



## Medial Unicompartmental Knee Arthroplasty in Patients Less Than 55 Years Old: Minimum of Two Years of Follow-Up

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### ABSTRACT

Eighty-five fixed bearing medial unicompartmental arthroplasties were performed in 42 men and 33 women with a mean age of 49 years (range, thirty-three to fifty-five years old) at the time of surgery. At a mean of 4.0 years (range two to twelve years), the mean pre-operative Knee Society score improved from 49 to 95.1 points ( $P < 0.0001$ ) and the mean UCLA activity score was 7.5 (range 5 to 9). Three knees underwent revision to a total knee arthroplasty; two for arthritic progression in the lateral compartment and one for pain. At the time of final follow-up, two knees (2.4%) demonstrated progressive Grade 4 arthritis of the patellofemoral compartment but were asymptomatic. There was no radiographic evidence of loosening, osteolysis, or premature polyethylene wear. Estimated survivorship was 96.5% at 10 years. UKA offered excellent early outcomes in this cohort of younger, active patients.

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Treatment of isolated, unicompartmental arthritis of the knee in young, active patients continues to present difficult treatment decisions for the orthopaedic surgeon. Once a patient has failed non-operative measures, high tibial osteotomy, cartilage preservation procedures, unicompartmental knee arthroplasty (UKA) and total knee arthroplasty (TKA) have all been described as potential surgical treatments for unicompartmental disease [1].

High tibial osteotomy has been demonstrated to provide favorable results in younger patients, although recovery can be extended and results in terms of survivorship have been equivocal with several authors reporting a high rate of conversion to total knee arthroplasty beyond ten years [2,3]. Cartilage preservation techniques may address focal defects of the femoral condyles, but do not address arthritic lesions of the proximal tibia. Thus, UKA has emerged as a popular treatment for arthritis of the knee in the young active patient.

When compared to TKA, several authors have reported shorter hospital stays, lower morbidity, improved range of motion, and more physiologic gait in patients undergoing UKA [4-7]. Improvements in surgical techniques, implant design, and adherence to defined surgical indications have resulted in favorable clinical outcomes, particularly in an older patient population [8-10]. These experiences may account

for the rapidly rising implantation of UKA in the U.S., which accounted for 8% of all knee arthroplasties performed in 2005 compared to 2.5% in 1999 and has been increasing in frequency at triple the rate of TKA [11]. However, few reports have been published that describe the performance of contemporary UKAs in a younger population despite their increasing rates of implantation in this patient demographic [12]. The purpose of this investigation is to report the outcomes of UKA performed in a patient population under the age of fifty-five years old.

### Materials and Methods

Between October 2000 and April 2009, the senior authors performed 95 cemented, fixed bearing medial UKA in 85 patients who were all less than 55 years old at the time of surgery. The implants included the Miller-Galante (seven knees) or Zimmer Uni Knee (eighty-eight knees), both manufactured by Zimmer (Warsaw IN). Over this time period, the senior authors performed 645 TKA, five lateral UKA and seven patellofemoral arthroplasties in patients less than 55 years old and thus, medial UKA in patients under the age of 55 represented 12.6% of the primary knee arthroplasties performed in this age group. In comparison, UKA represented 18.4% of all knee arthroplasties performed in patients older than 55 years of age during this same time period.

Two patients died (at 3 and 5 years postoperatively) and eight knees were lost to follow-up (mean follow-up, 7 months) leaving seventy-five patients (eighty-five knees) who were followed for a mean of 4.0 years (range, two to twelve years). The patients included

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thirty-three women and forty-two men with a mean age of 49 years old (range, thirty-three to fifty-five years old). The diagnosis was osteoarthritis in all knees. Sixty-five patients underwent unilateral UKA, two underwent simultaneous bilateral UKA, and eight had a staged bilateral procedure. Three knees demonstrated symptomatic insufficiency of the anterior cruciate ligament (ACL) and underwent concomitant ACL reconstruction at the time of implantation of the UKA.

Patients were deemed to be candidates for UKA rather than TKA on the basis of the modified Kozinn and Scott criteria [13]; in general, patients had unicompartmental arthritis with an intact ACL, a minimal flexion contracture that was not symptomatic, and a flexion-arc that was typically beyond 120°. Patients who were ACL deficient but met all other preoperative requirements were offered concomitant ACL reconstruction at the time of their UKA. All procedures were performed through an abbreviated medial approach without patellar eversion. The tibia was cut perpendicular to the mechanical axis and the distal femoral cut was performed at 4°. An appropriate polyethylene liner thickness was chosen to allow for two to three mm of joint laxity in both full extension and 90° of flexion as determined with a calibrated spacer.

All patients were evaluated prospectively. Postoperative knee function was evaluated by independent observers (clinical nurses and fellows) with use of the Knee Society Score [14] and range of motion was measured using a goniometer; activity was determined postoperatively using the UCLA activity score [15].

Radiographs including standing AP, lateral and patellar views were obtained at 6 weeks, 3 months, one year and then annually thereafter; a full standing alignment film was obtained at the 6 week visit. The cement interfaces were evaluated for the presence and extent of radiolucent lines in each of ten zones (Fig. 1) [9]. A radiolucent line was considered to be progressive if it increased in size

or if it progressed from one zone to an adjacent zone over time. Sequential radiographs were reviewed for evidence of component subsidence, or change in position. Definite loosening was defined as a change in position (subsidence) of >2 mm or an angular change of >3° relative to the surrounding bone as seen on sequential radiographs, with use of the six week radiographs as a baseline [9]. In addition to evaluating component fixation, we evaluated arthritic progression in the lateral compartment and the patellofemoral joint on standing radiographs. Radiographic changes were defined as Grade 1 (evidence of radiographic changes such as osteophytes, but with no measurable loss of joint space), Grade 2 ( $\leq 25\%$  loss of joint space), Grade 3 ( $\leq 50\%$  loss of joint space), or Grade 4 (>50% loss of joint space) [9]. All radiographic measurements were carried out by three observers.

### Statistical Analysis

A two-tailed Student's T-test was utilized to compare both the pre-operative and post-operative Knee Society Scores as well as range of motion for each patient. Kaplan–Meier survivorship analysis of all eighty-five knees was performed with revision for any reason or radiographic signs of loosening as the end points.

### Results

The mean pre-operative Knee Society score improved from a mean of 49 points (range, 27 to 78 points) to a mean of 95.1 points (range 48 to 100;  $P < 0.0001$ ) at the most recent evaluation. Seventy-three knees (85.9%) had a score of greater than 90 points (Fig. 2). The mean range of motion improved from 120° (range, 85° to 145°) to 124° degrees (range 90° to 135° degrees) ( $P < 0.05$ ). The average UCLA activity score was 7.5 (range 5 to 9) at final follow-up.

### Complications

Three patients experienced adverse postoperative events officially defined by standardized Knee Society guidelines, including two who had undergone revision procedures and one who required a wound revision [16]. Two patients (three knees, 3.5%), underwent revision to TKA. One of these knees was in a fifty-one-year-old woman with a body mass index of 38.5. At the time of the index procedure, the patellofemoral articulation demonstrated no intraoperative evidence of arthrosis. She experienced anterior and posteromedial knee pain postoperatively that was recalcitrant to non-operative treatment and underwent conversion to a TKA at nine months following her UKA. At the time of revision, there were no degenerative changes noted in the articular cartilage of the trochlea, patellar facets, or lateral compartment. The unicompartmental knee components were well fixed at the

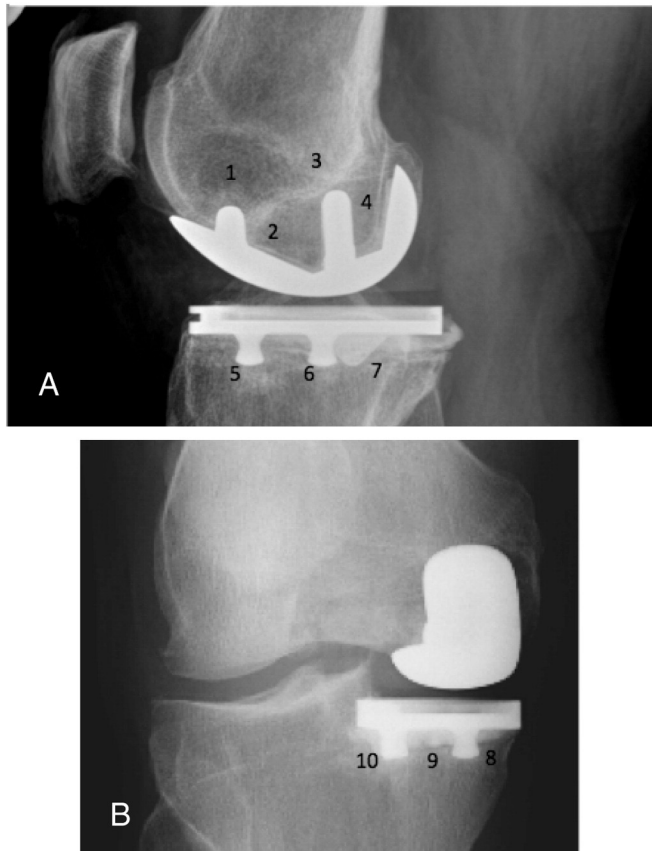


Fig. 1. Specified zones utilized to determine presence of radiolucent lines around fixed bearing cemented unicompartmental arthroplasty [9].

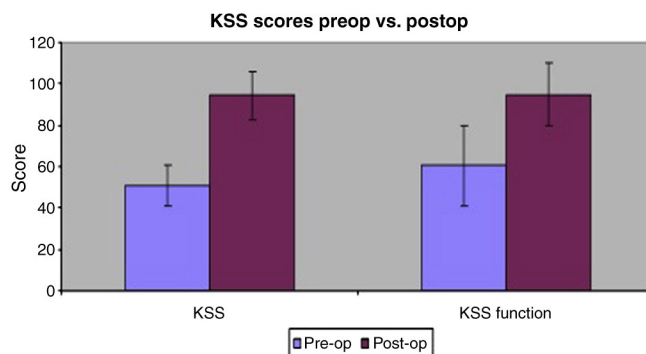


Fig. 2. Pre-operative and Post-operative Knee society scores (KSS);  $P < 0.001$  for both regular KSS and functional KSS evaluations.

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