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ORIGINAL ARTICLE

Arthroscopic excision of separated ossicles of the lateral malleolus

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Abstract
Background We have conducted a retrospective review of 19 patients for whom 20 separated ossicles of the lateral malleolus were excised arthroscopically. We examined the operating methods, findings, and overall results.
Methods The patients' indications for this procedure were as follows. The main complaints were pain alone; ossicle sizes were small and ankle instability was minimal. There were 12 ankles of 12 males and eight ankles of seven females. The patients' average age was 17.6 years. A 2.7-mm, 30° arthroscope was inserted into the ankle joint through the anterolateral portal. Instruments were inserted through the accessory anterolateral portal, and ossicles were removed piece by piece. Talar tilt angles and anterior displacements were examined and compared before and after surgery by use of stress radiographs. Japanese Society for Surgery of the Foot (JSSF) ankle/hindfoot scales were assessed pre and postoperatively.
Results All patients recovered their original levels of activity. The mean talar tilt angle changed from 6.1° ± 2.4° preoperatively to 6.0° ± 1.8° postoperatively ($p = 0.93$), and the mean anterior displacement changed from 5.9 ± 1.7 mm preoperatively to 6.1 ± 2.0 mm postoperatively ($p = 0.42$). Average JSSF ankle/hindfoot scale improved from 77.6 ± 2.6 points preoperatively to 97.2 ± 5.2 points postoperatively ($p < 0.01$).
Conclusions Arthroscopic excision of separated ossicles of the lateral malleolus achieved good results with minimum incisions, and relatively early resumption of daily and sports activity was possible. However, when the ossicles were embedded within the fibers of the anterior talofibular ligament, it was impossible to avoid cutting of ligament fibers. To reduce the possibility of ligament dysfunction, we believe postoperative treatment should conform to the accepted method for treatment of acute ankle sprains.

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Introduction

Among patients who complain of pain at the tip of the lateral malleolus after ankle sprains or sports activity, separated ossicles ("os subfibulare") are often noted. These ossicles are found in 1 % of the human population [1], and are a result either of an unfused accessory ossification center [2] or an avulsion fracture of the anterior talofibular ligament [3, 4]. The presence alone of separated ossicles does not always cause symptoms. However, they can become symptomatic during trauma or overuse because of exercise, and require treatment [4]. Lateral ankle pain is believed to be caused by traction stress of the ossicle from the attached ligament [5] or by surrounding synovitis and hypertrophic soft-tissue impingement [6]. In general, nonoperative treatment should be chosen first (two to four weeks of rest with restricted weightbearing on crutches or immobilization) [2, 7]. However, surgical treatment can be required for cases which resist nonoperative treatment and for which symptoms recur. In operative treatment, excision of the ossicle (and repair or reconstruction of the lateral

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ligament of the ankle) and fusion of the ossicle in open treatment are performed, and good results are usually obtained [2, 3, 5, 7]. We selected fusion of the ossicle in cases where the size of the ossicle was relatively large and the patient was young (before completion of epiphyseal closures) and achieved high success of bone union. We performed excision of the ossicle (and repair or reconstruction of the lateral ligament of the ankle) in other cases, especially when the patient desired to return as early as possible to sports activity. Among patients requiring surgical treatment, there could be indications for arthroscopic treatment [5, 6, 8].

The purpose of this paper is to report operating methods, findings, and overall results for separated ossicles of the lateral malleolus that were treated by arthroscopic excision.

Materials and methods

Indications for arthroscopic excision of separated ossicles of the lateral malleolus complied with the conditions below, on the basis of clinical symptoms, plain radiographs, and stress radiographs (Fig. 1).

1. The main complaint is pain alone, with no, or only slight, sensations of ankle instability.
2. On stress radiographs, there is no, or relatively little, ankle instability (talar tilt angle $\leq 10°$, and anterior displacement <10 mm).
3. The size of ossicle is small on the anteroposterior plain radiograph (longitudinal diameter ≤ 5 mm), and the possibility of increasing ankle instability postoperatively seems to be minor.

If, on the other hand, ankle instability was apparent from clinical or imaging findings, and if it seemed possible that postoperative ligament dysfunction would result because of the large size (>5 mm) of ossicles, other open treatment was chosen [2, 3, 5, 7].

Between 1990 and 2009, operative treatment was performed on 111 ankles of 107 patients for separated ossicles of the lateral malleolus. Excision of the ossicle (and repair or reconstruction of the lateral ligament of the ankle) was conducted on 75 ankles of 72 patients, arthroscopic excision of the ossicle was performed on 20 ankles of 19 patients, and fusion of the ossicle was performed on 16 ankles of 16 patients. Arthroscopic treatment was performed on 12 ankles of 12 males and on eight ankles of seven females. The average age at the time of operation was 17.6 (range 8–35) years. Mean postoperative followup was 50.2 (range 29–126) months. This study was approved by our Institutional Review Board.

Chief complaints consisted of pain at the tip of the lateral malleolus during exercise in all cases; slight sensations of ankle instability were noted in three cases. All patients acknowledged local tenderness surrounding the site of the ossicles. A clear history of trauma was noted for 12 ankles (sprains of 11 ankles, a traffic accident for one ankle). Pain in seven ankles was concluded to have been caused by overuse, and the cause was unclear for one ankle. All patients received nonoperative treatment for more than three months. However, because symptoms did not improve, arthroscopic treatment was performed.

Stress radiographs were taken by use of a TELOS device (TELOS, Weiterstadt, Germany). The talar tilt angle and anterior displacement were measured before surgery and at last followup examination. The talar tilt angle was defined as the angle between the articular surfaces of the tibia and talus on the anteroposterior varus stress radiograph. Anterior displacement was determined as the shortest distance between the posterior lip of the tibia and the talar dome on the lateral anterior stress radiograph [9].

The results from surgery were based on the Japanese Society for Surgery of the Foot (JSSF) ankle/hindfoot scale [10]. For all patients, pre and postoperative JSSF ankle/hindfoot scales were assessed retrospectively from the medical records (Table 1).

For talar tilt angle, anterior displacement, and JSSF scale, paired t tests were used for statistical analysis; results were regarded as statistically significant for values of $p < 0.05$.

Operative technique

The patient was placed in a supine position under general anesthesia with a pneumatic tourniquet on the thigh. During the operation, intracapsular working space was maintained by using a joint-irrigation system with approximately 60 mmHg pressure. No distraction devices were applied to the ankle. A 2.7-mm 30° arthroscope was inserted into the ankle joint via the anterolateral portal. The accessory anterolateral portal was established approximately 10 to 15 mm distal from the anterolateral portal, in the superior margin of the anterior talofibular ligament, and instruments were inserted using this portal [11].

Because the ossicle was partially or completely embedded within the fibers of the anterior talofibular ligament, its size and location were confirmed by palpation with the probe (Fig. 2a). A 3.5-mm full-radius shaver was inserted, and resection of the surrounding inflamed synovial tissue was performed to obtain visual space. The ossicle was then carefully dissected from the surrounding ligament fibers by use of a banana knife, but the procedure was maintained as noninvasive as possible by not disrupting the continuity of ligament fibers (Fig. 2b). The ossicle was removed piece by piece with a grasper

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