

Tibialis anterior herniation – a rare clinical entity: a case report and review of the literature

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Objectives: *To present a case of a tibialis anterior muscle herniation in a soccer player.*

Clinical features: *A 28-year-old male soccer player presented with a trauma-induced injury to his right anterior shin. After assessment and due to his clinical signs and symptoms, a high suspicion of tibialis anterior muscle herniation was suspected.*

Intervention and outcomes: *Diagnostic ultrasound confirmed this diagnosis, and a trial of conservative therapy was recommended. After eight weeks of treatment, he was able to return to sport.*

Summary: *A trial of conservative treatment for the tibialis anterior muscle hernia should be included as a part of general treatment strategy prior to any surgical interventions.*

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KEY WORDS: tibialis anterior herniation, muscle herniation, soft tissue herniation, chiropractic

Objectifs : *Présenter un cas d'une hernie tibiale antérieure chez un joueur de soccer.*

Caractéristiques cliniques : *Joueur de soccer de 28 ans présentant une blessure traumatique. Après examen et en raison de ses signes et symptômes cliniques, on a fortement suspecté une hernie tibiale antérieure.*

Intervention et résultats : *L'échographie a confirmé ce diagnostic et un essai de traitement conservateur a été recommandé. Après huit semaines de traitement, il a pu reprendre une activité sportive.*

Résumé : *Avant toute chirurgie, un essai de traitement conservateur de la hernie tibiale antérieure doit être inclus dans la stratégie générale de traitement.*

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MOTS CLÉS : hernie tibiale antérieure, hernie musculaire, hernie des tissus mous, chiropratique.

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Introduction

Muscle herniation, also known as myofascial defect, is the protrusion of a muscle through the surrounding fascia. This type of herniation, which is a relatively atypical clinical entity, has been rarely discussed in the dermatological and musculoskeletal literature.¹ The clinician's ability to differentially diagnose and treat this type of injury from other similar looking pathologies such as lipomas, hematomas and fibromas is of great importance.² Correct diagnosis will prevent unnecessary skin biopsy and the potential psychological side effects for patients due to a mistakenly diagnosed serious pathology.

Tibialis anterior muscle herniation often presents as a distinct palpable swelling or nodule over the muscle especially with weight bearing and muscle contraction.¹ The swelling tends to shrink in size with muscle inactivation or when the patient is non-weightbearing or supine.³⁻⁵ Even though clinical signs and symptoms have been the gold standard for the diagnosis of this condition, the recent use of dynamic ultrasound for the diagnosis of different muscle herniation has surged in popularity among healthcare professionals.²

The conservative management of tibialis anterior muscle herniation has not yet been discussed or researched in depth. The purpose of this case report is to highlight the successful conservative management of a tibialis anterior muscle herniation.

Case presentation

A 28-year-old male soccer player was referred by his family physician for his persistent localized swelling and pain over his right anterior shin of three months duration. His injury was the result of a direct trauma (slide tackling) from the left side in a soccer match. He was unable to continue playing due to the severity of pain. The pain was described as a dull, localized pain with an intensity of 7/10 on a Numerical Pain Rating Scale (NPRS). Weight bearing and intense physical training increased his symptoms. There was no numbness, tingling or weakness in the lower extremities. His medical and social histories were unremarkable.

Plain film imaging ordered by his family physician to rule out a potential fracture, and a complete neurovascular examination were within normal limits. There was palpable swelling over the belly of the tibialis anterior muscle, which would decrease in size when the patient was in a



Figure 1.
An example of Fencer's lunge position causing tibialis anterior herniation.

supine position. Fencer's lunge position (Figure 1), which will increase the strain on the tibialis anterior muscle, increased the localized swelling and pain. During gait analysis, using a treadmill, a mild bilateral subtalar overpronation during mid-stance and a five degree decrease in the ankle dorsiflexion was noted. Other orthopedic and functional assessments of the lower extremity were unremarkable.

Due to the high positional variability of the lesion, presenting history and the absence of red flags, muscle herniation was highly suspected and a diagnostic ultrasound was ordered.

The diagnostic ultrasound confirmed a 1 cm hypoechoic lesion of the tibialis anterior muscle in the transverse plane, showing a loss of continuity in the surrounding fascia. Conservative management of this condition was recommended to the patient with a possibility of a surgical referral if there were no significant changes in his symptomology within a month.

Based on the available scientific literature, conserv-

ative treatment was limited to load modifications and compression stockings. Due to the pathophysiology of this condition, supine isometric contraction of the tibialis anterior was recommended for the first two weeks, with eventual progression to concentric and eccentric exercises. Home stretches and mobility exercises targeting the ankle range of motion especially in dorsiflexion were prescribed. Custom made orthotics to alleviate the tensile load and contraction of the tibialis anterior during heel strike was also prescribed.

After eight weeks of conservative management, his reported pain intensity was substantially reduced to 1/10 on the NPRS and he had a small reduction in the observed size of his muscle hernia. At this time, he was cleared to return to sport and to resume previous activities. A two-month follow-up after his medical release was unremarkable as he continued to enjoy playing soccer with a visible muscle hernia, pain free.

Discussion

Muscular hernia, which is the protrusion of the muscle through its surrounding fascia, is a rare clinical finding.² There have been about 200 cases of extremity muscle herniation reported in the literature with the majority occurring in the tibialis anterior muscle.¹ The extensor digitorum muscle of the forearm is the other common reported site of herniation.¹

Due to its rare occurrence and the limited literature on the topic, this condition is routinely misdiagnosed as a serious pathology such as a lipoma, hematoma or fibroma.² A lack of clinical and orthopedic red flags and the often traumatic nature of this condition should guide the clinician away from unnecessarily procedures such as skin biopsy.²

In the past, clinical findings such the appearance of a focal swelling with weight bearing and the disappearance or the decrease in its size when supine was sufficient criteria for the diagnosis of tibialis anterior muscle herniation. Currently the use of diagnostic ultrasound is the gold standard for such diagnosis.⁴ MRI is the imaging modality of choice if conservative treatments fail and surgical treatment is recommended.¹⁰ MRI allows better visualization of the musculofascial demarcation, determination of herniated muscle volume, and will assist with surgical planning by assessing the neighboring neuromusculoskeletal tissues.¹⁰

Muscle hernias can be classified into traumatic and constitutional in origin. In this case, a single slide tackle from the opposing player and the direct trauma to the anterior shin presumably disrupted the superficial and deep fascia membrane surrounding the tibialis anterior muscle, causing localized herniation. Constitutional muscle hernia origins can either be congenital or due to the increased intracompartmental pressure from excessive muscular exertion and exercise.^{1,6,7}

Treatments for muscle herniation are controversial. Asymptomatic tibialis anterior herniation typically requires no specific treatment except patient assurance and education.³ The only conservative management for painful hernias cited in the literature are rest, load modification, and compression stockings.⁸

In this case, isometric contraction of the tibialis anterior muscle, which will decrease pain and increase motor neural recruitment, was added for the first two weeks. Bement *et al.*¹¹ demonstrated the analgesic effect of isometric contraction as they suggested that the activation of high-threshold motor units is involved in exercise-induced analgesia. These exercises were recommended in the supine position to minimize any potential intracompartmental pressure from weight bearing.

Concentric contraction in supine and in weight bearing were recommended to the patient for the following two weeks, followed by eccentric exercises to generate force at greater length and to stimulate maximal tissue adaptation to elastic force.¹² The elastic energy stored during the lengthening phase of the eccentric contraction can be used during the shortening phase of muscular contraction to amplify force and power production during exercise.¹² In the last stage of rehabilitation, sports-specific plyometric exercises were introduced to generate multidirectional force and stability through neural adaptation which enhances proprioception and kinesthesia required when playing soccer.¹³

If conservative treatments fail, surgery is an option. Traditionally, the surgical technique was the direct closure of the fascia defect by tightening the area.³ However this procedure has lost its popularity due to a high muscular herniation recurrence rate and increased intracompartmental pressure which predisposed the patient to compartment syndrome.⁹ Recent studies suggest a newer approach of longitudinal decompressive fasciotomy or repair with synthetic patches.³ Hegde recommended the

closure of the facial defect with an autologous tensor fascia lata graft.⁵

In this case, conservative management had a very good outcome in eight weeks allowing full recovery and participation in sport. These results, however, should be interpreted with caution, as many important variables such as the natural history of this condition may have played a role in this case. Furthermore, there are no randomized control studies comparing different types of conservative management in tibialis anterior herniation.

Summary

Tibialis anterior muscle hernia is a rare clinical condition and can be a differential diagnosis of patients with localized leg pain and focal swelling. Direct trauma, size variability of the lesion with and without weight bearing, and the absence of red flags in the history should assist the clinician with this diagnosis. Diagnostic ultrasound can confirm this diagnosis, which will prevent the unnecessary use of other imaging modalities such as MRI and CT scan. Conservative management including the use of therapeutic exercises, load modifications, and compression stockings alongside optimal functional movements in the lower extremity can be prescribed prior to potential surgical referral.

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