# Ultrasound for the rheumatologist – focal myositis

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A 70-year-old woman presented to our hospital with a 2 week history of progressive pain, swelling and redness of the left lower calf. The onset of pain was preceded by significant itching in that region. She denied trauma or prolonged immobilization. Her medical history was significant for sporadic episodes of recurrent focal myositis involving the left calf/soleus muscle, right triceps and the right rectus abdominis muscle over the preceding years with the last episode three years before the current clinical presentation. A rectus abdominis biopsy at that time showed scattered necrotic and regenerating muscle fibers, few muscle fibers invaded by macrophages, few vessel walls invaded by mononuclear cells, and absence of fibrinoid necrosis suggestive of myopathy with necrosis and inflammation without vasculitis. Before our evaluation, ultrasound (US) evaluation elsewhere excluded deep venous thrombosis and a T1 and STIR magnetic resonance imaging (MRI) without contrast demonstrated left soleus 'edema' as well as subcutaneous edema. She was treated as a case of cellulitis with several courses of different antibiotics without any improvement.

Erythema, warmth, swelling and extreme tenderness of her left calf were present on physical exam. Muscle strength was normal. Laboratory studies showed an elevated erythrocyte sedimentation rate of 57 (normal <20 mm/hour), elevated C-reactive-protein of 154 (normal < 8 mg/L) and leukocytosis with a white count of 16.7 (normal <10.5x10$^9$/L) but normal muscle enzymes. An MRI (Siemens Skyra, 3 Tesla) at our hospital suggested myositis involving only the left soleus with sparing of the surrounding musculature (Figure 1 and 2). The right lower extremity was normal. She declined

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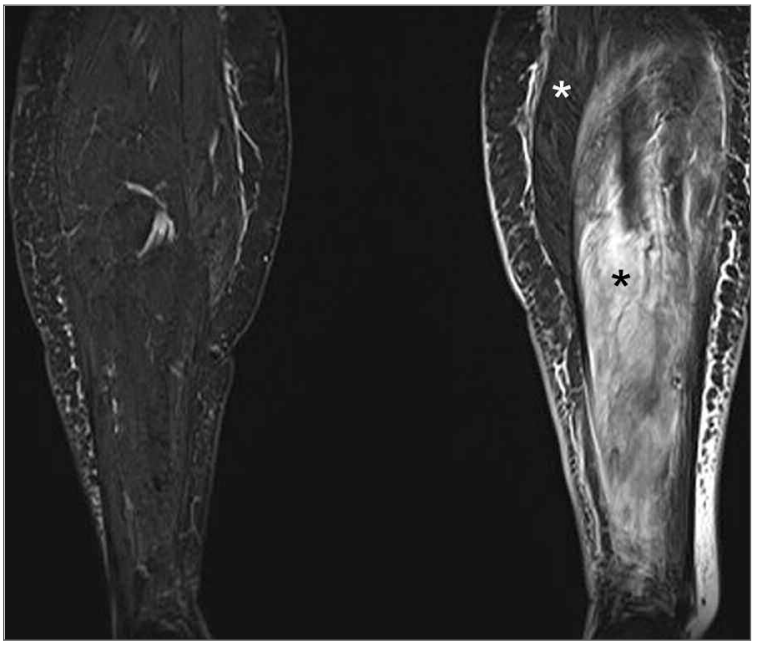


**FIGURE 1.** Coronal STIR MRI (TR 3000/TE56/TI220) image demonstrated marked increased signal in the left soleus muscle (*) with normal signal in the medial gastrocnemius (white *) consistent with myositis

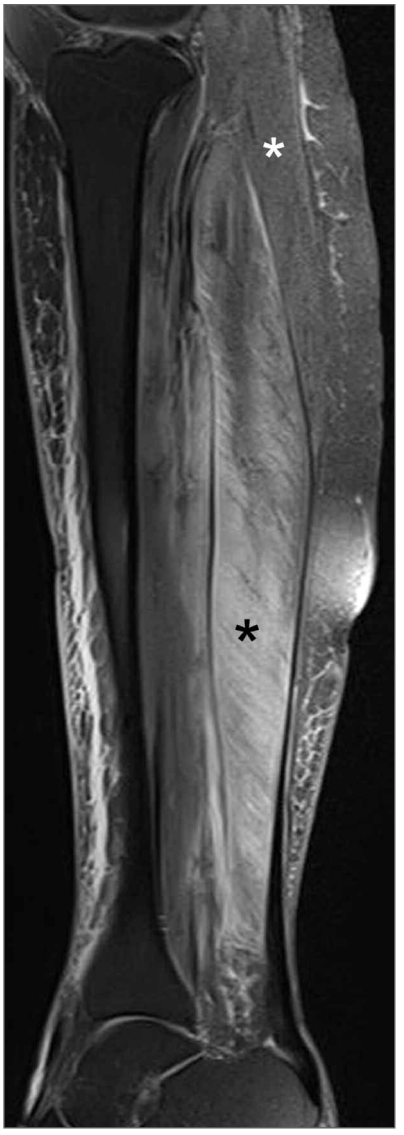

**FIGURE 2.** Sagittal proton density fat suppression (PDFS): Sagittal PD FS (TR3000/TE36) of the left lower extremity demonstrates markedly increased signal throughout nearly the entire soleus muscle (*) in contrast to the normal signal in the gastrocnemius (white *)

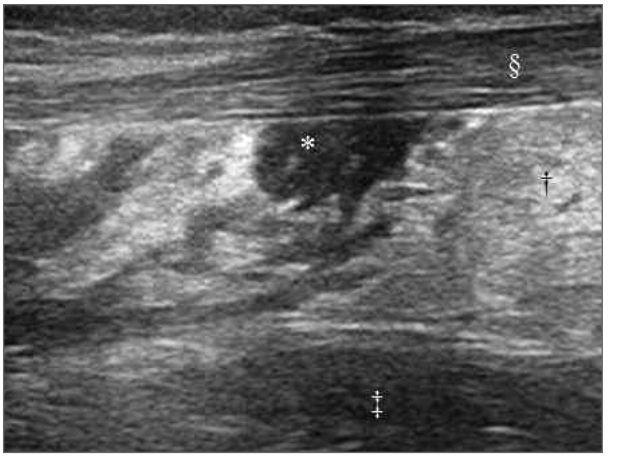

**FIGURE 3.** Longitudinal US (Esaote, MyLab25, Linear transducer 7.5-12MHz) of the left lower calf showed an irregular hypoechoic area (*) within a hyperechogenic (†) soleus muscle. Flexor hallucis longus (‡) and Achilles tendon (§) were normal. Underlying tibia not shown to reduce depth of the image

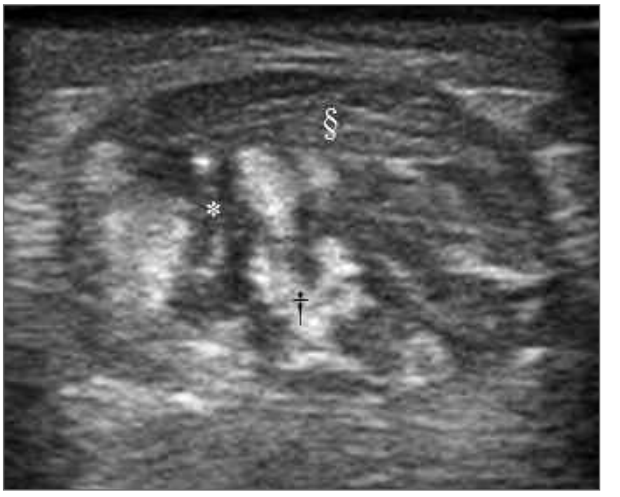

**FIGURE 4.** Transverse US (Esaote, MyLab25, Linear transducer 7.5-12MHz) of the left lower calf showed an irregular hypoechoic area (*) within a hyperechogenic (†) soleus muscle. Achilles tendon (§) was normal. Underlying tibia not shown to reduce depth of the image

a muscle biopsy due to concerns of post-biopsy pain and responded to empiric prednisone. While on 40 mg prednisone, a follow-up ultrasonography (US) (Esaote, MyLab25, Linear transducer 7.5-12MHz, images obtained at 12MHz) of the left lower calf showed an irregular hypoechoic area (*) within a hyperechogenic (†) soleus muscle. Flexor hallucis longus (‡) and Achilles tendon (§) were normal (Figure 3 and 4). The patient remained opposed to disease modifying therapy. She became more symptomatic with pain at prednisone doses below 7.5mg. Her inflammatory markers improved but did not normalize. Follow-up US showed unchanged findings.

Focal myositis is a rare inflammatory myopathy presenting with localized muscle pain and swelling without systemic features, predominantly in the lower ex-

tremity. Muscle enzymes are usually normal. MRI typically shows increased T2 signal and homogenous contrast enhancement with a differential diagnosis that includes infection, inflammatory myositis, malignancy and myositis ossificans[1]. Patients are often initially incorrectly treated as a case of cellulitis due to the rarity of focal myositis.

US can be very helpful in such scenarios and will likely be increasingly utilized as its use in rheumatology increases. US can readily differentiate muscle involvement from cellulitis and from deep venous thrombosis, the two conditions that are most commonly confused with focal myositis. This case adds to the scant literature describing the US features of focal myositis which include an ill-defined hypoechoic lesion, a multilobular hypoechoic mass and a heterogeneous lesion with septae and vascularity with preservation of muscle fiber orientation[1,2]. Our case showed a prominent element of hyperechogenicity of the soleus muscle with interspersed hypoechoic areas. In the acute stage, muscle appears hypoechoic due to edema. Chronically, the muscle can appear as hyperechoic due to fatty infiltration[3]. Muscle may appear hyperechoic after corticosteroid treatment due to improving edema[4]. The central rounded hypoechoic area that was very tender area on sonopalpation may reflect a nidus of ongoing inflammatory activity although Doppler signal was absent. US can be used to diagnose focal myositis with greater availability and lower cost as compared to MRI and can guide aspiration of fluid/abscess and/or muscle biopsy and for follow-up[5]. It must be noted, however, that US is operator dependent, there are no pathognomonic features of an inflammatory myopathy on either imaging, and MRI may be better at detecting edema like changes than US. However, use of perfusion US may help in narrowing the differential diagnosis[3].

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