The Journal of Foot & Ankle Surgery 54 (2015) 237–241

Contents lists available at ScienceDirect

The Journal of Foot & Ankle Surgery

journal homepage: www.jfas.org

Interpositional Arthroplasty With Palmaris Longus Tendon Graft for Osteonecrosis of the Second Metatarsal Head: A Case Report

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ARTICLE INFO

Level of Clinical Evidence: 4

Keywords:
avascular necrosis
forefoot pain
Freiberg's disease
interpositional arthroplasty
osteochondrosis

ABSTRACT

Osteonecrosis of the second metatarsal head is often attributed to Freiberg's disease. We describe the case of a 27-year-old Taiwanese male soldier with persistent painful disability of the right forefoot of 9 months' duration, but no history of trauma. A series of radiographs suggested the diagnosis of late-stage Freiberg's disease. The lesion was treated with interpositional arthroplasty using a palmaris longus tendon graft, in a modification of the traditional interpositional arthroplastic technique for treating Freiberg's disease. After 2 years of follow-up examinations, the patient was satisfied with the clinical outcome, despite having a limited range of motion of the right second metatarsophalangeal joint relative to the adjacent toes. The patient returned to his army group with functional activity that was better than he had experienced before surgery. We believe this modified interpositional arthroplastic treatment strategy will provide more symptom relief and satisfactory functionality for the treatment of late-stage Freiberg's disease.

Freiberg's disease is a condition involving osteonecrosis of the metatarsal head. It frequently occurs in the second metatarsal head (1–3). Patients with this condition typically present with localized pain, swelling, stiffness, and crepitus over the metatarsophalangeal (MTP) joints. Radiographs and magnetic resonance imaging findings can strongly suggest the diagnosis in most cases, although histopathologic examination serves as the reference standard for confirmation of osteonecrosis. If the articular surface is preserved, nonsteroidal anti-inflammatory drugs, reduced weightbearing, and immobilization of the forefoot have been recommended to relieve forefoot pain. Surgical intervention is indicated if conservative treatment has failed. Multiple surgical procedures are available for the treatment of Freiberg's disease; however, the most optimal approach has been debated. We report the case of a patient with late-stage Freiberg's disease treated by a modification of interpositional arthroplasty using a palmaris longus tendon graft.

Case Report

The patient we evaluated and treated was a 27-year-old Taiwanese male soldier who had experienced metatarsalgia of the right forefoot for 9 months, but had no history of previous trauma or any predisposing factors that we could identify. His forefoot pain had progressively worsened during 9 months of army training and was accompanied by localized swelling, stiffness, and crepitus. He was referred to our outpatient surgery department after conservative treatment had failed.

At his presentation to our service, the physical examination revealed tenderness localized to the second metatarsal head, combined with localized swelling and limited range of motion (ROM). His preoperative visual analog scale scores were 6 to 7. Plain radiography revealed a collapsed and flattened second metatarsal head with subchondral sclerosis (Fig. 1). Magnetic resonance imaging scans showed a low-signal zone within the second metatarsal head in the sagittal plane of the T_1-weighted image and a high-signal zone within the subchondral bone in the sagittal plane of the T_2-weighted image (Fig. 2). These images revealed a flattened joint surface, a loose body, subchondral sclerosis, osteochondrosis, and osteonecrosis of the second metatarsal head. However, the articular cartilage surface of the second proximal phalanx remained smooth. From these evaluations, we diagnosed the patient with Freiberg's disease (Smillie stage

Financial Disclosure: None reported.
Conflict of Interest: None reported.
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http://dx.doi.org/10.1053/j.jfas.2014.12.003

Fig. 1. (*A* and *B*) Radiographic images showing a flattened joint surface, a loose body, subchondral sclerosis, and osteonecrosis of the second metatarsal head.

V) (4). Because conservative treatments had failed, we performed interpositional arthroplasty with palmaris longus tendon grafting for osteonecrosis of the second metatarsal head.

The patient was placed in the supine position, and general anesthesia was administered. The right upper and lower extremities were prepared and draped in the standard sterile manner, and we used inflated pneumatic tourniquets to achieve intraoperative hemostasis of the right upper and lower extremities. First, we created a 3-cm longitudinal incision that was centered at the right second MTP joint. We retracted the extensor digitorum longus tendon and the neurovascular structures after dissecting the underlying soft tissues along the incision, and the second right MTP joint capsule was exposed and incised by longitudinal capsulotomy. The surgical findings included bony erosion over the total metatarsal head with flattening, subchondral sclerosis, and osteonecrosis (Fig. 3*A*). We identified and removed the metatarsal head.

After preparing the MTP joint, we addressed attention to the right upper extremity to procure the graft material for interposition at the resection site in the foot. Because we did not believe that infection or tumor was present in the metatarsal head, in accordance with the history and clinical and diagnostic imaging examination findings, we thought it best to prepare the MTP recipient site before procuring the slip of tendon graft to be able to immediately implant the graft at the recipient site. To this end, 2 incisions were made in the right forearm to harvest a split portion of the right palmaris longus tendon for grafting. The rolled palmaris longus tendon was implanted into the MTP joint space and attached to the capsule with absorbable 3-0 suture (Vicryl®; polyglactin 910®, Ethicon, Inc., a Division of Johnson

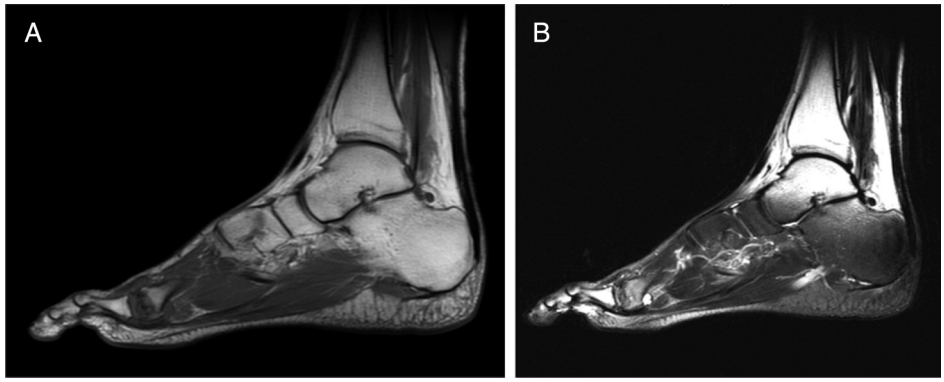

Fig. 2. (*A* and *B*) Magnetic resonance imaging scans showing a low-signal zone within the second metatarsal head in the sagittal plane of the T_1-weighted image and a high-signal zone within the subchondral bone in the sagittal plane of the T_2-weighted image.