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Extended curettage and adjuvant therapy for benign tumors of the talus

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HIGHLIGHTS

- Benign tumors of the talus are rare, and their management is controversial.
- We retrospectively reviewed six cases of benign talar tumors (three giant cell tumors, two aneurysmal bone cysts, one osteoblastoma) treated by extended curettage and adjuvant cryotherapy.
- All patient had a mobile painless ankle and good functional outcome. No patient experienced recurrence or complications related to cryotherapy.
- Intralesional extended curettage with bone grafting and cryotherapy is a successful, safe, and efficient treatment of benign tumors of the talus.

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ABSTRACT

Purpose: Benign tumors of the talus are rare, and their management is controversial. Recent efforts have extended the safety margin of intralesional excision and curettage by chemical and physical means. Cryotherapy as adjuvant therapy is associated with risks of local wound and bony complications (delayed healing, potential for pathological fractures).
Methods: We retrospectively reviewed six cases of benign talar tumors (three giant cell tumors, two aneurysmal bone cysts, one osteoblastoma) treated by extended curettage and adjuvant cryotherapy. Talar bone stock was restored by bone grafting the residual cavity with fibular strut grafts and/or cancellous bone grafts. Patients were followed for a mean of 40 months.
Results: At latest follow-up, each patient had a mobile painless ankle and good functional outcome. No patient experienced recurrence or complications related to cryotherapy.
Conclusions: Intralesional extended curettage with bone grafting and cryotherapy is a successful, safe, and efficient treatment of benign tumors of the talus.

1. Introduction

The most common bone tumors of the foot and ankle are osseous and cartilaginous lesions, including enchondromas, osteochondromas, and chondromyxoid fibromas [1]. Giant cell tumors (GCT), chondroblastomas, osteoid osteomas, and osteoblastomas also occur. Non-neoplastic conditions include intraosseous lipomas, simple (unicameral) bone cysts, and aneurysmal bone cysts [2].

GCT, also known as osteoclastomas, are fairly common bone tumors, accounting for 5% of all primary bone tumors. They are benign tumors with a tendency for local aggressiveness and high rates of recurrence. The most common sites are the distal end of the femur, proximal end of the tibia, and distal end of the radius. The foot is an unusual site for presentation of GCT, and GCT involving hand and foot bones seems to occur in a younger age group and tend to be multicentric [3]. GCT of the talus is rare. It occurs more commonly during the 3rd decade of life [3–5]. Even though it is a rare entity, talar lesions should be considered in the differential diagnosis of nontraumatic conditions of the foot if radiographic and clinical signs are present. The presentation of GCT can be similar to that of giant cell reparative granulomas, brown tumors, and aneurysmal bone cysts [6].

Aneurysmal bone cysts are solitary benign osteolytic lesions. Thirteen percent of aneurysmal bone cysts have been reported to occur around the ankle and in the foot. They can cause swelling and pain and can compromise the structural integrity of involved bone. Although the distal tibia and fibula are more common sites

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than the foot, aneurysmal bone cysts do occur in the tarsal bones. Occasionally, aneurysmal bone cysts are completely solid [2].

Osteoblastomas are benign bone-forming neoplasms that most commonly present with pain. Approximately 9% involve the foot and ankle [7], with the neck of the talus being a common site. In the feet, they more commonly occur in cancellous bone; in other parts of the body, they more commonly occur in cortical bone. Osteoblastomas have a nidus larger than 1.5 cm, have a higher potential for growth, and commonly involve cancellous bone. Frequently, they are subperiosteal and can be difficult to detect.

Some authors [8] have reported satisfactory results with intralesional curettage and bone grafting to treat these benign tumors. However, use of curettage alone is associated with a high rate of recurrence. Adjuvants such as methylmethacrylate (bone cement), phenol, and cryotherapy have been suggested. Partial or total talectomy can be considered for cases that include extensive involvement of the talus. Arthrodesis is essential after resection of all the tarsal bones except the calcaneum [9]. Fresh-frozen osteochondral allograft reconstruction has also been described for aggressive GCT of the talus, but the availability of the literature on this modality of treatment is limited [10].

We reviewed six cases of benign tumors of the talus for which talectomy and arthrodesis had been avoided. Our hypothesis was that a meticulous surgical technique aimed at reconstruction of the talar bone stock after complete eradication of the tumor with extended curettage and adjuvant therapy is a successful treatment of benign tumors of the talus.

2. Methods

From our prospectively collected database, we retrospectively identified patients with histologically confirmed benign tumors of the talus who had been treated at our institution between 2006 and 2011. Inclusion criteria for this study were diagnosis of benign tumor of the talus; treatment by intralesional curettage, burring, adjuvant cryotherapy, and bone grafting; minimum postoperative follow-up of 24 months. Patients with pathological fractures (including intra-articular fractures) and those with malignant tumors were not treated with the specified technique and were therefore excluded from the study.

GCT were graded according to the method presented by Campanacci et al. [11], as follows: Grade I, tumor has well-marginated border with rim of mature bone and intact cortex; Grade II, tumor has relatively well-defined margins but no radiopaque rim (cortex and rim of reactive bone are rather thin and moderately expanded but still present); Grade III, tumor has irregular borders, suggesting a rapid and possibly permeative growth, and extraosseous soft-tissue extension is present to a variable extent.

The average follow-up duration was 40 months (range, 24–52 months). Success of surgical treatment was measured by radiographic evidence of no recurrence.

2.1. Surgical technique

All patients underwent intralesional extended curettage, burring, adjuvant cryotherapy, and bone grafting. Cementing was not considered because of the concern that the subchondral placement of cement might cause early degeneration of the articular cartilage. In each case, with the patient under general anesthesia, a standard anteromedial incision was made to expose the talus.

The lesion was exposed under tourniquet control, and either the expanded cortical shell was excised or a wide window was created to expose the interior of the lesion (Fig. 1). Considering that each lesion was localized to the talus, thorough curettage and bone grafting were planned. Aggressive curettage of the lesions, including application of a high-speed burr, was performed.

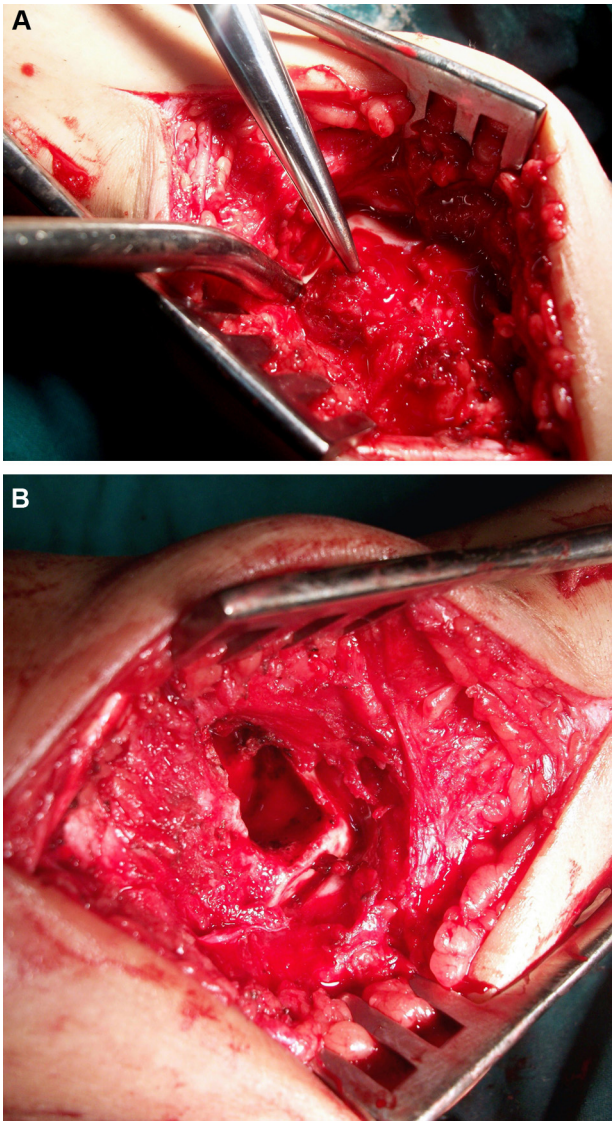

Fig. 1. Intraoperative photographs show the expanded cortical shell (A), which was excised for exposure of the lesion, and the same case after curettage (B).

After curettage of the tumor tissue with different size curettes and the use of a high-speed burr to extend the surgical margin to be excised, liquid nitrogen was poured into the cavity through a funnel (Fig. 2). This was continued to obtain a progressively expanding sphere of freezing extending beyond the periphery of the curetted margin. It was important not to prevent the evaporation of nitrogen by occluding the cortical opening. Thawing was next induced. The freeze-thaw cycles were repeated to obtain maximum tissue necrosis. Great care was taken to retract and protect the skin to prevent necrosis, with the use of Gelfoam (Pfizer, Pharmacia and Upjohn Company, Kalamazoo, Michigan, USA) circumferentially and continuous pouring of warm saline until complete evaporation of the liquid nitrogen was accomplished.

The cavity was filled with cancellous and corticocancellous bone graft. In Case 3, we used a nonvascularized fibular strut graft with cancellous bone graft. In Case 2, a fibular osteotomy was performed through a posterolateral approach. In this case, we used cancellous bone graft with periosteal flap from the proximal tibia to cover the articular surface defect (Fig. 3). In Case 5, a medial malleolar osteotomy was performed. In Cases 2 and 5, the lesions were