



## Do we need to replace the patella in knee arthroplasty for rheumatoid disease ?

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We have examined the anterior knee function in two patient groups who had undergone primary knee arthroplasty without patellar resurfacing to identify differences for osteoarthritis compared with rheumatoid disease. We identified two consecutive series of patients who had undergone knee replacement surgery for either osteoarthritis or rheumatoid disease between 1992 and 1994 under the care of a single surgeon using the same implant and surgical technique. There were 90 patients in each group. All were examined and asked to complete a questionnaire so as to determine Hospital for Special Surgery (HSS) score, Western Ontario and McMasters Universities Osteoarthritis Index (WOMAC) score, Bartlett patellar score and a Visual Analogue score (VAS) for any persistent anterior knee pain at rest. We failed to identify any significant differences in terms of anterior knee function between these two groups of patients. The re-operation rate was similar for both groups. It would appear that primary knee replacement for rheumatoid disease is met with a similarly good outcome for anterior knee function despite absence of patellar resurfacing. We would question the contention that patellar resurfacing is necessary for patients undergoing knee replacement for rheumatoid disease.

**Keywords:** patellar resurfacing ; knee arthroplasty ; rheumatoid disease.

### INTRODUCTION

Patellar resurfacing remains a topic of controversy in knee arthroplasty. A number of randomised

controlled studies have examined the role of patellar resurfacing in minimising anterior knee pain (3,6, 22,26,27). The conclusions of these studies have been mixed. The majority of the patient populations examined have suffered from osteoarthritis. Rheumatoid disease is an inflammatory disease of the knee with synovial hypertrophy, articular cartilage erosion, pannus formation and often significant bone loss and osteoporosis (7). These patients tend to exhibit severe osteoporosis, significant lateral compartment disease, limited flexion pre-operatively and poor patellar tracking (1). It has been received wisdom that in a patient with rheumatoid disease of the knee presenting for knee replacement the patella should be resurfaced (2,7,16). It has been proposed that residual articular cartilage of the unresurfaced patella may continue to provide an antigenic stimulus for synovial inflammation (5,9). The incidence of complications from resurfacing has been

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considered to be lower in RA compared with OA disease perhaps due to the lower level of activity in this patient group. However faced with increasing numbers of revision procedures, patellar bone loss represents a particular challenge to the treating surgeon (9). In our unit we have historically avoided to resurface the patella in either the primary or revision setting for rheumatoid disease. The null hypothesis of this study was that there is no significant difference in subjective anterior knee function in knees with non-resurfaced patellae beyond 5 years from surgery for patients with rheumatoid disease compared with osteoarthritis.

### PATIENTS AND METHODS

In our unit we have prospectively recorded patient demographics of all patients presenting to the senior author from 1990 as part of a prospective hospital CASPE review. In order to examine the unique outcome for anterior knee function following knee replacement for rheumatoid disease we studied two consecutive groups of patients (90 with osteoarthritis and 90 with rheumatoid disease) who had undergone knee arthroplasty for end stage disease. These two groups were selected on the basis that a minimum of eight years follow-up was achievable at time of ongoing institutional review. All procedures were performed by or under the direct supervision of the senior author. All surgery was carried out under laminar flow conditions in the same theatre suite. Standard instrumentation with intramedullary referencing for the femur (5° offset) and an extramedullary tibial referencing system with a 3° posterior cutting slope were used throughout. There were equivalent numbers of patients with valgus deformity in each group (RA group 8 / 90 and OA group 6 / 90). We selected these two groups of patients on the basis that anterior knee dysfunction would present itself and revision surgery for anterior knee problems would have been performed by five years from date of index surgery. In our cohort the minimum follow-up was eight years and the median follow-up was 10 years (range 8-12). All patients underwent Kinemax knee cruciate retaining surface replacement using Palacos cement. The surgical procedure has been described in detail previously (23). We have recently reported the 15 year outcome for such an implant. The longer term series using this established implant confirm that it has a standard condylar design allowing for excellent patellar tracking (14,28). No patient underwent patellar resurfacing at time of index surgery in either

group. It was, however, the senior author's standard practice to circumscribe the peripatellar soft tissues with diathermy. Any peripheral osteophytes were removed with the use of a rongeur so as to avoid lateral patellar impingement. The senior author had already performed in excess of 4000 primary knee arthroplasty procedures prior to the commencement of this study. It was his observation that the majority of patellae in rheumatoid disease are shallow at time of primary surgery and that this loss of bone stock often does not allow effective anchorage of any patellar prosthesis in this group. No patient underwent a formal soft tissue lateral release. At the time of clinical review for purposes of comparison, data regarding knee function was collected so as to complete the Hospital for Special Surgery (HSS) score, Western Ontario and McMasters Universities Osteoarthritis Index (WOMAC) score, a specific anterior knee function score (Bartlett score) and a visual analogue score (VAS) of anterior knee rest pain was documented (6,12,13). The study was registered with the Trust R&D department and all patients were under routine clinical review as part of the hospital arthroplasty surveillance programme.

### RESULTS

Table I outlines the demographics of the two groups of patients. More than 120 knee replacements were studied in each group. There were more males in the OA group compared with the RA group. No patient required revision for anterior pain. Three patients in the OA group and four in the RA group had undergone revision surgery at time of review. In none of these patients was the patella resurfaced at time of review and these patients were excluded from final analyses.

The RA group had a tendency towards valgus deformity pre-operatively but this did not reach significance. The WOMAC, Visual Analogue pain score, HSS and Bartlett anterior knee scores for each of the two groups are given in table II. No significant differences were found for any of the scores between the two groups at review.

We were particularly interested in the subgroup of patients in each disease type who presented with valgus deformity. For this subset, again, no differences were noted for any of the scoring systems and in particular the patellar (RA 24[12-26] vs OA 22[13-29]) and HSS (RA group 83[58-96] vs OA 76[29-85]) scores were equivalent.

Table I. — Demographics of patient groups

	Rheumatoid disease	Osteoarthritis
Number of patients	90	90
Number of knees studied	126	120
Number of bilateral TKR	36	30
Median age at time of surgery	66	72
Male / female	24/66	48/42
Mean body mass (range) in kg	70 (52-90)	80 (65-110)
Mean follow-up (range) in months	117 (96 to 167)	121 (101 to 168)
Median tibiofemoral pre-operative angle(+valgus ; - varus) – [range]	-1 [-4 to +15]	-3 [-12 to +8]
Post-operative range of active movement (median, range) in degrees	112, 90-140	110, 85-135

Table II. — Comparison of the various scores in the RA and OA Groups

	RA	OA
WOMAC score	18 (0 to 52)	17 (0 to 67)
VAS score	21 (0 to 92)	23 (2 to 92)
HSS score	81 (56 to 96)	80 (29 to 96)
Patellar score	22 (12 to 29)	23 (14 to 30)

All intergroup comparisons  $p > 0.05$  (Mann-Whitney U-test).

## DISCUSSION

In this study we failed to identify a significant difference for subjective anterior knee function following knee arthroplasty without resurfacing beyond 5 years when comparing the average results of a group of patients with either rheumatoid or osteoarthritic diseases. We hypothesised that the rheumatoid group would exhibit worse anterior knee function given that this group often exhibits poorer quadriceps strength, a more inflammatory picture and the widely held philosophy that this disease originates in the subchondral bone (1,2,7,21). Failure to remove the antigenic stimulus from the patellar bone stock may have lead to recurrence of disease, persistent synovial hypertrophy and in particular worsening with time of anterior knee symptoms. In contradistinction to this we have identified good anterior knee function in both groups for the scoring systems despite absence of a resurfacing procedure (14). It was not the objective of this cohort case study to compare the change in knee function for each disease category but rather to confirm whether or not, with time from knee

arthroplasty, anterior knee strength, kneeling ability and stair climbing would deteriorate particularly so in the rheumatoid group.

We elected to examine these two groups of patients beyond 5 years from surgery on the basis that anterior knee function would be expected to be maximal beyond 2 years following replacement surgery. Proponents of resurfacing argue that this enhances patellar tracking, restores patellofemoral kinematics and in the rheumatoid knee removes all potential antigenic stimuli for disease recurrence (5,7,15,16,19). Conversely other authors have highlighted the risks of fracture, bone loss at time of revision, extensor apparatus disruption and the inexplicable incidence of persistent anterior knee pain following such surgery (8,10,11,17,24,25).

Berti found better outcomes for passive knee flexion, active knee joint range of motion during stance phase and knee scores in 26 patients receiving patellar resurfacing for knee osteoarthritis compared to 21 patients without resurfacing of the anterior compartment at knee surgery (4). These were small numbers of patients and all had suffered from osteoarthritis. It has been argued that the outcome following patellar resurfacing is influenced by surgeon experience and component design (15,17,18). Smith *et al* in a prospective randomized study using an uncemented ‘patellar friendly’ anatomic femoral component knee system did not record any revisions for the patellofemoral compartment (23). Again this group comprised patients suffering from primary osteoarthritis. Furthermore, there was no significant difference for the resurfaced group compared to the non-resurfaced group for knee pain scores or Knee clinical rating scores.

In a separate recent study no differences were found for anterior knee function in a patellar friendly uncemented knee implant in a blinded prospective study comparing resurfacing versus non-resurfaced knees (22). This tends to lend weight to the theory that no discernible improvement is identified at long term follow-up following knee arthroplasty for primary osteoarthritis.

Whilst there remains no clear consensus for patellar resurfacing in the osteoarthritic knee, there is a stronger theoretical argument for resurfacing in the rheumatoid knee. There is very limited information on the outcome of anterior knee function following knee arthroplasty in this disease. Holt *et al* studying at 24 months follow-up an isolated group of 47 patients who did not undergo patellar resurfacing, found good outcome for anterior knee scores (11). No comparative group was studied from this unit. On the basis that good anterior knee function is found in the absence of patellar resurfacing in osteoarthritis we hypothesised that a poorer outcome would be seen in an equivalent group of patients suffering from rheumatoid disease. Using a similar rationale to that of Waters *et al* (18) with a power ratio of 95% and therefore similar numbers of patients but greater numbers of knee replacements we failed to identify any trend towards improvement in any aspect of anterior knee function for osteoarthritic versus rheumatoid disease. We have found in our patient cohorts that with a modern patella friendly condylar cemented implant, the requirement for secondary revision of the anterior compartment is negligible.

The rate and nature of complications found subsequent to patellar resurfacing have been outlined in detail previously (1,9,18). Patellar resurfacing should be avoided in circumstances where the patella is too thin or small due to a perceived risk of subsequent fracture (9). It is recognised that resurfacing may be unnecessary in patients under 60 years of age, in the presence of a normal retropatellar surface and normal tracking. Multivariate analysis of randomised studies fails to consider the influence of design characteristics upon knee function (15). The surgical community has long been aware of the significant complications of primary resurfacing and technical difficulty associated with late revision with poor

bone stock, requirement for bone grafting, risk of fracture and extensor apparatus disruption and impaired knee kinematics (6,9,10).

Whilst this is a cross sectional study and as such is limited by the single observational time frame, our results would tend to support the null hypothesis that there is no difference for anterior knee function in these two groups of patients in the absence of patellar resurfacing when clearly one would have expected sharp differences to exist. All patients were studied during this time frame for lower limb arthroplasty in our institution and all demographic data was collected at time of presentation for surgery as part of a larger institutional audit. This has allowed for prospective long term survival analysis. We feel that the minimum follow-up in our study does allow for adequate comparison of the two groups of patients. We contend that there remains little evidence to support patellar resurfacing in the rheumatoid knee at time of primary surgery. Clearly these results are confined to the use of an established patellar friendly design with published long term good results. The trochlear design of this condylar prosthesis has previously been validated for osteoarthritic disease (28).

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