

Paper #223

Inverted V-Shaped High Tibial Osteotomy for Medial Osteoarthritic Knees with Severe Varus Deformity

Eiji Kondo, MD, PhD, JAPAN

Koji Yabuuchi, MD, JAPAN

Koji Iwasaki, MD, PhD, JAPAN

Yoshiaki Hosokawa, MD, JAPAN

Tomohiro Onodera, MD, PhD, JAPAN

Kazunori Yasuda, MD, PhD, Prof., JAPAN

Tomonori Yagi, MD, PhD, JAPAN

Norimasa Iwasaki, MD, PhD, JAPAN

Hokkaido University

Sapporo, Hokkaido, JAPAN

Summary:

This study demonstrated that a hemi-closing-wedge and hemi-opening-wedge, inverted V-shaped high tibial osteotomy with local bone graft has been reported to be an effective surgical procedure for medial osteoarthritis of the knee with moderate or severe varus deformity.

Abstract:

Introduction

The authors reported the 10- to 15-year results of the originally developed 'inverted V-shaped' high tibial osteotomy (HTO) procedure with an external fixator (JBJS-Br 2006). This procedure was classified as neutral (hemi-closing and hemi-opening) wedge osteotomy. Mechanically, this inverted V-shaped osteotomy does not change the posterior tibial slope angle of the tibial plateau, the patellar height, or the length of the lower limb at all, because the center of tibial alignment correction is located approximately at the center of rotation of angulation (CORA) of the lower limb deformity. However, this procedure had a few disadvantages. First, it was technically difficult to perform inverted V-shaped osteotomy. Second, a long period was needed before weight-bearing on the operated limb. To solve these disadvantages, the authors recently modified this procedure by performing biplanar osteotomy with precise cutting guide devices and fixing the tibia with a locking plate (Arthrosc Tech 2018). The purpose of this study was to clarify short-term clinical results of inverted V-shaped HTO.

Methods

39 patients (42 knees) who underwent inverted V-shaped HTO with a locking plate were enrolled in this study. Inclusion criteria involved patients who had medial osteoarthritis with varus deformity, the valgus correction angle of which is calculated to be 15° or more. There were 29 women and 10 men with a mean age of 58 (44-75) years at the time of surgery. In this procedure, inverted V-shaped osteotomy was made by resecting a wedged bone block from the lateral side, and the resected bone block was implanted into the medial opening space created after valgus correction. The tibia was then fixed with a locking plate (TomoFix Lateral High Tibia Plate, Depuy Synthes). All patients underwent clinical and radiological examinations before surgery and at 2 years after surgery. This study design had been accepted by the institutional review board clearance in our hospital. Statistical analyses were made using a Student t test. The significance level was set at p=0.05.

Results

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Postoperatively, the mean functional knee score (Japanese Orthopaedic Association score, total 100 points) improved significantly from 71 to 85 points ($p < 0.0001$). The mean hip-knee-angle significantly corrected from -12° to 2° ($p < 0.0001$). The mean medial proximal tibial angle (MPTA) significantly changed from 81° to 92° ($p < 0.0001$). The mechanical axis percentage shifted to pass through a point 60% lateral from the medial edge of the tibial plateau. Concerning the Blackburn-Peel ratio, Caton-Deschamps index, the Insall-Salvati ratio, the posterior tibial slope, and the tibial length, there were no significant differences in each parameter between before surgery and 2 years after surgery.

Discussions

Common medial osteoarthritic knees with severe varus deformity can be treated with this procedure. This procedure has several advantages. First, the lateral wedge resection space and medial open space are the smallest of the other HTO procedures. Second, there is no vacant space in the tibia due to grafting the resected bone block after surgery. Third, bone stock in the tibia does not change after surgery. Fourth, deformation of the proximal tibia is minimal after inverted V-shaped HTO. Namely, the inverted V-shaped HTO procedure is recommended for severe varus knees that show MPTA less than 80° . The results suggested that the inverted V-shaped osteotomy can maintain the optimal correction angle with short-term results. However, further long-term studies are needed to assess the subjective and objective patient outcomes of this osteotomy in patients with severe varus malalignment.