Unicompartmental knee arthroplasty

2- TO 12-YEAR RESULTS IN A COMMUNITY HOSPITAL

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We report the outcome of 135 knees with anteromedial osteoarthritis in which the Oxford meniscal-bearing unicompartmental arthroplasty was inserted in a district general hospital by a single surgeon. All the knees had an intact anterior cruciate ligament, a correctable varus deformity and the lateral compartment was uninvolved or had only minor osteoarthritis. The mean follow-up was 5.82 years (2 to 12).

Using revision as the end-point, the outcome for every knee was established. Five knees have been revised giving a cumulative rate of survival of the prosthesis at ten years of 94.04% (95% confidence interval 84.0 to 97.8). Knee rating and patient function were assessed using the modified Knee Society scoring system. The mean knee score was 92.2 (51 to 100) and the mean functional score 76.2 (51 to 100).

The survival of the implant is comparable to that reported by the designers of the prosthesis and not significantly different from that for total knee replacement. Unicompartmental knee replacement offers a viable alternative in patients with medial osteoarthritis. Appropriate selection of patients and good surgical technique are the key factors.

Isolated unicompartmental osteoarthritis of the knee is common. Operative treatment varies from high tibial osteotomy and unicompartmental knee replacement to total knee replacement according to the age of the patient and the level of activity. Different unicompartmental knee replacements have been used with varying rates of success. The congruent mobile-bearing Oxford knee replacement¹ was designed for the treatment of anteromedial osteoarthritis and was first used in 1982.

The advantages of unicompartmental arthroplasty over total knee replacement are preservation of bone stock, less invasive surgery, minimal blood loss, faster recovery, better range of movement and more physiological function.² It is also more cost-effective than total knee replacement.³

In 1998 Murray, Goodfellow and O'Connor,⁴ reported a cumulative rate of survival of 98% at ten years for the Oxford knee. A study from the Swedish Knee Arthroplasty Register reviewing 699 Oxford knee replacements cast doubt as to whether similar results could be achieved in other units.⁵ Svard and Price⁶ in 2001 reported a cumulative rate of survival of 95% at ten years in a non-teaching hospital.

We report the outcome of 135 Oxford unicompartmental knee replacements performed

over a period of 12 years by a single surgeon in a district general hospital in the UK.

Patients and Methods

Between 1989 and 2000, 135 medial Oxford unicompartmental knee replacements were implanted in 124 patients by a single surgeon (AS) in a non-teaching community hospital. There were 113 unilateral and 22 staged bilateral procedures.

All the knees had primary anteromedial osteoarthritis. Age and weight did not influence the selection of the patients. Fibrillation or marginal erosions of the lateral compartment and patellofemoral osteoarthritis of any severity were not a contraindication. All patients had a functionally intact anterior cruciate ligament. Patients with a fixed flexion deformity of more than 15° and those with a passively uncorrectable varus deformity were excluded.

There were 71 men and 53 women. The mean age was 70.2 years (58 to 87) in men and 73.1 years in women (53 to 88).

A standard midline incision and medial parapatellar arthrotomy were used to implant the prosthesis in the early days. With experience, the later operations were performed using a relatively small incision. The Oxford knee

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Table I. Details of the five revised arthroplasties

Time to revision (yrs)	Indication for revision	Operative findings	Procedure
0.9	Pain	Tibial component loose	TKR
1.0	Pain (valgus deformity)	Components firm	TKR
1.3	Pain	Tibial component loose	TKR
2.7	Pain	Tibial component loose and bearing dislocated	TKR
7.4	Dislocation of bearing	Components firm	Bearing exchanged

Table II. Survival table for the Oxford knee

Year	Number	Number withdrawn	Number of failures	Number at risk	Failure rate (%)	Cumulative survival (%)	95% confidence interval
0 to 1	135	7	1	131.5	0.76	99.22	94.6 to 99.8
1 to 2	127	3	1	125.5	0.80	99.22	94.6 to 99.8
2 to 3	123	13	2	116.5	1.72	98.43	93.8 to 99.6
3 to 4	108	27	0	94.5	0.00	96.73	91.5 to 98.7
4 to 5	81	7	0	77.5	0.00	96.73	91.5 to 98.7
5 to 6	74	11	0	68.5	0.00	96.73	91.5 to 98.7
6 to 7	63	15	0	55.5	0.00	96.73	91.5 to 98.7
7 to 8	48	12	1	42.0	2.38	96.73	91.5 to 98.7
8 to 9	35	7	0	31.5	0.00	94.04	84.0 to 97.8
9 to 10	28	7	0	24.5	0.00	94.04	84.0 to 97.8
10 to 11	22	21	0	10.5	0.00	94.04	84.0 to 97.8
11 to 12	1	7	0	8.5	0.00	94.04	84.0 to 97.8

Table III. Outcome studies for unicompartmental knee arthroplasty

Author/s	Prosthesis	Number of knees	Survival at ten years (%)
Marmor ⁹	Marmor	228	70
Scott et al ¹⁰	Unicondylar	100	85
Capra and Fehring ¹¹	Marmor comp II	52	94
Heck et al ¹²	Marmor, Zimmer I & II	294	91
Munk and Frokjaer ¹³	Marmor	68	92
Weale and Newman ¹⁴	St Georg	42	90
Cartier et al ¹⁵	Marmor	60	93
Ansari et al ¹⁶	St Georg	461	96
Tabor and Tabor ¹⁷	Marmor	67	84
Murray et al ⁴	Oxford	144	98
Squire et al ¹⁸	Marmor	140	90
Berger et al ¹⁹	Miller-Galante	62	98
Svard and Price ⁶	Oxford	124	95
Perkins and Gunckle ²⁰	Zimmer MG II	40	97

phase-II prosthesis⁴ (Biomet UK Ltd, Bridgend, UK) was used throughout.

Of the 124 patients (135 knees), 29 died and five were too ill to attend for follow-up. In these patients we determined the state of the implant from hospital and general practitioner records establishing that no further surgical procedure had been carried out. Five revisions had been performed. The remaining 85 patients (96 knees) attended a follow-up clinic. Function was determined using the modified Knee Society score⁷ in which each patient receives both a 'total knee score' assessing pain, range of movement and stability and 'functional score' assessing the ability to walk and climb stairs with 100 points maximum for each. The dual score theoretically eliminates the problem of declining scores from advancing age and medical comorbidity despite a sound prosthesis. A simple questionnaire recorded overall satisfaction with surgery and whether the patients would undergo the same procedure again. Blood transfusion and any complications were noted.

Statistical analysis. Using revision of the prosthesis for any cause as the end-point, a life table was constructed and rates of survival determined using Kaplan-Meier survival analysis.

Results

The mean follow-up was 5.82 years (2 to 12). The mean total knee score at follow-up was 92.2 (51 to 100). The mean functional score was 76.3 (20 to 100). A total of 89% of patients had good or excellent results for the total knee and 70% for the functional scoring. The discrepancy resulted from increasing age, medical comorbidity and disease in previously asymptomatic joints. The mean range of movement at follow-up was 114.6° (35 to 140). Overall, 49 (57%) of the patients had no pain, 28 (33%) mild or occasional and 8 (10%) moderate pain.

Revision operations were performed in five knees because of aseptic loosening in three, progressive valgus deformity in one and dislocation of the bearing in one (Table I). There were no cases of deep infection.

Fig. 1

Kaplan-Meier survival analysis using revision for any reason as an end-point.

Only 10 (12%) of the patients required blood transfusion. There were four haematomas, none of which needed surgical evacuation. Two patients had a deep-vein thrombosis and three knees a superficial wound infection which responded to antibiotics. Intra-operatively, one patient had fracture of the proximal tibia which was fixed with two partially threaded cancellous screws.

A total of 78 (92%) of patients were fully satisfied with the procedure and 67 (91%) expressed willingness to undergo a similar procedure in the opposite knee.

The cumulative survival (Table II) at five years was 96.73% (confidence interval (CI) 91.5 to 98.7) and at ten years 94.04% (CI 84.0 to 97.8) (Fig. 1). These figures represent the 'worst-case' scenario since no patient was lost to follow-up.

Discussion

Unicompartmental knee arthroplasty for the treatment of anteromedial osteoarthritis of the knee remains controversial despite excellent reported results (Table III).^{4,6,8-20} Appropriate selection of patients, improved surgical technique and better prosthetic design contribute to these.

In our series 80% of patients were over 65 years of age. It has been previously reported that the results are better in this age group.^{18,20}

We had one failure because of progression of arthritis in the lateral compartment within a year which resulted from slight overcorrection into valgus. Kennedy and White²¹ have shown that the best results occur when alignment is slightly undercorrected. In their study four of the five failed knees had post-operative alignment outside the recommended range.²¹ Neutral to slight valgus is the optimal alignment for unicompartmental knee arthroplasty for anteromedial osteoarthritis.

The survival rate of 94.04% of our series at ten years is comparable to that reported by Murray et al.⁴ We used their selection criteria. It is difficult to compare our results

with those from the Swedish Knee Arthroplasty Register⁵ since many surgeons with varying experience and training were involved and they did not define their indications for surgery. All the patients in our study were operated on by a single surgeon which contributed to the reliability of the survival data. We have confirmed that good long-term results can be obtained in unicompartmental knee replacement in a community hospital setting.

The Oxford meniscal bearing arthroplasty offers long-term relief from pain with good knee function in the treatment of anteromedial osteoarthritis of the knee with appropriate selection of patients and good surgical technique. Our results justify the use of unicompartmental surgery for isolated medial compartmental osteoarthritis of the knee.

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