



## CASE REPORT

### SURGICAL SOLUTION AND CLINICAL RESULTS IN A YOUNG AMERICAN FOOTBALL ATHLETE WITH ACUTE POST-TRAUMATIC COMPARTMENT SYNDROME

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#### ABSTRACT

We present the case of a 15 year old boy, athlete and American football player, who after receiving a contusion with the helmet of a player from the opposing team on his right thigh, began with sudden and disabling pain, however, despite of the initial anti-inflammatory treatment with physical measures and once the presence of femoral fracture and hematoma had been ruled out, it persisted with symptoms highly suggestive of compartment syndrome. Due to the high rates of morbidity and mortality that can occur in an untreated compartment syndrome, we decided on emergency surgical management, which consisted of a lateral and posterior fasciotomy of the right thigh and delayed primary closure 2 days later. The patient was discharged due to clinical improvement and returned to competitive sports activity 4 months after the surgical procedure.

#### INTRODUCTION

Acute compartmental syndrome is considered a medical emergency that jeopardizes function of the extremity and could result on amputation or even death of the patient.<sup>2</sup> The thigh has muscle compartments with high capacity of extravasation of free volumen to the gluteal region<sup>6,7</sup>, also it has an extremely elastic fascia and absence of an interosseus membrane, that's why compartmental syndrome on the thigh is exceptional founding it more frequently on the leg and the forearm<sup>2</sup>. Blunt trauma causes the tear of connective tissue and rupture by many degrees of muscle fibers which creates generalized<sup>10</sup> edema and ends up with the increase of intracompartmental pressure. Inflammatory process on a football player in which muscular mass is above the average and has less intracompartmental space make them the patients most at risk.<sup>2</sup> Nowadays the diagnosis of compartmental syndrome it's made by medical history, physical examination and in some cases measurement of intracompartmental pressure.<sup>6</sup> On another hand on institutions like ours that lack of specialized equipment for the measurement of intracompartmental pressure (Stryker's manual pressure monitor/ arterial or venous line pressure transducer) we must take decisions based only on clinical presentation and basic x-ray studies.

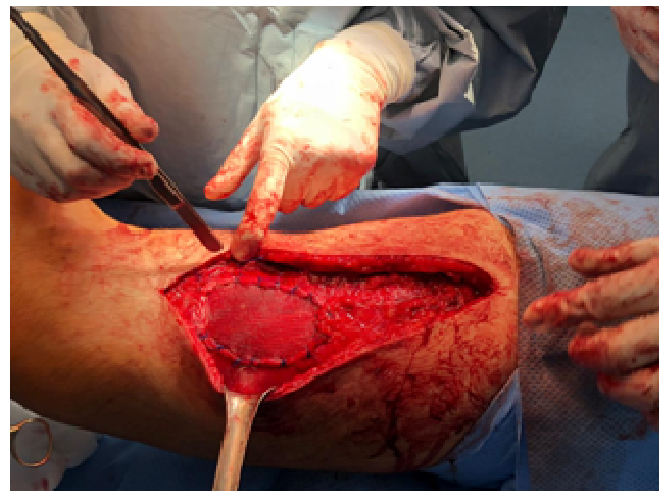
**Case History:** 15 year-old male patient brought to the emergency service by his mother. The patient presented pain on lateral and anterior sides of the right thigh of intensity 8/10

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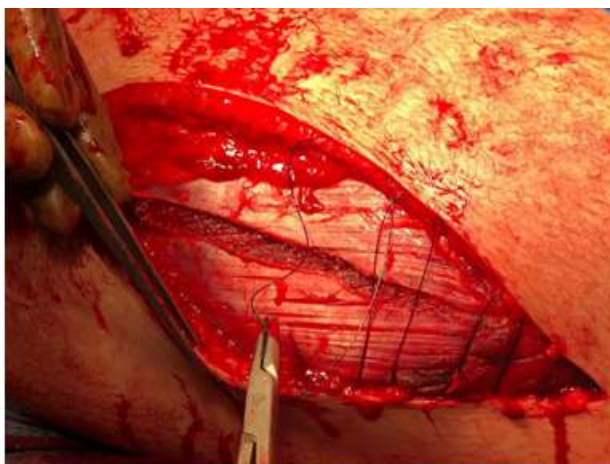
that increased to 9/10 from the Visual Analog Scale for Pain (VAS). The patient told he was playing a football match 8 hours before when he suffered a direct contusion across the anterior face of the thigh by another player's helmet. The patient stopped playing presenting moderate pain on the thigh and without limitation for walking. He went to another hospital where the diagnosis of blunt trauma to the right thigh was made and was discharged with painkillers and rest. At home the patient presented important increase of volume of the thigh, inability for walking and pain 8/10, that was why he was brought to our emergency service for diagnosis and treatment. At physical examination we found the right extremity with generalized edema at the middle third of the thigh, the skin looked tense and also there was a size increase at the anterolateral side of the thigh (there was peripheral difference of 11 cm on behalf the contralateral leg). There was no ecchymosis, dermabrasions or open wounds. The patient referred pain to the superficial palpation of the anterior and lateral compartments of the thigh. The active range of motions (ROM) of the hip were limited by pain and weakness from the anterior side of the thigh and passive flexion was tolerated to 45°. Knee active ROM were also restricted by pain and to passive extension he referred worsening of pain across the anterolateral face of the thigh. The ROM and strenght of the ankle and toes were normal. We didn't found any abnormalities of sensitivity on dermatomes neither neurologic deficit. We reassessed the patient every 20 minutes until he was on the operating room to check vascular integrity. We never found any neurovascular deficit during assessment. On the initial approach there were taken anteroposterior (AP) and lateral x-rays of the right femur and AP x-ray of the pelvis to dismiss any femoral fractures.

After we didn't find any fractures we asked for an ultrasound of the whole right thigh where they reported: increase of volume from soft tissues, an hypoechoic image found at the most tense part of the thigh at physical examination compatible with the disproportionate increase of volume from the anterolateral compartment, not suitable to drainage cause there was no evidence of blood collection or hematoma on any of the compartments. The treatment suggested on this patient was divided on two surgical times: first procedure a posterior and lateral fasciotomy plus delayed primary closure with ShoeLace technique and second procedure a primary closure of urgent dermofasciotomy plus colocation of prolene mesh at fascia layer. Based on physical examination and mechanism of injury of compartmental syndrome we decided to do a dermofasciotomy of posterior and lateral compartments. A longitudinal incision was made across the lateral face of the thigh cutting the iliotibial band and vastus lateralis muscle to decompress lateral and posterior compartments. The patient was put on supine position with the right extremity a little upward by the hip. To liberate the compartments there was made an incision from the tip of the great trochanter to the proximal lateral epicondyle of the distal femur exposing skin and dissecting the tissues, proximal to fascia lata and the iliotibial band. At the fascia lata/iliotibial band level, the vastus lateralis was exposed, it was elevated outside the intermuscular septum, and retracted anteromedially; exposing the lateral intermuscular septum. Once it was done and after a new neurovascular assessment, a not definitive wound closure was made by Shoelace technique which helps by releasing pression from the compartments on the immediate postoperative time.

After two days the postsurgical evolution and hourly neurovascular assessment the definitive wound closing was decided. Initially the viability from tissues was checked and found without alterations. The suture used for the Shoelace technique was taken out. Lateral and posterior fascicles of the compartments where repaired from proximal to distal. At last the closure of the fascia was made, however the compressive forces generated by the increased pressure of the compartment and elasticity from the tissue showed friability from the fascia, that was the reason to choose not primary close on the first surgical time, so it was decided to use a 2-0 prolene mesh (Figure B.) which functions like a mechanical contention to avoid prolapse from the previous mentioned compartments. After surgery assessment of the thigh extensor and flexor mechanisms was found without alterations. The only limitation found after surgery was stiffness at maximal flexion of the thigh



(Figure B: Intraoperative image of the second surgical stage. The lateral fascia was closed with a prolene mesh due to lack of complete coverage after fasciotomy.)



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(Figure A. Intraoperative image showing the lateral dermo fasciotomy as well as the application of delayed closure under the Shoe Lace technique )

**DISCUSSION**

Compartmental syndrome's definition is the rising of a muscular compartment's pressure that jeopardizes capillar

perfusion that concludes on cellular necrosis. On current literature there are case reports and small studies that show positive results of patients with thigh compartmental syndrome after conservative and surgical treatment, however the decision making process for the treatment selection remains controversial. Robinson et al made an study with 6 athletes with compartmental syndrome diagnosis in whom conservative treatment was chosen (ice, rest and elevation of the extremity). The patients had strict measurement of intracompartmental pressure with ranges from 66-68 mmHg and 5 weeks later showed completely recovered with return to physical activity. The compartmental syndrome it's confirmed with one of the following criteria: absolute compartmental pressure >30 mmHg or Delta-P value (difference between diastolic arterial pressure and compartmental pressure) of <30 mmHg. Otherwise like diagnostic tools these numbers have been accepted for indication of fasciotomy. However these values haven't been accepted for compartment syndrome in general. Right now there's no consensus of a determined number for thigh pressure to dictate definitive management.

### Conclusion

The compartmental syndrome it's fundamentally clinical, leaving the measures of intracompartmental pressure to few not so clear cases or for patients with neurologic status impairment.<sup>5</sup> Unfortunately by being an uncommon pathology there are no standardized clinical guidelines that establishes definitive treatment for the different scenarios seen on this pathology. Contusions to the quadriceps muscle on high performance contact sports are the most common and can be classified from low to severe grade but rarely compartmental syndrome it's present. It is important to emphasize that the presence of femoral fracture don't exclude the presence of compartmental syndrome and in the absence of fracture the compartmental syndrome is less suspected. That's why physical examination is fundamental for the decision making process. An undiagnosed compartmental syndrome could have severe consequences from ischemic contractures with a extension or flexion lag to amputation, that's the reason why we should be aware of and never underestimate a low grade contusion.

**CONFLICTS OF INTEREST:** No conflicts of interest were found.

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