Muscle Herniation of the Extremity

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Muscle hernias of the upper and lower extremities, also known as *myofascial herniations*, refer to focal protrusions of muscle fibers through acquired or, less commonly, congenital fascial defects. These defects are usually caused by athletic activity, occupational injury, trauma, or fascial weakness due to perforating nerves and vessels, chronic compartment syndrome, and prior fasciotomy (Figures 1, 2).[1,2] The tibialis anterior is the most commonly affected muscle, but hernias involve other muscles in the upper and lower limbs, including the extensor digitorum longus, peroneus longus, peroneus brevis, gastrocnemius,[3] and the forearm flexors.[4]

Patients usually present with a palpable soft-tissue mass that becomes more firm and prominent with contraction of the affected muscle. These herniations are usually painless and the primary clinical concern is for an underlying benign or malignant neoplasm. However, in some cases, muscle hernias may become painful after prolonged standing or during exercise, likely owing to focal muscle entrapment and resultant ischemia.

Both ultrasound (US) and magnetic resonance imaging (MRI) have been used to evaluate myofascial herniations. The site of swelling should be marked and the imaging examination tailored to the area of interest. Sonographically, focal thinning, elevation, or disruption of the covering fascia can be seen, often with adjacent focal protrusion of hypoechoic muscle fibers (Figure 1). Dynamic US can be performed during rest and stress, frequently demonstrating the muscle herniation in real-time. Conventional MRI may occasionally delineate the fascial defect, but this can be challenging as most patients are imaged at rest and the fascial covering is very thin (Figure 2). In most cases, however, the fascial defects can be clearly seen or indirectly inferred from the bulging contour and T_2-hyperintensity at the site of palpable abnormality (Figure 3). T_2-hyperintensity may

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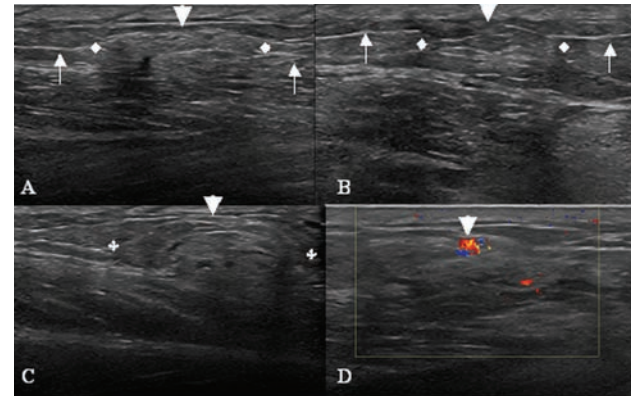

Figure 1. Longitudinal (A) and transverse (B) ultrasound images obtained at rest over the palpable abnormality in the right leg shows bright, echogenic fascia (small arrows) with a well-defined fascial defect (area between calipers). A focal muscle herniation is noted at the site of the fascial defect (arrowheads). Longitudinal gray scale (C) and color Doppler (D) provocative images through the same area obtained with the patient standing demonstrate accentuation of the muscle herniation (arrowheads) through the fascial defect (calipers) with muscle contraction. (D) Note the presence of arterial color flow within this area (arrowhead), which supports the hypothesis that these muscle herniations originate at sites where penetrating vessels weaken the fascia.

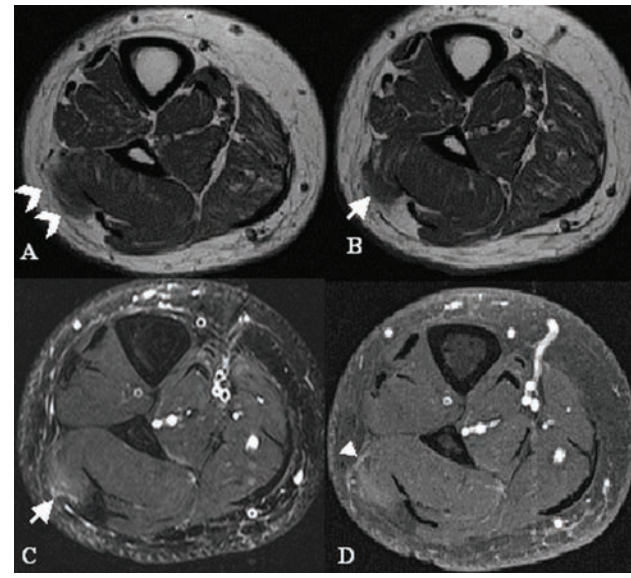

Figure 2. (A) Axial T_1-weighted image demonstrates prominent contour deformity of the peroneus brevis muscle at the site of palpable mass (chevrons). (B) In axial T_1-weighted image, a longitudinal fascial tear is seen adjacent to the area of muscle bulge (arrow). (C) Axial fat-suppressed T_2-weighted image shows hyperintensity within the herniated muscle and the adjacent fascia, related to edema and tearing (arrow). (D) Axial fat-suppressed post-contrast T_1-weighted image delineates small enhancing perforating vessels at the site of fascial defect (arrowhead).

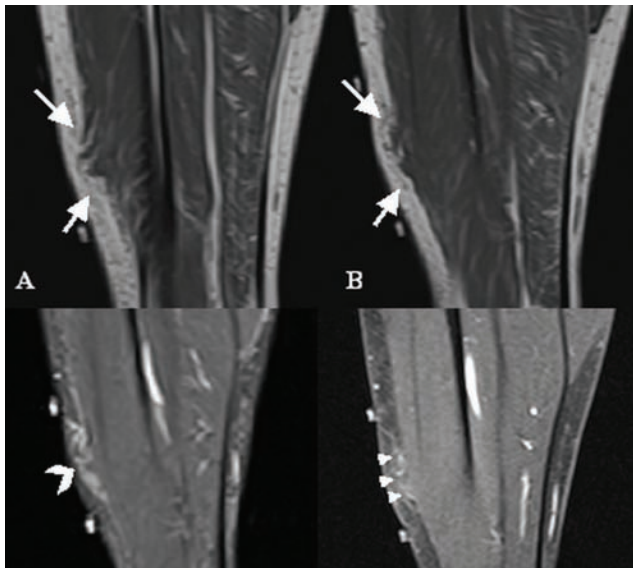

Figure 3. Coronal T_1-weighted images (A, B) delineate the extent of muscle protrusion (arrows) through the fascial defect. Coronal fat-suppressed T_2-weighted image (C) shows hyperintensity at the site of muscle hernia (chevrons). Coronal fat-suppressed post-contrast T_1-weighted image (D) delineates small enhancing perforating vessels (arrowheads).

be seen within the herniated muscle and the adjacent fascia, which is related to muscle edema, fascial tearing, and scarring (Figure 2). Rapid dynamic MRI can also be performed during both muscle contraction and rest, which allows for better depiction of changes in size and shape of the muscle hernias and the adjacent fascia.

Asymptomatic hernias typically require no treatment. Support stockings and restriction of activity may provide relief for those with mild symptoms. Surgical treatment is required only if symptoms are severe or disabling. Various surgical techniques have been described to treat extremity muscle herniations, including wide fasciotomy, direct approximation of the fascial defect, tibial periosteal flap, partial muscle excision, and patch repair with autologous fascia lata or synthetic mesh.[2] Direct approximation may result in compartment syndrome,[3] and fasciotomy may cause an unwanted deformity.

Authors' Disclosure Statement

The authors report no actual or potential conflict of interest in relation to this article.

References

1. Beggs I. Sonography of muscle hernias. *AJR Am J Roentgenol.* 2003;180(2):395-399.
2. Gilardino MS, Loftus JB, Brutus JP. Successful repair of symptomatic extremity muscle herniation with synthetic mesh. *Plast Reconstr Surg.* 2009;123(1):44e-45e.
3. Mellado JM, Pérez del Palomar L. Muscle hernias of the lower leg: MRI findings. *Skeletal Radiol.* 1999;28(8):465-469.
4. Greene DL, Brown JA, Mohty A. An unusual reverse wringer injury: traumatic forearm flexor muscle herniation through the first web space. *Orthopedics*. 2003;26(2):193-194.