

## Case Report

# Avulsion fracture of the Iliac Crest: a clinical and radiological evaluation 17 years later

Ruben Depasquale, Frederick Zammit Maempel

## Abstract

The authors present the case of a sports-related avulsion fracture of the iliac crest, which happened in 1987, in an 18-year old adolescent. This was diagnosed using plain radiography, and was managed non-surgically. They recently reviewed the patient both clinically and radiologically and are here reporting their findings 17 years down the line.

## Introduction

Apophyses are secondary ossification centres appearing during childhood which, as opposed to epiphyses, are involved in the development of a bone's shape but do not contribute to the lengthening process.<sup>1</sup>

Apophyseal injuries around the pelvis and hip are relatively rare conditions affecting adolescent athletes, usually aged between 14 and 25, who are involved in competitive sports.<sup>2</sup> They include apophysitis, i.e. an inflammation of the apophysis resulting from the repetitive pull of the various muscles, and apophyseal avulsion fractures which are typically of acute onset.

The epiphyseal plates and apophyses are the weakest parts of the musculoskeletal system in children and adolescents. Injuries that would cause muscle strains and tendonitis in adults tend to cause growth plate injury in immature skeletons.

## Keywords

Sports, avulsion fracture, iliac crest, adolescent, follow-up

**Ruben Depasquale\*** MD, MRCSEd  
Department of Orthopaedics,  
St Luke's Hospital, G'Mangia, Malta  
Email: [ruben.depasquale@gmail.com](mailto:ruben.depasquale@gmail.com)

**Frederick Zammit Maempel** MD FRCS(Eng)  
Department of Orthopaedics,  
St Luke's Hospital, G'Mangia, Malta

\*corresponding author

## Case Report

We present the case of an 18-year-old male who, back in 1987, sought medical advice 7 days post injury. He gave a history of a sudden onset of severe left-sided pain, accompanied by the feeling of something snapping, over the anterior aspect of his pelvis whilst running. He attributed the injury to a sudden sprint whilst nearing the end of his run. The pain was sharp and excruciating initially, with minimal improvement over the following days. It was persistent, radiated to his left groin and was associated with a limp. The pain was exacerbated by movement, and specifically by rising from lying. It was relieved by rest.

Our patient was not involved in competitive sports, but was a regular sportsman nonetheless. He practised various sports including running, swimming, tennis, rugby and squash, alternating between the various types according to preference. At the time of injury, he had been running 4 kilometres once weekly for 3 weeks prior to injury. His exercise was not preceded by any substantial warming-up or stretching.

Save for the antalgic gait, examination revealed no abnormalities on inspection. There was no associated swelling or bruising. He was tender to palpation over the anterior aspect of his left iliac crest. Abdominal muscle contraction reproduced the pain. Hip examination was normal.

Plain radiological examination of his pelvis revealed the separation of part of his anterior iliac crest apophysis when compared to the contralateral, asymptomatic side. This was consistent with a diagnosis of an avulsion fracture of the iliac crest apophysis (Figure 1).

The patient was treated non-surgically with rest and non-steroidal analgesia. He was advised to refrain from walking until the pain allowed. He required 5 days of bed rest, after which he gradually resumed his routine daily activities as the pain slowly subsided. The pain lasted a total of 3 months, and he was able to resume sports with minimal discomfort at 6 months.

We have recently reviewed the patient, almost 18 years after his injury. He still practices various sports, including waterpolo twice weekly during the summer months, and running twice weekly during the winter months. He denies any form of pain related to his injury, both during his daily activities and whilst participating in the above-mentioned sports.

A fresh plain radiograph of the injured iliac crest was reported as normal, thereby showing that his avulsion fracture had united leaving no evidence of past injury (Figure 2).



**Figure 1:** Pelvic radiograph 1 week post injury



**Figure 2:** Pelvic radiograph 17 years post injury

## Discussion

Apophyseal avulsion fractures of the pelvis are uncommon. They have been described as occurring at 5 sites in the pelvis, namely in order of prevalence, ischial tuberosity, anterior inferior iliac spine, anterior superior iliac spine, superior angle of pubic symphysis and iliac crest. Soccer, gymnastics and athletics were noted to be the commonest associated sports.<sup>3</sup>

Acute avulsion fractures typically result from sudden, powerful muscle contractions. The resulting tensile forces are so great that muscle insertions pull the bony or cartilaginous apophyses away from their respective growth plates.<sup>4,5</sup> Muscles attaching to the iliac crest are the external oblique, internal oblique and transversus abdominis. Their sudden contraction is typically caused by excessive arm swinging and trunk rotation while running or shooting a ball, compounded by a sudden change in direction. The study of kick kinetics revealed that forward motion of the leg is initiated by rotation of the pelvis around the weight-bearing leg. The force of these rotational movements was noted to be proportional to the speed and strength of the kick.<sup>5</sup> Iliac crest avulsion may also result from repetitive contractions (e.g. running).

The typical scenario of a patient suffering an apophyseal avulsion fracture involves one in which the patient complains of a sudden onset of pain, swelling and inability to continue sport participation. A few patients will describe the sensation of something snapping coinciding with the time of onset of pain.

Diagnosis primarily involves an accurate history. It is suspected by the localised tenderness and possibly swelling and bruising.<sup>2</sup> Radiological confirmation of the diagnosis follows.

Antero-posterior and lateral views of the pelvis are required, and in the case of iliac crest avulsions, oblique views may be necessary. Comparative radiographs of the asymptomatic side are useful if avulsion is not clearly evident. Unless the diagnosis is still in doubt, CT scan or radio-nuclide bone scanning are not required. Magnetic Resonance Imaging (MRI) is not useful in diagnosis but may elucidate the specific soft tissue damage in further detail.<sup>4</sup>

Non-surgical treatment is sufficient in most cases. Recent evidence<sup>1,2,6,7</sup> suggests an initial period of bed rest along with the application of ice packs and the use of non-steroidal anti-inflammatory agents (NSAIDs). Once pain permits, active and passive range of motion should be initiated, and the patient is allowed up non-weight-bearing with crutches for a period of 2 to 4 weeks. By this time, pain should have subsided and the patient is allowed full weight-bearing and the performance of normal daily activities. Once routine activities are pain-free, gentle flexibility exercises should be instituted, followed by the introduction of gentle resistive exercise. Stretching and muscle strengthening exercises should slowly be introduced and gradually increased in intensity. Assuming that the patient is performing the above in a pain-free manner, slow addition of sports should be possible at about 8 weeks followed by the

resuming of competitive sports by 12 weeks. Premature return to sports could result in failure of non-surgical treatment. Surgery is very rarely indicated in these patients, unless persistent pain becomes troublesome.

Displacement of >3 centimetres has been described as being an indication for early intervention in avulsions of the iliac crests.<sup>1</sup>

## Conclusion

Apophyseal avulsion fractures are rare sport injuries. Diagnosis is dependent on a high index of suspicion.

A thorough history and examination is of paramount importance in the diagnosis of these injuries. This should be followed by very gradual return to normal life and sporting activities, as a hasty recovery is fraught with unnecessary morbidity. Non-surgical management is usually sufficient and very successful, rendering intervention a very remote possibility.

This case report is intended to increase the awareness of the possibility of such injuries in an era where the trend towards sports and exercise is constantly on the increase.

## References

1. Moeller JL. Pelvic and hip apophyseal avulsion injuries in young athletes. *Current Sports Medicine Reports* 2003;2:110-115
2. Browning KH. Hip and pelvis injuries in runners. *The Physician and Sports medicine* 2001;29(1):[3p.] Available from: [http://www.physsportsmed.com/issues/2001/01\\_01/browning.htm](http://www.physsportsmed.com/issues/2001/01_01/browning.htm)
3. Rossi F, Dragoni S. Acute avulsion fractures of the pelvis in adolescent competitive athletes: prevalence, location and sports distribution of 203 cases collected. *Skeletal Radiology* 2001;30(3):127-131
4. Stevens M.A., El-Khoury G. Y., Kathol M.H., Brandser E.A., Chow S. Imaging features of avulsion injuries. *Radiographics* 1999;19(3):655-672
5. Valdes M, Molins J, Acebes O. Avulsion fracture of the iliac crest in a football player. *Scand J Med Sci Sports* 2000;10:178-180.
6. O'Kane JW. Anterior hip pain. *Am Fam Physician* 1999;60:1687-96
7. Anderson K, Strickland S, Warren R. Hip and groin injuries in athletes. *Am J Sports Med* 2001;29:521-533