A Nonsurgical Approach to Arteriovenous Malformation of the Foot

A Case Report

Faith A. Schick, DPM*

There are few documented reports of arteriovenous malformations in the extremities, and even fewer specifically in the foot. Most of the documented cases in the foot present surgical treatments, and there is limited information on the nonsurgical approach. A brief review of the surgical approach to arteriovenous malformations in the foot and hand is presented first, followed by a case report of the nonsurgical treatment of an arteriovenous malformation in the foot, which was initially diagnosed incorrectly. (J Am Podiatr Med Assoc 105(4): 377-379, 2015)

Vascular malformations have been studied for more than 300 years. In 1966, William F. McCormick, MD, wrote about the different types of vascular malformations. He noted that arteriovenous malformations (AVMs) were just one type. Arteriovenous malformations are not true neoplasms but simply developmental malformations.[1]

Vascular malformations are present at birth and never regress. Vascular malformations are believed to be the result of aberrant vascular morphogenesis during the fourth to tenth weeks of intrauterine life.[2] Sometimes they are picked up at infancy, and other times they are found during adulthood. Most commonly, AVMs occur in the pelvis, extremities, and intracranial circulation. Arteriovenous fistulas and AVMs are considered "high-flow malformations," which compose 10% of all malformations.[2]

Some physical examination findings include localized pain, swelling, increased skin temperature, varices, a mass, thrills, bruits, and functional impairment.[3,4] Although physical examination findings are important, magnetic resonance imaging (MRI) is an important tool for assessing AVMs. It will show multiple signal voids when an AVM is present. Signal voids are the dysplastic vessels in the center of the AVM.[2]

A common treatment for AVMs is surgical resection, with embolization when appropriate.[5] Total surgical excision of AVMs, however, may produce anatomical defects and result in exposure of important structures, such as bones, joints, tendons, and neurovascular bundles, requiring additional tissue grafting and surgical intervention.[6,7] Herein, we review the diagnosis of an AVM of the deep plantar foot. In addition, we give a concise overview of the nonsurgical treatment of an AVM in the foot.

*Rothman Institute, 925 Chestnut St, Philadelphia, PA 19107. (E-mail: faith.schick@rothmaninstitute.com)

Case Report

A 50-year-old woman presented with a 4-month history of focal discomfort to the plantar aspect of her foot centrally. She reported worsening of pain at the end of the day after many hours of standing on her feet working as a nurse. Before presenting for care at our office she was treated with a course of conservative treatment, with a diagnosis of plantar fasciitis. Treatment included footwear modification, activity modification, corticosteroid injections, stretching, and nonsteroidal anti-inflammatory medication, with worsening of her symptoms. She did not report a history of recent trauma, and her medical history was unremarkable.

On physical examination, she was neurovascularly intact, with mild edema to the plantar aspect of her foot. Otherwise, she had normal range of motion at the midtarsal, subtalar, and ankle joints. There was tenderness to palpation along the central aspect of the plantar fascia to the left foot. Plain films were normal, without signs of fracture or osseous abnormality. A plantar fascial tear was suspected. The patient was placed into a CAM boot for immobilization and an MRI was obtained. The MRI revealed a 22×8-mm soft-tissue mass of low signal intensity consistent with an AVM arising between the flexor digitorum brevis and the flexor

digitorum longus underlying the calcaneocuboid joint (Fig. 1). There was no osseous destruction or infiltration into the tendons.

After the correct diagnosis of left plantar foot AVM was established, a treatment plan was devised. Conservative management was the initial plan, with consideration of surgical intervention with ligation and resection of the AVM should the symptoms persist. The patient reported initial relief of symptoms at the 2-week follow-up visit when she presented for review of her MRIs. It was, therefore, decided to continue with an additional 4 weeks of immobilization to allow for rest and reduction of irritation to the AVM and surrounding soft tissue.

After 6 weeks of immobilization, the patient reported substantial reduction of symptoms and was returned to regular footwear and activity. At 1-month follow-up, the patient reported mild residual

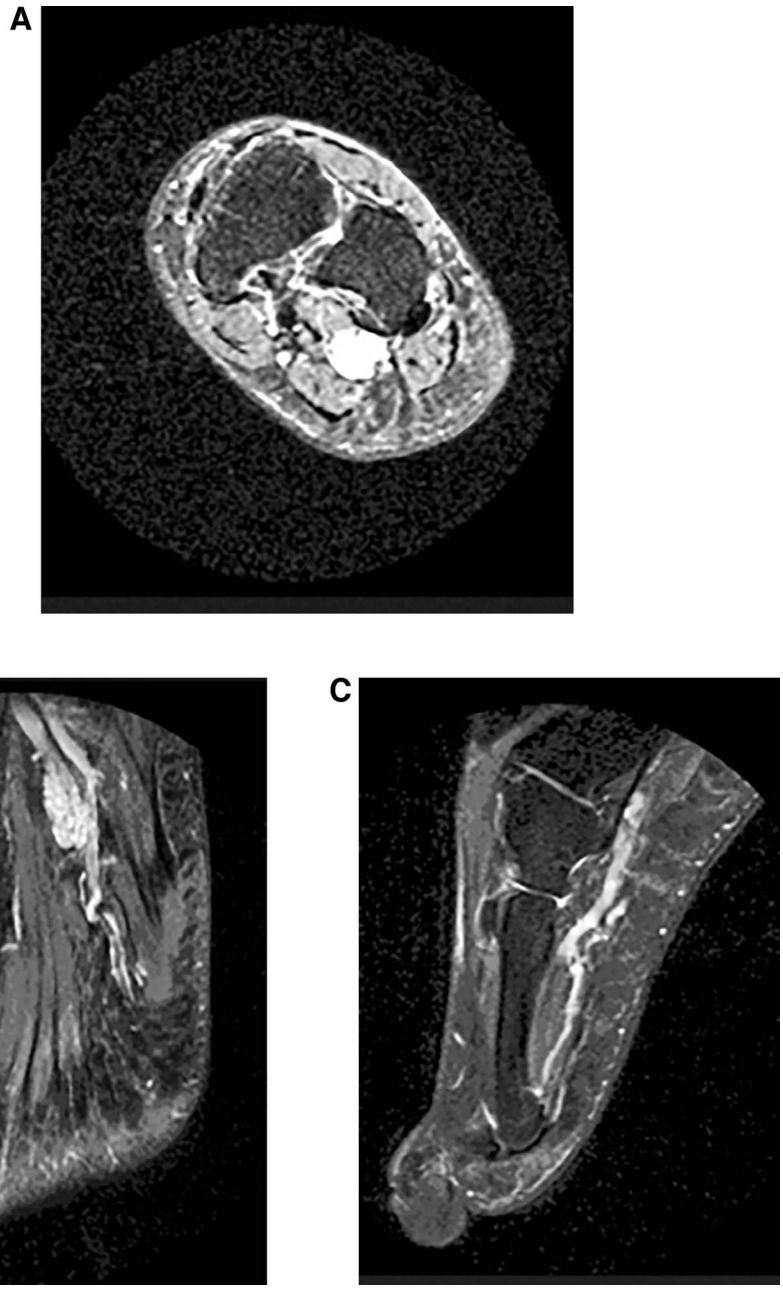


Figure 1. T2-weighted coronal (A), axial (B), and sagittal (C) magnetic resonance images representing an arteriovenous malformation measuring 22 × 8-mm with an area of hyperintensity below the calcaneocubiod joint region.

discomfort at the end of the day with excessive activity. An accommodative custom orthotic device was fabricated to improve shock absorption and reduce pressure to the site of the AVM. The orthotic device included a top cover of combined polyurethane foam and polyethylene foam (plastazote). At 3-month follow-up the patient had returned to work full duty without complaints of discomfort. Incidentally, she is a nurse at a neurosurgical facility, where she cares for patients with cerebral AVMs.

Discussion

Although AVMs have rarely been reported in the foot, they may be included when considering a differential diagnosis for plantar foot pain. This case was of particular interest because of the deep nature and plantar location of the AVM. Because of the location, precedence was given to a concerted attempt at conservative treatment, as the level of dissection and the potential scar tissue formation associated with surgical resection would be extensive. In addition, it has been found that surgical treatment does not always result in definitive cure for AVMs in all patients because recurrence after resection may occur. In a case series review by Igari et al,[8] surgical excision of dorsal foot AVMs in two patients required staged surgical treatment, with recurrence of the AVM in one of the patients with total treatment time of 20 months.

Furthermore, there has been limited literature documenting nonoperative treatment associated with AVMs in the foot. The AVM that this patient presented with had existed since the time of her birth. It can be hypothesized that some form of excessive activity may have led to the exacerbation of her symptoms. Therefore, immobilization allowed the patient to return to her previously asymptomatic state. It is our belief that consideration of conservative treatment of AVMs in the foot should be considered before surgical treatment in all patients presenting with new onset of symptoms.

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Conflict of Interest: None reported.

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