

# RESULTS OF TOTAL KNEE REPLACEMENT WITH/WITHOUT RESURFACING OF THE PATELLA

ABDUL KHAN, NIKHIL PRADHAN

## ABSTRACT:

**Objective:** To study the difference of post-op patellofemoral pain, clunk and crepitus in patients with/without resurfacing at 5 years who had pre-op patellofemoral pain. To study the incidence of post-operative patellofemoral pain, clunk and crepitus following patelloplasty in both the groups. **Methods:** Retrospective review of 765 patients who had total knee replacement with/without resurfacing. Patients were asked about both pre-operative pain and also post-operative pain 5 years after the operation. Patients were examined by a specialist nurse at 5 years post-operatively to check for any patellofemoral clunk/

crepitus. **Conclusion:** In patients with pre-op PF pain, there is significant ( $p < 0.005$ ) higher incidence of post-op clunk in the R group. In patients without pre-op PF pain, there is significantly ( $p < 0.005$ ) higher incidence of post-op crepitus in the R group. In patients with/without pre-op PF pain, the incidence of post-op PF pain, clunk and crepitus is lower than in patients who underwent patelloplasty when compared to the other members of the NR group (statistically significant  $p < 0.005$ ). **Level of Evidence: Type 4, Case series.**

**Keywords:** Patellofemoral pain syndrome. Patella. Arthroplasty, replacement, knee. Prospective studies.

**Citation:** Khan A, Pradhan N. Results of total knee replacement with/without resurfacing of the patella. *Acta Ortop Bras.* [online]. 2012;20(5): 300-2. Available from URL: <http://www.scielo.br/aob>.

## INTRODUCTION

Total knee arthroplasty is one of the most effective surgical procedures to provide improved function and pain relief in most patients.<sup>1-3</sup> The question of performing patellar resurfacing during primary total knee arthroplasty has been debated since the introduction of this operative procedure.

The conclusions of several peer-reviewed studies have been limited due to methodological flaws including lack of randomization, independent assessment of outcomes, limited assessment of possible confounding variables and potential bias associated with confounding factors not measured or unknown inherent in observational studies. Therefore, the true merits of resurfacing or not resurfacing the patella is routinely discussed.<sup>4-8</sup>

We conducted a retrospective study of 765 patients who underwent total knee replacement to verify the advantages of patellar resurfacing with respect to the group without resurfacing or vice versa, to study the difference among patellofemoral pain, clunk and crepitus post-operatively in patients with/without resurfacing at 5 years who had pre-op patellofemoral pain and to study the difference among post-op patellofemoral pain, clunk and crepitus in patients with/without resurfacing at 5 years who did not have pre-op patellofemoral pain. Furthermore, we also studied the incidence of post-operative patellofemoral pain, clunk, and crepitus following patelloplasty and compared with the other members of the non-resurfacing group in patients with/without pre-op patellofemoral pain.

## METHODS

A total of 765 patients who underwent primary total knee replacement (NexGen) due to osteoarthritis at the Warrington Hospital from June 2005 to April 2006 was included in the study. The data were supplied by the Zimmer, USA. The patients were followed for up to 5 years and were asked about the post-operative pain before surgery and 5 years later.

The patients were examined by a specialist nurse 5 years after the surgery to check for any patellofemoral clunk/crepitus. The patelloplasty included excision of excessive marginal osteophytes and decompression by drilling two vertical holes in the patella with a K wire. Out of a total of 765 patients, 688 patients (89.9%) had patellofemoral pain and 77 patients (10.1%) did not. Group R included 503 patients and group NR included 262 patients.

## RESULTS

### 688 patients (89.9%) had pre op PF pain.

Out of 688 patients, 449 had resurfacing ( R ) while 239 did not have resurfacing ( NR ). 36 patients in the NR group had patelloplasty. Incidence of post op PF pain was 13.3% in the R group while 13.6% in the NR group.

Incidence of post op PF clunk in the R group was 10.4% while it was only 1.3% in the NR. ( statistically significant  $p < 0.005$  compared to R group)

All the authors declare that there is no potential conflict of interest referring to this article.

Department of Trauma & Orthopaedics, Warrington Hospital, Warrington, Cheshire.

Correspondence: Department of Trauma & Orthopaedics, Warrington Hospital, Warrington WA9 1QA (UK). Email: [adkhan@rediffmail.com](mailto:adkhan@rediffmail.com)

Artigo recebido em 22/05/2011, aprovado em 19/12/2011.

Incidence of post crepitus in the R group was 13.5% while it was 17% in the NR.

The incidence of post PF pain was lowest ( only 2.7% ) in the patients who had patelloplasty in the NR Group. ( statistically significant  $p < 0.005$  compared to the other members of the NR group )  
 The incidence of post PF clunk was lowest ( 0% ) in the patients who had patelloplasty in the NR Group. ( statistically significant  $p < 0.005$  compared to the other members of the NR group )  
 The incidence of post PF crepitus was lowest ( only 2.7% ) in the patients who had patelloplasty in the NR Group. ( statistically significant  $p < 0.005$  compared to the other members of the NR group ). (Table 1)

**Table 1.** Patients with pre-op patellofemoral pain.

	Total	Post-op PF pain (%)	Post-op PF clunk (%)	Post-op Patello femoral F crepitus (%)
Resurfaced (R)	449	13.3%	10.4%	13.5%
Non-resurfaced(NR)	239	13.6%	1.3%	17%
Patelloplasty (Subgroup of NR)	36	2.7%	0%	2.7%

**77 patients (10.1%) had no pre op PF pain.**

Out of 77 patients, 54 had resurfacing while 23 did not have resurfacing.

Incidence of post op PF pain was 8.5% in the R group while 8.3% in the NR.

Incidence of post op PF clunk in the R group was 12.7% while it was only 8.3% in the NR.

Incidence of post crepitus in the R group was 14.8% while it was 8.3% in the NR. ( statistically significant  $p < 0.005$  compared to the R group )

The incidence of post PF pain was lowest ( 0% ) in the patients who had patelloplasty in the NR Group. ( statistically significant  $p < 0.005$  compared to the other members of the NR group )

The incidence of post PF clunk was lowest ( 0% ) in the patients who had patelloplasty in the NR Group. ( statistically significant  $p < 0.005$  compared to the other members of the NR group )

The incidence of post PF crepitus was lowest ( 0% ) in the patients who had patelloplasty in the NR Group. ( statistically significant  $p < 0.005$  compared to the other members of the NR group ). (Table 2)

**Table 2.** Patients without Pre op patellofemoral pain.

	Total	Post-op PF pain (%)	Post-op PF clunk (%)	Post-op Patello femoral F crepitus(%)
Resurfaced (R)	54	8.5%	12.7%	14.8%
Non-resurfaced(NR)	23	8.3%	8.3%	8.3%
Patelloplasty (Subgroup of NR)	4	0%	0%	0%

**DISCUSSION**

The optimal treatment of patella during total knee replacement is unclear. After initial enthusiasm of resurfacing, complications appeared including wear of the patellar polyethylene, loosening of the patellar component, patellar fracture, and rupture of the patellar tendon which led to difficult surgical revisions and uncertain results.<sup>9,10</sup>

These problems were considered so important that some authors decided to conduct studies that kept the patella non-resurfaced.<sup>11-13</sup>

Investigators of these non comparative studies concluded that in specific conditions it was advisable to leave the patella non-resurfaced. Picetti et al.<sup>12</sup> and Sodry et al.<sup>13</sup> considered the non-resurfacing for patients with osteoarthritis with good cartilage on the patella and who were young active and non-obese. Kim et al.<sup>14</sup> proposed this option for knees with the same characteristics but that also had a congruent patellofemoral tracking, a normal anatomic patella shape, and no evidence of crystalline disease or inflammatory synovitis. On the contrary, Ranawat et al.,<sup>15</sup> Rae et al.,<sup>16</sup> Harwin et al.<sup>17</sup> and Larson et al.<sup>18</sup> using various types of prostheses advocated routine patellar replacement based on 10 years of excellent clinical results and low morbidity attributable to patellar replacement. A definite conclusion cannot be drawn from these different studies.

Randomized studies represent the best design to compare patellar resurfacing and non-resurfacing. However different outcomes and variable conclusions were reported by the investigators. From a general point of view, the systematic review allows integration of existing information and provides data for a rational decision making. Moreover, it increases the statistical power of the study and can establish whether findings are consistent and can be generalized across population, local and treatment variations. The explicit method used in systematic reviews limits bias and improves reliability and accuracy of the conclusions when quality criteria are fulfilled.<sup>19,20</sup>

The meta-analysis of patellar resurfacing was performed by Nizard et al.<sup>21</sup> in 12 randomized, controlled trials between January 1966 and August 2003. The resurfaced patella had better performance and we found higher relative risk of re-operation due to significant anterior knee pain and significant pain when climbing stairs where the patella was left non-resurfaced. No differences were observed between the two groups regarding the functional score of the International Knee Society, the score of the Hospital for Special Surgery and patient satisfaction.

Parvizi et al.<sup>22</sup> performed a meta-analysis of 14 studies between 1966 and 2003. The incidence of anterior knee pain was higher when the patellae were not resurfaced. Secondary resurfacings due to anterior knee pain were required in 8.7% of the non-resurfaced knees. There were no differences in reported complications. Total knee arthroplasty resulted in improved functional outcome regardless of patellar resurfacing.

Although there is controversy, the scientific evidence that favors patellar resurfacing in primary total knee arthroplasty (TKA) is abundant. The literature shows a substantially higher incidence of anterior knee pain and higher rates of re-operation where the patella is not resurfaced primarily. Prospective randomized studies have reported re-operation rates to carry out the resurfacing of the patella that exceeded the complications after the surgery with resurfacing.<sup>23,24</sup>

When resurfacing the patella, strict surgical principles are paramount to avoid complications. These principles include doubling the original thickness of the patella, maintenance of patellar blood supply, achieving central patellar tracking and properly positioning of the femoral, tibial and patellar components. The ideal characteristics of the design of the prosthesis to the resurfacing of the patella are anatomical, asymmetric

and wide trochlear groove, that extends and deepens more compared with the first-generation designs.

On the contrary, routine patellar resurfacing in TKA is not warranted when a patella-friendly femoral component is used. Frequently in comparative studies, all non-resurfaced patellae are analyzed, regardless the femoral component design.

Designs with a deep patellar groove and supporting lateral flange surfaces present lower contact stresses, similar to those seen in normal patellofemoral joint.<sup>25</sup> However, when patella-friendly femoral components are used and the results are compared with the best resurfaced patellar designs, revision operation rate, knee function, and patient satisfaction tend to be higher.

Recent studies have shown that the design of the femoral component influences patellofemoral contact stresses in knees whether or not the patella has been resurfaced.<sup>26-29</sup>

In vivo and in vitro studies have shown that a deep trochlear groove extending more distally with an anatomic radius of curvature and more medial placement of the patellar component reproduces the most normal tracking by both resurfaced and native patellae.<sup>30-32</sup>

Rotational alignment along the epicondylar axis and lateral placement of the femoral component have been shown to improve patellar tracking.<sup>33,34</sup> The advantages of not resurfacing the patella include conserving patellar bone stock, reduced operative time, and avoidance of any complications associated with resurfacing. However non-resurfaced patella may generate a higher prevalence of anterior knee pain postoperatively and require subsequent resurfacing.

Selection of suitable implants and adherence to proper surgical techniques are the fundamental principles that result in successful outcomes. The so called patella-friendly femoral components are available. These are designed with a more anatomic patellofemoral groove which is intended to reduce point loading and improve tracking compared with components which incorporate a flange intended to articulate with a non-anatomically designed patellar component.

Although our study is retrospective and with short follow-up period, it shows that there is no significant difference in the incidence of post-op patellofemoral pain when the patella is resurfaced or not, since we use a patellar-friendly femoral prosthesis like NexGen. The studies with prolonged follow-up are needed to reinforce this view.

## CONCLUSION

In patients with pre-op PF pain, the incidence of post-op clunk was significantly higher ( $p < 0.005$ ) in the R group. In patients without pre-op PF pain, the incidence of post-op crepitus was significantly ( $p < 0.005$ ) higher in the R group.

In patients with or without pre-op PF pain, the incidence of post-op PF pain, clunk and crepitus is the lowest in patients who had patelloplasty when compared with the other members of the NR group (statistically significant  $p < 0.005$ ). Long term studies are needed to verify the results of patelloplasty.

It is difficult to draw a definitive conclusion about whether or not resurface the patella, due to many confounding factors, such as component design, surgeon experience and technical aspects of surgery, which can influence the outcome in certain patients.

## REFERENCES

1. Font-Rodriguez DE, Scuderi GR, Insall JN. Survivorship of cemented total knee arthroplasty. *Clin Orthop Relat Res.* 1997;(345):79-86.
2. Insall J, Ranawat CS, Scott WN, Walker P. Total condylar knee replacement: preliminary report. 1976. *Clin Orthop Relat Res.* 2001;(388):3-6.
3. Ranawat CS. History of total knee replacement. *J South Orthop Assoc.* 2002 Winter;11(4):218-26.
4. Barrack RL. Orthopaedic crossfire--All patellae should be resurfaced during primary total knee arthroplasty: in opposition. *J Arthroplasty.* 2003;18(3 Suppl 1):35-8.
5. Barrack RL, Burak C. Patella in total knee arthroplasty. *Clin Orthop Relat Res.* 2001;(389):62-73.
6. Burnett RS, Bourne RB. Indications for patellar resurfacing in total knee arthroplasty. *J Bone Joint Surg Am.* 2003;85:728-45.
7. Insall J. The patella in total knee replacement: does it matter? *Knee Surg Sports Traumatol Arthrosc.* 2001;9(Suppl 1):S2.
8. Rorabeck CH, Dorr LD, Hofmann AA, Insall JN, Kebabian PA, Krackow KA et al. Controversial issues in knee arthroplasty. *Orthopedics.* 1995;18(9):905-14.
9. Barrack RL, Matzkin E, Ingraham R, Engh G, Rorabeck C. Revision knee arthroplasty with patella replacement versus bony shell. *Clin Orthop Relat Res.* 1998;(356):139-43.
10. Rand JA. The patellofemoral joint in total knee arthroplasty. *J Bone Joint Surg Am.* 1994;76(4):612-20.
11. Levitsky KA, Harris WJ, McManus J, Scott RD. Total knee arthroplasty without patellar resurfacing. Clinical outcomes and long-term follow-up evaluation. *Clin Orthop Relat Res.* 1993;(286):116-21.
12. Picetti GD 3rd, McGann WA, Welch RB. The patellofemoral joint after total knee arthroplasty without patellar resurfacing. *J Bone Joint Surg Am.* 1990;72(9):1379-82.
13. Soudry M, Mestriner LA, Binazzi R, Insall JN. Total knee arthroplasty without patellar resurfacing. *Clin Orthop Relat Res.* 1986;(205):166-70.
14. 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.
15. Ranawat CS. The patellofemoral joint in total condylar knee arthroplasty. Pros and cons based on five- to ten-year follow-up observations. *Clin Orthop Relat Res.* 1986;(205):93-9.
16. Rae PJ, Noble J, Hodgkinson JP. Patellar resurfacing in total condylar knee arthroplasty. Technique and results. *J Arthroplasty.* 1990;5(3):259-65.
17. Harwin SF. Patellofemoral complications in symmetrical total knee arthroplasty. *J Arthroplasty.* 1998;13(7):753-62.
18. Larson CM, Lachiewicz PF. Patellofemoral complications with the Insall-Burstein II posterior-stabilized total knee arthroplasty. *J Arthroplasty.* 1999;14(3):288-92.
19. Montori VM, Swiontkowski MF, Cook DJ. Methodologic issues in systematic reviews and meta-analyses. *Clin Orthop Relat Res.* 2003;(413):43-54.
20. Mulrow CD. Rationale for systematic reviews. *BMJ.* 1994;309(6954):597-9.
21. 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.
22. Parvizi J, Rapuri VR, Saleh KJ, Kuszkowski MA, Sharkey PF, Mont MA. Failure to resurface the patella during total knee arthroplasty may result in more knee pain and secondary surgery. *Clin Orthop Relat Res.* 2005;438:191-6.
23. Freeman MA, Todd RC, Bamert P, Day WH. ICLH arthroplasty of the knee: 1968--1977. *J Bone Joint Surg Br.* 1978;60(3):339-44.
24. Bayley JC, Scott RD, Ewald FC, Holmes GB Jr. Failure of the metal-backed patellar component after total knee replacement. *J Bone Joint Surg Am.* 1988;70(5):668-74.
25. Matsuda S, Ishinishi T, Whiteside LA. Contact stresses with an unresurfaced patella in total knee arthroplasty: the effect of femoral component design. *Orthopedics.* 2000;23(3):213-8.
26. Benjamin JB, Szivek JA, Hammond AS, Kubchandhani Z, Matthews AI Jr, Anderson P. Contact areas and pressures between native patellas and prosthetic femoral components. *J Arthroplasty.* 1998;13(6):693-8.
27. Chew JT, Stewart NJ, Hanssen AD, Luo ZP, Rand JA, An KN. Differences in patellar tracking and knee kinematics among three different total knee designs. *Clin Orthop Relat Res.* 1997;(345):87-98.
28. Petersilge WJ, Oishi CS, Kaufman KR, Irby SE, Colwell CW Jr. The effect of trochlear design on patellofemoral shear and compressive forces in total knee arthroplasty. *Clin Orthop Relat Res.* 1994;(309):124-30.
29. Tanzer M, McLean CA, Laxer E, Casey J, Ahmed AM. Effect of femoral component designs on the contact and tracking characteristics of the unresurfaced patella in total knee arthroplasty. *Can J Surg.* 2001;44(2):127-33.
30. Andriacchi TP, Yoder D, Conley A, Rosenberg A, Sum J, Galante JO. Patellofemoral design influences function following total knee arthroplasty. *J Arthroplasty.* 1997;12(3):243-9.
31. Theiss SM, Kitziger KJ, Lotke PS, Lotke PA. Component design affecting patellofemoral complications after total knee arthroplasty. *Clin Orthop Relat Res.* 1996;(326):183-7.
32. Yoshii I, Whiteside LA, Anouchi YS. The effect of patellar button placement and femoral component design on patellar tracking in total knee arthroplasty. *Clin Orthop Relat Res.* 1992;(275):211-9.
33. Rhoads DD, Noble PC, Reuben JD, Tullos HS. The effect of femoral component position on the kinematics of total knee arthroplasty. *Clin Orthop Relat Res.* 1993;(286):122-9.
34. Scuderi GR, Insall JN. Total knee arthroplasty. Current clinical perspectives. *Clin Orthop Relat Res.* 1992;(276):26-32.