

**AVULSION FRACTURE OF THE TIBIAL TUBERCLE IN AN ATHLETIC ADOLESCENT.
A CASE REPORT AND REVIEW OF THE LITERATURE.**

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Summary

The avulsion fractures of the tibial tubercle are not common. This is a case report of a 15 years old athletic ad boy. The diagnosis was suspected in front of the circumstances of the trauma (during 100m race training) and clinical findings (swelling, hematoma and impotence of the involved knee). Plain radiographs were essential to precise the type of avulsion fracture and to determine the adequate treatment. The early open reduction and internal fixation we adopted in this case gave us a satisfactory result.

Keywords: *Avulsion, tibial tubercle, diagnosis, treatment*

Résumé

Les fractures de la tubérosité tibiale antérieure ne sont pas très fréquentes. Cet article rapporte le cas survenu chez un adolescent de 15 ans. Le diagnostic a été évoqué devant les circonstances du traumatisme (pendant une course de 100m) et des manifestations cliniques typiques (tuméfaction, hématome et impotence fonctionnelle du genou incriminé). Les radiographies standard ont été essentielles pour préciser le type de fracture et déterminer le traitement adéquat. Le traitement chirurgical retenu a donné un résultat satisfaisant.

Mots clés : *Fracture, tubérosité tibiale, diagnostic, traitement.*

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INTRODUCTION :

The avulsion fractures of the tibial tubercle, described for the first time at the years 1950s [1, 2], are uncommon lesions. They represent 0,4% to 2,7% of all epyphyseal injuries and 3% of all proximal fractures of the tibia according to various authors [3, 4, 5, 6, 7, 8]

. They occur usually among male adolescents who practice sports related to sudden and violent contraction exerted by the quadriceps muscle at the tibial tuberosity when the knee is flexed: basket ball, soccer, jumping. The aim of this study is to report the first case diagnosed and treated successfully since these last 5 years in Douala General Hospital in Cameroon, in the light of the review of the literature.

CLINICAL HISTORY :

He was a young athletic male adolescent of 15 years old brought at the emergency service. He fell down during 100 m race training, before the arrival line. No history of Osgood-Schlatter disease is pointed out. In the clinical examination of the involved left knee there was tenderness, a local swelling and inability to extend his knee. There were no associated lesions. The standard X-rays showed an avulsion fracture type IIA according to Ogden or Watson-Jones classification: avulsion fracture of the tibial tubercle with an upward angulation of the fragment without comminution (Fig.1).



Fig1. *15 years athletic boy: Ogden type II A avulsion fracture of the tibia tubercle*

This patient was operated under general anaesthesia. We realised, by a vertical midline approach, an open anatomic reduction and internal fixation with a 3.5mm cortical screw with a washer (Fig.2).

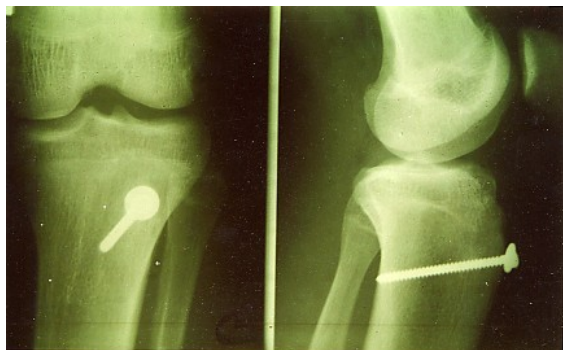


Fig2: Radiological aspect after open reduction and internal fixation (ORIF).

The suture of the expanded avulsion of the periosteum of the tuberosity was made by transosseous resorbable sutures. The knee was then immobilized postoperatively in full extension by a long cylinder leg cast for 6 weeks. After removal of the cast the boy began graded mobilisation of the knee in flexion and extension. The result was good one year after the surgery (Fig.3): no growth complications and complete recovery of range of motion and return to sports activities.

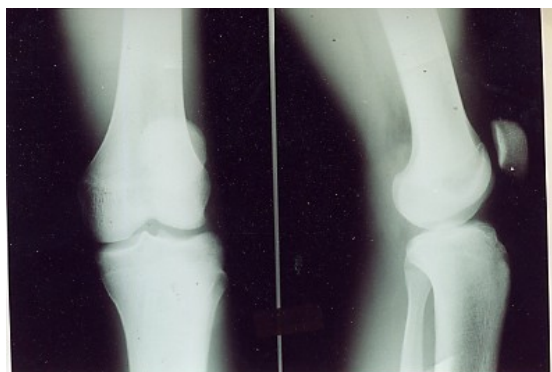


Fig3.: Latest radiological aspect (Day 462)

DISCUSSION :

The infrequency of the avulsion fractures of the tibial tuberosity is demonstrated by small published series and his rarity in female adolescent is underlined by most authors: only 7 girls for 106 cases (less than 8%): ([3, 9], [10, 11, 12] and [13]). It is now admitted that the avulsion fractures of the tibial tuberosity is due to sudden contraction of the quadriceps muscle which pulls on the flexed knee. That is why this injury affects adolescents who practice jumping sports. Usually it occurs at the

approach of physiological closure of the growth plate. It is believed that at this stage there are histological changes that undergo the physis from fibrocartilage (which is normally resistant) to hypotrophic striated cartilage (which is weaker). This phenomenon predisposes the tibial tubercle to avulsion fracture ([3, 14, 15]). A certain number of authors reported close link between avulsion fracture of the tibial tuberosity and Osgood-Schlatter disease (apophysitis of the tibial tubercle) in an incidence from 12% to 60% in the literature [3, 16, 17, 18]. The pathophysiological mechanism put forward are the concept of micro avulsions at the ossification centre, weakness of the point of attachment of the patellar tendon. In our case there was no history of Osgood-Schlatter disease. The clinical findings (swelling or haematoma of the anterior part of the proximal tibia, inability to stand or to extend the knee) reinforce the circumstances of occurrence of the injury. Some associated lesions are reported: medial or lateral ligament or anterior cruciate ligament deficiency [19, 20]; medial or lateral meniscus tear [19, 9, 21, 10, 14]; rare proximal tibia or fibular fracture and particularly the compartment syndrome [9]. That is why these authors recommended early open reduction in order to evacuate the haematoma of the proximal tibia and prevent this redoubtable complication. We did not observe any associated lesion.

The radiological examination (anterior-posterior and particularly lateral views) is essential to diagnose and classify the avulsion fracture of the tibial tubercle. Frankl et al [22] advocated dynamic x-rays at flexion and extension to confirm suspected displaced avulsion fracture of the patellar tendon with small osseous fragments. Rosenberg [23] and Bates [24] recommended the use of the new radiological techniques (scintigraphy, computered tomography and magnetic resonance imaging) to make the delicate follow up of Osgood-Schlatter syndrome before and after treatment and diagnosis of partial sleeve fracture of the patellar tendon respectively.

Nevertheless, in our conditions of practice in Africa where these sophisticated means are not always available nor available everywhere, the plain radiographs were enough to diagnose and classify this case as Ogden IIA a fracture.

The Ogden type III is known to be the most reported lesion (avulsion fracture with propagation of the fracture-line into the knee joint): [25, 9, 10]. Most authors have adopted the surgical treatment with an essential golden goal: early anatomical reduction and internal fixation to prevent complications. We used the median vertical approach. We noticed the disproportion between radiological size of the fragment and the preoperative finding of the real size. Schiedts [12]

and other authors prefer the protection of the fixation by a wire band to allow early motion of the knee between 0° to 60°. We have opted for the cylinder cast on extended knee to avoid 2 more operations to remove the wire band and the screw. Some complications have been reported in relatively large series:

- decreased range of motion of the knee [25, 21, 14];
- disgraceful prominent tibial tubercle [17, 10];
- disturbance of growth like limb length discrepancy or genu recurvatum [18, 21, 1] ;
- 1 re current fracture of the tibial tuberosity due to early return to activities within 4 weeks [21] ;
- severe quadriceps atrophy [5] .

At the most recent follow up, our adolescent presented no complications and he has recovered a full range of motion and has returned to sports activities.

CONCLUSION :

The avulsion fracture of the tibial tuberosity is a rare injury occurring usually in a male athletic adolescent. Our paper confirm one more time that early open reduction and internal fixation can prevent complications and provide satisfactory result.

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