The Journal of Foot & Ankle Surgery ■■ (2017) ■■–■■

Contents lists available at ScienceDirect

The Journal of Foot & Ankle Surgery

journal homepage: www.jfas.org

Case Reports and Series

Combined Autograft and Bone Cement for Painful Chondroblastoma: A Case Report

Jae Jung Ryu, MD, Wanlim Kim, MD, Jong Seok Lee, MD, You Keun Kim, MD, Ho Seong Lee, MD, PhD, Sang Gyo Seo, MD

Orthopedic Surgeon, Department of Orthopedic Surgery, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Republic of Korea

ARTICLE INFO

Level of Clinical Evidence: 4

Keywords:
bone cement
bone graft
chondroblastoma
polymethylmethacrylate
talus

ABSTRACT

Chondroblastomas of the talus can lead to joint collapse and are often treated using curettage and bone grafting. In the present report, we describe the case of a 19-year-old female with a large chondroblastoma of the talus associated with a secondary aneurysmal cyst. We treated the large cartilage lesion, which involved most of the talus, with an iliac bone graft combined with bone cement to fill the large bone defect and preserve the subchondral bone of the articular surface of the dome of the talus.

Chondroblastoma is a relatively rare, benign, but locally aggressive, tumor that produces giant cells and chondroid matrix and accounts for 1% to 2% of all bone tumors (1,2). The lesion is more common in males than in females and is known to occur frequently in childhood and adolescence (3). Conventional treatment of chondroblastoma is surgical excision, often using curettage and packing the resultant defect with a bone graft, either autologous or otherwise. Therefore, aggressive curettage and bone grafting have been the mainstays of treatment aimed at removing the tumor and maintaining function. However, bone grafting of the medullar bone defect after tumor evacuation allows for the potential for bone graft resorption and local tumor recurrence, even when autogenous bone has been used. Moreover, on occasion, the cavity created by curettage cannot be completely filled (4), simply owing to the volume of bone loss required to adequately remove the tumor. In such cases, filling the defect with polymethylmethacrylate (PMMA) bone cement has been reported to be effective (5,6). Chondroblastoma of the talus, which accounts for approximately 4% of all chondroblastomas, is typically treated using curettage and bone grafting (4,7–9). In the present report, we describe the treatment of a 19-year-old female who presented with a large chondroblastoma of the talus associated with a secondary aneurysmal bone cyst. The lesion was so large that to adequately fill the void in the body of the talus and support the articular surface of the dome of the talus, we combined the use of an autogenous bone graft with bone cement.

Case Report

A 19-year-old female presented with pain in the anterior aspect of the tibiotalar joint 2 years after a previous injury. The patient's pain was worse with walking, and she had an American Orthopaedic Foot and Ankle Society hindfoot-ankle score (range 0 to 100) of 76 (10,11). The patient had no history of infectious disease or fracture and no familial history of tumors. No specific abnormal hematologic findings were present. On physical examination, the patient experienced tenderness at the anterior aspect of the left tibiotalar joint; however, no apparent mass was seen, and no findings suggestive of infection (localized heat, redness, edema, or drainage) were observed.

Standard foot and ankle radiologic findings revealed a cloud-like, loculated, radiolucent mass with a clear border occupying the medial two thirds of the body of the talus, as viewed on the frontal plane, and extending from the anterior to posterior margins of the body of the talus in the sagittal plane (Fig. 1). Computed tomography images revealed a $2.5 \times 4.1 \times 2.9$-cm osteolytic lesion with a loculation in the body of the talus. Osteocortical invasion of the mass, with expansion beyond the dorsal cortical margin, was apparent at the anterior margin of the posterior facet and the neck of the talus (Fig. 2). Magnetic resonance imaging scans (Fig. 3) revealed fluid–fluid interfaces in the body and neck of the talus, consistent with the mass, with a low signal intensity on T1-weighted (Fig. 3A,B) and medium and high signal intensities on T2-weighted (Fig. 3C,D) images. The T1-weighted contrast-enhanced images (Fig. 3E,F) showed a well-defined border and contrast enhancement. After discussion with the patient, the decision was made to undertake surgical treatment.

Surgery to remove the tumor was performed with the patient supine and under general anesthesia, with the use of an ipsilateral thigh

Financial Disclosure: None reported.
Conflict of Interest: None reported.
Address correspondence to: Sang Gyo Seo, MD, Department of Orthopedic Surgery, Asan Medical Center, Olympic-ro 43 gil 88, Songpa-gu, Seoul, Republic of Korea.
E-mail address: sgseo@amc.seoul.kr (S.G. Seo).

1067-2516/$ - see front matter © 2017 by the American College of Foot and Ankle Surgeons. All rights reserved.
https://doi.org/10.1053/j.jfas.2017.08.019

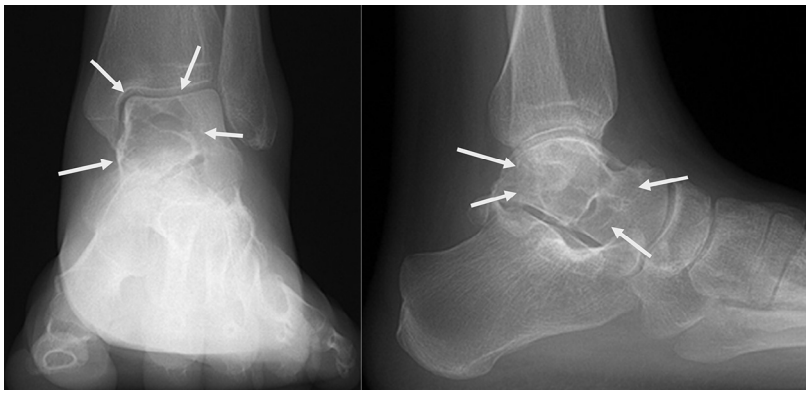

Fig. 1. Preoperative radiographs of left ankle showing osteolytic mass in the talus *(arrows)*.

tourniquet. First, the soft tissues of the medial malleolus were dissected longitudinally, and an osteotomy was made in the medial malleolus. This was oriented transversely in the sagittal plane and vertically in the frontal plane, such that distal reflection of the malleolus on the medial collateral ligaments allowed direct access to the body and neck of the talus and the tumor (Fig. 4). Cystic lesions with cortical collapse were seen in the talar dome and neck, and cortical collapse was identified in the talar component of the posterior talocalcaneal (subtalar) joint. No evidence was seen of invasion of the tumor into the adjacent soft tissue, which showed no signs of inflammation. The dome, body, and neck of the talus were palpably unstable, similar to dense rubber, indicative of loss of subchondral trabecular support of the cortical bone. A window was made in the medial aspect of the body of the talus, and the tumor was largely excised initially. Next, the remaining confines of the body and neck of the talus were thoroughly curettaged in an effort to eradicate the tumor. Biopsy was performed using the removed specimen. Additional eradication was conducted using the diamond burr to achieve negative tumor margins. Meticulous saline irrigation using irrigation spoid and bactericidal lavage with sodium hypochlorite was performed.

Because of the large volume of bone loss and the intact nature of the shell of the body and neck of the talus, the decision was made to combine an autogenous cancellous bone graft from the ipsilateral iliac crest with PMMA bone cement. Our aim was to fill as much of the body centrally with the cement and support the cortices with the autogenous bone graft. A combination of 18 cm^3 of bone cement and 5 cm^3 of ipsilateral iliac crest cancellous bone graft was used. Once the talus was packed and the cortical window replaced, it was determined to be suitably stable, and attention was directed toward reducing and fixating the malleolar osteotomy, which was stabilized with 2 fully threaded lag screws and a smooth Kirschner wire. The postoperative radiologic findings showed that the bone tumor had been excised and the cavity packed with the bone cement (Fig. 5). After the surgery, the left foot and ankle were maintained in a non-weightbearing attitude, using a removable short leg splint and crutches for the first 2 weeks, after which a short leg cast was used for an additional 2 weeks with continued non-weightbearing. The pathologic findings of the specimens obtained by curettage showed cysts that were partially filled with cells and stroma (Fig. 6). The cellular component was composed of mononuclear chondroblasts with nuclear grooves and eosinophilic cytoplasm and osteoclastic giant cells. The stroma consisted of a pink cartilaginous matrix around the cells. At 4 weeks postoperatively, the cast was removed and partial weightbearing and ankle range of motion exercises were started. After 1 year of follow-up, the patient denied ankle or hindfoot pain, her American Orthopaedic Foot and Ankle Society ankle-hindfoot score was 100, and

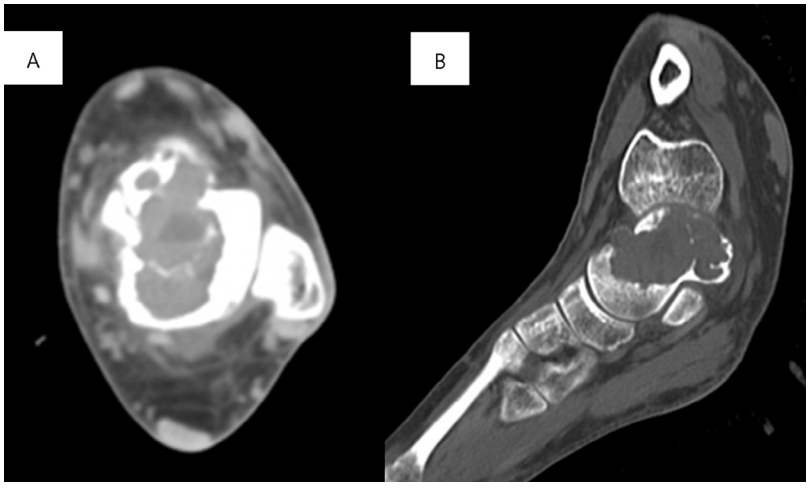

Fig. 2. *(A)* Axial and *(B)* sagittal computed tomography images of the left foot demonstrating a 2.5 × 4.1 × 2.9-cm, lobulating, well-circumscribed osteolytic mass in the talus. The mass shows cortical disruption and extraosseous extension at the anterosuperior aspect.