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The cemented twin-peg Oxford partial knee replacement survivorship: A cohort study

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ABSTRACT

Background: A new twin-peg version of the Oxford knee was introduced in 2003. However, until now there has been no information about its survivorship. The aim of this study was to determine the survivorship, and the patients' perception of outcome over time.
Methods: A cohort of all patients treated from 2003 until 2009 using the twin-peg Oxford partial knee was contacted. The main indication for treatment was anteromedial osteoarthritis (AMOA). The Oxford Knee Score (OKS), American Knee Society Functional (AKS-F) score and satisfaction rate were obtained, and the time-to-failure was used to perform a survival analysis.
Results: There were 249 patients treated, with 288 medial cemented implants. Of these, 248 patients with 287 implants could be contacted and implant survival or failure was verified. Their mean age was 67 years (range: 34–94). The mean follow-up time was 5.1 years (maximum: 9.2). The nine years cumulative implant survival rate for all cases using revision for any reason to define failure was 98% (95% CI, 84 to 100). There were no cases of femoral loosening. The mean OKS was 22 pre-operatively, 41 at two years, and 41 at final review, at which point 96% of patients were very or fairly pleased with the result.
Conclusion: The survivorship of the twin-peg knee was better than that of the single peg knee at our centre, and appeared no worse than the results of the single peg knee at the originating centre. It can offer secure femoral fixation, sustained clinical benefit and patient satisfaction.
Level of evidence: Level IV case-series.

1. Introduction

Surgeons who implant unicompartmental knee replacements face a challenge to consistently achieve excellent long-term results in terms of a full range of movement, freedom from pain and long-term survivorship. Throughout the world there have been mixed results with a variety of modes of failure [1,2]. Although there was no case of femoral and only one case of tibial loosening in a series of 1000 cases of patients treated using the Oxford knee at the originating centre [1], others found loosening to be the most common cause of failure [3,4]. In a series of 1165 operations carried out between 1996 and 2008, loosening accounted for 40% of 89 revisions [3]. The National Joint Registry for England, Wales and Northern Ireland Annual Report of 2013 reports loosening to be the commonest single cause of failure of mobile bearing unicompartmental knee replacements, responsible for 25% of all revisions [4]. Early femoral loosening proved to be an issue in our practice as well, at a rate of three of 31 cases within three years [5] and one of 78 knees by two years [6]. For this reason, we were keen to use a more securely fixed version of the Oxford implant.

In 2003, the twin-peg Oxford femoral component was made available. It had been primarily designed to allow over 165° of flexion after unicompartmental replacement. Whilst the natural human knee can accommodate such flexion in sitting and kneeling, the single peg Oxford femoral component would only be in partial contact with the bearing at such extremes of flexion (Fig. 1). The resulting increased stresses and edge contact could accelerate polyethylene wear. The new femoral component incorporating the extra femoral peg increases the arc and can be inserted in greater flexion, thereby adding more contact with the bearing in deep flexion. With the approval of our new procedure committee and our patients' informed consent, we decided to discontinue the phase III single peg Oxford partial knee in 2003 in favour of the twin-peg version (Fig. 2). In 2012 we reported our clinical results of the first 100 patients who had all reached two years of follow-up, and showed a mean Oxford Knee Score (OKS) of 41, a mean American Knee Society knee (AKS-K) score of 93, a functional (AKS-F) score of 84 and a mean 130° range of flexion [7]. The radiological analysis at two years showed no evidence of femoral loosening [7]. However, the clinical results and survivorship of this implant beyond two years are not known.

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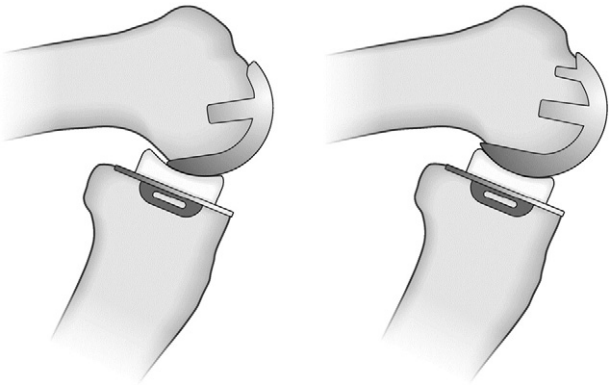

Fig. 1. Single peg Oxford knee on the left, twin peg version on the right.

The aim of the present study therefore is to report the longer-term implant survivorship and clinical outcome of the cemented twin-peg Oxford partial knee in a patient cohort which includes the original group of 100 patients, treated between 2003 and 2005, plus those treated since until the end of 2009.

2. Patients and methods

2.1. Patients and outcome measures

This study comprised all patients operated upon using the cemented twin-peg Oxford partial knee (Biomet UK Ltd, Bridgend, UK) by the senior author or under his direct supervision up to and including 2009. Patients had been selected for treatment if they had medial compartment osteoarthritis, which in most cases meant anteromedial osteoarthritis [8], but also included patients who had previous trauma or avascular necrosis. In AMOA there should be full thickness cartilage loss on both sides of the medial compartment with bone on bone contact. There should also be preservation of full thickness cartilage in the lateral compartment. The medial collateral ligament should be functionally normal as demonstrated by a correctable intra-articular varus deformity at 20° of flexion. The anterior cruciate ligament (ACL) should be normal as inspected and probed at surgery. The presence of a chondral ulcer on the inter-condylar margin of the lateral femoral condyle can be ignored as well as the patient's age, weight, level of activity and the presence of chondrocalcinosis. Patients were excluded if there was evidence of inflammatory arthritis or if there was fixed flexion of the knee beyond 10°. Patients with patellofemoral osteoarthritis, regardless of the degree or pattern, were included because preservation of the cruciate ligament was considered more beneficial in terms of patellofemoral contact stresses compared to the pathomechanics that is inevitable on sacrificing the anterior cruciate ligament when carrying out total knee replacement.

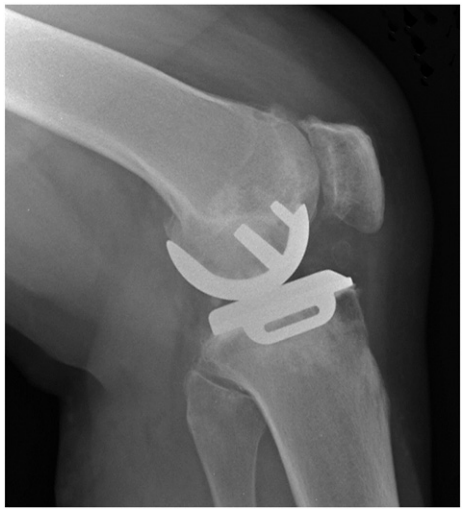

Fig. 2. Lateral radiograph showing the cemented twin peg Oxford knee.

All patients were followed up at two years with radiographs, clinical examination, and recording of the Oxford Knee Score (OKS) and American Knee Society Functional (AKS-F) score [9,10]. In addition, the range of motion of each knee was recorded by a research physiotherapist (SR). A satisfaction questionnaire and a form to record any complications that had occurred during the first two years were completed.

All patients who were alive and had the implant in-situ at the two years clinical follow-up were contacted again for final review up to the tenth year after surgery using a variety of techniques: post, phone call and ultimately by contacting the GP. They were assessed using a postal questionnaire which included the OKS, the AKS-F, the Tegner Activity score [11], and a satisfaction questionnaire as used in Oxford [1].

The process of final review was begun in March 2012 and the database finalised in July 2013. The extended duration was because of difficulties in some cases of contacting patients. For patients who were non-contactable, including those who had died, information was gathered from hospital notes and by contacting the general practitioner to confirm whether the knee had been revised or not.

The operative technique was as previously described [7].

2.2. Statistical analysis

A multilevel model with a random intercept was used to determine the difference between OKS scores pre-operatively and two years post-operatively and between OKS scores and AKS-F scores two-years post-operatively and at the latest follow-up. The multilevel method was used to properly account for scores obtained from patients with bilateral implants. It also allowed including all patients with at least one score to investigate changes in score over time.

Implant survival was determined using the life-table method and Greenwood estimates of the 95% confidence intervals [12]. The lower confidence limit took account of the effective sample size at each time point. Implant failure was defined as revision for any reason.

All statistical analyses were performed using R vs 3.0.2, using the packages “survival” and “nlme”. All statistical tests were performed as two-tailed tests, and a p-value below 0.05 was assumed to denote statistical significance.

3. Results

3.1. Patient demography

There were 288 medial cemented implants, inserted in 249 patients (Table 1). There were 210 unilateral and 39 bilateral procedures. Only one bilateral case was simultaneous,

Table 1
Demographic details.

Characteristic	n or mean (SD)	Range
Number of patients	249	
Female	121	
Male	128	
Number of implants	288	
Unilateral	210	
Bilateral	39	
Staged	38	
Simultaneous	1	
Age at operation	67.0 (9.8)	34 to 94
Indications		
AMOA	267	
AMOA extended	11	
AVN/OCD	4	
Trauma	3	
Others	3	