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Ultrasonographic Findings of Low-Grade Myofibroblastic Sarcoma: A Case Report

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Abstract: *Objective*: To analyze the ultrasonographic features of low-grade myofibroblastic sarcoma (LGMS) and explore its preoperative diagnostic value and key points of differential diagnosis. *Methods*: A case of LGMS confirmed by surgical pathology was retrospectively analyzed. The ultrasonographic manifestations were combined with magnetic resonance imaging (MRI) and pathological results for comprehensive analysis, and relevant literature was reviewed. *Results*: The patient was a 41-year-old female with a hypoechoic mass (45 mm × 30 mm × 21 mm) in the muscle layer of the left lower leg. The mass had an irregular shape with lobulated margins, and some boundaries were unclear. A large hyperechoic area (8.0 mm × 1.6 mm) was seen inside. Color Doppler flow imaging (CDFI) showed rich blood supply around and within the mass, and a cord-like extension was visible at the lower edge. MRI showed an isointense signal on T1-weighted images and a long T2 signal, with high signal intensity on diffusion-weighted imaging (DWI) and significant enhancement on contrast-enhanced scans. Postoperative pathology confirmed LGMS. *Conclusion*: The ultrasonographic manifestations of LGMS have certain characteristics, but a definite diagnosis still depends on pathological examination. Ultrasonography can provide important imaging evidence for preoperative assessment.

Keywords: Ultrasonography; Low-grade myofibroblastic sarcoma; Soft tissue tumor; Color Doppler flow imaging; Magnetic resonance imaging; Differential diagnosis

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1. Introduction

Low-grade myofibroblastic sarcoma (LGMS) is a rare mesenchymal malignant tumor, which was first systematically described by Mentzel et al. in 1978. In the 5th edition of the WHO classification in 2020, LGMS was classified as an intermediate type (locally invasive) category among fibroblastic/myofibroblastic tumors [1,2]. This tumor is more common in the head and neck, followed by the extremities, chest wall, groin and pelvic cavity, and mostly occurs in adults. Its clinical manifestations lack specificity and are often manifested as painless masses or slowly growing masses [3]. Ultrasound examination, with its advantages of being non-invasive, convenient and capable of real-time dynamic observation, has become the preferred imaging method for soft tissue tumors. This study analyzed the ultrasound imaging features of a patient

with LGMS confirmed by pathology, combined with MRI and pathological results, to explore the key points of ultrasound diagnosis and differential diagnosis of LGMS, aiming to improve the understanding of this disease and the accuracy of preoperative diagnosis.

2. Clinical data

A 41-year-old female patient was admitted to our hospital on February 27, 2023, with a complaint of a mass in the left lower leg for 1 month. Specialist physical examination: The spine showed a normal physiological curvature without tenderness; the pelvic compression-separation test was negative; a mass of approximately 4 cm × 2 cm was palpable on the medial side of the left lower limb, which was hard, painless, and clearly bounded from the surrounding tissues; the peripheral blood supply and sensation of the left lower limb were good.

Ultrasonographic findings: A hypoechoic lesion of 45 × 30 × 21 mm was observed in the muscular layer at the site indicated by the patient in the left lower leg, with an irregular and lobulated shape, partial unclear boundaries, and thick hyperechoic foci (the largest was about 8.0 × 1.6 mm) inside. Color Doppler Flow Imaging (CDFI) showed abundant blood supply in and around the lesion, and a "rat-tail sign" was visible at the lower edge (see **Figure 1** and **2**). Ultrasonic suggestion: Hypoechoic mass with calcification in the muscular layer of the left lower leg: neurogenic lesion?

Plain and enhanced MRI of the tibia and fibula suggested: A mass-like isointense T1 and hyperintense T2 signal shadow in the muscles on the medial side of the upper segment of the left tibia, with a diameter of about 30mm, hyperintense on DWI, clear boundaries, and obvious enhancement on enhanced scan with visible blood vessel penetration. No obvious abnormalities were found in the shape and enhanced signal of the left tibia and fibula, and the adjacent knee and ankle joints were in normal position (see **Figure 3**). Conclusion: Space-occupying lesion in the muscles on the medial side of the upper segment of the left tibia, possibly hemangioma, other possibilities to be excluded.

The patient underwent resection of the muscular lesion in the left lower leg on February 28, 2023. Intraoperative exploration: The mass was solid, pale white, with unclear boundaries, closely connected and adherent to the surrounding muscles, nerves, and blood vessels.

Postoperative pathology suggested: Fibroblastic and myofibroblastic tumor, tending to low-grade myofibroblastic sarcoma (see **Figure 4**).

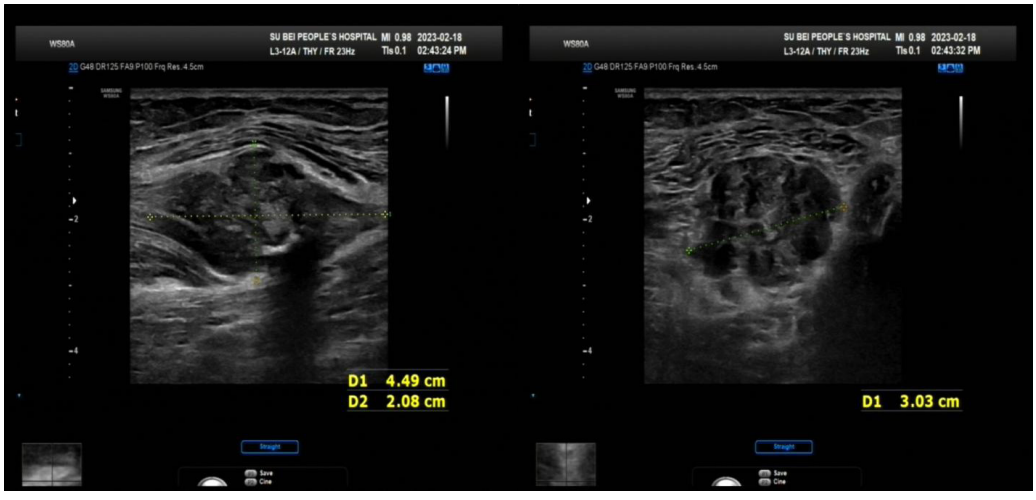

Figure 1. Ultrasonic measurement diagram of hypoechoic mass in the muscular layer of the left lower leg

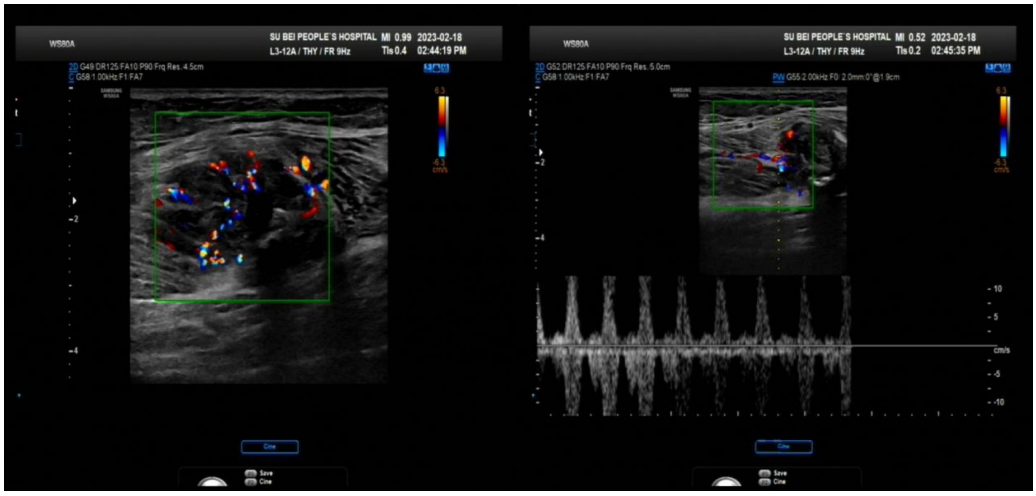

Figure 2. Ultrasonic blood flow signal diagram of hypoechoic mass in the muscular layer of the left lower leg

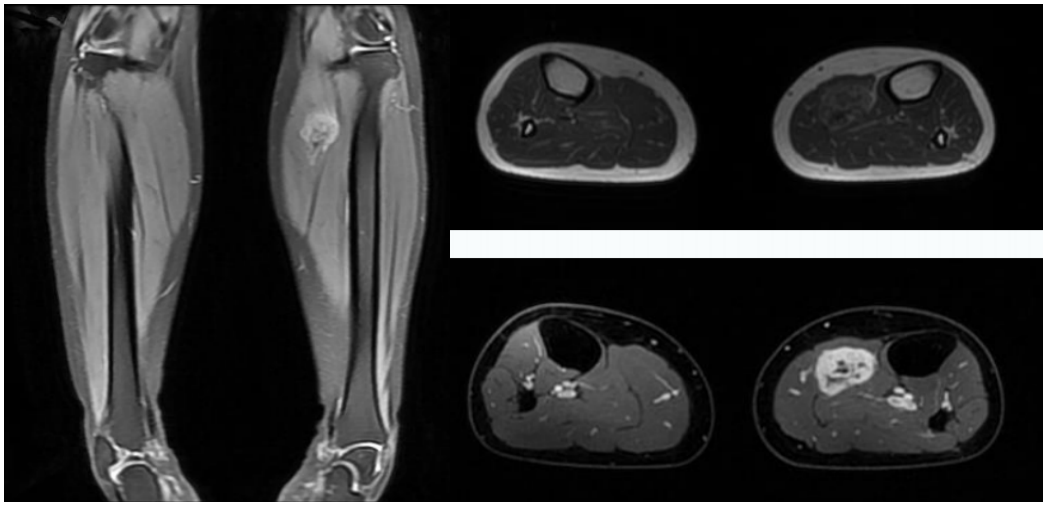

Figure 3. MRI image of hypoechoic mass in the muscular layer of the left lower leg

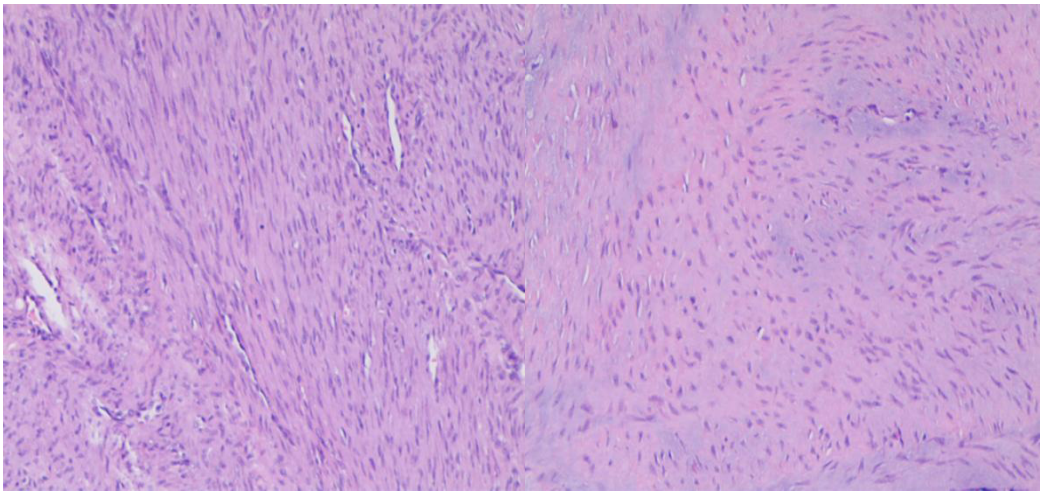

Figure 4. Pathological image of hypoechoic mass in the muscular layer of the left lower leg

3. Discussion

3.1. Overview

Low-grade myofibroblastic sarcoma (LGMS) is a rare mesenchymal tumor first proposed by Vasudev et al. in 1978, and classified as an independent type by the WHO in 2002 [1]. LGMS mostly occurs in patients aged 60-80 years, with a few cases under 20 years old, and the male-to-female ratio is about 1.28:1 [2]. Most LGMS cases are single, and a few are multiple; the preferred site is the head and neck, followed by the extremities, chest wall, groin, and pelvic cavity. Most lesions are located in deep soft tissues, especially muscular soft tissues, and some are in fascia and subcutaneous tissues, often showing invasive or destructive growth [3]. The clinical manifestations are non-specific, mostly painless masses or gradually enlarging tumors.

3.2. Diagnosis

According to previous reports, the ultrasonographic manifestations of LGMS include:

(1) Irregular or lobulated shape;

(2) Clear boundaries or invasion of surrounding tissues;

(3) Mostly heterogeneous hypoechoicity with strip-like hyperechoic septa inside, posterior echo enhancement; irregular anechoic fluid areas may form due to ischemia and necrosis;

(4) CDFI usually shows abundant and unevenly distributed blood flow.

CT manifestations: Soft tissue nodular shadow with irregular enhancement after contrast administration, lobulated lesion with punctate calcification inside; common isointense to hypointense heterogeneous signal on T1WI and mixed hyperintense signal on T2WI [4–6].

Histological manifestations: Composed of fascicular, lightly eosinophilic spindle cells, often diffusely infiltrating into surrounding soft tissues, especially skeletal muscle and adipocytes; moderate nuclear atypia is present at least in local areas [7,8].

3.3. Treatment and prognosis

Currently, LGMS is moderately invasive; the preferred treatment is complete surgical resection, supplemented by radiotherapy and chemotherapy after surgery [9]. The tumor is prone to recurrence, which is related to the active cell growth and the presence of necrotic foci. Multiple recurrences may progress to higher-grade myofibroblastic sarcoma, but metastasis is rare. Therefore, close postoperative follow-up is necessary to avoid recurrence [10].

4. Conclusion

Although LGMS is clinically rare and final diagnosis relies on histopathological examination, familiarity with its ultrasonographic characteristics combined with clinical manifestations can effectively improve the preoperative diagnostic accuracy of this disease.

Disclosure statement

The authors declare no conflict of interest.

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