The Lubinus patellofemoral arthroplasty
A FIVE- TO TEN-YEAR PROSPECTIVE STUDY
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We present a prospective review of the outcome of 76 Lubinus patellofemoral arthroplasties carried out in 59 patients between 1989 and 1995. At a mean follow-up of 7.5 years, 62 knees in the 48 patients were reviewed; 11 patients (14 knees) had died. None was lost to follow-up.

The clinical outcome using the Bristol Knee Scoring system was satisfactory in 45% of the cases. Maltracking of the patella, resulting in lateral tilt, subluxation and polyethylene wear, was the most common complication (32%). Revision surgery was carried out in 21 knees (28%) giving a cumulative survival rate of 65% (confidence interval (CI) 49 to 77) at eight years. The survival rate for revision and moderate pain was 48% (CI 36 to 59) at six years. Progression of arthritis was seen in seven cases (9%). In five of these (6.5%), the symptoms were severe enough to need revision surgery. Due to the high proportion of unsatisfactory results, we have discontinued the use of this prosthesis.

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Isolated symptomatic patellofemoral osteoarthritis is reported in 8% of women and 2% of men over the age of 55 years.1 Conservative management comprises rest, physiotherapy and medication. The surgical options include elevation of the tibial tubercle,2 spongiosation,3 patellectomy,4 patellar resurfacing (hemiarthroplasty)5 and patellofemoral arthroplasty.6-8

In 1975 Lubinus developed his own patellofemoral endoprosthesis, using resurfacing and gliding mechanics in an attempt to copy the normal anatomy (Fig. 1). He reported good early results with this prosthesis in 1979,9 but to our knowledge, no long-term study of its use has been reported. This prosthesis has been used in Bristol for six years and we present our medium-term results.

Patients and Methods
We carried out patellofemoral arthroplasty using the Lubinus prosthesis (Waldemar Link, Hamburg, Germany) in 59 patients (76 knees). There were ten men and 49 women with a mean age at the time of the surgery of 65.5 years (50 to 87). The preoperative diagnoses are given in Table I. At a mean follow-up of 7.5 years (5 to 10) after surgery, 48 patients (62 knees) were available for review; 11 patients (14 knees) had died, of whom all except one had satisfactory arthroplasties at the time of death. No patient was lost to follow-up.

We considered patellofemoral arthroplasty to be appropriate when there was clinical and radiological evidence of severe and established arthritis in the patellofemoral compartment, with a well-preserved and pain-free tibiofemoral joint (Fig. 2). Patients aged less than 50 years of age, or with a fixed flexion deformity of more than 10° or flexion of less than 90°, were excluded. The final decision was made at arthrotomy.

The operation was carried out through an upper medial parapatellar approach. The implant and operative technique used were as described by Lubinus,9 with one significant alteration. From 1992 onwards, the metal femoral trochlea was routinely reversed, such that the right femoral trochlea was used on the left knee and vice versa because patellofemoral tracking was found to be improved with that configuration.

In two patients there was, in addition, considerable arthritis of the medial compartment and, therefore, a St Georg Sled (Waldemar Link) medial condylar prosthesis was also inserted. Tracking of the patella was meticulously assessed after cementation of the prosthesis using the ‘no thumb technique’. If there was any tendency to medial lift-off, a formal lateral retinacular release was performed. This was required in 37 of 76 operations (48%). The patellar tracking was judged to be satisfactory at the end of all the procedures. The mean operating time was 50 minutes (30 to
Postoperative care included mobilisation with support from the second day. The mean length of hospital stay was nine days (7 to 14).

All knees were prospectively evaluated using the Bristol Knee Score (Table II) before operation and at eight months and 2, 5, 8 and 10 years after surgery. The results were graded excellent when the score was 90 points or more, good with a score between 80 and 89, fair between 70 and 79 and poor if the score was below 70. They were considered to be unsatisfactory when the score was below 80 points or the prosthesis was revised. Life-table and survival analysis was determined by the method of Armitage and Berry.

Radiographs were taken at each visit. We analysed anteroposterior and lateral weight-bearing views and tangential views of the patellofemoral joint for overall alignment, position of the components and for progression of arthritis in the remaining compartments.

Results

There were 62 knees available for analysis. The mean preoperative Bristol Knee Score (BKS) was 55 points (29 to 86). At the latest review of the 41 unrevised knees, it was 81 (42 to 100). The outcome was satisfactory (BKS 80 points and above) in 28 of 62 knees (45%) and unsatisfactory (BKS 79 points and below or the prosthesis revised) in 34 (55%).

The average BKS for pain before the operation was 5 (0 to 20), equivalent to continual severe pain which improved to 30 (15 to 40), equivalent to occasional mild pain. At the most recent review, 53% of the patients reported no pain, 26% had mild pain and 21% had moderate pain.

The mean preoperative range of flexion was 100° (90 to 120). At the latest follow-up, this had improved to 112° in 54% of the cases. It was unchanged in 29%, and in 17% of the cases it was less than before the operation.

We have looked at our results, both before and after 1992, to determine the effect of reversing the trochlea. Of the 21 patients who had revision, 13 had their initial operation before 1992. Of the 28 patients in whom the operation was satisfactory, 22 had their initial operation after 1992.

The higher proportion of patients whose knees had been revised or who had unsatisfactory results before reversing the trochlea, may be explained by the longer follow-up in this group of patients (Table III).

Table I. Aetiology of patellofemoral arthritis in the 76 knees

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Post-traumatic</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Primary osteoarthritis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lateral facet</td>
<td>61</td>
<td>80</td>
</tr>
<tr>
<td>Medial facet</td>
<td>8</td>
<td>10</td>
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<tr>
<td>Symmetrical</td>
<td>5</td>
<td>7</td>
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Table II. The Bristol Knee Score

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<tr>
<th>Score</th>
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<tbody>
<tr>
<td>Pain</td>
</tr>
<tr>
<td>Function</td>
</tr>
<tr>
<td>Technical merit</td>
</tr>
<tr>
<td>Movement</td>
</tr>
<tr>
<td>Deformity</td>
</tr>
<tr>
<td>Stability</td>
</tr>
<tr>
<td>Total</td>
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Fig. 1
Photograph of the Lubinus patellofemoral endoprosthesis. The patellar shape was subsequently changed to a round 'Mexican-hat design'.

Fig. 2
Radiograph showing a skyline view of the knee with isolated patellofemoral arthritis.

We have drawn survival curves from life-table analyses (Tables IV and V). The cumulative survival...
rate for revision was 65% (CI 49 to 77) at eight years (Fig. 3). The cumulative survival rate for revision and moderate pain was 48% (CI 36 to 59) at six years (Fig. 4).

Revision surgery was performed in 21 knees (28%). Of the 15 with maltracking of the patella, resulting in lateral tilt, subluxation and polyethylene wear (Fig. 5) five were revised to total joint replacement (Kinemax; Stryker, Limerick, Ireland) and ten to a different patellofemoral arthroplasty (Avon Patella; Stryker). Progression of arthritis in other compartments was noted in seven knees, and in five the symptoms were severe enough to need revision (Fig. 6). They were revised to a total knee replacement (Kinemax). One patient sustained a fracture of the patella and supracondylar fracture of the femur and was treated by a custom-made knee replacement.

Complications other than revisions. Patellar malalignment was seen in 24 of 76 knees (32%). Fortunately, this was not always symptomatic. Three of these were satisfactorily treated by patellar tendon realignment (Roux-Goldthwaite). Early in the study, seven knees had only the femoral trochlea replaced. They required insertion of a patellar button as a secondary procedure. Diagnostic arthroscopy was carried out in four knees. Two knees sustained fracture of the patella approximately one year after the operation. Both fractures healed, although one required open reduction and internal fixation. Mechanical loosening of the components was not observed during the period of study. The complications are shown in Table VI. Overall, at the final follow-up, 28 of 62 knees (45%) had satisfactory results and 34 (55%) were unsatisfactory.
Discussion

Patellofemoral arthritis is a relatively common condition which is often unrecognised. The symptoms may be modest and rarely produce severe disability. The natural history of the disease can extend over many years. Symptoms of sufficient severity to justify patellofemoral arthroplasty occur infrequently. Success depends upon many factors including the critical selection of the patient, balancing the extensor mechanism, and the choice of the patellofemoral implant. The results in the literature have varied. Blazina et al. reported poor results with patellofemoral arthroplasty in a patient population with a mean age of 39 years. More than 50% of their patients required additional surgery within two years. They concluded, however, that patellofemoral arthroplasty was an acceptable alternative for older women with isolated arthritis. Arciero et al. reported satisfactory results in 72% of their patients with a mean follow-up period of 5.2 years. Carter et al. studied 72 knees with a mean follow-up of four years. Despite a complication rate of approximately 20%, they achieved satisfactory results in 85% of the knees. Krajca-Radcliffe and Coker reported 88% satisfactory results in 16 knees at 5.8 years. Argenson, Guillaume and Aubaniac had a success rate of 84% at 5.6 years. Our follow-up is longer than the above series and the results are less satisfactory. The reasons for the poor results are persistent or recurrent patellar maltracking, the choice of implant or radiological progression of arthritis.
Patellofemoral replacement should always be carried out in conjunction with measures to obtain satisfactory alignment of the extensor mechanism since persistent lateral malalignment, if not corrected, will cause lateral tilt, subluxation and early wear of the patellar button. Preoperative malalignment of the patellofemoral joint associated with osteoarthritis of the lateral facet was present in 61 knees (80%). Lateral retinacular release was carried out in 48% of the cases. This compares with 70% of the cases in the series of Cartier et al and 87.5% of the series of Krajca-Radcliffe and Coker. Moreover, Cartier et al used a routine lateral release.

The normal trochlea is difficult to reproduce with a congruous patella throughout the range of flexion. Anatomical designs have not met with success. Patellar malalignment and instability have been cited as major complications in these designs. Cartier et al agree with Renard that a non-anatomical trochlear design is preferred. The Lubinus patellofemoral prosthesis is an unconstrained anatomical implant with a femoral trochlea of metal and a patellar button of high-density polyethylene. The trochlear component is narrow and short. It is symmetrical in the proximal region and asymmetrical distally. Since the trochlea has to be fitted anatomically, no adjustment can be made to improve tracking, congruence and contact. This could make the patella susceptible to malalignment, lateral tilt, polyethylene wear and impingement. This design characteristic makes it an unforgiving prosthesis.

Radiological progression of arthritis, needing revision, was seen in 6.5% of our cases. Arciero et al noticed this complication in 8.3% of their patients and Cartier et al in 5.5%. At present, we have not been able to predict who will develop progression of arthritis. It is of interest that 10% of the cases (8 knees) had wear of the medial facet. This may be an early stage of the arthritic variant described by McAlindon et al as medial tibiofemoral and patellofemoral disease. The two patients who had this condition and were treated by a medial St Georg Sled combined with a Lubinus prosthesis, continue to function well more than eight years later. Our experience of progression of the disease suggests that this arthritic variant might better be treated ab initio, by a total knee replacement.

We conclude that patellofemoral arthroplasty can give satisfactory results in suitably selected patients, with 45% of knees functioning well at 7.5 years. The operation should be viewed as a soft-tissue procedure involving resurfacing of the femoral trochlea and the articular surface of the patella. Every effort should be made to obtain proper balance of the extensor mechanism to ensure immaculate tracking of the patella. However, as the results of the Lubinus patellofemoral prosthesis have not been satisfactory in our hands we have discontinued its use.

We are grateful to Rosemary Greenwood, statistician at the Bristol Royal Infirmary for analysis of the data. We thank Mrs Sue Miller, research co-ordinator at the Avon Orthopaedic Centre for her secretarial support. No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

Table VI. Complications encountered following 76 Lubinus patellofemoral arthroplasties carried out in 59 patients

<table>
<thead>
<tr>
<th>Complication</th>
<th>Number</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Patellar malalignment/polywear</td>
<td>24</td>
<td>32.0</td>
</tr>
<tr>
<td>Disease progression</td>
<td>5</td>
<td>6.5</td>
</tr>
<tr>
<td>Revisions</td>
<td>21</td>
<td>28.0</td>
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</tbody>
</table>

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References


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