

# The Oxford Unicompartmental Knee Prosthesis for the Treatment of Medial Compartment Knee Disease: 2 to 5 Year Follow-Up

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**ABSTRACT:** **Background:** Unicompartmental knee replacement has become a surgical alternative for treating isolated medial or lateral osteoarthritis of the knee or avascular necrosis of the femoral condyls.

**Objectives:** To evaluate the short-term results of the Oxford Phase 3<sup>®</sup> unicompartmental knee replacement for unicompartmental knee arthrosis or avascular necrosis of the medial femoral condyle.

**Methods:** During the period 2003–2005 a total of 59 patients (59 knees) underwent medial Oxford Phase 3<sup>®</sup> unicompartmental knee replacement in our unit. The patients were interviewed and examined, and standing anteroposterior and lateral X-rays were taken. All patients completed the Western Ontario and McMaster Universities Index of Osteoarthritis and the Short Form 12 questionnaire, and the International Knee Society score was evaluated. The data were collected and statistical analysis was performed.

**Results:** X-rays were performed and scores for the WOMAC and IKS were assessed for 42 patients (31 females, 11 males). At an average of 32 months after surgery the total WOMAC score was 30. The mean SF-12 physical score was 38 and the mean SF-12 mental score was 51. The mean IKS score was 166. Ninety-one percent of the patients had active flexion of 120 degrees or more. Of 59 knees 7 were converted to total knee arthroplasty – all of them within the first 2 years of starting the procedure and all of them in relatively young patients.

**Conclusions:** Despite the higher revision rate to TKR in this study, our findings confirm the short-term results reported in other studies of the Oxford medial unicompartmental knee and our early failure rate could be explained by a performance learning curve. This study confirms that this bone-preserving procedure should be considered in end-stage isolated unicompartmental osteoarthritis or avascular necrosis by surgeons who have the adequate training and experience.

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**KEY WORDS:** medial compartment knee disease, Oxford unicompartmental knee prosthesis

WOMAC = Western Ontario and McMaster Universities Index of Osteoarthritis

IKS = International Knee Society

SF = short form

TKR = total knee arthroplasty

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For the past 20 years the overall results of unicompartmental knee replacement have been promising [1-3]. This procedure is especially appropriate for early posterior-medial osteoarthritis of the knee since the degenerative changes in idiopathic osteoarthritis of the knee begin in the medial compartment in 80–90% of patients [4,5]. Unicompartmental knee arthroplasty is less invasive, causes less blood loss, and preserves bone stock and almost normal knee kinematics in comparison with total knee arthroplasty. Recent studies even suggest that UKA should be the favored procedure for treating medial unicompartmental osteoarthritis of the knee [6]. Appropriate patient selection, radiographic evaluation, surgical technique and prosthetic design are reported to contribute to the good results of this procedure [6].

The mobile meniscal-bearing designs show prolonged implant survival when compared with fixed-bearing implants [7]. One of these designs is the Oxford prosthesis, which consists of a spherical femoral component, a flat tibial tray, and an unconstrained meniscal bearing between them. This bearing provides a large contact area and allows free sliding and translation between the femur and tibia, controlled by the intact knee ligaments.

We present the results of our 2–5 year follow-up with this procedure.

## PATIENTS AND METHODS

During the period 2003–2005 a total of 59 patients underwent the Oxford Phase 3<sup>®</sup> Unicompartmental Knee Replacement procedure (Biomet, Warsaw, IN, USA). The patients were retrospectively interviewed and examined, and standing anteroposterior and lateral X-rays were performed. The assessment included the Western Ontario and McMaster Universities Index of Osteoarthritis, the Short Form-12 questionnaires and calculation of the International Knee Society score.

The clinical evaluation was performed by two senior orthopedic surgeons (I.F. and S.V.). The radiological assess-

UKA = unicompartmental knee arthroplasty

ment included measuring the alignment of each component on anteroposterior and lateral views and evaluating any sign of loosening around the prosthesis or subsidence of the tibial component. All data were entered in the Orthowave database (ARIA Sarl, Lille, France).

For statistical analysis we used the SPSS statistical program (version 13.0; SPSS, Chicago, IL).

**RESULTS**

The mean age of the 59 patients, 40 women and 19 men, was 63 years (range 45–80) at the time of surgery. X-rays were performed and evaluation of WOMAC, SF-12 and IKS was completed for 42 patients (31 women, 11 men). The remaining patients were interviewed by telephone with regard to additional surgery on the operated knee.

Of the 42 patients 33 had osteoarthritis and 9 had avascular necrosis of the medial femoral condyle as the index disease. At an average of 32 months after surgery the total WOMAC score was 30 (range 0–87). The mean SF-12 physical score was 38 (range 18–57) and the mean SF-12 mental score 51 (range 19–64). The mean IKS score was 166 (range 54–200). Ninety-one percent of the patients had active flexion of 120 degrees or more.

Although male patients had a tendency towards better functional outcome, the differences between males and females were not statistically significant. A comparison of the functional results between patients who had osteoarthritis and those who had osteonecrosis did not reveal a statistically significant difference [Table 1].

Of the 59 knees, 7 were converted to total knee arthroplasty: 3 had aseptic loosening of the tibial component, one had subsidence of the tibial component, and one had a dislocation of the polyethylene insert 2 years after the procedure. Another two patients had to have revision due to unexplained pain. The four patients who underwent revision due to a component loosening or subsidence had their operation during the first year after surgery. Three of the patients who underwent a conversion to TKR were under the age of 60. All the patients who had their UKA converted to TKR had osteoarthritis as their primary disease. No progressive radiolucent lines or bone resorption were noted on the radiographs of the unrevised patients.

**DISCUSSION**

The original Oxford mobile-bearing unicompartmental prosthesis was introduced 30 years ago and has undergone very few changes since. According to Price and co-authors [8] the design characteristics of this prosthesis cause a mean linear wear rate of 0.03 mm/year. This low rate of wear contributes to the longevity of this implant – a 10 year survival of up to

**Table 1.** Summary of results

	Male	Female	Osteoarthritis	Osteonecrosis	Total
Total WOMAC score	26.3	31.6	28.2	34.3	30.3
Reduced WOMAC score	6.8	10.2	8.9	10.5	9.3
SF-12 physical	37.4	37.9	37.0	40.3	37.8
SF-12 mental	54.9	49.6	52.0	48.0	51.1
IKS: knee score	87.1	84.1	83.8	87.6	84.8
IKS: function score	82.9	81.6	84.3	75.0	81.9
Active flexion	124	122	121	126	123
Axis deviation	4.1	3.5	3.6	4.0	3.7

98% according to Murray et al. [2]. Pandit and co-authors [9] report a 97.3% survival rate of the Phase 3 prosthesis at 7 years, and 96% of their patients had a good or excellent American Knee Society score at 5 years, with a mean Oxford Knee Score of 39 and mean flexion of 133 degrees.

Although we found a high revision rate compared to standard TKR, especially in patients under age 60, the short-term results of the Oxford Phase 3 UKA in our study are promising. We observed good and excellent functional results in the unrevised patients, with 91.4% having active flexion of 120 degrees or more.

The relatively high rate of early revision is attributed to the learning curve associated with a new procedure, and it also emphasizes the importance of correct patient selection for this surgery. All the patients who underwent revision were operated on in the first 2 years that the procedure was performed in our unit. The early revision within the first years of the procedure is an indication of a technical failure and part of the unavoidable learning curve, especially in a sophisticated relatively uncommon procedure.

In conclusion, we believe that there is certainly a place for this procedure for correctly selected patients with isolated unicompartmental osteoarthritis and medial compartment avascular necrosis. Since the procedure is less invasive and less destructive to the soft tissue envelope around the knee and the bone of the joint, this procedure should be considered in patients who fit the criteria regardless of age and activity level. This procedure should be carried out by skilled surgeons who have acquired experience with the procedure and its indications, which should improve the outcome for this procedure in the future by reducing the number of technical failures.

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