

**Journal club:** 12 February 2013

**Chairmen:** Mr A Ajuied & Miss D Back

**Convener:** Mr I Findlay

Guy's and St. Thomas' Hospitals NHS Trust

**Theme:** Patellar resurfacing at TKR

1. **Keblish PA, Varma AK, Greenwald AS.** Patellar resurfacing or retention in total knee arthroplasty. A prospective study of patients with bilateral replacements.  
*J Bone Joint Surg [Br]* 1994;76-B:930-7.

**Reviewer:** Mr Henry B Colaço

#### **Background**

Patellofemoral problems are a common cause of morbidity and reoperation after total knee arthroplasty. In the 1970s, patellar resurfacing was uncommon and most knee prostheses had no anterior flange. However, 20-40% of patients were experiencing anterior knee pain for which a number of solutions were proposed, including patellectomy and realignment procedures. In 1975, the cobalt chrome 'dome' patella prosthesis was developed, primarily for patellofemoral osteoarthritis; this led to the development of a polyethylene version for use with the Total Condylar Knee. Patellar resurfacing increased in the 1980s, but the high complication rate rekindled interest in patellar retention in the 1990s.

#### **Aims**

To determine whether patella resurfacing in patients undergoing bilateral total knee replacement altered outcome in terms of functional outcome, preference and radiological parameters.

#### **Methods**

Prospective study of 52 patients (104 knees), 16 male and 36 female, mean age 67.8 years (39-87), who underwent bilateral TKR under a single surgeon, using a medial parapatellar or lateral approach. For each patient, one patella was resurfaced, the other was treated with patellaplasty. Follow up of 30 patients (60 knees) at 6 weeks, 3 months, 6 months, 1 year, and yearly with a mean of 5.24 years (2-10). LCS TKA prosthesis used (12 bicruciate-retaining, 65 PCL-retaining, 27 rotating-platform cruciate-sacrificing), 88 uncemented, 16 cemented.

Preoperative and postoperative evaluation with modified HSS score (Buechel, 1982) by an independent examiner, in addition to patient evaluation of subjective preference, stair climbing, anterior knee pain. Repeat radiographs performed at each clinical review, assessed using the Knee Society radiological evaluation system (Ewald, 1989).

#### **Results**

##### Clinical

No significant difference between Modified HSS knee rating scores in retained and resurfaced groups (89.2 v 90.1) in terms of pain, function or range of movement. 14 patients did not favour one knee, 9 preferred the resurfaced side, and 7 preferred the retained side.

##### Radiographical

No significant difference between the groups in terms of component alignment, condylar height, joint line,

or patellar tracking.

### **Paper's Conclusions**

The authors proposed that their excellent clinical and radiological results in both groups may have been related to the 'near anatomical' articular surface of the LCS prosthesis. They do not propose any absolute criteria for patella resurfacing, but include a helpful table of strong and relative indications.

'If the prosthesis is suitable, and if technical and radiological criteria are met, the non-resurfaced patella performs as well as the resurfaced patella'

### **Appraisal**

The purpose of the study was inferred, although no hypothesis was stated.

Study design: small number of subjects, internal control, 42% attrition rate, no blinding, no primary outcome stated, no adjustment for co-morbidities, smoking etc.

Treatment: Multiple prosthesis combinations, multiple approaches, 10% formal lateral release, Control group underwent patellaplasty (lateral soft tissue release, +/-LPFL release, patellar rim cautery, multiple drilling of articular surface, osteophyte removal).

Assessment: Validated modified HSS knee scoring system, unvalidated subjective preference, and radiological patellofemoral congruency used. Follow-up 5.20 years (2.5-8.3) for resurfaced group, and 5.28 years (2.1-10.4) for patellaplasty group.

Statistics: The authors do not include an *a priori* power calculation, the statistical method used is not stated, a *p* value is only given when comparing joint line and patellar tracking radiographically.

### **Recommendations for Practice**

This relatively early paper on the subject supports the theory that there is no difference in outcome with resurfacing or patellaplasty in total knee replacement. It has been superseded by more recent, larger studies.

2. **DJ Wood, AJ Smith, D Collopy, B White, B Brankov & MK Bulsara.** Patellar Resurfacing in Total Knee Arthroplasty – A Prospective, Randomized Trial.  
*J Bone Joint Surg [Am]* 2002; 84-A:187-93.

**Reviewer:** Mr Iain Findlay

### **Background**

There is equivocal evidence as to whether patellar resurfacing significantly improves post-total knee arthroplasty knee scores. High complications rates of patellar resurfacing have previously been reported. Previous to this study, there had been no prospective, randomized study comparing the mid-term results of resurfacing versus patelloplasty.

### **Aims**

- Clearly identified null hypothesis:
  - *"There was no clinical difference in terms of re-operation or revision rates between total knee arthroplasty with and without patellar resurfacing."*
- A prospective, randomized study.
- An attempt was made to identify indications for patellar resurfacing.

### **Methods**

This is a prospective, randomized study of 220 osteoarthritic knees using the Miller-Galante II prosthesis. It is a dual centre, ethically approved trial with surgery performed by or under the supervision of 6 experienced surgeons. Exclusion criteria were clearly defined. Patients were followed up radiographically, with the Knee Society Clinical Rating system and with clinical assessment of stair climbing. Mean follow-up 4.0yrs (range 3.0-6.6). Level of evidence 1B.

### **Results**

- No significant difference in revision rate (P=0.739).

- No pre- or peri-operative predictor of revision surgery.
- No significant difference between knee scores (P=0.939).
- No significant difference in stair-climbing (P=0.167).
- No association between patellar tilt (P=0.294) or Insall-Salvati ratio (P=0.202) & post-operative anterior knee pain.
- 5 revisions of patellar component post-resurfacing.
- Significantly higher incidence of anterior knee pain in non-resurfaced patellas (P=0.016).
- With adjustment for age & sex, patients without patellar resurfacing ~2x risk of post-operative anterior knee pain (hazard ratio 1.95).
- Clinically significant but not statistically significant reluctance to load affected knee in non-resurfaced patellas (P=0.059).

### **Paper's Conclusions**

The authors conclude that patients who underwent patellar resurfacing had superior clinical results in terms of anterior knee pain & stair descent. They also note that anterior knee pain still occurs after patellar resurfacing.

### **Appraisal**

The trial was set up well with clearly defined aims. The follow-up was comprehensive and looked at a variety of outcomes and measures. My main concern is that with the large amount of data generated from the patients, the investigators have over-statistically analysed their results. The most important and unquestionable conclusion is that there was no significance difference in revision rates and the validated Knee Society scores between the two groups. There seems to be too much emphasis placed on a significant difference between their unvalidated stair climbing test and conclusions drawn from it only when specific aspects (stair descent) were analysed. Predictors of anterior knee pain also had to be adjusted for age and sex in order to achieve significance.

I feel that this paper does not answer our concerns regarding the pros and cons of resurfacing and its conclusions are not justifiable.

### **Recommendations for our practice**

Based on this paper there is no clear evidence for patellar resurfacing. Even with patellar resurfacing patients should be warned of the risk of developing anterior knee pain.

3. **Breeman S, Campbell M, Dakin H, Fiddian N, Fitzpatrick R, Grant A, Johnston L, MacLennan G, Morris R & Murray D.** Patellar Resurfacing in Total Knee Replacement: Five-Year Clinical and Economic Results of a Large Randomized Controlled Trial.  
*J Bone Joint Surg [Am]* 2011;93-A:1473-81.

**Reviewer:** Mr Roland Walker

### **Background**

There is considerable debate about whether or not the patella should be re-surfaced during primary knee arthroplasty. There is a lack of rigorous trial data to inform the debate.

### **Aims**

The aim was to compare outcomes between those patients who had patella resurfacing and those who did not, as part of their primary knee arthroplasty.

### **Methods**

Multi-centre, multi-surgeon, multi-implant, unblinded randomised controlled trial design as an arm of a larger trial investigating several types of knee arthroplasty. Any UK knee surgeon could take part, and their patients could be enrolled unless the surgeon felt that only one of the two options was indicated. Randomisation was stratified by surgeon with minimisation according to age, sex and location of arthritis.

The primary outcome measure was the Oxford Knee Score (OKS). The secondary outcomes were quality of life (EuroQuol 5D and SF-12), complications, cost and the ability to walk downstairs. Data analysis was performed on an intention to treat basis. Central, plus broad industry funding.

### **Results**

1715 patients were enrolled of which 1424 (83%) received the allocated procedure. Ninety-five (11.1%) of the 854 patients who were allocated to receive no resurfacing had the patella resurfaced, and 138 (16.0%) of the 861 patients who were allocated to resurfacing did not have the patella resurfaced. The two groups were well matched. There was no significant difference in OKS at any time during follow up as far as 5 years. No significant difference was found in stair climbing, or any of the quality of life outcomes. There was no significant difference between the two groups with respect to the prevalence of knee-related readmission, of minor or intermediate reoperation, or of subsequent patella-related surgery. 16 patients (2%) in the non-resurfacing group subsequently had late resurfacing for pain. These patients had improvements in OKS but did not reach the mean outcome scores for the overall study group (22.9 vs 35). The rate of patella fracture in the resurfacing group was 0.2%. Overall health costs for the two groups did not differ significantly.

### **Paper's Conclusions**

Patients' functional status and quality of life are not significantly affected by resurfacing the patella. In addition there is no difference in health care cost between the two options. There was adequate power in the study to detect a difference of 3 points on the Oxford Knee Score which is thought to be clinically important. The authors cannot demonstrate a benefit of resurfacing but likewise the evidence does not lead to criticism of those surgeons who do re-surface the patella.

### **Appraisal**

A large randomised controlled study, well powered to show a small difference in clinical outcome. However there are many concerns regarding the methodology. There were large proportions of patients in each arm who did not receive the allocated treatment. There were multiple different implants used. The statistical analysis is highly complex with regression analysis to fill missing data points for cost estimation. It is therefore difficult to be certain about the validity of the results and it is the reviewer's opinion that this is far from the definitive paper regarding patellar resurfacing.

### **Recommendations for our practice**

This paper provides no convincing evidence to support or recommend against resurfacing the patella. Surgeons may choose any regimen for treating the patella in knee arthroplasty based on this study.

4. **Pilling RWD, Moulder E, Allgar V, Messner J, Sun Z, Mohsen A.** Patella Resurfacing in Primary Total Knee Replacement: A Meta-Analysis.

*J Bone Joint Surg [Am]* 2012;94-A:2270-8

**Reviewer: Mr Gev Bhabra**

### **Background**

Whether or not to resurface the patella in primary knee replacement is a much debated subject. According to the UK National Joint registry, in 2010 67% of TKRs were performed without patella-femoral joint resurfacing. There are concerns, however, that there is an increased risk of anterior knee pain in patients who have not had patella resurfacing, whilst there may be increased complications following patella resurfacing.

This paper is a meta-analysis aiming to review the current available literature. In 2005 two meta-analyses on this subject were published, however, the authors state that both of these contained a non-randomised study and RCTs with small sample sizes. Since then several more RCTs have been reported with longer follow-up times. A further meta-analysis was published in 2010 which, according to the authors, had a

number of methodological shortfalls. Here the authors have attempted to perform a meta-analysis of RCTs using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methodology.

### **Aims**

To undertake a meta-analysis of randomised controlled trials to address the hypothesis that resurfacing the patella in primary total knee replacement improves patient outcome with regards to knee scores, anterior knee pain and patient satisfaction.

### **Methods**

The authors have used the PRISMA methodology for reporting meta-analyses. They carefully described their search strategy, study selection, outcome measures and risk of bias. This is level 1 evidence.

They searched Medline, Embase and Cochrane library for the terms “Knee replacement” or “knee arthroplasty” AND “patella resurfacing” or patellofemoral resurfacing” or “patella retention” or patella non-resurfacing”. They included all RCTs comparing patella resurfacing with non-resurfacing in primary TKRs, that had been published in peer reviews journals. They only included RCTs with a minimum of 35 cases that had measured at least one of the following outcomes: patient satisfaction, infection rate, operative time, knee score, patellofemoral complication rate, anterior knee pain, blood loss, and length of stay. To reduce language bias they included studies in all languages.

Their primary outcome measures were knee society scores, anterior knee pain and patient satisfaction. Secondary outcome measures were complications, revision of patellofemoral joint, infection, operative time and radiographic appearance.

### **Results**

The total number of studies identified after the initial search was 1065. The studies were filtered according to their eligibility based on the above mentioned inclusion and exclusion criteria, leaving a final number of 16 studies included in the meta-analysis.

There was no significant difference between the resurfacing and non-resurfacing groups in any of the primary outcomes measured. Patient satisfaction was 90% in each group. Anterior knee pain was reported in 13.4% of knees in the resurfacing group and 23.5% of knees in the non-resurfacing group, but this difference was not statistically significant ( $p=0.1$ ). There was no significant difference in knee society scores, however, the authors report that if they separated the knee society scores into its constituent “knee” and “function” components, they found that patients in the knee resurfacing group scored significantly higher (better) in the knee component of the knee society score compared with patients in the non-resurfacing group.

When considering the secondary outcomes, there were no significant differences between the 2 groups for infection, operative time or radiographic appearance. Patients in the resurfacing group had significantly less patellofemoral joint complications compared with patients in the non-resurfacing group (5.9% vs 12.6%,  $p=0.02$ ). However when patellofemoral joint complications excluding anterior knee pain were calculated, there was no difference between the groups. Finally, there were significantly more re-operations related to the patellofemoral joint in the non-resurfacing group than in the resurfacing group ( $p=0.002$ ).

### **Paper’s Conclusions**

Patella resurfacing in primary total knee replacement has no effect on anterior knee pain, patient satisfaction, infection rates, operative time or radiographic appearance. A difference was recorded in one component of the knee society score; however it is not possible to conclude that there is any overall difference in knee society scores between the two groups.

The difference in reoperation related to the patellofemoral joint is similar to that reported in previous meta-analyses. The authors speculate that the difference between the 2 groups is because of the poorly justified temptation to attribute anterior knee pain to lack of patella resurfacing.

The authors do not comment further on the differences seen in patellofemoral joint complications between the two groups, given that they have previously stated that there is no difference in anterior knee pain.

The authors recognise some of the limitations of their meta-analysis. The randomisation methods in 6 of the 16 studies included was either incompletely reported or classified as quasi-randomised. Power calculations were only performed in 2 of the 16 studies. It is also recognised that direct comparison

between different studies is confounded by the use of different implant designs and surgical technique. Finally, the authors suggest that a scoring system specific to patellofemoral joint pain should be developed and used in an RCT. They conclude that as 90% of patients are satisfied with their surgery whether they have the patella resurfaced or not, the decision should be made by the surgeon and patient together based on current evidence.

### **Appraisal**

There is sound justification for performing an up to date meta-analysis on this much debated subject. There is a comprehensive literature review and clear hypothesis stated in the introduction.

Although the recommended reporting system, PRISMA, is used and clearly followed, inherent weaknesses in many of the included studies reduce the validity of this meta-analysis. With power calculations performed on only 2 of the 16 studies included, and 6 of the 16 studies using questionable randomisation methods, it is clear that there is a distinct paucity of good RCTs with robust methodology. A more rigorous exclusion of studies with poor methodology may have led to the inclusion of only very few studies, but highlights the need for further research in this subject.

The authors also remark on the need for the development of a patellofemoral-specific knee score, but do not appear to recognise the validated scoring system specific to the patellofemoral joint published by Baldini et al. in 2006.

Based on current evidence there is no difference in patient satisfaction, anterior knee pain, infection rates, operative time or radiographic appearance between patients who have patella resurfacing and those who do not have patella resurfacing as part of the primary knee replacement.

### **Recommendations for our Practice**

As there is currently no evidence to support either patella resurfacing or non-resurfacing in total primary knee replacement, we would recommend that surgeons should have a set routine and rigid criteria for patella resurfacing, rather than changing practice from one patient to the next. This eliminates the need for unnecessary intra-operative decision making.

A randomised controlled trial comparing the Baldini scores in resurfacing versus non resurfacing groups has been registered (the PATRES trial, Netherlands) and we look forward to seeing the results.