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VASCULAR MEDICINE

IMAGING VIGNETTE: CLINICAL VIGNETTE

Fibro-Adipose Vascular Anomaly of the Lower Extremity

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ABSTRACT

Fibro-adipose vascular anomaly (FAVA) is characterized by intramuscular vascular malformation with secondary overgrowth of further mesenchymal elements, particularly fibro-adipose tissue. A rare disease complicated by nonspecific, overlapping clinical and imaging features, FAVA is often misdiagnosed, causing a dilemma in its diagnostic and therapeutical management. We present a case of FAVA of the lower extremity. (J Am Coll Cardiol Case Rep 2024;29:102274)

Fibro-adipose vascular anomaly (FAVA) is a rare, complex vascular anomaly characterized by an intramuscular venous malformation (VM) with secondary overgrowth of further mesenchymal elements, particularly fibro-adipose tissue.[1] The clinical and imaging features can be challenging and regularly overlap with those of other vascular malformations such as venous malformations, which can also occur regularly intramuscularly, or phosphatase and tensin homologue deleted on chromosome 10 (PTEN) hamartoma of soft tissues also presenting hypervascular components with adjacent solid tissue hyperplasia. Thus, FAVA is often misdiagnosed, causing a dilemma in its diagnostic and therapeutical management.[2] Here, we describe a patient with FAVA of the lower extremity and the corresponding clinical, imaging, and histopathologic findings.

A 12-year-old girl presented with chronic pain and a solid palpable swelling, both of which had been increasing for several years. Recently, after a severe pain episode, a progressive clubfoot developed on the affected right leg. The adjacent skin presented just minimally bluish discolored. The combination of rather chronic, nonphasic pain and a progressive clubfoot suggested the potential for vascular malformation, combined with progressive scarring and a subsequent shortening of the calf tendons. In addition to venous malformation and fatty tissue, FAVA is characterized by connective tissue that typically becomes increasingly contracted, making FAVA a potential differential diagnosis in the present case.[3]

Magnetic resonance imaging revealed a vascularized lesion with interposed fatty tissue located in the flexor musculature (**Figures 1A and 1B**) and diffuse dysplastic venous channels. In contrast to common venous malformations, in which the T_2 signal is typically similar to fluid signal and relatively homogeneous, the T_2 signal in FAVA is less hyperintense than in common venous malformation and far more heterogeneous because of the presence of fibro-fatty infiltration (**Figure 1C**). Several dilated, dysplastic veins in the sense of a VM were seen in the entire affected musculature, additionally shown during diagnostic phlebography (**Figure 1D**). Due to the

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ABBREVIATIONS AND ACRONYMS

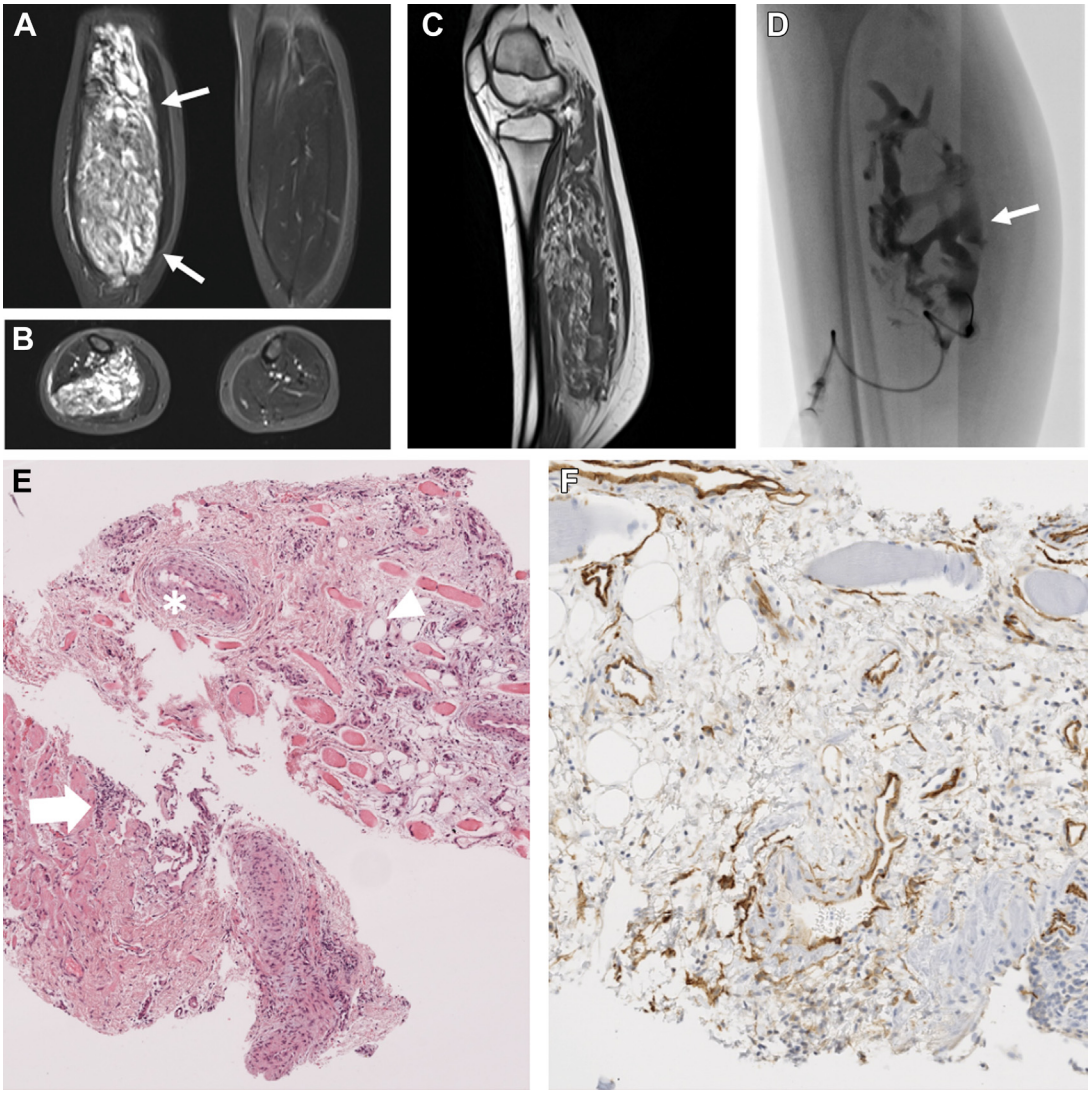
FAVA = fibro-adipose vascular anomaly

VM = venous malformation

low-flow and consecutive stasis of the blood within the malformation, formation of fluid-fluid levels could be observed. In addition, a large thrombus in a dilated, dysplastic vein was detected. The contrast-enhanced magnetic resonance angiography showed a complete enhancement of the VM component in the left leg with pooling of the contrast agent.

In addition to diagnostic phlebography (Figure 1D) for mapping of the deep venous system, an image-guided lesional biopsy was performed to secure the diagnosis and gain additional molecular information. Histopathologic examination showed infiltrating vascularized fibro-adipose soft tissue between skeletal muscle fibers and thick-walled, muscularized venous channels (Figure 1E). CD34 immunostaining

FIGURE 1 Multimodal Imaging and Histopathologic Findings of FAVA



(A and B) Coronal and axial T_2-weighted fat-suppressed magnetic resonance images showing an intramuscular vascular lesion with clearly interposed hyperintense fatty tissue, more than is usual in a normal venous malformation. (C) Sagittal T_1-weighted magnetic resonance image with typical presentation of a fibro-adipose vascular anomaly (FAVA) called the black and white "salt and pepper pattern," caused by the neighboring fatty tissue and connective tissue. (D) Plain angiography image presents an extensive network of dilated, dysplastic venous channels forming the venous malformation part (arrow). (E) Overview tissue core in hematoxylin and eosin stain showing infiltrating vascularized fibro-adipose soft tissue (arrowhead) between skeletal muscle fibers and thick-walled venous vessels (asterisk) as well as several lymphoid aggregates (arrow). (F) CD34 immunostaining showing CD34 co-expression in the endothelium.

revealed CD34 co-expression in the endothelium (**Figure 1F**), sometimes aberrantly co-expressed with podoplanin (not shown). Furthermore, aggregates of lymphocytes and perivascular mononuclear cell infiltrate were noted on hematoxylin and eosin staining. Pyrosequencing of the PIK3CA gene (exons 8, 10, and 21) revealed an activating PIK3CA mutation in exon 21 of the PIK3CA gene. With display of typical histomorphologic and molecular pathologic characteristics, the suggested diagnosis of FAVA was confirmed.

The patient underwent sclerotherapy with polidocanol followed by bleomycin electrosclerotherapy. Treatment with bleomycin electrosclerotherapy achieved substantial clinical success accompanied by significant volume reduction of the lesion. Close orthopedic care of the patient aims to treat the clubfoot of the right leg by surgical Achilles tendon lengthening as the next therapeutic step. Treatment of FAVA as a rare vascular anomaly requires dedicated interdisciplinary treatment combining disciplines from the diagnostic specialties, vascular medicine, and pediatric surgery and orthopedics.

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