Evaluation of non-resurfaced patella in total knee arthroplasty

Vijayanarshiman, V and Lionel John,J.
Department of Orthopaedics, Sree Balaji Medical College and Hospital, BIHER-Bharath University, Chromepet, Chennai-600044, Tamilnadu, India

Abstract
The current study provided results of a short-term analysis of the non-resurfaced patella in total knee arthroplasty. The study illustrates that total knee arthroplasty can be performed without resurfacing the patella irrespective of age, weight, and disease conditions as there was no significant association of clinical or radiological problems detected. In majority of patients with rheumatoid arthritis the patella appears to be small and the morphological changes appears to have influence on functional outcomes. The prevalence of anterior knee appears to be not affected by radiological appearance of abnormal patellar tracking. Minimal patellar mallet racking did not affect the knee and functional scores.

Keywords: arthroplasty, osteoarthritis, rheumatoid arthrosis

Corresponding author
1Dr.V.Vijayanarshiman, Professor, Department of Orthopaedics, Sree Balaji Medical College and Hospital, BIHER-Bharath University, Chromepet, Chennai-600044, Tamilnadu, India
Email id – medical44dept@gmail.com
**Introduction**

To mend the injured weight-bearing knee-surfaces that are causing pain is a normal intervention procedure and in this process, restoration of all components of the diseased knee joint with a synthetic implant is called as “Total Knee replacement surgery” whereas the replacement of one or two compartments of the knee implant is known as a partial knee replacement. The decision to resurface or not to resurface the patella during total knee replacement remains unresolved issue. Many surgeons recommend that the patella should always be resurfaced (1,2), citing a low complication rate (3) and predictive postoperative results, with less anterior knee pain. Other surgeons contend that the clinical results of non-resurfacing the patella are similar to that of resurfacing, without the added complications associated with resurfacing (4,5). Patellar related complications stood as the major indication for aseptic failure in total knee arthroplasty. Stress fracture of the patella, loosening of the patellar component, and dislocation or subluxation of the patellar components were the most common problems encountered. As a result, some authors have suggested selective resurfacing of the patella. It is also our observations that indicated that the average patella size in 30% of our population is <20 mm thick. This increases the propensity to complications when resurfaced. Recent clinical and laboratory studies evaluating knee anatomy surgical technique, component design, and biomechanics have added to our understanding of the impact of the patellofemoral joint on total knee arthroplasty. The purpose of the current study is to report on the clinical radiography and functional results of patients undergoing total knee arthroplasty without resurfacing the patella. Emphasis was laid specially on the observable changes of the patellar surface. Attention was focused on anterior knee pain, function and the predictive radiographic changes observation at 2-1/2 years (30 months) follow-up.

**Materials & methods**

A total of 21 patients who had undergone total knee arthroplasty for various indications without resurfacing the patella, in our unit at Sree Balaji Medical College & Hospital Chennai were all taken up for this study. Inclusion criteria were patients who underwent total knee replacement without patellar resurfacing regardless of
the state of the patellar cartilage. Patients who had less than 6 months follow-up, patients lost for follow up, patients who underwent revision knee arthroplasty, and patients with previous patellectomy were excluded from the study.

Diseases for which total knee arthroplasty was done were primary osteoarthritis and rheumatoid arthritis. Sixteen patients had osteoarthritis and four patients had rheumatoid arthritis, seventeen patients were women and four patients were men, and the average age was 60 years. Nine patients had bilateral total knee arthroplasty.

All patients were evaluated preoperatively by knee society clinical rating system (6), a specific patellofemoral pain questionnaire that includes the patellar score (7), and the British orthopaedic association patient-satisfaction score (8).

All the patients selected for total knee arthroplasty were subjected to a thorough preoperative assessment. A gonimeter was used to assess the alignment of lower extremity and the range of motion of knee. Radiological evaluation was done according to the knee society roentgenographic evaluation and scoring system (9). Standing Anteroposterior, lateral and merchant view radiographs were taken preoperatively. Femorotibial alignment was measured on standing hip-to-ankle anteroposterior radiographs. Insall-salvati ratio was calculated in the lateral radiographs.

**Surgical procedure**

Preoperative planning was done a day before the surgery to determine the selection of implants, their size and the degree of the cuts to be taken. The knee to be operated was cleaned with povidone iodine solution and wrapped in a sterile towel and a broad spectrum of antibiotic was given to the patients 1 hr before surgery.

The anaesthesia used was combination of spinal and epidural in majority of the patients and general in some. The standard surgical procedures was followed in all patients and are presented as figure 1&2. The patella was not resurfaced in all patients. Treatment of the patella included removal of peripheral osteophytes, chondroplasty by shaving the fibrillated cartilage with a power shaver, patellar rim cautery to provide partial denervation and a lateral release was performed if the patella did not track centrally as demonstrated by the so called no-thumb test (10).

In the postoperative period, a few high risk patients had chemoprophylaxis with low molecular heparins. Quadriceps muscle
strengthening and chest physiotherapy were started on the day of surgery. All patients were mobilized on the 1st postoperative day. The average duration of stay for unilateral total knee arthroplasty was 7 days and 12 days for those who underwent bilateral knee arthroplasty. After discharge, the patients were instructed to follow the same physiotherapy at home and advised to avoid squatting and sitting with cross legs.

Patients were reviewed in the immediate postoperative period, 3 months, 6 months and yearly follow-ups. The average duration of follow-up was 18 months. Six patients were of 6 months, eight patients were of 12 months, 7 patients were of 24 months, 1 patient was of 30 months follow-up. Merchant view x-rays was done at 3 months, 6 months and at yearly follow-up. The functional results were correlated with radiological results and risk factors leading to abnormal changes of the patella were analysed.

**Statistical analysis**

Data were analysed using students t test and chi square test.
Surgical Procedure

- Medial parapatellar approach
- Patella showing intact articular cartilage
- Excision of osteophytes
- Smoothening of the patellar facets
Results

Detection of preoperative Pain among patients

Preoperatively 3 patients had severe pain, 14 patients had moderate continuous pain, 5 patients had moderate occasional pain and 2 patients had mild pain during walking (Table 1).

Range of knee flexion movements

The mean knee flexion has improved from 90° preoperatively to 114.16° at the latest review of patients. The range of motion and the presence of fixed flexion deformity and extensor lag were analysed, which revealed no difference between the groups with regard to prevalence of flexion deformity or extensor lag.

Stair climbing function

Preoperatively 28 patients were using rail support for stair climbing. At the latest follow up, 12 patients were able to climb up and down stairs with rail support, 4 of them had anterior knee pain. 9 patients were able to climb up stairs normally but for down they needed help of railing, 3 of them had anterior knee pain. 1 patient was able to climb up and down stairs without support and dosent have anterior knee pain.
Prosthesis

The proetheses used were posterior stabilizing designs. 2 patients out of 7 in whom PFC prosthesis was used had anterior knee pain. 5 patients out of 15 patients in whom natural knee prosthesis was used had anterior knee pain. The difference is not statistically significant.

Nee society evaluation: Knee score and Functional score

The mean knee society score improved from 30.06 to 92.56 points post operatively. At the latest review the patients without anterior knee pain had a mean score of 93 and 89 for those with anterior knee pain. Mean functional score improved from 48.16 points preoperatively to 74.66 points post operatively. At the latest review the patients without anterior knee pain had a mean score of 76 and 68 for those with anterior knee pain.

Radiographic results; Patellar height ratio, Tibio femoral alignment, Congruence angle, Patellar tilt angle

The mean patellar height ratio of patients without anterior knee pain was 1.24 and 1.07 for those with anterior knee pain. The difference is not significant.

The mean Tibio-femoral alignment pre operatively was -7.8°. Post operatively the mean Tibio-femoral alignment was +3.3°. mean Tibio-femoral angle of the patients with anterior knee pain was +3.71°, and 3.17° for those without anterior knee pain. The difference is not statistically significant.

The mean congruence angle was -1.66°. for the seven patients with anterior knee pain the mean congruence angle was -4° compared with -0.95° for those with no anterior knee pain. 13 patients had normal range tracked centrally out of them 11 patients had no anterior knee pain, 4 had mild anterior knee pain. 6 patients had minimal incongruence none of them had anterior knee pain. 7 patients had moderate incongruence out of them 3 patients had anterior knee pain, 4 had no anterior knee pain. The difference is not statistically significant.

The mean patellar tilt angle was 8.1°. Thirteen patients had normal tilt angle range <5 degree. 9 patients had a minimal tilt out of them 8 had no anterior knee pain. 1 had anterior knee pain. 8 patients had moderate tilt out of them 5 had no pain. The difference is not statistically significant.
Table 1. Number of patients who had preoperative pain during walking

<table>
<thead>
<tr>
<th>Preoperatively patients had pain during walking</th>
<th>Number of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>severe pain</td>
<td>3</td>
</tr>
<tr>
<td>moderate continuous pain</td>
<td>14</td>
</tr>
<tr>
<td>moderate occasional pain</td>
<td>5</td>
</tr>
<tr>
<td>mild pain</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>24 patients</td>
</tr>
</tbody>
</table>

Patello femoral space, No loss of space found in 4 patients out of them, 1 patient had anterior knee pain

Lateral PF space: minimal loss found in 5 patients out of them 1 had anterior knee pain. Moderate loss found in 7 patients 1 had anterior knee pain. Medial PF space

Minimal loss found in 2 patients

Both PF spaces:

Minimal loss found in 3 patients, moderate loss found in 4 patients, out of them 1 had anterior knee pain. Sever loss found in 1 patient who had knee pain. The association of anterior knee pain with patellofemoral space is significant.

Patellar displacement and patellar shift,

No displacement found in 10 patients

Lateral displacement

1mm displacement found in 1 patient, 2 mm displacement in 6 patients, 3 mm in 2 patients, 4 mm in 2 patients and 5 mm in 1 patient who had pain.

Medical displacement

1 mm in 2 patients, 2 mm in 3 patients, 3 mm in 2 patients. The difference is not statistically significant.

Patellar shift

2 patients had abnormal lateral shift of more than 30%, which is abnormal and both had anterior knee pain.

Patellar sclerosis:

Patellar sclerosis was absent in 28 patients.

Lateral facet sclerosis noted in 2 patients. The difference is not statistically significant.
Osteophytes

Patellar osteophytes were absent in 24 patients. Marginal osteophytes was noted in the lateral facet of 6 patients. The difference is not quite statistically significant.

Complications

One female patient who had bilateral knee arthroplasty, had foot drop in one knee following the surgery, which was completely recovered in the 3 months post operative period.

Patient satisfaction

15 patients (71%), (22 knees) were enthusiastic, 6 patients (29%), (8 knees) were satisfied.

Correlation of clinical and radiological results

The association of anterior knee pain with various demographic, clinical and radiological features were discussed as above. The other correlation were

1. Knee score and disease

Out of 16 patients who had osteoarthritis, 8 patients had excellent score, 11 patients had good and 1 patients had fair score. All the rheumatoid patients had good score.

No patient had poor score. The difference is not statistically significant.

2. Functional score and disease: out of 16 patients who had osteoarthritis, patients had excellent score, 8 patients had good, 1 patient had fair score an d1 patient had poor score. In rheumatoid patients 2 had good score, 3 had fair score and 2 had poor score. The difference is not statistically significant.

3. Knee score and range of flexion

Out of 9 knees 5 patients had knee flexion range of 111 to 120°, 2 patients had 120 to 130 flexion. 16 patients shown god score, among them, 8 patients had 111 to 120° flexion, 5 patients had below 100° flexion. The difference is not significant.

Functional score and range of flexion: out of 2 patients with excellent score, had knee flexion range of 111° to 120°, 10 patients shown good scores, among them, 6 patients had 111° to 120° flexion, out of 9 patients with fair score, 4 patients had 111° to 120° flexion and 3 patients had below 100° flexion. The difference is not significant.

Prosthesis and range of knee flexion

Out of 7 patients in whom PFC was used, 4 patients had 111° to 120° flexion, 2 patients had 101° to 110°, 1 patient had
below 100° flexion. Out of 15 in whom natural knee was used, 1 patient had 121° to 130° flexion, 7 patients had 111° to 120°, 2 patients had 101° to 110°, 4 patients had less than 100° knee flexion. The difference is not significant.

Discussion

The current study evaluated the functional results of the knee performed without patellar resurfacing. At surgery however it was ensured that all the marginal osteophytes were excised. The patellar surface was smoothened and patelloplasty was done. Patella was refashioned to as near normal geometry as possible. It was ensured that patellar tracking was as congruent as possible and if needed limited lateral release was performed. The mean range of knee flexion overall in group improved from 90° to 114° though the present cohort was small group, we could not identify any correlation between the postoperative range of movement and the findings of the patellofemoral joints in terms of congruence angle patellar tilt angle. Mean preoperative knee score of 30 points improved to 92 points at the latest review and that of functional score from 48 to 74 points. The results obtained in the present study are similar and comparable to the data that were published (11,12). Barrack et al (12) reported that the mean Knee Society preoperative score was a scale ranging from 0 to 200 points and the postoperative score was 89.7 points (range, 33 to 132 points) and the score was reported to be improved to a mean of 172.7 points (range, 98 to 200 points) and these authors could detect no significant difference between the knees that had had patellar resurfacing and those that had not with regard to the over-all score (p = 0.63), the subscore for pain (p = 0.56), or the subscore for function (p = 0.77). We also could detect no difference between the treatment groups, with the numbers available, with regard to patient satisfaction or the responses to questions involving the function of the patellofemoral joint, including the ability to exit from an automobile, to rise from a chair, and to climb stairs. It is necessary however that proper care and attention is paid to prepare the non resurfaced patella with proper excision of the marginal osteophytes patelloplasty and ensure tracking of the patella. The total knee arthroplasty resulted in the occurrence of anterior pain in some cases which were not subjective by whether or not the patella had been resurfaced. The incidence of preoperative anterior pain,did not help to envisage the development postoperative clinical scores, the
postoperative of anterior pain and resurfacing.

References


9. Ewald F.C., Leg lift technique for simultaneous femoral, tibial and patella prosthetic cementing, rule of no thumb for patella tracking and steel rod rule for ligament tension. Tech Orthop. 6: 44-61991.
