Patellar Resurfacing Versus Patellar Nonresurfacing in Total Knee Arthroplasty: A Retrospective Study

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Abstract

Background: Patellar resurfacing in total knee arthroplasty (TKA) is a matter of long-standing debate and there is no consensus regarding the superiority of either patellar resurfacing or patellar nonresurfacing.

Objectives: We aimed to compare the outcomes of patellar resurfacing with patellar nonresurfacing in a cohort of knee OA patients sustaining a TKA.

Methods: In this retrospective study, patients who had undergone TKA between 2001 and 2011 in two hospitals in Tehran, Iran, were included. The Persian version of Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) was used to quantify the health status of patients. Post-operative complications and rate of reoperation were also compared between the two study groups.

Results: The study population consisted of 89 patients in the resurfacing and 72 patients in the nonresurfacing groups. The demographic characteristics of the patients were not significantly different. The mean total WOMAC scores were 19.1 ± 8.8 and 19.6 ± 9.7 for the resurfacing and nonresurfacing groups (P = 0.55). No significant difference was observed between the mean WOMAC subscale scores of the two study groups including pain (P = 0.73), stiffness (P = 0.24), and physical function (P = 0.84). Two reoperations (2.2%) were performed in the resurfacing group and one (1.4%) in the nonresurfacing group.

Conclusions: The health status and rate of reoperation were not considerably different between the patellar resurfacing and nonresurfacing groups. These results reveal that patellar resurfacing is not necessary in TKA.

Keywords: Patellar Resurfacing, Patellar Nonresurfacing, Total Knee Arthroplasty

1. Background

Osteoarthritis (OA) is one of the most prevalent debilitating conditions of the elderly population, characterized by the progressive degradation of articular cartilage (1). The prevalence of symptomatic knee OA is estimated 10% in males and 13% in females aged 60 years or older (2), which has doubled since the mid-20th century mainly due to the recent increase in life expectancy and body mass index (BMI) (3). The prevalence of knee OA is even higher in rural areas, as a prevalence of as high as 19.34% has been reported in rural areas of Iran (4).

Along with the increased prevalence of knee OA, the rate of patients who sustain a total knee arthroplasty (TKA) also has grown and thus, the need for a more optimized TKA remains critical. Yet, there is no consensus regarding the many aspects of this surgery and further studies are warranted to resolve these uncertainties (5).

Patellar resurfacing is a technique in which the surgeon attaches a tibial implant to the backside of the patella to fit smoothly with the femoral implant in TKA (6) (Figure 1). Patellar resurfacing, as one of the most controversial subjects in TKA, is a matter of long-standing debate and different point of views have been provided in this respect. Proponents of patellar resurfacing point out the advantages such as cost-effectiveness, better functional outcomes, less anterior knee pain, and lower number of reoperations. Advocates of patellar retention believe that resurfacing entails a higher risk of patellar fracture, dislocation, patellar tendon injury, and patellar component loosening (7). Moreover, the latter group believes that resurfacing offers no benefit in functional outcomes, reoperation rate, and total health-care cost (8). In consequence, there is no agreement on the best management of patella in TKA (9), such that more than 90% of surgeons in North America, 60% of surgeons in Australia, 80% of the
surgeons in Denmark, and only 2% of the surgeon in Sweden and Norway resurface the patella in TKA (10).

2. Objectives

Considering the same controversy in Iran and other parts of the world (11), in this study we aimed to compare the results of patellar resurfacing with patellar nonresurfacing in a cohort of knee OA patients sustaining a TKA.

3. Methods

This study was approved by the review board of our institute and informed consent was obtained from the patients to use their medical data. In a retrospective study, the patients who had undergone TKA between 2001 and 2011 in one of two hospitals in Tehran (Mostafa Khomeini Hospital and Parsian Hospital) were identified. The inclusion criteria were age of > 50 years and follow-up of at least 12 months. The exclusion criteria were history of patellar fracture, patellofemoral instability, and patellectomy. Patients who were not available for the final assessment were excluded as well.

The patients’ medical data were used to investigate the post-operative complications such as patellar fracture, dislocation, patellar tendon injury, and implant failure. The Persian translation of Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) (12) was used to quantify the health status of the patients. The WOMAC consists of three subscales of pain, stiffness, and physical function, and its total score ranges from 0 to 96, where a higher score represents a worse health status.

From a total of 266 patients who underwent a TKA surgery during the study period, 203 were eligible for the study, from which 161 cases were available for the final evaluation of the health status and were included in the analysis. Patellar resurfacing and nonresurfacing were performed in 89 and 72 patients, respectively. The same postoperative protocol was used for both groups of patients.

3.1. Statistical Analysis

SPSS version 16 was used for all the statistical evaluations. Descriptive data are presented as mean ± standard deviation (SD) or numbers and percentages. Independent samples t-test or its nonparametric equivalent (Mann-Whitney U test) was used for the comparison of mean values between the resurfacing and nonresurfacing groups. The Chi-square test was run for the comparison of qualitative variables between the two groups. P value less than 0.5 was considered statistically significant.

4. Results

The study population included 31 males and 130 females with the mean age of 64.2 ± 13.6 years (age range: 55 to 80 years). The mean follow-up period of the patients was 4.63 ± 2.12 years, ranging from 1 to 8.5 years. The BMI of the patients was 32.1 ± 3.87 kg/m². No significant difference was observed in the demographic characteristics of the two study groups (Table 1).

The mean total WOMAC score of the patients was 19.3 ± 9.2. The mean scores of pain, stiffness, and physical function subscales were 4.62 ± 1.72, 1.87 ± 0.91, and 12.82 ± 6.6, respectively.

The mean total WOMAC scores were 19.1 ± 8.8 and 19.6 ± 9.7 for the resurfacing and nonresurfacing groups (P = 0.55). The mean WOMAC score of the patients in the pain subscale was 4.5 ± 1.9 for the resurfacing and 4.77 ± 1.96 for the nonresurfacing groups (P = 0.73). The mean WOMAC score of the patients in the stiffness subscale was 1.65 ± 0.83 for the resurfacing and 2.16 ± 0.98 for the nonresurfacing groups (P = 0.24). The mean WOMAC score of the patients in the physical function subscale was 12.95 ± 6.62 for the resurfacing and 12.67 ± 6.64 for the nonresurfacing groups (P = 0.84). Accordingly, no significant difference was observed in the total or subscale scores of WOMAC between the patients of the study groups (Table 2).

4.1. Post-Operative Complications

Two patients in the resurfacing group required a revision, one due to patellar fracture and the other one due
Table 1. Comparison of the Demographic Characteristics Between the Patients of the Two Study Groups<sup>a, b</sup>

<table>
<thead>
<tr>
<th>Variable</th>
<th>Resurfacing Group, N = 89</th>
<th>Nonresurfacing Group, N = 72</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y</td>
<td>63.9 ± 13.1</td>
<td>64.5 ± 13.9</td>
<td>0.36</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>18 (20)</td>
<td>13 (18)</td>
<td>0.44</td>
</tr>
<tr>
<td>Female</td>
<td>71 (80)</td>
<td>59 (82)</td>
<td></td>
</tr>
<tr>
<td>Side</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right</td>
<td>46 (52)</td>
<td>39 (54)</td>
<td>0.52</td>
</tr>
<tr>
<td>Left</td>
<td>43 (48)</td>
<td>33 (46)</td>
<td></td>
</tr>
<tr>
<td>BMI, kg/m²</td>
<td>32.3 ± 3.75</td>
<td>31.8 ± 3.93</td>
<td>0.68</td>
</tr>
<tr>
<td>Follow-up, mo</td>
<td>4.89 ± 2.22</td>
<td>4.42 ± 2.13</td>
<td>0.39</td>
</tr>
</tbody>
</table>

Abbreviations: BMI, body mass index.

<sup>a</sup>Values are expressed as mean ± SD or No. (%). A P value of < 0.05 is considered significant.

<sup>b</sup>A P value of < 0.05 is considered significant.

Table 2. Comparison of the Total and Subscale WOMAC Scores Between the Patellar Resurfacing and Nonresurfacing Group<sup>a, b</sup>

<table>
<thead>
<tr>
<th>Variable</th>
<th>Resurfacing Group, N = 89</th>
<th>Nonresurfacing Group, N = 72</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>4.5 ± 1.9</td>
<td>4.77 ± 1.96</td>
<td>0.73</td>
</tr>
<tr>
<td>Stiffness</td>
<td>1.55 ± 0.83</td>
<td>2.16 ± 0.98</td>
<td>0.24</td>
</tr>
<tr>
<td>Physical function</td>
<td>12.95 ± 6.62</td>
<td>12.67 ± 6.64</td>
<td>0.84</td>
</tr>
<tr>
<td>Total WOMAC</td>
<td>19.1 ± 8.8</td>
<td>19.6 ± 9.7</td>
<td>0.55</td>
</tr>
</tbody>
</table>

<sup>a</sup>Values are expressed as mean ± SD. A P value of < 0.05 is considered significant.

<sup>b</sup>A P value of < 0.05 is considered significant.

One patient in the non-resurfacing group also required a revision due to severe anterior knee pain. No case of patellar tendon injury or dislocation was recorded in either group.

5. Discussion

In this study, we compared the outcome of TKA with and without patellar resurfacing at a mean follow-up period of 4.63 years in two Iranian hospitals. According to our results, the total and subscale WOMAC scores, including pain, stiffness, and physical function scores, were not significantly different between the two study groups. Two (2.2%) reoperations were performed in the resurfacing group and one (1.4%) reoperation was conducted in the nonresurfacing group.

Kaseb et al. performed the same comparison in a short-term randomized clinical trial on Iranian TKA population. According to their results, no significant difference was observed between resurfaced and non-resurfaced groups in terms of outcome measures including the WOMAC score. Moreover, the range of motion was not significantly different between the two study groups. No revision surgery was required in any of the participants as well. They concluded that the short-term results of patellar resurfacing and non-resurfacing in TKA were similar (13).

The advantages and disadvantages of patellar resurfacing and non-resurfacing have also been assessed in several systematic reviews and meta-analyses through the analysis of comparative studies. Chen et al. in 2013 in a meta-analysis of randomized controlled trials compared the outcome of patellar resurfacing versus nonresurfacing in TKA. In total, 14 trials assessing 1,725 knees were included in their study. According to their results, the risk of reoperation was reduced by 4% following patellar resurfacing. No significant difference was observed in anterior knee pain, knee pain score, knee society score, and knee function score of the two groups. Yet, in long-term follow-up (> 5 years) the knee society scores were superior in resurfacing group. Altogether, they concluded that the benefit of patellar resurfacing was limited (14).

In 2018, Longo et al. cumulated data from randomized controlled studies on patellar resurfacing to evaluate the advantages and disadvantages of this procedure with particular attention to anterior knee pain, follow-up, reoperation rate, and knee scores. Based on their study, the rate of reoperation was 1% for patellar resurfacing and 6.9% for non-resurfacing groups. Moreover, the resurfacing group
revealed a significantly higher postoperative knee society score pain and postoperative hospital for special surgery score. Accordingly, they concluded that patellar resurfacing group outperformed the non-resurfaced group, and thus resurfacing is the more effective option (7).

Grassi et al. in 2018 systematically reviewed the overlapping meta-analyses of patellar resurfacing versus patellar retention in primary TKA. Their study included a meta-analysis of randomized controlled trials that compared TKA with and without patellar resurfacing. In total, 10 meta-analyses, published between 2005 and 2015, were included in their study. Two out of 10 studies found a significant increase in knee society score of resurfacing groups. In 4 out of 10 meta-analyses, the incidence of anterior knee pain was lower in resurfacing groups in comparison with nonresurfacing groups. The other six meta-analyses also reported a greater risk of re-intervention in nonresurfacing groups. Yet, they concluded that resurfacing was not superior to nonresurfacing (15).

We found no significant difference between the patellar resurfacing and nonresurfacing groups in terms of pain, stiffness, physical activity, and reoperation rate. Reviewing the literature also revealed no or negligible differences between patellar resurfacing and nonresurfacing groups. Thus, it can be concluded that patellar resurfacing is unnecessary in TKA.

The main limitation of this study was the retrospective design of the investigation that might have adversely affected the quality of data. Moreover, the mean follow-up period of 4.63 years is barely adequate for the assessment of complications such as loosening of the patellar component. Thus, future prospective randomized trials with longer follow-up periods are still welcomed to shed light on the advantages and disadvantages of patellar resurfacing.

References


Fukharian MA et al.