DOI: https://doi.org/10.30795/jfootankle.2024.v18.1825

Case Report

Chronic exertional compartment syndrome of the deep posterior compartment the leg: a rare presentation*

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Abstract

The chronic exertional compartment syndrome predominantly affects young athletes and often requires surgery when conservative treatments fail. The anterior compartment is the most commonly involved, accounting for 72.8% of cases, while isolated involvement of the deep posterior compartment is rare, occurring in only 2.8% of cases. This study presents a case of isolated deep posterior compartment syndrome and demonstrates a minimally invasive decompression technique for faster rehabilitation and early return to activity. A 26-year-old male athlete presented with posterior leg pain after running, unresponsive to conservative treatment. Stress magnetic resonance imaging revealed isolated deep posterior compartment involvement. Patient underwent minimally invasive segmental fasciotomy of the leg's four compartments, with excellent postoperative recovery and no deficits. Surgical intervention remains the gold standard for maintaining activity levels in athletes, and a high index of suspicion is crucial for diagnosis and treatment of this rare pathology.

Level of evidence IV; Therapeutic study; Case report.

Keywords: Chronic exertional compartment syndrome; Minimally invasive surgical procedures; Athletes; Sports Medicine; Sports.

Introduction

Chronic exertional compartment syndrome (CECS) of the leg is a pathology that affects mostly young athletes, affecting their performance and also leading to a reduction in activity level and/or exercise abstention[1-3]. This condition might be found in any compartment of the leg, but is more commonly anterolateral, followed by the isolated impairment of the anterior and lateral compartments[1,4-6]. Isolated impairment of the deep posterior compartment is a very rare condition, occurring in only 2.8% of patients[5]. Diagnosis must be suspected in patients complaining of pain initiated during exertion, being confirmed by compartment pressure measurement or imaging methods[2,6,7]. Open surgical decompressive fasciotomy is the gold-standard treatment, but recent studies have shown promising results with minimally invasive and endoscopic techniques[2,4,8,9]. In this article, we report a rare case of bilateral, isolated deep posterior compartment CECS treated with a minimally invasive surgical approach after failed conservative measures.

Case description

A 26-year-old man presented with bilateral leg pain for 18 months, initiated after at least five minutes of exertion. He worked as a military police officer and used to practice running and swimming. Symptoms were limiting his job and exercise performance. Patient-reported pain was up

Study performed at the Felicio Rocho Hospital, Belo Horizonte, MG, Brazil.

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Conflicts of interest: None. **Source of funding:** None. **Date received:** September 13, 2024. **Date accepted:** October 23, 2024. **Online:** December 20, 2024.

How to cite this article: Baumfeld DM, Oliveira GM, Silva MKF, Mourão JM, Baumfeld TS. Chronic exertional compartment syndrome of the deep posterior compartmentthe leg: a rare presentation*. J Foot Ankle. 2024;18(3):402-5.

*This abstract was presented at the 2024 Annual Meeting of the American College of Sports Medicine, in Boston, MA, US.

to nine on the visual analog scale, involving the posterior region of the leg, especially while running. He had already tried conservative measures, such as reducing training levels, using nonsteroidal anti-inflammatory drugs, and more than 100 sessions of physical therapy with stretching exercises, massage, and transcutaneous electrical nerve stimulation. Physical examination revealed mild pain on palpation of the posterior muscle bellies and diffuse mild pain on palpation of the anterior tibia. He also had a small fascial hernia in the lateral compartment, palpable bilaterally. No reduction of strength or numbness was remarkable, and the other examination points were unremarkable. Post-effort magnetic resonance imaging (MRI) was requested, showing bilateral volumetric enhancement of the deep posterior compartments when compared to pre-exertional sequences. It also described a 20% enhancement of the signal of the muscle bellies of the flexor digitorum longus and flexor hallucis longus, configuring CECS (Figure 1). A minimally invasive surgical approach was proposed to allow fasciotomy of the compartment. Patient was taken to the operating room and both lower limbs were prepared with standard drapes. Tourniquet was not used for this approach to allow bleeding control and avoid post-operative hematoma. We performed a single 4 cm medial incision to release the fascia of the superficial and deep posterior compartments and two 4 cm lateral incisions that allowed fasciotomy of anterior and lateral compartments (Figures 2 and 3). The fascia was incised with a curved Metzenbaum scissor. Complete release of all four compartments was achieved and checked by palpation. Limbs were protected with standard dressing and weight-bearing was immediately allowed as tolerated. At the first postoperative visit, after one week, patient was able to walk with no need of crutches and had normal strength in all muscular groups of both legs, with no complaint of paresthesia (Figure 4). After six weeks, he returned to strengthening activities at the gym and was able to run without pain after nine weeks.

Discussion

The CECS is a condition that causes pain during exercise, especially in young runners. A high clinical suspicion is required when facing a patient with chronic exertional leg pain, because most patients are asymptomatic during rest. Ruling out differential diagnosis is an important step in patients' care. Pathologies such as stress fractures and medial tibial stress syndrome are frequently associated with this clinical picture, and MRI is a valuable tool for excluding these confounding hypotheses[4].

Isolated impairment of the posterior compartments is extremely rare[5]. In a retrospective review, Davis et al. found that isolated involvement of the deep posterior compartment occurred in only 2.8% of patients[5]. The involvement of this compartment was more frequent in association with other compartments, totaling 18.9% of cases. The anterior compartment was involved in 42.5% of patients and the lateral compartment, in 35.5% of patients. Among these patients, 63.4% had bilateral positive tests.

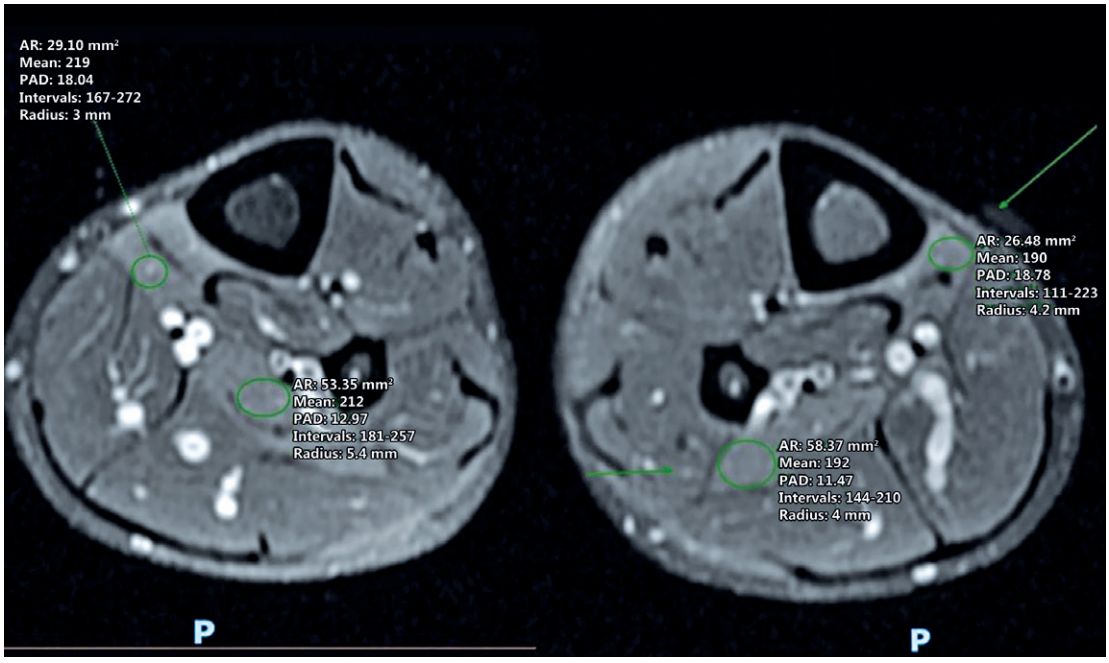

Figure 1. Patient T2-weighted, post-effort MRI image showing increased volume and signal.

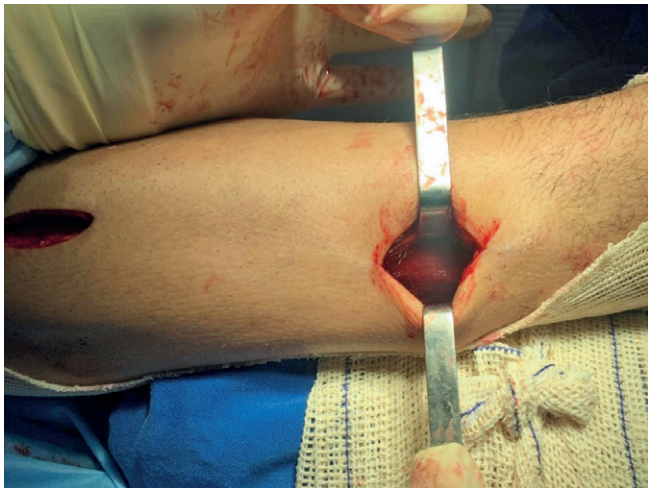

Figure 2. Distal lateral incision showing the released fascia of the lateral compartment.

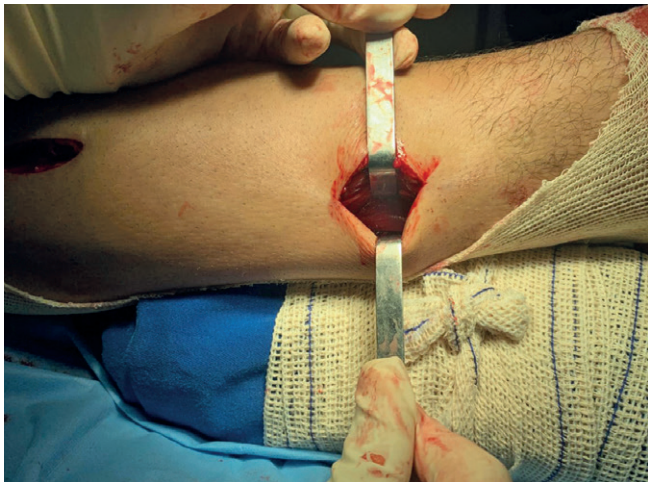

Figure 3. Medial incision showing the released fascia of the posterior compartment.

Figure 4. Photograph one week after operation showing the patient's progress, with full range of motion.

In the present report patient experienced chronic posterior pain during exercise and had attempted conservative treatment without success. Diagnosis was possible with the use of post-exercise MRI. The conventional leg MRI protocol usually presents normal results in the setting of CECS, and well-defined thresholds for MRI diagnosis are still missing. However, recent studies have attempted to validate established protocols. The use of liquid-sensitive sequences after physical exertion has shown high specificity and sensitivity in the diagnosis of CECS according to the intracompartimental-measured pressure[6,7].

Conservative treatment should be attempted for at least six weeks before surgery, but it is usually ineffective, unless the patient is willing to avoid the inciting activities[3,9]. A comparative study of conservative versus surgical treatment[3] showed that 77% of subjects in the surgical group were able to return to their previous activity level, in comparison to only 25% of patients in the conservative group.

Open fasciotomy has been considered the gold-standard treatment[3,4,8]. However, different techniques have been described for performing minimally invasive or even endoscopic treatment[2,4,8,9]. For our patient, surgical option was to use minimally invasive incisions and fasciotomy of the four compartments of the leg. The use of two incisions laterally allows a better visualization of the fascia and minimizes the risk of injury of the superficial peroneal nerve, one of the most common complications of this technique[4,9]. These incisions are made to release the anterior and lateral compartments. The medial incision is performed in the middle third of the leg, just posterior to the medial border of the tibia. Caution is taken to protect the saphenous vein and nerve, and the superficial and deep posterior compartments are released.

A systematic literature review has not shown statistically relevant differences between the results of minimally invasive treatment and endoscopic-assisted techniques, with satisfactory results above 80%[10]. However, the author points out that high-quality evidence is still lacking. Another review of the literature[4] shows good results with minimally invasive treatment, but with a considerable high incidence of complications such as nerve injuries. However, the abovementioned review mentioned only studies with single incision techniques.

The military population has been pointed out as having poorer results following CECS treatment[4]. Up to 27.7% of patients were unable to return to the previous activity level, and 44% of patients had persistent symptoms in a large retrospective review. Our patient worked in the military police and managed to return to his previous activity levels.

The CECS is a challenging pathology, and its diagnosis requires a high level of suspicion, especially in unusual presentations. The MRI is a useful noninvasive method for diagnosis. Minimally invasive fasciotomy has been shown to be an effective option of treatment, and the technique described in this article might reduce complications associated with other minimally invasive treatments described.

Authors' contributions: Each author contributed individually and significantly to the development of this article: GMO *(https://orcid.org/0000-0003-2215-779X) Formatting of the article, bibliographic review, presentation in conference, participated in the review process, interpreted the results of the study, survey of the medical records, data collection; MKFS *(https://orcid.org/0000-0002-2564-4617) Clinical examination, Performed the surgeries, approved the final version, participated in the review process, interpreted the results of the study, survey of the medical records, data collection; JMM *(https://orcid.org/0009-0008-3118-6676) , and TSB *(https://orcid.org/0000-0001-9244-5194) Clinical examination, Performed the surgeries, participated in the review process, approved the final version; DSB *(https://orcid.org/0000-0001-5404-2132) Clinical examination, performed the surgeries, conceived and planned the activities that led to the study, participated in the review process, interpreted the results of the study, approved the final version. All authors read and approved the final manuscript. *ORCID (Open Researcher and Contributor ID .

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