The Journal of Foot & Ankle Surgery 55 (2016) 1106–1109

Contents lists available at ScienceDirect

The Journal of Foot & Ankle Surgery

journal homepage: www.jfas.org

Heterotopic Ossification and Entrapment of the Tibial Nerve Within the Tarsal Tunnel: A Case Report

Alexander R. Willis, MD [1], Adil A. Samad, MD [1], Gail T. Prado, MD [2], Glenn G. Gabisan, MD [3]

[1] Orthopaedic Surgery Resident, Department of Orthopaedic Surgery, Monmouth Medical Center, Long Branch, NJ
[2] Resident Physician, Department of Pathology, Monmouth Medical Center, Long Branch, NJ
[3] Orthopaedic Surgeon, Department of Orthopaedic Surgery, Monmouth Medical Center, Long Branch, NJ

ARTICLE INFO

Level of Clinical Evidence: 4

Keywords:
ankle arthroscopy
heterotopic ossification
ossicle
tarsal tunnel
tibial nerve

ABSTRACT

Heterotopic ossification has been reported to occur after musculoskeletal trauma (including orthopedic procedures). This has been known to cause nerve entrapment syndromes and persistent pain, limiting joint mobility. We present a case of a 19-year old female collegiate athlete who had previously undergone ankle arthroscopy and arthrotomy to remove 2 ossicles. At approximately 1 year postoperatively, the patient developed pain when planting and pivoting her foot. Imaging revealed a radiodense lesion at the posteromedial ankle consistent with heterotopic ossification and entrapment of the tibial nerve within the tarsal tunnel. The patient underwent surgical resection and postoperative indomethacin prophylaxis. At the 1-year follow-up visit, the patient remained asymptomatic, without evidence of recurrence of the heterotopic ossification. In our review of the published data, we found no previously reported cases of heterotopic ossification causing entrapment of the tibial nerve within the tarsal tunnel. In the present case report, we describe this rare case and the postulated etiologies and pathophysiology of this disease process. In addition, we discuss the clinical signs and symptoms and recommended imaging modalities and treatment.

Heterotopic ossification (HO) is the abnormal formation of trabecular bone within extraskeletal soft tissues and has been reported to occur after trauma, neurologic injury, severe burns, and surgical trauma (especially after total hip arthroplasty) (1). It occurs as a reactive phenomenon in a variety of tissues. Similar histopathologic lesions have been described within the fat, ligaments, tendons, and joint capsules (2).

Nerve entrapment syndromes secondary to HO have previously been described, primarily around the elbow and hip (3,4). After a recent review of the published studies, however, we found no previous reports of HO with involvement of the tarsal tunnel and entrapment of the tibial nerve.

Case Report

A 19-year-old female collegiate basketball player with no significant medical history developed pain, swelling, and clicking at the posterior medial ankle over the course of a few weeks. She underwent ankle arthroscopy and posteromedial arthrotomy for the removal of 2 ossicles measuring 6 mm and 1 cm in diameter at the medial ankle. Her postoperative course was uncomplicated and she progressively resumed her collegiate activities. At 1 year postoperatively and 3 weeks into the start of the basketball season, she developed posteromedial ankle pain when planting and pivoting her foot. On physical examination, a palpable firm mass was found at the tarsal tunnel. She had a positive Tinel sign at the tarsal tunnel. The remainder of the examination findings were within normal limits. Radiographs revealed a 3 × 1-cm radiodense lesion at the posteromedial ankle that was best seen on the lateral view (Fig. 1). Magnetic resonance imaging demonstrated extension of this lesion from the posteromedial talus and involvement of the neurovascular bundle (Fig. 2). A clinical diagnosis of HO was made, and the lesion was surgically resected (Fig. 3). At surgery, a 3 × 2-cm calcification was noted that was adherent to the neurovascular bundle, posteromedial talus, flexor digitorum longus sheath, and flexor hallucis longus sheath. The specimen was sent for pathologic examination and deemed consistent with HO (Fig. 4). The patient was prescribed indomethacin 25 mg 3 times daily for 6 weeks postoperatively. At the 1-year follow-up examination, the patient remained asymptomatic with no recurrence of the HO.

Discussion

To the best of our knowledge, this is the first documented case of HO of the tarsal tunnel, with entrapment of the tibial nerve. The most

Financial Disclosure: None reported.
Conflict of Interest: None reported.
Address correspondence to: Alexander R. Willis, MD, Department of Orthopaedic Surgery, Monmouth Medical Center, 300 2nd Avenue, Long Branch, NJ, 07740.
E-mail address: AXRWillis@gmail.com (A.R. Willis).

1067-2516/$ - see front matter © 2016 by the American College of Foot and Ankle Surgeons. All rights reserved.
http://dx.doi.org/10.1053/j.jfas.2016.01.032

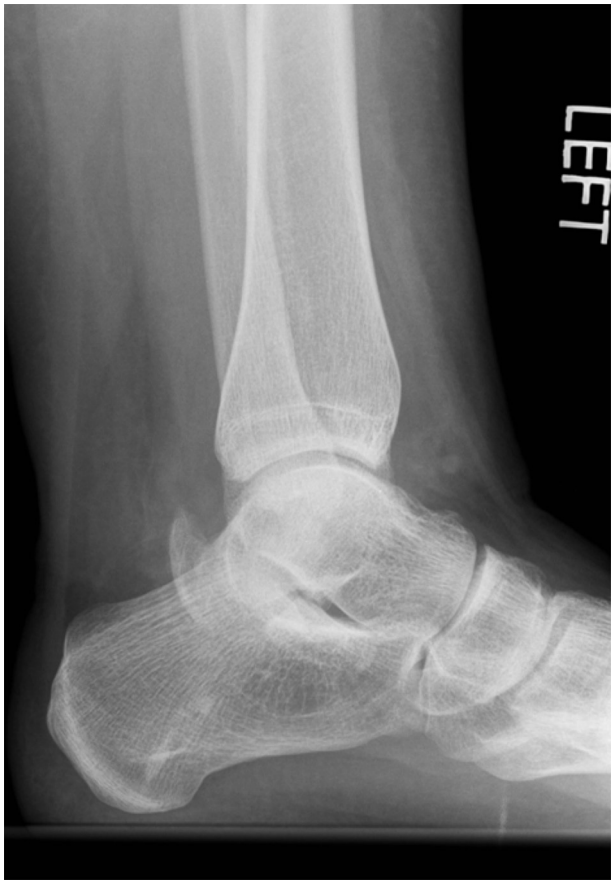

Fig. 1. Lateral radiograph demonstrating a 3 × 1-cm lesion at the posteromedial ankle.

likely precipitating event leading to HO in our patient was the previous ankle surgery. Although the exact pathophysiology of HO remains unknown, it has been widely accepted that musculoskeletal trauma (including orthopedic procedures) is one of the most common initiating factors (5,6).

HO is thought to originate from primitive stem cells of mesenchymal origin that lie dormant in the connective tissue septa within the muscle (7). With a proper stimulus, these stem cells differentiate into osteoblasts, leading to the eventual formation of mature heterotopic bone (5). Urist et al (7) discovered that demineralized bone matrix could invoke bone formation ectopically and postulated bone morphogenetic protein as an inducing agent. It has been postulated that bone morphogenetic protein is liberated from normal bone in response to venous stasis, inflammation, diseases of connective tissue attachments to bone, immobilization, or trauma (8). HO can develop after calcification of a hematoma, thus supporting trauma and surgery as the primary etiologies (9,10).

The clinical signs and symptoms of HO can appear as early as 3 weeks after musculoskeletal trauma or a precipitating event, such as an orthopedic procedure (11). Early in the course of the disease, HO can cause pain (if sensation is intact), swelling, erythema, or decreased joint mobility. In this early inflammatory phase, the condition can mimic cellulitis, thrombophlebitis, missed fracture, osteomyelitis, or tumor (osteosarcoma and osteochondroma) (12,13). The loss of joint mobility and pain are the principal complaints of patients with HO (14). Less commonly, HO can entrap the peripheral nerves around the hip and elbow (3,4). Our patient had posteromedial ankle pain, mechanical symptoms, and a positive Tinel's sign, which were undetected for 1 year and only presented when her activity level increased.

Plain radiography can be highly specific in the diagnosis of HO but is not helpful in the early stages. The radiographic findings will not usually be positive until 4 to 6 weeks after the initiation of ossification (15). The typical radiologic appearance of HO is circumferential ossification with a lucent center (16). Three-phase bone scintigraphy is

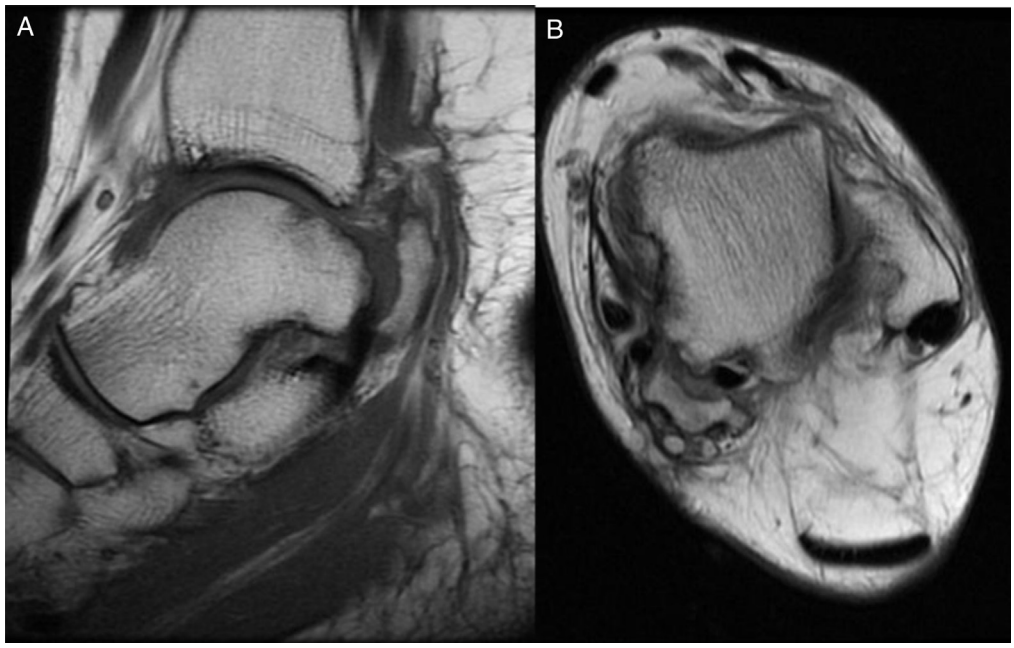

Fig. 2. (*A* and *B*) Magnetic resonance imaging scan demonstrating an osseous lesion involving the tarsal tunnel and extending from the posteromedial talus.