

Adolescent with groin pain: case report

Daniela Couto^{1*}, José R. Oliveira², Bárbara Choupina², and Mafalda Santos²

¹Pediatrics Department, Centro Hospitalar Universitário Cova da Beira, Covilhã; ²Orthopedics Department, Centro Hospitalar Vila Nova de Gaia/ Espinho, Vila Nova de Gaia. Portugal

Abstract

Introduction: Avulsion fractures are common in skeletally immature athletes and occur more often in the proximal femur and in the iliac bone. An avulsion fracture of the lesser trochanter is a rare pathology, and it results from a sudden and violent muscle contraction of the iliopsoas muscle during sports practice. Radiography is important for the diagnosis and exclusion of other pathologies. In most cases, symptomatic treatment is recommended, and surgery is reserved for specific situations. **Case report:** We report a clinical case of an adolescent with groin and right thigh pain and impaired gait after kicking a ball during a football match. **Discussion:** The patient underwent a radiographic study, and an avulsion fracture of the lesser trochanter was diagnosed. He was successfully treated with a conservative approach and no sequelae were documented.

Keywords: Adolescent. Avulsion. Femur. Fractures.

Adolescente com dor inguinal: um caso clínico

Resumo

Introdução: fraturas avulsão são comuns em atletas esqueléticamente imaturos e ocorrem mais frequentemente no fémur proximal e osso íliaco. A fratura avulsão do pequeno trocânter é uma patologia rara e resulta da contração muscular súbita e violenta do músculo iliopsoas durante a prática desportiva. É importante a realização de radiografia para o diagnóstico e exclusão de outras patologias. Na maioria dos casos, o tratamento é conservador e a cirurgia está reservada para casos específicos. **Relato de caso:** Apresentamos um caso clínico de um adolescente com fratura avulsão do pequeno trocânter que iniciou quadro de dor na região inguinal e coxa direita e claudicação da marcha após um remate num jogo de futebol. **Discussão:** O adolescente foi tratado conservadoramente, com boa evolução clínica e sem sequelas.

Palavras-chave: Adolescente. Avulsão. Fémur. Fraturas.

*Correspondence:

Daniela Couto
E-mail: danielarccouto@gmail.com

Received: 20-05-2023
Accepted: 20-11-2024
<https://pjp.spp.pt>

Available online: 10-07-2024
Port J Pediatr. 2024;55(3):189-192
DOI: [10.24875/PJP.M24000452](https://doi.org/10.24875/PJP.M24000452)

2184-3333 / © 2024 Portuguese Society of Pediatrics. Published by Permanyer. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Keypoints

What is known

- An avulsion fracture of the lesser trochanter is an uncommon injury that should be suspected when a skeletally immature patient presents with painful limping after sports activity requiring forceful hip flexion.

What is added

- This injury can be misdiagnosed, so it is important to perform a complete history and examination to provide the correct diagnosis and treatment.
- Although some patients require surgery, the conservative approach showed excellent results.

Introduction

Avulsion fractures in the proximal femur and iliac bone (at the ischial tuberosity, anterior superior iliac spine, and anterior inferior iliac spine) are relatively common in young athletes. An isolated fracture of the lesser trochanter is rare, especially compared to other fracture sites^{1,2}.

This pathology affects mostly young male athletes between the ages of eight and 16 years old. Patients usually manifest groin pain, thigh pain, or referred knee pain that is linked to a reduction in strength and range of motion^{1,3}. An avulsion fracture of the lesser trochanter should be suspected when a skeletally immature patient presents with painful limping after sports activity requiring forceful hip flexion.

We describe the clinical case of an adolescent with an avulsion fracture of the lesser trochanter, presenting pain in the groin and right thigh and impaired gait.

Case report

A 13-year-old male with prior medical consultations due to lower limb asymmetry and isthmic spondylolysis was observed at a Pediatric Orthopedics consultation. He presented pain and functional limitation of the right lower limb after kicking a ball during a football match two days prior to the evaluation. At the physical examination, he displayed intense tenderness of the groin and right thigh linked to a limitation of active and passive flexion of the right hip. In a sitting position, pain was elicited with further flexion of the right hip (positive Ludloff sign). No edema or deformities were evident. There were no neurological or vascular deficits.

A standard radiograph of the pelvis showed an avulsion of the right lesser trochanter with a deviation of approximately 0.75 cm (Fig. 1) and an avulsion of the right anterior inferior iliac spine was suspected. Nuclear Magnetic Resonance Imaging (MRI) of the hip confirmed the avulsion of the right lesser trochanter and showed a modest degree of apophysitis and traction of the anterior inferior iliac spine, but with no detachment (Fig. 2).



Figure 1. Standard radiograph of the pelvis showed the avulsion fracture of the right lesser trochanter with displacement.

The patient was treated with a conservative approach including analgesics and non-weight-bearing activity followed by partial weight-bearing activity as tolerated, associated with a functional rehabilitation program.

He was re-evaluated at six weeks, with good clinical progression, no pain, normal gait, and symmetrical muscle strength in both lower limbs. A hip radiography was repeated and showed full union of the fracture (Fig. 3).

At this time, the patient returned to sports practice with no restrictions and no sequelae of the lesion were documented.

Discussion

Avulsion fractures occur at points where tendons, ligaments, or muscles are attached to bone. The soft tissue is pulled away from the anchoring site (usually an apophysis), ripping a fragment out of the bone.

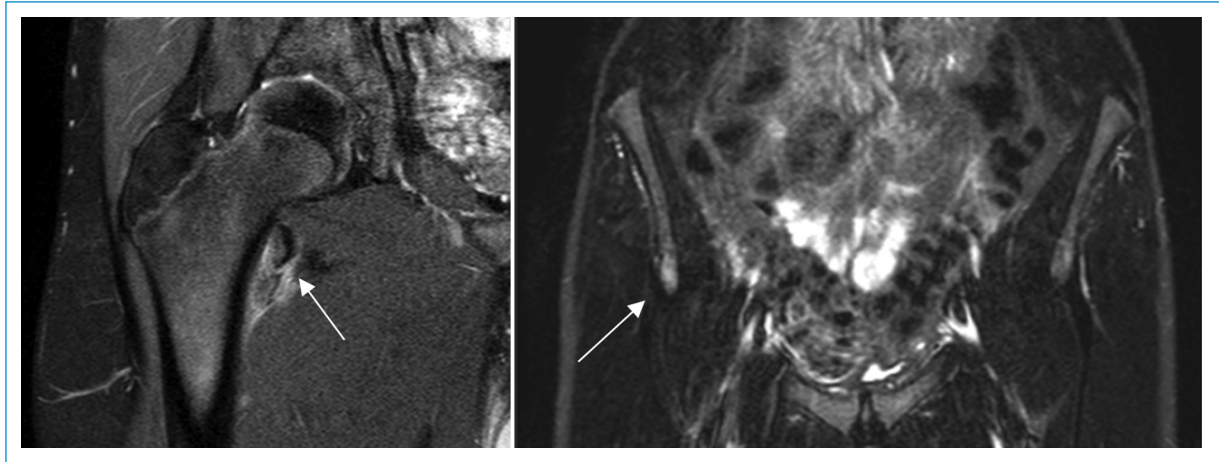


Figure 2. Nuclear Magnetic Resonance Imaging (MRI) of the hip showed the avulsion fracture of the right lesser trochanter and a modest degree of apophysitis of the ante-rior inferior iliac spine, but with no detachment.



Figure 3. Standard radiograph of the pelvis of same patient at six weeks after the injury, demonstrating full union of the fracture.

Apophyses usually have secondary ossification centers and, therefore, are a vulnerable place for these injuries during the period of skeletal growth. In the pediatric age, the muscle is connected to the apophysis by Sharpey's fibers that are more resistant to tensile force than the junction of cells between the calcified and uncalcified apophysis^{4,5}. After skeletal maturity, due to the complete ossification of the growth plates, tendon, ligament, and muscle ruptures are more common than avulsion¹.

Avulsion fractures typically involve the proximal femur and the iliac bone, namely the ischial tuberosity, anterior

superior iliac spine, and anterior inferior iliac spine^{1,2}. Acute trauma is the most common cause of these injuries. However, some authors reported that avulsion fractures may also be associated with repetitive movements of the lower limb with the hip and knee in flexion. These movements cause tension forces on the distal insertion of the iliopsoas muscle, encouraging fractures of the small trochanter^{6,7,8}.

An avulsion fracture of the lesser trochanter is a rare injury representing < 1% of hip injuries². It affects mostly young males between the ages of eight and 16 years and is associated with sports activity, usually involving running and jumping^{1,2,3}. It is caused by sudden and forceful tensile force applied through a powerful muscle contraction of the iliopsoas during flexion of the thigh⁷. Patients may present with groin pain, posterior thigh, or referred knee pain and reduced strength and range of motion¹. Physical examination reveals tenderness over the hip and patients are unable to flex the hip in a sitting position (Ludloff sign)².

An anteroposterior radiography is essential not only to make the diagnosis, but also to exclude other pathologies, such as Legg-Calvé-Perthes disease or Slipped Capital Femoral Epiphysis. If there is uncertainty, other imaging techniques such as ultrasound or an MRI may be necessary^{9,10}.

Groin pain is common in adolescents and may have several causes in addition to orthopedic pathology. The child's age, gender, location, and intensity of the pain and associated symptoms may help clarify the diagnosis. In pediatric age, it is important to rule out the presence of genitourinary disorders such as ovarian cyst,

pelvic inflammatory disease, urinary tract infection, nephrolithiasis, testicular torsion, and varicocele. Intra-abdominal pathologies (inguinal hernia, appendicitis, lymphadenitis, and inflammatory bowel disease) may also cause groin pain¹¹.

With an avulsion fracture of the lesser trochanter, symptomatic treatment is recommended with pain control, non-weight-bearing activity, and a rehabilitation program. Ruffing T et al.² showed excellent results with non-operative treatment with all patients returning to competitive sports.

In contrast, many authors have described significant displacement (≥ 2 cm) and late-onset painful sequelae as indications for surgery^{1,2}. For example, Khemka A et al.⁴ established that surgical treatment of these injuries minimizes the chances of a non-union, secondary loss of muscle strength, and potentially of ischiofemoral impingement.

Physical activity can be resumed within two to three months after the injury, and most athletes return to their original activity levels^{1,2}.

With a growing participation of adolescents in competitive sports, timely diagnosis and treatment of avulsion fractures is essential to allow a quick return to sports and to avoid long-term disability. Patients should be followed up in consultation to identify possible complications, such as symptomatic pseudoarthrosis or painful exostosis that may require surgical treatment⁶.

Authors' contribution

Daniela da Rocha Couto: Bibliographical search, study design, drafting of the article. José Ricardo Oliveira, Bárbara Angélica Choupina de Melo e Sousa, and Mafalda Santos: Critical review of the content of the article.

Funding

There were no external funding sources for drafting this paper.

Conflicts of interest

None.

Ethical disclosures

Protection of human and animal subjects. The authors declare that the procedures followed were in accordance with the regulations of the relevant clinical research ethics committee and with those of the Code of Ethics of the World Medical Association (Declaration of Helsinki).

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. The authors have obtained the written informed consent of the patients or subjects mentioned in the article. The corresponding author is in possession of this document.

Use of artificial intelligence for generating text. The authors declare that they have not used any type of generative artificial intelligence for the writing of this manuscript, nor for the creation of images, graphics, tables, or their corresponding captions.

References

1. Tomberg S, Heare A. Pelvic trauma: Initial evaluation and management [last updated March 2022]. Available at: <http://www.uptodate.com>
2. Ruffing T, Rückauer T, Bludau F, Hofmann A, Muhm M, Suda AJ. Avulsion fracture of the lesser trochanter in adolescents. *Injury* 2018; 49: 1278-1281. DOI: 10.1016/j.injury.2018.04.030
3. Grissa MH, Bzeouich N, Zrig M, Boubaker H, Msolli MA, Abid A et al. Avulsion of the Lesser Trochanter following a Shot Put Sport Session. *Clin Pract and Cases Emerg Med* 2017; 1(2): 87-88. DOI: 10.5811/cp-cem.2016.12.32605
4. Khemka A, Raz G, Bosley B, Ludger G, Al Muderis M. Arthroscopically assisted fixation of the lesser trochanter fracture: a case series. *J Hip Preserv Surg* 2014;1:27-32. DOI: 10.1093/jhps/hnu006
5. Jude CD. Radiologic evaluation of the hip in infants, children, and adolescents [last updated June 2021]. Available at: <http://www.uptodate.com>
6. Tahir T, Manzoor QW, Gul IA, Bhat SA, Kangoo KA. Isolated Avulsion Fractures of Lesser Trochanter in Adolescents – A Case Series and Brief Literature Review. *J Orthop Case Rep* 2019; 9(1): 11-14. DOI: 10.13107/jocr.2250-0685.1286.
7. Carvalho M, Balacó I, Cardoso PS, Matos G. Fratura Avulsão Isolada do Pequeno Trocânter – Descrição de 2 casos. *Rev Medicina Desportiva* 2016; 7(4): 29-30.
8. Homma Y, Baba T, Ishii S, Matsumoto M, Kaneko K. Avulsion fracture of the lesser trochanter in a skeletally immature freestyle footballer. *J Pediatr Orthop B* 2015; 24: 304-307. DOI: 10.1097/BPB.000000000000154
9. Vazquez E, Kim TY, Young TP. Avulsion fracture of the lesser trochanter: na unusual cause of hip pain in an adolescent. *CJEM* 2012; 15(2): 124-126. DOI: 10.2310/8000.2012.120613
10. Nigrovic PA. Approach to hip pain in childhood [last updated November 2021]. Available at: <http://www.uptodate.com>
11. Johnson R. Approach to hip and groin pain in the athlete and active adult [last updated June 2021]. Available at: <http://www.uptodate.com>