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Avulsion fracture of the anterior tibial tuberosity. About a case and review of the literature

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Abstract
Avulsion of anterior tibial avulsion are rare lesions. It occurs in adolescence during sport exercises. Ogden classification is most used to describe these fractures. there management is surgical once they are replaced. We reported a case of 15-year-old who presented an avulsion of tibial tuberosity. We discuss the mechanism and the management.

Keywords: Anterior tibia tuberosity, Avulsion, chirurgical treatment, screwing

Introduction
Avulsion fractures of the anterior tuberosity of the tibia are rare injuries. They represent 0.4 to 2.7% of fractures in children and less than 1% of fractures of the proximal end of the tibia [1]. They generally occur in adolescent athletes with a male predominance. Two main mechanisms have been described in their occurrence [2].
Several classifications have been developed to explain the physiopathological bases of this lesion and their therapeutic implication. The support depends on the displacement and the size of the fragment [3].
We report the case of a 15-year-old patient who presented an avulsion fracture of the left anterior tibial tuberosity during a playing accident. The mechanism of occurrence and the therapeutic modalities will be discussed in this report.
Observation
It was a 15-year-old boy, a student, brought for consultation by his parents for pain and relative functional impotence of the left pelvic limb following a fall during football. He felt a sharp pain in his left knee when he wanted to kick the ball. This pain forced him to stop playing.
He was taken to the emergency room by his parents 24 hours after the trauma
On examination, there was swelling of the left knee, exquisite pain on palpation of the knee below the joint line. Patellar shock was present, and it was impossible for the patient to lift the heel off the bed. An X-ray of the knee was requested and showed a fracture of the anterior tibial tuberosity [figure 1].
We therefore concluded that it was a closed avulsion fracture of the anterior tibial tuberosity which we classified as Ogden type IIB. A surgical indication was made, and the patient was operated on the eighth day post-injury. Using a midline anterior approach to the knee, we exposed the fracture. We evacuated of the hematoma and noted an incarceration of the periosteum in the fracture site. After extrication, we proceeded to reduce the fracture, provide temporary stabilization with a hook and fix it threes screws. The anterior and posterior cruciate ligaments as well as collateral ligaments were tested and were intact. Post-operatively, a knee brace was put for 4 weeks and a control x-ray was satisfactory [figure 2]. Rehabilitation was started after 4 weeks.
The patient was seen for follow-up every 3 months. At the last check-up at 12 months post-operatively, walking was normal without lameness, the quadriceps was of identical tone compared to the contralateral side. Knee flexion was 140° and extension was 0° [figure 3]. The control X-ray carried out showed consolidation of the fracture [figure 4]. The patient was therefore encouraged to return to his usual level of play.

Discussion

Avulsion fractures of the anterior tibial tuberosity are rare. Two mechanisms of occurrence are described: a strong contraction of the quadriceps during knee extension during a jump and rapid passive flexion of the knee on contracted quadriceps [4]. Osgood-Schlatter disease has been reported as a factor favoring the occurrence of these lesions in 23% of cases [5]. In our patient, the hypothesis of the first mechanism would be the most plausible.

Radiography is generally enough to make the diagnosis. CT scanning is requested in case of diagnostic doubt. She confirms the diagnosis and assesses the size of the avulsed fragment [6].

Injuries to the central pivot (cruciate ligaments and menisci) and collateral ligaments can be associated. Magnetic imaging helped to diagnose these lesions before surgical intervention [7]. In our patient, we limited our explorations to radiography for financial reasons. Avulsion fractures present an anatomo-pathological diversity which explains the multitude of classifications proposed by different authors.

The first classification was introduced by Watson-Jones in 1955 where he distinguished 3 types ranging from an avulsion without damage to the proximal epiphysis in type I, to an avulsion with extension to the proximal epiphysis in type III [8]. This classification was modified in 1980 by Ogden *et al* who subdivided each type into subtypes A and B by introducing the displacement and communion of the avulsed fragment. In 1985, Ryu *et al* added a type IV corresponding to a posterior extension of the fracture line through the physis [3, 9]. In 2003, McKoy associated a type V. This latter type associates type III of the Ogden classification with type IV of the Salter-Harris classification producing the Y invoice.

The aim of the treatment is to restore knee extension. Several therapeutic methods are proposed through the literature.

Orthopedic treatment is indicated for lesions whose displacement is less than 2 mm, therefore Ogden types I and IIA. It consists of immobilization with a cruropedial cast or a knee brace for 8 to 12 weeks.

Surgical treatment is reserved for displaced lesions [10, 11]. Fixing is ensured by screwing, guying or strapping. This fixation should allow early rehabilitation, but most authors suggest additional immobilization lasting four to six weeks [12].

Minor complications are described, as compartment syndrome, after lesions of the collateral branches of the popliteal artery. Studies by Frey *et al*, and Palokoff *et al* reported 17–20% in their study [13, 14]. It is therefore recommended to systematically look for the related signs in the face of any avulsion of the tibial tuberosity.

The results are satisfactory with surgical treatment. Most patients return to their previous physical activities after 12 to 18 months [15].

Conclusion

Avulsion fractures of the anterior tuberosity are rare injuries. The adolescent male is most affected. The Ogden classification allowed to determine the stage of severity and provides therapeutic guidelines. The results are satisfied with a well-conducted surgical treatment and the adolescent returns to his previous level of physical activity.

Fig 1: Knee Rx showing avulsion fracture of tibial anterior tuberosity

Fig 2: immediate post-operative Rx;

Fig 3: picture showing Knee flexion and extension

Fig 3: Knee Rx at 12 month post-operative

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