

Comparison of High Tibial Osteotomy and Unicompartmental Knee Arthroplasty at a Minimum Follow-Up of 3 Years

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Abstract: The purpose of this study was to compare clinical outcomes including return to recreational activities (cycling, swimming, exercise walking, dancing, jogging, and mountain climbing) after opening-wedge high tibial osteotomy (HTO) and unicompartmental knee arthroplasty (UKA). Clinical outcomes were assessed using Tegner activity scores, ranges of motion, and Lysholm knee scores. In both groups, the number of patients participating in recreational activities was significantly reduced after surgery, but without a significant intergroup difference (1.3 activities in HTO group and in 1.6 activities in UKA group). Average Tegner activity scale scores, ranges of motion, and Lysholm knee scores did not show significant differences between the 2 groups. This study identified no significant differences between HTO and UKA for medial unicompartmental osteoarthritis in terms of return to recreational activity and short-term clinical outcomes. **Keywords:** knee, high tibial, osteotomy, unicompartmental, arthroplasty. © 2013 Elsevier Inc. All rights reserved.

Valgus high tibial osteotomy (HTO) and unicompartmental knee arthroplasty (UKA) are established treatment options for patients with medial compartmental osteoarthritis (OA) of the knee [1-3]. However, the clinical outcomes of these treatment modalities for unicompartmental OA have become subjects of debate.

Although HTO for the correction of malalignment in the medial osteoarthritic knee has been shown to provide successful outcomes in some studies [4-7], it is technically difficult to achieve the ideal valgus position postoperatively, and the likelihood of postoperative complications after HTO is greater than that after UKA [8-11]. As compared with HTO, UKA has been reported to provide better long-term results, to have a shorter time to full weight bearing, to allow easier rehabilitation, and to have fewer perioperative complications. Furthermore, indications for UKA are broadening, including younger and more active patients, since encouraging midterm and long-term results were published [12-17].

In general, published clinical outcomes and survival rates are better for UKA than for HTO, but published results for HTO mainly concern closing-wedge HTO [4,6,7]. Recently, opening-wedge HTO has become more popular and has been shown to produce good or excellent results [18,19].

Only a few studies have directly compared the clinical results of opening-wedge HTO and UKA [8,10]. Moreover, there is a lack of information regarding return to sports or recreational activities after HTO or UKA. Hence, the purpose of this study was to compare clinical outcomes including return to recreational activities after opening-wedge HTO and UKA.

Materials and Methods

Two groups of patients, all younger than 65 years, underwent either valgus opening-wedge HTO or UKA for unicompartmental OA of the knee by the senior author between January 2003 and March 2006. Patients who underwent HTO or UKA for medial unicompartmental OA with varus deformity (Kellgren-Laurence [K-L] grade \geq II OA) and with complete postoperative follow-up records for at least 3 years (range, 3-4 years) were included. Patients with K-L grade II OA or higher of the lateral or patellofemoral compartments, knee flexion below 120°, or flexion contracture exceeding 20° and those with ligament instability or inflammatory arthropathy were excluded. The decision to perform UKA or HTO was made by the patients after discussion with

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Submitted December 24, 2011; accepted June 11, 2012.

The Conflict of Interest statement associated with this article can be found at <http://dx.doi.org/10.1016/j.arth.2012.06.011>.

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0883-5403/2802-0007\$36.00/0

<http://dx.doi.org/10.1016/j.arth.2012.06.011>

surgeon about the rehabilitation program and their expectation to do a level of physical activity after surgery.

Fifty-eight patients who underwent HTO and 50 patients who underwent UKA were found to meet the study criteria. The average age at surgery was 58.3 years (range, 43-65 years) in the HTO group, and the average follow-up time was 3.6 years (range, 3-4 years). This group included 7 men and 51 women. The average age at the time of surgery was 60.3 years (range, 47-65 years) in the UKA group, and the average follow-up time was 3.7 years (range, 3-4 years). The UKA group comprises 2 men and 48 women (Table 1). The protocol of this retrospective study was approved by the institutional review board of our hospital (study number: 2008-20).

To compare returns to recreational activity, a questionnaire was used to ascertain participation in 6 different activities before and after surgery, namely, cycling, swimming, exercise walking, dancing, jogging, and mountain climbing, all of which are low-impact sports that patients would expect to return after knee arthroplasty [20,21]. We compared the number of patients who returned to recreational activities with preoperative levels after UKA and HTO. The Tegner activity scale was also used to evaluate activity levels. Furthermore, ranges of motion and Lysholm knee score were assessed preoperatively and at final follow-up as measures of clinical outcomes. We also evaluated complications after the 2 surgical procedures. All questionnaire and clinical data were evaluated and recorded by a physical assistant. Preoperative and postoperative radiologic assessments of osteoarthritic changes of the tibiofemoral and patellofemoral joints were performed using a K-L grading system [22]. We also evaluated mechanical tibiofemoral angles on weight-bearing knee radiographs.

We performed medial opening HTO using 2 wedge plates (Aescula; Medyssey, Dongducheon, Korea) under fluoroscopic control (Fig. 1). When the medial opening gap was more than 10 mm, it was filled with a cancellous chip allograft. Unicompartamental knee arthroplasty was done using a Miller-Galante fixed-bearing prosthesis (Zimmer, Warsaw, Indiana) and fixed it with cement in all cases (Fig. 2).

Table 1. Comparison Preoperative Characteristics of Patients Between 2 Groups

	HTO	UKA	<i>P</i>
Age (y)	58.3 ± 5.4	60.3 ± 4.5	.06
Sex (M/F)	7/51	2/48	.13
Follow-up duration (y)	3.6 ± 0.4	3.7 ± 0.4	.29
Mechanical tibiofemoral angle (deg)	-7.6 ± 2.4	-7.1 ± 2.7	.47
Range of motion (deg)	135.2 ± 9.0	135.0 ± 10.8	.07
Lysholm knee score	62.4 ± 9.5	61.5 ± 8.1	.40
Tegner activity score	3.1 ± 1.1	3.2 ± 0.9	.71

-, Varus.



Fig. 1. Postoperative anteroposterior after valgus HTO.

Postoperative Rehabilitation

In the HTO group, active range of knee motion (ROM) exercises, patellar mobilization, and straight-leg raises were started on the first postoperative day. Partial weight bearing with a crutch was allowed at 6 weeks



Fig. 2. Postoperative anteroposterior after UKA.

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