



ELSEVIER



## Case Report

# Avulsion fracture of the iliac crest in a child<sup>☆,☆☆</sup>

Rafael Borghi Mortati\*, Lucas Borghi Mortati, Matheus Silva Teixeira, Marcelo Itiro Takano, Richard Armelin Borger

Orthopedics and Traumatology Service, Hospital do Servidor Público Estadual de São Paulo, São Paulo, SP, Brazil

### ARTICLE INFO

#### Article history:

Received 6 May 2013

Accepted 7 June 2013

Available online 27 March 2014

#### Keywords:

Epiphysis/physiopathology

Epiphysis/lesions

Cartilage fractures

Ilium

#### Palavras-chave:

Epífises/fisiopatologia

Epífises/lesões

Fraturas de cartilagem

Ílio

### ABSTRACT

Avulsion fractures of the apophysis of the iliac crest have rare incidence and are little known. In this article, we report the case of an 11-year-old female patient who presented this injury after indirect trauma. From careful radiographic analysis, an avulsion fracture of the iliac crest was identified. It was decided to use nonsurgical treatment comprising analgesia and load restriction. This case report emphasizes the importance of suspecting avulsion fractures in cases of low-energy trauma, and also guides the treatment, so as to prevent functional deficit and deformities.

© 2014 Sociedade Brasileira de Ortopedia e Traumatologia. Published by Elsevier Editora Ltda. All rights reserved.

### Fratura avulsão da crista ilíaca em criança

### RESUMO

A fratura avulsão da apófise da crista ilíaca apresenta incidência rara e pouco conhecida. Neste artigo relatamos caso de paciente do sexo feminino, de 11 anos, que apresentou essa lesão após trauma indireto. Após uma análise cuidadosa da radiografia, foi identificada fratura avulsão da crista ilíaca e optou-se pelo tratamento não cirúrgico com analgesia e restrição de carga. O relato do caso salienta a importância da suspeição da fratura avulsão em traumas de baixa energia, além de orientar o tratamento e prevenir déficit funcional e deformidades.

© 2014 Sociedade Brasileira de Ortopedia e Traumatologia. Publicado por Elsevier Editora Ltda. Todos os direitos reservados.

## Introduction

Avulsion fractures of the apophyses of the pelvis are rare injuries and little is known about their incidence.<sup>1</sup> The

commonest such fractures are in the ischium and the anterior, superior and inferior iliac spines. Avulsion of the apophysis of the iliac crest is rarer.<sup>2–5</sup> It occurs mainly in patients between the ages of 8 and 14 years, given that this apophysis becomes fused between the ages of 15 and 17 years. Nonetheless, it

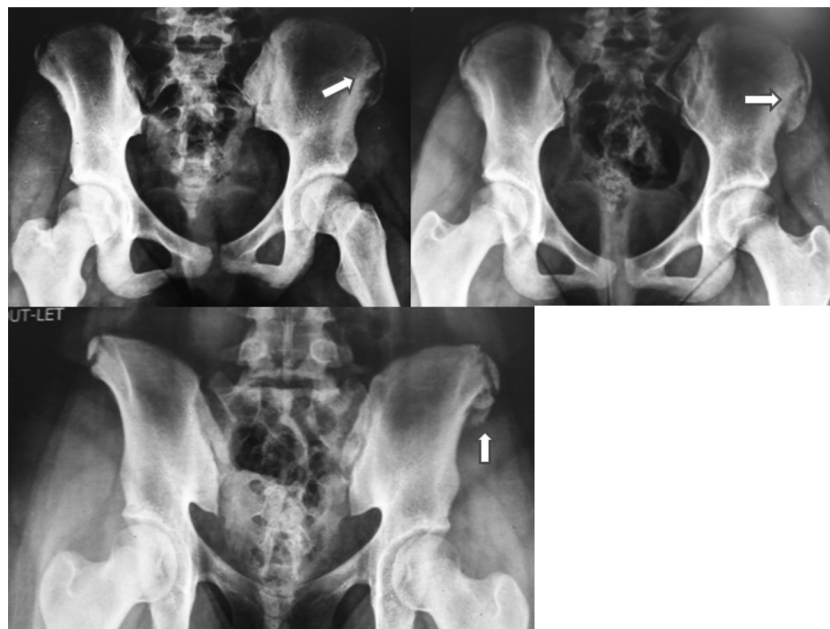
<sup>☆</sup> Please cite this article as: Mortati RB, Borghi Mortati L, Silva Teixeira M, Itiro Takano M, Armelin Borger R. Fratura avulsão da crista ilíaca em criança. Rev Bras Ortop. 2014;49:309–312.

<sup>☆☆</sup> Work performed at Hospital do Servidor Público Estadual de São Paulo Francisco Morato de Oliveira, São Paulo, SP, Brazil.

\* Corresponding author.

E-mail: rafaelmortati@yahoo.com.br (R.B. Mortati).

2255-4971/\$ – see front matter © 2014 Sociedade Brasileira de Ortopedia e Traumatologia. Published by Elsevier Editora Ltda. All rights reserved. <http://dx.doi.org/10.1016/j.rboe.2014.03.010>



**Fig. 1 – Radiography of the pelvis showing avulsion fracture of the left iliac crest (see white arrow).**

can also occur in adults.<sup>6-8</sup> It generally results from indirect trauma caused by traction of the musculature inserted in this region (external and internal oblique muscles and the transverse muscle of the abdomen).<sup>8-10</sup> It is a diagnosis that is clinically difficult to suspect, since these are low-energy injuries that are rarely caused by direct trauma. Conservative treatment using conventional analgesics and restriction of weight-bearing is generally chosen. According to the degree of displacement (>3 cm), surgical treatment may be chosen, which prevents functional deficits and deformities.<sup>9-11</sup>

### Case report

The patient was an 11-year-old female who was attended at the emergency service of Hospital do Servidor Público Estadual de São de Paulo. She reported having severe pain in the topographical area of the left iliac crest, which had started suddenly while running in a physical education class, at a moment when she made a rotating movement of the trunk, inclining it to the right, while moving the left leg to the left. The patient said that she had not had any direct trauma at that locality.

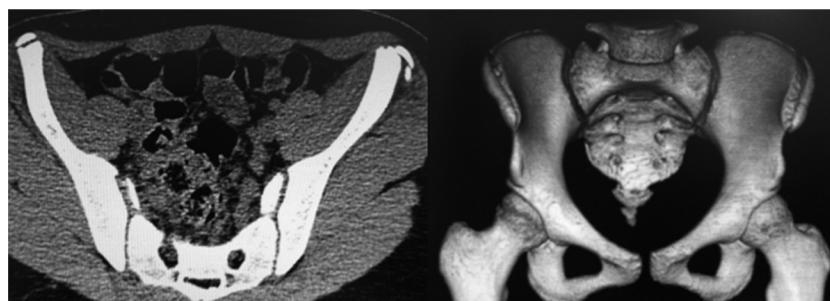
During the physical examination, the patient presented severe pain on palpation of the left iliac crest, with edema and ecchymosis, and limitation of left-leg movement in relation to passive adduction or abduction against resistance. She also reported discomfort in relation to hip rotation, but she did not present joint block or dysmetria of the lower limbs or deformities. The patient was unable to walk with her left foot bearing weight on the ground.

A radiograph of the pelvis in inlet and outlet anteroposterior (AP) views was requested (Fig. 1). An avulsion fracture of the anterior portion of the apophysis of the left iliac crest was observed.

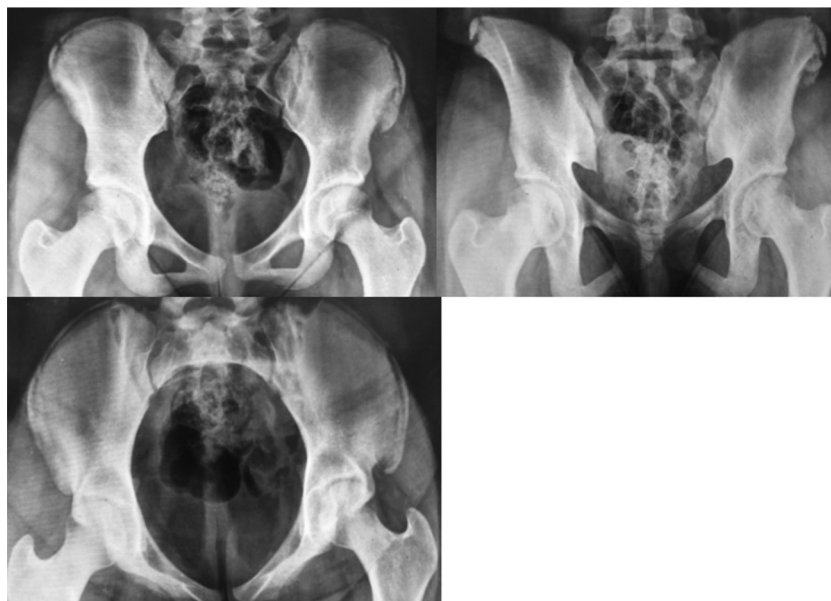
Computed tomography on the pelvis confirmed the bone avulsion and provided better understanding of the displacement of the fracture (Fig. 2).

We decided to institute conservative treatment with conventional analgesics and restriction of weight-bearing for two weeks. After two weeks, the patient was released for progressive partial weight-bearing. She returned to her day-to-day activities four weeks after the trauma.

Nine months have now passed since the fracture and the patient presents radiological signs of bone consolidation (Fig. 3). She is asymptomatic, without any functional deficit, is



**Fig. 2 – Apophysis of the iliac crest with displacement less than 3 cm.**



**Fig. 3 – Signs of bone consolidation on radiography of the pelvis.**

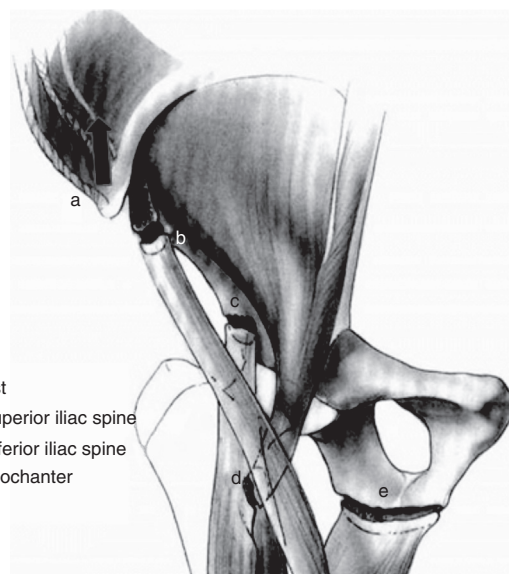
Trendelenburg-negative and is even doing physical activities such as running and dancing.

## Discussion

Avulsion fractures of the pelvis in children and adolescents are uncommon and little known. A radiological review on 1238 radiographs from athletic adolescent patients with focal traumatic symptoms revealed 203 avulsion fractures of the apophyses of the pelvis (16.4%).<sup>1</sup> Another study, reported as four large series, showed that among 268 avulsion fractures of the pelvis, 50% were avulsions of the ischium, 23% were avulsions of the anterosuperior iliac spine, 22% were avulsions of the anteroinferior iliac spine, 3% were avulsions of the lesser trochanter and 2% were avulsions of the iliac crest.<sup>2-5</sup> Fig. 4 shows the possible locations of avulsion fractures of the apophyses of the pelvis.

The ossification of the iliac apophysis occurs gradually and usually from anterior to posterior. At the age of around 14 years among females and 15 years among males, all the cartilage has become ossified. However, fusion of this ossified cartilage with the iliac bone will only take place around the age of 18 years. Thus, over the intervening time period, the ossified cartilage is subject to direct or indirect trauma that could cause its displacement.<sup>6-8</sup>

Indirect trauma is generally the commonest mechanism, due to abrupt contraction of the musculature that is inserted in the iliac crest (transverse abdominal, internal oblique and external oblique muscles), in association with rotational movement or inclination of the trunk toward the opposite side.<sup>7,8</sup> Such trauma may result not only from active abrupt contraction, but also from passive traction, acceleration, jumping and repetitive muscle stress. There are authors who believe that because the trunk and hip do not present synchronized movement at the time of muscle contraction,



**Fig. 4 – Locations of avulsion fractures of the apophyses of the pelvis.<sup>12</sup>**

this serves as a very important element in the mechanism of the injury.<sup>9</sup> Direct trauma is a mechanism rarely found in this type of injury.

Because this is low-energy trauma, the lack of radiographs made at emergency services may lead to diagnostic errors. The symptoms include pain, edema, ecchymosis and functional limitation. Radiological examination confirms the diagnosis and, in cases of doubt, computed tomography can be chosen.

Most avulsion fractures of the pelvis that occur in children and adolescents present satisfactory results from conservative treatment. This treatment is based on analgesia and restriction of weight-bearing for two weeks. After this period,

patients are released for progressive resumption of weight-bearing, with a return to physical activities after four weeks.<sup>7,8</sup> Two studies on adolescents with pelvic avulsion fractures showed good results among patients who were treated conservatively and returned in a normal manner to their activities at pre-injury levels.<sup>2,3</sup> Avulsion of the apophysis of the iliac crest may present displacements of greater or lesser degree. When the displacement is greater than 3 cm, open reduction and fixation may be needed in order to avoid future deformities, while smaller displacements can be treated using non-surgical methods.<sup>10</sup>

This case report had the aim of highlighting the existence of avulsion fractures of the iliac crest in young patients who suffer indirect trauma. Lack of diagnosis, along with inadequate treatment, may lead to unsatisfactory results, such as deformities and functional limitation.

---

### Conflicts of interest

The authors declare no conflicts of interest.

### REFERENCES

---

- O'hEireamhoin S, McCarthy T. Fractures around the hip in athletes. *Open Sports Med J*. 2010;4:58-63.
- Fernbach SK, Wilkinson RH. Avulsion injuries of the pelvis and proximal femur. *Am J Roentgenol*. 1981;137(3):581-4.
- Metzmaker JN, Pappas AM. Avulsion fractures of the pelvis. *Am J Sports Med*. 1985;13(5):349-58.
- Rossi F, Dragoni S. Acute avulsion fractures of the pelvis in adolescent competitive athletes: prevalence, location, and sports distribution of 203 cases collected. *Skeletal Radiol*. 2001;30(3):127-31.
- Sundar M, Carty H. Avulsion fractures of the pelvis in children: a report of 32 fractures and their outcome. *Skeletal Radiol*. 1994;23(2):85-90.
- Ogden JA, editor. *Skeletal injury in the child*. 3rd ed. New York: Springer-Verlag; 2000.
- Tachdjian MO. *Scoliosis. Pediatric orthopaedics*. Philadelphia: Saunders; 1990. p. 2265-379.
- Pereira GJ, Pereira HR, Cruz M. Avulsão indireta da epífise da crista ilíaca – Uma rara lesão. *Acta Ortop Bras*. 2002;10(2):58-61.
- Godshall RW, Hansen CA. Incomplete avulsion of a portion of the iliac epiphysis: an injury of young athletes. *J Bone Joint Surg Am*. 1973;55(6):1301-2.
- Lambert MJ, Fligner DJ. Avulsion of the iliac crest apophysis: a rare fracture in adolescent athletes. *Ann Emerg Med*. 1993;22(7):1218-20.
- Lombardo SJ, Retting AC, Kerlan RK. Radiographic abnormalities of the iliac apophysis in adolescent athletes. *J Bone Joint Surg Am*. 1983;65(4):444-6.
- Beaty JH, Kasser JR, editors. *Rockwood and Wilkins fractures in children*. 7th ed. Baltimore: Lippincott Williams & Wilkins; 2007. p. 744-68.