A Case of Arthroscopic Treatment of Chondroblastoma-Induced Chondropathy Situated at the Posterior Talus

Curettage, Bone Grafting, and Augmentation with Cell-Free Matrix

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Chondroblastoma located in the talus is a rare incidence, and due to the weightbearing duty of the talus, the results of local excision may not be favorable. While the volume of the tumor increases, more sophisticated techniques may be undertaken. Cell-free matrix application for extensive osteochondral defects is gaining popularity for its structural support when it is used with microfracture and autograft application. In this case report, we present a patient with 13 × 20 × 8mm–sized chondroblastoma located in the talus. After evaluation of the mass, we performed curettage, iliac crest autograft application, and augmentation with cell-free matrix. After uneventful clinical follow up, we present our patient's postoperative second year magnetic resonance imaging and functional status.
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Bone tumors of the foot account for approximately 3% of all osseous tumors, and tumors of the talus alone represent 8% to 23%.[1,2] Various benign and malignant tumors that affect the talus have been reported in the literature, with chondroblastoma being one of them. Chondroblastoma is characteristically encountered juxta-articularly affecting the epiphyseal regions of the long bones.[3-5] Pain, localized swelling, effusion, and limited range of motion (ROM) are common symptoms.[3,6,7] Radiographically, it is characterized by a well-circumscribed geographic lytic lesion with a narrow zone of transition and a sclerotic rim.[3,4] Surgery is the primary treatment of choice, and curettage alone or in combination with bone grafting or cementation is accepted as the gold-standard treatment.[3,7,8]

The wide articular surface and tenuous blood supply of the talus may complicate the surgical approach, especially for posteromedially situated lesions because of the need for medial malleolar osteotomy. We present a case of a juxta-articularly located chondroblastoma of the talus that was operated on by curettage and bone grafting supported by cell-free matrix by means of standard posterior ankle arthroscopy.

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Case Report

A 25-year-old man presented to a local hospital with a complaint of pain in his left ankle. The initial radiographs showed a medially located bone cyst (Fig. 1A), and further evaluation was performed with magnetic resonance imaging, which revealed a lesion with a well-circumscribed sclerotic bony margin, located at the posteromedial talus (Fig. 1B). The patient was referred to our clinic with these findings. He reported that the pain had an insidious onset, after which his complaints gradually increased and started limiting his daily activities. His history did not reveal any previous trauma. His physical examination revealed tenderness with deep palpation along the posteromedial ankle region, and his posterior impingement test was positive. His ankle joint ROM was normal. Computed tomography revealed the approximate margins of the lesion to be 13 × 20 × 8 mm (Fig. 1C). A benign cystic lesion with a possible osteochondral origin was considered to be the initial diagnosis.

After a complete diagnostic workup, we decided to proceed with curettage and bone grafting of the

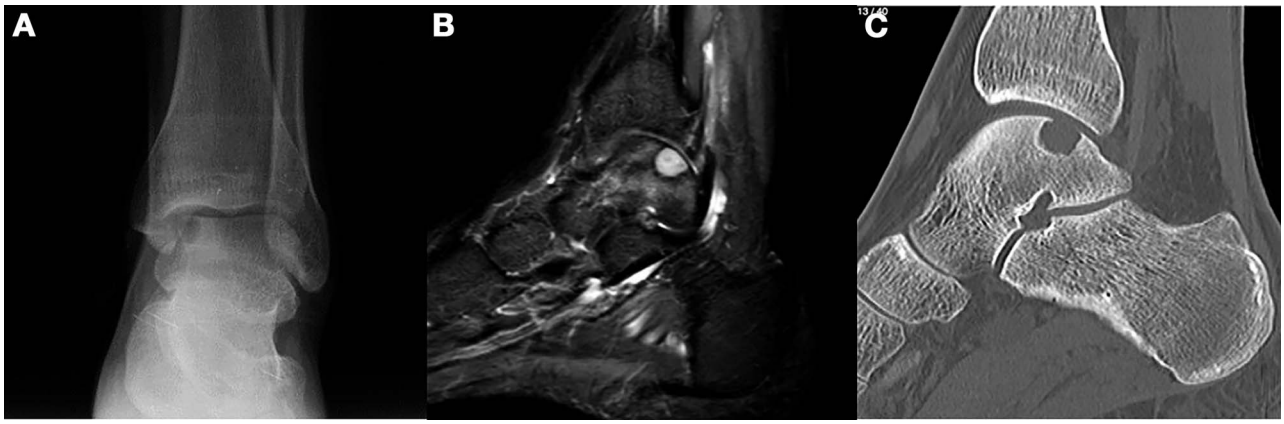


Figure 1. A, Anteroposterior radiographic image of the ankle. B, Sagittal magnetic resonance imaging view of the chondroblastoma located in the talus. C, Sagittal computed tomographic scan showing the exact margins of the chondroblastoma.

lesion and evaluation of the chondral surface overlying the lesion using two-portal posterior ankle arthroscopy. Under general anesthesia, the patient's surgical site was prepared and draped; his posterior superior iliac spine was also prepared for harvesting autologous bone graft if needed.

Hindfoot arthroscopy was performed with the patient in the prone position under thigh tourniquet control by using the two-portal posterior ankle arthroscopy approach as described by van Dijk et al.[9] Using standard posteromedial and posterolateral portals, the ankle joint was visualized. Arthroscopic examination revealed unstable cartilage over the predicted site of the lesion (Fig. 2A). Before curettage, water flow was ceased and the joint was aspirated. Through the defective chondral surface, the lesion was approached. A yellow-gray soft-tissue mass was encountered. Curettage was performed arthroscopically, and all soft-tissue particles along with the unstable chondral surface were collected with the help of a forceps where possible (Fig. 2B). Smaller fragments and loose cartilage flaps were debrided with an arthroscopic shaver. Absolute excision was checked under direct visualization; then, microfracture was performed (Fig. 3A). Because of lesion size, autologous bone grafting was preferred to fill the void. Over the previously prepared posterior superior iliac spine, an incision was made and spongious bone graft was harvested, and through the posteromedial arthroscopy portal, the osseous cavity was filled with the autograft. After the impaction of the graft material, to improve chondrogenesis, a cell-free hyaluronic acid (HA)-based scaffold was applied (Hyalofast; Anika Therapeutics, Bedford, Massachusetts) and stabilization was achieved with the help of a commercial fibrin glue (Tisseel; Baxter AG, Vienna, Austria) (Fig. 3B).[10] Pathologic examination of the curettage material revealed findings consistent with chondroblastoma (Fig. 4).

Postoperatively, the patient was followed up with a removable splint and permitted to perform ankle passive ROM exercises. After 3 weeks, the splint was changed to a walking boot, and he was allowed to bear weight as tolerated. At the end of 6 weeks postoperatively, regular shoe wear was allowed. At the final follow-up, 2 years after the operation, he was pain-free without any limitation of the ankle motion, and magnetic resonance imaging revealed complete osseointegration and fibrocartilaginous cartilage formation over the repair site (Fig. 5).

Discussion

Chondroblastomas are benign bone tumors that usually originate from the epiphysis or apophysis of long bones.[8] They are histologically characterized by proliferation of chondroblasts and account for less than 1% of all bone tumors.[3] Pain is the most common complaint, and symptomatic lesions are generally treated with surgery.[7] Curettage and bone grafting is accepted as the gold-standard treatment for talar lesions; the surgical approach is considered according to the location of the lesion because of surrounding structures such as malleoli and neurovascular and tendinous structures.[2] For our patient; the lesion was situated at the posteromedial surface of the talus. This is a challenging location to reach; either medial malleolar osteotomy or a posteromedial approach can be used, but both will require extensive dissections that could lead to wound healing problems, nerve damage, or postoperative

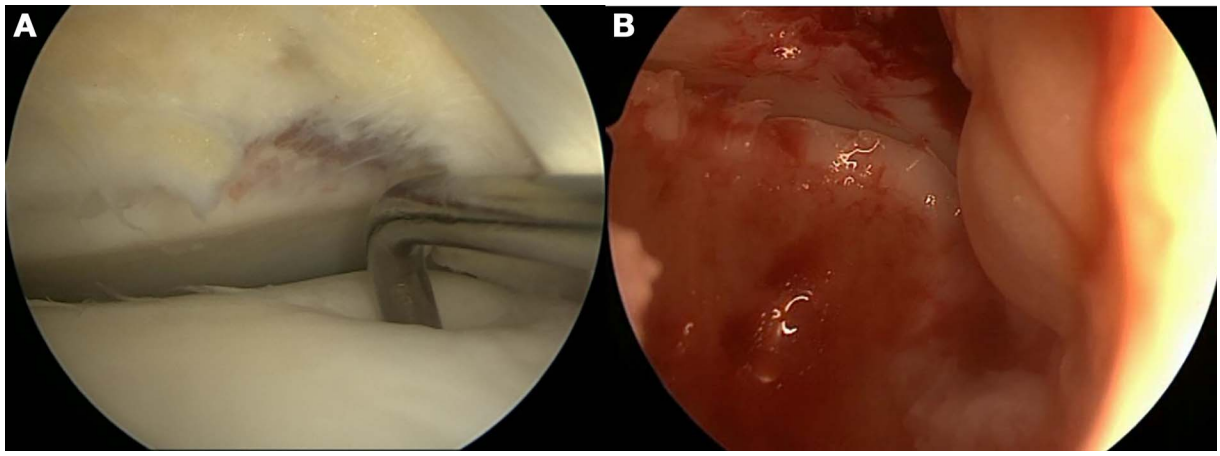


Figure 2. A, Arthroscopic evaluation of unstable cartilage. B, Appearance after excision and microfracture.

immobilization and thus a prolonged recovery period. To minimize these risks and, most importantly, for adequate visualization of the lesion, we prefer to reach the lesion by means of posterior ankle arthroscopy.[8,11] In addition to known advantages of arthroscopic interventions, hindfoot arthroscopy is found to be an effective means of definitive treatment of posteriorly localized talar cysts.[12]

After the initial debridement of the defective cartilage cap and underlying bone lesion, we decided to treat the lesion in the same fashion as an osteochondral lesion. In talar osteochondral lesions, Choi et al[13] and Chuckpaiwong et al[14] showed that lesions exceeding 150 mm^2 or 15 mm in diameter are associated with poor outcome after the use of microfracture alone. In addition, a recent consensus report has further decreased the threshold to 10 mm^2.[13-15] Therefore, it is recommended to use restorative techniques such as mosaicplasty, autologous chondrocyte transplantation, autologous matrix–associated chondrogenesis, or allograft transfers for the treatment of such larger lesions.[16] However, in case of a posteriorly localized lesion, one should use malleolar osteotomy to properly visualize the lesion and perform these restorative procedures. Because of this, we decided to fill the lesion with autograft in an arthroscopic manner and cover the defect with an HA-based, cell-free membrane to further stabilize the graft and to support chondrogenic formation.[10,17] We preferred an HA-based scaffold, as it had been supported in the literature for its potential to improve chondrogenesis, and because it can also be inserted arthroscopically without the need for a larger incision.[10]

Although massive lesions may require talectomy and fusion operations, lesions that allow joint-sparing surgery options vary in the literature.[18] In contrast, Wagener et al[18] reported three case reports of large (30×30 mm, $25 \times 34 \times 23$ mm, and $20 \times 30 \times 30$ mm) talus-situated chondroblastomas operated on by vascularized iliac and femoral condyle autograft with a minimum follow-up of 3 years. Even with long-term follow-up, all patients were highly satisfied and were able to safely return

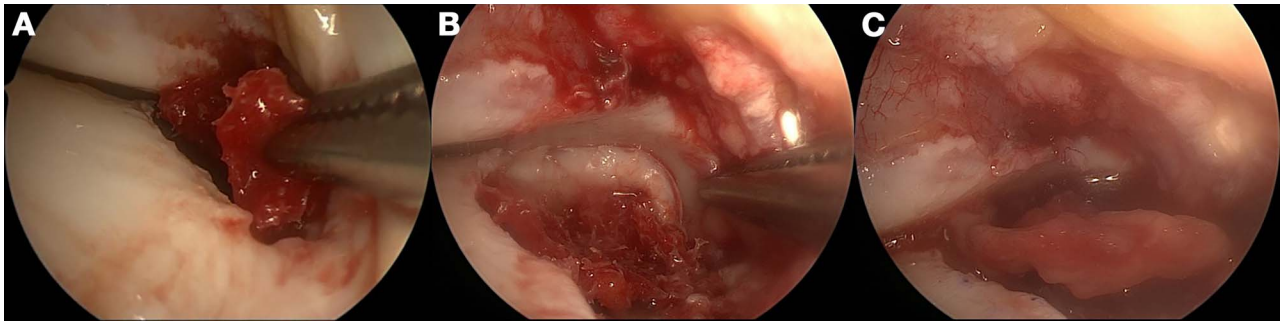


Figure 3. A, Iliac crest autograft application. B, Appearance after autograft application. C, Application of cell-free matrix.

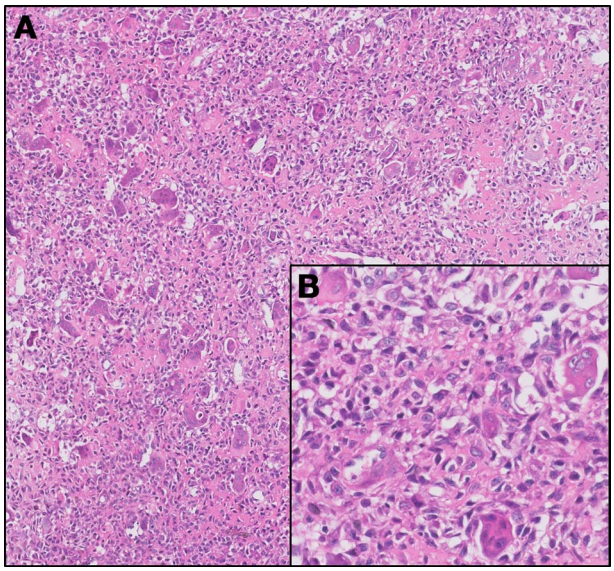


Figure 4. A, Histopatologic examination revealed a tumor with marked cellularity and osteoclast-type giant cells (H&E, x50). B, Chondroblasts with pink cytoplasm, well-defined cell borders, and grooved nuclei. The background consists of chicken wire matrix that surrounds chondroblasts (H&E, x200).

to their previous sports activities.[19] Because of the favorable results, vascularized autograft choice may be reserved for large lesions. Chondroblastoma cases located in the talus were discussed with regard to their proximity to articular surface, size, bone substitutes used, and osteoarthritis complication. Farfalli et al[20] reported their surgical outcomes in juxta-articularly located chondroblastoma lesions, and five of seven operated talus-situated lesions had shown osteoarthritic changes. Even though bone graft was used for structural support and biological healing, the results were not encouraging, especially because chondroblastoma is mostly encountered in the young population. Zhang et al[21] reported a 32 × 22-mm anteromedially located chondroblastoma case treated by curettage and allogenic bone grafting. After 2 years of follow-up, mild pain was encountered without any radiologic abnormalities. In our case, after 2 years of follow-up, the patient did not complain of pain or ROM limitation, which can be attributed to the use of Hyalofast and formation of fibrocartilaginous cartilage. Ryu et al[22] used bone cement and autologous bone graft from iliac crest for an anteromedially situated 25 × 41 × 29-mm chondroblastoma. Osteoarthritis was not seen in their case, but as for our insight, 1 year of follow-up was not enough for the formation of osteoarthritis.

Conclusions

Chondroblastomas are benign in nature; but when juxta-articularly located, they may affect the articular surface and present themselves as osteochondral lesions. If the symptoms persist, surgery may be inevitable. Not only chondroblastoma, but juxta-articularly situated benign lesions may be operated on arthroscopically with meticulous curettage and grafting followed by HA-based scaffold application for further induction of chondrogenesis, which can

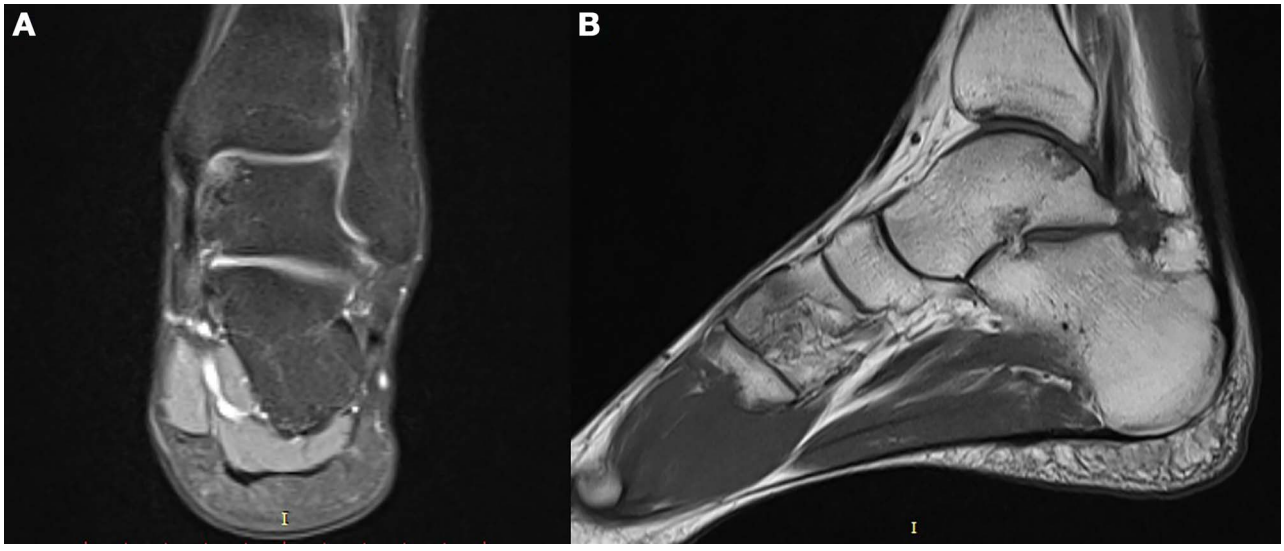


Figure 5. Postoperative second-year magnetic resonance imaging (MRI) findings showing osseointegration of autograft and cell free matrix. A, Coronal MRI view. B, Sagittal MRI view.

be a good alternative to more aggressive treatment options.

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