The case:

A 27-year-old man presented with a painful right calf mass, reporting that the pain intermittently worsened with plantar flexion.

Figure 1: Transverse ultrasound image of the medial gastrocnemius muscle during flexion. Figure 2: Transverse ultrasound image of the medial gastrocnemius muscle during relaxation.

Your diagnosis?

For answer see page 853
Diagnosis

Gastrocnemius Fascial Defect and Muscle Herniation

Scott Tyson, MD; Naveen Subhas, MD

A 27-year-old man with no significant past medical history noticed a new lump along the medial aspect of the right calf while he was lying in bed. The mass increased in size and became painful on plantar flexion. Concerned about a history of lipomas in his family, he presented to his primary care physician the next day.

On physical examination, the patient had a 3×3-cm soft tissue mass along the medial aspect of the right calf, approximately 10 cm below the popliteal fossa. The mass was more conspicuous and painful with plantar flexion. Ultrasound of the right calf with attention to the area of the lump (Figures 1, 2) demonstrated a gastrocnemius muscle herniation through a fascial defect.

MECHANISM OF INJURY

A muscle hernia is the result of a focal defect in the covering fascia that allows the muscle to protrude into the overlying subcutaneous tissue.1,2 The majority of symptomatic muscle hernias occur in the leg, most commonly in the tibialis anterior muscle; however, cases of muscle herniation involving the peroneus brevis, peroneus longus, digitorum longus, and gastrocnemius muscles have been described.3 Although no...
consensus exists regarding the cause of muscle herniation, most cases have been reported in the context of sports activities, trauma, chronic compartment syndrome, and weakening of the overlying fascia due to perforating vessels. In general, fascial defects have been classified as traumatic (penetrating or indirect trauma) or constitutional (congenital or caused by muscle hypertrophy and elevated intracompartmental pressure).

**Clinical Presentation**

The clinical presentation of muscle herniation is variable. Most cases are asymptomatic; however, some patients may present with a palpable mass overlying the fascial defect and intermittent pain. Patients with no history of trauma or recent athletic activity that present with a painless mass are often concerned they have a malignant lesion.

**Imaging**

Because of the variability of symptoms associated with muscle hernia, this condition can be a challenge to diagnose. Although magnetic resonance imaging (MRI) has been used for the diagnosis of muscle herniation, the use of MRI in the workup for muscle hernia is limited by increased examination time and the dynamic nature of the patient’s symptoms. Patients with positional-related masses and pain may not be able to tolerate maintaining muscle flexion throughout the length of the examination. Additionally, MRI is an expensive imaging modality.

With current sonographic technology, an ultrasound can be a useful imaging modality for the characterization and diagnosis of a number of musculoskeletal disorders, including musculoskeletal hernia. Besides being noninvasive and inexpensive, ultrasonography has real-time imaging capability, giving this method a significant advantage over other imaging modalities, particularly in cases of musculoskeletal disorders that may be detectable only during dynamic evaluation. Ultrasonography can be used to diagnose muscle hernia and to exclude alternative diagnoses, such as muscle tear and tumor.

**Ultrasound Findings**

The normal muscle fascia is a thin and continuous echogenic linear structure that separates the overlying subcutaneous fat from the deeper musculature. If a muscle hernia is present, sonography will demonstrate the protrusion of muscular tissue through a defect or focal area of thinning in the fascia. Investigators have reported that the herniated muscle may appear hypoechogenic in comparison to the normal musculature, secondary to anisotropy and muscle atrophy caused by repetitive trauma to the herniation.

For dynamic sonography, probe pressure should initially be minimal to avoid inadvertent reduction and nonvisualization of the herniated musculature. Dynamic procedures, such as augmenting patient position with muscle flexion or extension, can be performed to make muscle hernias more conspicuous.

**Treatment**

For most patients, a muscle hernia is asymptomatic and requires no further therapy. For patients with symptoms or cosmetic concerns, treatment consists of fasciotomy of the involved compartment to decompress the herniation. Fascial repair is generally not performed, as this procedure can result in acute compartment syndrome.

**References**