UNICOMPARTMENTAL ARTHROPLASTY OF THE KNEE
A FOLLOW-UP OF 3 TO 9 YEARS

GRAHAME S. INGLIS

From Christchurch Public Hospital, Christchurch

A retrospective review of medial compartment arthroplasty in 22 patients (22 knees) is reported. The operations were performed between 1973 and 1978. Eighty-six per cent were rated good or excellent using the knee rating system devised by the Hospital for Special Surgery, New York. Excellent or good results were achieved in six patients who had previously had a high tibial osteotomy. At the time of follow-up significant loosening had not occurred, although progression of patellofemoral disease was noted. This study supports the promising results reported for unicompartmen-tal resurfacing arthroplasty in the elderly.

Unicompartmental arthroplasty (Marmor 1973) for single compartment joint disease is an attractive concept, and an alternative procedure to high tibial osteotomy (Coventry 1973). However, the operation has been criticised because of poor early results (Insall and Walter 1976; Laskin 1978), especially when used for medial compartment disease. Insall and Walter (1976) reported that 42% of results were fair or poor after unicompartmental replacement and concluded that it should not be used for medial compartment disease; if the disease was sufficiently advanced, bicompartmen-tal arthroplasty should be performed.

By contrast, several authors have reported favourable results and remain optimistic about unicompartmen-tal knee replacement (Marmor 1973, 1976, 1979; Dolibois and Mallory 1976; Scott and Santore 1981; Shurley et al. 1982; Bae, Guhl and Keane 1983).

The purpose of this retrospective review was to analyse the results of unicompartmen-tal arthroplasty more than three years after operation, and to ascertain its place in treatment.

MATERIALS AND METHODS
Between 1973 and 1978 two surgeons at the Christchurch Public Hospital performed 44 resurfacing procedures using a unicondylar prosthesis (Figs 1 and 2); this operation was not performed before 1973. Of these 44 knees, 14 were lost to follow-up, 11 because the patients had died (of unrelated causes). This study therefore concerns 30 knees in 30 patients. The average age of the patients at the time of operation was 66 years (range 51 to 80 years). The ratio of men to women was 2:3. All the patients presented for operation complaining of severe pain in the knee with or without loss of movement. Eight had undergone previous operation; six had a high tibial osteotomy and two a patellectomy. (One had neither an osteotomy and a patellectomy.)

From the records provided, it was impossible to evaluate the condition of the knees before operation. The operative procedure was performed as described and demonstrated by Marmor (1973). Routine anticoagulant and antibiotic prophylaxis was not practised.

![Fig. 1](image1.png)  ![Fig. 2](image2.png)

Anteroposterior and lateral radiographs nine years after operation showing the maintenance of the lateral joint space, with minimal evidence of loosening. There is impingement of the femoral component on the patella and advanced patellofemoral osteoarthritis.

Twenty-two medial compartmental and eight bicompartmen-tal arthroplasties were carried out; four geometric components and 26 Marmor components were used. The tibial components used included twelve of 9 mm and six of 6 mm; in four cases the component size was not recorded.

The average follow-up was 5 years 9 months (range 3 to 9 years). All the patients were reviewed and examined by the author, and their knees were assessed using the Hospital for Special Surgery scoring system promoted by Ranawat, Insall and Shine (1976) and subsequently used by Insall and Walter (1976) and Shurley et al. (1982).
This scoring system assesses the knee both subjectively and objectively, awarding points to evaluate pain (30), function (22), range of movement (18), strength (10), flexion contracture (10) and instability (10). Points are subtracted for extensor lag, angulatory deformity and the use of walking aids. The maximal score is 100 points; 85 to 100 points is graded as excellent, 70 to 84 points as good, 60 to 69 points as fair, and below 60 points as a failure.

Of the six knees with 6 mm components, five achieved excellent or good ratings; and of the 12 knees with 9 mm components, 11 were excellent or good. One from each group was therefore unsatisfactory. Six millimetre tibial components are no longer used in Christchurch.

The range of varus and valgus measured from follow-up radiographs varied from 4° varus to 10° valgus (average 3.9° valgus). There appeared to be no relation between these angles and the rating.

Complications. There were four complications from the procedure: one patient had superficial wound breakdown which required resuture, but went on to achieve an excellent result; one patient developed acute renal failure secondary to analgesic nephropathy; and two knees required manipulation, one at eight weeks and one at five months—both were subsequently rated as failures.

Analysis of failures. In the group of 22 knees there were three failures (scoring less than 60). One patient never regained flexion of his knee. He underwent a manipulation at five months and then developed medial compartment pain; the tibial component was revised but with no improvement. In another patient the knee became ankylosed in 20° of hyperextension, but remained painless (Figs 5 and 6). The third failure was in a 53-year-old alcoholic weighing 115 kg with an arthrodesis of his other knee. At 106 months after operation the tibial component had subsided into 22° of varus and the knee was stiff and painful, but the patient remained satisfied.

Loosening. There was loosening in 10 knees based on the

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### Table I. Summary of results of unicompartmental knee arthroplasty and comparison with other series

<table>
<thead>
<tr>
<th>Series</th>
<th>Total</th>
<th>Excellent</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
<th>Percentage of satisfactory results</th>
</tr>
</thead>
<tbody>
<tr>
<td>This series</td>
<td>22</td>
<td>14</td>
<td>64</td>
<td>23</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Insall and Walter 1976</td>
<td>19</td>
<td>5</td>
<td>26</td>
<td>6</td>
<td>32</td>
<td>3</td>
</tr>
<tr>
<td>Shurley et al. 1982</td>
<td>59</td>
<td>28</td>
<td>47</td>
<td>17</td>
<td>29</td>
<td>6</td>
</tr>
</tbody>
</table>

The figures in italic type are all percentages.
evidence of a radiolucent line around one or both components or any change in position of the components (Stauffer 1982). In the majority of knees these signs had been seen on early follow-up films, and had not progressed markedly.

Patellofemoral degeneration. Those patients with pain after operation and at follow-up referred it to the patellofemoral joint (Fig. 2). Radiography confirmed the progression of osteoarthritic changes in the patellofemoral joint, whereas the lateral compartment appeared to maintain its joint space.

DISCUSSION

These results confirm that unicompartmental arthroplasty of the knee is a valuable alternative to high tibial osteotomy in elderly patients, in whom the results of osteotomy are often poor. Insall and Walter (1976) reported poor results, but 15 of their 24 patients had undergone previous patellectomy, indicating multicompartamental disease. Marmor (1976) and others (Dolibois and Mallory 1976; Scott and Santore 1981; Shurley et al. 1982; Bae et al. 1983) achieved favourable results, their poor results occurring mainly with 6 mm tibial components which are no longer used.

Laskin (1978) based his criticism of the operation on its possible hastening of wear in the lateral compartment. In this present review, progression of osteoarthritis in the lateral compartment was not evident on radiographs or in the single knee that was re-explored. Jones et al. (1981) similarly reported that lateral progression of the disease was less of a problem than suggested by Laskin (1978), although when it did occur the prognosis was poor. Laskin did not relate failure to the size of the tibial component, though others have found such a correlation. In this present study, there did not appear to be any relation between the size of the tibial component and progression of disease in the lateral compartment.

Osteoarthritis of the patellofemoral joint was found to progress with time, particularly in those patients who complained of pain early in their follow-up. In some of the earlier cases the femoral component did not appear to have been recessed sufficiently to prevent impingement of the patella, possibly accounting for the progression of the patellofemoral disease. Laskin (1978) and Marmor (1979) have reported similar findings; however, Jones et al. (1981) did not consider patellofemoral degeneration to be a problem. With improved operative techniques and careful placement of the femoral component, the patellofemoral joint appears to withstand the procedure without the deterioration seen in the earlier series.

Of interest is the satisfactory results achieved in patients who had undergone previous high tibial osteotomy. It has been suggested that these patients would not benefit from a resurfacing procedure; however, in this study, excellent or good results were obtained in all six patients who had unicompartmental replacement between five months and seven years after high tibial osteotomy (they all had the second operation because of pain in the medial compartment).

Evidence of loosening, as indicated by a radiolucent line about the components, was seen in 10 patients. However, the lines did not progress and clinically the patients remained satisfactory; no revisions were performed.

Conclusion. Where joint involvement is bicompartamental or tricompartmental then a complete resurfacing procedure is indicated. But for medial compartment disease, unicompartmental replacement is a satisfactory procedure, particularly in patients over the age of 65 years in whom long periods of immobilisation should be avoided. It also has the advantage that bone resection is minimal and therefore does not preclude subsequent bicompartamental (or tricompartmental) arthroplasty should the disease advance, or the components loosen.

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REFERENCES


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