

Periosteal Incarceration in the Growth Plate: A Rare Association in Epiphyseal Detachment Fractures.

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ABSTRACT

Growth cartilage is a pivotal area between the epiphysis and the metaphysis, with relative fragility. She was incarcerated for soft tissue during a Salter-Harris type I epiphysic detachment in a 13-year-old girl. Such a lesion can be easily obscured with irreversible after-effects.

Very few cases of incarceration of soft tissue in growth cartilage, have been described in the literature. We present in this study, a case of tissue incarceration in growth cartilage discovered incidentally during the realization magnetic resonance imaging with study of the literature review.

KEYWORDS: Growth cartilage, soft tissue, child.

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INTRODUCTION

Orthopaedic surgeons must be vigilant to epiphyseal detachments and aware of their potential consequences. The Salter and Harris classification is currently the most widely used in the literature for epiphyseal detachments [1].

It is important to recognize the complexity of the chondroepiphyseal structure, which is composed of epiphysis, growth plate and perichondral sheath [2]. While most epiphyseal detachment fractures may be obvious on plain radiography, those of the knee, and in particular the distal femur, may be very subtle or even radiographically obscured. Magnetic resonance imaging is often performed in children with severe joint injuries to assess the status of ligaments, menisci, and articular cartilage. In some cases, there may be unsuspected fractures involving the physeal, usually Salter-Harris type 1 fractures without displacement. We present the case of a 13-year-old girl who presented a Salter-Harris type 1 distal femoral epiphyseal displacement fracture associated with periosteal incarceration in the growth plate.

PATIENT AND OBSERVATION

This is about a 13-year-old girl with no prior medical history who presented with pain and functional impotence of the left pelvic limb following a closed left knee trauma from a motor vehicle accident. Initial radio-clinical evaluation

concluded a Salter-Harris type 1 epiphyseal detachment fracture of the left distal femur (Figure 1). Treatment

Consisted of immobilization in a Zimmer splint for 3 weeks. The patient was seen 3 weeks later with persistent symptoms of lameness on walking, passive and active mobilization of the left knee was painful. It was decided to perform an MRI, which revealed soft tissue incarceration in the growth plate of the left distal femur (Figure 2).

The surgical indication was given to remove the soft tissue in order to obtain an anatomical reduction and avoid epiphysiodesis. Intraoperatively, through a medial approach, incarceration of the periosteum in the growth plate was demonstrated. The periosteum is dislodged from the growth plate (Figure 3). Postoperatively, immobilization of the knee with a splint in extension for 3 weeks was prescribed. The patient was reviewed 6 weeks after surgery without any complaints and with full resumption of sports activities.

DISCUSSION

The growth plate is a hinge zone located between the epiphysis and the metaphysis, with a relative fragility [3]. Therefore, an epiphyseal detachment fracture [4] can be detrimental to the functional prognosis of the pelvic limb in children. Epidemiological data shows that 15-30% of all osteoarticular injuries in children involve the epiphyseal region. Approximately 80% of these epiphyseal injuries

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occur between the ages of 10 and 16 years, with a peak age for epiphyseal detachments between the 12th and 13th year of life [5]. 1% of epiphyseal detachment fractures occur in the distal femur [6]. This is important as the complication rate for distal femur fractures is reported to be 50% in some series with epiphysiodesis as a high risk complication. There are many reasons for the high rate of epiphysiodesis in Salter and Harris [7] epiphyseal detachment femur fractures, such as: the high energy absorbed by the bone during trauma (which may impair epiphyseal and germinal zone blood flow), the undulating configuration of the distal femoral growth plate, resulting in more reserve cell shear injuries, the fact that many of these traumas occur in late-growth adolescents, the degree of fracture displacement, and the additional harm caused by the surgical procedure. Recently, periosteal incarceration in the growth plate has been considered by some as a predisposing cause of epiphysiodesis [8].

Knee radiographs are usually the first-line paraclinical examination following trauma to the distal femur. In our clinical case, the epiphyseal detachment fracture of the Salter-Harris type 1 femur was radiographically evident (Figure 1). However, neither the clinic nor the radiograph could lead to the suspicion of an associated lesion. MRI was extremely helpful in demonstrating this associated lesion of periosteal incarceration in the growth plate. Magnetic resonance imaging provides excellent visualization of the growth plate and plays an important role in the evaluation of associated lesions in epiphyseal detachments [9]. In a large series of 315 children with knee trauma, 9 patients (2.9%) had an epiphyseal detachment fracture, with Salter Harris type 2 lesion being the most common [9]. Of these 9 children, 6 had an associated lesion. In Salter-Harris type 1 epiphyseal detachment fractures, there is complete epiphyseal separation without adjacent bone fracture [10]. To our knowledge, the first case of periosteal incarceration in the growth plate involving the distal femur was reported in 2011 [8]. In that publication, the authors reported two cases. In 2015, another case had been published [11]. All three cases were Salter-Harris type 2 epiphyseal detachment fractures. The originality of the present case is that it differs from the others by its Salter-Harris type 1 associated with an incarceration of the periosteum in the growth plate. This is a rare occurrence that requires suspicion of any epiphyseal detachment. Incarceration of the periosteum in the growth plate requires surgical intervention in most cases, as it can be a cause of epiphysiodesis. In the case presented, surgery could have been discussed because the girl was 13 years old, thus almost at the end of her growth. The risk of epiphysiodesis was therefore low.

CONCLUSION

This very rare case illustrates a periosteal incarceration in the growth plate associated with an epiphyseal detachment of the left distal femur, Salter and Harris type I. It requires

all practitioners to be suspicious when confronted to any epiphyseal detachment fracture.

FIGURES

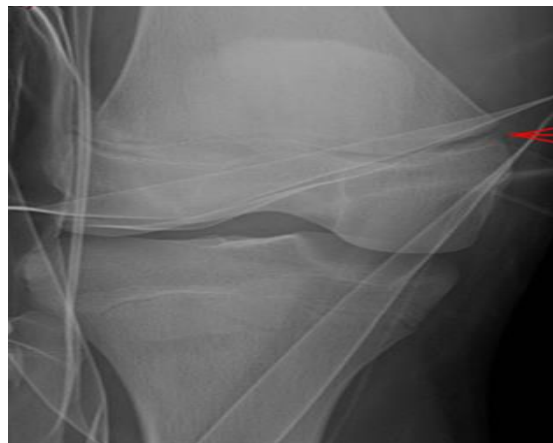


Figure 1: Salter and Harris type I epiphyseal detachment fracture



Figure 2: Incarceration of soft tissue in the growth plate seen on MRI



Figure 3: Periosteal incision in the growth plate seen intraoperatively

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