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Survivorship and clinical outcome of the minimally invasive Uniglide medial fixed bearing, all-polyethylene tibia, unicompartmental knee arthroplasty at a mean follow-up of 7.3 years

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ABSTRACT

Background: Medial UKA performed in England and Wales represents seven to 11% of all knee arthroplasty procedures, and is most commonly performed using mobile-bearing designs.
Fixed bearing eliminates the risk of bearing dislocation, however some studies have shown higher revision rates for all-polyethylene tibial components compared to those that utilize metal-backed implants. The aim of the study is to analyse survivorship and maximum eight-year clinical outcome of medial fixed bearing, Uniglide unicompartmental knee arthroplasty performed using an all-polyethylene tibial component with a minimal invasive approach.
Methods: Between 2002 and 2009, 270 medial fixed UKAs were performed in our unit. Patients were reviewed pre-operatively, five and eight years post-operatively. Clinical and radiographic reviews were carried out. Patients' outcome scores (Oxford, WOMAC and American Knee Score) were documented in our database and analysed.
Results: Survival and clinical outcome data of 236 knees with a mean of 7.3 years follow-up are reported. Every patient with less than 4.93 years of follow-up underwent a revision. The patients' average age at the time of surgery was 69.5 years. The American Knee Society Pain and Function scores, the Oxford Knee Score and the WOMAC score all improved significantly. The five-year survival rate was 94.1% with implant revision surgery as an end point. The estimated 10 years of survival rate is 91.3%. Fourteen patients were revised before the five-year follow-up.
Conclusion: Fixed bearing Uniglide UKA with an all-polyethylene tibial component is a valuable tool in the management of a medial compartment osteoarthritis, affording good short-term survivorship.
Level of evidence IV

1. Introduction

Total knee arthroplasty (TKA), unicompartmental knee arthroplasty (UKA) and high tibial osteotomy (HTO) are accepted alternative surgical treatments for medial compartment osteoarthritis.

A recent meta-analysis comparing HTO versus UKA indicated that UKA is a more favourable technique for improving clinical outcome and relief of pain up to 10-years following surgery [1]. Survivorship did not differ significantly but there was a trend towards UKA beyond 12 years post-operatively. UKA was also associated with a lower rate of post-operative infection [2,3]. Studies comparing UKA and TKA for treatment of medial joint osteoarthritis (OA) have shown that patients with UKA achieve higher levels of post-operative function [4], range of motion [5,6] and task specific activities such as kneeling [7] up to 10, 15 and two years after surgery respectively. In addition, lower mortality rates, reduced post-operative infection rates and fewer perioperative complications [8] have all been shown with UKA [9,10].

Medial UKA performed in England and Wales represents seven to 11% of all knee arthroplasty procedures, and is most commonly performed using mobile-bearing designs. These may have advantages in reducing linear polyethylene wear and have been shown, in some studies, to be capable of producing good long term survivorship [11]. However bearing dislocation may occur in one to 5.3% of medial UKAs [12,13] and has been identified as the fourth most frequent mode of failure for mobile-bearing implants [14]. Fixed bearing designs have been shown in several studies to have equivalent clinical and radiographic outcomes compared to mobile-bearing implant designs at mid- and

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long-term follow-up [15]. A fixed bearing eliminates the risk of bearing dislocation, however some studies have shown higher revision rates for all-polyethylene tibial components compared to those that utilize metal-backed implants [16–18].

The Clear advantage of this implant is its low cost. Also the non-inferior performance of all-poly Total knee replacement (TKR) may support its use [19,20]. Disadvantages of all-polyethylene implant are the lack of modularity, thus care must be taken not to overstuff the joint as one simply cannot downsize the bearing; the lack of potential to change an isolated bearing during future reoperations (e.g. bicompartmental, patellofemoral OA) and the lack of an uncemented option.

The aim of this study was to analyse survival and up to eight-year clinical data of fixed bearing all-polyethylene tibia Uniglide UKA and compare to literature data.

2. Methods

2.1. Patients

Between 2002 and 2009, 270 medial fixed bearing all-polyethylene tibia UKAs (Uniglide, Corin Group PLC, Cirencester, England, UK) were implanted in 236 patients (112 females and 124 males) were performed at our unit.

Patients were offered a UKA if they had typical anteromedial pattern osteoarthritis with radiographic evidence of full thickness loss of articular cartilage confirmed on either an anteroposterior (AP) or Rosenberg weight bearing view. All patients had a minimum of 90° knee flexion, a maximum of 15° of passively correctable varus deformity, a maximum of 10° of fixed flexion deformity and the presence of a functioning anterior cruciate ligament. This was determined by clinical examination. In some cases varus/valgus stress X-rays were performed to confirm cartilage thickness in the lateral compartment, although this was not routinely performed.

Patients with less than 90° of flexion, severe symptomatic patellofemoral arthritis or evidence of lateral tibiofemoral osteoarthritis (more than Ahlbäck grade 1) [21] were not offered a UKA. Fibrillation or minor circumscribed cartilage lesions of the medial aspect of the lateral femoral condyle or the patellofemoral joint were not seen as contraindications.

2.2. Prosthesis design

The Uniglide (Corin Group PLC, Cirencester, UK) femoral component has a triple-radius femoral geometry and is made of titanium nitride coated cobalt chrome. It is available in cemented or uncemented form. The tibia has both fixed and mobile-bearing options. The ultra-high molecular-weight all-polyethylene tibial fixed bearing component is flat, with a central keel, which is cemented to the prepared surface of the medial tibial plateau. The tibiofemoral articulation formed is unconstrained and non-congruous (Figure 1).

2.3. Surgical technique

Depending on individual surgeon preference, the patient was either positioned as for total knee arthroplasty, with a foot rest and lateral side support or, alternatively, using a leg holding device with the lower leg hanging. All medial UKAs were performed using MIS (minimally invasive) technique with a skin incision of approximately eight centimetres and a mini mid-vastus or a subvastus approach. The lateral compartment was inspected for evidence of arthrosis not determined radiographically. A Langenbeck retractor was placed under the patellar ligament in slight flexion. This gave a limited view, however enough to judge the distal joint surface of the lateral femoral and tibial condyle. An extra-medullary tibial jig was used to set the valgus/varus alignment and the posterior slope of the axial tibial cut. The tibial sagittal cut was made referencing from the tibial jig, aligned with the second metatarsal.

Figure 1. The Uniglide™ fixed bearing unicompartmental knee replacement.

A stylus was used to determine the tibial resection depth. Tibial resection was adjusted to allow easy insertion of a seven millimetre spacer feeler gauge, taking into account the thinnest fixed bearing all-polyethylene tibial insert (seven millimetres).

An extra-medullary jig was used to set the femoral component valgus/varus and internal/external rotation. A guide rod was placed through the jig to ensure that flexion/extension of the femoral component was set parallel with the femoral shaft. In the coronal plane, the rod was set to point at a marker dot attached to the patient showing the position of the femoral head midway between the anterior superior iliac spine and pubic symphysis. The posterior femoral cut was made first and then the distal femoral condyle was reamed with the aim to carefully balance the flexion and extension gaps and to ensure that the mechanical axis was not over corrected.

To reduce the risk of cement extrusion posteriorly cement is pressed into tibia with a wet osteotome or gloved finger. Minimal cement is then applied to the all-polyethylene component. During implantation the all-polyethylene tibia is inserted at an angle so that the posterior part of the prosthesis is compressed first allowing excess cement to extrude anteriorly. Any cement that does extrude posteriorly is scraped away prior to implantation of the femur.

2.4. Outcome measures

Pre-and post-operative data were collected prospectively. Either a research nurse or physiotherapist carried out a follow-up in a research clinic. Patients underwent physical and radiographic examinations of the knee and completed a questionnaire consisting of the Oxford Knee Score (OKS, 0 worst and 48 best), the American Knee Society Score pain and function domains (AKSS pain, 0 worst and 50 best, AKSS function, 0 worst, 100 best) and Western Ontario and McMaster Universities Arthritis Index (WOMAC, 60 worst and 12 best; pain domain worst 25 and best five; function domain worst 35 and best seven) [22–24] at five and eight years post-operatively. Revision of the prosthesis was used to define survivorship.

2.5. Statistical analysis

Kaplan–Meier survival analysis was used to determine the survivorship. Only patients with known outcomes were included, thus patients

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