



## Case Report

# Segmental decompressive fasciotomy for acute non-traumatic compartment syndrome in a professional soccer player: case report<sup>☆</sup>



Daniel Baumfeld<sup>a,b,\*</sup>, André Lourenço Pereira<sup>c</sup>, Claudio Freitas Guerra Lage<sup>b</sup>, Gabriel Mendes Miura<sup>b,d</sup>, Yuri Vinicius Teles Gomes<sup>a</sup>, Caio Nery<sup>e</sup>

<sup>a</sup> Universidade Federal de Minas Gerais, Belo Horizonte, MG, Brazil

<sup>b</sup> Departamento Médico, Cruzeiro Esporte Clube, Belo Horizonte, MG, Brazil

<sup>c</sup> Hospital das Clínicas, Universidade Federal de Minas Gerais, Belo Horizonte, MG, Brazil

<sup>d</sup> Hospital Biocor, Belo Horizonte, MG, Brazil

<sup>e</sup> Departamento de Ortopedia e Traumatologia, Universidade Federal de São Paulo, São Paulo, SP, Brazil

## ARTICLE INFO

### Article history:

Received 28 November 2016

Accepted 23 February 2017

Available online 15 February 2018

### Keywords:

Less invasive surgical procedures

Fascia/surgery

Compartment syndromes

Surgical decompression

Soccer

Athletes

## ABSTRACT

Acute compartment syndrome in athletes is a rare orthopedic emergency associated with strenuous exercise. It is often diagnosed late and can lead to severe complications and high morbidity. This report describes the case of a young soccer player with acute compartment syndrome with no history of trauma, diagnosed and treated 24 h after the onset of symptoms, through minimally invasive decompressive fasciotomy, with good postoperative evolution.

© 2017 Sociedade Brasileira de Ortopedia e Traumatologia. Published by Elsevier Editora Ltda. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## Síndrome compartimental aguda não traumática em atleta de futebol tratada por fasciotomia decompressiva segmentar: relato de caso

## RESUMO

A síndrome de compartimento aguda não traumática em atletas é uma emergência ortopédica rara associada ao exercício físico extenuante. Apresenta diagnóstico difícil, frequentemente tardio, pode levar a complicações graves e alta morbidade. Os autores relatam

### Palavras-chave:

Procedimentos cirúrgicos não

convencionais

Fascia/cirurgia

<sup>☆</sup> Study conducted at Departamento Médico do Cruzeiro Esporte Clube, Universidade Federal de Minas Gerais, Belo Horizonte, MG, Brazil.

\* Corresponding author.

E-mail: [danielbaumfeld@gmail.com](mailto:danielbaumfeld@gmail.com) (D. Baumfeld).

<https://doi.org/10.1016/j.rboe.2018.02.001>

2255-4971/© 2017 Sociedade Brasileira de Ortopedia e Traumatologia. Published by Elsevier Editora Ltda. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Síndromes compartimentais  
Descompressão cirúrgica  
Futebol  
Atletas

o caso de uma atleta de futebol juvenil com uma síndrome compartimental aguda sem história de trauma, diagnosticada e tratada 24 horas após início dos sintomas, através de fasciotomia descompressiva minimamente invasiva, com boa evolução pós-operatória.

© 2017 Sociedade Brasileira de Ortopedia e Traumatologia. Publicado por Elsevier Editora Ltda. Este é um artigo Open Access sob uma licença CC BY-NC-ND (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## Introduction

Acute leg compartment syndrome after physical exertion in athletes is an unusual orthopedic emergency caused by strenuous physical exercise that leads to muscle edema and stiffness of the fascia, progressing to anoxia, ischemia, and muscle necrosis. Its diagnosis is difficult, requiring a high index of suspicion, especially in absence of associated trauma or fracture. If decompressive fasciotomy is not performed rapidly, complications such as ischemic contraction, neurological deficit, infection, and muscle necrosis can occur and definitely impair the athlete's career. In the present study, the authors describe the rare case of a 16-year-old soccer player who presented acute left leg compartment syndrome after exhaustive training, without associated trauma; the diagnosis was late, and the patient was treated by minimally invasive surgery, presenting good postoperative evolution.

## Case report

A 16-year-old male soccer player with no comorbidities, previously asymptomatic, had performed an intense practice session for 90 min, with no history of trauma or complaints during his activity. After three hours, he reported the onset of moderate pain in the anterolateral region of the left leg, with no associated signs of inflammation; the neurovascular examination presented without alterations. Common analgesic and cryotherapy were prescribed. Nine hours after the training session, he presented to the medical department with complaint of progressive worsening of pain, visual analog scale 8/10, edema in the anterolateral region of the left leg, and pain when mobilizing the extrinsic muscles of the foot and ankle. The limb was immobilized, and cryotherapy, elevation, rest, and associated anti-inflammatory drugs were prescribed. The athlete persisted with significant pain until the following morning, when the beginning of a motor deficit in the territory of the common fibular nerve and paresthesia in the dorsal lateral region of the foot were identified. On physical examination, he presented edema in the anterior and lateral compartment of the left leg, decreased sensitivity of the first interdigital space of the left foot, and decreased strength in the anterior tibial (M3), long extensor digits (M3), and hallux (M0; Fig. 1). Posterior tibial and dorsal pedis pulses were palpable, with capillary perfusion of less than three seconds, and no associated pallor. The patient was diagnosed with compartment syndrome; an emergency magnetic resonance imaging was performed (Fig. 2), and the patient was operated 24 h after the onset of symptoms.

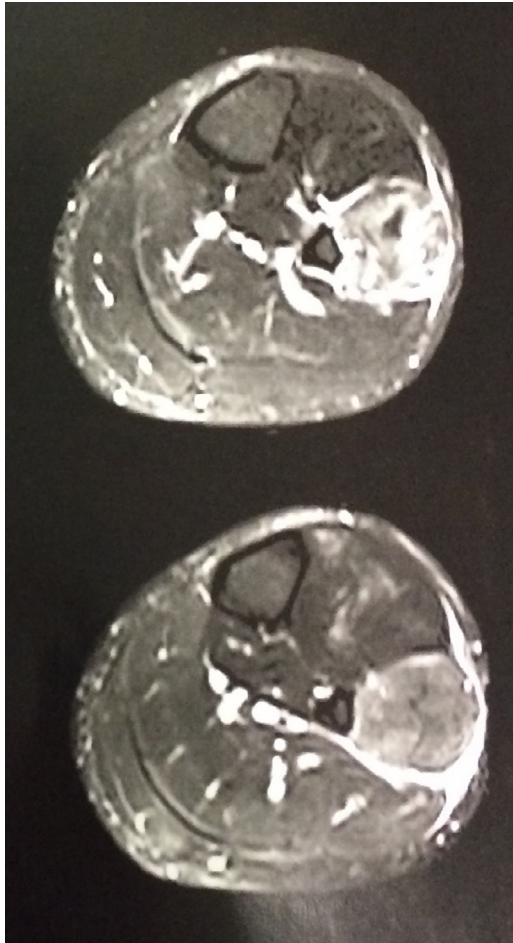


**Fig. 1 – Preoperative clinical evaluation indicating reduced hallux extension and alteration in the function of the anterior tibial.**

An anterolateral segmental fasciotomy of the left leg was performed (Figs. 3 and 4), with immediate improvement of pain and local appearance. The patient presented a good evolution, with no residual sensory deficits, as well as total recovery of the tibialis anterior and flexor digitorum longus (M5), but maintained a partial deficit (M2) of the flexor hallucis longus for eight postoperative weeks.

## Discussion

Acute non-traumatic compartment syndrome after physical activity is a rare clinical entity that involves an acute increase in intracompartmental pressure secondary to intense physical exercise, without a history of associated trauma. The literature



**Fig. 2 – Magnetic resonance imaging indicating signal changes in the anterolateral leg muscles.**



**Fig. 3 – Decompressive fasciotomy with four anterolateral incisions.**



**Fig. 4 – Distal incision indicating the color difference in the normal and post-decompression muscles.**

on this pathology consists only of case reports and few series of cases; there is no estimated incidence. Livingston et al.<sup>1</sup> published a series of cases of seven patients with acute non-traumatic compartment syndrome, all young male athletes; 86% of the patients presented neurological deficits, 71% presented muscle weakness, and 51% had a clinical presentation similar to that of the present patient. Their results indicated a 24-h cut-off point for decompressive fasciotomy: all patients treated before this period evolved without long-term sequelae.

The present patient was healthy, previously asymptomatic, and in good physical shape. He presented acute symptoms three hours after standard soccer training, with no signs to warn of compartment syndrome. His case evolved with maintenance of pain and onset of neurological symptoms; he was kept under observation and subsequently taken to urgent surgery. The service in which he was initially treated did not have intracompartmental pressure evaluation methods, which would have helped in the diagnosis and consequently led to earlier treatment. In published literature,<sup>2,3</sup> non-traumatic compartment syndrome in athletes is often diagnosed late, which is explained by the rarity of this condition and presence of other more common differential diagnoses. Because the patient is an elite athlete, a minimally invasive anterolateral fasciotomy was performed, with four small incisions and total fascia release. Maffulli et al.<sup>4</sup> published a prospective study evaluating minimally invasive fasciotomy in the treatment of lateral traumatic or non-traumatic anterolateral syndrome in athletes. The results indicated that 94% of the patients returned to sport activity in 8-13 weeks. Traditional fasciotomy presents a higher rate of infection and longer healing time, factors that delay the return to sports.<sup>4</sup> However, the fascial release of at least 90% of the affected compartment to return intracompartmental pressure to basal levels is essential, as demonstrated by Mathis et al.<sup>5</sup>; in theory, this release is more difficult in minimally invasive surgery.

At two months postoperatively, the present patient has no pain, presenting full recovery of sensitivity and strength in the tibialis anterior and flexor digitorum longus; however, the

deficit of the flexor hallucis longus persisted, possibly due to its more proximal innervation by the nerve fibularis longus. The recovery time was similar to that found in the literature,<sup>6-9</sup> such as in the retrospective study by Irion et al.<sup>10</sup> on the return to physical activity after fasciotomy for compartment syndrome in elite athletes; 84.6% returned to the previous level 11 weeks after surgery.

Despite the rarity of acute non-traumatic compartment syndrome in athletes, orthopedists and physicians involved in sports should maintain a high index of suspicion when examining patients with disproportionate limb pain without etiology or history of known trauma. The delay in diagnosis and treatment is associated with muscle necrosis and high morbidity, which can lead to an early termination of an athlete's career. Decompressive fasciotomy is the indicated treatment; less invasive surgery presents good results, is esthetically and functionally better, and presents lower time of recovery and return to sports.

---

### Conflicts of interest

The authors declare no conflicts of interest.

### REFERENCES

---

1. Livingston KS, Meehan WPJ3rd, Hresko MT, Matheney TH, Shore BJ. Acute exertional compartment syndrome in young athletes: a descriptive case series and review of the literature. *Pediatr Emerg Care*. 2016 [Epub ahead of print].
2. Kowalewski K, Mayo A, Journeaux S. How a footballer got hurt without getting hit: isolated peroneal compartment syndrome of a non-traumatic cause. *Ann R Coll Surg Engl*. 2007;89(8):W1-2.
3. How MI, Lee PK, Wei TS, Chong CT. Delayed presentation of compartment syndrome of the thigh secondary to quadriceps trauma and vascular injury in a soccer athlete. *Int J Surg Case Rep*. 2015;11:56-8.
4. Maffulli N, Loppini M, Spiezia F, D'Addona A, Maffulli GD. Single minimal incision fasciotomy for chronic exertional compartment syndrome of the lower leg. *J Orthop Surg Res*. 2016;11(1):61.
5. Mathis JE, Schwartz BE, Lester JD, Kim WJ, Watson JN, Hutchinson MR. Effect of lower extremity fasciotomy length on intracompartmental pressure in an animal model of compartment syndrome: the importance of achieving a minimum of 90% fascial release. *Am J Sports Med*. 2015;43(1):75-8.
6. Stollsteimer GT, Shelton WR. Acute atraumatic compartment syndrome in an athlete: a case report. *J Athl Train*. 1997;32(3):248-50.
7. Johnson J, Becker J. Bilateral acute compartment syndrome in a football player: a case report. *Curr Sports Med Rep*. 2012;11(6):287-9.
8. Green JE, Crowley B. Acute exertional compartment syndrome in an athlete. *Br J Plast Surg*. 2001;54(3):265-7.
9. Laframboise MA, Muir B. Acute compartment syndrome of the foot in a soccer player: a case report. *J Can Chiropr Assoc*. 2011;55(4):302-12.
10. Irion V, Magnussen RA, Miller TL, Kaeding CC. Return to activity following fasciotomy for chronic exertional compartment syndrome. *Eur J Orthop Surg Traumatol*. 2014;24(7):1223-8.