



# A Case of Tibialis Anterior Muscle Herniation Diagnosed by Ultrasonography

## Ultrasonografi İle Tanı Konulan Bir Tibialis Anterior Kas Herniasyonu Olgusu

Mehmet Ali ULU, Muharrem ÇAKMAK\*, Kemal NAS

Dicle University Faculty of Medicine, Department of Physical Medicine and Rehabilitation, Diyarbakir, Turkey

\*Dicle University Faculty of Medicine, Department of Radiology, Diyarbakir, Turkey

### Summary

Muscle hernia is a focal muscular protrusion through a fascial defect and the tibialis anterior muscle is the most commonly affected site in the lower leg. It is usually an asymptomatic bulge which changes in size with the patient's position. In this article, we report a patient who presented with a swelling on his leg and was diagnosed with tibialis anterior muscle herniation by ultrasonographic examination. *Turk J Phys Med Rehab 2013;59:73-5.*

**Key Words:** Muscle herniation, tibialis anterior muscle, ultrasonography

### Özet

Kas hernisi fasiyal bir defektten kaynaklanan fokal kas protrüzyonu olup bacaklarda en sık tibialis anterior kası etkilenir. Genelde hastanın pozisyonuyla boyutu değişen asemptomatik bir şişlik olarak karşımıza çıkar. Bu yazıda bacağına şişlik ile gelen ve ultrasonografi ile tibialis anterior hernisi tanısı konulan bir vaka sunulmuştur. *Türk Fiz Tıp Rehab Derg 2013;59:73-5.*

**Anahtar Kelimeler:** Kas herniasyonu, tibialis anterior kası, ultrasonografi

### Introduction

Herniation of a muscle through an overlying fascial defect, such as a loosening or tearing, is most frequently reported in athletes or individuals with occupations causing excessive strain on the legs. While the tibialis anterior muscle is the most common site of herniation (1), some other muscles such as the extensor digitorum longus, peroneus longus, peroneus brevis, and gastrocnemius have also been reported in the literature as the sites of herniation in the legs (2-4). More than 200 cases of muscle herniations in the lower extremities have been reported, however, there is no epidemiological study in the literature regarding the incidence of tibialis anterior muscle herniation. The most common cause of this type of injury is a local trauma that causes a tear within the fascia, leading the underlying muscle to herniate into the adjacent subcutaneous tissue (2,5). Patients usually present with soft, compressible nodules, varying in size depending on the patient's position. Although the herniation is frequently asymptomatic, patients may seek treatment due to cosmetic concerns. Nevertheless, long periods of excessive activity may cause pain and cramps (6). Clinical examination forms the main method of the diagnosis. However, sonography or magnetic

resonance imaging (MRI) is also usually needed as an additional method for confirmation. Tibialis anterior muscle herniation is a rare clinical entity and it may not be born in mind at first in the differential diagnosis. In this article, we report a case of tibialis anterior muscle herniation diagnosed by sonographic evaluation.

### Case Report

A 34-year-old man presented with a palpable mass on the anterior-lateral area of his right lower leg. He was a porter working with wheelbarrows and had first recognized the mass four years ago. His primary complaints were a disturbing appearance and a moderate pain during weight-bearing. He was also worried that the mass could be a tumor. During the examination, the local temperature was not raised and no tenderness or discoloration was evident. There was no varicosity or edema over the mass either. A coin-sized, skin-colored, soft and compressible subcutaneous mass was visible on the patient's right lower leg. The mass was more apparent when the patient took a forward lunge position (Figure 1a). The patient's neurological examination was normal.

His laboratory values, including the liver function tests, complete blood count and renal function tests, were within the normal limits. The patient was generally healthy and his medical history and family history were not contributory.

The sonographic examination (with a Toshiba Aplio XG device provided with a 2D 7,5 MHz linear probe, PLT-704 SBT) carried out by a research assistant practicing diagnostic ultrasonography revealed a muscle herniation that became more apparent when the patient took squatting or lunging position (Figure 2a). The adjacent soft tissue structures were normal. Further evaluation with color Doppler ultrasound revealed a patent artery traversing the fascia at the site of the herniation (Figure 2b). MRI of the right lower leg was normal (Figure 3).

Based on the clinical and sonographic findings, the diagnosis of a hernia in the tibialis anterior muscle was established. Surgical intervention was not recommended after an orthopedic consultation and a conservative treatment including compression stockings and avoidance of vigorous activity was prescribed. The patient was asymptomatic after 8 months and the mass was less apparent in squatting position (Figure 1b).

## Discussion

The most common site of a muscle herniation in the lower leg is the tibialis anterior muscle, since the anterolateral tibial compartment is more vulnerable to traumas (5,7). The characteristic presentation of such a hernia is a local mass



Figure 1a. Herniated muscle appearing as swelling.



Figure 1b. The mass was less apparent in squatting position after 8 months.

visible at the level of the fascial defect, which becomes more prominent in the weight-bearing position or resisted dorsiflexion of the ankle (2,5,8,10). Muscle hernias are categorized as traumatic or constitutional (1). Traumatic hernias may be direct or indirect, with the former being an injury of the fascia and the latter an injury of the contracted muscle causing disruption of the overlying fascia (10). Constitutional defects are either congenital or secondary to excessive exertion resulting in muscle hypertrophy and elevated intra-compartmental pressure (7,10). This leads to a muscular herniation through the weak areas in the fascia at the entrance sites of the perforating vessels (2,10).

A positional variation observed in the size of the mass and a careful physical examination combined with sonographic assessment is helpful in the definitive diagnosis of muscle herniation. Dorsiflexion of the patient's foot usually accentuates the fascial defect (5,8,10). The mass in our patient was more apparent in a forward lunge position. The differential diagnosis included varicosities, lipomas, hematomas, thrombophlebitis, and fibromas (4,11).

Sonographic methods are well-known for their advantages such as low cost, accessibility, portability, noninvasiveness, and

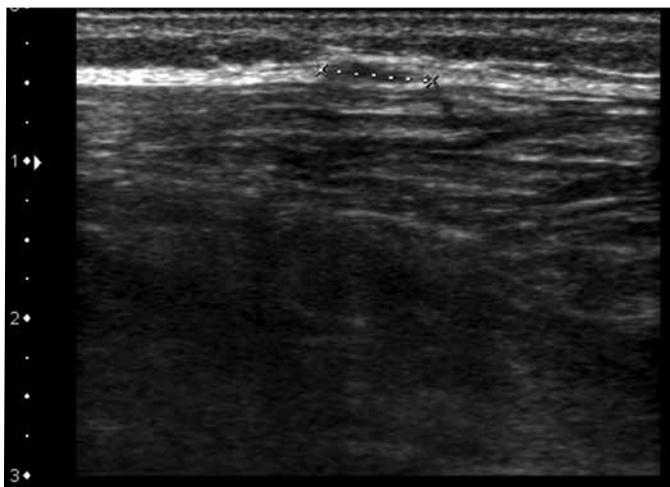


Figure 2a. Longitudinal sonographic image of the right tibialis anterior muscle in weight bearing position showing focal fascial defect.



Figure 2b. Color Doppler sonogram demonstrates an artery protruding through fascial defect at site of hernia.

multiplanar imaging possibilities. One of the most important diagnostic advantages of sonography over the other techniques is its real-time imaging capability that allows a dynamic evaluation. The real-time imaging feature of sonography is of particular interest because some muscle disorders are better seen dynamically, that is, during motion of the extremity, muscle contraction, probe compression, or position change of the patient. Sonography is useful to make the diagnosis a muscle hernia and also exclude alternative diagnoses such as muscle tears and tumors. Bianchi et al. (12) reported a study on eight patients in whom the sonographic examination method was used to diagnose muscle hernias. Bates (10) reported a patient examined using dynamic ultrasonography, which turned out to be bilateral anterior tibialis muscle herniations. In our patient, the longitudinal sonogram showed that the fascia was thinned and elevated by a small muscle bulge and color doppler sonogram showed a patent vessel at the site of the herniation. Dynamic sonography revealed muscle herniation, which was more apparent when the patient took a squatting position. Being non-invasive, highly accurate, economical and easily available; ultrasonography has been reported to be a good diagnostic tool in the diagnosis of muscle herniations (8,10,12).

MRI is also useful in the diagnosis of muscle herniation, determining the herniated muscle volume, planning surgical treatment and differentiating other soft tissue pathologies. Mellado et al. (2) used dynamic MRI for the diagnosis of muscle hernias in the lower extremities of three patients and observed changes in the volume of herniated muscle during forced dorsiflexion and plantar flexion of the ankle. However, MRI is a difficult method to implement, and due to their small sizes and dynamic features as in our patient, muscle hernias are frequently overlooked on MRI.

The treatment of tibialis anterior muscle hernia depends on the patient's symptoms. First of all, patients should be reassured that the palpable mass is not a tumor. Asymptomatic hernias require no treatment. Hernias with moderate symptoms may well respond to conservative treatment including the avoidance of vigorous exercise and use of compression stockings (13). Surgery is generally reserved for patients suffering from persistent symptoms in spite of the conservative modalities. Longitudinal fasciotomy is a treatment choice in large hernias (14). Primary

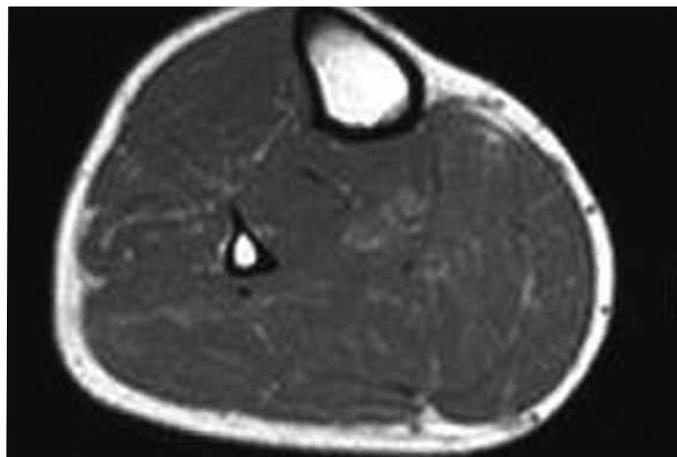


Figure 3. MRI of right lower leg was normal.

repair of fascial defects may result in compartment syndrome (15). Fasciotomy (7,9) and bovine pericardium grafting have been successfully used for the repair of fascial defects (16) in cases with tibialis anterior muscle herniations. In our patient, surgical intervention was not recommended and a conservative treatment including compression stockings and avoidance of excessive activity was prescribed and a favorable outcome was achieved.

In conclusion, a tibialis anterior muscle herniation should be suspected in the differential diagnosis of a mass on the lower leg and, ultrasound imaging should be the preferred diagnostic method, since it is a non-invasive, relatively economical, highly accurate and readily available imaging technique.

### Conflict of Interest

Authors reported no conflicts of interest.

### References

1. Ihde H. On muscular hernia of the leg. *Acta Chir Scand* 1929;65:97-120.
2. Mellado JM, Pérez del Palomar L. Muscle hernias of the lower leg: MRI findings. *Skeletal Radiol* 1999;28:465-9.
3. Verbov J. Muscle herniation of the lower legs. *Br J Dermatol* 1976;95:329-30.
4. Harrington AC, Mellette JR Jr. Hernias of the anterior tibialis muscle: case report and review of the literature. *J Am Acad Dermatol* 1990;22:123-4.
5. Kim M, Hong SP, Hwang SM, Park H, Ahn SK. Tibialis anterior muscle herniation developed after trauma. *Int J Dermatol* 2008;47:845-7.
6. Simon HE, Sacchet HA. Muscle hernias of the leg. Review of literature and report of twelve cases. *Am J Surg* 1945;67:87-9.
7. Agarwal A, Agarwal R. Abnormal presentation of tibialis anterior herniation. *Eur J Orthop Surg Traumatol* 2006;16:271-2.
8. Beggs I. Sonography of muscle hernias. *Am J Roentgenol* 2003;180:395-9.
9. Gupta RK, Singh D, Kansay R, Singh H. Cricket ball injury: a cause of symptomatic muscle hernia of the leg. *Br J Sports Med* 2008;42:1002-3.
10. Bates DG. Dynamic ultrasound findings of bilateral anterior tibialis muscle herniation in a pediatric patient. *Pediatric Radiol* 2001;31:753-5.
11. Zeiss J, Ebraheim NA, Woldenberg LS. Magnetic resonance imaging in the diagnosis of anterior tibialis muscle herniation. *Clin Orthop Rel Res* 1989;244:249-3.
12. Bianchi S, Abdelwahab IF, Mazzola CG, Ricci G, Damiani S. Sonographic examination of muscle herniation. *J Ultrasound Med* 1995;5:357-60.
13. Lane JE, Woody CM, Leshner JL. Tibialis anterior muscle herniation. *Dermatol Surg* 2002;28:641-2.
14. Miniaci A, Rorabeck CH. Tibialis anterior muscle hernia: a rationale for treatment. *Can J Surg* 1987;30:79-80.
15. Almdahl SM, Due J Jr, Samdal FA. Compartment syndrome with muscle necrosis following repair of hernia of tibialis anterior. Case report. *Acta Chir Scand* 1987;153:695.
16. Alemdaroğlu KB, İltar S, Say F, Kara T, Aydoğan NH. Perikard grefti ile tedavi edilen tibialis anterior kas herniasyonu- bir olgu sunumu. *SDÜ Tıp Fak Derg* 2007;14:41-3.