



Case Report

Tibial tubercle fracture associated with distal rupture of the patellar tendon: case report[☆]



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ARTICLE INFO

Article history:

Received 12 February 2017

Accepted 11 April 2017

Available online 11 June 2018

Keywords:

Avulsion fractures

Tibial tubercle

Rupture

Patellar tendon

Palavras-chave:

Fraturas avulsão

Fraturas da tibia

Ruptura

Tendão patelar

ABSTRACT

Avulsion of the tibial tubercle is an uncommon injury that occurs in the young athlete, resulting from an eccentric contraction of the extensor mechanism with the leg fixed to the ground. Concomitant injuries to the patellar tendon are very rare, with few cases reported in the literature. The authors present a case of a 15-year-old basketball player who suffered an avulsion of the tibial tubercle associated with complete distal rupture of the patellar tendon while training. It was treated with open reduction of the tibial fragment and reconstruction of the patellar tendon with mini-anchors and cannulated screws, as well as hamstring autograft tendon reinforcement. The patient showed excellent results and returned to sports after 12 months of follow-up.

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Fratura da tuberosidade anterior da tibia associada à ruptura distal do tendão patelar: relato de caso

RESUMO

A fratura-avulsão da tuberosidade anterior da tibia é uma lesão incomum que ocorre no jovem atleta, resultado de uma contração excêntrica do mecanismo extensor do joelho com o membro inferior fixo ao solo. Lesões concomitantes ao tendão patelar são muito raras, com poucos casos relatados na literatura. Os autores apresentam o caso de um atleta de basquete de 15 anos que sofreu uma fratura-avulsão da tuberosidade anterior da tibia associada à ruptura completa distal do tendão patelar durante movimento de arremesso no treino esportivo. O paciente foi tratado com redução aberta da fratura e reparo do tendão patelar com miniâncoras e parafuso poste com reforço tendinoso

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<https://doi.org/10.1016/j.rboe.2018.05.009>

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com enxerto autólogo de semitendíneo. O paciente apresentou ótimos resultados e retornou ao esporte após 12 meses de acompanhamento.

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Introduction

Avulsion fracture of the anterior tibial tuberosity is a rare injury in young athletes, accounting for less than 1% of all physeal injuries.¹ The fracture mechanism is an eccentric contraction of the quadriceps at the beginning of a jump or during landing.¹ The association with complete distal rupture of the patellar tendon is even rarer, with few cases reported in the literature and no known estimated incidence.

This injury, first classified by Ogden et al., was modified by Frankl et al.² in 1990 to include associated rupture of the patellar tendon. The management of this injury is typically surgical, and a high incidence of preoperative suspicion is necessary to identify the associated rupture of the patellar tendon. The authors present a rare case of anterior tibial tuberosity fracture with distal avulsion of the patellar tendon that occurred in a 15-year-old basketball player, who was surgically treated and presented good postoperative evolution.

Case report

A 15-year-old basketball player presented a left knee injury after a jump while pitching during basketball practice. He complained of severe pain and the impossibility of weight-bearing immediately after the trauma. During the initial evaluation, he presented massive hemarthrosis, a flexion attitude, and inability to actively extend the knee. The initial radiographs indicated a fracture-avulsion of the anterior tibial tuberosity and patella alta (Fig. 1). Magnetic resonance imaging showed a complete distal rupture of the patellar tendon associated with the fracture (Fig. 2).

The patient was admitted to hospital and underwent open reduction and internal fixation of the fracture, and repair of the tendon injury. An anterior longitudinal incision was chosen; the anatomical reduction was secured with two cannulated screws (4.5 mm, Synthes®; Fig. 3A). The patellar tendon then underwent repair + grafting with a semitendinosus graft and fixation with two mini-anchors (5 mm, Metabio®) and a distal pole screw (4.5 mm, Synthes®; Fig. 3B).

Due to the patient's physical size and his high functional demand, the graft was reinforced with autologous semitendinous graft (Kelikian et al.³ technique). After surgery, the knee was immobilized with a brace in extension; the patient was discharged the following day. He was encouraged to perform passive assisted movements until 60 degrees of flexion and kept on crutches for partial weight support. The brace was removed after six weeks; physical therapy was then initiated for strength gain. Total weight-bearing was authorized as tolerated. After 14 weeks, full mobility and radiographic consolidation were observed. Strengthening exercises, through



Fig. 1 – Lateral view radiographs of the knee indicating anterior tibial tuberosity fracture and patella alta.

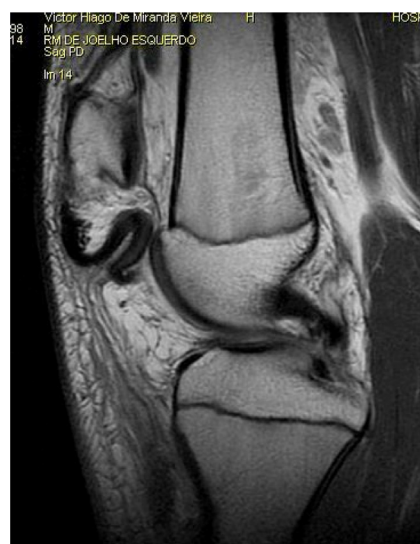


Fig. 2 – Magnetic resonance imaging demonstrating total patellar tendon rupture.

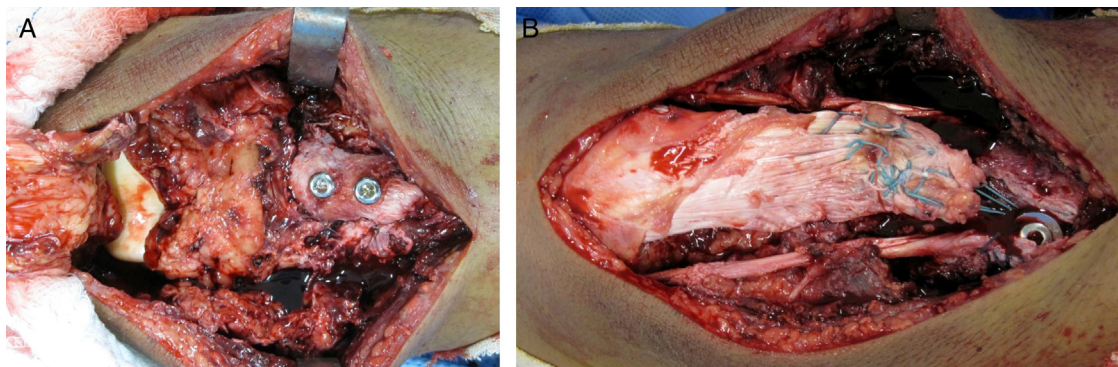


Fig. 3 – Anterior longitudinal incision, fixation of the tibial tuberosity fracture with two cannulated screws, and repair of the patellar ligament + fixation with pole screw.

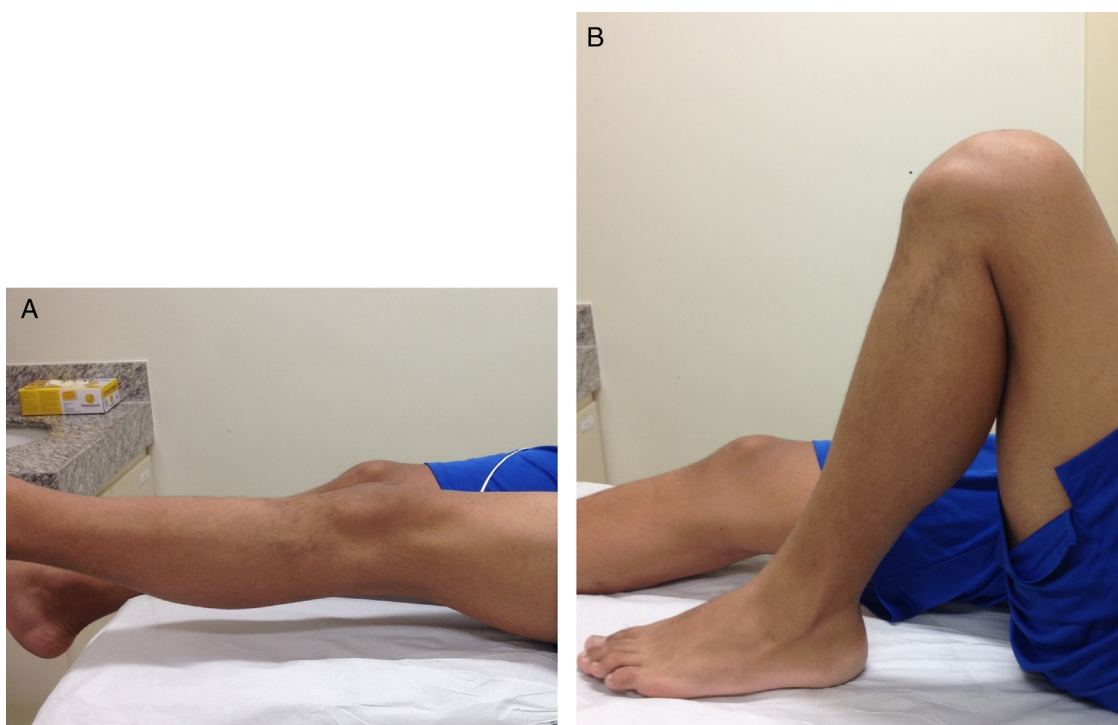


Fig. 4 – Clinical aspect of the knee, 12 weeks postoperatively.

eccentric activities, were initiated after six weeks. Plyometric activities were started six months postoperatively. At 12 months of follow-up, the patient presented mild residual quadriceps hypotrophy (1+ out of 5), complete range of motion, and no residual edema (Fig. 4A and B). He was authorized to return to his sports activity.

Discussion

Avulsion fractures of the anterior tibial tuberosity are well-described injuries that are usually observed in adolescents practicing sports involving jumping or direct contact.¹ Associated patellar tendon rupture is a rare event; it was first described in 1982 by Mayba et al.⁴ in a 15-year-old long jump athlete.

Anterior tibial tuberosity fracture can be described using the Watson-Jones classification, modified by Ogden, which takes into account anatomy, deviation, and fragmentation. Frankl et al.² later modified this classification, adding subtype C for avulsions of the anterior tibial tuberosity associated with patellar tendon avulsion. The patient described in the present case was classified as type IIC.

The mechanism of injury was a vigorous eccentric contraction of the extensor mechanism with the knee fixed in flexion when the athlete jumped to pitch the ball. Kaneko et al.⁵ indicate that an eccentric contraction of the quadriceps would initially result in avulsion of the anterior tibial tuberosity, which intensifies to the point of rupture of the patellar tendon. The fracture is easily diagnosed using knee radiographs, but the associated tendon injury is difficult to diagnose. The fact that patellar height was considerably

increased on radiographs when compared with the fractured fragment increased suspicion.⁶ Magnetic resonance imaging was shown to be very effective in indicating this association. This combination of lesions favors the choice of open surgery for anatomical reduction of the tuberosity fragment with direct visualization of the patellar tendon.⁷ The bone fragment can be secured with screws or Kirschner wires. For the patellar tendon, transosseous suture, stapling, suture with anchors, and reinforcement with semitendinous graft can be performed.⁸ Seo et al.⁹ reported that this same treatment was used successfully in a 14-year-old patient. The present results were similar to those of previously published studies⁹⁻¹¹ on this injury; 12 months after the injury, the patient was able to return to the sports activities without subjective symptoms or weakness of the extensor mechanism.

Conclusion

Avulsion fracture of the anterior tibial tuberosity associated with distal rupture of the patellar tendon is a rare and challenging presentation its incidence is little known; early diagnosis and adequate surgical treatment presented good results.

Conflicts of interest

The authors declare no conflicts of interest.

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