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Case Reports and Series

Tenosynovial Giant Cell Tumor in the Midfoot Treated With Femoral Head Allograft Reconstruction

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ABSTRACT

Tenosynovial giant cell tumor (also known as giant cell tumor of tendon sheath or pigmented villonodular synovitis) is a rare soft tissue tumor that arises from the tenosynovium of a tendon sheath or the synovium of a diarthrodial joint. This disease process occurs infrequently in the foot and ankle but can result in significant bone erosion and destructive changes of affected joints. These cases are challenging to treat, because the tumor most commonly presents in young, active patients and can be associated with extensive bone loss. We review a case of tenosynovial giant cell tumor of tendon sheath of the midfoot, which was treated with mass resection, structural femoral head allograft bone grafting, and internal fixation with dorsal plating. The patient had achieved successful bony fusion and acceptable functional outcomes at the final follow-up visit 40 months postoperatively.

Tenosynovial giant cell tumor refers to both giant cell tumor of tendon sheath (GCTTS) and pigmented villonodular synovitis (PVNS). GCTTS is a benign proliferative disease that originates from the synovial lining of the tendon sheaths (1). It is histologically equivalent to PVNS, which refers to the same disease process that originates from an intraarticular location. The etiology of the disease is unknown and controversial (2). Most commonly, the disease manifests as $\geq$1 nodular, yellow-brown outgrowths of the synovial membrane (3). Histopathologically, the lesions are characterized by polyhedral stromal cells, multinucleated giant cells, and hemosiderin deposits (3). Although the disease is not considered malignant, it can be locally destructive (4).

GCTTS is a relatively rare disease, with an estimated incidence of 9.2 cases per 1 million people (5). Most cases occur in the hand, and the foot and ankle region represents the second most common location, accounting for only 5% to 15% of cases (5). Very few cases in the midfoot have been reported, and the ankle and forefoot are the more typical locations for GCTTS in the lower extremity (4,6–15). Most reported cases have been treated with simple excision and have not necessitated a reconstructive procedure. In our patient, the GCTTS had originated from the flexor hallucis longus tendon sheath and caused extensive destruction and bone loss throughout the midfoot, requiring an innovative form of reconstruction. The present case report serves to educate about the uncommon, but locally destructive, disease process of midfoot tenosynovial giant cell tumor and describe a novel treatment strategy for this challenging problem.

Case Report

A 24-year-old male software developer complained to his physician of pain at the plantar aspect of his left foot that had been present for several years. The pain was tolerable at rest and with walking but was more severe with running and had limited his activity level. He had no neurologic complaints. On physical examination, fullness was present at the plantar and medial aspect of the midfoot, with mild tenderness to palpation at the navicular and cuneiform bones. No bony deformity or instability was present. He had no diminished strength or sensation, and the pulses were palpable and strong. Radiographs of the left foot showed evidence of bony destruction, primarily of the navicular and cuneiform bones (Fig. 1). Magnetic resonance imaging revealed a plantar soft tissue mass, measuring 4.5 cm $\times$ 5 cm $\times$ 1.5 cm, with bone and midfoot articular erosive changes. The mass had low signal intensity on T1-weighted, T2-weighted, and short tau inversion recovery imaging (Fig. 2). Computed tomography further delineated the extensive bony

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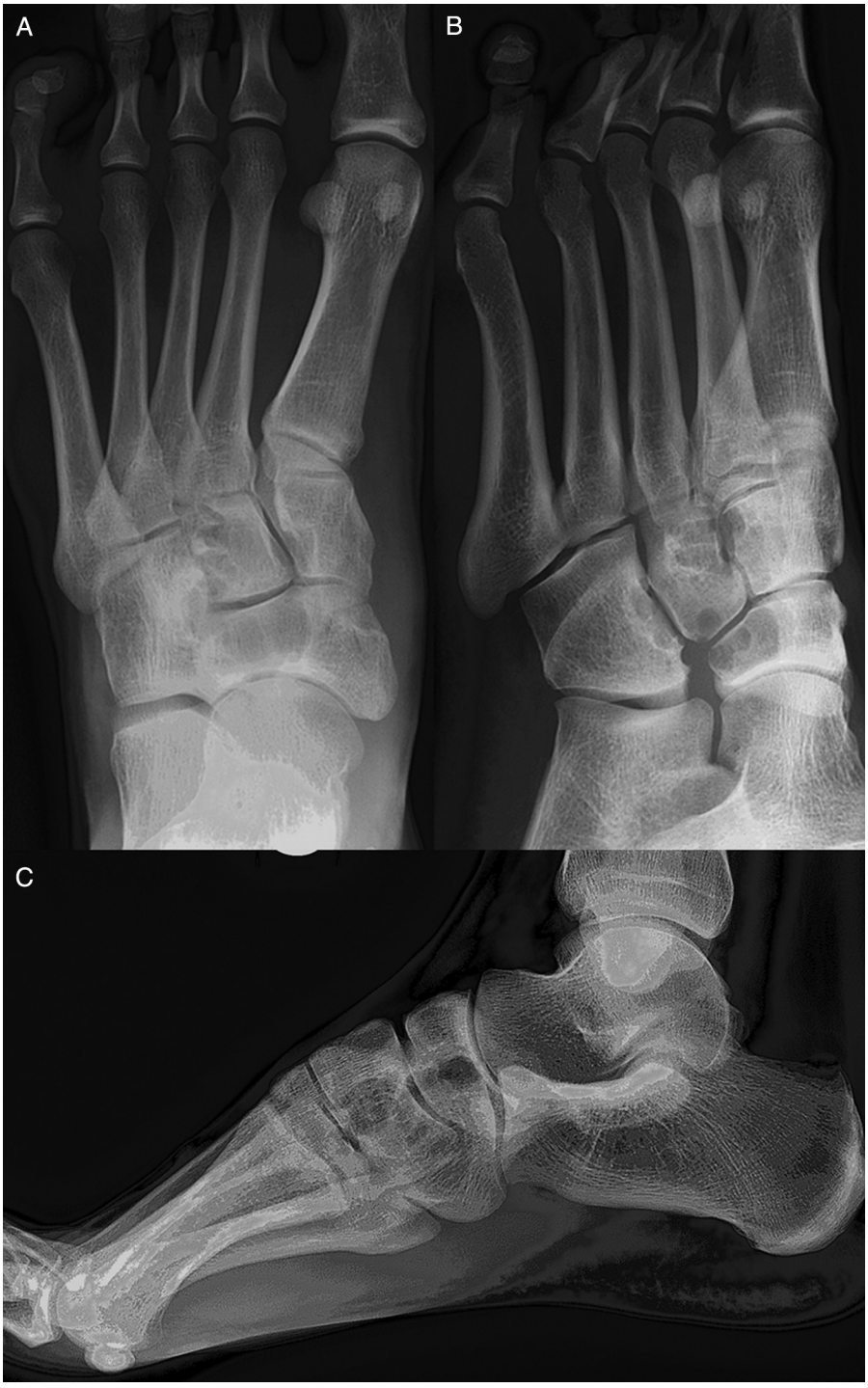

Fig. 1. Preoperative radiographs of left foot showing radiolucent lesions of the navicular, medial, middle, and lateral cuneiform, and cuboid bones with areas of cortical destruction: (*A*) preoperative anteroposterior view, (*B*) preoperative oblique view, and (*C*) preoperative lateral view.

destruction, which involved >50% of the plantar aspect of the navicular, cuboid, medial, intermediate, and lateral cuneiform bones and the base of the second and third metatarsal bones (Fig. 3). Only the dorsal cortices of the navicular, cuneiform, and metatarsal bones remained intact, and the articulations were congruent dorsally. After appropriate radiographic workup, ultrasound-guided core needle biopsy examination revealed nests of foamy histiocytes, some with hemosiderin pigment and scattered osteoclast-like giant cells consistent with tenosynovial giant cell tumor.

The treatment options were discussed with the patient. Although his symptoms were only mild to moderate, the disease has been associated with progressive bone and joint destruction, and treatment was recommended. The treatment options included operative resection and reconstruction, radiation, or medical therapy directed at