Epithelioid hemangioendothelioma involving the superficial femoral artery and femoral vein

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ABSTRACT

Epithelioid hemangioendothelioma (EHE) is a rare vascular tumor. We present the case of a 64-year-old woman who presented with new-onset claudication and an atypical vascular mass involving the superficial femoral artery and femoral vein. En bloc resection and vascular reconstruction was performed which revealed a G1 EHE involving the walls of the superficial femoral artery and femoral vein with tumor cells positive for ERG-, CD31, and CAMTA-1. We discuss the preoperative workup for atypical vascular masses and the challenges associated with EHE. (J Vasc Surg Cases Innov Tech 2025;11:101645.)

Keywords: Epithelioid hemangioendothelioma; Vascular tumor

Epithelioid hemangioendotheliomas (EHE) are rare vascular tumors originating from endothelial or pre-endothelial cells.[1] This malignant vascular tumor affects middle-aged patients most commonly, with a female:-male predilection of 4:1.[1] The etiology and pathogenesis are still largely unknown.[2] EHE manifest in a multitude of anatomical locations with multiple presentations, including solitary lesions, regional metastases, or widespread metastases.[3,4] EHE originate from a small vessel in one-half to one-third of cases.[5,6] Bone metastases are the most frequent, with more than one-half of cases occurring in the lower extremity. We present the case of a patient with a right lower extremity EHE. The patient provided written informed consent for the report of their case details and imaging studies.

CASE REPORT

A 64-year-old Hispanic woman was referred for evaluation of right lower extremity anteromedial thigh pain and claudication. She developed the acute onset of right calf claudication 1 month prior and subsequently developed pain of the proximal medial thigh with numbness and tingling of the dorsum of the right foot. She had no other associated symptoms, including no B type symptoms with no fevers, chills, night sweats, or weight loss. There was no history of preceding trauma, intravenous drug use, infection, or endocarditis. The patient was an active smoker and her medical history included hypertension, hyperlipidemia, and invasive ductal carcinoma of the right breast (pT1a, cN0, cM0, ER+, PR+, HER2−). Her surgical history included partial mastectomy of the right breast 1 year prior with adjuvant radiation and hormonal therapy with exemestane. On examination, there was no obvious palpable mass or skin changes, but there was significant tenderness to palpation of the proximal medial right thigh. She had 3+ bilateral palpable dorsalis pedis and posterior tibial artery pulses with intact motor and sensory function bilaterally.

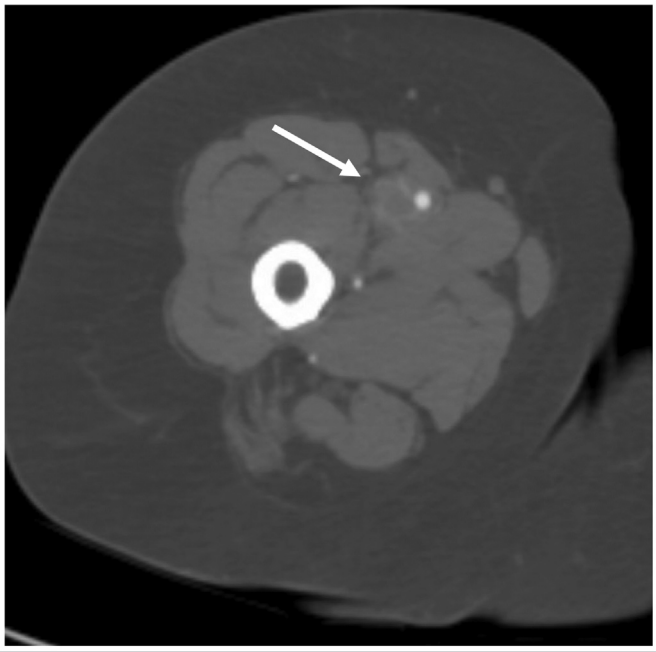

Fig 1. Cross-sectional computed tomography angiogram (CTA) of a right thigh mass involving the superficial femoral artery and femoral vein in axial view.

She had undergone a computed tomography angiogram (CTA), which revealed a 16-mm lesion abutting the proximal right superficial femoral artery and femoral vein (Fig 1). Differential diagnosis included thrombosed pseudoaneurysm, neoplasm, and metastatic disease. Magnetic resonance angiography

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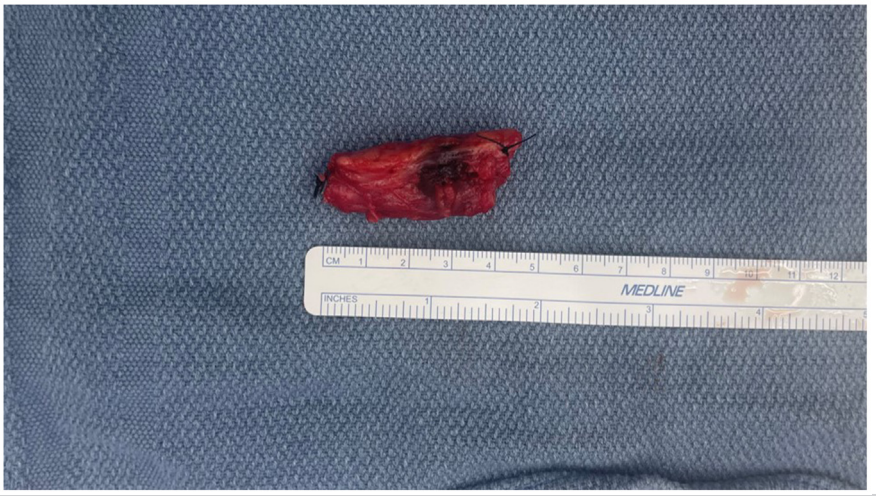

Fig 2. Excised mass including superficial femoral artery and femoral vein.

favored a superficial femoral or profunda femoral branch artery pseudoaneurysm with luminal thrombus, old blood products, and perilesional enhancement suggestive of inflammation. Ultrasound examination revealed a hypoechoic area with both arterial and venous flow, and further consideration was given to the diagnosis of a pseudoaneurysm or arteriovenous fistula. A multidisciplinary discussion was conducted, and the decision was made for excision given symptomatic vascular involvement.

The patient underwent general endotracheal anesthesia. Ultrasound examination was used to identify and mark the lesion at the skin level. A longitudinal incision was made along the lateral border of the sartorius muscle and the proximal superficial femoral artery was exposed and controlled proximal to the lesion. Beneath the fascia, there was a readily palpable, hard mass at the area of the lesion. The distal superficial femoral artery was exposed and controlled, and the encasing inflammatory mass was explored. The mass was dissected off the overlying muscular fascia easily. However, the superficial femoral artery and femoral vein were densely adherent to the mass. In appearance, the entire structure was similar in color to an atherosclerotic ulcer with dark, brown and black thrombus (Fig 2). En bloc excision of the mass including the superficial femoral artery and femoral vein was performed with inline reconstruction of the femoral vein and superficial femoral artery with saphenous vein conduit (Fig 3). Pathology was positive on initial tumor stain with a concern for a positive anterolateral margin. Surgical oncology was consulted intraoperatively and further tissue was excised at this area, including the overlying fascia. The femoral nerve was skeletonized proximally with a negative margin showing only reactive changes of fibrosis and chronic inflammation. Pathology confirmed a G1 EHE involving the walls of the superficial femoral artery and femoral vein (<1 mitotic figure per 10 high-power fields), with tumor cells positive by immunohistochemistry for ERG-, CD31, and CAMTA-1 (Fig 4, *A* and *B*).

The patient recovered without complication and was last seen 6 months after her surgery in the outpatient setting with resolution of claudication and normal ankle-brachial indices. The superficial femoral artery and femoral vein bypasses were patent without evidence of stenosis on duplex ultrasound

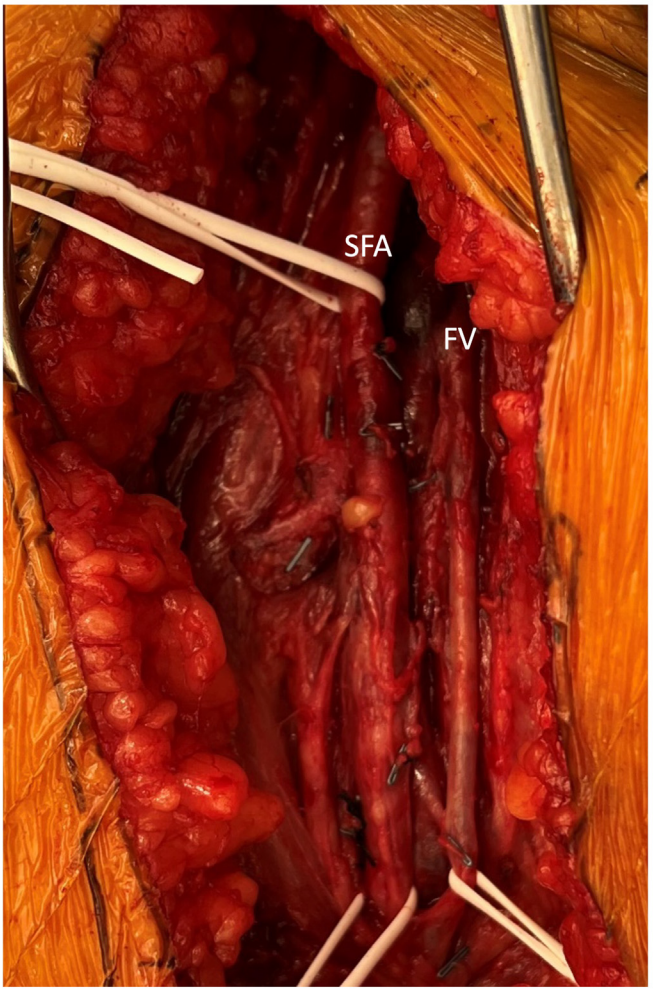

Fig 3. Reconstruction of the superficial femoral artery (*SFA*) and femoral vein (*FV*) with saphenous vein.

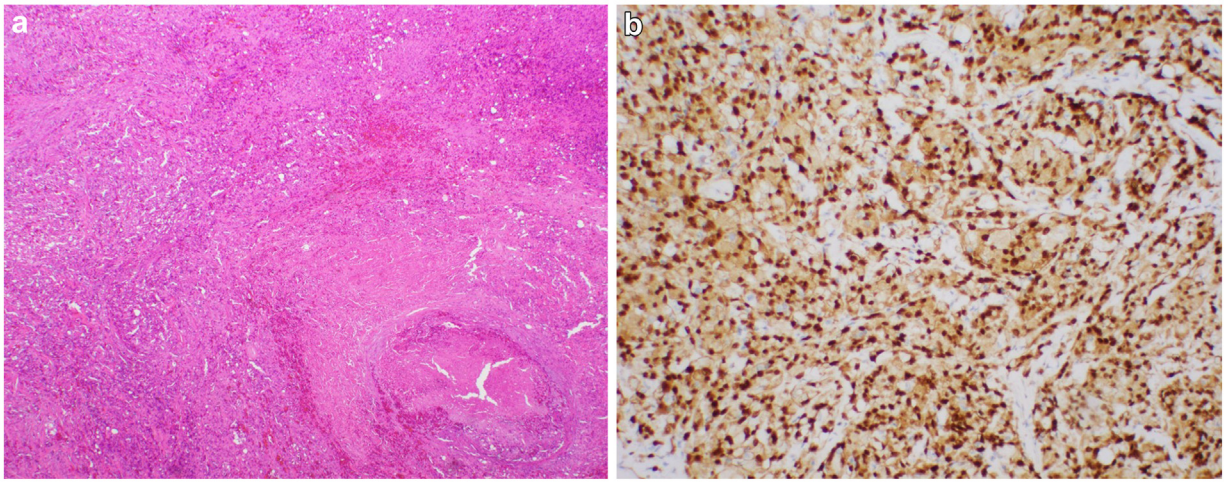

Fig 4. **(A** and **B)** Low-power view (2×) of the specimen with a vascular structure in the center of the mass **(B)** and immunohistochemistry stain with tumor cells strongly positive for ERG (10×).

imaging. There was robust hypertrophic scarring along the incision with firm induration with a reticular rash of the lower extremity that persisted for 8 weeks. Positron emission tomography with CT scan (fluorodeoxyglucose) whole body general metabolic tumor imaging was performed, which revealed no significant hypermetabolic activity in the surgical bed to suggest local tumor recurrence, no hypermetabolic lymphadenopathy, and no hypermetabolic distant metastasis. The patient also underwent magnetic resonance imaging (MRI) of the lumbar spine and head for new-onset lumbar pain and headaches, which were negative for distant metastasis or primary lesions. Given the low-grade tumor status, negative staging scan, and margins, the patient will undergo surveillance MRI of the right thigh and CTA of the chest, abdomen, and pelvis every 6 months for 3 to 5 years, then annually with circulating tumor DNA monitoring (Signatera).

DISCUSSION

We present the case of EHE involving the superficial femoral artery and femoral vein. EHE is a rare vascular tumor native from endothelial cells of intermediate malignancy between hemangioma and angiosarcoma in terms of frequent local recurrences and metastatic potential.[7,8] EHE is a heterogeneous tumor, most commonly found in the liver, lung, and bone; however, it has been reported to involve many other sites.[5] When they arise in soft tissue, EHE often arise from large vessel walls. The prevalence is <1 in a 1 million in the general population. The median age of diagnosis for EHE ranges from 36 to 54 years of age with a female predominance.[1,6] EHE is more common in White (80%-83%) and African American (9%-11%) patients, with 11% of patients reported as Hispanic.[9,10] Age at diagnosis, race, and tumor location may affect overall survival. Factors associated with decreased survival include age >80 years, African American race, American Indian/Alaska Native or Asian or Pacific Islander race, extrapulmonary thoracic disease, pleural effusion, respiratory tumors, peritoneal tumor deposits, ascites, and involvement of three or more bones.[5,9]

This patient's presentation is similar to case reports from Yven et al[11] and Charette et al,[12] all of which highlight the difficulty of preoperative diagnosis of EHE. These patients had similar, new onset claudication which prompted ultrasound imaging revealing small (1-3 cm), echogenic vascular masses. Advanced imaging revealed vascularized, delimited lesions with regular margins in contact with the femoral vessels that prompted surgical exploration. Tumors of vascular origin are uncommon and are often diagnosed postoperatively, after vascular reconstructions have been performed to relieve obstruction from a presumed benign cause.[12] The presentation in this group bears a similarity to atherosclerotic claudication; however, claudication associated with an atypical, vascular mass should prompt advanced imaging for the consideration of a primary vascular tumor. Tumors arising in blood vessels present diagnostic and management challenges. Malignant and benign tumors may demonstrate similar preoperative imaging and symptomology.

For localized cancer, surgery is recommended as the first approach in the treatment of EHE.[11,13] Surgery has even demonstrated efficiency in multifocal EHE.[14] The aim of surgery is the complete resection of EHE with microscopic negative (R0) margins. Resection should be carried out according to the principles of sarcoma surgery with en bloc resection of soft tissue EHE and the vessel of origin by leaving a cuff of normal tissue around the tumor surface, to minimize the risk of local recurrence.[15] Vascular reconstruction should be considered in all cases. Musculocutaneous flaps can also be considered to cover the defect and vascular reconstruction.[15] Resected tissue should be sent to pathology and, when suspicion of malignancy arises intraoperatively,

oncologic surgical consultation is recommended.[12] Often, it is impossible to differentiate benign from malignant tumors in the operating room because frozen sections and needle biopsies can be inaccurate when not examined by an experienced multidisciplinary team.[12,16,17] The histological nuances of these extremely rare tumors may delay the final pathologic diagnosis. In our case, there was an initial concern for positive margins. Similar to Yven et al,[11] adhesions were noted between the tumor and the sartorius muscle fascia in our case, which required further resection revealing reactive changes of fibrosis and negative margins. Pathology revealed a robust inflammatory response surrounding the tumor which may explain the patient's postoperative hypertrophic scar formation, induration and skin changes. Fortunately, the patient in our case did not require multiple procedures, as can be seen in these cases.[12] However, a long delay in the final postoperative diagnosis can be expected in these cases because of the unusual pathology and requirement for outside hospital consultation.

It can be difficult to determine if EHE is multicentric or if it is a primary lesion with metastases in other tissues, because EHE may even have more than one primary site.[17] Therefore, staging positron emission tomography with CT scan (fluorodeoxyglucose) whole body general metabolic tumor imaging is necessary after diagnosis. Adjuvant radiation can be recommended in select cases where margins are close or positive and there is concern regarding the risk of local recurrence.[15] There are no reported cases evaluating the role of preoperative radiation therapy for EHE. Because of the indeterminate nature of a primary lesion vs metastasis and the wide spectrum of clinical behavior, ranging from indolent to aggressive, it is important to perform a thorough workup for additional symptoms. This patient developed new-onset lumbar spine tenderness and headaches during the follow-up period, which were further investigated with MRI. The risk of local recurrence after surgical resection is 10% to 15%.[4,18] Therefore, follow-up imaging is recommended with regular surveillance of the site of local resection and whole body imaging. In our case, the patient will undergo an MRI of the right thigh and CTA of the chest, abdomen, and pelvis every 6 months for 3 to 5 years, and then annually. Surveillance with circulating tumor DNA monitoring can also be considered.[19] Thirty percent of tumors will develop metastases (one-half to regional lymph nodes and one-half to the lungs) that may not appear for many years.[12] Of the eight reported cases in the literature with primary involvement of the femoral vein or artery, only one was diagnosed with metastasis.[11,12,20-25]

CONCLUSIONS

EHEs are rare vascular tumors of intermediate malignancy between hemangioma and angiosarcoma in terms of frequent local recurrences and metastatic potential. Lessons in this case include the importance of thorough preoperative imaging for atypical vascular masses, intraoperative pathology and multidisciplinary decision-making with surgical oncology, R0 resection, and staging and surveillance.

DISCLOSURES

None.

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