

Compartmental Leg Syndrome in Bodybuilder

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Abstract

Case Report

Compartment leg syndrome is an orthopedic emergency that may compromise the viability of the affected limb. This entity results from increased pressure of the osteofascial compartment which leads to decrease limb perfusion and subsequently to irreversible damage to muscles and nerves. We present a case report of a 19 year old male bodybuilder taking anabolic steroids, presented in the emergency department with severe leg pain with functional limb disability without trauma. In the operating room, the pressure of the various compartments of the leg were measured. After the confirmation of compartment syndrome, the patient underwent decompression fasciotomy of the leg. Late treatment of compartment syndrome can lead to serious complications and high morbidity, so the recognition of injuries and clinical situations that may predispose to the development of compartment syndrome is of great importance.

Keywords: Compartment Syndrome, Fasciotomy, Leg pain.

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INTRODUCTION

Acute compartment syndrome was firstly described by Richard von Volkman in 1881 [1]. It is defined as a critical pressure increase within a confined compartment space causing a decline in the perfusion pressure to the tissue within that compartment [2, 3]. Tissue perfusion is proportional to the difference between capillary perfusion pressure and the interstitial fluid pressure. This decreased perfusion causes tissue ischemia, resulting in nerve injury and muscle death [4].

This entity can result from various etiologies, being the most common trauma (with or without fracture). Others are constrictive dressings, casts, infection and bleeding disorders [2]. Another variety of atraumatic compartment syndrome is acute exertional compartment syndrome, which is rare and characterized by acutely elevated compartment pressures that are the result of physical exercise without a discrete traumatic event [4].

Acute compartment syndrome is a clinical diagnosis. The most important determinant of outcome is early recognition and a timely surgical decompression [2, 5]. Classically the five Ps – pain, pallor, pulselessness, paralysis and paraesthesia must be searched. If the diagnosis is in doubt, emergent surgical fasciotomy is needed. When in doubt, the

intracompartment pressure of the various compartments must be measured [2]. A normal intracompartment pressure of healthy muscle is 10 mmHg [2, 6].

Prognosis depends on a number of factors like injury severity, duration of ischaemia, pre-injury status and comorbidities, and most importantly, time to fasciotomy [2].

Rorabeck postulated that fasciotomy has to be performed within six hours for complete recovery of limb. When fasciotomy was performed within twelve hours, normal limb function was regained in only 68% of patients. After twelve hours only 8% regained normal function [7, 8].

CASE REPORT

A 19-year-old male bodybuilder with no comorbidities, with history of consumption of anabolic steroids for 12 weeks (testosterone, trenbolone, stanozolol, boldenone and oxandrolone). Presents to the emergency department, for the second time in 3 days, with severe pain in the anterolateral region of the right leg with ten days of evolution. The pain had been increasing, with functional incapacity and inability to walk. On physical examination the patient presented with edema in the anterolateral region of the right leg

(Fig-1), loss of sensation to the first web space and inability to dorsiflex the toes and ankle. Posterior tibial and dorsal pedis pulses were palpable. It was performed a radiographical and that presented with no acute alterations. The ecography showed an increase in anterior tibial muscle volume and diffuse hyperechogenicity favoring an inflammatory process with aspects compatible with muscle rupture, without findings suggesting deep vein thrombosis. The laboratory analysis showed a slight increase in C-reactive protein and an increase in creatine Kinase (CK) and creatine Kinase MB (CK-MB).

The patient was diagnosed with compartment syndrome. In the operating room, due to the lack of a proper device, the compartmental pressures were measured using a closed serum column system connected to a central venous pressure measuring device. The patient presented intra-compartmental pressure of 80 mmHg. It was then decided to do an anterolateral segmental fasciotomy of the right leg (Fig-2).

The anterolateral incision was placed halfway between the tibial crest and the shaft of the fibula over the anterior intermuscular septum. A transverse incision in the fascia allowed the identification of the anterior intermuscular septum. The anterior and lateral compartments were then released with care to avoid the superficial peroneal nerve just posterior to the intermuscular septum. The anterior compartment showed signs of muscle necrosis while the lateral compartment was well.

At 48 and 96 hours, the patient returned to the operation room to evaluate the evolution of muscle necrosis and approximation of the wound edges (Fig-3).



Fig-3: Decompressive fasciotomy with 48 hours of evolution



Fig-4: Decompressive fasciotomy with 2 weeks of evolution

At 2 weeks (Fig-4), the patient was discharged, with no leg pain, but unable to perform ankle dorsiflexion or toe and hallux extension.

He stayed an ankle position splint, in a neutral position to prevent the echinus, and was referred for consultation for eventual surgery to correct muscle deficits.



Fig-1: Preoperative clinical evaluation of the right leg



Fig-2: Decompressive fasciotomy with anterolateral incision. The anterior compartment showed signs of muscle necrosis

DISCUSSION

Patients with acute exertional compartment syndrome tend to be male athletes in their late teens

presenting after moderate physical activity. These patients are often initially misdiagnosed with a muscle strain and sent home from the emergency department, later returning with more dramatic symptoms of

compartment syndrome. These patients have a high incidence of neurologic deficits secondary to a substantial delay in diagnosis [4, 9].

Anabolic steroid and creatine use are risk factors for development of compartment syndrome because of the sudden increase in muscle volume. Eccentric exercise also increases the risk due to decrease fascial compliance [10, 11]. This elevated risk is the result of an altered ratio between increased rapidly growing muscle in a relatively limited and inelastic fascial envelope [12].

Acute compartment syndrome is a surgical emergency. A value >30 mmHg in any one compartment is often cited as an indication for fasciotomy, whereas other sources suggest that a delta P value <20 mmHg from diastolic blood pressure level or <30 mmHg from mean arterial pressure is more appropriate [13, 14].

Immediate management involves the identification and removal of external compressive forces, releasing casts or dressings down to the skin. It is important to ensure that the patient is normotensive (hypotension elevates risk by lowering perfusion pressure to tissues) and to maintain the limb at heart height (substantial elevation will reduce the arteriovenous pressure gradient), and provide supplemental oxygen [2, 13, 15].

The literature suggests that the muscle recovery in children is more robust than that in adults and that debridement of myonecrotic tissue should be reserved for subsequent irrigation and desbriments⁹. In the setting of delayed diagnosis, in which tissue and nerve damage has already occurred, the decision to decompress the compartments has limited evidence. However, because of the potential for recovery in children. The literature suggests aggressive fasciotomy, even in late cases [13]. It is controversial to perform fasciotomy in this clinical case due to the time of evolution, but given the patient pain and age, this treatment was chosen considering the possibility of recovery. In addition, surgical decompression allowed a non-worsening of the tissue ischaemia, enabling future less aggressive reconstructive treatments.

It is a difficult diagnosis, often late, that can lead to serious complications and high morbidity, so the recognition of injuries and clinical situations that may predispose to the development of this syndrome must be considered in the face of a clinical situation suggestive of this diagnosis.

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