The Modified Oblique Keller Capsular Interpositional Arthroplasty for Hallux Rigidus

By R. Brian Mackey, MD, A. Brian Thomson, MD, Ohyun Kwon, PT, PhD, Michael J. Mueller, PT, PhD, and Jeffrey E. Johnson, MD

Investigation performed at Barnes-Jewish Hospital at Washington University Medical Center, Chesterfield, Missouri

Background: Hallux rigidus is a common problem characterized by localized osteoarthritis and limited range of motion of the hallux. First metatarsophalangeal joint arthrodesis has been the accepted procedure for the treatment of late-stage disease. Despite the success of arthrodesis, some patients object to the notion of eliminating motion at the metatarsophalangeal joint. For this reason, motion-sparing procedures such as the modified oblique Keller capsular interpositional arthroplasty have been developed.

Methods: We compared a cohort of ten patients (ten toes) who had undergone the modified Keller arthroplasty with a group of twelve patients (twelve toes) who had undergone a first metatarsophalangeal joint arthrodesis at an average of sixty-three and sixty-eight months, respectively. Clinical outcomes were evaluated, and range of motion, great toe dynamometer strength, plantar pressures, and radiographs were assessed.

Results: Clinical outcome differences existed between the groups, with the American Orthopaedic Foot and Ankle Society score being significantly higher for the arthroplasty group than for the arthrodesis group. The arthroplasty group had a mean of 54° of passive and 30° of active range of motion of the first metatarsophalangeal joint. The plantar pressure data revealed significantly higher pressures in the arthrodesis group under the great toe but not under the second metatarsal head.

Conclusions: The modified oblique Keller capsular interpositional arthroplasty appears to be a motion-sparing procedure with clinical outcomes equivalent to those of arthrodesis, and it is associated with a more normal pattern of plantar pressures during walking.

Level of Evidence: Therapeutic Level III. See Instructions to Authors for a complete description of levels of evidence.

Hallux rigidus is a common condition characterized by first metatarsophalangeal joint pain and limited hallux range of motion due to localized osteoarthritis of that joint. Patients who have had a failure of nonoperative treatment have several operative procedures available. Dorsal metatarsophalangeal joint cheilectomy has been recommended when there is mild to moderate joint damage and pain only at the end of the range of motion. Arthrodesis, implant arthroplasty, or interpositional/resection arthroplasty are options in cases in which the joint is not salvageable and there is pain throughout the range of motion. Each option offers specific advantages and disadvantages. Arthrodesis is associated with malunion, nonunion, shortening, and transfer metatarsalgia[1]. It eliminates motion and pain in most patients, but the concept of eliminating motion at the first metatarsophalangeal joint is not easily accepted by many patients. Implant arthroplasty with silicone or high-density polyethylene/metal composites is associated with stiffness, wear debris-related synovitis, and high failure rates[2,3]. The Keller resection arthroplasty maintains some metatarsophalangeal joint motion. It initially was described for the correction of a hallux valgus deformity[4] with resection of a substantial portion (as much as one-third) of the proximal portion of the proximal phalanx and was associated with a high rate of complications, including lateral transfer metatarsalgia, decreased great toe strength, excessive shortening of the first ray, great toe cock-up deformity, and clawing of the interphalangeal joint[5,6]. Modified versions of the resection arthroplasty have been introduced for the treatment of hallux

Disclosure: In support of their research for or preparation of this work, one or more of the authors received, in any one year, outside funding or grants in excess of $10,000 from the Midwest Stone Institute. In addition, one or more of the authors or a member of his or her immediate family received, in any one year, payments or other benefits in excess of $10,000 (Midwest Stone Institute and OrthoHelix Surgical Designs, Inc. [OSDI]) and of less than $10,000 (Midwest Therapy) or a commitment or agreement to provide such benefits from these commercial entities.

A video supplement to this article will be available from the *Video Journal of Orthopaedics*. A video clip will be available at the JBJS web site, www.jbjs.org. The *Video Journal of Orthopaedics* can be contacted at (805) 962-3410, web site: www.vjortho.com.