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Surgical Treatment of Confirmed Intraosseous Lipoma of the Calcaneus: A Case Series

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ABSTRACT

Intraosseous lipoma of the calcaneus is a benign lesion formed by mature adipose tissue. When the lesion is symptomatic, the most frequent presentation is localized pain and soft tissue swelling. Because these lesions can regress spontaneously, conservative treatment methods are recommended. Operative excision is mostly required for painful lesions and pathologic fractures. The data from 14 patients with calcaneal intraosseous lipoma, who had undergone surgery in our clinic, were evaluated retrospectively. Using Milgram's classification system, 9 lesions were classified as stage 1, 4 as stage 2, and 1 as stage 3. All lesions were occupying 100% of intracalcaneal cross-section in the coronal plane and >30% in the sagittal plane of magnetic resonance imaging sections. The mean preoperative visual analog scale score was 5.29 ± 1.14 (range 4 to 7), and the mean postoperative visual analog scale score at the last follow-up visit was 1.14 ± 0.36 (range 1 to 2), which was significantly better ($p < .01$). The mean Maryland foot score at the last follow-up visit was 97.71 ± 2.02 (range 95 to 100). The mean American Orthopaedic Foot and Ankle Society Ankle-Hindfoot scale score was 97.86 ± 2.11 (range 94 to 100) at the last follow-up visit. The differences between the pre- and postoperative values were statistically significant ($p < .01$). No recurrence had been detected within a median follow-up period of 84 months. Operative management of symptomatic lesions related to intraosseous lipoma of the calcaneus provides better results compared with the preoperative state.

Intraosseous lipoma of the calcaneus is a benign tumor formed by mature adipose tissue (1). First described by Brault in 1868, these lipomas constitute <0.1% of all primary bone tumors and most commonly involve the metaphysis of the long bones (2,3). Child (4) was the first to describe this tumor of the calcaneus in 1955. The incidence of intraosseous lipomas with calcaneal involvement has been reported to be 15% (1,5). However, because these tumors are commonly asymptomatic or misdiagnosed (5,6), they might not be as rare as reported (2,7). When symptomatic, the most frequent presentation is localized pain and soft tissue swelling (6).

Radiographically, the tumor is commonly found plantar to the angle of Gissane (2,7). Magnetic resonance images will show a signal intensity similar to that of normal fat tissue on T1- and T2-weighted sections (8). Comparing the Hounsfield unit of the tumor on computed tomography to that of lipoma can be helpful in the diagnosis (9). Conservative treatment is recommended for painless tumors and for those with no risk of pathologic fractures, because these tumors can sometimes regress spontaneously. Excision is mostly required for painful lesions and because of impending pathologic fractures (10).

Several cases of intraosseous lipomas have been reported (11–14), although only a few reports have consisted of series (15–18). However, controversy remains concerning whether conservative or surgical treatment methods are best (15,19,20). To answer this question, we compared the preoperative and postoperative foot scores and patient satisfaction of patients with histologically confirmed intraosseous lipoma that had been surgically removed.

Patients and Methods

We retrospectively evaluated the medical records and radiologic findings of patients in whom an intraosseous lipoma of the calcaneus had been diagnosed, confirmed histologically, and treated surgically at Baltalimani Bone Diseases Training and Research Hospital from February 2003 to June 2013. The lesions were classified according to Milgram's classification of intraosseous lipomas (7). Radiographically pure osteolytic lesions were classified as stage 1, those with central calcifications within osteolytic lesions were classified as stage 2, and those with reactive bone formation within extensive ischemic bone were classified as stage 3.

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Intralesional curettage was performed, and the defect was filled with a corticospongeous allograft in all patients. Postoperative radiographs were evaluated at each follow-up visit. The wounds were assessed 2 and 4 weeks after surgery. Weightbearing was not allowed for 6 weeks, was limited for the next 2 weeks, and encouraged subsequently. After hospital discharge, all the patients were instructed to move the foot through the full range of motion to avoid stiffness. Pain was measured using a 10-cm visual analog scale (VAS), the Maryland Foot Score, and the American Orthopaedic Foot and Ankle Society (AOFAS) Ankle-Hindfoot scale before surgery and at the last follow-up visit. The mean scores were assessed using paired *t* tests. The data were and analyzed using the SPSS, version 2.0, software package (IBM Corp., Armonk, NY). Alpha was set at 0.01, and all tests were 2 tailed.

Results

Of 56 patients in whom intraosseous lipoma of the calcaneus was diagnosed radiologically, the diagnosis (Fig. 1) was verified histopathologically (Fig. 2) in 14 consecutive patients (7 females, 7 males; Table). All 14 were treated surgically. Their mean age was 41 (range 20 to 66) years. All 14 patients were symptomatic and had used heel pads for ≥6 months before surgery. The conservative treatment methods had not decreased the pain for any patient. Only 3 patients reported a history of trauma to the affected side, and none had a history of calcaneal fracture.

Radiographically, all lesions were in Ward's triangle of the calcaneus, and none were close to the joint lines (Table). On magnetic

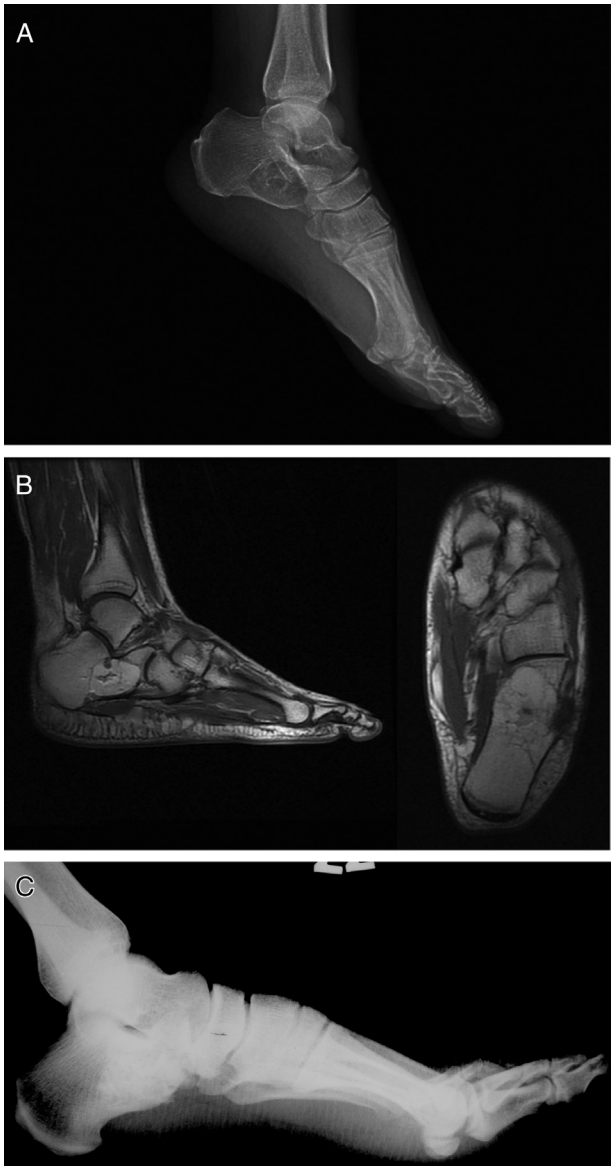

Fig. 1. (*A*) Lateral view of the left foot of a 43-year-old male with histologically confirmed intraosseous lipoma of the calcaneus. The patient presented with foot pain. (*B*) Magnetic resonance images of the foot showed features similar to those of subcutaneous lipid on T1-weighted series, including central necrosis. (*C*) Lateral view of the foot after resection of the tumor by curettage, with allograft packing.

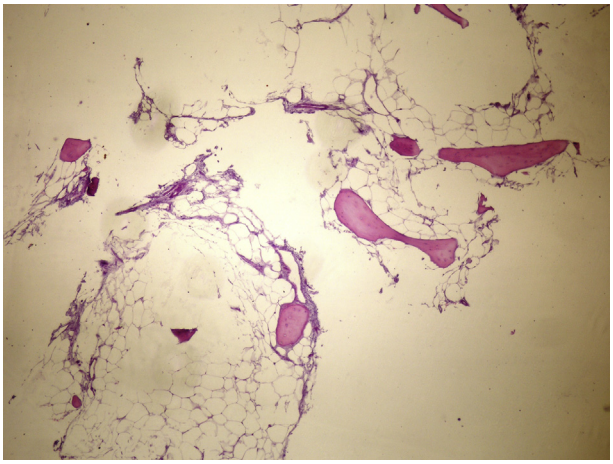

Fig. 2. The diagnosis of an intraosseous lipoma of the calcaneus was confirmed by histopathologic examination. The slide shows mature adipocytes with scarce irregular calcification areas (original magnification × 10; hematoxylin and eosin stain).

Table
Characteristics of patients with histologically verified intraosseous lipoma of the calcaneus undergoing surgical resection (n = 14 feet in 14 patients)

Variable	Value	*p* Value*
Gender (n)		NA
Male	7	
Female	7	
Age (y)		NA
Mean ± standard deviation	40 ± 14	
Range	20 to 66	
Follow-up time (mo)		NA
Median	84	
Range	18 to 108	
Milgram classification (n)		NA
Stage 1	9	
Stage 2	4	
Stage 3	1	
VAS pain score*		.01
Preoperative		
Mean ± standard deviation	5.3 ± 1.1	
Range	4 to 7	
Postoperative		
Mean ± standard deviation	1.1 ± 0.4	
Range	1 to 2	
Maryland Foot Score		.01
Preoperative		
Mean ± standard deviation	80.6 ± 3.7	
Range	74 to 86	
Postoperative		
Mean ± standard deviation	97.7 ± 2.0	
Range	95 to 100	
AOFAS Ankle-Hindfoot scale score		.01
Preoperative		
Mean ± standard deviation	82.1 ± 3.2	
Range	78 to 86	
Postoperative		
Mean ± standard deviation	97.8 ± 2.1	
Range	94 to 100	

Abbreviations: AOFAS, American Orthopaedic Foot and Ankle Society; NA, not applicable; VAS, visual analog scale.

* Change from preoperatively to postoperatively.