



## Case report

# Compartment syndrome after tibial plateau fracture<sup>☆</sup>

Guilherme Benjamin Brandão Pitta\*, Thays Fernanda Avelino dos Santos,  
Fernanda Thaysa Avelino dos Santos, Edelson Moreira da Costa Filho

Universidade Estadual de Ciências da Saúde de Alagoas, Maceió, AL, Brazil

### ARTICLE INFO

#### Article history:

Received 6 February 2013

Accepted 9 April 2013

#### Keywords:

Tibial fractures

Bone wires

Fracture fixation internal

#### Palavras-chave:

Fraturas da tibia

Fios ortopédicos

Fixação interna de fraturas

### ABSTRACT

Fractures of the tibial plateau are relatively rare, representing around 1.2% of all fractures. The tibia, due to its subcutaneous location and poor muscle coverage, is exposed and suffers large numbers of traumas, not only fractures, but also crush injuries and severe bruising, among others, which at any given moment, could lead compartment syndrome in the patient. The case is reported of a 58-year-old patient who, following a tibial plateau fracture, presented compartment syndrome of the leg and was submitted to decompressive fasciotomy of the four right compartments. After osteosynthesis with internal fixation of the tibial plateau using an L-plate, the patient again developed compartment syndrome.

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### Síndrome compartimental pós-fratura de platô tibial

#### RESUMO

As fraturas de platô tibial são relativamente raras e representam, aproximadamente, 1,2% de todas as fraturas. A tibia, por sua localização subcutânea e pobre cobertura muscular, está exposta a sofrer grandes quantidades de traumatismos, que não são somente fraturas, mas também lesões por achatamento, contusões severas, entre outras que, em um determinado momento, podem causar no enfermo a síndrome compartimental. É relatado o caso de um paciente de 58 anos que, após fratura de platô tibial, apresentou síndrome compartimental de perna e foi submetido à fasciotomia descompressiva dos quatro compartimentos direitos. Após osteossíntese com fixação interna de platô tibial com placa em L, evoluiu com nova síndrome compartimental.

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<sup>☆</sup> Please cite this article as: Pitta GBB, dos Santos TFA, dos Santos FTA, da Costa Filho EM. Síndrome compartimental pós-fratura de platô tibial. Rev Bras Ortop. 2014;49:86-88.

\* Corresponding author.

E-mail: [guilherme@guilhermepitta.com](mailto:guilherme@guilhermepitta.com) (G.B.B. Pitta).

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<http://dx.doi.org/10.1016/j.rboe.2014.02.002>

## Introduction

Tibial plateau fractures are relatively rare and represent 1.2% of all fractures.<sup>1</sup> The tibia is exposed to a lot of traumas, that can cause compartment syndrome (CS).<sup>2</sup> With a diagnosis of SC, fasciotomy is indicated for the opening of the four compartments.<sup>3</sup>

The aim of this study is to report a case of compartment syndrome after tibial plateau fracture treated with fasciotomy prior to osteosynthesis of tibial metaphysis and which developed into a compartment syndrome postoperatively.

## Case report

Patient, male, 58 years old, fell from height, developed pain in the right lower limb (RLL), associated with swelling and difficult walking. The radiograph of RLL revealed fracture of proximal tibial metaphysis and proximal fibular epiphysis with involvement of the knee joint.

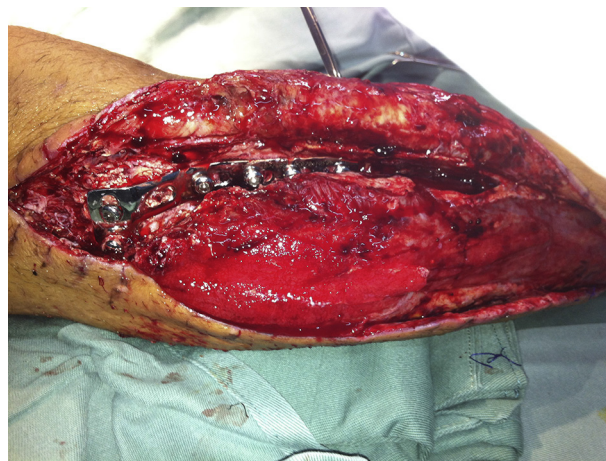
Computed tomography of joints revealed comminuted fractures of the tibial plateau and fibular head. In the biochemical tests, it was found that total CK=637 U/L. As the patient developed progressive and severe pain, paresthesia, paresis, pallor and tense and shiny skin, he was referred to the vascular surgery service, where a Doppler vascular ultrasonography was requested, excluding venous thrombosis. The indication for decompressive fasciotomy was based on the leg nerve paresthesia, associated with the limb volume, when compared to the contralateral limb.

The patient was referred for decompressive fasciotomy of urgency in other surgical service. The surgery was performed under peridural anesthesia and medial and lateral fasciotomies were made, to release the four compartments of the leg. Finally, the surgeon proceeded with haemostasis, partial synthesis of fasciotomy and surgical wound dressing.

In that service, 48h later, the osteosynthesis was performed under spinal anesthesia. Fracture reduction, internal fixation of the tibial plateau fracture in the medial and lateral sides with L-plate and closure of fasciotomy were performed. During the fracture manipulation for its fixation with the L-plate, the right leg developed progressive swelling and pain in a localized compartment, and this complication has made the patient seek our service, when we identified the need to reopen the incision (a new decompressive fasciotomy), being possible to visualize the plate stem (Fig. 1), which had not been previously removed. A wound dressing was made and, after 15 days postoperatively, a free skin graft in the lateral region of the affected leg was applied, with exposition of the plate and of the internal fixator screw (Fig. 2). After six weeks, the lateral stem was retired; then, total closure of the wound was made, with a good progress so far and without associated comorbidities.

## Discussion

Tibial plateau fractures account for 1% of all fractures; in elderly subjects they represent about 8% of their fractures.<sup>4</sup> These lesions are a challenge for surgeons, both for the



**Fig. 1 – Reopening of surgical incision (new decompressive fasciotomy).**

complexity of the bone lesion, as for the associated soft tissue injury.<sup>5</sup>

Important factors for the diagnosis of this lesion are a detailed clinical history and the use of imaging studies.<sup>6</sup> In this case report, the patient first sought another surgical service with pain associated with swelling and difficult walking; a tibial plateau fracture was diagnosed with the aid of radiography and computed tomography.

In several studies of fractures associated with vascular trauma, the likelihood of compartment syndrome (CS) increases; therefore, also increases the possibility of fasciotomies. A study was published exploring the association between the site of trauma penetration to the lower extremity and the need for fasciotomies. Its authors concluded that proximal lesions below the knee confer a substantially increased risk of “compartment” and that the risk increases with an association with a proximal tibial fracture.<sup>7</sup> In our study, we showed radiographically a fracture of proximal tibial metaphysis and of proximal fibular epiphysis with involvement of the knee joint.



**Fig. 2 – Free skin grafting in anterolateral fasciotomy of the right leg with exposure of plate and internal fixation screw.**

CS is defined as the increase in pressure within the compartment enclosed by fascia and which affects the viability of the tissues. Acute CS is a severe condition and occurs as a result of trauma which, in many cases, require decompression fasciotomies to prevent muscle necrosis.<sup>2</sup>

The degree of damage will depend on how fast the pressure rise is established and how long it lasts. The pathogenesis is explained by the high intracompartmental pressure, at levels sufficient to compromise the microcirculation of tissues.<sup>8</sup>

Classically there are six clinical findings in the diagnosis of compartment syndrome: (1) pain in the affected extremity, disproportionate to the injury; (2) pain induced by the stretching of the compartment muscles; (3) paresis of the muscles of the compartment; (4) hypoesthesia or paresthesia in the topography of the nerves that run through the affected segment; (5) hardening or inflammation, or both, of the affected site; and (6) reduced or absent distal pulses.<sup>9</sup> The most important clinical finding is hardening, strain in the affected segment (if accompanied by pain), swelling, decreased sensitivity and difficulty in moving the limb.<sup>10</sup>

In the laboratory workup, an increased creatine kinase (CK) to 1000–5000 U/ml is possible, which demonstrates a myoglobinuria that may suggest the diagnosis.<sup>9</sup> The patient came to our service after fracture manipulation for fixation with L-plate, because the right leg developed swelling and progressive pain in a localized compartment, and a decompressive fasciotomy was indicated, based on leg nerve paresthesia associated with limb volume, when compared to the contralateral limb. Furthermore, a total CK = 637 U/L was obtained, which confirmed the diagnosis.

Absolute indications for surgical treatment are open fractures and fractures associated with CS or vascular injury. In these situations, the treatment should be conducted on an emergency basis. In other cases, the time of surgery is dictated by the general clinical condition of the patient.<sup>6</sup>

## Conclusion

The fracture of the tibial plateau is a major trauma, which may be associated with poor prognosis. Thus, because of the importance of the association between bone fractures and the development of compartment syndrome, the establishment

of the differential diagnosis is essential, based on the early recognition of the signs and symptoms of the syndrome for the institution of an appropriate therapy, which improves the prognosis and decreases the morbidity.

## Conflicts of interest

The authors declare no conflicts of interest.

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