

AVULSION FRACTURE OF THE MEDIAL TIBIAL PLATEAU (REVERSE SEGOND INJURY)

FABIO JANSON ANGELINI¹, EDUARDO ANGELI MALAVOLTA², CAIO OLIVEIRA D'ELIA³,
JOSÉ RICARDO PÉCORÁ⁴, ARNALDO HERNANDEZ⁵, GILBERTO LUIS CAMANHO⁶

SUMMARY

This article reports an injury pattern described only twice in literature, totaling four cases, and referred to as reverse Segond injury for its clinical and radiological findings are precisely opposite to those observed in the classical Segond injury. Similarly to the previously described cases, our case reported avulsion fracture of the medial tibial plateau at the insertion of the deep tibial collateral ligament, associated

to posterior cruciate ligament injury. Similarly to one of the previous cases, anterior cruciate ligament injury was found in our case, although it differs from the previous ones because it does not show medial meniscal injury.

Keywords: *Posterior cruciate ligament; Knee; Fractures; Tibial plateau*

Citation: Angelini FJ, Malavolta EA, D'Elia CO, Pécora JR, Hernandez AJ, Camanho GL. Avulsion fracture of the medial tibial plateau (reverse Segond injury). *Acta Ortop Bras.* [serial on the Internet]. 2007; 15(3): 169-170. Available from URL: <http://www.scielo.br/aob>.

INTRODUCTION

The Segond injury corresponds to a marginal avulsion fracture of lateral tibial plateau, resultant from flexion traumas, stress in varus and internal rotation. The structure responsible for avulsion is the lateral collateral ligament, and anterior cruciate ligament and lateral meniscal injuries are also frequently present⁽¹⁻⁴⁾.

Hall and Hochman⁽⁵⁾ provided the first report of an injury described as "Medial Segond-Type Fracture", where clinical and imaging findings would be opposite to those of the classical Segond injury. They reported an avulsion fracture of the medial tibial plateau, caused by medial collateral ligament insertion (deep portion), combined to posterior cruciate ligament rupture and medial meniscal injury. Escobedo et al.⁽⁶⁾ described three additional cases of this unusual injury, naming it as "Reverse-Segond Fracture", these being the only reports in literature.

In this article, we describe a case similar to the four previously published articles, where an avulsion fracture of the medial plateau was reported caused by deep medial collateral ligament and posterior cruciate ligament injury. This patient presented with concurrent anterior cruciate ligament injury, similarly to one of the cases previously described, and, differently from the others, it didn't show meniscal injury.

CLINICAL CASE

This was a 29 year-old male patient, victim of car trampling, presenting injury on the right knee with supposed mechanism of stress in valgus. Concurrently, he presented with cranial-encephalic trauma.

At clinical examination, distal pulses were present, and no peripheral neurological deficit was found. Ligamentar tests (confirmed by examination under anesthesia) showed gross medial laxity combined to anterior and posterior cruciate ligaments failure.

X-ray at anteroposterior plane of the knee showed marginal fracture of the medial tibial plateau (Figure 1).

The computed tomography image confirmed the finding, not evidencing any other bone injury (Figure 2).

Magnetic resonance showed avulsion fracture of the medial tibial plateau, with avulsed fragment attached to the deep portion of the medial collateral ligament. Full injury of the posterior cruciate ligament and partial injury of the anterior cruciate ligament were also seen. The lateral compartment was unaffected, as well as the medial meniscus.

(Figure 3)

The patient was submitted to reinsertion of the deep portion of the medial collateral ligament with fixation of the avulsed fragment and arthroscopic reconstruction of the posterior

Study developed at the Orthopaedics and Traumatology Institute, FMUSP

Correspondences to: José Ricardo Pécora - Rua Dr. Ovidio Pires de Campos, 333 - 3º Andar - Sala 317-B - E-mail: jpecora@uol.com.br - Phone: 55 11 3069-7812 - Fax: 3069-6888

1) Assistant Doctor, Orthopaedics and Traumatology Institute, HC/ FMUSP

2) Resident Doctor (R3), Orthopaedics and Traumatology Institute, HC/ FMUSP

3) Preceptor, Orthopaedics and Traumatology Institute, HC/ FMUSP

4) Assistant Doctor and Head of the Knee Group, Orthopaedics and Traumatology Institute, HC/ FMUSP

5) Associate Professor, Medical College, USP

6) Full Professor, Medical College, USP

Received in: 06/06/06, approved in: 04/29/07

cruciate ligament. The anterior cruciate ligament injury was not addressed in this first treatment phase. When the finding at magnetic resonance was confirmed, no meniscal injuries were seen at joint inspection. (Figure 4)

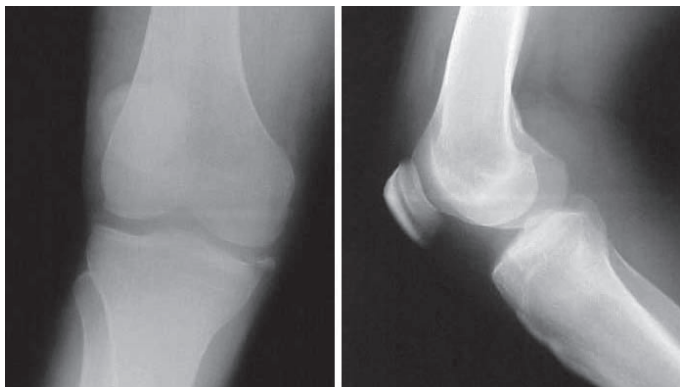


Figure 1 - Preoperative X-ray Images

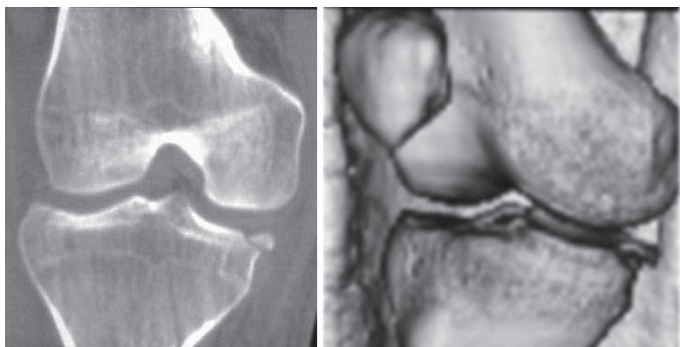


Figure 2 - Tomography: coronal plane and three-dimensional reconstruction

DISCUSSION

The avulsion fracture of the medial tibial plateau is a rare injury, with only four cases being found in literature previously described as two case reports. In addition, as suggested by Hall, this injury may be underestimated or underdiagnosed because associated injuries usually receive more attention. The presumed mechanism of trauma, in agreement with previous publications^(5,6), was the stress in valgus associated to external rotation (opposite mechanism to the classic Segond injury). The occurrence of concurrent involvement of the anterior cruciate ligament in this case, as well as in

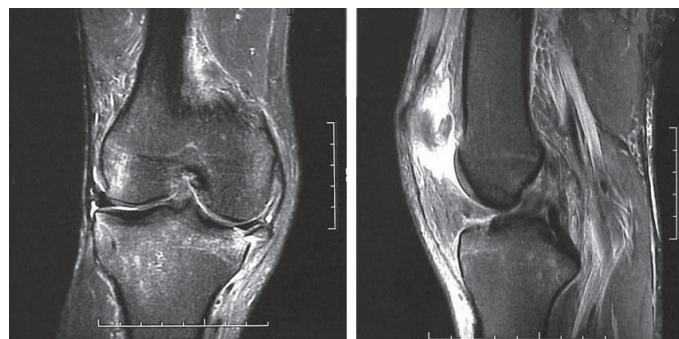


Figure 3 - Magnetic resonance

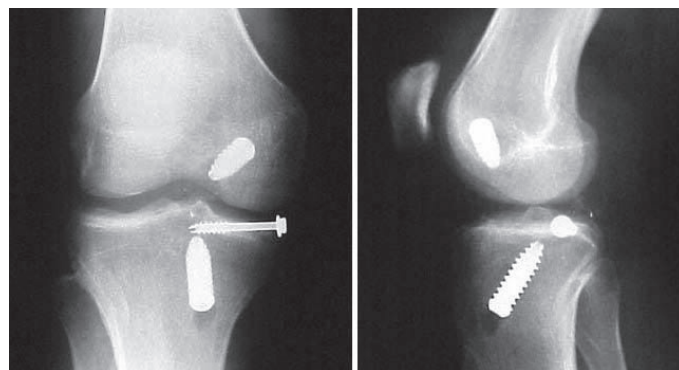


Figure 4 - Postoperative X-Ray Images

one of the cases described by Escobedo et al.⁽⁶⁾, suggests associated mechanisms, which are common in high energy traumas. Similarly to three of the four previous cases, trauma occurred as a result of car trampling.

The presence of a small marginal bone fragment at the medial tibial plateau represents an avulsion fracture by deep medial collateral ligament, which should call orthopaedic doctors' and radiologists' attention to the presence of other associated injuries; in all five cases reported so far, posterior cruciate ligament and medial meniscal injuries occurred, and, in two (including the present case), an associated injury of the anterior cruciate ligament was found. This is critical for addressing the case, since isolated injuries of the medial collateral ligament should be preferably conservatively treated; however, when associated to other ligament injuries, surgical treatment may be employed^(7,8). Furthermore, collateral ligaments injuries associated to central pivot injury may imply on a dislocated or displaceable knee, considerably increasing the risks of nervous or vascular complications⁽⁹⁾.

REFERENCES

- 1- Dietz G, Wilcox D, Montgomery J. Segond tibial condyle fracture: lateral capsular ligament avulsion. *Radiology*. 1986; 159:467-9.
- 2- Woods G, Stanley R, Tullos H. Lateral capsular sign: x-ray clue to a significant knee instability. *Am J Sports Med*. 1979; 7:27-33.
- 3- Goldman A, Pavlov H, Rubenstein D. The Segond fracture of the proximal tibia: a small avulsion that reflects major ligamentous damage. *AJR Am J Roentgenol*. 1988; 151:1163 -7.
- 4- Weber WN, Neumann CH, Barakos JA, Peterson AS, Steinbach LS, Genant HK. Lateral tibial rim (Segond) fractures: MR imaging characteristics. *Radiology*. 1991; 180:731-4.
- 5- Hall F, Hochman M. Medial Segond-type fracture: cortical avulsion off the medial tibial plateau associated with tears of the posterior cruciate ligament and medial meniscus. *Skeletal Radiol*. 1997; 26:553 -5.
- 6- Escobedo EM, Mills WJ, Hunter JC The "reverse Segond" fracture: association with a tear of the posterior cruciate ligament and medial meniscus. *AJR Am J Roentgenol*. 2002; 178:979-83.
- 7- Frolke J, Oskam J, Vierhout P. Primary reconstruction of the medial collateral ligament in combined injury of the medial collateral and anterior cruciate ligaments: short-term results. *Knee Surg Sports Traumatol Arthrosc*. 1998; 6:103 -6.
- 8- Ballmer P, Ballmer F, Jakob R. Reconstruction of the anterior cruciate ligament alone in the treatment of combined instability with complete rupture of the medial collateral ligament: a prospective study. *Arch Orthop Trauma Surg*. 1991; 110:139-41.
- 9- Twaddle B, Hunter J, Chapman J, Simonian P, Escobedo E. MRI in acute knee dislocation: a prospective study of clinical, MRI, and surgical findings. *J Bone Joint Surg Br*. 1996; 78:573 -9.