Fixed- versus mobile-bearing total knee arthroplasty in Indian patients

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ABSTRACT

Purpose. To compare the mid-term clinical outcomes in Indian patients after total knee arthroplasty (TKA) using a fixed- or mobile-bearing prosthesis.

Methods. 120 consecutive patients (50 men and 70 women) aged 55 to 76 (mean, 63) years who had arthritis of the knee with similar deformity and range of motion were randomised to undergo TKA using a fixed- or mobile-bearing prosthesis. Patients with mediolateral instability and infective arthritis were excluded. Knee Society knee and functional scores, range of motion, and the presence of flexion contracture were assessed.

Results. The mean follow-up duration was 3.5 (range, 1–4.6) years. The mid-term outcome of the 2 groups was comparable. One patient with a mobile-bearing prosthesis had recurrent dislocation at postoperative week 2, owing to iatrogenic medial collateral ligament injury.

Conclusion. Long-term studies of both functional and radiological outcomes are needed to determine the indications for fixed- versus mobile-bearing prostheses.

Key words: arthroplasty, replacement, knee; India

INTRODUCTION

Total knee arthroplasty (TKA) is a widely used treatment for relieving pain, correcting deformity, and maintaining movement.1 TKA with a symmetric fixed-bearing design has yielded good long-term results, but there are problems related to patellofemoral articulation, polyethylene wear, and osteolysis.2-5 A mobile-bearing prosthesis was therefore designed to solve these problems, especially in young patients. Congruence between the femoral component and the superior surface of the rotating polyethylene reduces polyethylene wear, whereas rotation between the inferior polyethylene surface and the metal tray reduces stress on the metal tray and the tibial bone interface.4,5 Nonetheless, a spin
out may occur and lead to early failure, especially in the presence of flexion asymmetry. Thus, balancing the flexion gap is very important. Fixed-bearing implants may also fail early, but more often they fail late secondary to wear rather than flexion instability or asymmetry. We compared the mid-term outcomes of Indian patients after TKA using a fixed- or mobile-bearing prosthesis.

MATERIALS AND METHODS

From July 2002 to December 2006, 120 consecutive Indian patients (50 men and 70 women) aged 55 to 76 (mean, 63) years who had arthritis of the knee with similar deformity and range of motion were randomised to undergo TKA using a fixed- (NexGen, Zimmer) or mobile- (low-contact stress rotating platform, Depuy) bearing prosthesis (Table). Patients with mediolateral instability and infective arthritis were excluded.

According to the Knee Society clinical rating system, 74 (62%) and 22 (18%) patients were categorised in groups B and C, respectively, based on the status of the other joints and medical comorbidities.

Antibiotic prophylaxis (intravenous cefazolin 2 g 1.5 hours before inflation of the tourniquet followed by 1 g every 8 hours for 3 days) and anti-thrombotic prophylaxis (subcutaneous enoxaparin or diltiaparin on the night before surgery until postoperative day 5) were given. All operations were performed under regional (spinal or epidural) anaesthesia with tourniquet control via a medial parapatellar approach. No patella was replaced, but all patients had a patelloplasty. Hybrid fixation (a cementless femoral component with a cemented tibial component) was used in 8 mobile- and 12 fixed-bearing prostheses; the remainder was all cemented.

Rehabilitation included the use of a knee immobiliser for 2 days, active and passive mobilisation and walking with support from day 3. Patients were followed up at week 2 and 6, month 3 and 6, and bi-yearly thereafter.

Performance of the replaced knee and overall function were assessed using the Knee Society knee and functional scores (maximum score, 100 each). The flexion range and the presence of flexion contracture were assessed using a goniometer. Differences between groups were compared using independent t-test. A p value of <0.05 was considered significant.

RESULTS

The mean follow-up duration was 3.5 (range, 1–4.6) years. Two patients were excluded from the analysis: one died on postoperative day 1 due to pulmonary embolism, and another (in the mobile-bearing group) had recurrent dislocation at postoperative week 2 owing to iatrogenic medial collateral ligament injury.

In the respective fixed- and mobile-bearing groups, the mean improvements in Knee Society knee and functional scores were 55 and 52, in range of motion were 13° and 13°, and in flexion deformity were 14° and 12° (Table). 93% of the patients had excellent or good Knee Society knee scores. Only one patient in the mobile-bearing group required the help of a cane for walking. The mid-term outcome in terms

<table>
<thead>
<tr>
<th>Variable</th>
<th>Fixed-bearining</th>
<th>Mobile-bearing</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients</td>
<td>60</td>
<td>60</td>
<td>-</td>
</tr>
<tr>
<td>Mean (range) age (years)</td>
<td>63 (57–76)</td>
<td>63 (55–75)</td>
<td>0.81</td>
</tr>
<tr>
<td>Males: females</td>
<td>20:40</td>
<td>30:30</td>
<td>1.0</td>
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<tr>
<td>Mean (range) follow-up duration (years)</td>
<td>3.3 (1–4.3)</td>
<td>3.6 (1–4.6)</td>
<td>0.94</td>
</tr>
<tr>
<td>Knee Society knee and functional scores</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preop</td>
<td>36.5±16.7 (0–60)</td>
<td>39.5±21.6 (0–50)</td>
<td>0.40</td>
</tr>
<tr>
<td>Final</td>
<td>91.7±11.6 (60–100)</td>
<td>91.2±12.8 (55–100)</td>
<td>0.89</td>
</tr>
<tr>
<td>Range of motion</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Preop</td>
<td>88.5±15.0 (70°–100°)</td>
<td>88.9±15.0 (70°–100°)</td>
<td>0.67</td>
</tr>
<tr>
<td>Final</td>
<td>101±7.8° (75°–115°)</td>
<td>102.7±7.9° (85°–115°)</td>
<td>0.78</td>
</tr>
<tr>
<td>Flexion contracture</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preop</td>
<td>16°±2.0° (5°–20°)</td>
<td>14°±2.1° (5°–20°)</td>
<td>0.25</td>
</tr>
<tr>
<td>Final</td>
<td>1.8°±6.6° (0°–15°)</td>
<td>2.2°±6.2° (0°–10°)</td>
<td>0.94</td>
</tr>
</tbody>
</table>

* Data are presented as mean±SD (range), unless otherwise stated.
of Knee Society knee and functional scores, range of motion, and survival rates were comparable in the 2 groups.

One patient in the mobile-bearing group developed popliteal artery thrombosis immediately after surgery (distal pulses were absent). The patient recovered after thrombectomy. Two patients endured superficial infections and recovered after prolonged antibiotic therapy. Two patients (one each from the fixed- and mobile-bearing groups) had a tear in the upper end of the tibia; they recovered after lag screw fixation and prolonged non-weight bearing.

**DISCUSSION**

The fixed-bearing prosthesis provides long-term fixation, with survival rates of 95 to 97%. The mobile-bearing prosthesis enables a near-normal joint mechanism and almost-complete femorotibial congruence, and thus reduces polyethylene wear and osteolysis. Both prostheses have yielded comparable results; only one study reported superior results following arthroplasty using mobile-bearing prostheses. Long-term studies of both functional and radiological outcomes are needed to determine the indication for fixed- versus mobile-bearing prostheses.

Kinematic patterns were similar with both prosthesis designs. Dislocation is a potential complication in mobile-bearing knees, with rates ranging from 1.1% to 9.3%. Arterial complications are rare. Only a few cases of popliteal artery thrombosis after TKA have been reported.

**REFERENCES**


