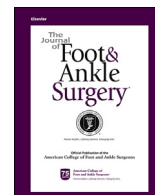




Contents lists available at ScienceDirect

The Journal of Foot & Ankle Surgery

journal homepage: www.jfas.org

Idiopathic Avascular Necrosis of First Metatarsal Head in a Pediatric Patient

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ARTICLE INFO

Level of Clinical Evidence: 4

Keywords:

adolescent
avascular necrosis
first metatarsal
Freiberg's disease
idiopathic

ABSTRACT

Idiopathic avascular necrosis of the first metatarsal head rarely occurs in pediatrics. The present case of avascular necrosis of the first metatarsal head occurred in a 13-year-old male who came to the clinic with a 9-month history of pain in the first metatarsophalangeal joint. Conservative treatment had been applied for 9 months, but the pain had not been relieved. Therefore, surgical treatment, including decompression and debridement, was performed in the first metatarsal head of the patient. After 6 months of follow-up monitoring, full range of motion of the first metatarsophalangeal joint was observed, and the pain had disappeared. No any other complications had developed during 18 months of follow-up monitoring.

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Freiberg's disease is avascular necrosis (AVN) of the metatarsal (MT) head and can have many etiologies, including trauma, circulatory impairment, steroid use, blood dyscrasias, alcoholism, trauma, Caisson's disease, and idiopathic origins (1,2). The most common area affected is the second MT head (68%). The third MT head accounts for 27% of the cases and the fourth for 3%; the fifth MT head is rarely affected (3). Only 2 cases of idiopathic AVN of the first MT head in adolescents have been reported in published studies. An Arabic boy was completely cured after conservative treatment of idiopathic bilateral AVN of the first MT head, and another adolescent underwent surgery to remove articular cartilage (2,4). The present study describes a new case of idiopathic AVN of the first MT head with an unusual pattern.

Case Report

A 13-year-old male, previously healthy, complained of pain in his right first metatarsophalangeal joint (MTPJ) of 9 months' duration. He often played soccer but had not experienced trauma or injury. A local physician diagnosed his ailment as a sprain and applied a short-leg splint and recommended no weightbearing for 2 weeks (Fig. 1). The patient and his family denied any history of overuse, medications, metabolic abnormalities, or blood dyscrasias. On physical examination, swelling of the right first MTPJ with mild local redness was noted. The joint was painful

with movement. The sensory and circulation of the toe were normal. Radiographs showed subchondral radiolucency, with the crescent sign. Mild depression and sclerosis of the first MT head were found (Fig. 2). On the opposite foot, the first MT head was normal. Magnetic resonance



Fig. 1. Initial foot anteroposterior radiograph at a local hospital showing a mild subchondral radiolucency line (arrow).

Financial Disclosure: None reported.

Conflict of Interest: None reported.

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Fig. 2. Anteroposterior foot radiograph taken at our hospital showing subchondral radiolucency, with the crescent sign, mild depression, and sclerosis of the first metatarsal head.

imaging showed that the first MT head had a round shape with mixed low- and high-signal changes, a double line sign on T₂-weighted images, and low subchondral intensity and low signal margin roundly on T₁-



Fig. 3. Low subchondral intensity and low-signal margin roundly on T₁-weighted magnetic resonance images.

weighted images (Figs. 3 and 4). The routine blood test (complete blood count, admission battery, erythrocyte sedimentation rate, and C-reactive protein) results were normal. We suspected Freiberg's disease (stage III) and decided on operative treatment. In the surgical field, a 0.5 × 0.5-cm osteochondral lesion was seen in the center of the first MT head, with a sclerotic bone lesion measuring 1 × 1 cm around the osteochondral lesion. We performed curettage and debridement of the osteochondral lesion and retrograde drilling and suturing of the first MTPJ capsule (Fig. 5). We excised the osteochondral lesion and submitted it for pathologic examination. The results showed focal fat necrosis with fibrovascular proliferation (Fig. 6). At 6 months postoperatively, the patient had recovered without any pain or complications (Fig. 7).

Discussion

Freiberg postulated the cause of Freiberg's disease to be ischemic necrosis from repetitive microtrauma resulting from a longer length of the second metatarsal than the other metatarsals (5,6). In 1914, Freiberg (7) reported 6 infractions (incomplete fracture of a bone without displacement of the fragments) of the second metatarsal head. In 1917, Campbell reported the same condition in the third metatarsal head (7). The incidence of AVN is 68% in the second MT head, 27% in the third metatarsal, and 3% in the fourth, with the fifth metatarsal rarely affected. The diagnosis is determined by pain over the MTPJ and characteristic radiologic findings. Although Freiberg's radiologic findings include joint space widening, as the condition progresses, the subchondral bone density will increase. Also, when the MT head has been flattened, the presence of subchondral bone infarctions bound by sclerotic rims will increase. Smillie (3) divided this process into 5 stages. The first stage usually cannot be seen on radiographs. The second stage includes

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