Topics in Diagnostic Imaging

Clinical and Sonographic Evaluation of a Lower Extremity Angioleiomyoma in a 52-Year-Old Woman

Ross Mattox, DC^{a,*}, Aaron B. Welk, DC^a, Aimee Jokerst, DC^b,
Brooke Van Kirk, ^c, Norman W. Kettner, DC^d

^a Diagnostic Imaging Fellow, Department of Radiology, Logan University, Chesterfield, MO

^b Health Center Clinician, Logan University, Chesterfield, MO

^c Chiropractic Student, Logan University, Chesterfield, MO

^d Chair, Department of Radiology, Department of Radiology, Logan University, Chesterfield, MO

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Abstract

Objective: The purpose of this case study is to describe the role of sonographic examination in the initial evaluation of an angioleiomyoma and to discuss the characteristic findings associated with this soft tissue mass.

Clinical Features: A 52-year-old woman presented with a large, tender, erythematous mass on the anterolateral aspect of her right knee. Sonographic examination revealed a highly vascular mass within the subcutaneous tissues. Differential considerations included benign soft tissues masses such as angioleiomyoma and hemangioma.

Intervention and Outcomes: Surgical consultation was recommended. Excisional biopsy was performed. Histopathological examination confirmed the diagnosis of angioleiomyoma.

Conclusion: Although ultrasonographic findings of a superficial soft tissue mass may be nonspecific, when a highly vascular, well-defined, slow-growing mass is present, angioleiomyoma should be included in the differential diagnosis.

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Introduction

Angioleiomyoma is a rare, benign, soft tissue tumor that arises from the tunica media of a vessel.¹ These

tumors measure an average of 2.0 cm, are mobile, and are usually painful. It presents in the second to sixth decade of life, is more common in females, and most commonly presents in the lower extremity.^{2,3} The mass can be dermal or subcutaneous, or may occur in the superficial fascia of the extremities.⁴ Pain is documented as a primary concern in 60% of patients.^{4–6} Three subdivisions

* Corresponding author at: 1851 Schoettler Rd, Chesterfield, MO 63017. Tel.: +1 636 230 1830; fax: +1 636 207 2429.

E-mail address: ross.mattox@logan.edu (R. Mattox).

of angioleiomyoma exist: solid, cavernous, and venous, with solid being the most common.⁷ The definitive diagnosis of an angioleiomyoma requires a biopsy with histopathological examination using smooth muscle actin stain. Histologically, angioleiomyoma exhibits bundles of smooth muscle cells surrounding the blood vessels.⁶ Sonography is often used for the initial imaging examination, and excision is the most common treatment for this condition.⁵

Masses in the superficial musculoskeletal soft tissues are a common clinical encounter and may pose challenges in their differential diagnosis. The purpose of this case report is to describe the clinical presentation, differential diagnosis, and sonographic features for this rare soft tissue mass.

Case Report

A 52-year-old woman presented for care at a chiropractic teaching clinic with a chief concern of low back pain and lower extremity radiation. The patient underwent a discectomy 5 years prior. Following her clinical evaluation, a diagnosis of lumbar radiculopathy was rendered, and the patient began treatment, which consisted of lumbar spine manipulation and extension exercises for centralization of radicular symptoms. Following a month of treatment, the lumbar pain improved. Through the course of treatment for low back pain, a secondary concern of right knee pain was evaluated. During knee examination, a subcutaneous mass was noted. The mass was located on the anterolateral aspect of the right knee, several centimeters cephalad to the joint. It was tender, warm, erythematous, and edematous. The patient stated that direct pressure resulted in discomfort and a dull ache persisted inferior to the patella. Walking relieved the pain, whereas remaining sedentary and rising from a seated position increased the knee pain. Four years prior to presentation at our clinic, an orthopedic surgeon noted the mass during a surgical consultation for a right meniscus repair. A right meniscal repair was performed, but the mass was not evaluated during the course of the meniscal workup. The surgeon opted to temporize, and a diagnosis regarding the mass was not rendered. The patient reported interval growth of the mass since the orthopedic consultation.

The patient was referred for sonographic evaluation of the mass. Sonographic examination (GE Logiq E9; GE Healthcare, Wauwatosa, WI) revealed a solid, large, heterogeneously hypoechoic mass within the subcutaneous layer on the anterolateral aspect of the right knee superior to the lateral femoral condyle

(Fig 1). There were no internal calcifications. Well-defined and lobulated borders were noted, without evidence of invasion into the adjacent dermis or subcutaneous fat. The mass measured 3.7 cm long, 2.6 cm wide, and 1.7 cm anterior to posterior. Power Doppler sonographic examination revealed disorganized hypervascularity penetrating the superficial area of the mass consistent with a pattern of type 2 vascularity (Fig 2). The vascularity involved greater than 50% of the mass. Enlarged draining veins within the subcutaneous fat were present. Imaging findings by sonography could not exclude a malignant lesion, and surgical consultation was advised. Tricompartmental osteoarthritis was also diagnosed in addition to the mass during sonographic evaluation.

Following surgical consultation, excisional biopsy of the mass was recommended. Histopathological examination following excision revealed a well-circumscribed tumor with uniform spindle cells and thickened blood vessel walls. Immunohistochemical stains revealed spindle cells positive for vimentin and smooth muscle actin, and negative for S-100 (ie, useful as a cellular marker for certain tumors). There was no evidence of mitosis or necrosis upon examination to suggest rapid cellular growth. These criteria, from the histopathological examination, were consistent with a benign vascular angioleiomyoma.⁸ Postoperatively, the patient reported a reduction in pain and began an exercise regimen with specific rehabilitation exercises targeting her knee osteoarthritis. The patient discussed in the following case gave written consent for publication of deidentified images and clinical data.

Discussion

Angioleiomyoma represents 5% of all benign soft tissue tumors.⁹ The tumor is most commonly seen in the lower extremity of females but is impossible to

Fig 1. Longitudinal sonographic image demonstrates a solid, well-defined, homogeneously hypoechoic mass (outlined by open arrows) within the subcutaneous tissues. The top of the image is superficial, and the left of the image is proximal. The scale on the right side of the image is in centimeters.

Fig 2. Axial power Doppler sonographic image demonstrates disorganized (type 2) vasculature within greater than 50% of the mass (rich vascularity). A large draining vessel is also noted inferior to the mass (solid arrow).

differentiate from other soft tissues masses such as hemangioma and glomus tumor based on sonographic examination alone.² The most common presentation is a solid, solitary subcutaneous nodule that may be painful, as in our patient.⁹ These lesions are slow growing and may take 10-15 years for patients to seek medical attention for the mass.¹⁰ Pain is the most common presenting symptom in patients with angioleiomyoma, reported in 58% of patients from a series by Hachisuga et al.⁷ The pain is thought to be related to local ischemia resulting from smooth muscle contraction.⁴

There are 3 categories of vasculature patterns in an angioleiomyoma: type 1, several clustered linear vessels that converge to a single point; type 2, scattered distribution of irregular vessels; and type 3, vessels (1 or more) that are centrally located.² Vasculature is further classified as little (covering less than 20% of the mass), moderate (20%-50%), and rich (>50%) vasculature. Rich type 2 vascular pattern was observed in our patient with diffuse spreading vasculature extending throughout the mass. In a study by Park et al² that compared clinical findings in 13 cases of angioleiomyomas, only 1 of the 13 demonstrated type 2 vasculature. The most commonly seen vascular pattern for angioleiomyoma in that study was type 1, with moderate vascular density.

A case series by Jalgaonkar et al¹¹ is believed to be the first study to evaluate the presence of angioleiomyoma on the medial aspect of the knee in 5 patients. They determined the mean age at 45 and the mean duration of symptoms to be about 34 months. There was complete resolution of symptoms in all of the 5 cases following surgical resection, with the only noted adverse effect being localized anesthetic patches where the lesion was excised. The location of the mass around the knee was similar to our patient's presentation; however, her mass was located at the lateral aspect of the knee.

In a study investigating treatment for 16 cases of angioleiomyomas by Woo et al,¹ only 2 of the masses occurred around the knee. Those masses were 0.7×0.5 cm and 1.7×1.2 cm, respectively, and both were classified pathologically as solid in nature. Woo et al¹ also demonstrated that typical tumor size of all locations was <2 cm. In a study by Hachisuga et al,⁷ 78% of the angioleiomyomas were <2 cm in size. The range in their study was 0.2-4.3 cm. The mass we report was somewhat unusual because it was located around the knee and was much larger in comparison to the other lesions near the knee, measuring 3.7 cm in the sagittal plane and 2.6 cm in the transverse plane. However, a recent case report described a painless, "giant" angioleiomyoma of the knee measuring 10×8 cm.¹²

Hachisuga et al⁷ demonstrated that the lower extremity was the most common anatomic location (75%) in 500 cases of angioleiomyomas. The lower extremity preference was more pronounced in females (83% of 290). This study also reported that 77% of subjects were in the fourth to sixth decade of life and a female predilection of 1.7:177. Therefore, the presentation of our patient was typical for angioleiomyoma following the above age, sex, and location preference.

Definitive preoperative diagnosis is difficult based on magnetic resonance and sonographic imaging, but both enable the clinician to reduce the differential diagnosis. Sonography is an excellent imaging modality for the initial investigation of a slow-growing, painful, subcutaneous soft tissue mass. It is able to provide a detailed description of the mass characteristics including dimension, location, presence or lack of calcification, solid nature, vascularity pattern, and hyperemia, which allows for exclusion of cysts and other fluid-filled lesions from the differential diagnosis.³

Magnetic resonance imaging and ultrasonography are valuable in the diagnosis of angioleiomyoma, but neither is sufficiently sensitive to provide a definitive diagnosis. The differential diagnosis for a painful, subcutaneous soft tissue mass of the lower extremity is wide, including benign lesions such as neuroma, angiolipoma, and ganglia, as well as malignant conditions such as malignant leiomyosarcoma, malignant fibrous histiocytoma, and synovial sarcoma.^{13,14} The typical sonographic appearance of angioleiomyoma is a hypoechoic, homogenous mass with well-defined margins, suggestive of a benign lesion.¹ Varying patterns of vascularity may be seen with angioleiomyoma as described previously. Although the sonographic imaging appearance is suggestive of a benign lesion, biopsy is required to exclude malignancy. The diagnosis of angioleiomyoma can only be made with certainty through a histopathological examination.

Limitations

This is a report of a rare finding. Therefore, findings that were found in this case may not be similar in other cases.

Conclusion

Superficial soft tissue masses are a frequent encounter in the clinical setting, and although most are benign and superficial lipoma is most common, its imaging characteristics are specific; however, the imaging of many other subcutaneous masses is nonspecific, and biopsy is necessary to exclude malignant neoplasm. For this patient, the clinical presentation, differential diagnosis, and sonographic evaluation of a patient presenting with a chronic and painful lower extremity soft tissue mass are provided. The diagnosis, established by excisional biopsy, was the rare angioleiomyoma. Clinicians observing the interval growth and/or pain arising from a subcutaneous mass in the lower extremity, regardless of size, should include angioleiomyoma in the differential diagnosis. The most common treatment is excision, which also allows for histopathological examination and definitive diagnosis.

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No funding sources or conflicts of interest were reported for this study.

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