.
14. Insall JN, Binazzi R, Soundrey M, Mestriner CA. Total knee arthroplasty. *Clin Orthop* 1985;192:13-22.
15. Scott WN, Rozbruch JD, Otis JC, Insall J, Ranawat CS, Burstein AH. Clinical and biomechanical evaluation of patella replacement in total knee arthroplasty. *Orthop Trans* 1978;2: 203-7.