High - Resolution Ultrasound Imaging for Angioleiomyoma: A Painful and Vascularized Superficial Tumor

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Abstract

Angioleiomyoma (ALM) is a rare benign, vascular smooth muscle tumor originating from the tunica media of the vessel wall. It typically arises in the cutaneous, subcutaneous tissue of the lower extremities in middle-aged women and is less than 2 cm in diameter. We report an ALM of the thigh in a 69-year-old woman with intermittent pain. US was performed with a high-resolution, broad-band (5 MHz-18 MHz) linear transducer for the superficial nodule. To the best of our knowledge, there has been no report of high-resolution ultrasound image features, including gray-scale US, color Doppler US and Real-Time Tissue Elastography (RTE) for an ALM. ALM should be considered as one of the painful and vascularized subcutaneous mass, a superficial location that can be seen on high-resolution US. The feature of adjacent blood flow signal on color Doppler US could be strongly suggested to be ALM.

Keywords: High - Resolution Ultrasound; Angioleiomyoma; Adjacent Blood Flow Signal; Painful and Vascularized Superficial Tumor; Color Doppler Ultrasonography

Introduction

ALM is a rare tumor that arises from the tunica media of small arteries and veins [1]. The tumors are usually small, solitary, round, painful, firm, skin-colored, and well-encapsulated [2]. Dermatologic ultrasound imaging has been rapidly growing in recent years because of the development of high-resolution multifrequency transducers and multichannel color Doppler machines [3]. We report a case of subcutaneous ALM, a superficial location that can be seen on high-resolution US. A high-resolution, broad-band (5 MHz-18 MHz) linear transducer was used for all scans, including gray-scale US, color Doppler US and RTE in our case. On gray-scale US, there are some reports [4,5] that the lesions were described as circumscribed homogeneous hypoechoic solid nodule. There are a few reports [4-6] concerning the imaging features on color Doppler US. Present case showed solid nodule pattern both on gray-scale US and RTE. Vascular flow signals were seen in both peripheral and central on color Doppler US in the present case. The peripheral flow signal on color Doppler US was suggested to be consistent with adjacent vessel. ALM is suspected in the female case of a painful, solid nodule of the extremities. ALM should be considered as one of the painful and vascularized subcutaneous mass, a superficial location that can be seen on high-resolution US. ALM mimic schwannoma very closely, appearing as well-defined hypoechoic, round nodules with internal vascularity. The detection of adjacent blood flow signal is a useful appearance in relation to the differentiation ALM from schwannoma on color Doppler US.

Case Report

A 69-year-old female, having noticed a nodule in her lower extremity, visited a nearby dermatologist in February 2014. The nodule was firm and slightly tender to touch. The patient noticed the nodule 20 years earlier. The nodule was small, solitary, round, painful and firm. US was performed with a high-resolution, broad-band (5 MHz-18 MHz) linear transducer (Nobulus Hitachi, Ltd. Tokyo, Japan). Gray scale US showed an oval shaped, circumscribed, homogeneous, hypoechoic lesion. The lesion is in a superficial location, possibly in close to the dermis in 4 mm depth. The size of the nodule is 2 mm in depth and 3 mm in width. Posterior echo enhancement was absent on gray-scale US, suggesting the solid tumor pattern. (Figure 1a). Central and peripheral blood
flow signals were detected on color Doppler US (Figure 1b). Spectral Doppler analysis demonstrated low blood flow velocity within the nodule (Figure 2a). On RTE, the nodule was depicted as mostly blue color, consistent with the hard nature mass [7] (Figure 2b). Operation was performed due to the painful nodule. Histopathological finding of the lesion showed proliferation of the blood vessels and intervascular smooth muscle bundles (Figure 3a). Nodule was pathologically diagnosed as ALM (Figure 3b).

Figure 1: (a) Gray-scale US shows an oval shaped, circumscribed, homogeneous, hypoechoic nodule without posterior echo enhancement. The lesion is in a superficial location in 4 mm depth. (b) Central and peripheral blood flow signals were detected on color Doppler US. Peripheral flow signal on color Doppler US was suggested to be consistent with adjacent vessel.

Figure 2: (a) Spectral Doppler analysis demonstrated low blood flow velocity within the nodule. (b) On Real-time tissue elastography, the nodule was depicted as mostly blue color, consistent with the hard nature mass.

Figure 3: (a) Histopathological finding of the lesion showed proliferation of the blood vessels and intervascular smooth muscle bundles. (hematoxylin and eosin, original magnification X20). (b) The nodule was pathologically diagnosed as ALM. (hematoxylin and eosin, original magnification X100).

Discussion

ALM is a rare tumor that arises from the tunica media of small arteries and veins [1]. The tumors are usually small, solitary, round, painful, firm, skin-colored, and well-encapsulated [2]. Dermatologic ultrasound imaging has been rapidly growing in recent years because of the development of high-resolution multifrequency transducers and multichannel color Doppler machines [3]. High-resolution ultrasound, at 5-18 MHz, have been used to image the skin and subcutaneous lesions. Raffin D et al. reported high-frequency ultrasound (HFU) imaging with 25-MHz linear probe for cutaneous neurofibroma in patients with neurofibromatosis type 1. They showed HFU of dermal lesion located in 4-6 mm depth [8]. Mandava A et al. reported that normal skin is made of three layers: the epidermis (thickness 0.06-0.6 mm) on the most external surface; the underlying dermis (thickness 1-4 mm) consisting of connective tissue, nerves, blood, and lymphatic vessels, gland, mast cells, fibroblasts, histiocytes, etc.; and the subcutaneous tissue (thickness 5-20 mm), mainly made of adipose cells [9]. We report a case of subcutaneous ALM, a superficial location, probably in close to the dermis located in 5 mm depth on high-resolution US.

A high-resolution, broad-band (5 MHz-18 MHz) linear transducer was used for all scans, including gray-scale US, color Doppler US and RTE. The nodule was depicted as hard nature with low elasticity on RTE [7], which was consistent with the solid tumor pattern without posterior echo enhancement on gray-scale US. Image features showed solid tumor pattern both on gray-scale US and RTE. The type of the nerve-tumor position and transition are valuable feature in neurogenic tumor [10]. This appearance of nerve-tumor connection was not detected in our case. Blood flow signals were detected in central and peripheral on color Doppler US, suggesting type 1 pattern as described previously [5]. Peripheral blood flow signal was suggested to be adjacent vessel as previously described [11]. Concerning the imaging features on gray scale and color Doppler US, some studies have been reported [4-6]. Zhang JZ et al. described typical sonographic features of ALM as subcutaneous mass,
Angioleiomyoma should be considered as one of the painful and vascularized superficial soft tissue tumor that can be depicted on high-resolution color Doppler US. The feature of adjacent blood flow signal on color Doppler US could be strongly suggested to be angioleiomyoma.

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