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Ankle Arthroscopy in a Hanging Position Combined with Hindfoot Endoscopy for the Treatment of Concurrent Anterior and Posterior Impingement Syndrome of the Ankle

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ABSTRACT

The purpose of the present study was to evaluate the results of arthroscopic and endoscopic treatment of concurrent anterior and posterior ankle impingement with the patient in a prone position. From May 2009 to September 2010, 22 patients with simultaneously combined anterior and posterior ankle impingements underwent ankle arthroscopy in a prone position. Noninvasive ankle distraction was achieved by hanging the affected ankle on a shoulder-holding traction frame, followed by hindfoot endoscopy. The mean age at surgery was 22.6 (range 20 to 46) years. The mean follow-up duration was 15.4 (range 12 to 29) months. The American Orthopaedic Foot and Ankle Society scores and Foot Function Index were checked preoperatively and at the final follow-up visit. The mean American Orthopaedic Foot and Ankle Society score increased from 62.6 preoperatively to 86.0 at the final follow-up visit ($p < .05$). The Foot Function Index improved from 45.8 to 17.2 ($p < .05$). Of the 22 patients, 18 were very satisfied or satisfied with the results, 2 rated their results as fair, and 2 were dissatisfied. No complications related to ankle distraction in a hanging position occurred. Ankle arthroscopy with the patient in a prone position with the ankle hung on a shoulder-holding traction frame combined with hindfoot endoscopy provided a useful method for treating anterior and posterior ankle impingement that does not require changing the patient's position from supine to prone.

During the past few decades, major technological advances in video cameras, fiberoptic light transmission methods, instruments for use in small joints, and distraction methods for ankle joints have improved the safety and effectiveness of ankle arthroscopy to address various pathologic conditions of the ankle joint (1–6). The arthroscopic treatment of anterior ankle impingement is well established, and the results of the arthroscopic treatment of anterior ankle impingement have been uniformly reported to be successful (4,7–11). However, ankle pathologic features located far posterior in the ankle joint remain difficult to reach from anterior portals because of its shape (12,13). Furthermore, extra-articular structures, such as the os trigonum, cannot be inspected during standard ankle arthroscopy (5,13,14). For these reasons, a 2-portal endoscopic approach to the hindfoot was proposed by van Dijk et al (13), and this technique rapidly achieved popularity for the treatment of posterior ankle impingement (9,15–17). However, the anterior compartment of the ankle joint is difficult to access using this technique with the patient prone. Therefore, when anterior and posterior ankle impingements occur simultaneously, it is sometimes inevitable that a pathologic finding is left untreated when either anterior ankle arthroscopy or hindfoot endoscopy is used. To combine these 2 techniques, surgery must be stopped, and the patient's position changed from supine to prone or vice versa, increasing the operating time and the risks of contamination.

Henderson and La Valette (7) reported on 62 patients with concurrent anterior and posterior ankle impingement. They had treated all by anterior arthroscopy and posterior arthrotomy with the patients in the supine position (7). Although they reported no significant neurovascular complications associated with posterior arthrotomy, open approaches have been associated with neurologic complications and wound problems (18–20). Compared with open arthrotomy, hindfoot endoscopy has the potential to shorten the recovery time and limit the surgical morbidity (17).

We have treated 24 patients with simultaneous anterior and posterior ankle impingement. Because of these problems, we developed a method that allows the performance of anterior ankle arthroscopy and hindfoot endoscopy without the need for

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repositioning the patient from supine to prone. The purpose of the present study was to evaluate the results of arthroscopic and endoscopic treatment of concurrent anterior and posterior ankle impingement with the patient in the prone position. The present study was a retrospective case series.

Patients and Methods

Subjects

Our institutional review board approved the present study. From May 2009 to September 2010, 24 consecutive patients with simultaneously combined anterior and posterior ankle impingement underwent ankle arthroscopy in the prone position. Noninvasive ankle distraction was achieved by hanging the affected ankle on a shoulder-holding traction frame (commonly used for shoulder traction during shoulder arthroscopy), followed by hindfoot endoscopy. The medical records were reviewed, and, after obtaining informed consent, the patients were invited for a final follow-up office visit for a detailed evaluation. Two patients were unreachable. The results of the operative procedures conducted in the remaining 22 patients (22 ankles) are presented. Of the 22 patients, 20 were men and 2 were women, and no patient had bilateral combined impingement. The mean age at surgery was 22.6 (range 20 to 46) years. The mean follow-up duration was 15.4 (range 12 to 29) months.

Combined anterior and posterior ankle impingement was diagnosed from the clinical symptoms and radiographic findings. All 22 patients had pain and tenderness to palpation on the anterior and posterior aspects of the ankle and were found to have anterior pain aggravated during forced ankle dorsiflexion and posterior pain during forced ankle plantar flexion. Anterior ankle osteophytes and the os trigonum, which can cause impingement and pain, were evaluated on plain radiographs (Fig. 1). Preoperative magnetic resonance imaging was performed on all patients. The magnetic resonance imaging findings from the patients with anterolateral soft tissue impingement included a soft tissue signal mass in the anterolateral gutter of the ankle (21–24). In the presence of posterior ankle impingement, posterior soft tissue edema or edema within or around a symptomatic os trigonum was detected. Associated lesions, such as an osteochondral lesion of the talus or tibial plafond and flexor hallucis longus (FHL) tenosynovitis, were detected on the magnetic resonance images and correlated with the symptoms. Anteroposterior and lateral weightbearing radiographs were used before surgery to assess tibiofibular syndesmosis instability and joint degeneration.

The indication for surgery was concurrent anterior and posterior ankle impingement with persistent anterior and posterior ankle pain despite a minimum of 3 months of conservative treatment, which included oral nonsteroidal anti-inflammatory drugs, physiotherapy with strengthening and proprioceptive exercises, and activity modification, constraining the patients from participating in sports activities or strenuous physical work. Ankles with degenerative joint disease, defined as joint space narrowing and subchondral sclerosis, or with a fracture history were excluded. The ankles with tibiofibular syndesmosis instability requiring screw fixation or syndesmosis reconstruction and ankles with chronic instability requiring ankle ligament reconstruction, such as the modified Bröstrom procedure, were excluded.

Operative Techniques

To prepare for ankle arthroscopy with the ankle in a hanging position, the distal portion of the operating table was flexed downward, and a shoulder-holding traction frame (commonly used for shoulder traction during shoulder arthroscopy) was connected to the operating table. With the patient under spinal or general anesthesia, the patient was placed in a prone position with the knees placed just proximal to the distal edge of the operating table. A leg holder was then applied around the involved thigh to hold the affected limb and provide a counterforce against the ankle traction (Fig. 2). After standard preparation and draping, to prevent extravasation of irrigation fluid into the lower leg, which can increase the risk of compartment syndrome, a Coban (3M, St. Paul, MN) was wrapped around the involved calf. The affected limb was then flexed 90° at the knee so that the sole of the foot faced the ceiling. Noninvasive distraction straps were then applied around the ankle and attached to a shoulder-holding traction frame, with an S hook, and 135 N (30 lb) of traction was applied. The anteromedial and anterolateral portals were created just as for ankle arthroscopy in the supine position (Fig. 3*A*), and the posterolateral portal was created 1 cm above the tip of the lateral malleolus, just lateral to the Achilles tendon. The posterior aspect of the capsule was punctured just medial to the posteroinferior tibiofibular ligament under direct visualization, with the arthroscope placed in the anteromedial portal and looking posterolaterally (3) (Fig. 3*B*). Anterior osteophytes and impinging soft tissue were removed through the anterior portals (Fig. 4). When superficial and partial thickness cartilage defects were detected, they were left untreated. However, chondral flaps and chondral fragments were removed, and the base of the lesion was abraded and microfractured. For an osteochondral lesion, a shaver was introduced to debride the osteochondral defect and underlying necrotic bone, and a microfracture awl was used to puncture the subchondral plate several times at approximately 3-mm intervals. Loose bodies were removed. Resection of hypertrophied soft tissue within the distal tibiofibular joint was performed if the medial deltoid ligament had not ruptured or no obvious widening was present on plain anteroposterior radiographs (25). Instrumentation of the posterior ankle joint was much easier through the posterolateral portal with the ankle hanging and the patient prone. Disorganized fibrotic scar tissue that seemed to impinge between the medial wall of the talus and the posterior margin of the medial malleolus was removed using a shaver introduced through the anteromedial portal with viewing from the posterolateral portal (Fig. 5). Posterior synovitis and frayed or torn intermalleolar ligament were removed.

After ankle arthroscopy, the ankle traction was released, and the distal portion of the operating table was extended upward to make the table flat. Next, the knee was

Fig. 1. Plain radiograph showing bony causes of both anterior and posterior impingement.

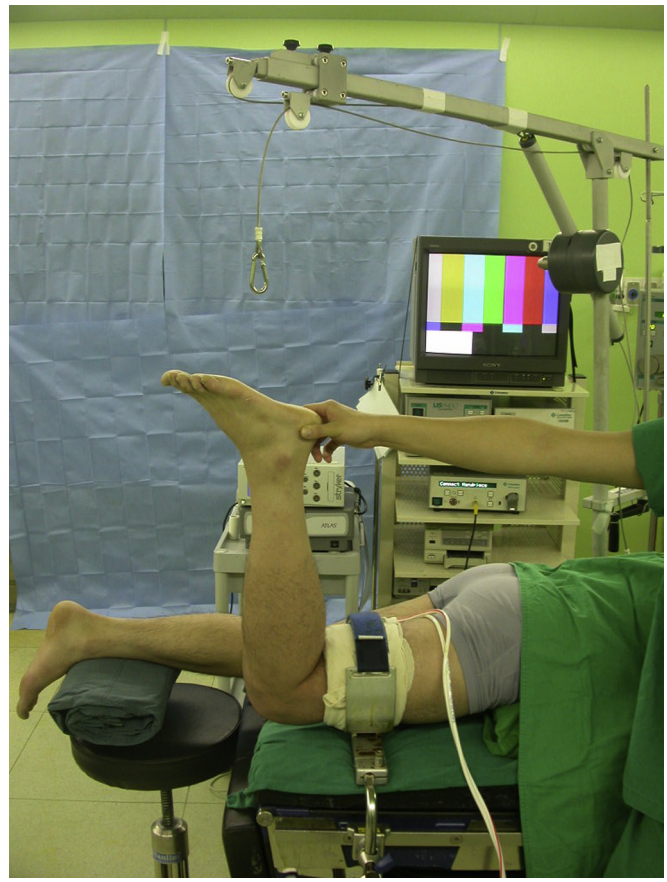

Fig. 2. Intraoperative image showing the patient placed in a prone position with knees just proximal to the distal edge of the operating table. A shoulder-holding traction frame (commonly used for shoulder traction during shoulder arthroscopy) is connected to the operating table. A leg holder has been applied around the involved thigh to hold the affected limb and provide counterforce against ankle traction.