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Arthroscopic Ankle Arthrodesis with Intra-articular Distraction

Hyong Nyun Kim, MD, PhD, June Young Jeon, MD, Kyu Cheol Noh, MD, PhD, Hong Kyun Kim, MD, Quanyu Dong, MD, Yong Wook Park, MD, PhD

Department of Orthopaedic Surgery, Kangnam Sacred Heart Hospital, Hallym University College of Medicine, Seoul, South Korea

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ABSTRACT

Arthroscopic ankle arthrodesis has shown high rates of union comparable to those with open arthrodesis but with substantially less postoperative morbidity, shorter operative times, less blood loss, and shorter hospital stays. To easily perform arthroscopic resection of the articular cartilage, sufficient distraction of the joint is necessary to insert the arthroscope and instruments. However, sometimes, standard noninvasive ankle distraction will not be sufficient in post-traumatic ankle arthritis, with the development of arthrofibrosis and joint contracture after severe ankle trauma. In the present report, we describe a technique to distract the ankle joint by inserting a 4.6-mm stainless steel cannula with a blunt trocar inside the joint. The cannula allowed sufficient intra-articular distraction, and, at the same time, a 4.0-mm arthroscope can be inserted through the cannula to view the joint. Screws can be inserted to fix the joint under fluoroscopic guidance without changing the patient's position or removing the noninvasive distraction device and leg holder, which are often necessary during standard arthroscopic arthrodesis with noninvasive distraction.

Ankle arthrodesis has traditionally been the preferred surgical method to treat end-stage ankle arthritis. Open approaches to the ankle joint have traditionally been used; however, arthroscopic arthrodesis has been increasing in popularity, because it is less invasive, offering the advantages of less postoperative pain and fewer wound problems (1–8). Several studies have shown high rates of union with arthroscopic arthrodesis compared with open arthrodesis but with substantially less postoperative morbidity, shorter operative times, less blood loss, and shorter hospital stays (4,7,9). However, nonunion has been reported after arthroscopic arthrodesis (10,11). One of the factors leading to nonunion has been insufficient removal of the articular cartilage from the talus and tibia. To easily perform arthroscopic resection of the articular cartilage, sufficient distraction of the joint is necessary to insert the arthroscope and instruments (12,13). However, sometimes, noninvasive ankle distraction will not be sufficient in post-traumatic ankle arthritis, with the development of arthrofibrosis and joint contracture after severe ankle trauma (12,14,15). In the present report, we have described a technique to distract the ankle joint by inserting a large-diameter blunt trocar into the joint. The trocar allows sufficient intra-articular distraction for resection of the articular cartilage. Screws can be inserted to fix the joint under fluoroscopic guidance without changing the patient's position or removing the noninvasive distraction device and leg holder, which are often necessary during standard arthroscopic arthrodesis with noninvasive distraction.

Operative Technique

The patient is placed in the supine position with the arthritic ankle (Fig. 1) distal from the operating table (Fig. 2). A pneumatic tourniquet is inflated around the thigh. A skin incision is made medial to the tibialis anterior tendon at the level of the ankle joint for the anteromedial portal. After blunt dissection with a clamp through the skin to the capsule, a 4.6-mm stainless steel cannula with a blunt trocar inside is inserted into the joint under fluoroscopic guidance (Fig. 3). To ease the insertion, a small-diameter (2.5-mm) trocar is inserted first to gradually widen the joint space and distract the soft tissue. Insertion of the cannula with a blunt trocar inside will distract the joint, and, at the same time, a 4.0-mm arthroscope can be inserted through the cannula to view the joint. Another skin incision is made just lateral to the Achilles tendon at the joint line to establish the posterolateral portal. When arthroscopic visualization of the posterior ankle is possible through the arthroscopic cannula previously introduced to distract the joint, a clamp is inserted anteriorly through the posterolateral incision into the space between the posteroinferior tibiofibular ligament and intermalleolar ligament under direct visualization through the arthroscope. The mosquito clamp is used to open the joint capsule. To gradually widen the joint capsule and soft tissue, a small-

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Address correspondence to: Yong Wook Park, MD, PhD, Department of Orthopaedic Surgery, Kangnam Sacred Heart Hospital, Hallym University College of Medicine, 948-1, Dalim-1dong, Youngdeungpo-gu, Seoul 150-950 South Korea.
E-mail address: footankle@hanmail.net (Y.W. Park).

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Fig. 1. Preoperative lateral ankle radiograph showing arthritic change of the articular surface and narrowing of the ankle joint.

diameter blunt trocar is inserted first and then substituted with larger ones. Finally, a 4.6-mm stainless steel cannula with a blunt trocar inside is inserted into the joint. When insertion of the cannula under direct visualization with the arthroscope is difficult, the cannula can be inserted under fluoroscopic guidance (Fig. 4). With 2 cannulas inside the joint, they can be used alternatively for maintaining joint distraction. One of the 2 cannulas can be retracted slightly to move freely, and an arthroscope can be inserted through that cannula to examine the joint, with the other cannula used to maintain the joint distraction. Alternatively, 1 of the cannulas can be removed and instruments can be inserted through the same portal, with distraction maintained using the other cannula. A standard anterolateral portal can be established for better instrumentation and visualization. When the arthritic joint distracts easily using this technique, a 5.5-mm disposable plastic cannula (ConMed Linvatech, Largo, FL), which has often been used in shoulder arthroscopy, can be used for distraction of the ankle joint. When a suction tube is connected to the plastic cannula after removing the trocar inside, cartilage debris of various size, which will often clog a shaver, can be resected by a curette and easily flushed out of the joint. Instruments can also be introduced into the joint through the plastic cannula for use.

Intra-articular positioning of the cannula can be changed to resect the articular cartilage hidden under the cannula. A blunt trocar can be inserted into the lateral gutter (talofibular space) or medial gutter (medial tibiotalar space) to widen the space to debride the articular cartilage.

After thorough removal of the articular cartilage and abrasion of the underlying subchondral bone surface, all the instruments and the arthroscope are removed, and 6.5-mm cannulated screws are inserted to fix the joint under fluoroscopic guidance (Fig. 5).

Discussion

Unlike hip and knee osteoarthritis, primary degenerative ankle osteoarthritis has rarely been encountered. Also, ankle osteoarthritis is much more likely to be post-traumatic, which accounts for 65% to 80% of ankle osteoarthritis cases (16). In the trauma cases, damage often extends to the soft tissue and leads to joint contracture and arthrofibrosis after severe ankle pilon fractures. Because of the shape of the talus, joint distraction is necessary for arthroscopic ankle arthrodesis (4). However, in cases with joint contracture and arthrofibrosis, noninvasive ankle distraction might not be sufficient (14,17). Some investigators have advocated invasive skeletal distraction for tight arthritic ankles (12,15). However, possibilities exist for pin breakage, infection, and a risk to neurovascular structures (12,15).

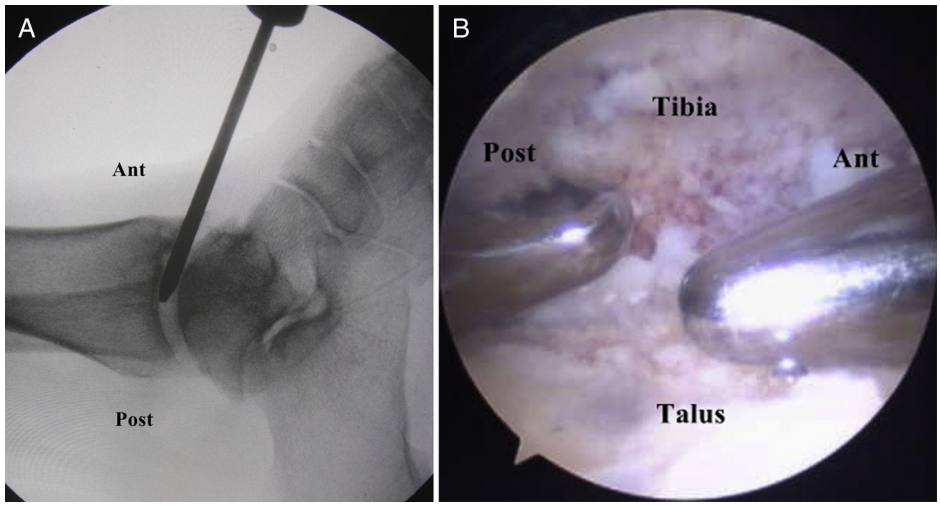

Fig. 2. Fluoroscopic radiographs showing (*A*) intra-articular ankle distraction by insertion of a large- diameter blunt trocar through the anteromedial portal. (*B*) Arthroscopic image of the medial ankle visualized from the anterolateral portal showing the blunt trocar inserted through the anteromedial portal and a shaver from the posterolateral portal debriding the articular cartilage.