



## Endoscopic Versus Open Surgery for Calcaneal Bone Cysts: A Preliminary Report



Akinobu Nishimura, MD, PhD<sup>1,2</sup>, Akihiko Matsumine, MD, PhD<sup>3</sup>, Ko Kato, MD, PhD<sup>4</sup>,  
Kunihiro Aasanuma, MD, PhD<sup>2</sup>, Tomoki Nakamura, MD, PhD<sup>2</sup>, Aki Fukuda, MD, PhD<sup>5</sup>,  
Akihiro Sudo, MD, PhD<sup>6,7</sup>

<sup>1</sup> Assistant Professor, Department of Orthopaedic and Sports Medicine, Mie University Graduate School of Medicine, Tsu City, Japan

<sup>2</sup> Assistant Professor, Department of Orthopaedic Surgery, Mie University Graduate School of Medicine, Tsu City, Japan

<sup>3</sup> Associate Professor, Department of Orthopaedic Surgery, Mie University Graduate School of Medicine, Tsu City, Japan

<sup>4</sup> Director, Department of Orthopaedic Surgery, Suzuka Kaisei Hospital, Suzuka, Mie, Japan

<sup>5</sup> Orthopedist, Department of Orthopaedic Surgery, Suzuka Kaisei Hospital, Suzuka, Mie, Japan

<sup>6</sup> Professor, Department of Orthopaedic and Sports Medicine, Mie University Graduate School of Medicine, Tsu City, Japan

<sup>7</sup> Professor, Department of Orthopaedic Surgery, Mie University Graduate School of Medicine, Tsu City, Japan

### ARTICLE INFO

Level of Clinical Evidence: 3

#### Keywords:

calcium phosphate cement  
endoscopy  
peroneal tendon sheath  
rehabilitation  
return to sports

### ABSTRACT

The purpose of the present study was to evaluate the advantages and disadvantages of an endoscopic procedure for patients with symptomatic calcaneal bone cyst compared with an open procedure. The cases of 16 consecutive patients with a calcaneal bone cyst were reviewed. Of the 16 patients, 8 had undergone the open procedure (O group) from October 2003 to August 2011, and 8 had undergone the endoscopic procedure (E group) from September 2011 to April 2013. The endoscopic procedure used a 2-portal technique in which skin incisions were made to avoid the peroneal tendon according to the preoperative ultrasonography. All surgeries (open or endoscopic) consisted of curettage of the inner wall of the bone cyst, followed by injection of calcium phosphate cement. The following factors were evaluated: radiographic assessment, operative time, postoperative adverse effects, and interval to the return to sports. No significant difference between the 2 groups was observed in the operative time ( $53.5 \pm 6.5$  minutes in the O group and  $56.1 \pm 13.8$  minutes in the E group). The E group experienced no adverse effects; however, the O group had 1 temporary irritation in the sural nerve area and 1 calcium phosphate cement leakage along the peroneal tendon sheath. The interval to a return to sports was significantly shorter in the E group ( $14.5 \pm 0.9$  weeks in the O group and  $6.5 \pm 1.1$  weeks in the E group;  $p < .01$ ). In conclusion, endoscopic surgery is a useful approach for the treatment of calcaneal bone cysts, allowing early rehabilitation and an early return to sports without any adverse effects.

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A solitary or simple bone cyst is a benign, fluid-filled lesion (1). These cysts are frequently located in the metaphysis adjacent to the growth plate of tubular bones, mostly the humerus and femur (2). Calcaneal bone cysts (CBCs) are relatively rare (3–5). Although CBCs can cause considerable disability and interfere with sports activities owing to the constant in-fracturing of the very thin cortex of the calcaneus, painful lesions usually become asymptomatic after several months (6). Furthermore, unlike cysts of the long bone, major pathologic fractures due to CBCs are rare, and only a few such cases have

been reported (4,7,8). Therefore, controversy exists about how to definitively treat CBCs. Although CBCs can be treated conservatively in most cases, surgery is indicated when the lesion is symptomatic or the cyst is located close to the cortical bone and, thus, threatening a fracture. The conventional surgical procedure for a CBC has been open curettage followed by bone grafting, and good outcomes have been reported (4,9,10). However, this procedure requires restriction of weightbearing for several weeks. Because CBCs usually occur in young patients who desire an early return to sports activities, a less invasive surgical approach is desirable. Recent studies have reported treatment using an endoscopic procedure as less invasive surgery (5,11).

We have been performing endoscopic surgery for CBCs since September 2011 to minimize the surgical invasiveness. The present study was a retrospective, case-control study comparing endoscopic and open surgery. We sought to determine whether an endoscopic approach has advantages compared with an open procedure. The

**Financial Disclosure:** None reported.

**Conflict of Interest:** None reported.

Address correspondence to: Akinobu Nishimura, MD, PhD, Department of Orthopaedic and Sports Medicine, Mie University Graduate School of Medicine, 2-174 Edobashi, Tsu City, Mie 514-8507, Japan.

E-mail address: [meiten@clin.medic.mie-u.ac.jp](mailto:meiten@clin.medic.mie-u.ac.jp) (A. Nishimura).

purpose of the present study was to examine the advantages and disadvantages of an endoscopic procedure for patients with a symptomatic CBC compared with an open procedure. We hypothesized that the endoscopic procedure would require a longer operative time but would enable an earlier return to sports activities compared with the open procedure.

#### Patients and Methods

##### Patients

The data from 16 consecutive patients (16 feet) who had undergone surgery for CBCs from October 2003 to April 2013 were reviewed. Surgery was indicated for patients with persistent heel or foot and ankle pain that affected their daily or sports

activities. All the patients had experienced recurrent pain despite conservative therapy such as sports restriction, heel support, and partial or non-weightbearing ambulation with crutches. Patients with a follow-up period <24 months were excluded from the present study. All the patients (8 males and 8 females) had been referred to our hospital by a general orthopedic surgeon because of heel pain. The right calcaneus was involved in 9 patients (56.3%) patients and the left in 7 (43.8%). The mean age at surgery was  $13.1 \pm 2.7$  (range 9 to 19) years. The diagnosis of CBC was determined by the findings from plain radiographs, computed tomography scans, and magnetic resonance imaging for all patients (Fig. 1). No patient had a pathologic fracture in the preoperative period. The diagnosis was confirmed by histologic examination for all patients who underwent surgery. Of the 16 patients, 8 were treated by the open procedure (O group) from October 2003 to August 2011, and 8 patients were treated by the endoscopic procedure (E group) from September 2011 to April 2013. The sports events that caused the trigger for the symptoms were as follows: Japanese fencing and tennis in 2 patients (25.0%), soccer and softball in 1 (12.5%), and school physical education in 2 (25.0%) in the O group and baseball and soccer in 2 patients each (25.0%), basketball, dance, and softball



**Fig. 1.** Imaging findings. (A) Radiograph and (B) computed tomography scan showing a well-defined, osteolytic lesion, measuring approximately 3 cm × 2 cm × 2 cm, situated plantar to the posterior facet. The lesion showed (C) low intensity on a preoperative T<sub>1</sub>-weighted magnetic resonance imaging scan, (D) high intensity on a T<sub>2</sub>-weighted magnetic resonance imaging scan, and (E) a rim-enhanced lesion on an enhanced T<sub>1</sub>-weighted magnetic resonance imaging scan.

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